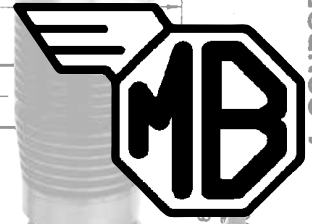


The Motor Boys International



-4 CONROD (modern)
2024 T3 Dural

-8 CONROD (Original)
Steel H&T

-7 CONROD (Original)
Steel (1 ends)

-2 CYLINDER
Cast Iron or Steel

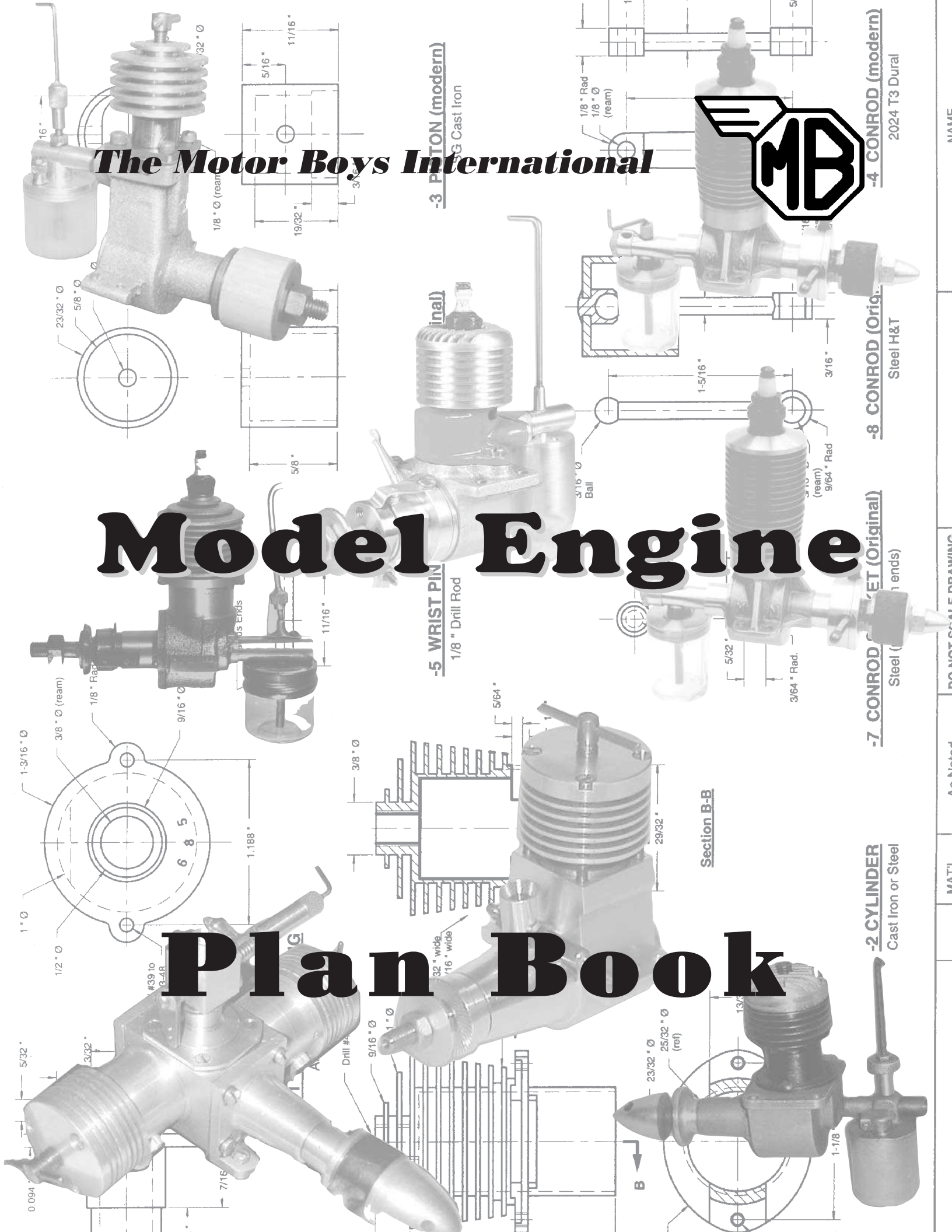
-3 PISTON (modern)
SG Cast Iron

-5 WRIST PIN (Original)
1/8" Drill Rod

Model Engine

Plan Book

Section B-B



PREFACE

Welcome to the second edition of the Motor Boys Model Engine Plan book. The Motor Boys are an informal group of men from around the world with a shared passion for the history, design, and construction of model engines. Using the Internet for the exchange of ideas and information, each has contributed unique talents on shared projects to add to the total enjoyment of their hobby.

In the year 2000, they collected a selection of model engine plans and background information into a book that was distributed by the Academy of Model Aeronautics with the stipulation that all profits from sales go to the AMA's Junior Encouragement program. That book is now out of print, but requests for copies continue to be received, leading to the revision and change in format that you are now reading. The hope is others can continue to appreciate the engine designs presented here and learn to enjoy them as the Motor Boys have.

In the preparation of this book, many pages of drawings, pages of text, and pictures were sent around the world using the Internet to coordinate the effort. Each design includes a brief history, followed by full construction plans. Ron Chernich did all the CAD work for the plans and Tim Dannels arranged the introductions.

The Boys are:

Gordon Burford (Australia)
Ron Chernich (Australia)
Tim Dannels (USA)
David Owen (Australia)
Randy Ryan (USA)
Les Stone (USA)

Vincent Chai (Australia)
Ken Croft (England)
Eric Offen (England)
Stan Pilgrim (Australia)
Roger Schroeder (USA)
Bert Striegler (USA)

This edition contains numerous corrections and improvements found by actual builders of the engines presented here. Although the plans are now believed to be free from error, corrections and improvements are always possible and readers should consult Ron Chernich's Model Engine News website at <http://modelengineneeds.org> for updates and corrections.

The Motor Boys dedicate this edition to their absent friends,
Don McClusky and **George Aldrich**, both founder members of the group.

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The 1938 Trojan Jr.

by Bert Striegler

Trojan engines were made by the Trojan Miniature Products Company of Hollywood, California. The manager of this company was Mr. Hal M. Atkins and his first production engines were sold beginning in 1937 with the introduction of the Trojan Jr. Very little has come to light on the history of this company or the number of engines that were produced. What is evident, though, is that the engine was a modern design for 1937 and included features that were quite advanced. This engine is not well known and is very rare.

The first Trojan Jr. of 1937 had a cast iron cylinder with a brazed on bypass cover and intake mounting flange. The shrunk-on cylinder fins and head were made of one piece from aluminum alloy. The head was fitted with a 3/8" sparkplug and no head fins were used. Two exhaust ports were cut into the rear of the cylinder just above the intake mounting flange. The exposed part of the cylinder was painted bright red. A metal fuel tank was fitted below the intake tube and the needle valve used a friction fit to prevent rotation when the engine was running. Ignition points were exposed and the operating cam was a flat cut off of the rim of the propeller drive washer. The engine had a bore and stroke of 5/8", giving a displacement of .192 cubic inches. A really unique feature was the crankshaft main bearing, which consisted of two small roller bearings running directly on the hardened shaft. A seal was used between the two bearings to prevent loss of crankcase compression. This is surely one of the first production engines to utilize antifriction bearings on the crankshaft.

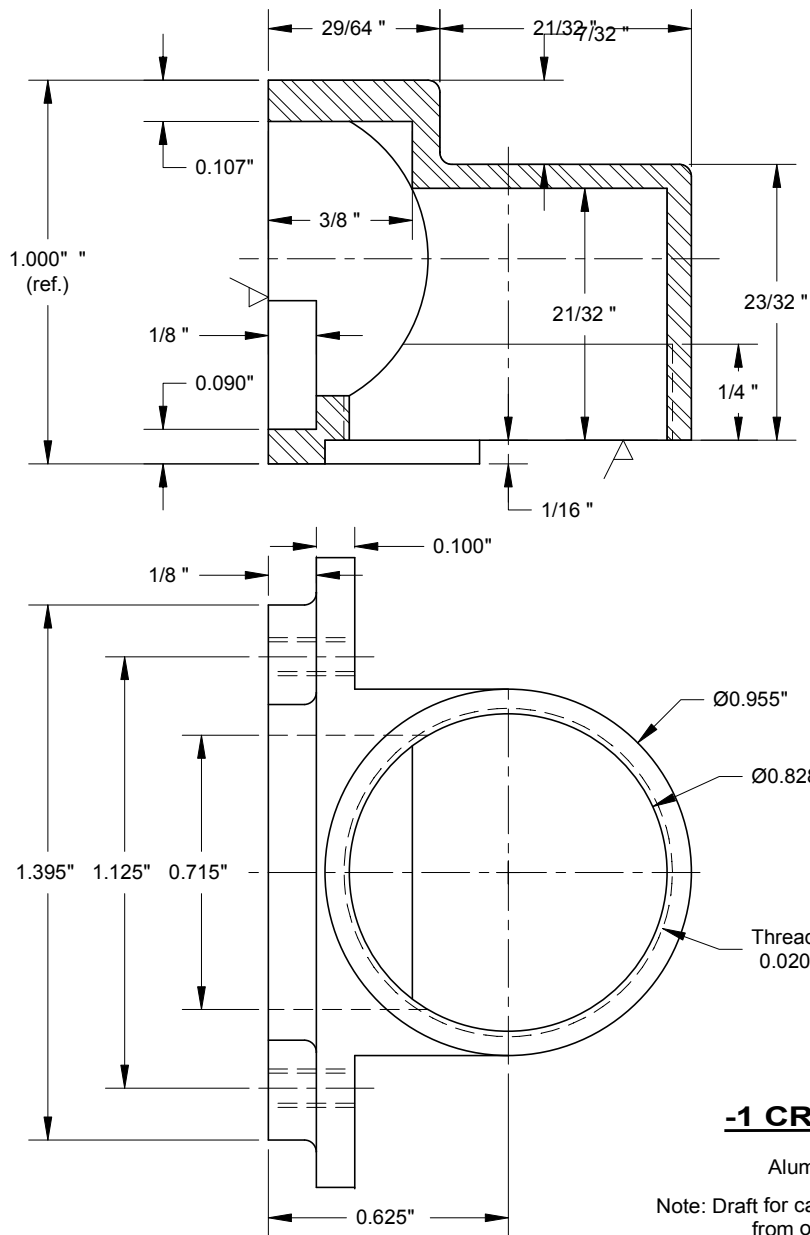
By early 1938, a number of small changes had been made to the 1937 engine. The head now had fins and some of the engines were fitted with a 1/4" sparkplug. The early 1938 engines had a metal fuel tank, while later production engines of that year sported a new plastic tank. The Motor Boys used an early 1938 version as the basis for the plan in this book and at least one running example has already been finished, and is pictured here.

The 1939 model was similar to the earlier models with the following exceptions. The cylinder was now painted blue. The exhaust ports were now fitted with screw-in tubular extensions that projected straight out from the rear sides of the cylinder. A new enclosed ignition timer was fitted. 1/4" spark-plugs were now standard and the needle valve now sported a coil spring tensioner. Displacement was also increased from .192 cu in to .232 cu in. One other new claim was made concerning the exhaust tubes. The company claimed that adding 8" extensions to the existing exhaust tubes would give a considerable power boost by causing a lowering of pressure in the inlet area of the cylinder. The first reference to tuned pipes?

Another Trojan, the Senior, entered at least the prototype stage. It looked a lot like a greatly enlarged Trojan Jr., used both ball and roller bearings, and sported a displacement of .98 cu in. It was nicely styled, but there is no information on the production status, if any, of the Senior. Unfortunately, 1939 marked the end of the Trojan line of engines.

After Trojan folded, Hal Atkins apparently started another company called Dragon engines in Los Angeles. While it had a number of detail changes, it's Trojan Jr. ancestry was quite clear. It was only produced in 1940. After that, no more was heard of this manufacturer. If anyone has further information on Mr. Atkins or his companies, we would be most grateful to hear from you. We have preserved the engine, but not it's history.





-1 CRANKCASE

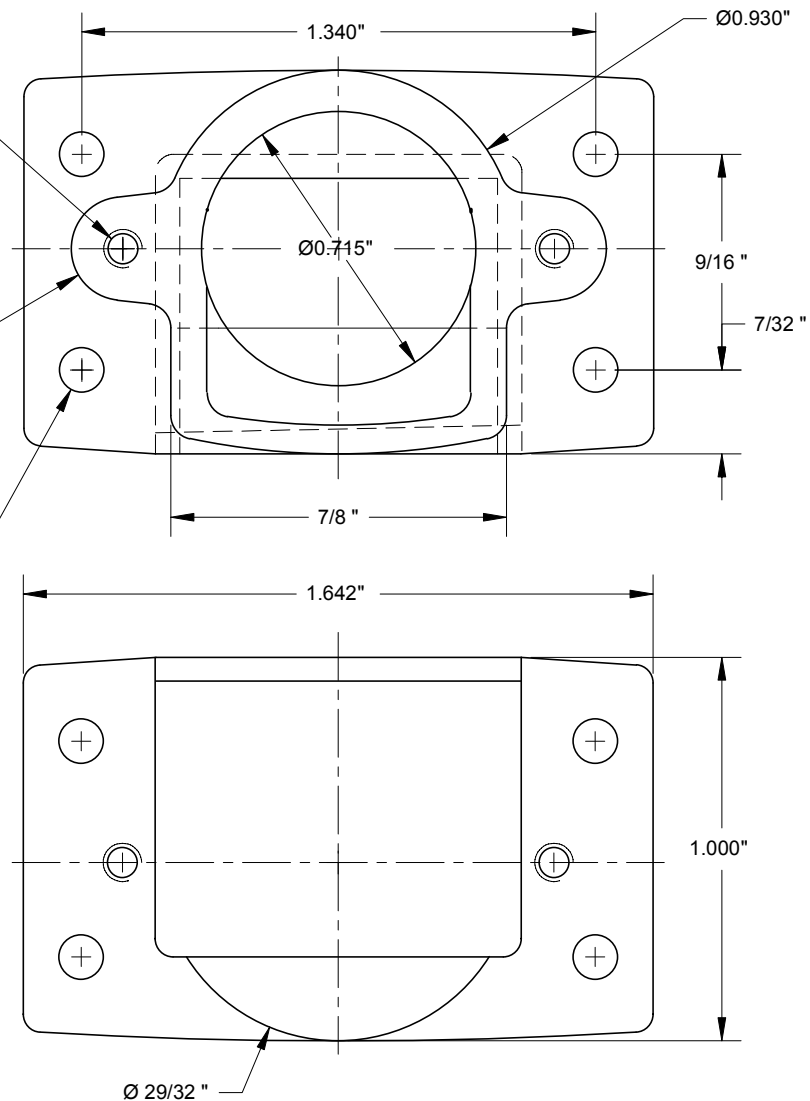
Aluminum Casting

Note: Draft for casting pattern omitted from overall dimensions


Drill #47
Tap 3-48
2 places

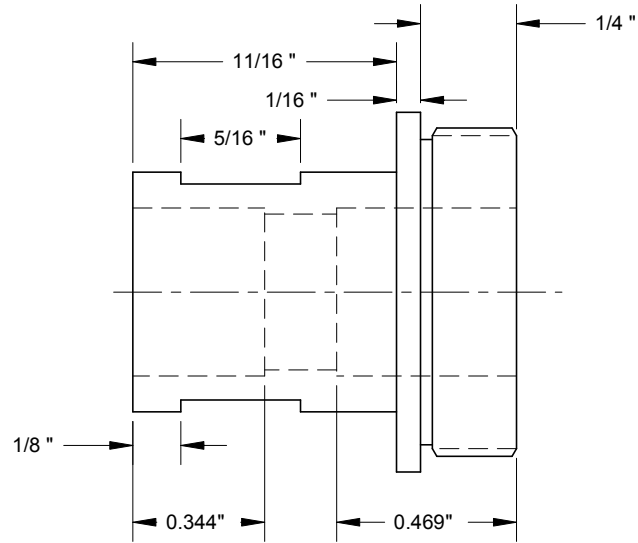
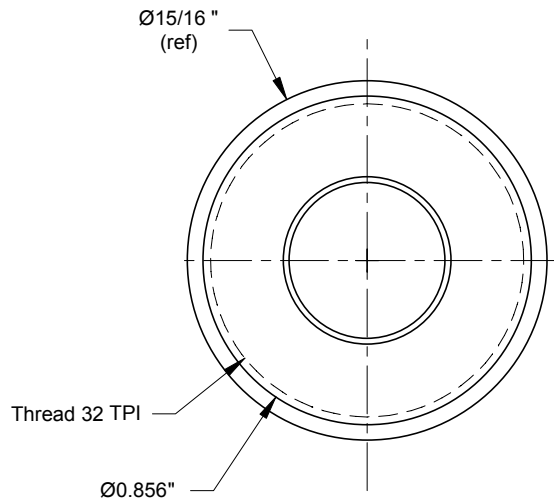
R0.135"

Drill #32
4 places



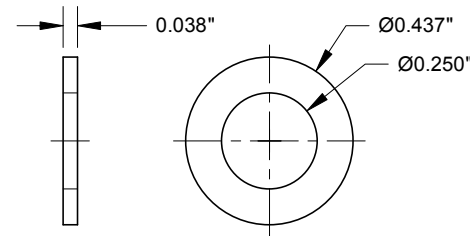
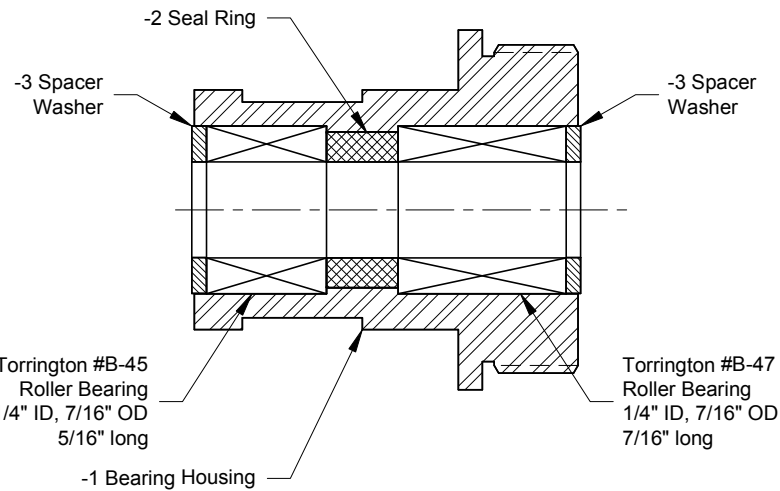
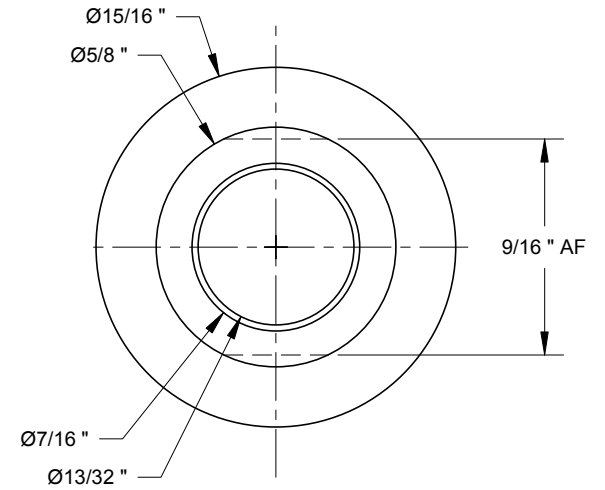
Machine

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1938 Trojan Jr.
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			Sheet 1 - Crankcase



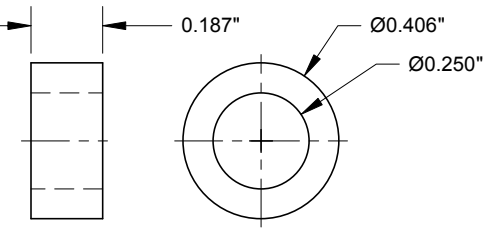
-1 BEARING HOUSING

Aluminum Casting




-3 SPACER WASHER

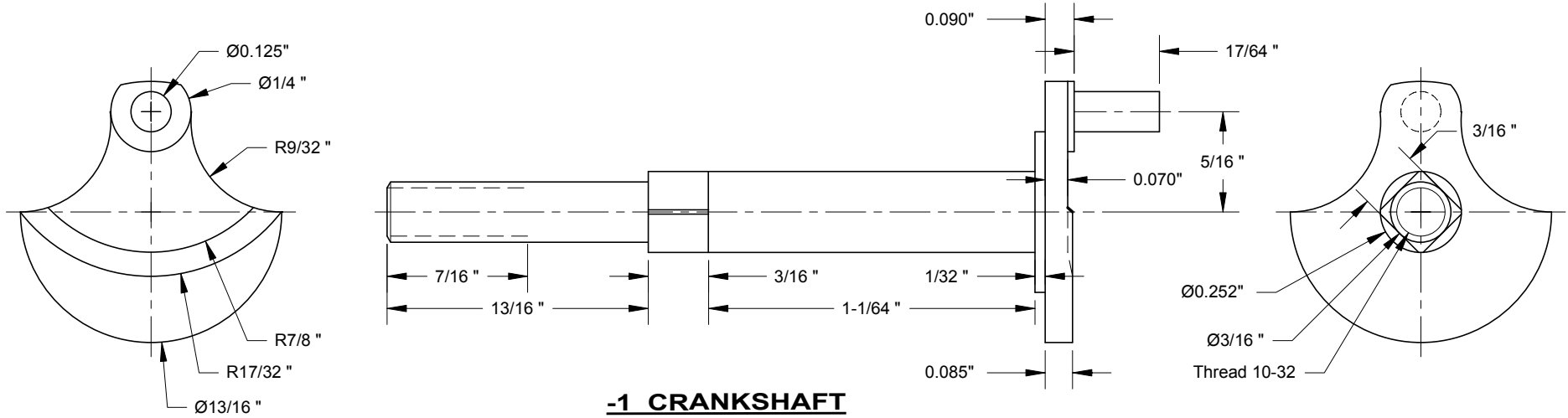
Bronze (2 required)



-2 SEAL RING

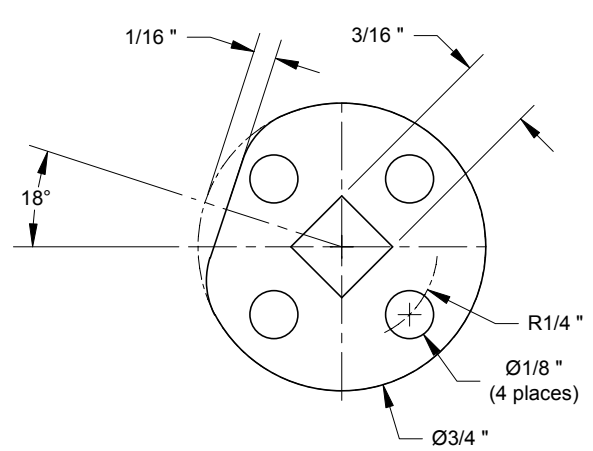
Teflon

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			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			Sheet 2 - Bearing Housing



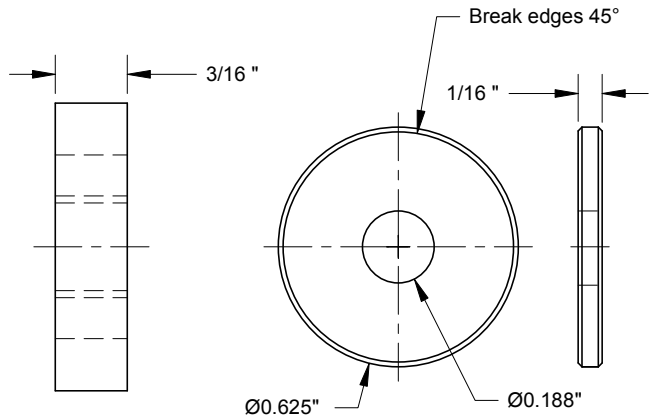
-1 CRANKSHAFT

Tool Steel



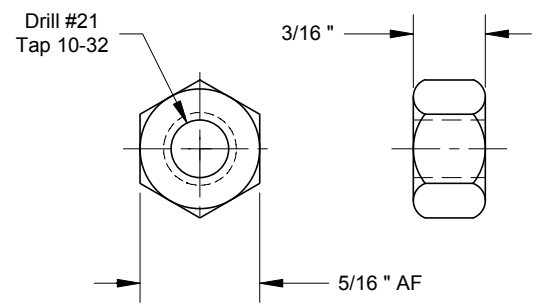
-2 CAM/PROP DRIVE WASHER

Tool Steel




-4 Prop Washer

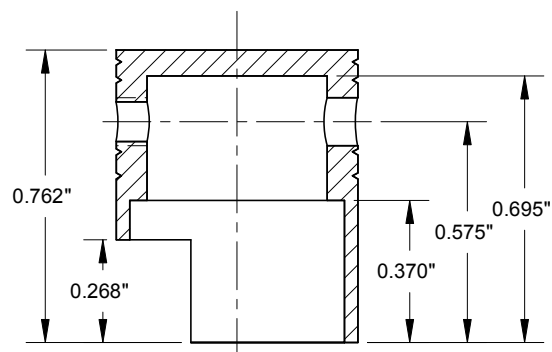
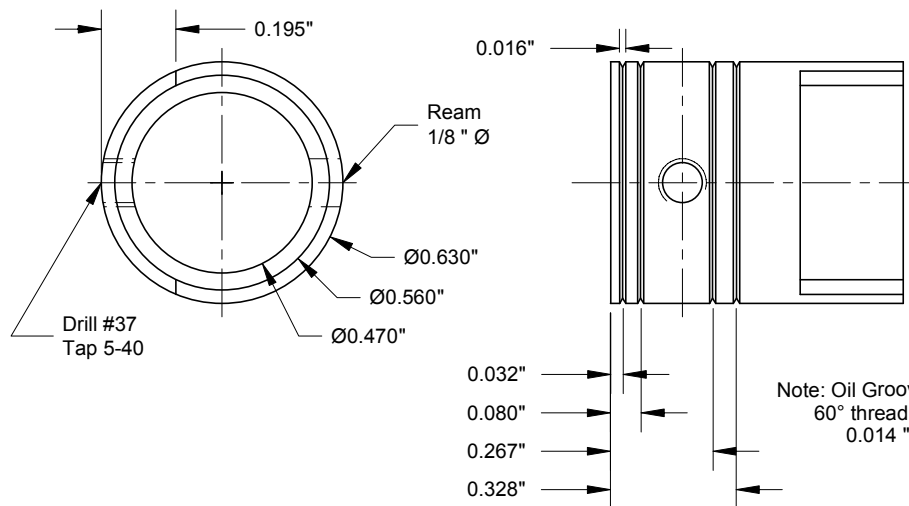
Steel (Case Harden)



-3 Prop Nut

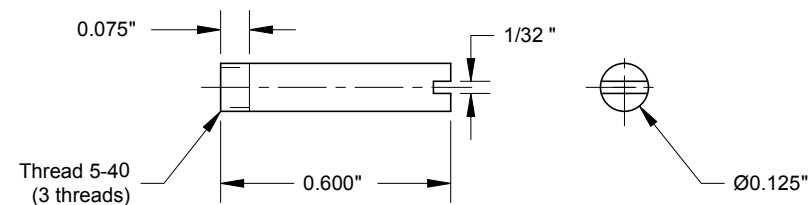
Hex Steel (Case Harden)

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			DRAWN	JM Oct 1998	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			



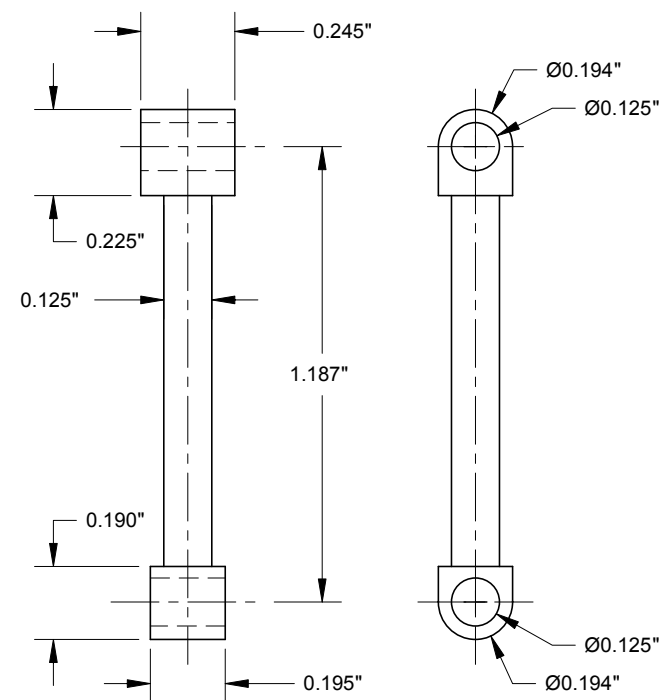
-1 PISTON

Cast Iron



-3 WRIST PIN

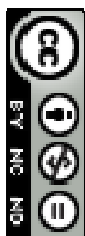
Drill Rod




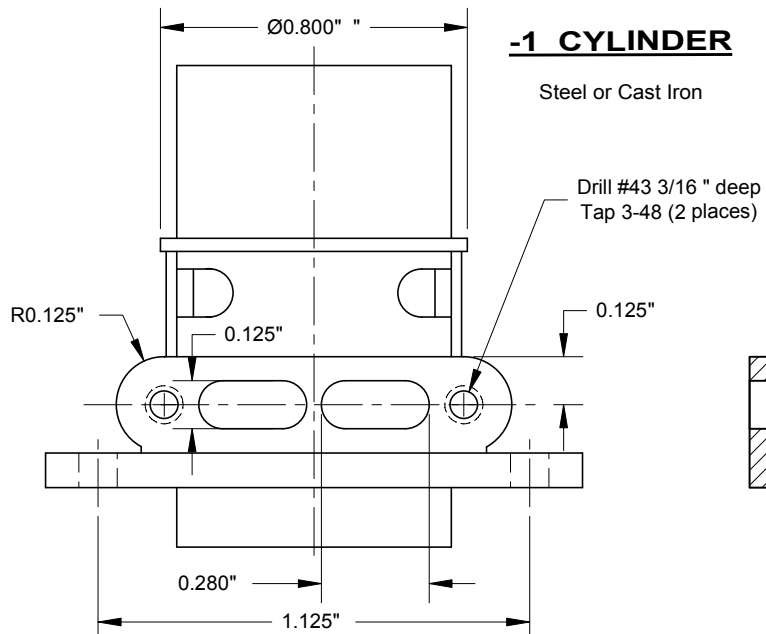
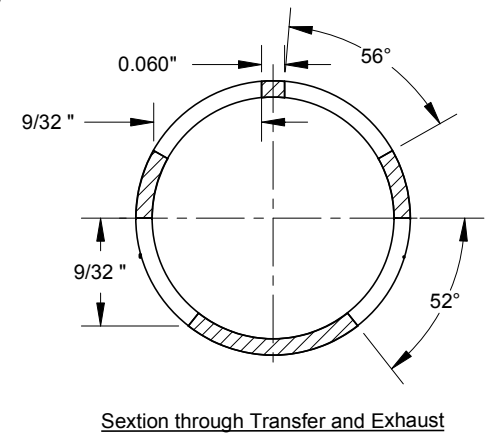
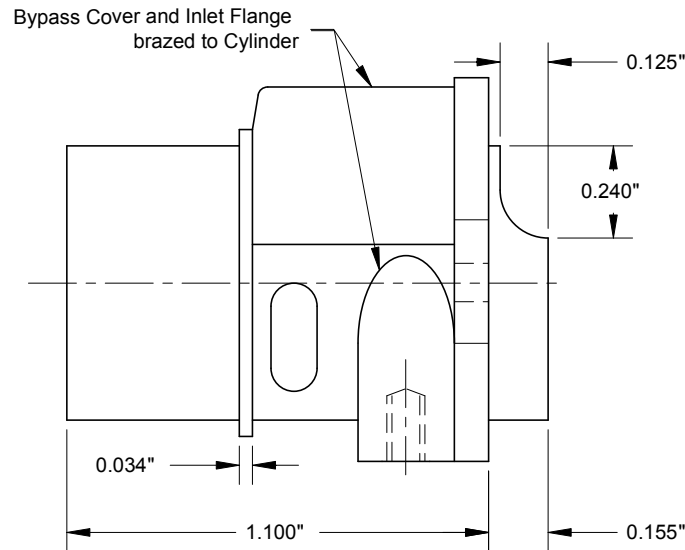
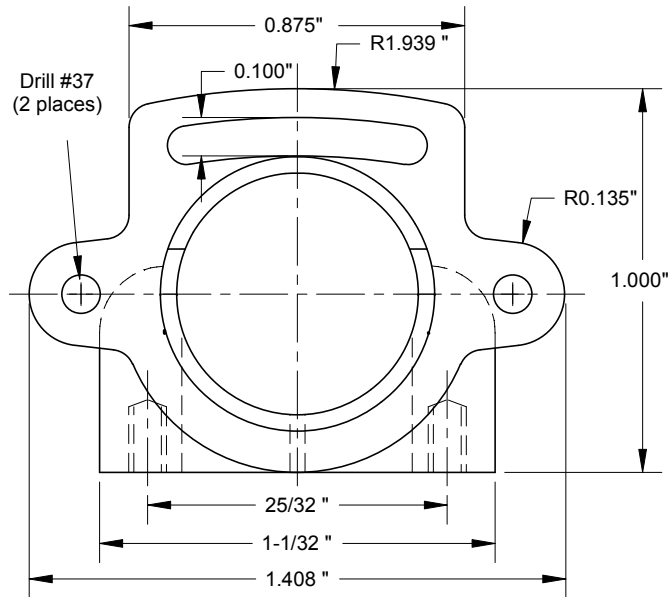
-2 CON ROD

Tobin Bronze

Note: Oil Grooves cut with
60° thread form tool
0.014" deep

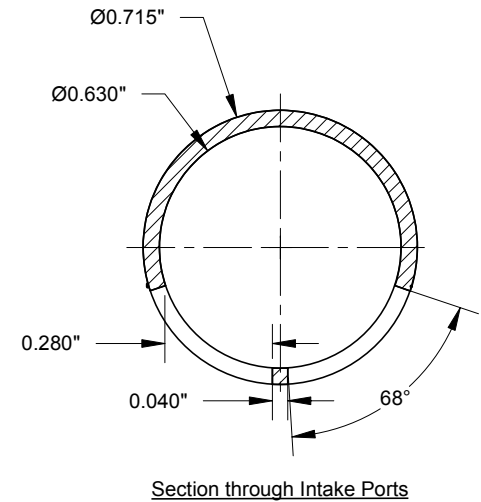
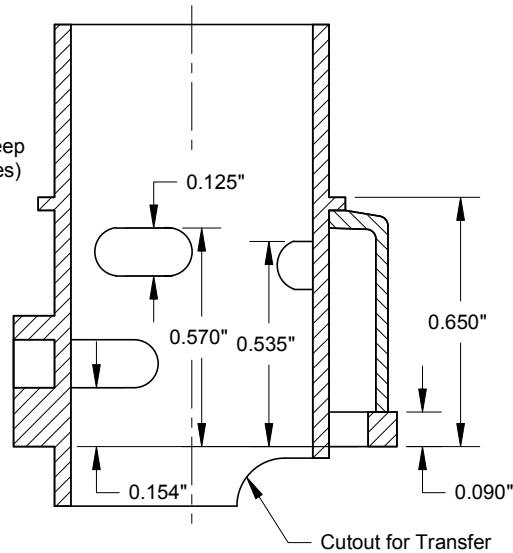



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			SCALE	2 X SIZE			1938 Trojan Jr.
			DRAWN	JM Oct 1998			NUMBER
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999	NEXT ASSEMBLY		Sheet 4 - Piston and Con Rod

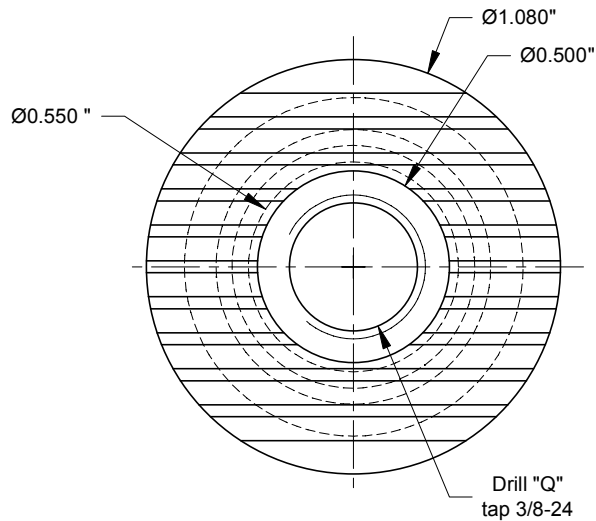
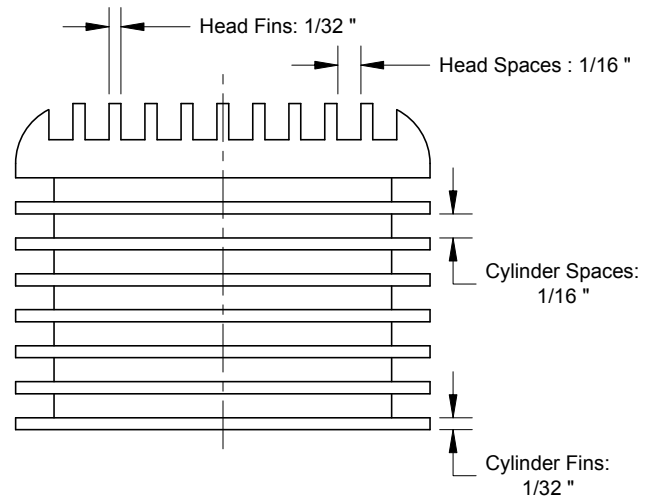
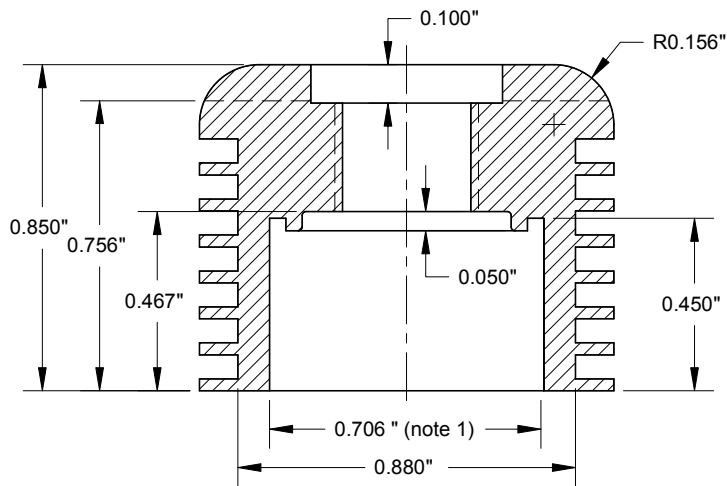


-1 CYLINDER

Steel or Cast Iron




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			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		NUMBER Sheet 5 - Cylinder
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			

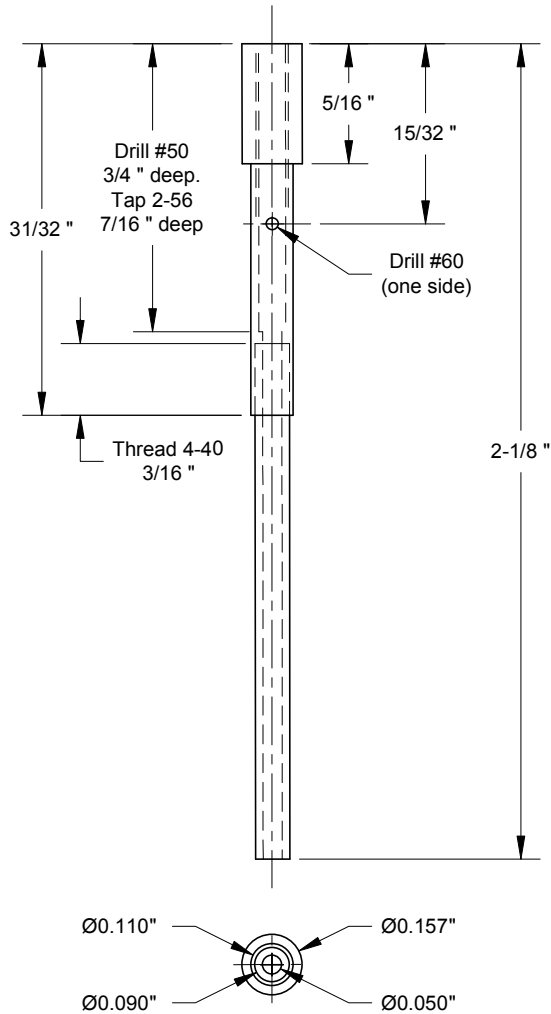


-1 CYLINDER HEAD

Aluminum

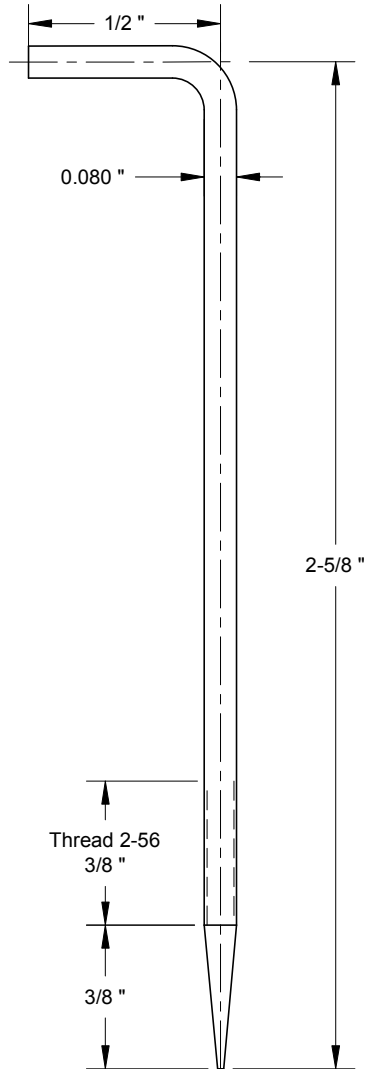
Note 1: Machine for 0.002" interference fit with 5-1 Cylinder. Heat and shrink fit.

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1938 Trojan Jr.
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		NUMBER Sheet 6 - Cylinder Head
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			



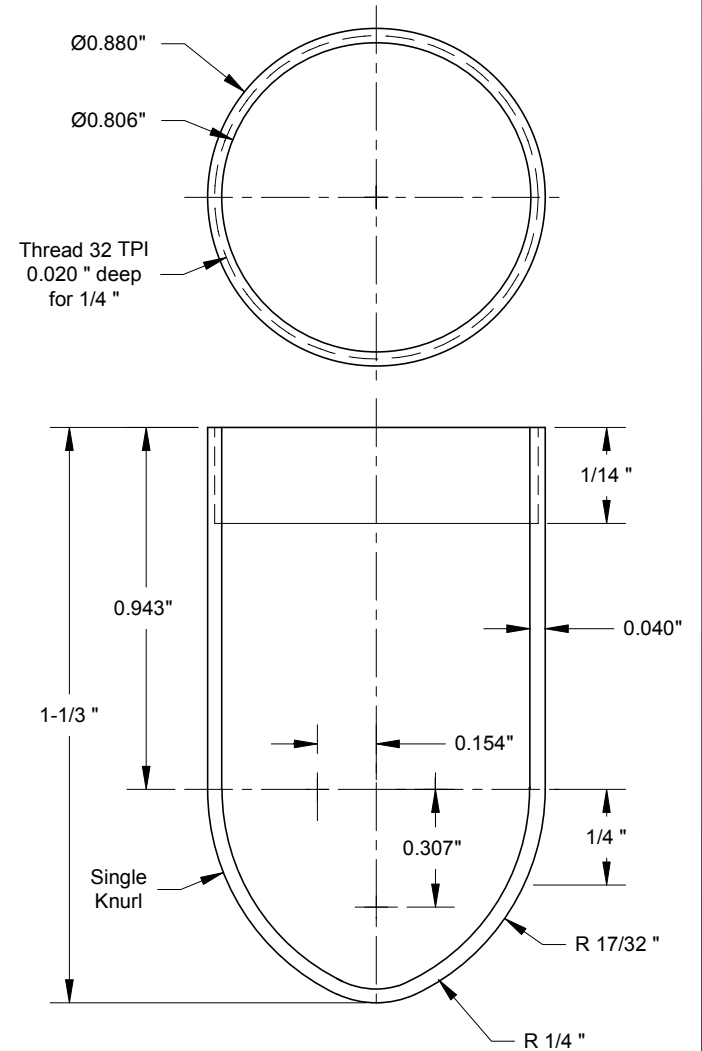
-1 SPRAY BAR

Brass




-2 NEEDLE VALVE

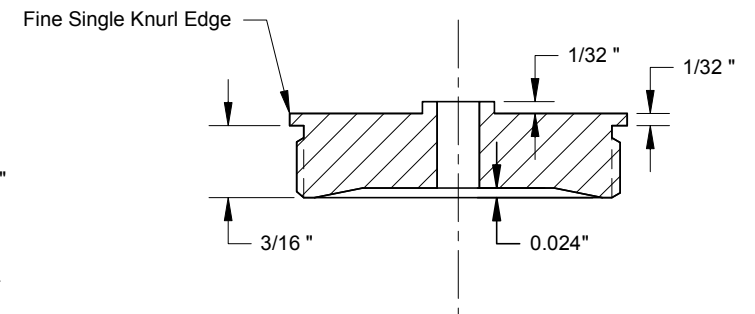
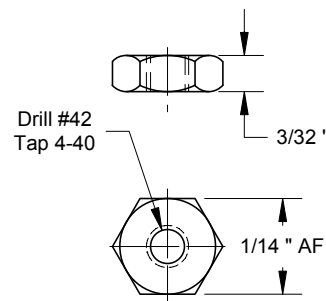
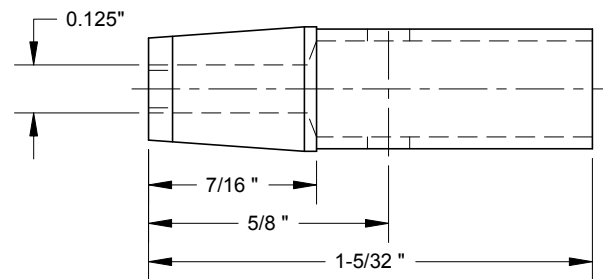
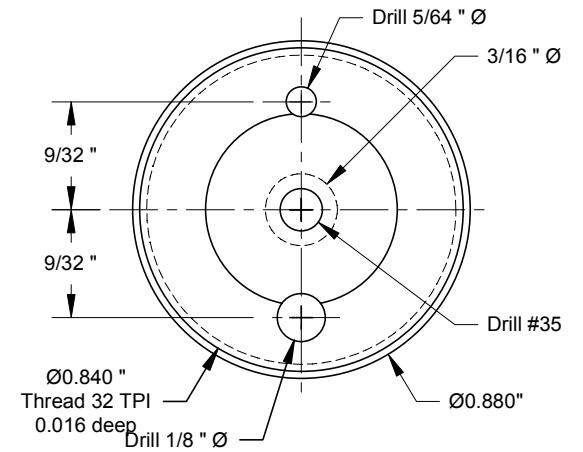
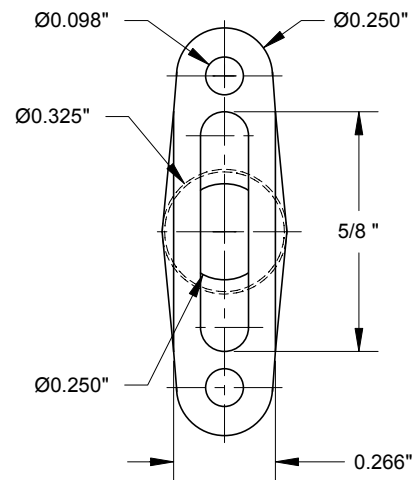
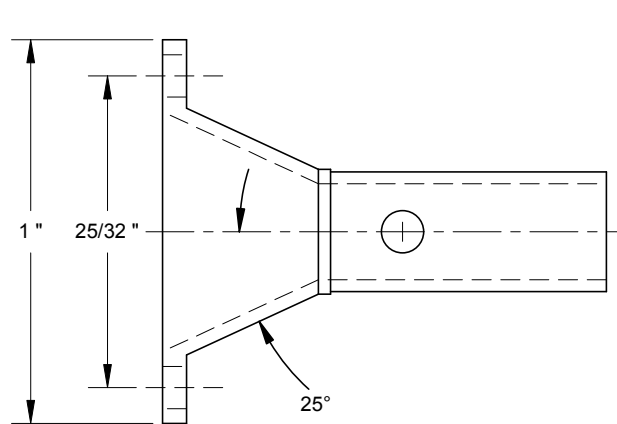
Steel (or Du-Bro threaded rod)



-3 FUEL TANK

Aluminum Casting

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			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER Sheet 7 - Fuel System
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			



-1 VENTURI


Aluminum Casting

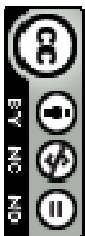
-2 LOCK NUT

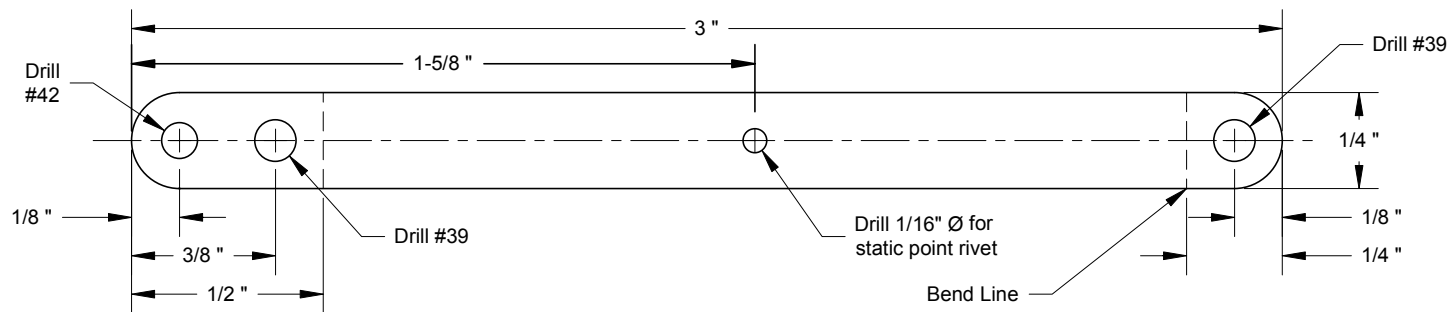
Hex Brass

-3 Tank Cover

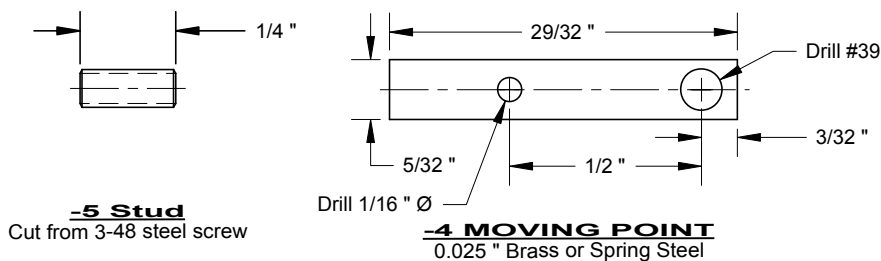
Aluminum Casting

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1938 Trojan Jr.
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			Sheet 8 - Fuel System





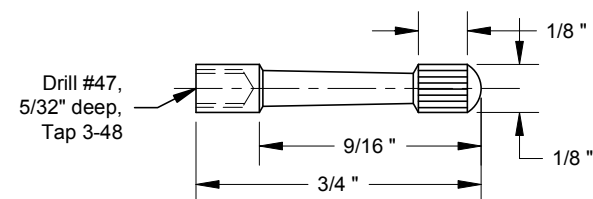
-3 STATIONARY POINT STRAP
0.020 " Brass



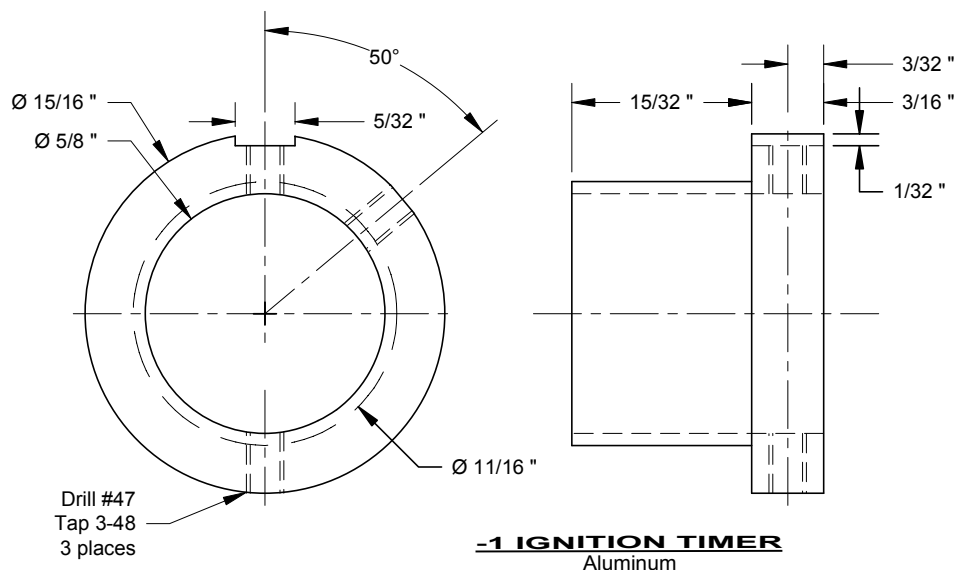
-5 Stud

Cut from 3-48 steel screw

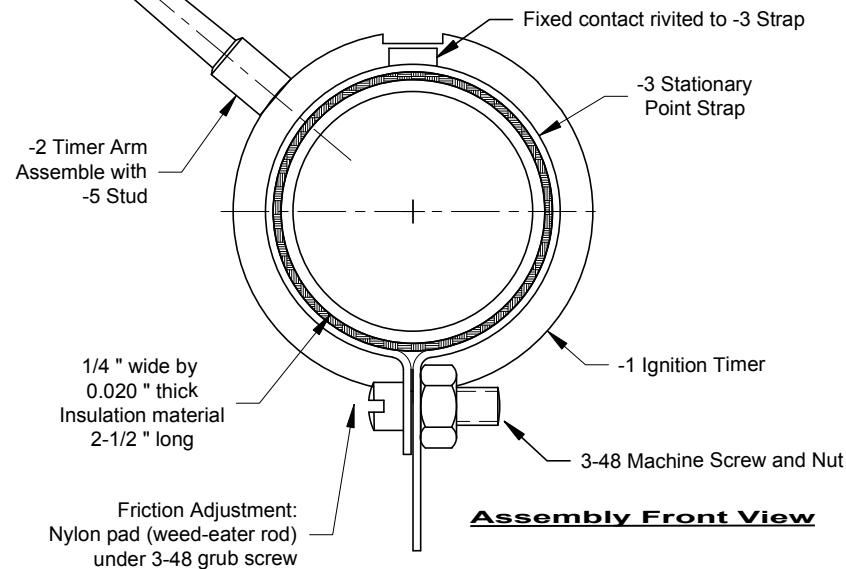
-4 MOVING POINT
0.025 " Brass or Spring Steel




-2 TIMER ARM
Aluminum

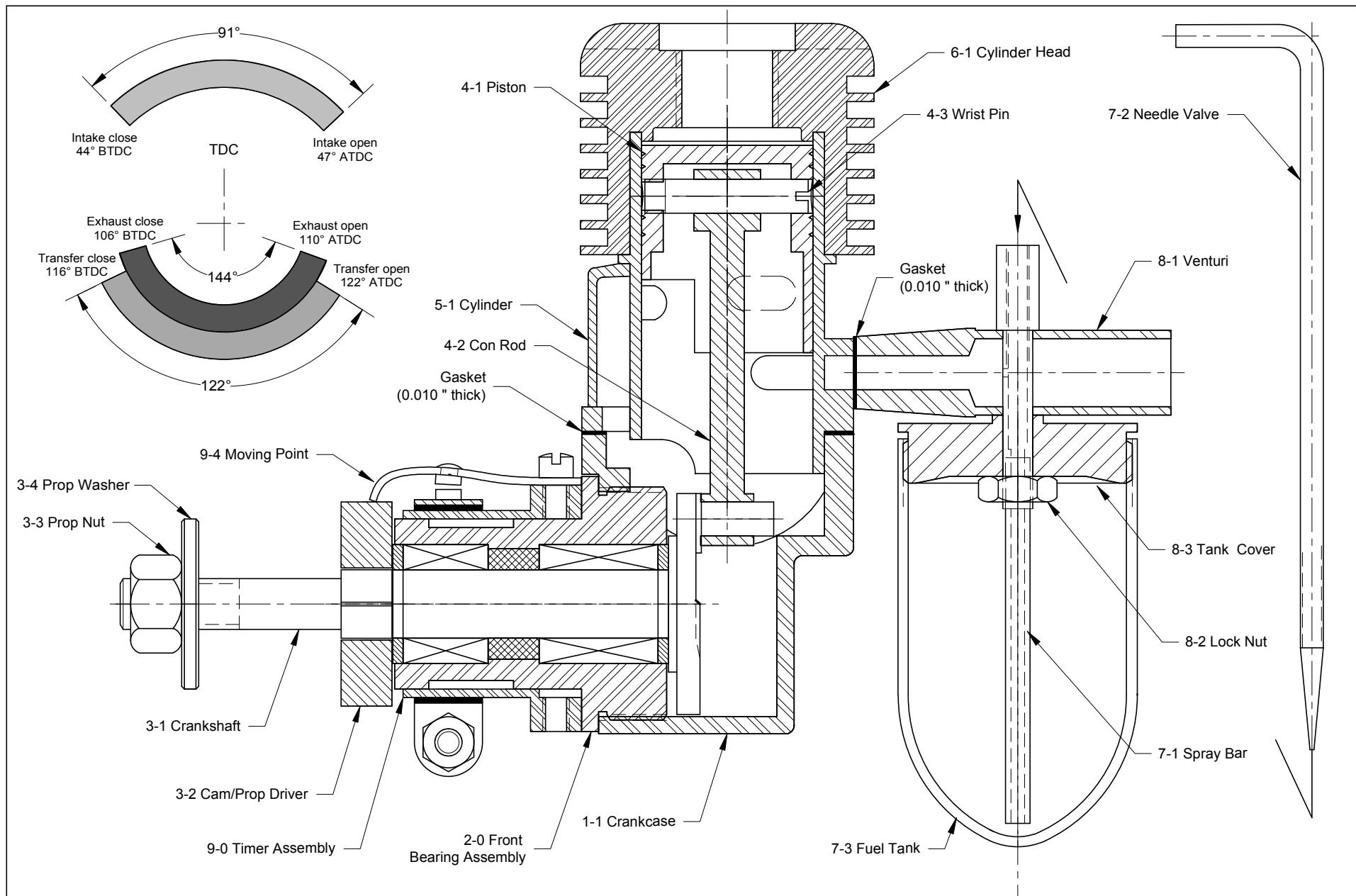



-1 IGNITION TIMER
Aluminum



Assembly Front View

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1938 Trojan Jr.
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
5 Jan 2000	Revise Timer arm design and positioning	BMBI	DRAWN	JM Oct 1998	NEXT ASSEMBLY		Sheet 9 - Timer Assembly
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			



			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1938 Trojan Jr.
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
			DRAWN	JM Oct 1998	NEXT ASSEMBLY		Sheet 10 - General Arrangement
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999			

THE 1939 M&M

by Roger Schroeder

The M&M engines were produced by the M&M Model Wheel Co. located at 325 North 79th St. in Seattle Washington. M&M air wheels for gas models are probably better remembered than their engines.

The first known M&M engine was the Bee, a rather conventional, .249 cu. in. displacement, engine introduced in 1937. It was followed by a variation known as the M&M 23 in 1938.

In 1939 M&M completely redesigned their product and introduced the M&M Piston Valve Motor having a displacement of .292 cu. in. The price was \$16.50. This was a unique engine having design features far different than the conventional engines of 1939. It was the unique features that attracted the Motor Boys attention to this engine. These important features are:

1. A piston valve for transfer of fuel/air mixture from the crankcase to the cylinder. This is similar to the Atom .09 engine introduced in 1940.
2. A disk valve (or clack valve) in the crankcase to admit fuel/air mixture from the inlet venturi into the crankcase. This valve operates on differential pressure between the crankcase and the venturi.
3. A fuel adjuster which is a 1/16 dia. brass tube, closed at the top and open at the bottom to admit fuel from the tank. A flat was cut on the side of the tube from the bottom to a .020 dia. hole in the tube that was aligned with a hole in a spray bar that held the tube. Fuel flow, from zero to full, was controlled by rotating the tube through about 90 deg.

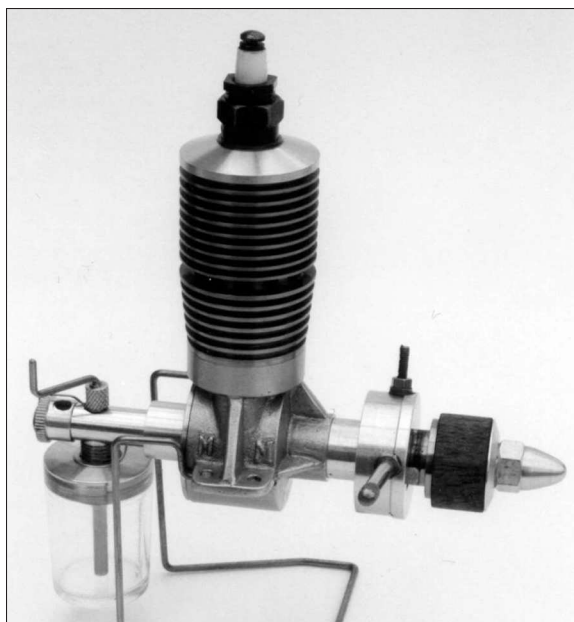
These three features were the subject of much discussion among several Motor Boys who believed that it would be difficult to run the M&M. We were all wrong.

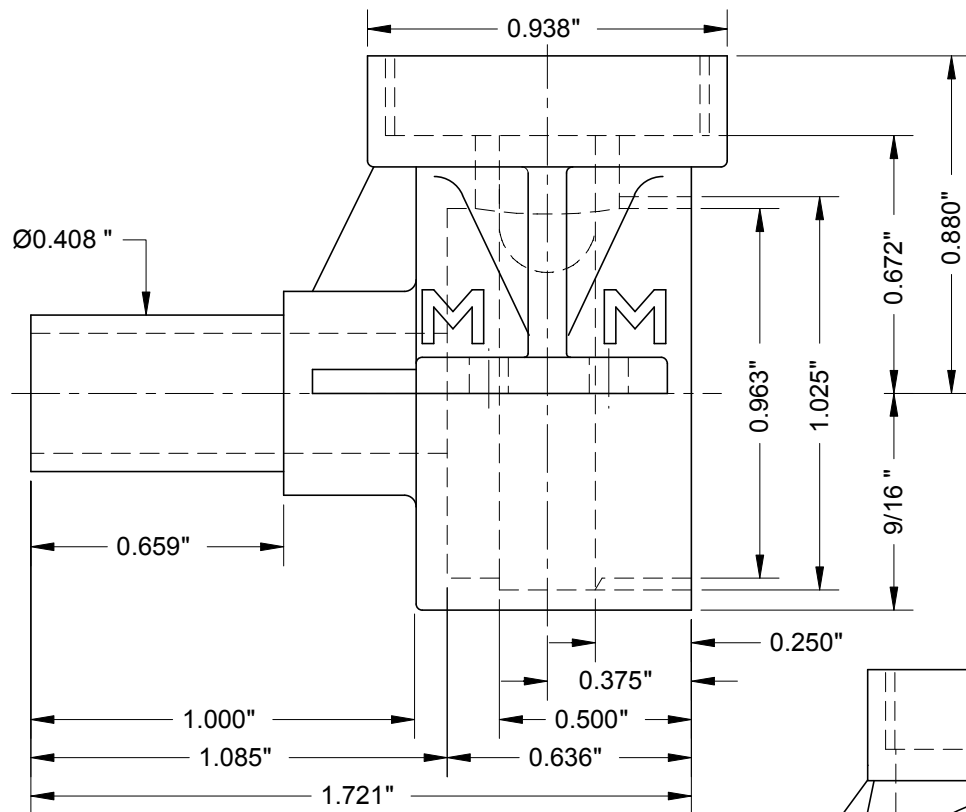
The Piston Valve Motor was only offered in 1939. In 1940 M&M offered an engine similar in appearance to the 1939 model, but it no longer had the piston valve. Production apparently ended with the 1940 model. Ads in the May 1940 and May 1941 issues of Model Airplane News promote sales of air wheels but do not mention an M&M engine.

Bert Striegler had a 1940 M&M engine and he made sketches of the parts common to the 1939 model. Ted Eticknap provided pictures and information from a complete 1939 model in his collection. This provided the basis for the Motor Boys Drawings of the M&M. They are believed to be an accurate representation of the original 1939 model.

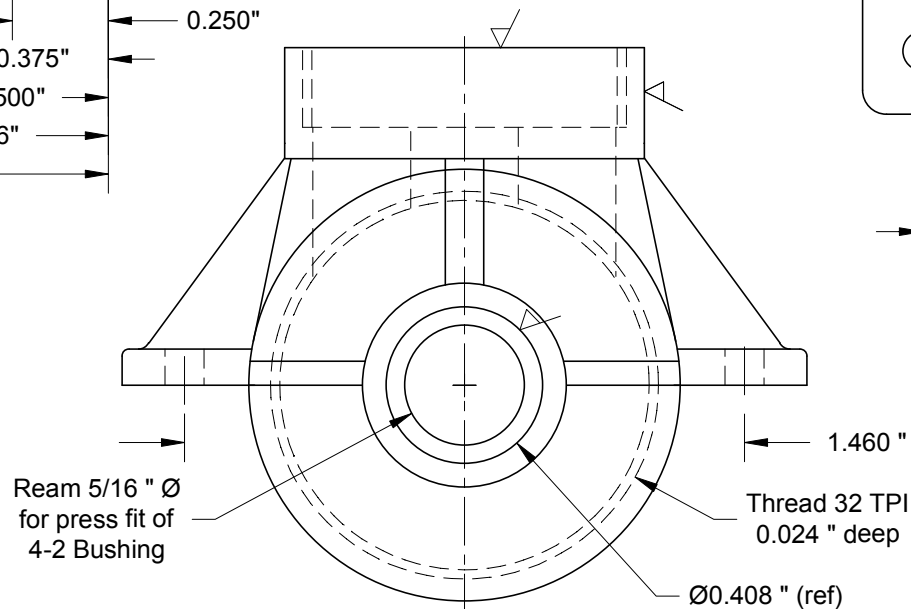
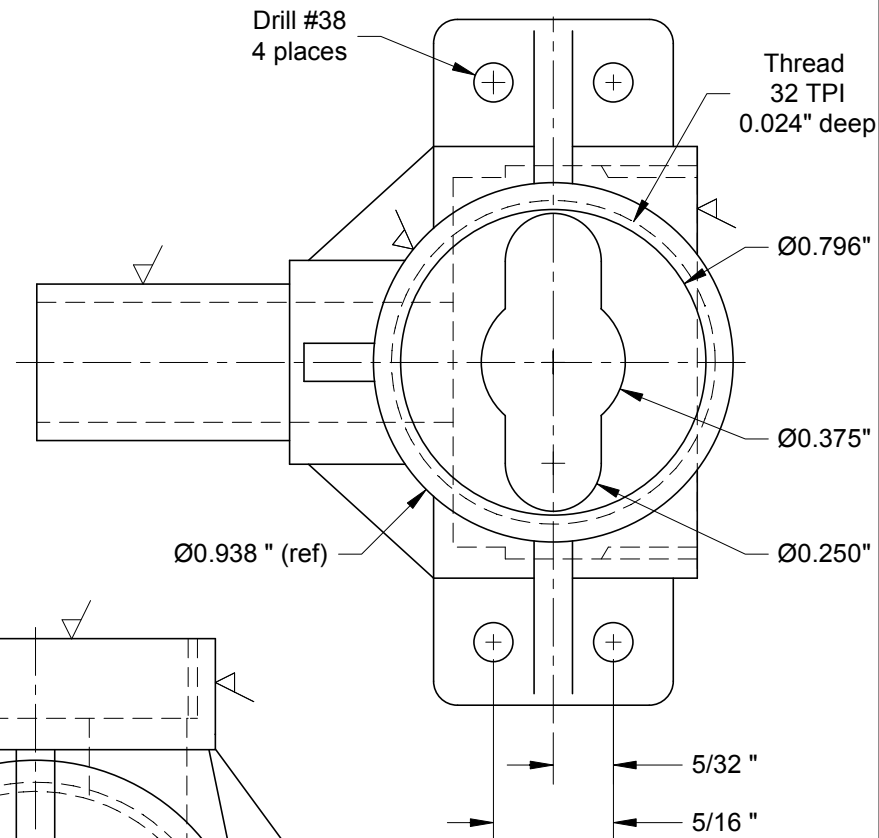
M&M engines have been built by Bert Striegler, Don McClusky, David Owen, Ron Chernich, Ken Croft, and Roger Schroeder. The original castings were probably made in permanent molds. The Motor Boys used sand castings. All other parts were according to the original design.

All the builders were pleasantly surprised to find the M&M was easy starting and running. It is a strong and smooth runner.




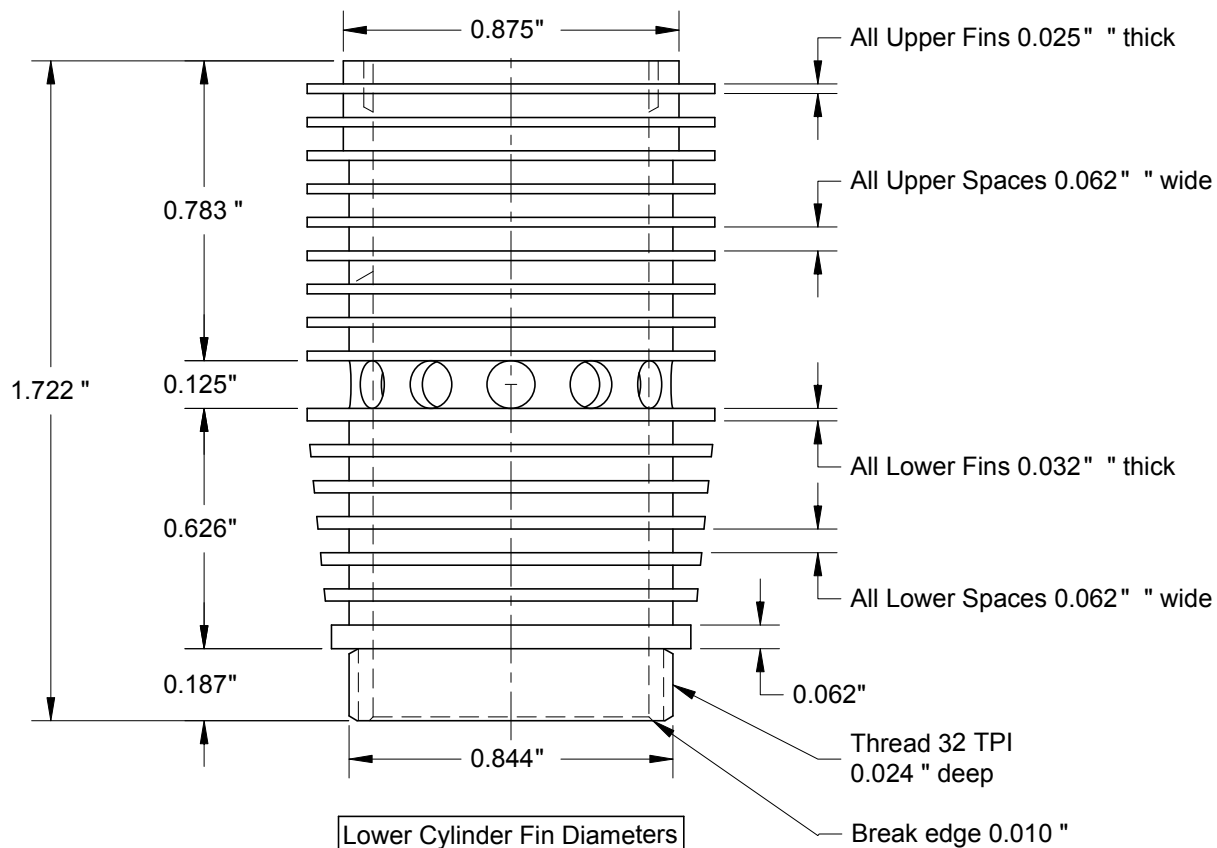


-1 CRANKCASE



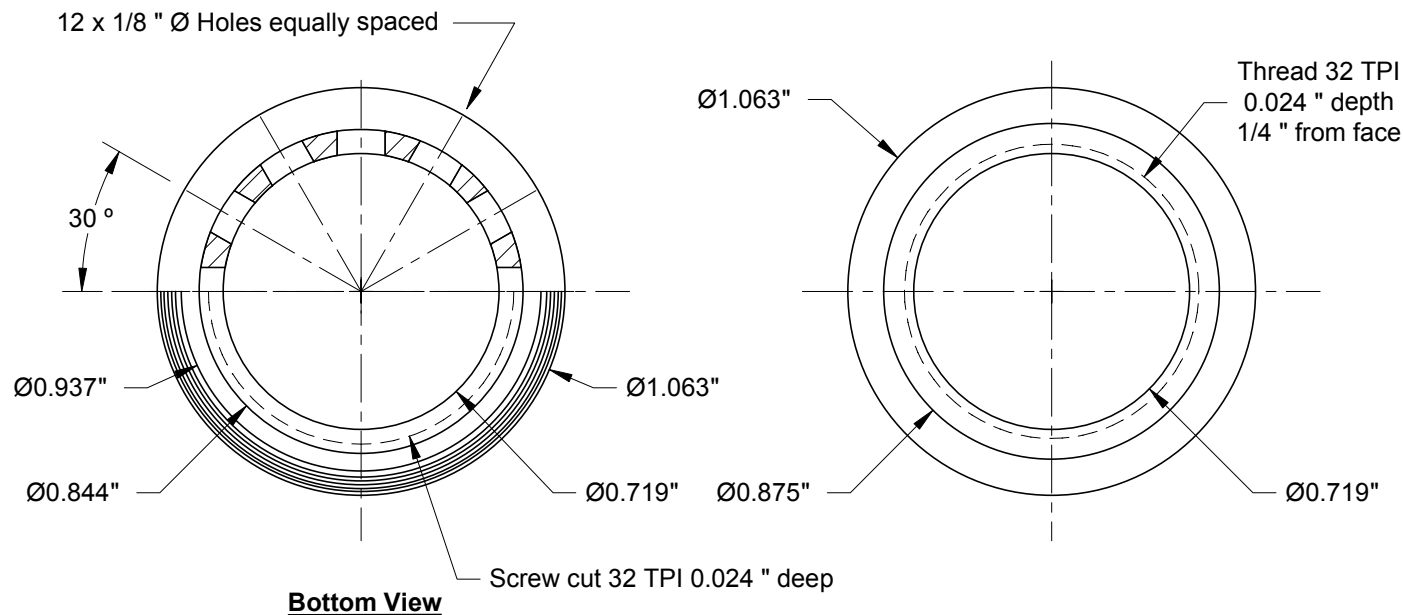
Machine

			MAT'L	Aluminum Casting	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1939 M&M Piston Valve .29
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
22 Mar 1998	Redrawn from actual casting	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER Sheet 1 - CRANKCASE
DATE	CHANGE	BY	CAD	PMB 2-22-1998			




Lower Cylinder Fin Diameters	
1 1.063 "	4 1.006 "
2 1.044 "	5 0.987 "
3 1.025 "	6 0.968 "

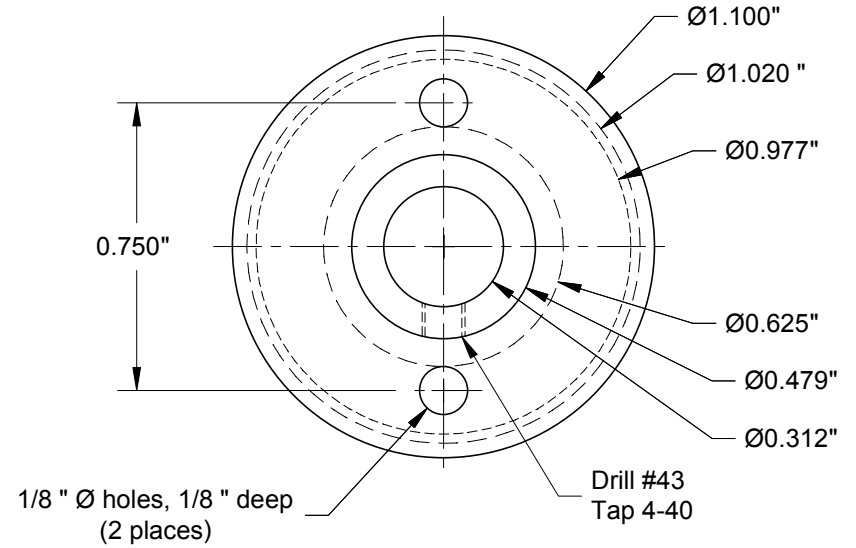
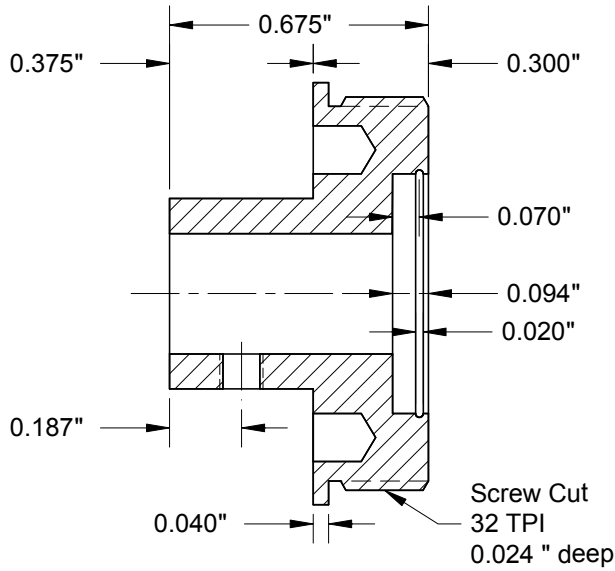
Section thru Ports



Bottom View

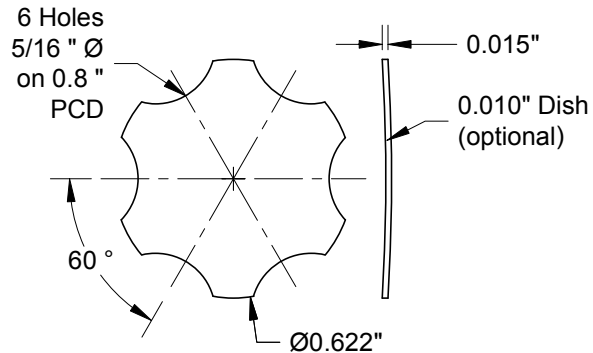
Top View

24 Oct '99	Correction by EMB				<u>Top view</u>	
MAT'L	Leaded Steel	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	 MOTOR BOYS (INTERNATIONAL)	NAME		
SCALE	2 X SIZE			1939 M&M Piston Valve .29		
DRAWN	RMB			NUMBER		
CAD	PMB			Sheet 2 - CYLINDER		



-1 BACKPLATE

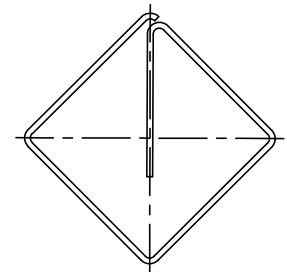
Aluminum Sand Casting



-2 CLACK VALVE


Aluminum

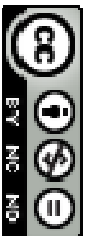
Bend to place light
or no pressure on
-2 Clack Valve in
-1 Backplate

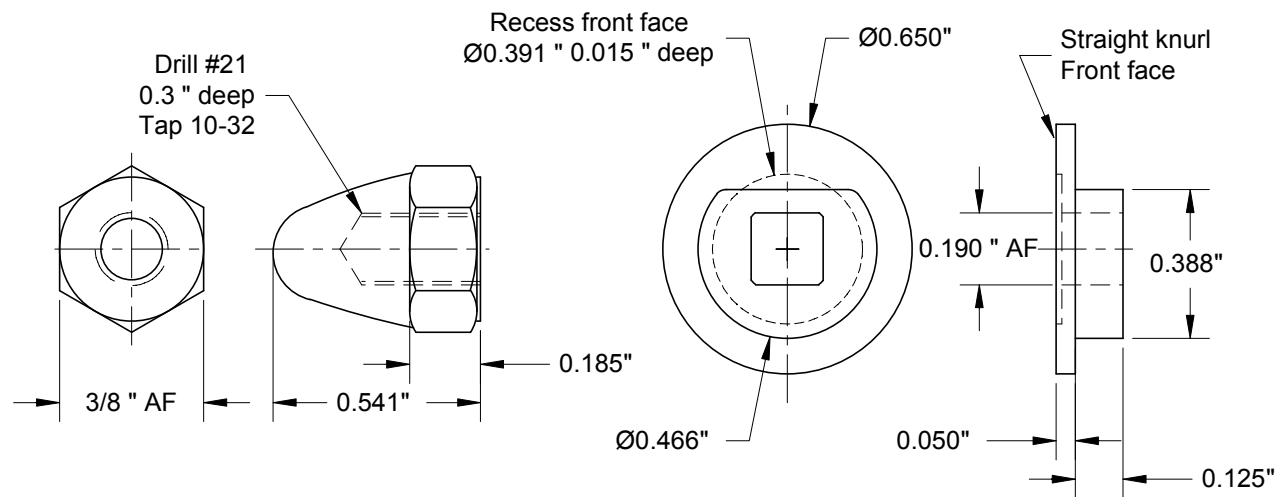


-3 Clack Valve Retainer

0.015" Music Wire

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
24 Oct 1999	Corrections by EMB		DRAWN	KCMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-21-1998			Sheet 3 - BACKPLATE ASSY



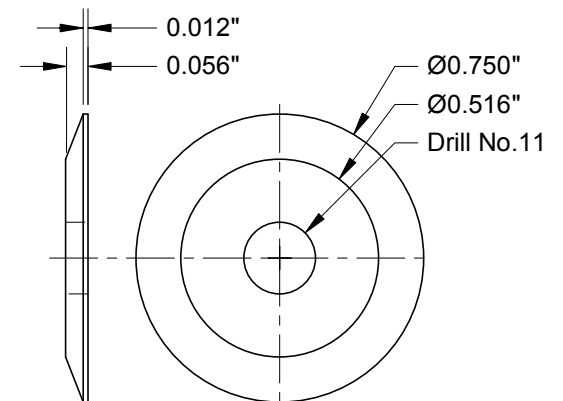


-2 ACORN NUT

(Aluminum)

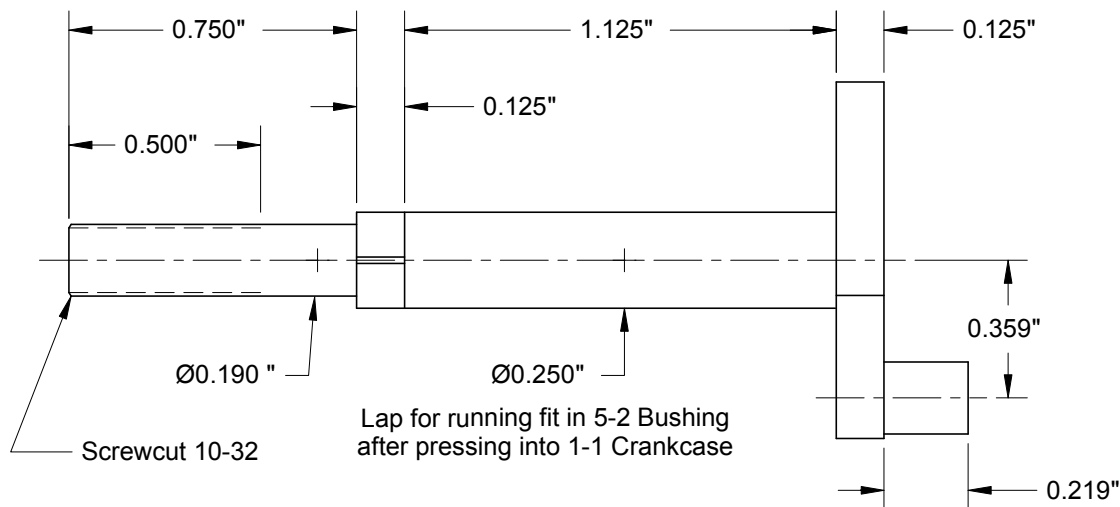
-3 CAM

Steel (case harden)



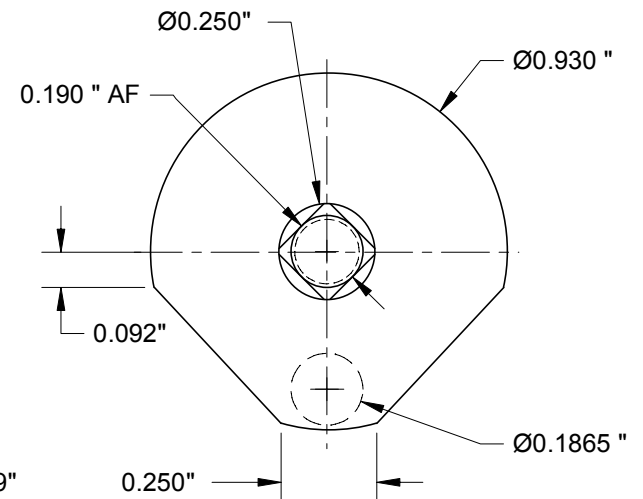
-4 PROP WASHER

Aluminum




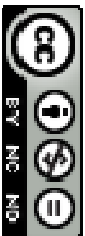
-1 CRANKSHAFT

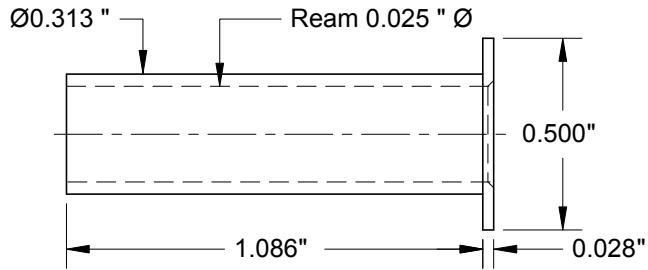
Steel



Original crank fabricated in three pieces

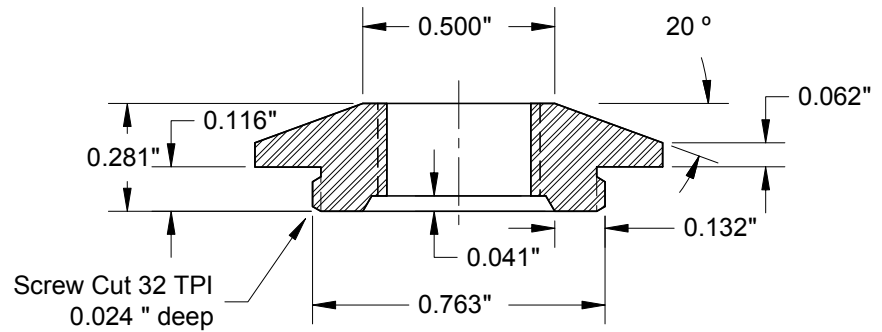
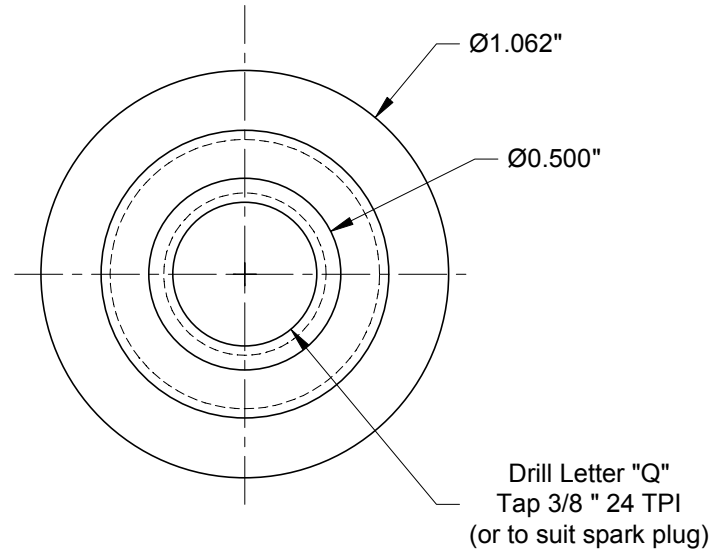
24 Oct 1999	Corrections by EMB		MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
22 Mar 1998	Corrections from RMBI	PMB	SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-21-98			Sheet 4 - DRIVE TRAIN






-2 BUSHING

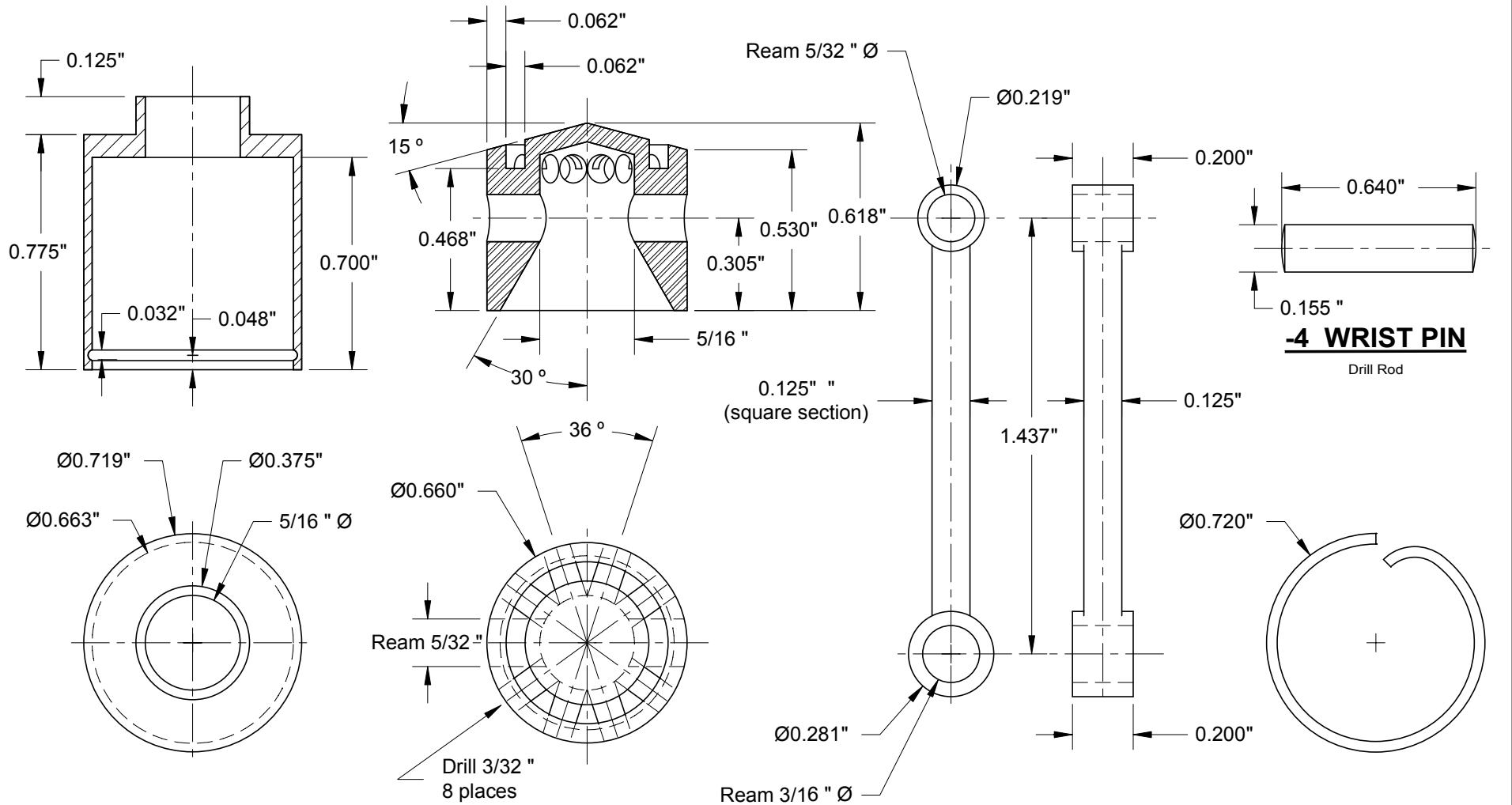
Bronze



-1 CYLINDER HEAD

(Aluminum)

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
24 Oct 1999	Corrections by EMB		SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-15-98			Sheet 5 - Cylinder Head



-1 PISTON

Cast Iron

-2 PISTON VALVE


Aluminium

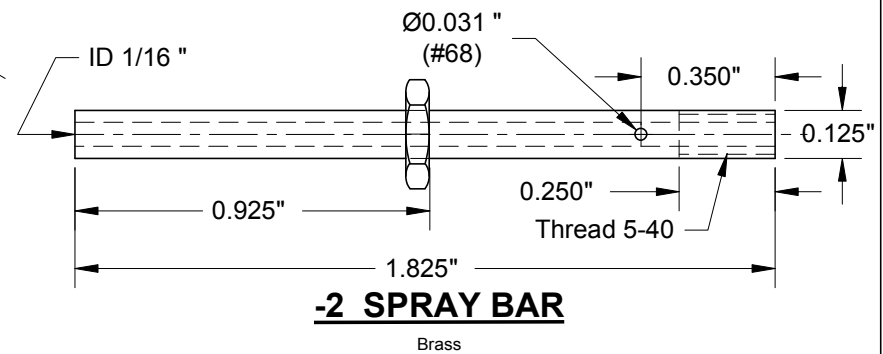
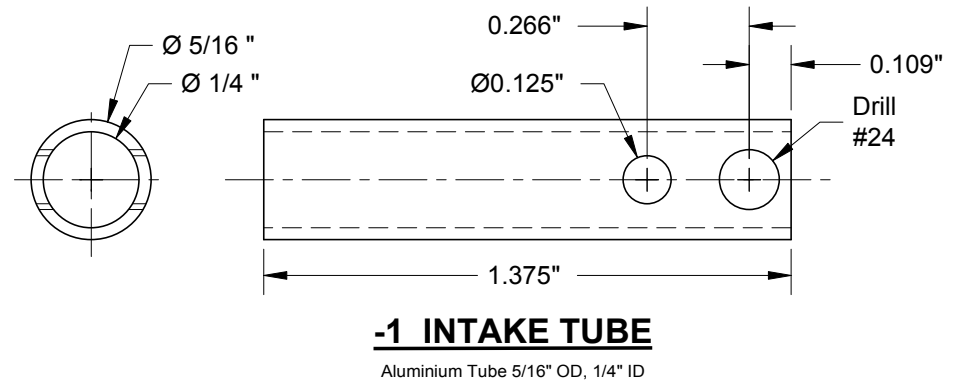
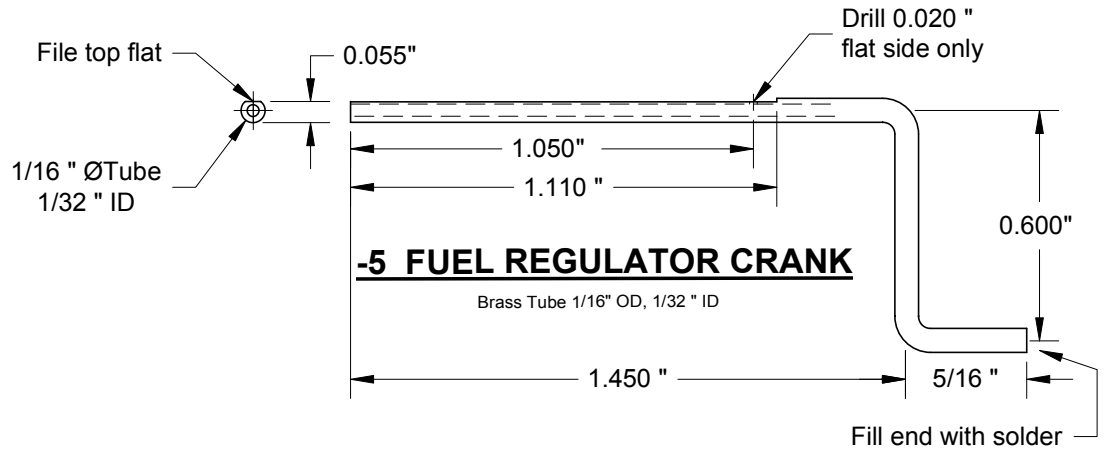
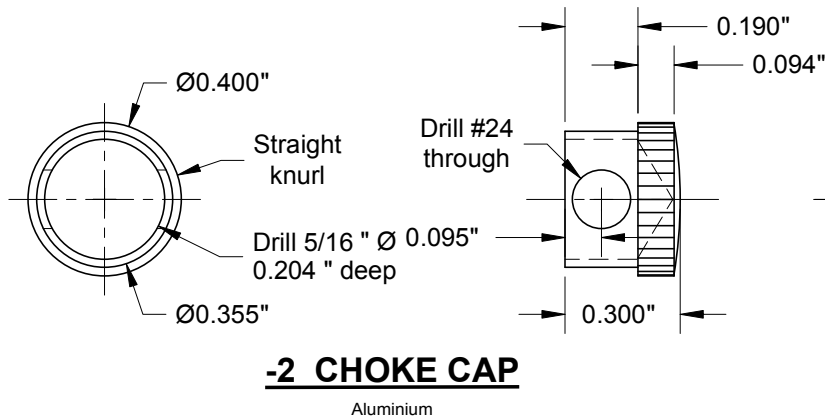
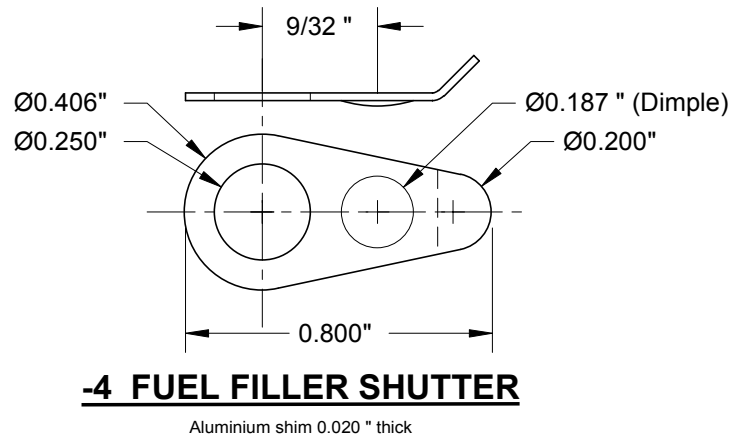
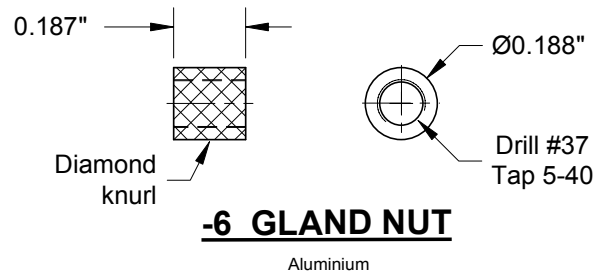
-3 CONNECTING ROD


2024 Aluminium

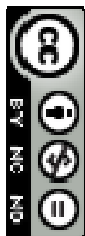
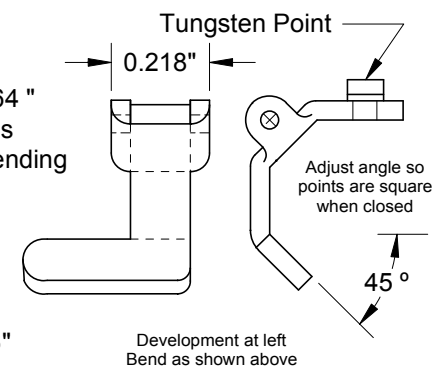
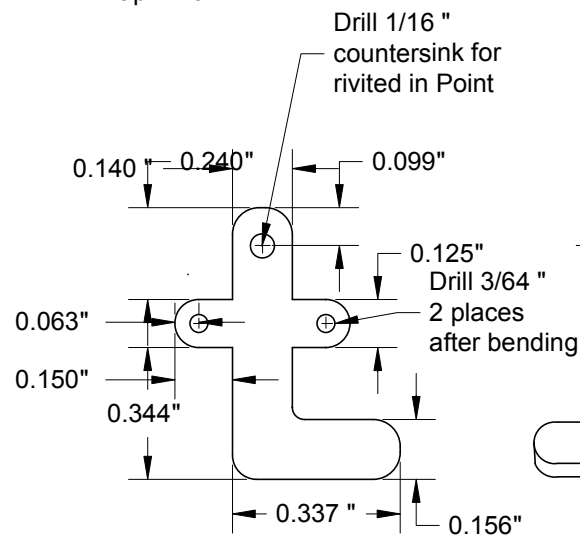
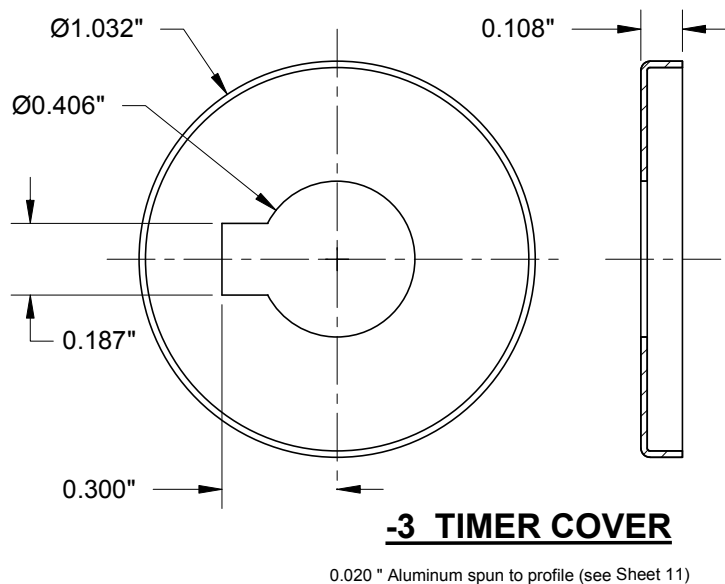
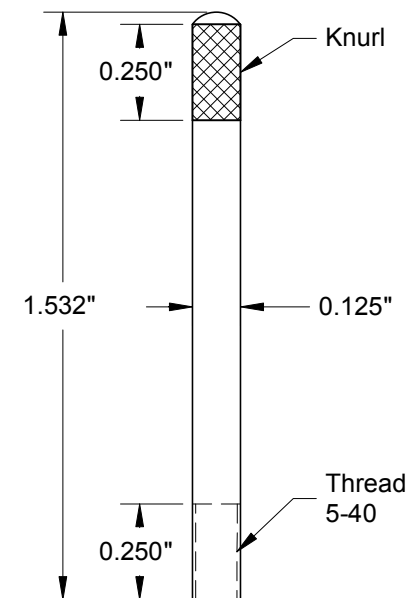
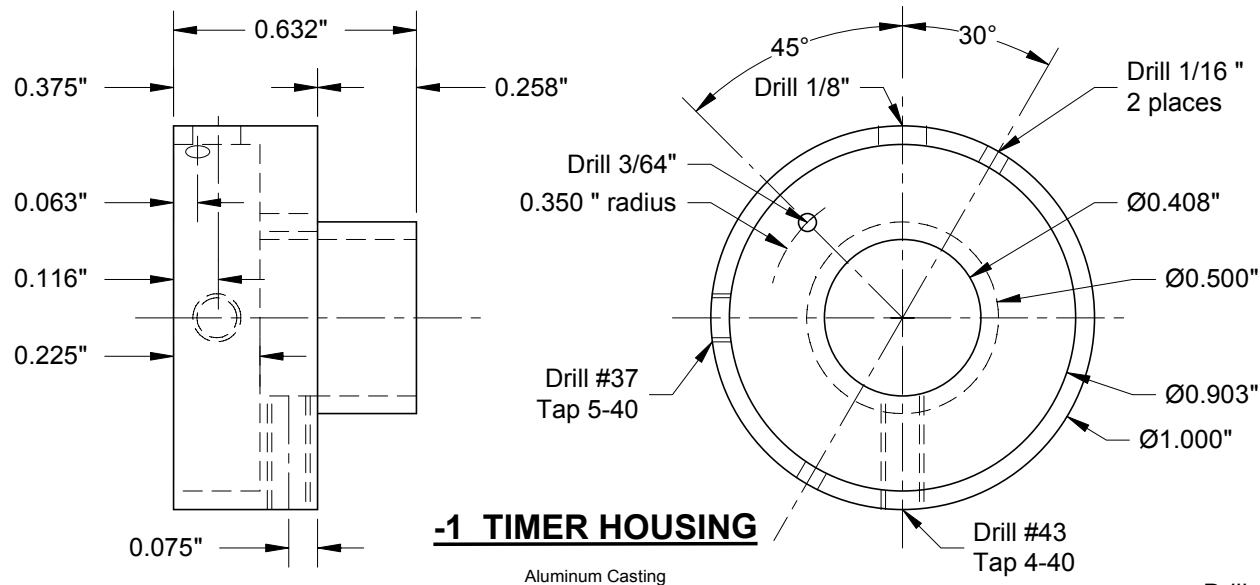
-5 VALVE CIRCLIP


0.020 " Music Wire

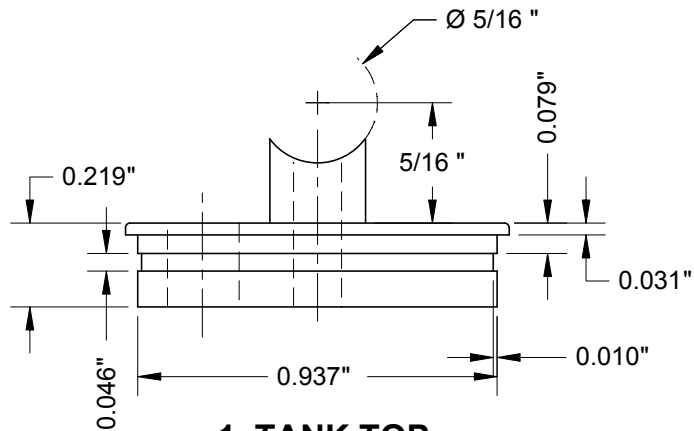
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3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-15-98			Sheet 6 - PISTON ASSEMBLY



24 Oct 1999	Corrections by EMB		MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
22 Mar 1998	Corrections from RMBI	PMB	SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB			Sheet 7 - FUEL SYSTEM

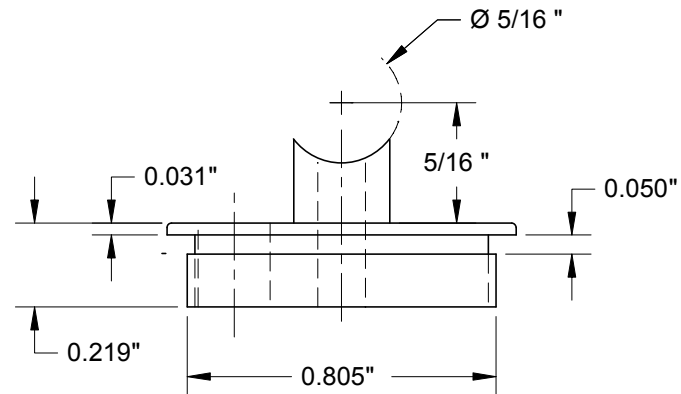


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
24 Oct 1999	Corrections by EMB		SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-22-1998			Sheet 8 - IGNITION TIMER



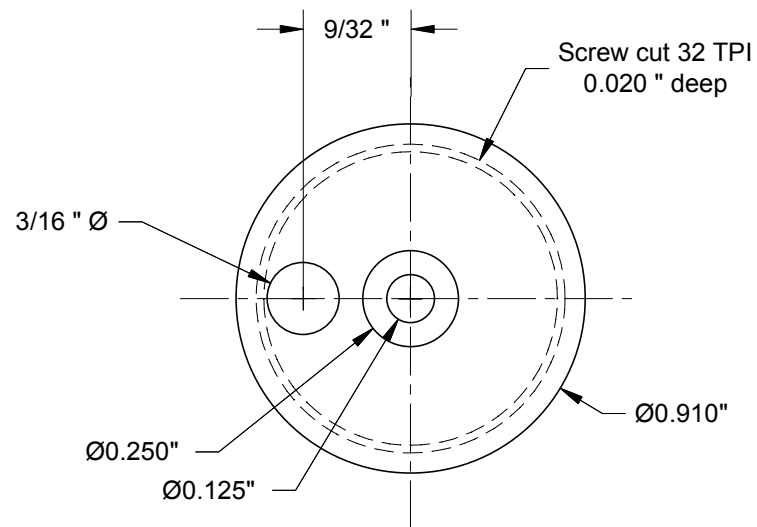
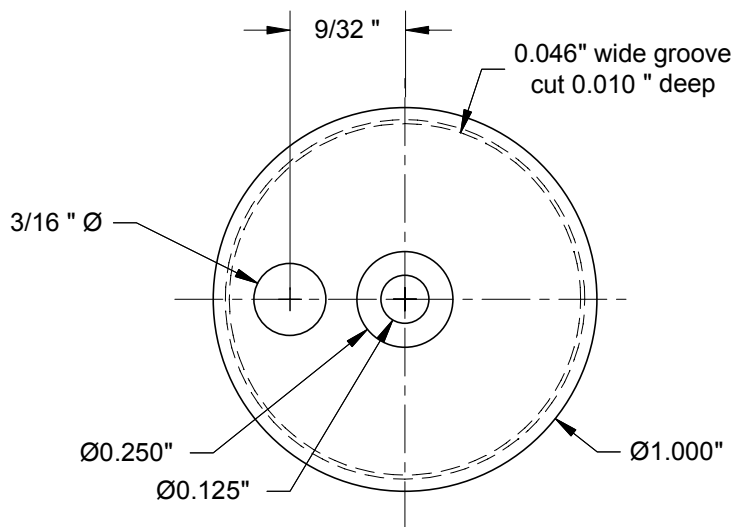
-1 TANK TOP

Dimensions shown are for
"Aunt Jimima"
Syrup Cap Tank



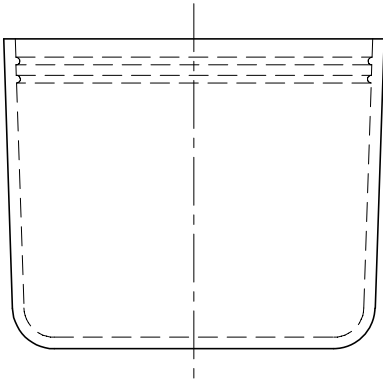
-2 TANK TOP

Dimensions shown are for
5-4 Replica Fuel Tank



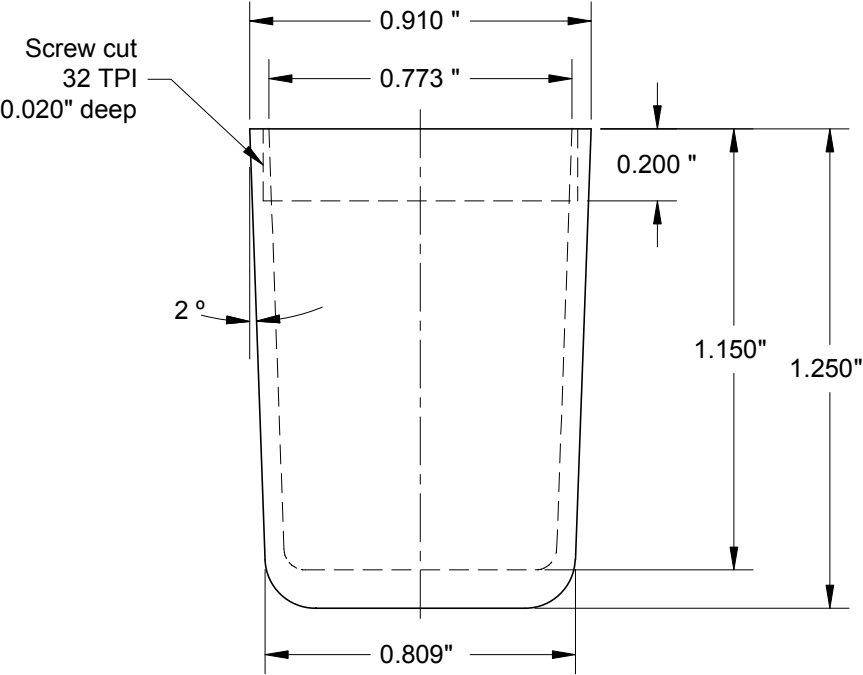
			MAT'L	Aluminum Sand Casting	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	NAME 1939 M&M Piston Valve .29
			SCALE	2 X SIZE		
			DRAWN	KCMB		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-21-1998		Sheet 9 - TANK TOP OPTIONS






-1 FUEL TANK

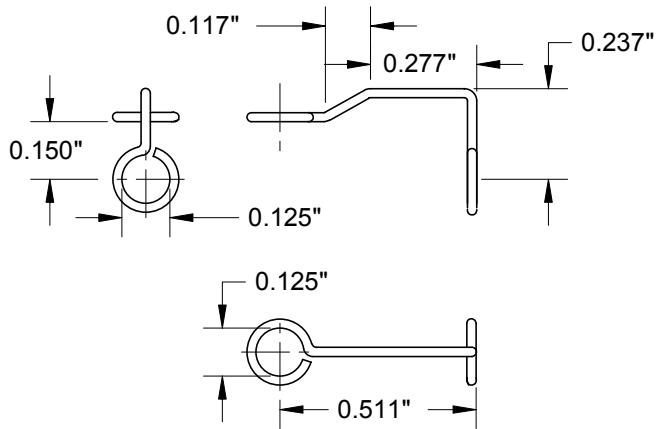
"Aunt Jimima" Syrup Bottle Cap



-2 FUEL TANK

Plastic

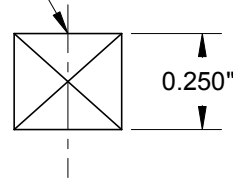
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
24 Oct 1999	Additional dim. by EMB		SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
3 Mar 1998	Corrections from KMBI	PMB	DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-15-98			Sheet 10 - TANK OPTIONS



-1 Choke Cap Retainer

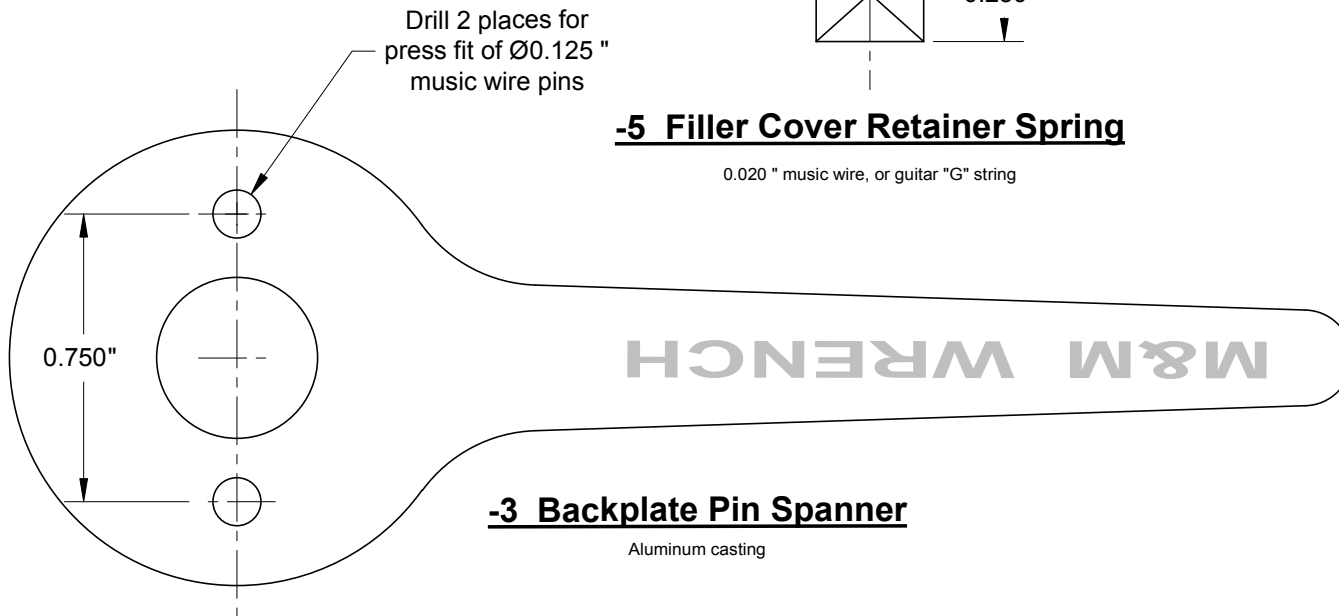
0.024 \" Music Wire

Coil spring
4 turns 0.020 \"
wire, 1/4\" ID



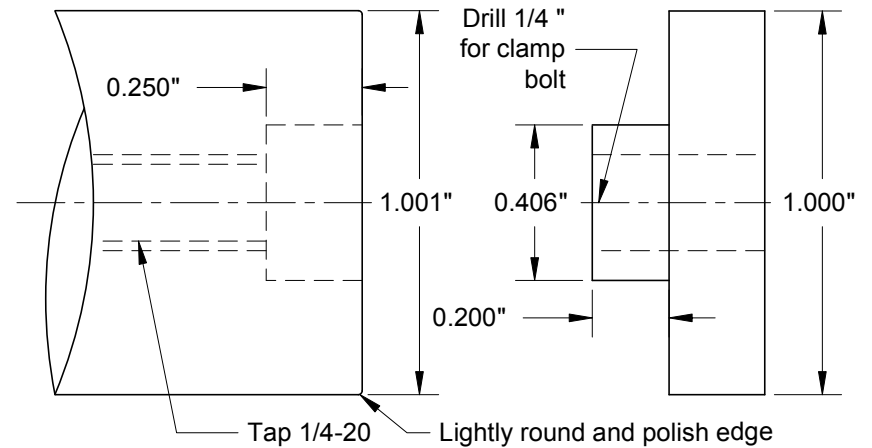
-5 Filler Cover Retainer Spring

0.020 \" music wire, or guitar \"G\" string



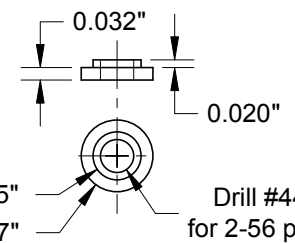
-3 Backplate Pin Spanner

Aluminum casting




-4 Timer Cover Spinning Fixture

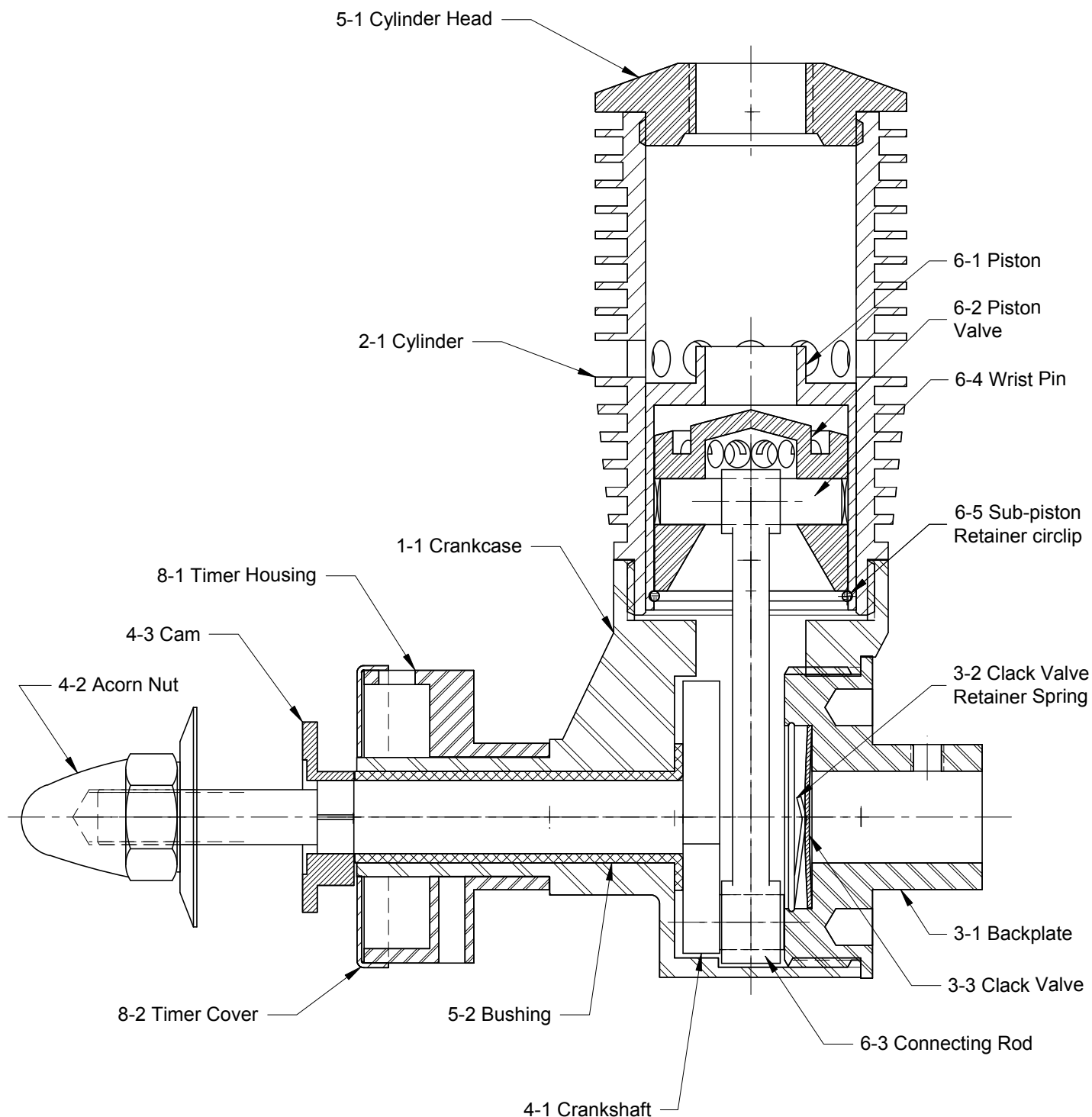
Mild steel




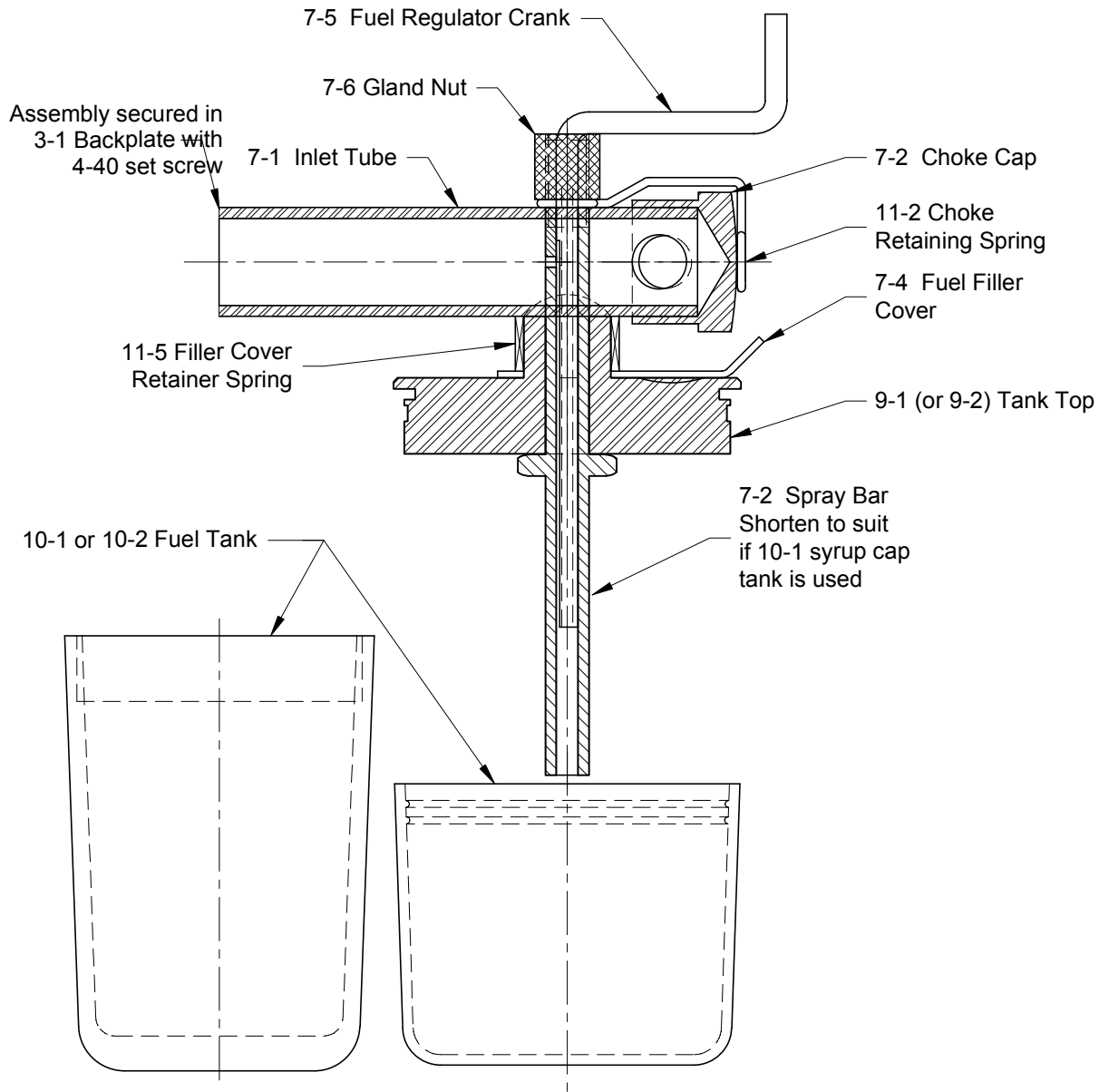
-6 Fixed Point Bush (2 off)


Phenolic or Nylon

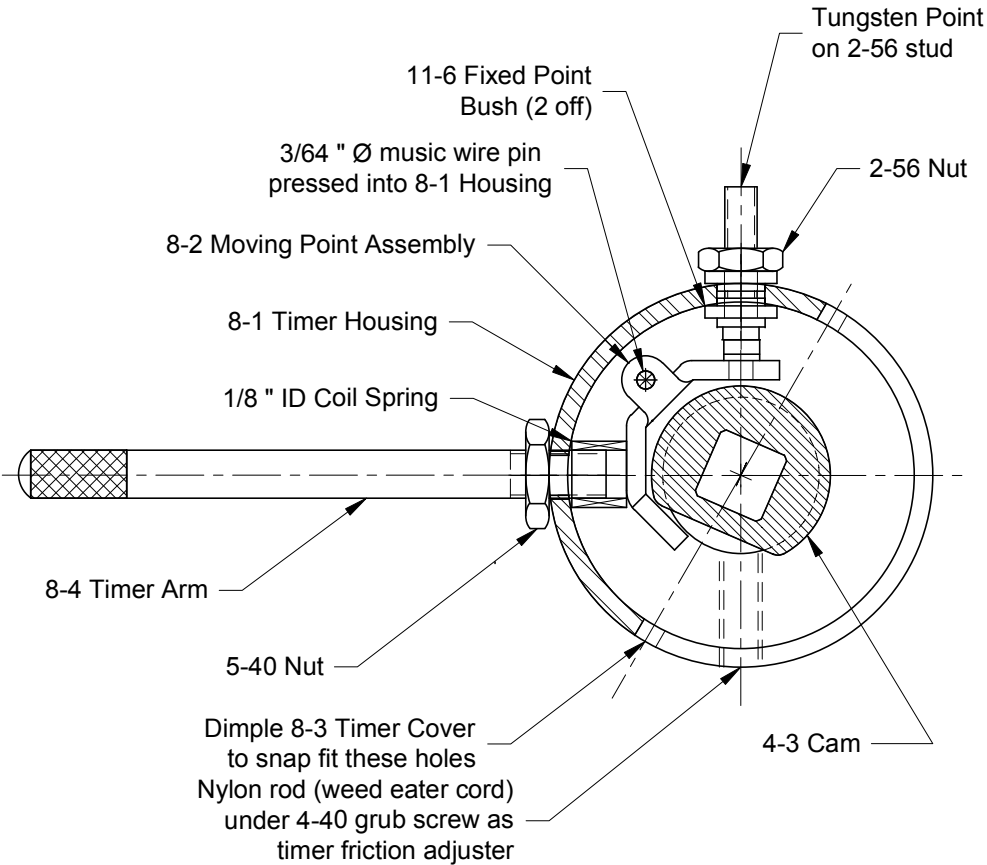
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
			DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-22-1998			Sheet 11 - Tools and Springs



MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME 1939 M&M Piston Valve .29
SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
DRAWN	RMB	NEXT ASSEMBLY		Sheet 12 - General Arrangement
CAD	PMB			




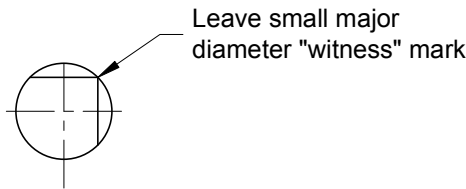
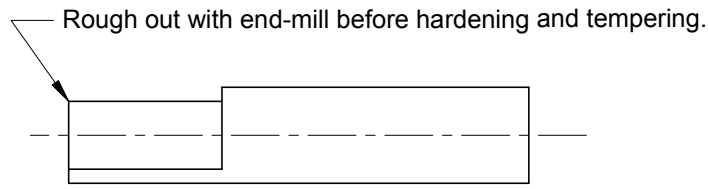
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
			DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-22-1998			Sheet 13 - Fuel System GA



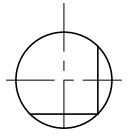
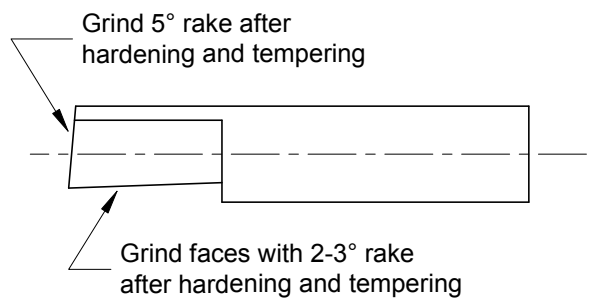
IGNITION TIMER ASSEMBLY

(8-3 Cover omitted for clarity)

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		1939 M&M Piston Valve .29
			DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-22-1998			Sheet 14 - Timer GA



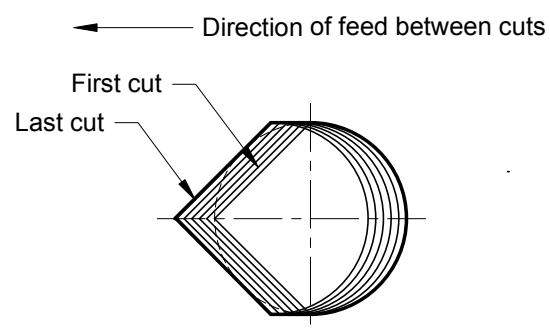
-1 Square Corner Broaching Cutter
3/16" Ø Water Hardening Drill Rod or HSS



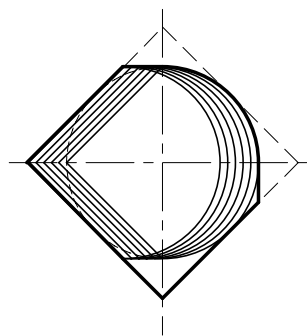
Note: Feed distance = $\frac{X - D}{2}$

Where: D is the diameter of the cutter used
X = the Across Flats (AF) square hole distance, divided by 0.707

Corner Formation Process



Cross section of broached hole after nibbling out the first corner.




Cross section after indexing work through 90° and nibbling out the second corner.

Note that one side is now completely formed.

1. Mount cam in 3 jaw chuck with flange against jaws to hold against broaching forces. Drill through 3/16" Ø.
2. Mount tool in a key-way cutter on the cross-slide with the point towards the operator and the sides at precisely 45° to the lathe bed. Pass cutter through drilled hole and zero the cross-feed dial.
3. Wind the cross-slide towards operator by approx. 0.002", then stroke cutter through the cam. Repeat until the current depth is reached for the corner.
4. Rotate the chuck by 90° and repeat step 3 for the three remaining corners.
(if available, use a headstock dividing attachment, but a block of wood under each jaw of a 4-jaw chuck will do as well)

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			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME M&M Cam Broach
			SCALE	Not to Scale	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
2008-11-06	Redrawn and updated for MBI Plan Book second edition	BMBI	DRAWN	BMBI 1-12-99	NEXT ASSEMBLY		NUMBER Sheet 1
DATE	CHANGE	BY	CAD	PMB 1-12-99			

Australian MATE Diesel

by David Owen

The Australian MATE 2cc Diesel was designed in 1989. It is a simple, crankshaft rotary- valve engine with radial porting and a plain-bearing crankshaft, typical of the many thousands of small diesels used for sport flying since the late 1940s.

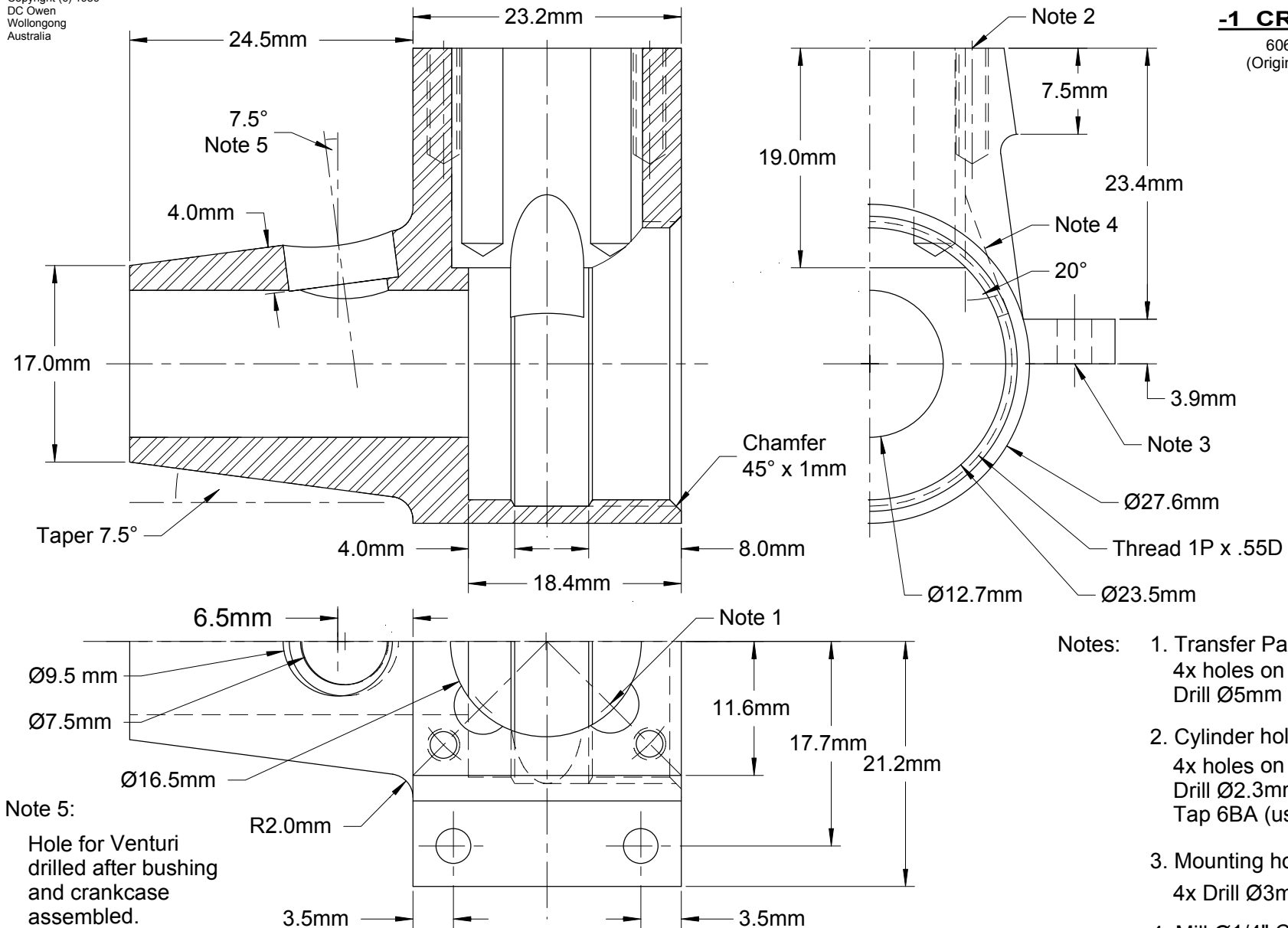
The MATE design incorporated a number of features to encourage first-time engine builders and, as a result, many MATEs have been successfully completed and run. A well-built example will turn an 8x4 prop at over 11,000 rpm and reports of MATE powered models have come from all over the world. A number of MATEs were also completed in the former Czechoslovakia and offered for sale ready-to-run.

The MATE is based on an extruded aluminium crankcase section, similar in concept to the famous COX engines, but a world-first for a home-built design. This extruded crankcase section was chosen for strength, accuracy and ease of setting-up and machining. The MATE extrusion was sold with a kit of selected materials and the detailed drawings which are reproduced in this book. A set of comprehensive instructions was included, which guided the builder through a construction sequence in which each part was carefully fitted to preceding parts. This eliminated the need for tolerancing, giving beginners an excellent chance of success.

The MATE extruded crankcase section is no longer available. However, several engines have been built to the MATE design, with crankcases machined from solid. The crankcase drawings do show sufficient detail for this approach. In addition, MATEs have been built in glow and spark-ignition versions by more experienced builders.


It is hoped that the inclusion of the MATE drawings in this book may encourage more first-time builders to think about the design of small diesels and to attempt construction of their own engine.

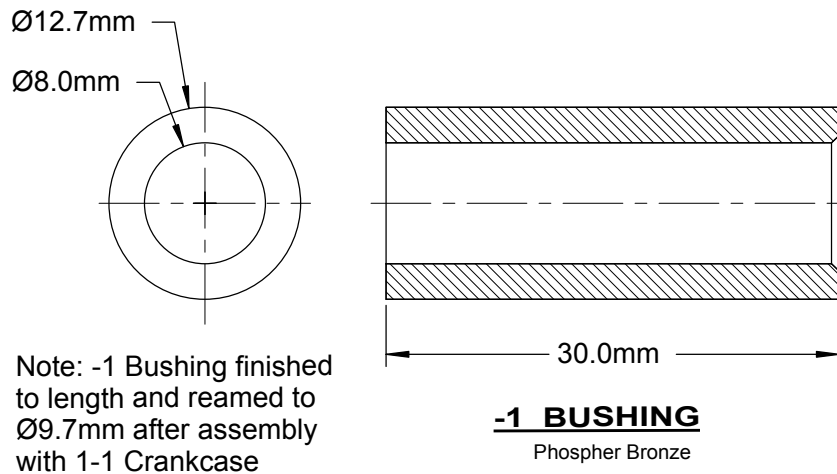
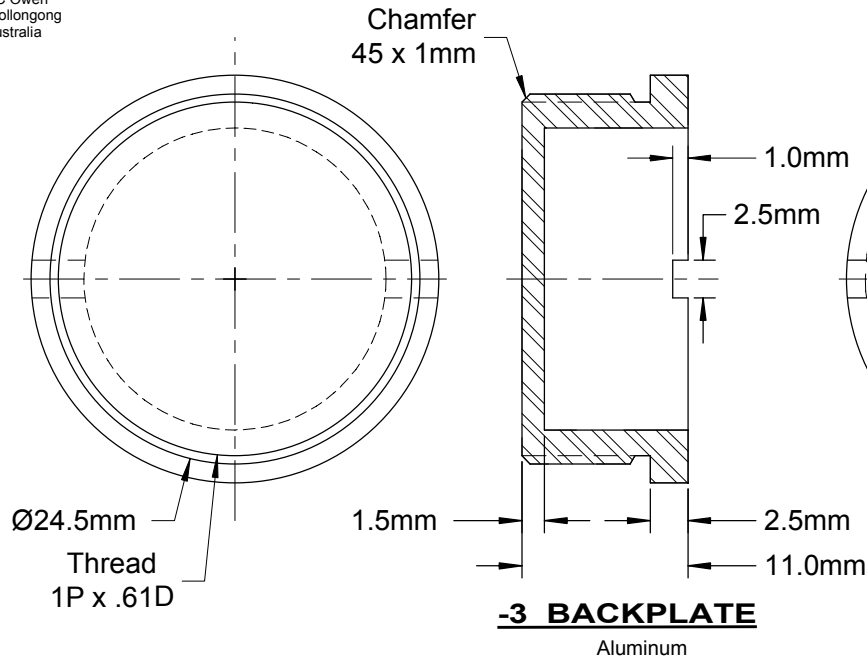




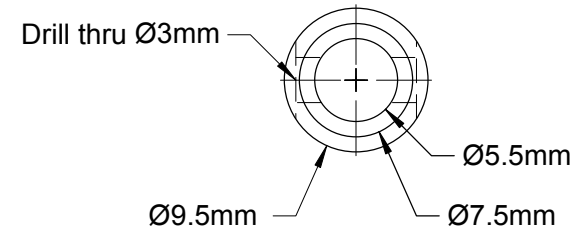
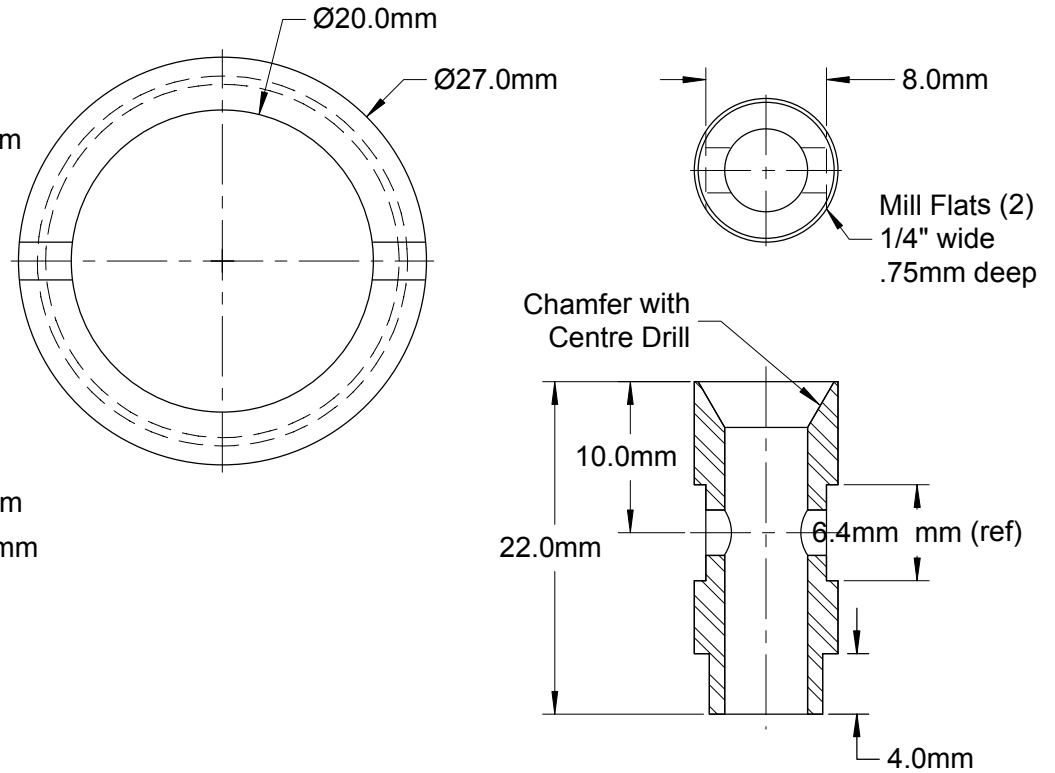
-1 CRANKCASE

6061-T6 Aluminum
(Original used Extrusion)


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN MATE 2cc Diesel
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			

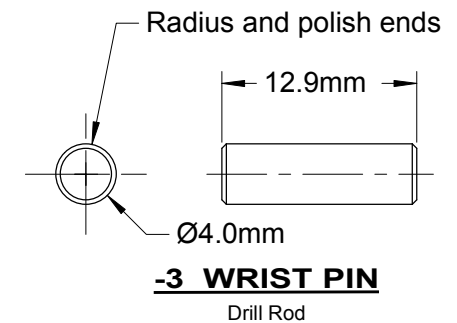
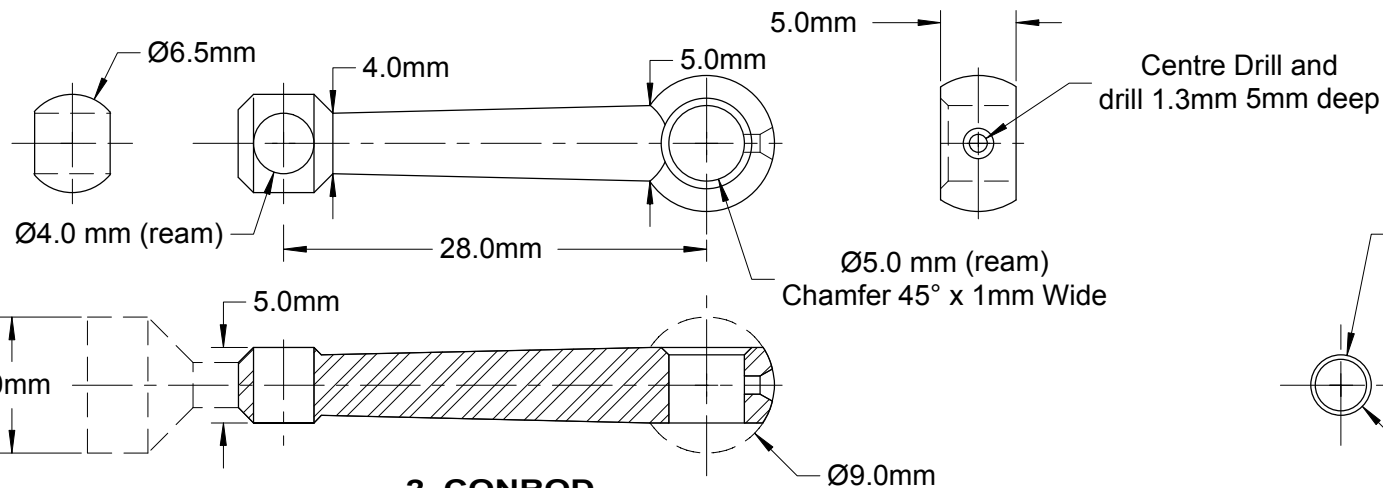
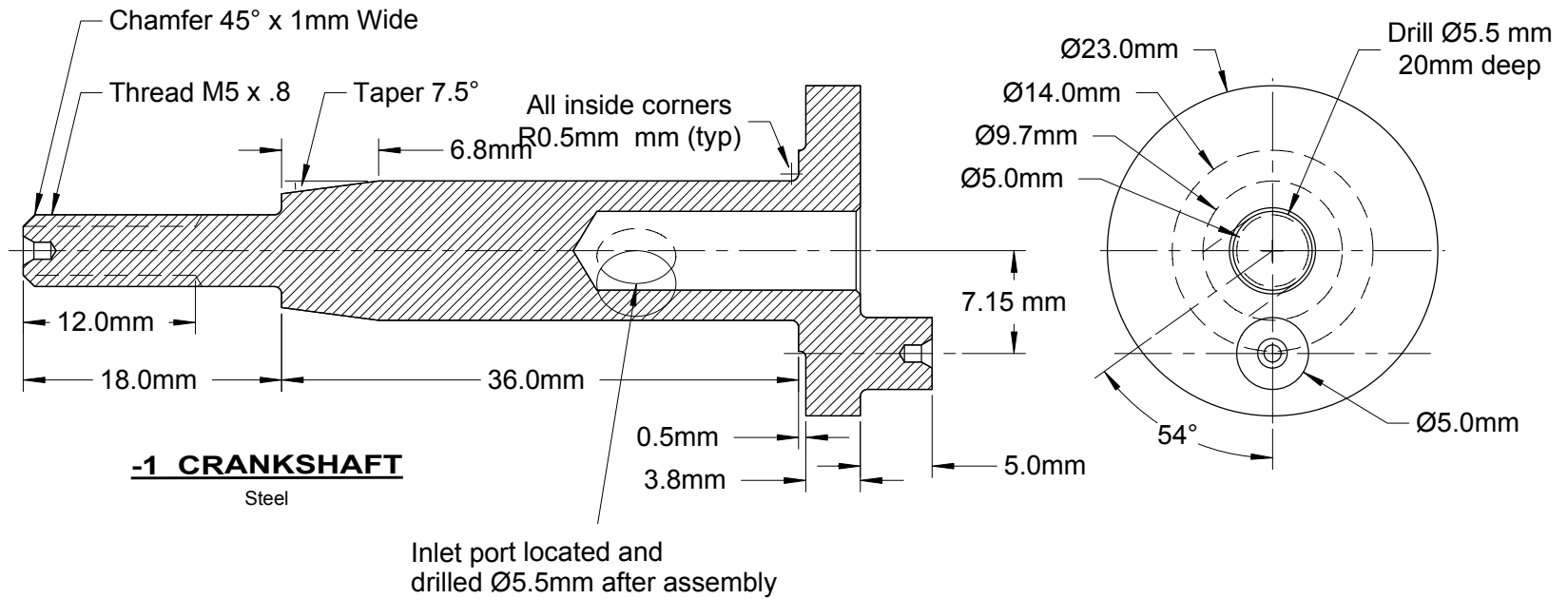


Note: -1 Bushing finished to length and reamed to Ø9.7mm after assembly with 1-1 Crankcase




Note: -2 Venturi is assembled to 1-1 Crankcase and -1 Bearing with Lok-Tite before finishing crankshaft bore to size.

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN MATE 2cc Diesel
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			Sheet 2 - Crankcase extra



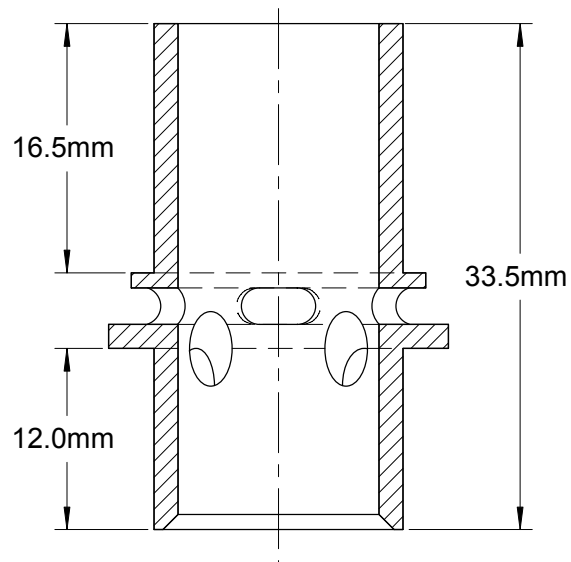
Note: Dotted lines show development prior to milling to 5mm

-2 CONROD
Aluminum

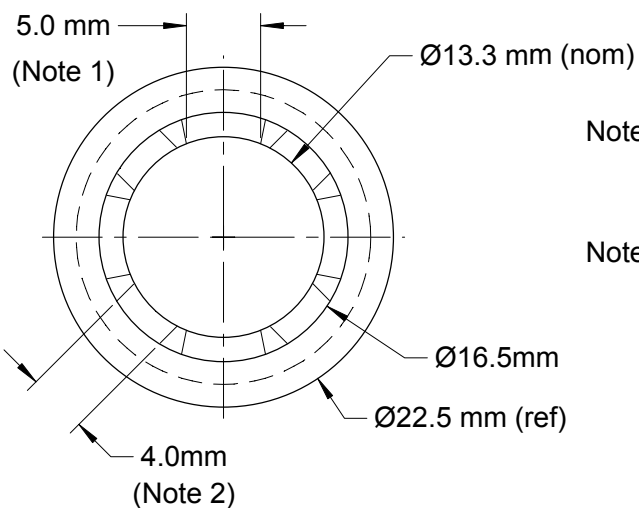
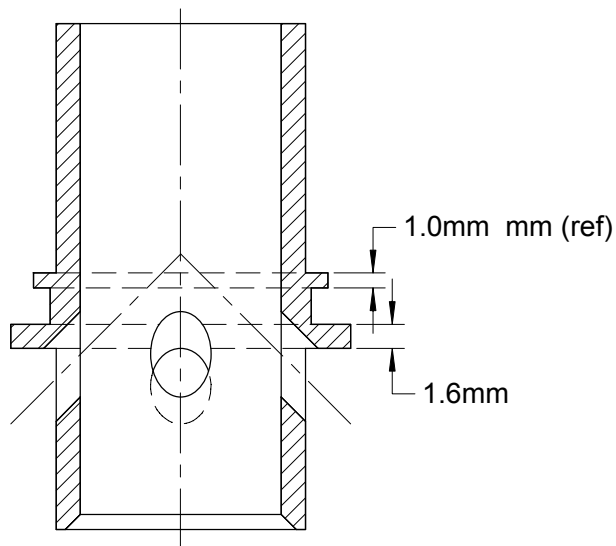
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN MATE 2cc Diesel
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER Sheet 3 - Crankshaft
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			



Section Through Exhaust Ports



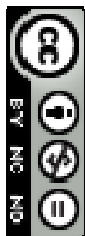
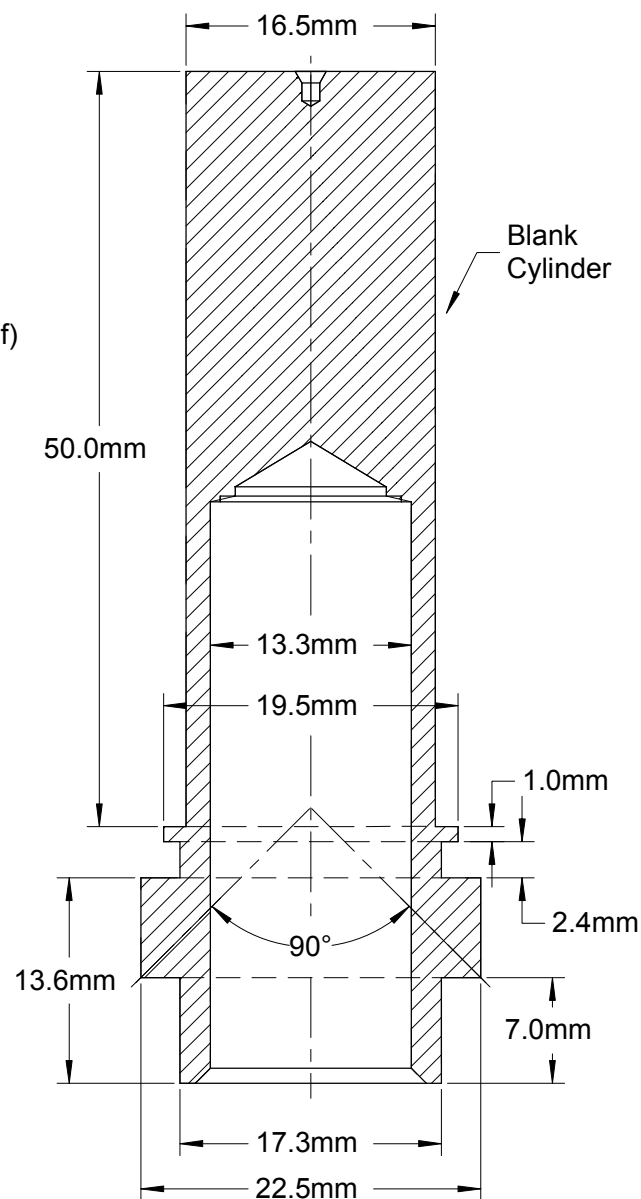
Section through Transfer Ports (Exhaust ports omitted for clarity)




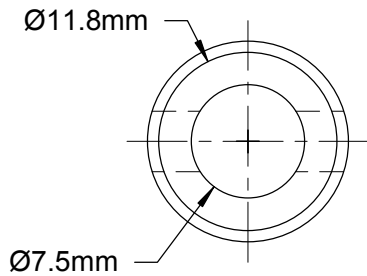
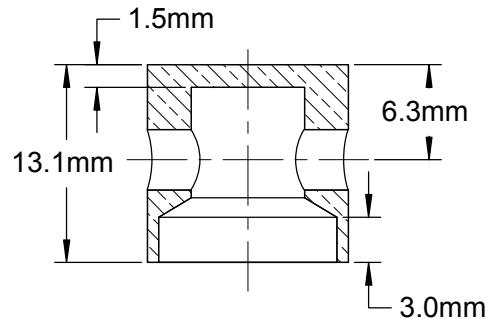
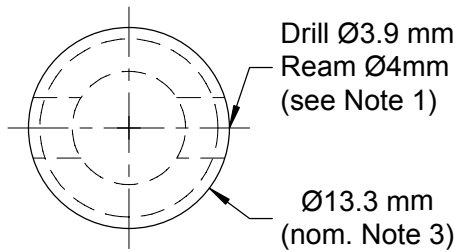
Note 1: Exhaust - cut 4x slots 2.4D x 5w on 90° spacing.

Note 2: Transfer - Drill 4x 4mm holes on 90° spacing, inclined 45° to cylinder axis centered on 22.5mm blank flange.

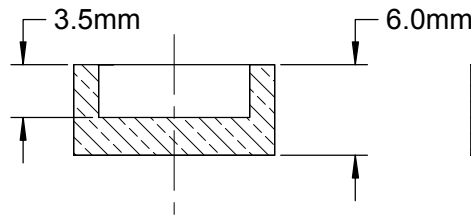
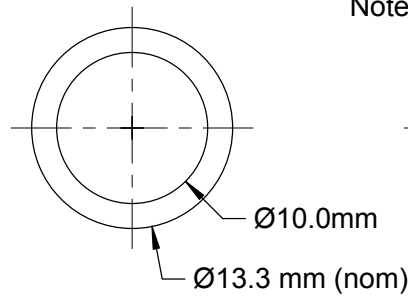
-1 CYLINDER
Steel



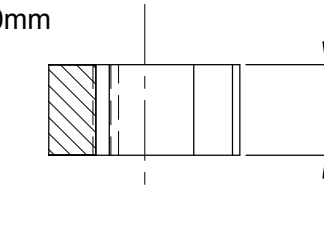
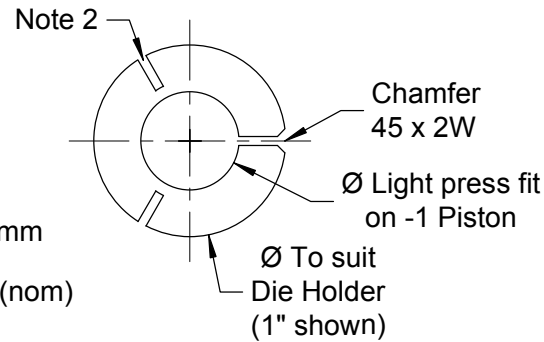
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN MATE 2cc Diesel
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER Sheet 4 - Cylinder
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			



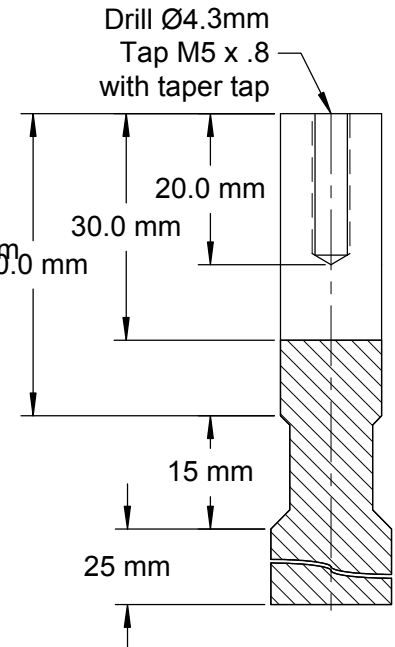
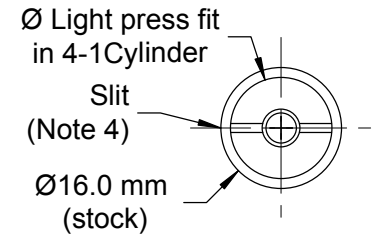
-1 PISTON
Cast Iron



-2 CONTRA-PISTON
Cast Iron



-3 PISTON LAP
Brass or Aluminum
SCALE 1:1



-4 CYLINDER LAP
Brass or Aluminum
SCALE 1:1

Note 1: Stop reaming short of full depth
for press fit of 3-3 Wrist pin

2: Hacksaw 3x slots
on 120° spacing.
Note only one slot
cut through to bore.

3: Actual diameter of piston
and contra-piston are bore
finished $\text{Ø} + 0.05 \text{ mm}$

4: Use M5 socket head
grub screw to expand lap.

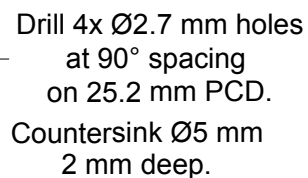
			MAT'L	As Noted	DO NOT SCALE DRAWING
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	



NAME
OWEN MATE 2cc Diesel

NUMBER
Sheet 5 - Pistons





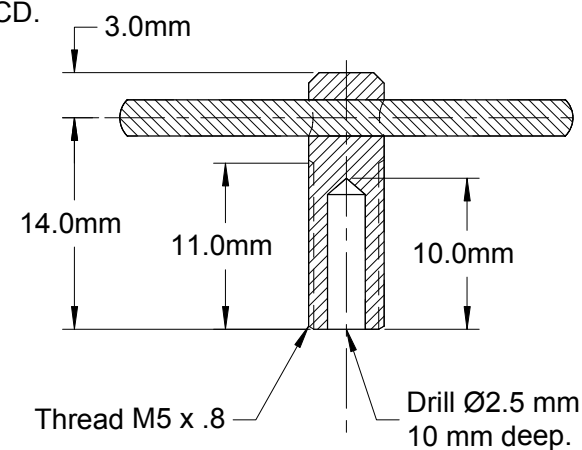
Technical drawing of a circular part with the following dimensions and features:

- Outer diameter: $\varnothing 32.0$ mm
- Inner diameter: $\varnothing 16.5$ mm
- Drill 4x $\varnothing 2.4$ mm holes on a 25.2 mm PCD.




Technical drawing of a shaft with dimensions: 32.0mm, 7.8mm, and 4.8mm.

6BA Cheesehead Screws (4 required)

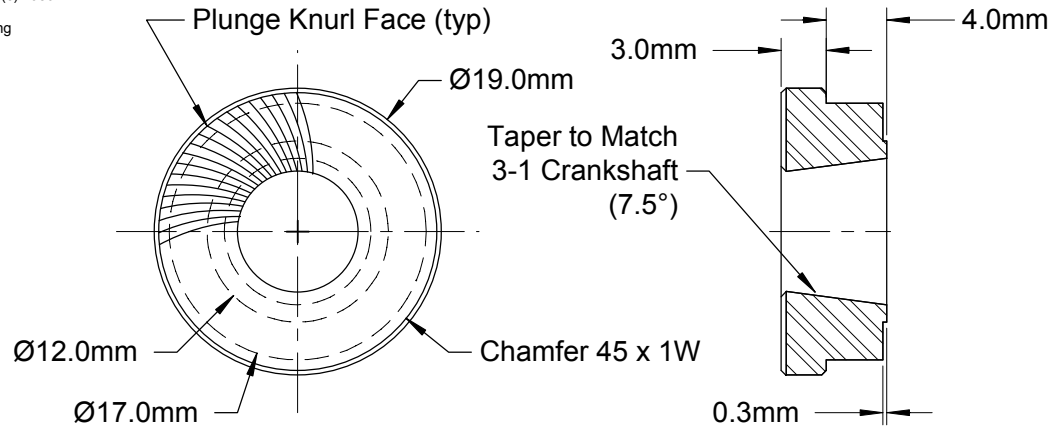


Drill Rod

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			Sheet 6 - Cylinder Head

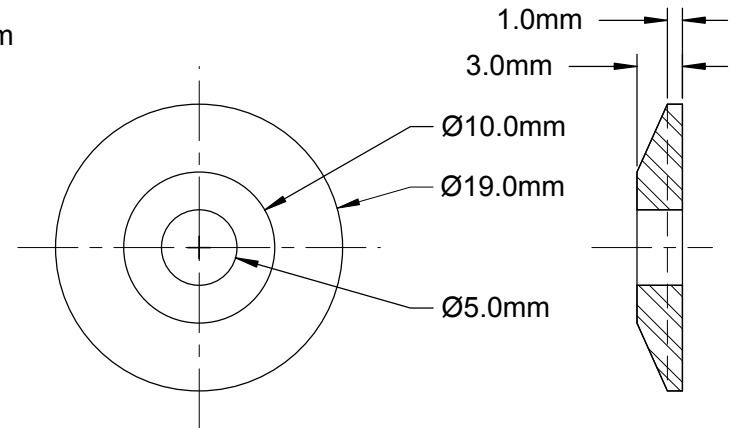


**MOTOR
BOYS**
(INTERNATIONAL)



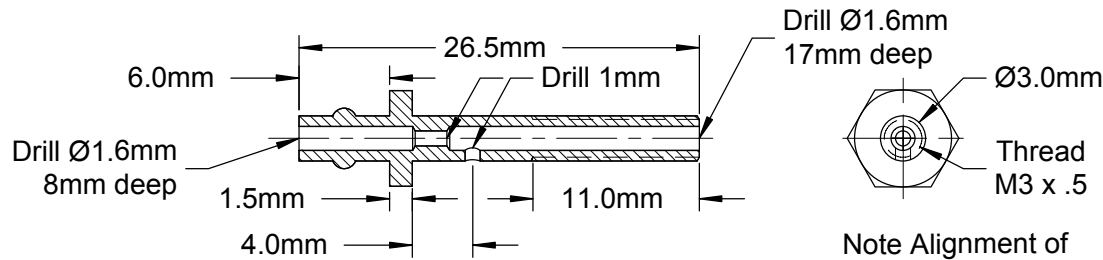
-1 PROP-DRIVER

Aluminum



-2 PROP-WASHER

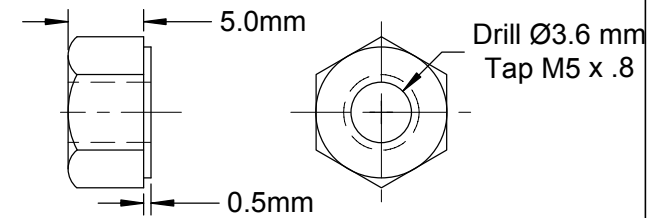
Aluminum



-4 SPRAY BAR

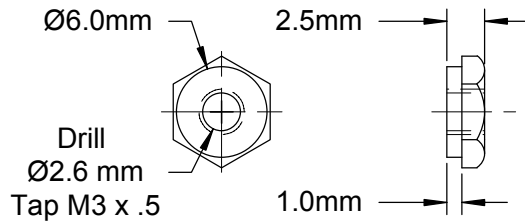
1/4" AF Hex Brass

Note Alignment of
fuel jet to Hex flats.



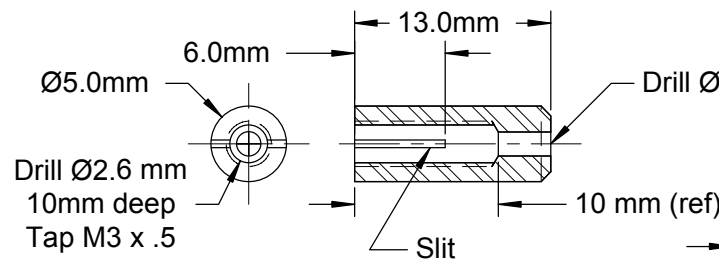
-3 NUT

Steel



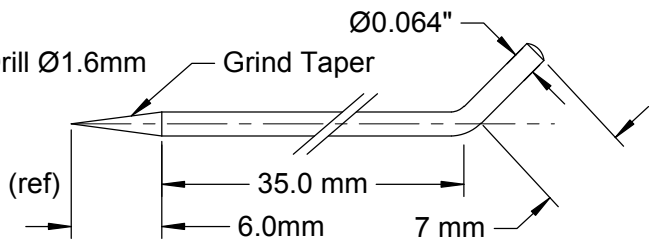
-5 SPRAY BAR NUT

1/4" AF Hex Brass




-6 NEEDLE THIMBLE

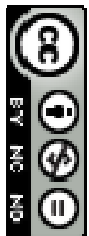
5mm Brass Stock

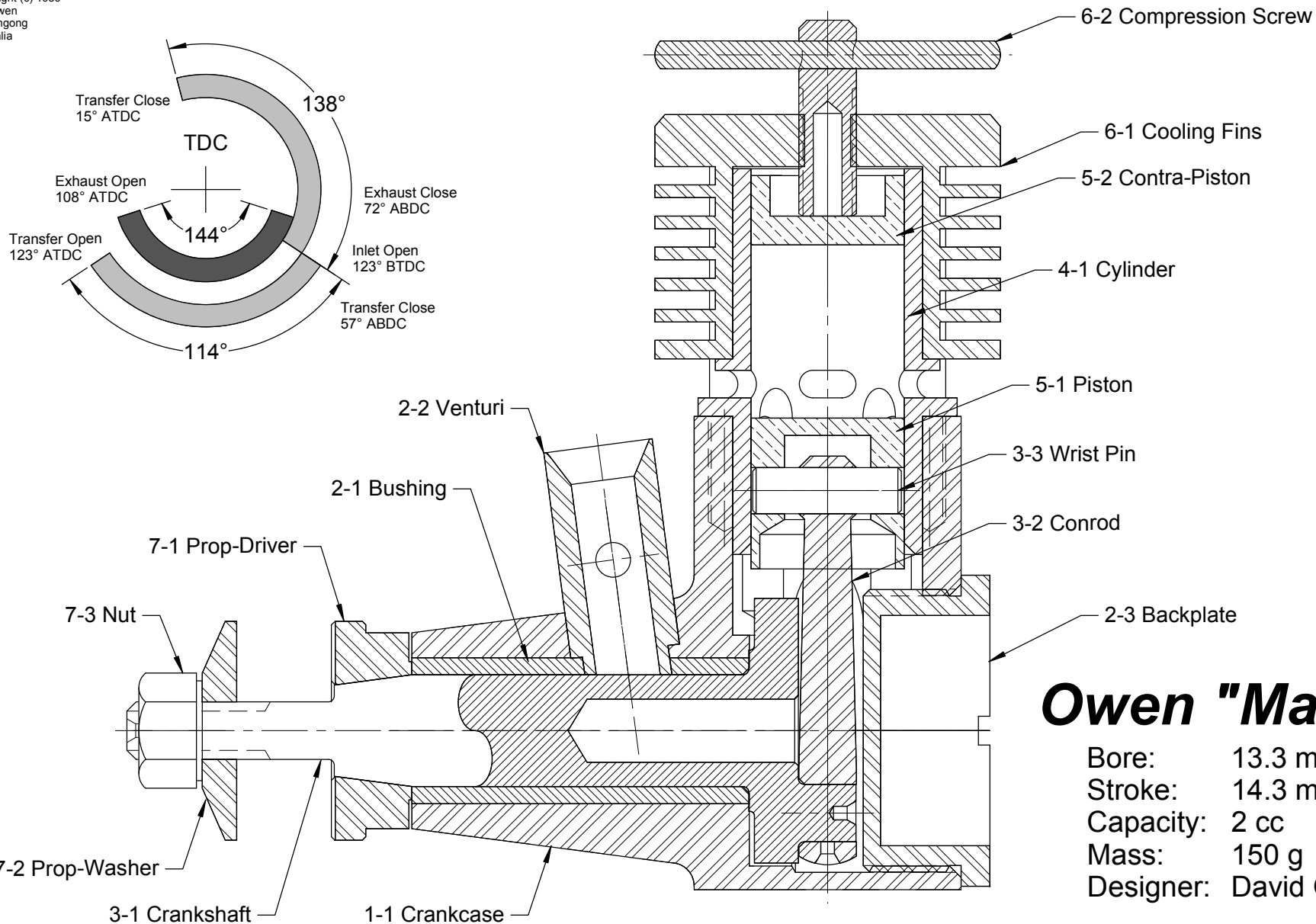


-7 NEEDLE

1/16" Music Wire


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN MATE 2cc Diesel
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			Sheet 7 - Needle Valve

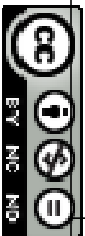




Owen "Mate"

Bore: 13.3 mm
Stroke: 14.3 mm
Capacity: 2 cc
Mass: 150 g
Designer: David Owen

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME OWEN <i>MATE</i> 2cc Diesel
			SCALE	2 X SIZE			NUMBER Sheet 8 - General Arrangement
			DRAWN	DCO 27 Apr 1989	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000			



THE DEEZIL ENGINE

by Roger Schroeder

The Deezil model airplane engine was originated by Gotham Hobby at 107 East 126 St., New York, NY, in about 1947 or 48. It was a .12 cu. in. diesel engine with a bore and stroke of .473 in. and .708 in. The designer and/or the manufacturer of the Deezil has not been identified. A July 1949 ad offers the Deezil for \$2.95. In an April 1955 ad, the price had gone down to \$1.95.

The name of Gotham Hobby is closely linked with America's Hobby Center (AHC) because both organizations were founded by brothers of the Winston family. AHC was started by four Winston brothers before WW 2. When WW 2 started, two brothers took their share of AHC and went into the service. When they returned the remaining two brothers were not interested in having the returning brothers rejoin AHC. Therefore, the returning two brothers started Gotham Hobby.

Despite the assurances in each ad that each Deezil was factory tested, only a few owners ever got their engines to run. As can be expected from the price, the Deezil was made cheap. Although the design was current for the time and similar to the classic Swiss and Italian engines, the execution was bad. Nothing fit well and the compression was usually insufficient to run. The Deezil was selected by the Motor Boys because it is an infamous engine! Ron Chernich did the Motor Boy drawings from casting kit drawings developed by Roger Schroeder.

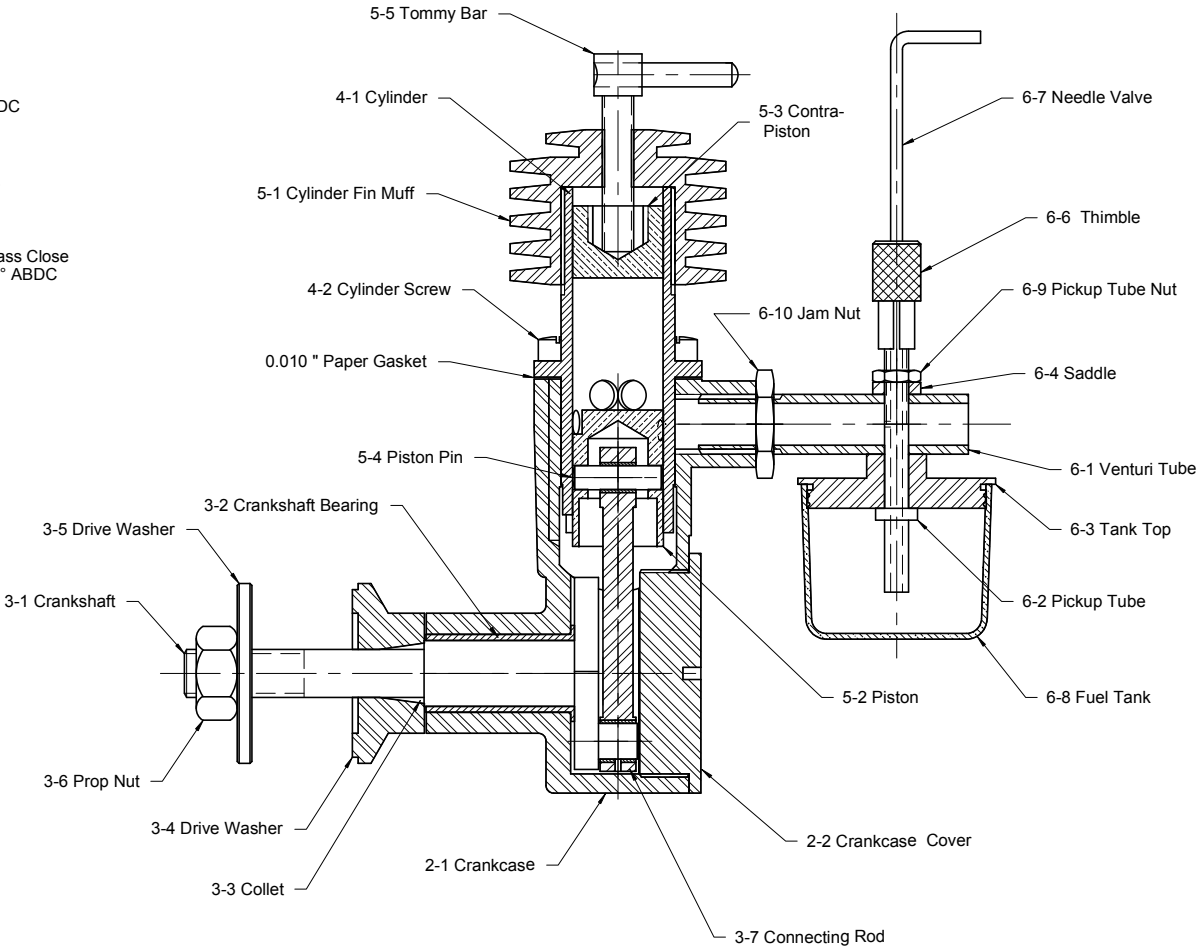
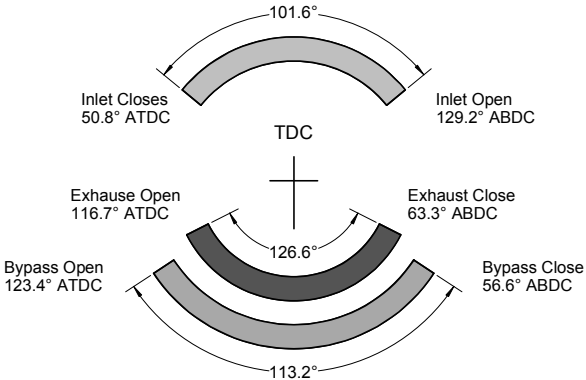
The Motor Boys wanted to make an engine that looked like the original Deezil, but unlike the original, it had to run well. For this reason the scavenging arrangement of the Mills 2.5 cc engine was selected and the port timing of Gordon Burford's reproduction Deezil used. The prop driver is secured with a collet instead of a flat on the shaft. A tank was added although there is no record of the original being supplied with a tank. The compression screw is turned with a "tommy bar" handle because this was shown in all the ads. The usual production engine had a 90 deg. bend in the compression screw that served as a handle. The crankcase was sand cast using an original die cast case as a pattern.

A lot of testing and design development has gone into this version of the Deezil. The result is a reliable design that is easy starting and will turn a 10-5 prop at 6000 rpm and a 9-4 at almost 8000 rpm. Deezils have been built by Bert Striegler, Ron Chernich and Roger Schroeder. Many more have been built from casting kits.






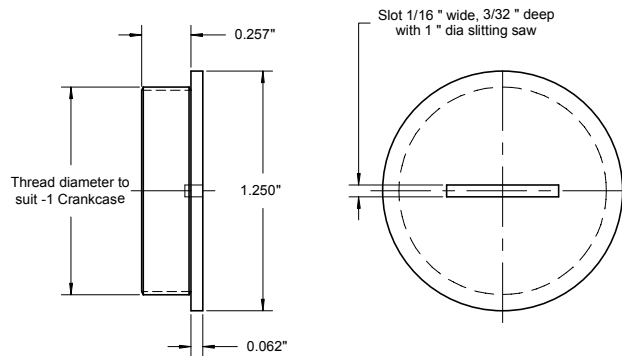
DEEZIL Timing Diagram



GOTHAM HOBBY "DEEZIL"

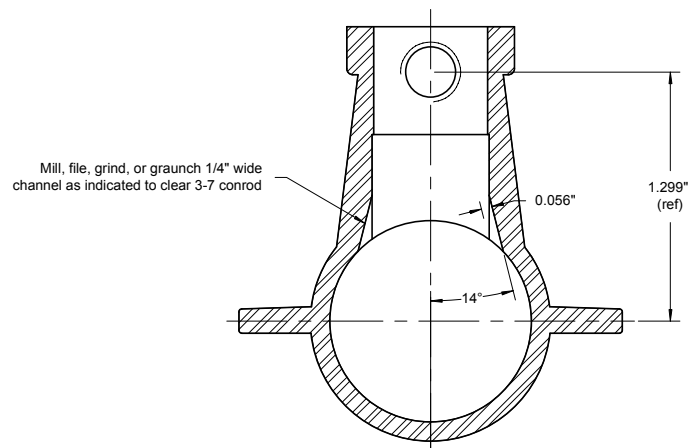
Bore: 0.473 in.
Stroke: 0.708 in.
Capacity: 0.1244 cu in.

			MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	FULL SIZE			GOTHAM HOBBY "DEEZIL" ENGINE
			DRAWN	RJS Feb 1994			NUMBER
15 Jan 2000	Timing diagram added	BMBI	CAD	BMBI Jan 1999	NEXT ASSEMBLY		SHEET 1 - GENERAL ARRANGEMENT
DATE	CHANGE	BY					

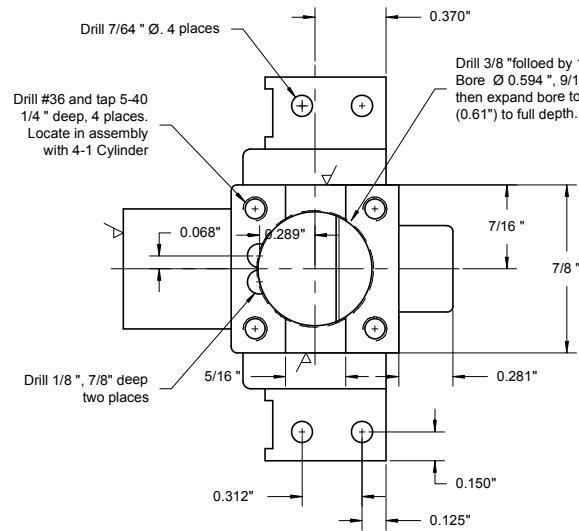


-2 CRANKCASE COVER

Aluminum Casting

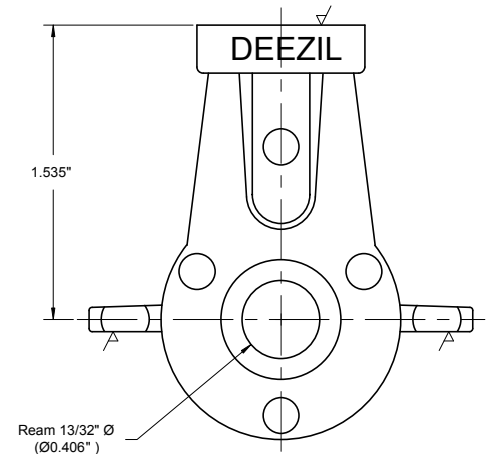
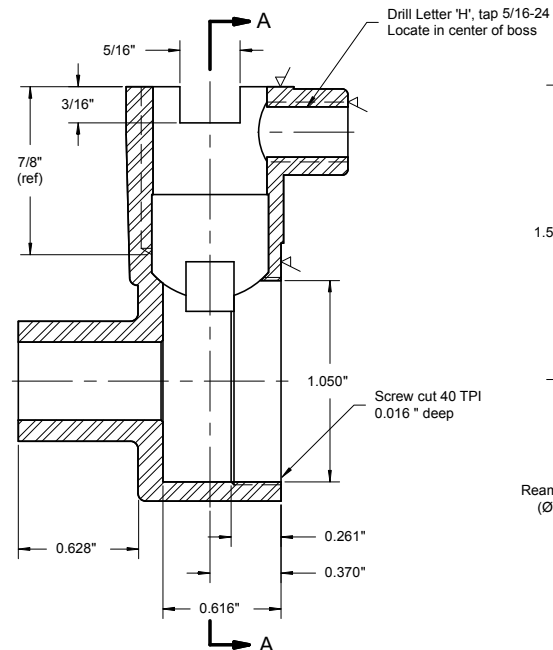


Section A-A




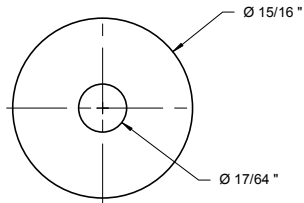
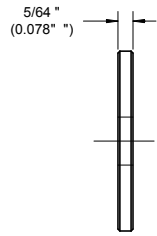
-1 CRANKCASE

Aluminum Casting



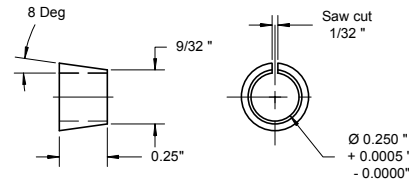
Machine

			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME GOTHAM HOBBY "DEEZIL" ENGINE
2012-09-07	Add Section A-A with conrod clearance; correct lower cylinder bore diameter dimension.	BMBI	SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
2008-11-17	Add missing tap drill size; standardize x-section.	BMBI	DRAWN	RJS Feb 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 1999			SHEET 2 - CRANKCASE AND COVER



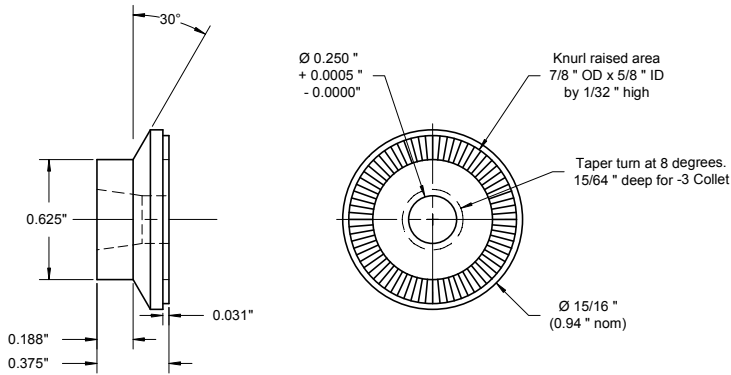
-5 FRONT WASHER

Steel (case harden)



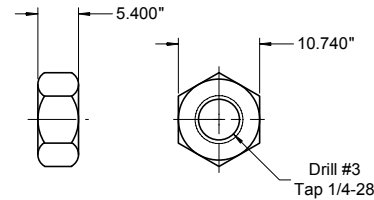
-3 COLLET

Soft Brass



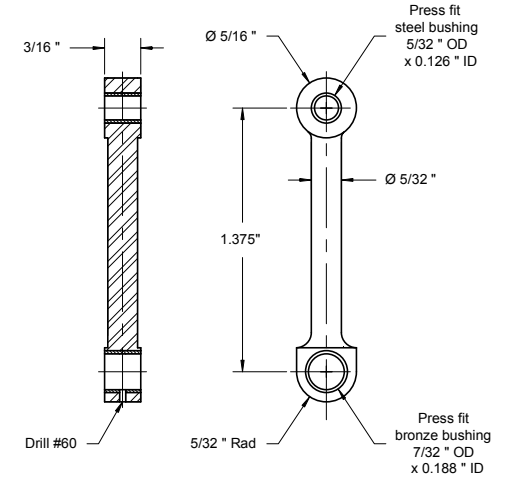
-4 DRIVE WASHER

Aluminum



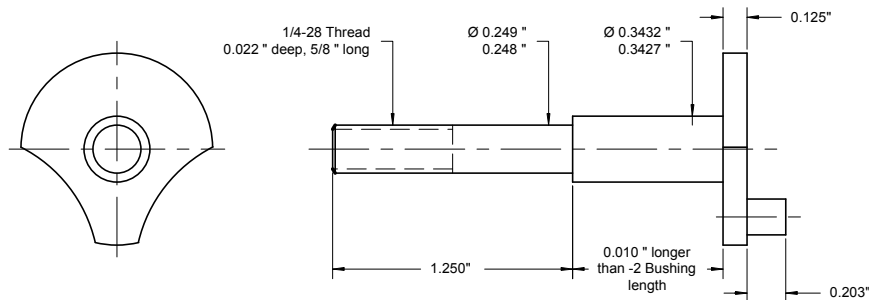
-6 PROP NUT

1/2" AF Hex Steel



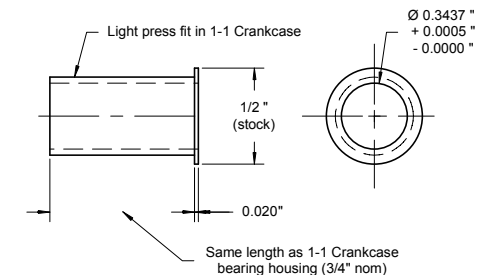
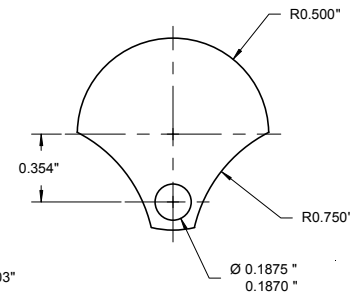
-7 CONNECTING ROD

Alloy Aluminum




-1 CRANKSHAFT

Leaded Steel

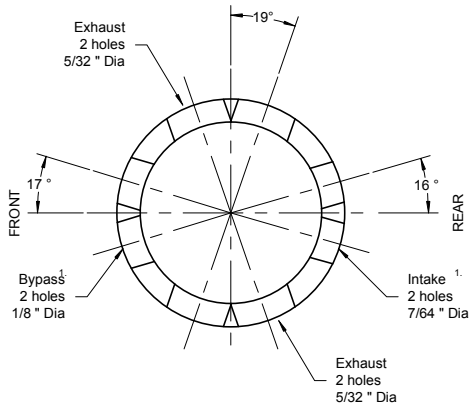


-2 CRANKSHAFT BEARING

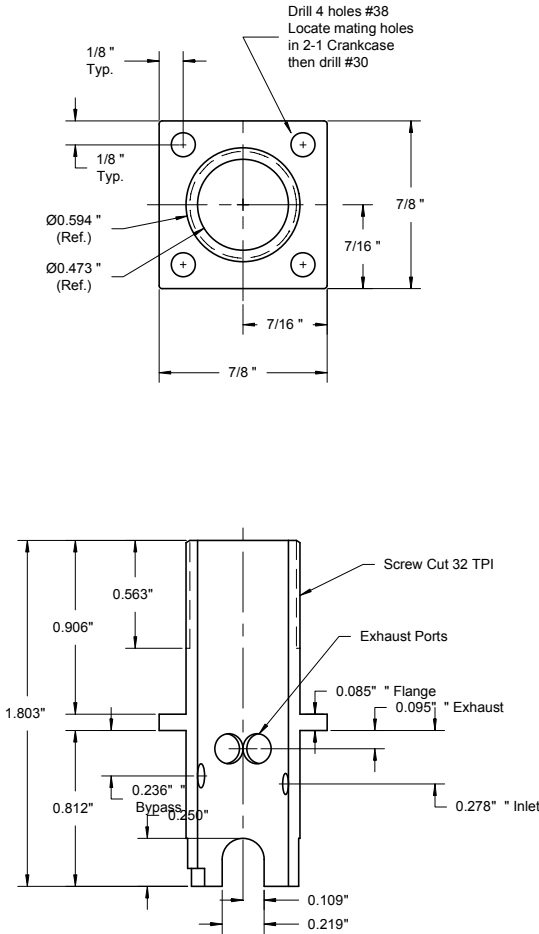
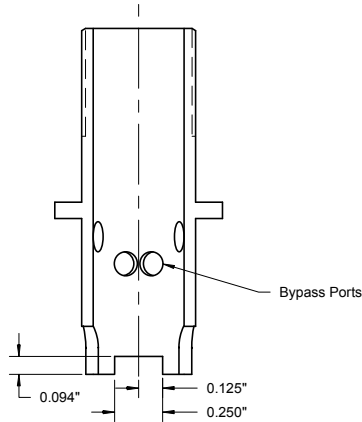
Bronze

			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		GOTHAM HOBBY "DEEZIL" ENGINE
			DRAWN	RJS Apr 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 1999			SHEET 3 - CRANKSHAFT AND ROD

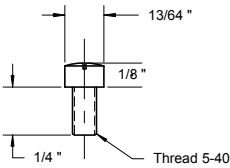




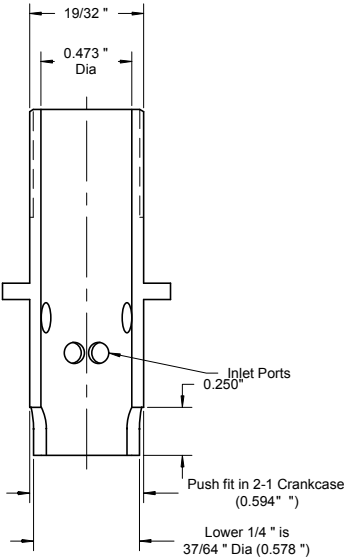
PORT DETAILS
2 X size
Ports are shown
in a single plane




-1 CYLINDER
Leaded Steel



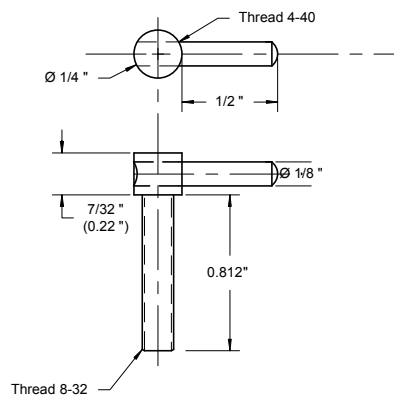
-2 CYLINDER SCREW
Steel (four required)



Note 1:
Leave a bridge between the
Inlet and bypass Ports.

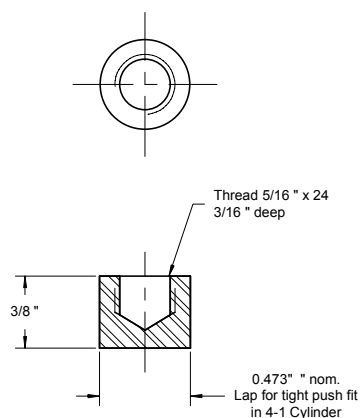
			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		GOTHAM HOBBY "DEEZIL" ENGINE
			DRAWN	RJS Sept 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 1999			SHEET 4 - CYLINDER

CC BY NC ND



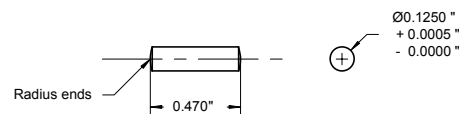
-5 TOMMY BAR

Steel



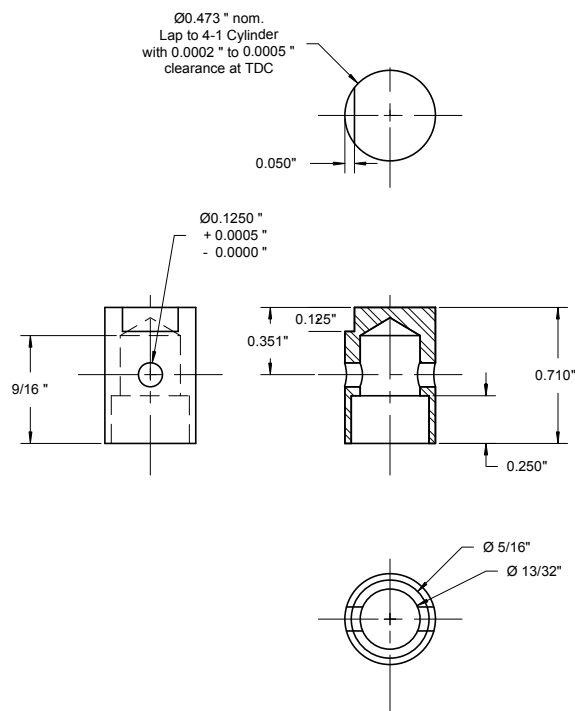
-3 CONTRA PISTON

Steel



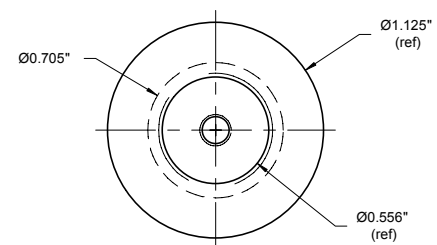
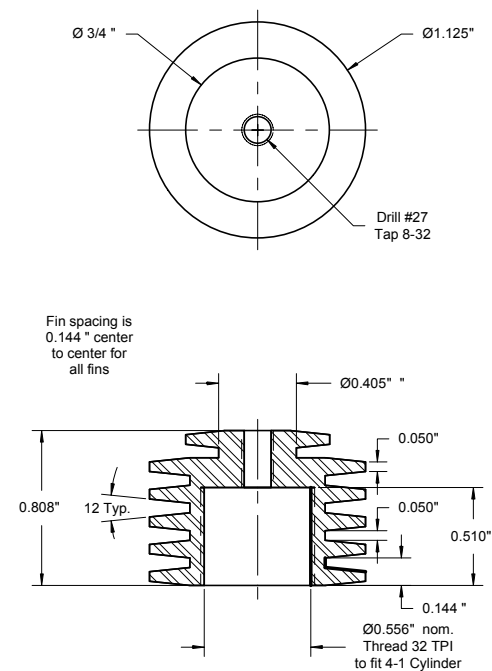
-4 PISTON PIN

Bronze




-2 Piston

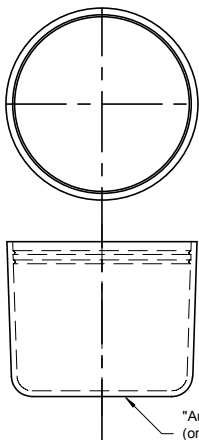
Leaded 4130 Steel
or Cast Iron



-1 CYLINDER FIN MUFF

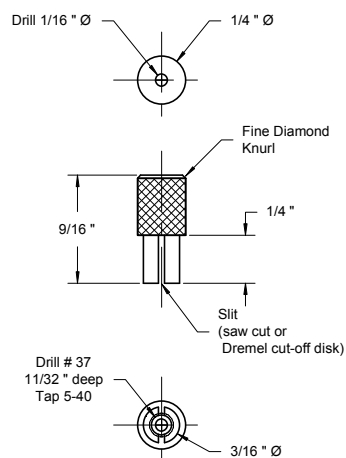
Aluminum

			MAT'L		DO NOT SCALE DRAWING <small>WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES</small>	 MOTOR BOYS <small>(INTERNATIONAL)</small>	NAME
			SCALE	FULL SIZE			
			DRAWN	RJS July 1994	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	BMBI Jan 1999			NUMBER SHEET 5 - PISTONS



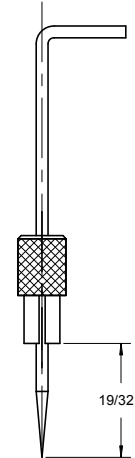
-8 FUEL TANK

Plastic Injection Moulding

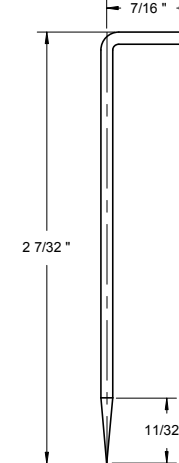


-6 THIMBLE

Brass

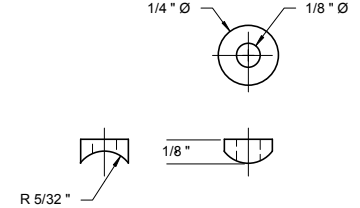


NEEDLE VALVE ASSEMBLY



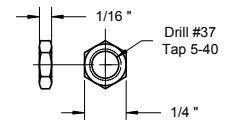
-7 NEEDLE VALVE

1/16" Music Wire



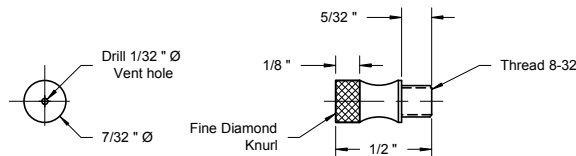
-4 SADDLE

Aluminum



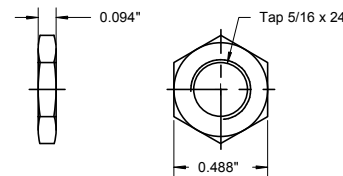
-9 FUEL PICKUP NUT

1/4" AF Hex Brass



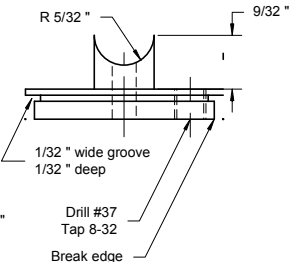
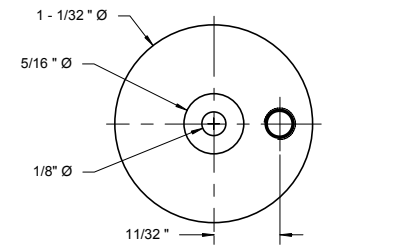
-5 FILLER CAP

Brass



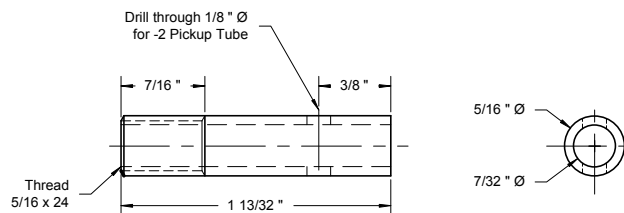
-10 JAM NUT

1/2" AF Brass Hex



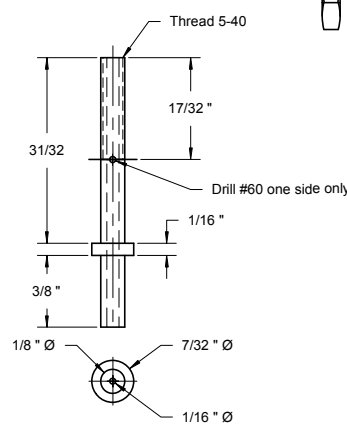
-3 TANK TOP

Aluminum Casting



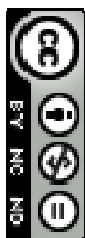
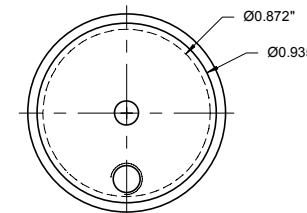
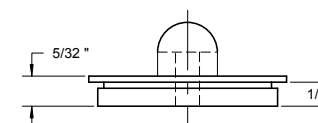
-1 VENTURI TUBE


Aluminum

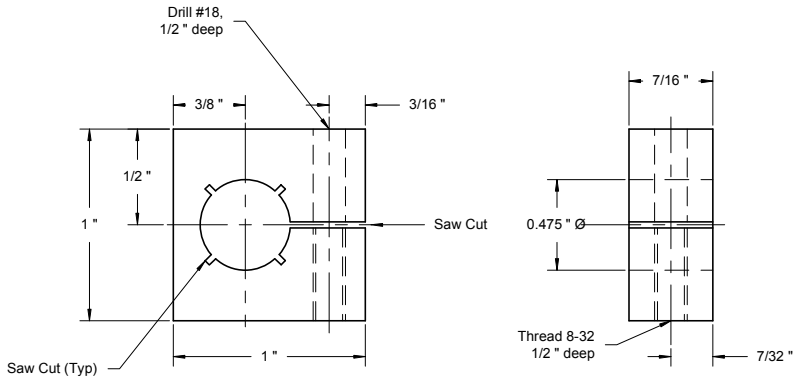


-2 PICKUP TUBE

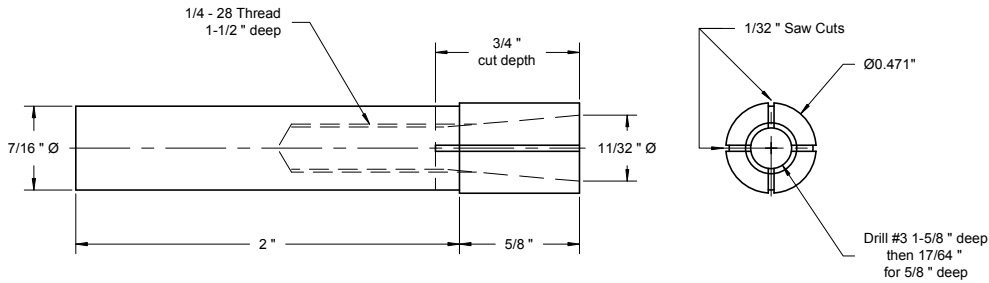
Brass



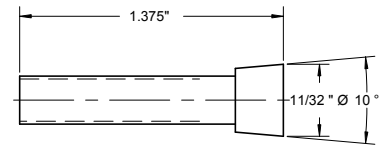
			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		GOtham HOBBY "DEEZIL" ENGINE
			DRAWN	RJS Oct 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 1999			SHEET 6 - FUEL SYSTEM COMPONENTS




PISTON LAP
Brass, Bronze, or Aluminum



CYLINDER LAP
Brass, Bronze, or Aluminum



CYLINDER LAP EXPANDER
Modified 1/4-28 Socket Head Screw

			MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	FULL SIZE			GOTHAM HOBBY "DEEZIL" ENGINE
			DRAWN	RJS Jan 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI Jan 1999			SHEET 7 - PISTON AND CYLINDER LAPS

The Mite Diesel

by Bert Striegler

The Mite diesel was designed by Howard Manderville sometime in 1946 and was first advertised in the February, 1947 issue of Model Airplane News. Commercial production of this engine was originally carried out by the Eagle Manufacturing Company of Brooklyn, New York during 1947. The Mite was an immediate success and the Eagle production facility was quickly overwhelmed with orders. A separate organization, The Mite Distributing Company, was then organized to expedite production and distribution of the engine. Eagle Manufacturing and The Mite Distributing Company were both operated by Walt Schroeder, one of the true pioneers of the model airplane industry and a noted author and editor. It is a little known fact that Walt was also the production manager for Ben Shereshaw's Bantam engine produced in Nutly, New Jersey.

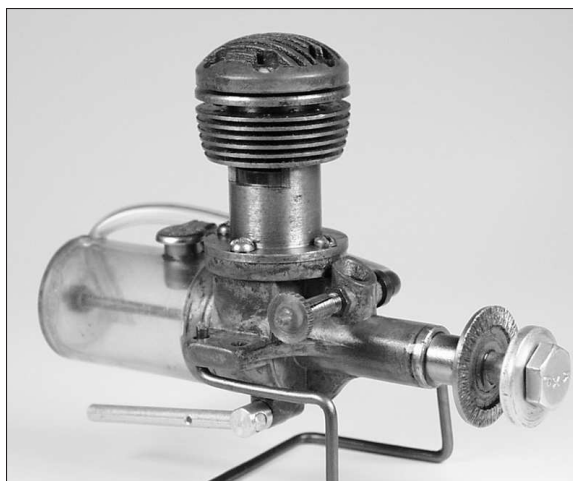
Bill Seidler was hired as the production chief of the Mite operation. Bill was known as a master machinist who also had a lot of production savvy. Bill, too, is one of the real pioneers in the field of model engine production and design. Norm Rosenstock, another modeling pioneer, came aboard as an apprentice doing crankcase machining, but after a couple of weeks Walt asked Norm if he would like to move to the engine testing room. Norm accepted this new assignment and in his own words, said, "I ran and tested about 5,000 engines. Each engine was started and run about 3 minutes, and then hand started by me before it was cleaned up and shipped out. If your engine has a slight depression on top of the right mounting lug, then I had run that engine. The mark was made by the test mount that used a cam-lock to hold the engine in place."

Total production of the Mite Diesel was about 6,000 units. The engine was produced in 1947 and part of 1948 before it was overwhelmed by Ray Arden's glo plug. Several glo versions of the Mite were produced, but to no avail and production of the engine ceased in 1948. The remains of the project were sold to Mercury Models of Brooklyn and assembled engines were sold until supplies were exhausted. Thus ended the saga of one of the true American pioneer production diesels, an engine that in many ways was ahead of its time both in design and performance. The Mite is a handsome engine of modern appearance.

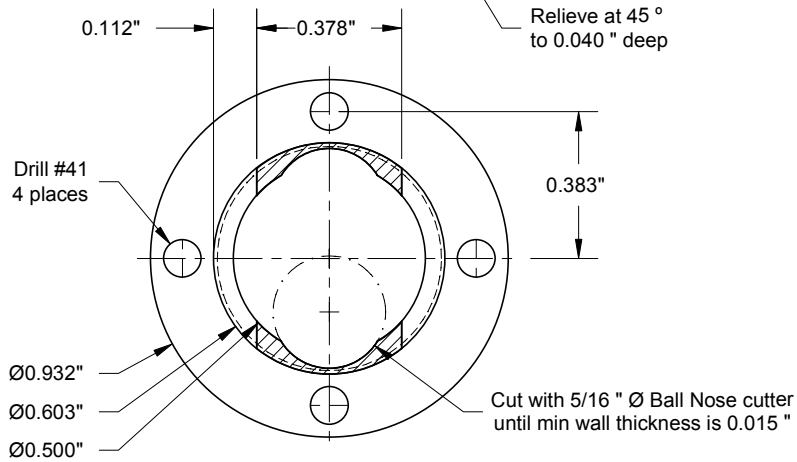
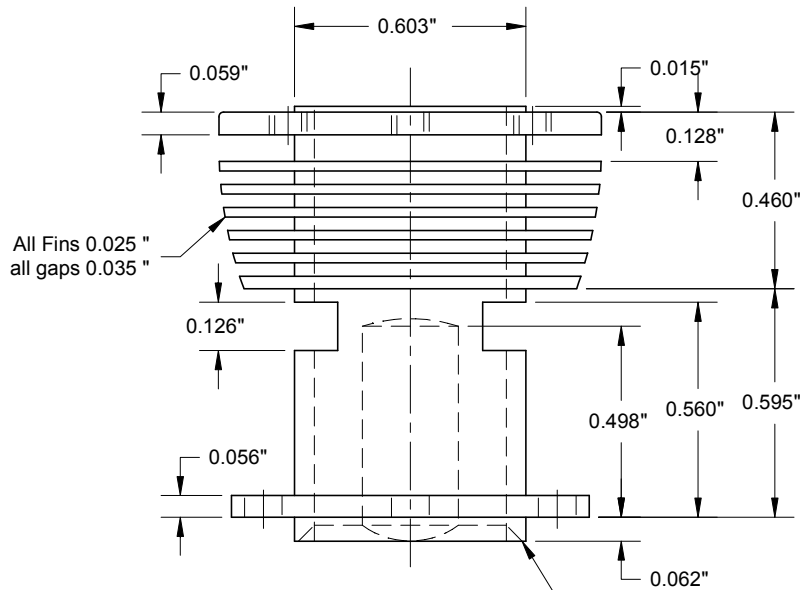
The Mite had a magnesium die-cast crankcase and fixed-compression cylinder head. The cylinder was leaded steel and the piston was hardened steel with a ball joint rod connection. The rod was steel, unbushed, and of circular cross section. The crankshaft was hardened steel and ran in a bronze bushing. Diesel versions of the engine had a tubular plastic tank attached to the backplate. Some glo versions were fitted with a metal tank. An unusual feature was a lever-operated valve on the bottom of the case that could be used as a cut-off or a throttle. Handled properly, the valve could be partly opened to bring the engine down to a slow speed without quitting. With the valve wide open, it operated as a cut-off.

The Mite diesel was a strong performer and held the national open record in class I control line speed at 67.6 MPH in 1947. The manufacturer claimed it would turn a 8x6 prop 9,000 RPM. Recommended fuel was 50% ether, 50% SAE 20 motor oil, a typical fixed-head diesel fuel in that day and time. The engine ran well on this mix and was not difficult to handle.

Charlie Bruce, past president of MECA, says that the Mite is still one of his favorite engines. He still uses one, but don't try to talk him out of it. You won't get it, that's for sure!

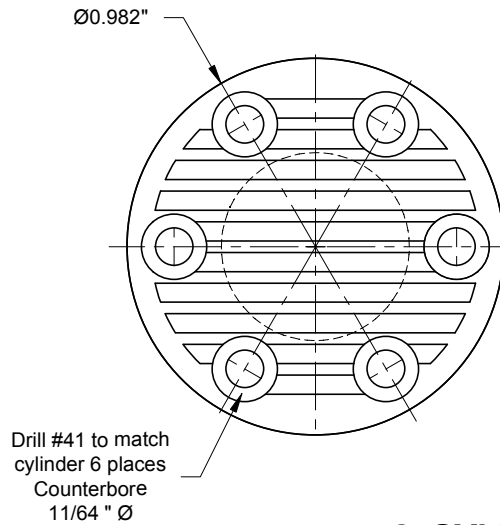


NOTE: Drawing # 6 is not used and is not a part of the set. The drawing #s are 1,2,3,4,5 and 7.



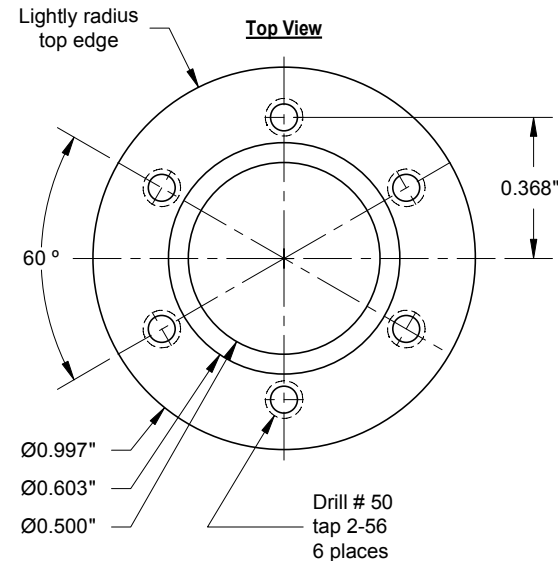
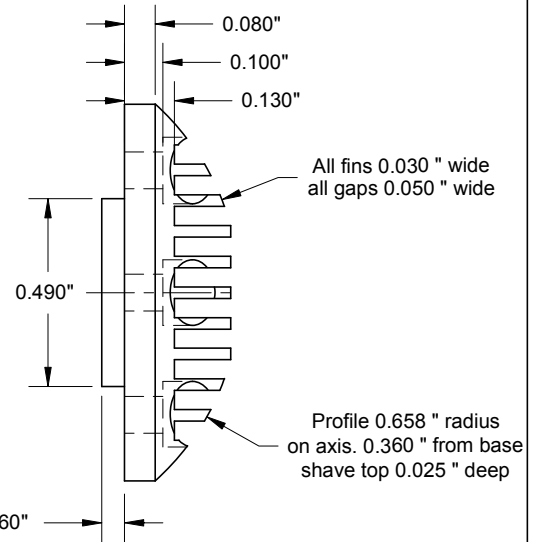
Section thru Exhaust Ports

-1 CYLINDER
Leaded Steel




-2 CYLINDER HEAD

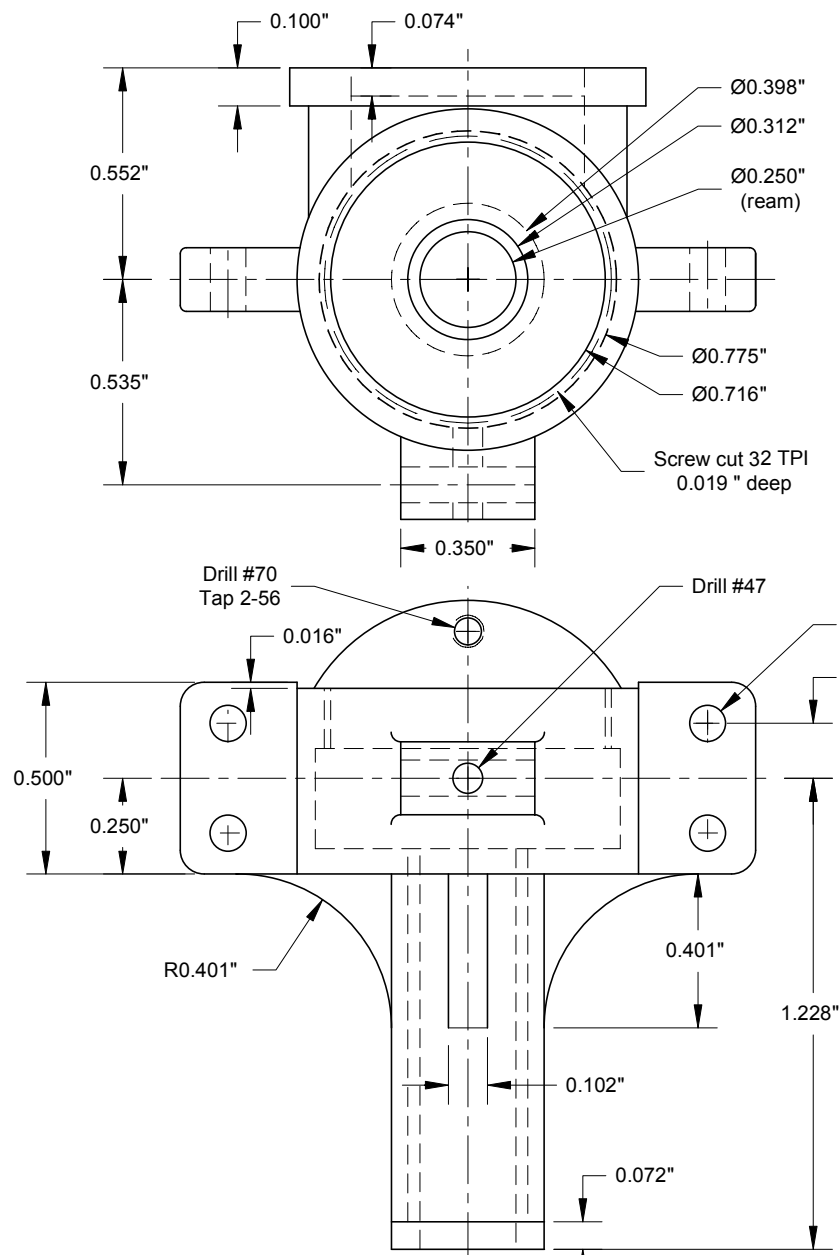
Magnesium casting



Fin	Diameter
1	0.997 "
2	0.996 "
3	0.988 "
4	0.973 "
5	0.952 "
6	0.924 "
7	0.889 "

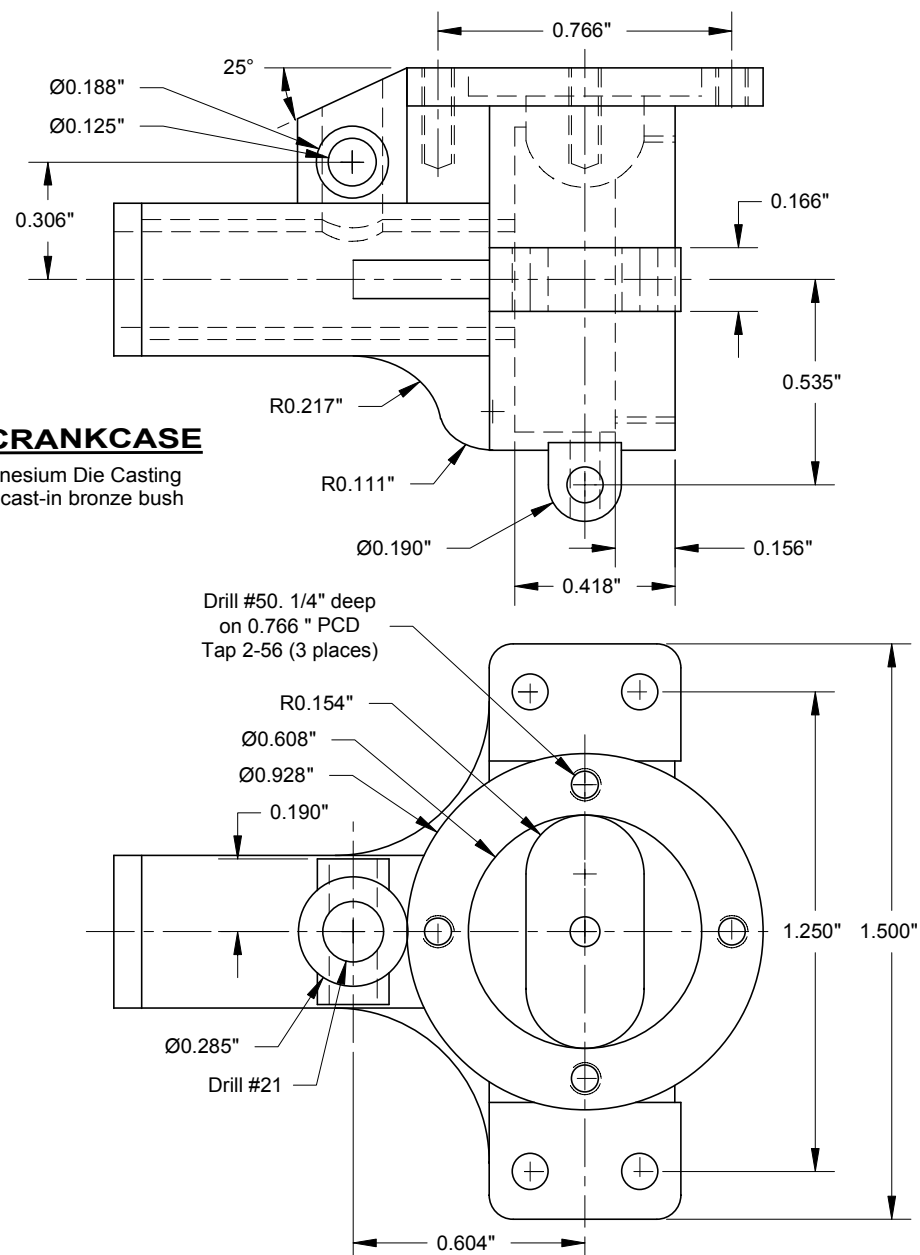
Fin profile formed on 1.130 " radius center 0.630 " from axis, 0.970 " from bottom of cylinder flange, or blend from maximum fin diameter table above.


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME Mite Mfg Co .098 Diesel 1949
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	PMB 1-31-1998	NEXT ASSEMBLY		NUMBER Sheet 1 - Cylinder Assembly
DATE	CHANGE	BY	CAD	PMB 2-22-1998			

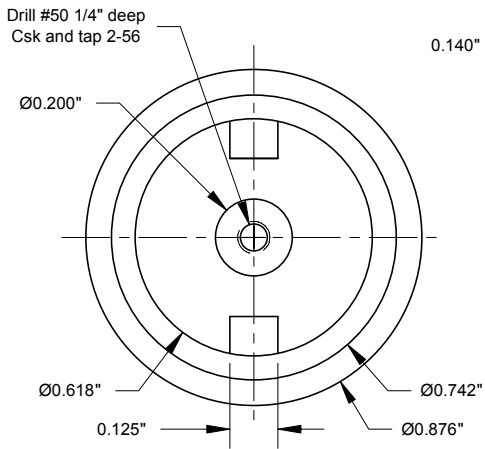


-1 CRANKCASE

Magnesium Die Casting
with cast-in bronze bush

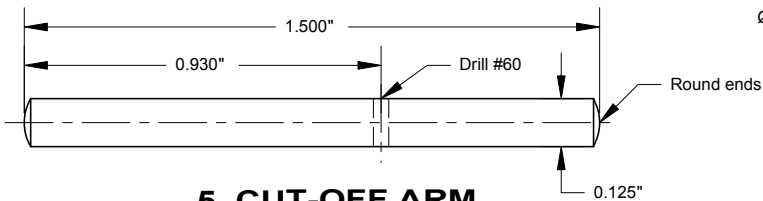


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Mite Mfg Co .098 Diesel 1949
			SCALE	2 X SIZE			NUMBER Sheet 2 - Crankcase
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		
			CAD	PMB 1-1-98			
DATE	CHANGE	BY					



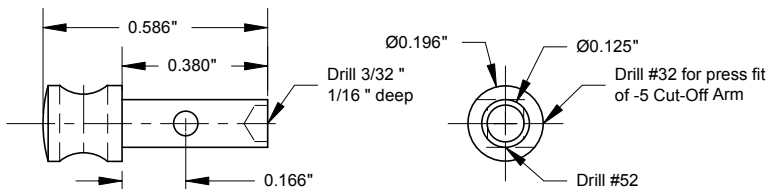
-6 BACKPLATE

Magnesium Casting



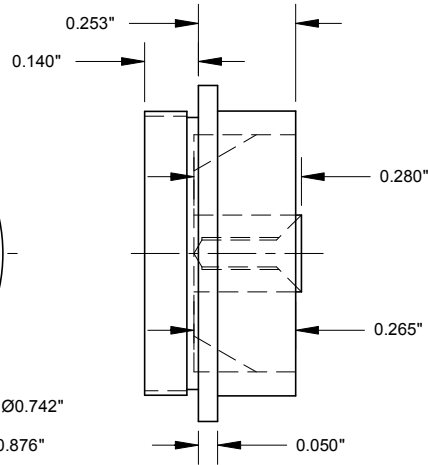
-5 CUT-OFF ARM

1/8 " Aluminum Rod



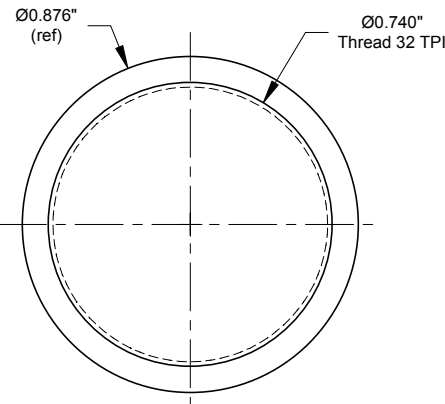
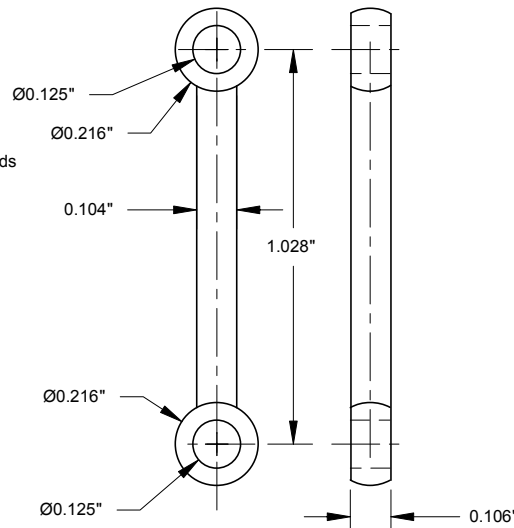
-4 CUT-OFF VALVE

Aluminum



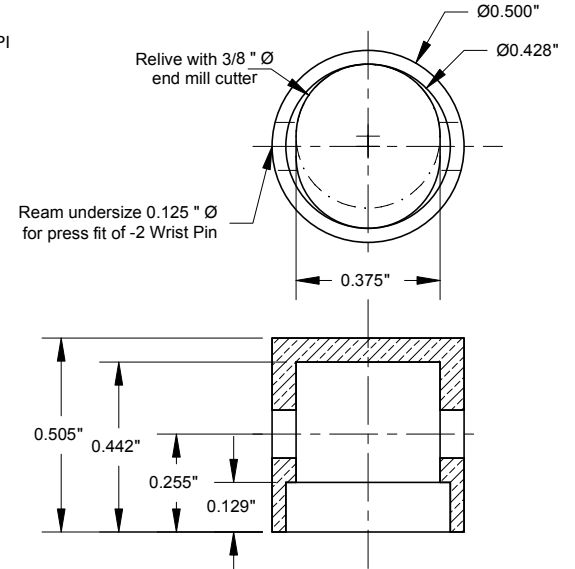
-3 CONNECTING ROD

Aluminum



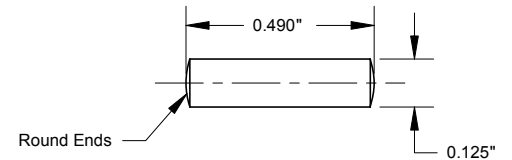
-1 PISTON


Cast Iron

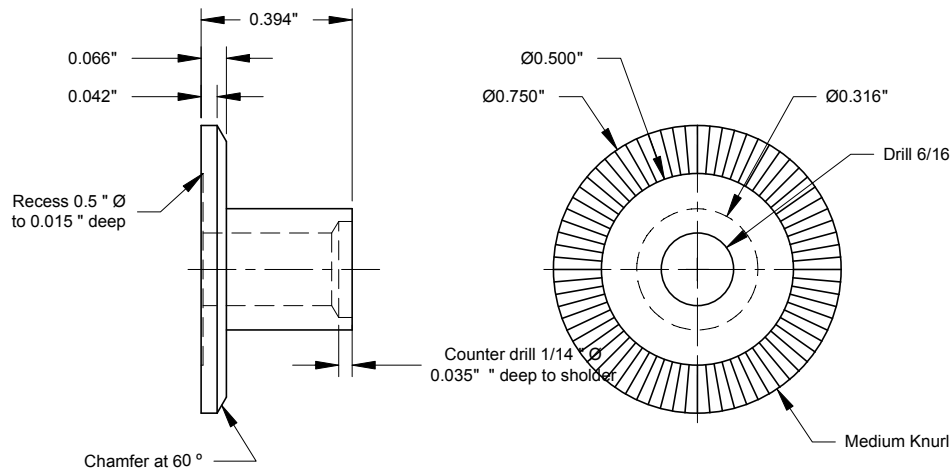


-2 WRIST PIN

Drill Rod

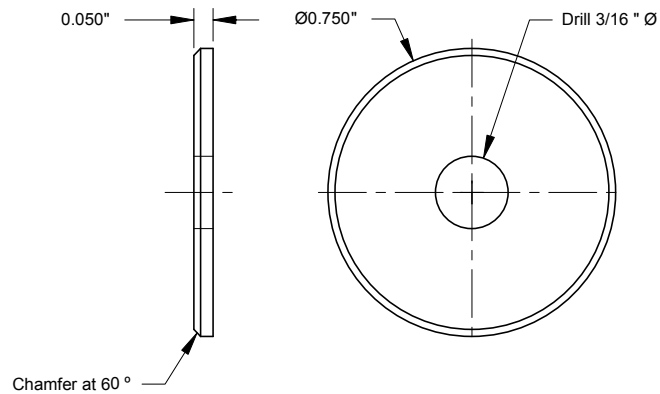


2001.5.1	Missing dimensions added	MBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Mite Mfg Co .098 Diesel 1949
			SCALE	2 X SIZE			NUMBER Sheet 3 - Piston
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 1-1-98			



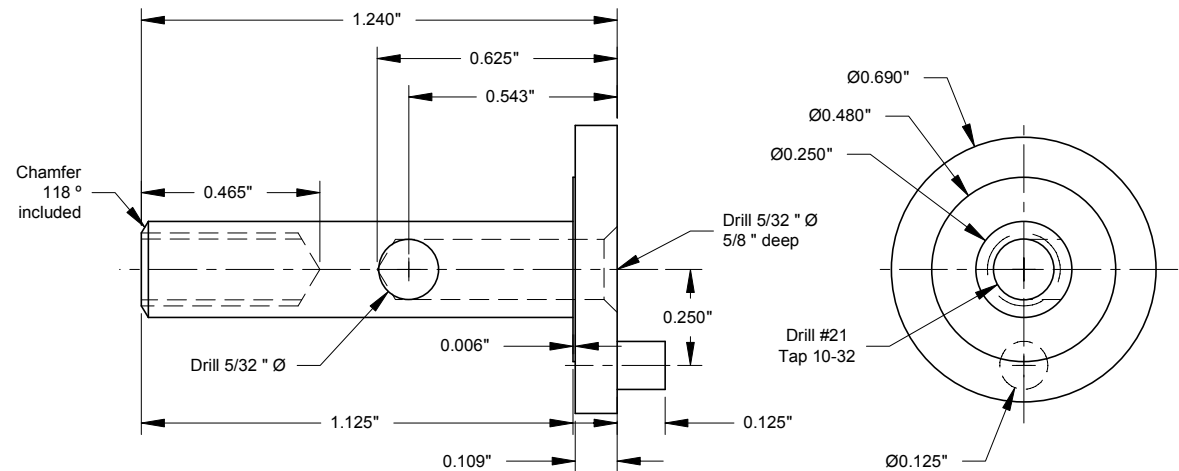
-1 DRIVE WASHER

Steel



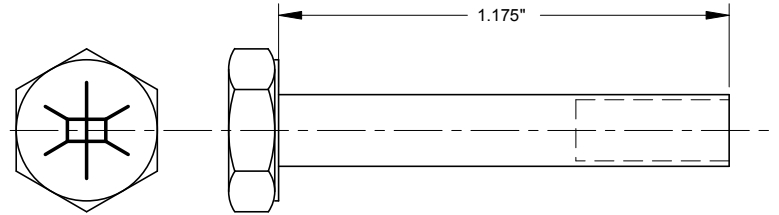
-2 PROP WASHER

Steel




-4 CRANKSHAFT

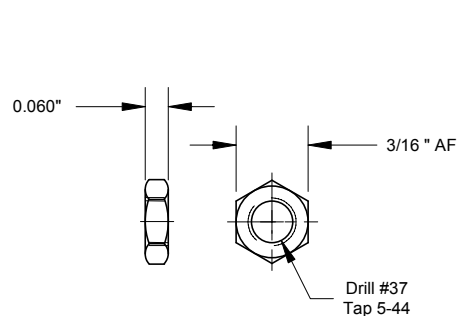
Steel



-3 PROP BOLT

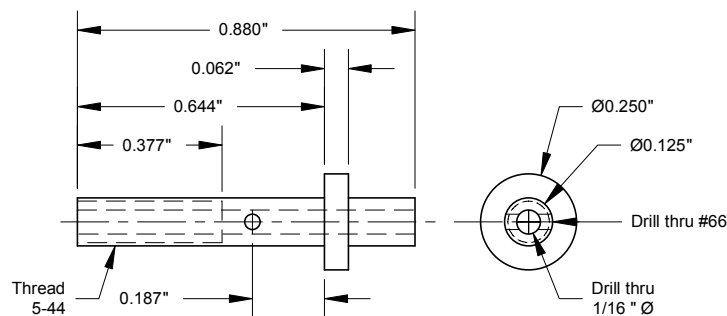
10-32 High Tensile Steel Bolt

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME Mite Mfg Co .098 Diesel 1949
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	PMB 1-31-1998	NEXT ASSEMBLY		NUMBER Sheet 4 - Drive Train
DATE	CHANGE	BY	CAD	PMB 2-22-1998			



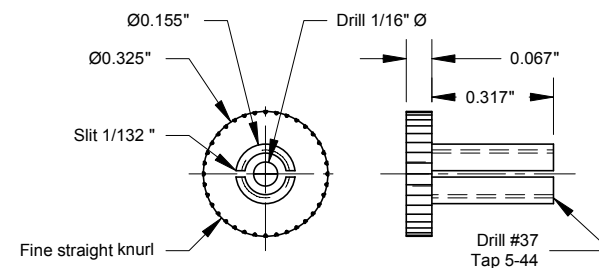
-1 SPRAY B AR NUT

3/16 " AF Hex Brass Rod



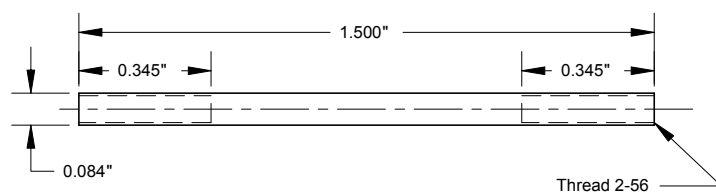
-2 SPRAY BAR

Brass



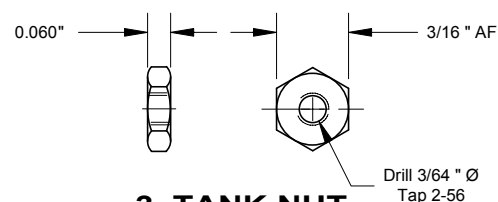
-4 NEEDLE VALVE THIMBLE

Brass



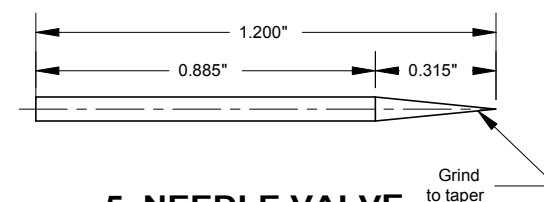
-7 TANK STUD

Brass Rod



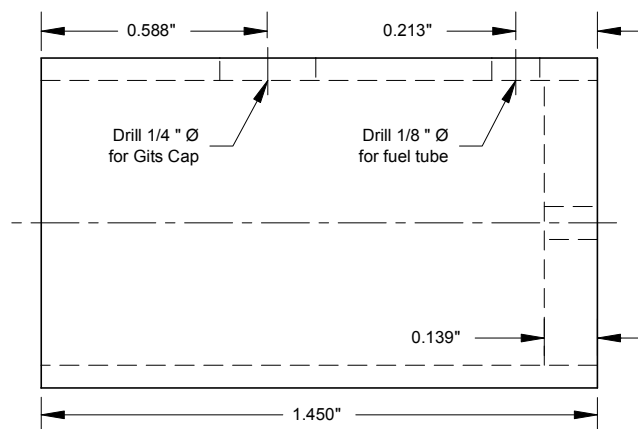
-3 TANK NUT

3/16 " AF Hex Brass Rod



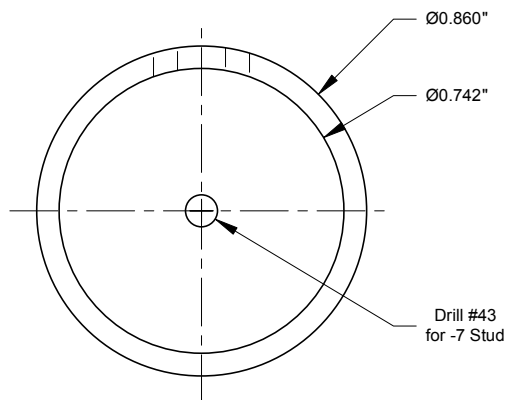
-5 NEEDLE VALVE

1/16 " Ø Music Wire



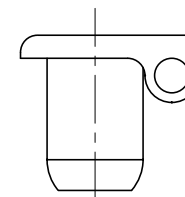
-6 FUEL TANK


Plastic

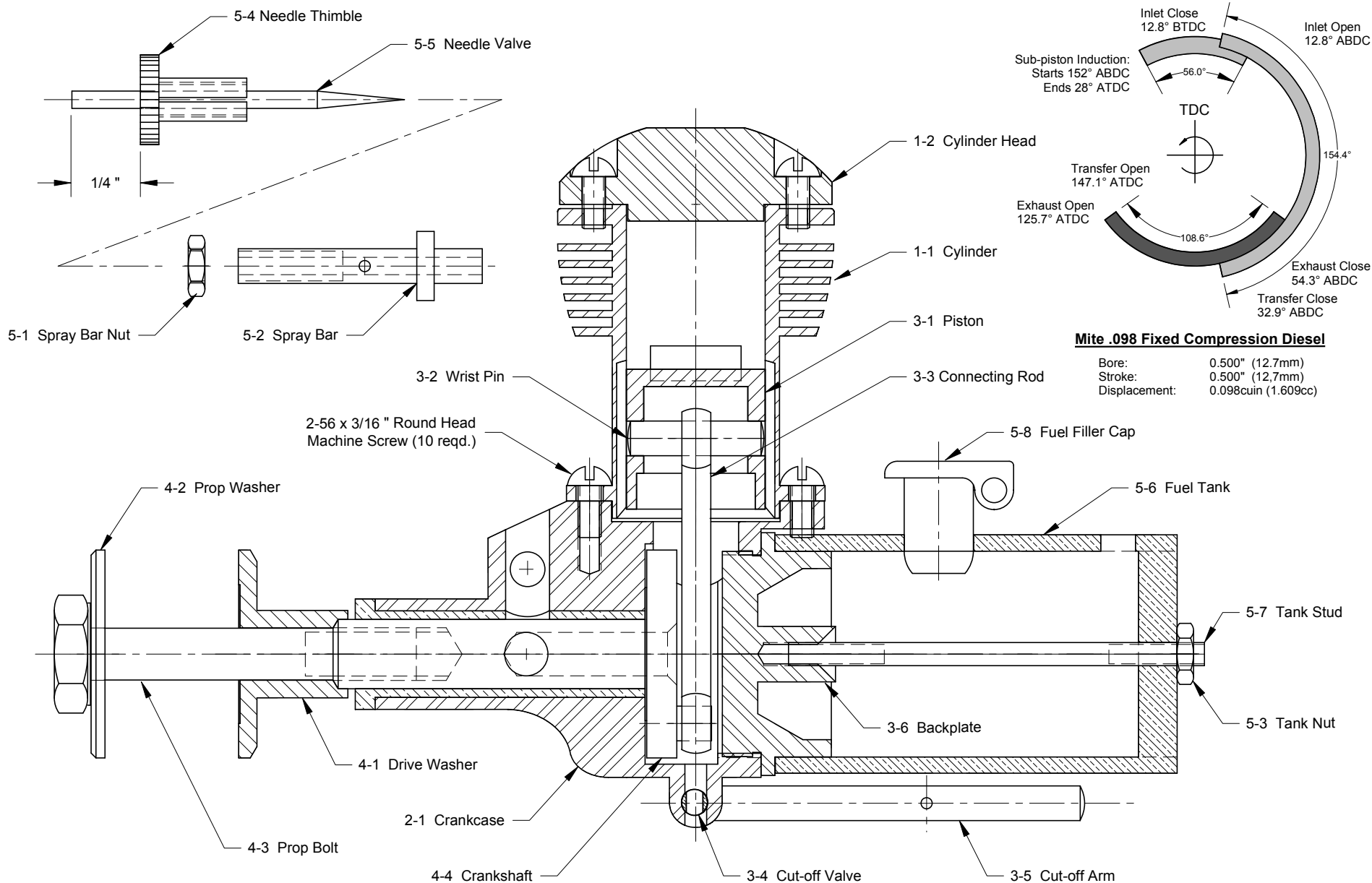


-8 FUEL FILLER CAP

1/4 " Gits Cap




			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 3-8-98			Sheet 5 - Fuel System



Mite .098 Fixed Compression Diesel

Bore: 0.500" (12.7mm)
Stroke: 0.500" (12.7mm)
Displacement: 0.098cuin (1.609cc)

2007-08-14	Revise and standardize timing diagram	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME Mite Mfg Co .098 Diesel 1949
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	PMB 1-31-1998	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-22-1998			Sheet 6 - General Arrangement

THE MYSTERIOUS 1943 MANCINI DIESEL

By Bert Striegler

The first time I ever heard of the 1943 Mancini was when a dear friend, Ray V. Strinati, wrote me that he had found one and had it in his hands! Ray, an Englishman of Italian descent, is an avid engine collector and is very knowledgeable of the very early engines. I hardly had the heart to ask, "What is a Mancini?". But I did and Ray told me that it is possibly the very first Italian diesel to be made in a small commercial quantity. He sent mechanical sketches that were made by a collector friend in the UK and even offered to send the engine over for my examination. I suggested to Ray that it was too risky to send what might be the only existent Mancini all the way to the USA in the mail. If an engine like that is lost, it is lost forever!

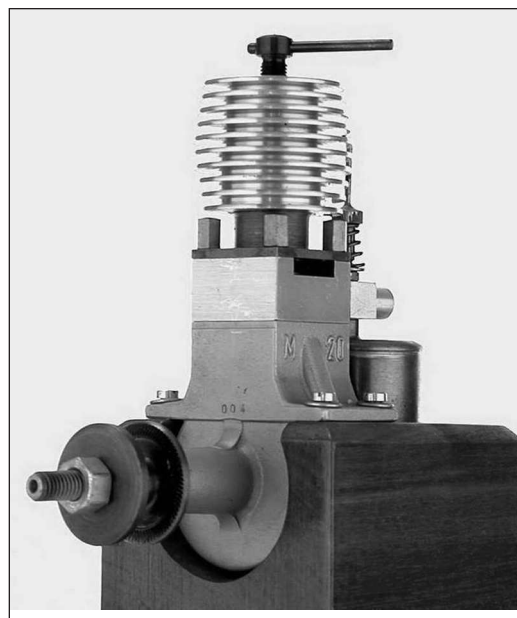
Later, Ron Chernich came up with a set of German drawings of the engine. The two sets of drawings were in general agreement and the German drawings were attributed to 'E.Mancini, 1943'. The dates were also in agreement. At first glance, the 1943 Mancini looks like a restyled Dyno, but on closer examination there are a number of details that differ substantially. The Mancini does not use the classic Dyno porting, and instead, uses a single side exhaust port with a single bypass port across the cylinder like many modern engines. The mounting lugs are set high above the centerline of the crankcase, unlike the Dyno. Another unusual feature was the domed piston with a matching contra piston configuration.

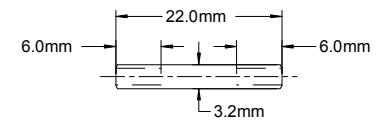
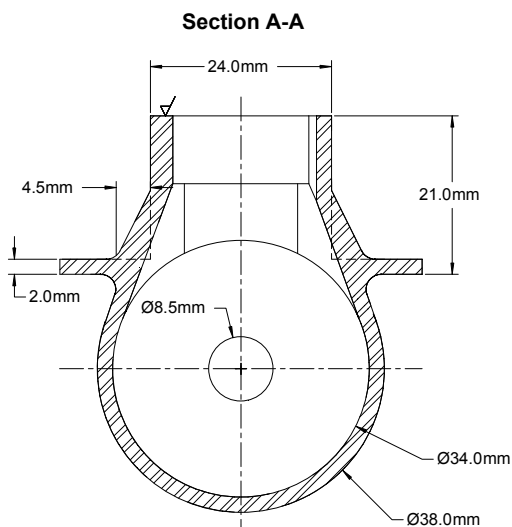
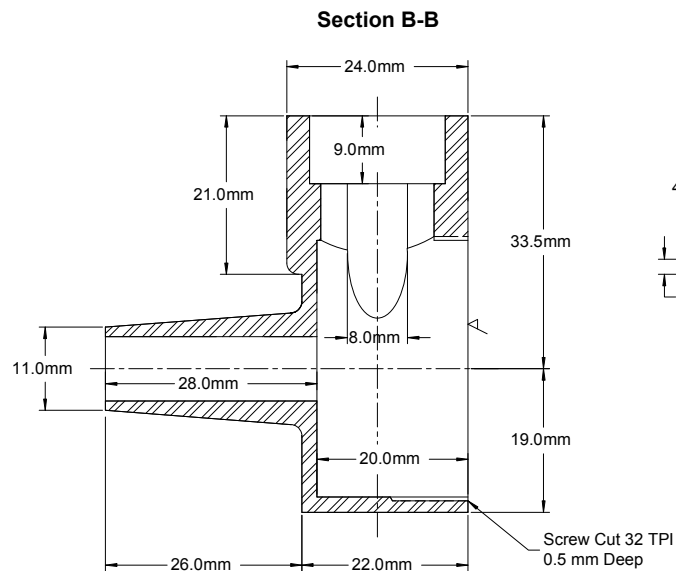
Like many early Italian diesels, the 1943 Mancini had a very long stroke. The bore was 14mm, but the stroke was a whopping 24mm, giving a displacement of 3.69cc. The crankcase is a two-part casting of similar construction to the Dyno. No tank was fitted. The engine construction was conventional, simple and very neat. I would guess that the engine ran well, based on it's timing and general arrangement.

Mr. Mancini remained very active in the engine building business. According to the listing in the superb Annual No. 1 produced by SAM Italia-Chapter 62 and edited by Cesare de Robertis, Mancini went on to produce the beautiful Alfa 1 in 1945, followed by the Alfa 2 in 1946. These are truly classic Italian 1.8cc diesels, with what I would call very long "necks", like a graceful swan. The Mancini Uranio, a new 4cc design, followed in late 1946. The last Mancini engine listed in the Annual is the 5.97cc Meteor 47, produced in 1947. I have not seen pictures of these last two engines, but based on Mr. Mancini's previous designs, I will bet they were handsome.

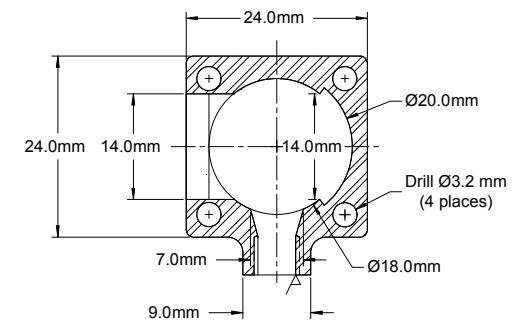
Jim Noonan wrote a famous article on Italian diesels and other obscure European engines. When his article was printed in Bill Winter's Plan Book in late 1946, many Americans heard of most of these diesel engines for the very first time. A whole new world had been discovered by Noonan on his trip through Italy as a GI in world War 2. I will quote Jim from his article, where he said, "Mancini's motors are known throughout Italy for their performance combined with light weight. This one (the Alfa 1) has a bore of .47", a stroke of .66"; turns at 5000 r.p.m., and weighs 4-1/2 ounces. Note the American trend in Italian engine design. Mancini is a member of a very progressive Florentine Model Club (G.A.F.)." This was probably written in early 1945.

Possibly, some of our Italian friends will be able to fill in the rest of the Mancini story. This man did some very nice work and deserves to be remembered. We hope this Motor Boys book will help in some small way to recognize his achievements in the model engine field. Jim Noonan's trip through Italy in wartime proved one thing - Modelers are modelers, war or no war. Isn't it a pity the rest of the people in the world do not have the kind of companionship we have in the modeling fraternity.



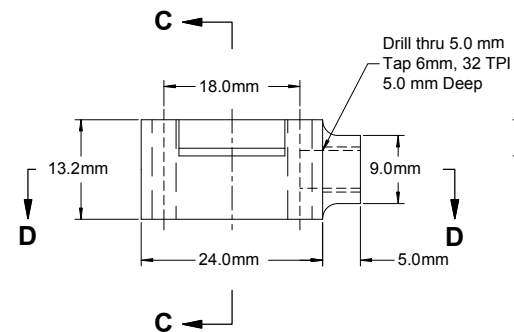
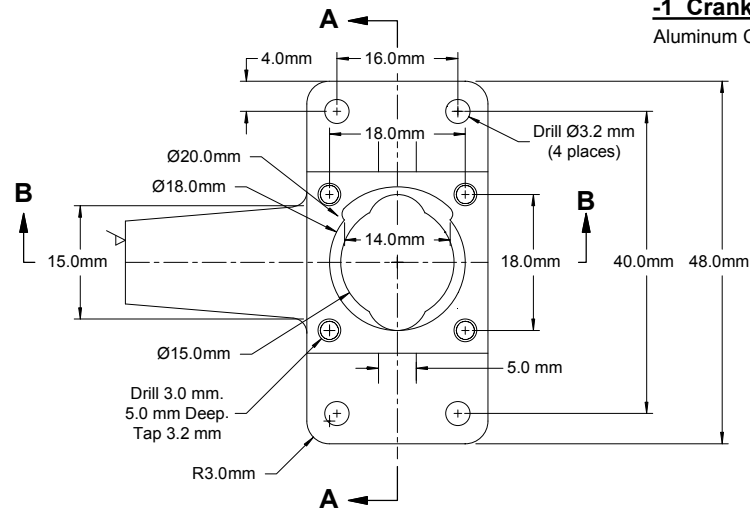


-3 Stud (4 required)
Mild Steel

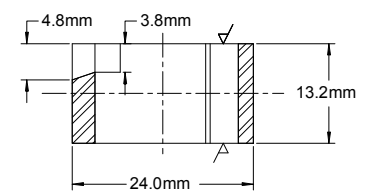


-1 Crankcase
Aluminum Casting

12-22-1998




Section D-D

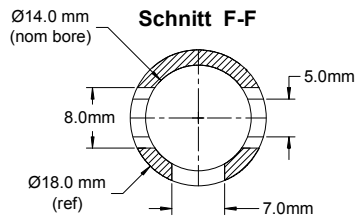


Section C-C

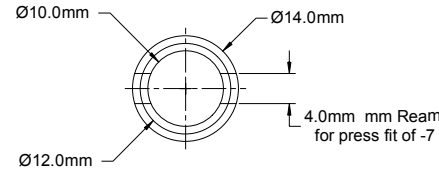
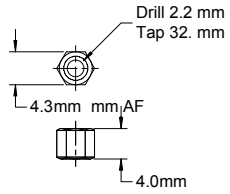
-2 Bypass
Aluminum Casting

Machine

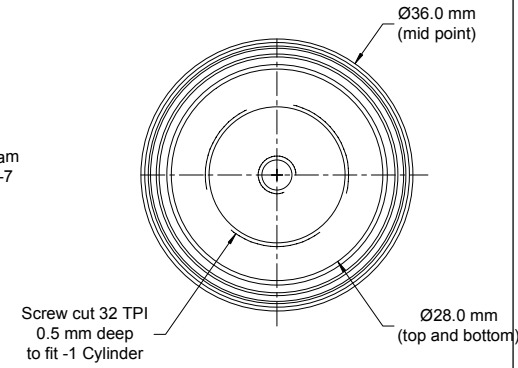
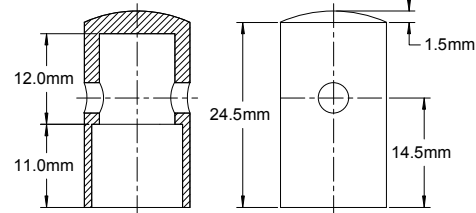
10 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Ein Dieselmotot zum Selbstbauen
2006-10-04	Fixed lower piston travel problem	BMBI	SCALE	Full Size			NUMBER Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI 12-22-1998			



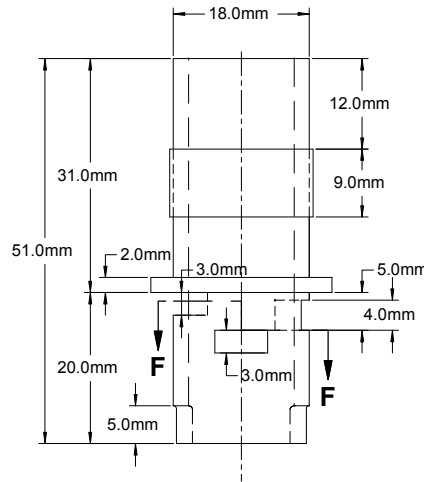
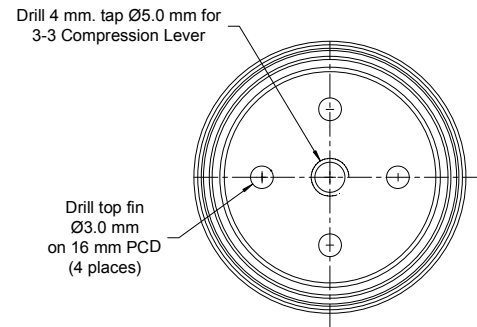
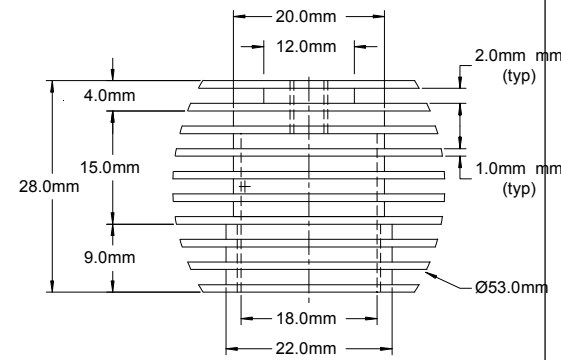
-6 Cylinder Nut (4 required)
5 mm AF Hex Mild Steel



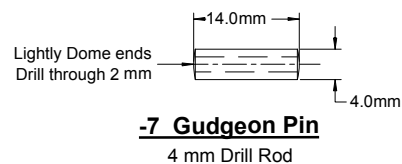
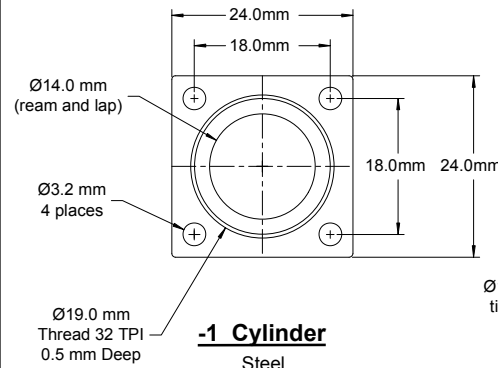
-4 Piston
Cast Iron



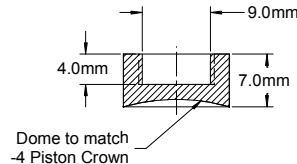
-2 Cylinder Muff
Aluminum



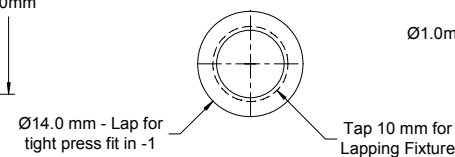
-1 Cylinder
Steel



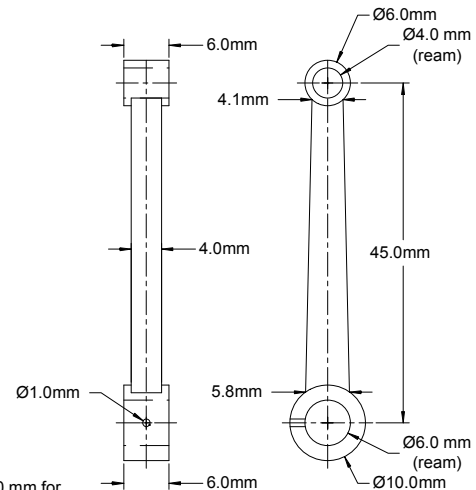
-7 Gudgeon Pin
4 mm Drill Rod



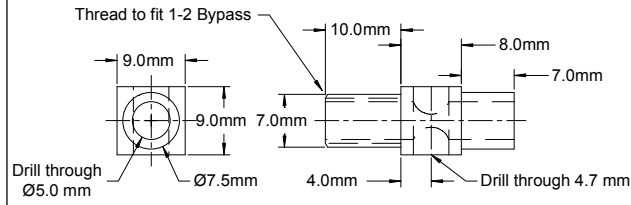
-5 Contra-piston
Cast Iron



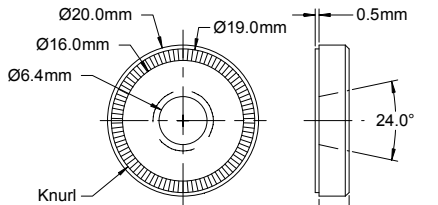
-3 Connecting Rod
Duralium



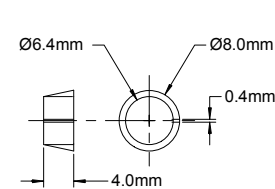
9 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NAME Ein Dieselmotot zum Selbstbauen
			SCALE	Full Size			
			DRAWN	E. Mancini 1943			NUMBER
DATE	CHANGE	BY	CAD	BMBI 12-23-1998			Sheet 2 - Cylinder



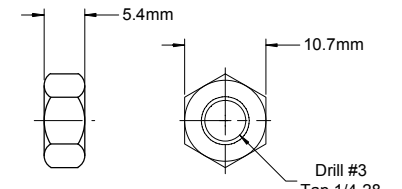
-4 Induction Tube
Aluminum



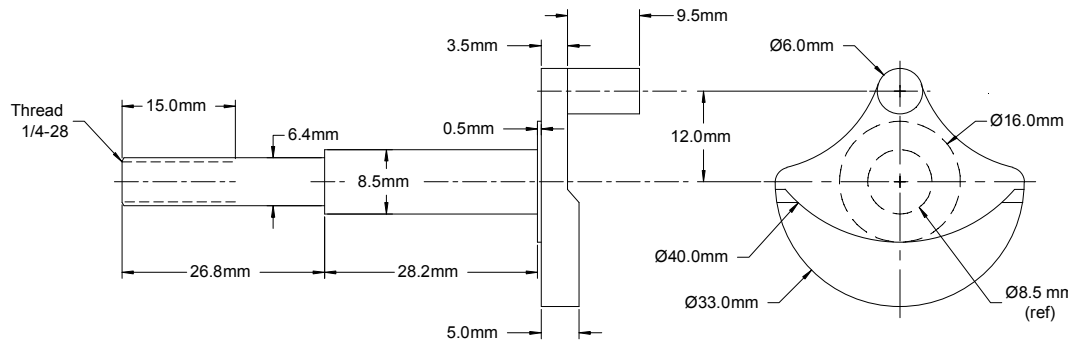
-9 Prop Drive Washer
Mild Steel



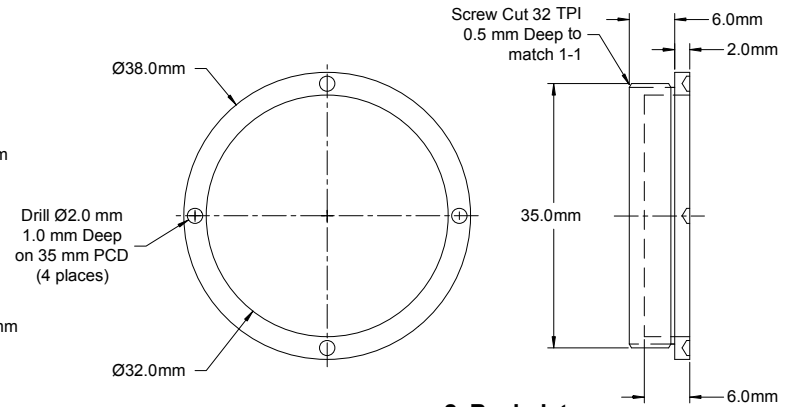
-8 Split Cone
Brass



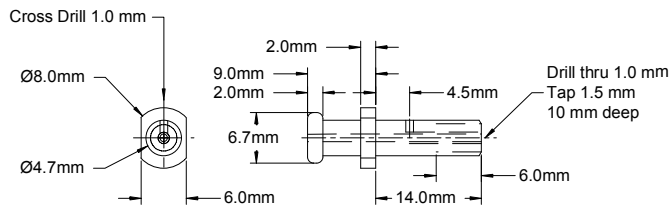
-10 Prop Nut
1/2 " AF Hex Steel



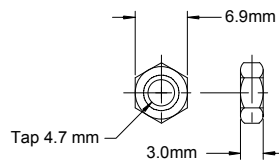
-1 Crankshaft
Steel



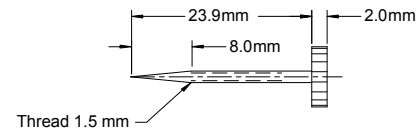
-2 Backplate
Aluminum



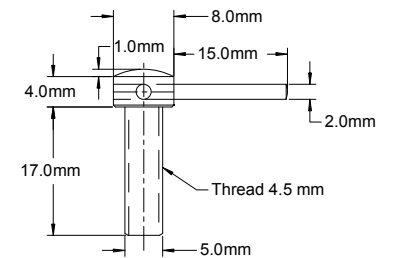
-6 Spray Bar
Brass




-5 Spray Bar Nut
7 mm AF Hex Brass



-7 Needle Valve
Brass (fabricate)



-3 Compression Lever
Mild Steel

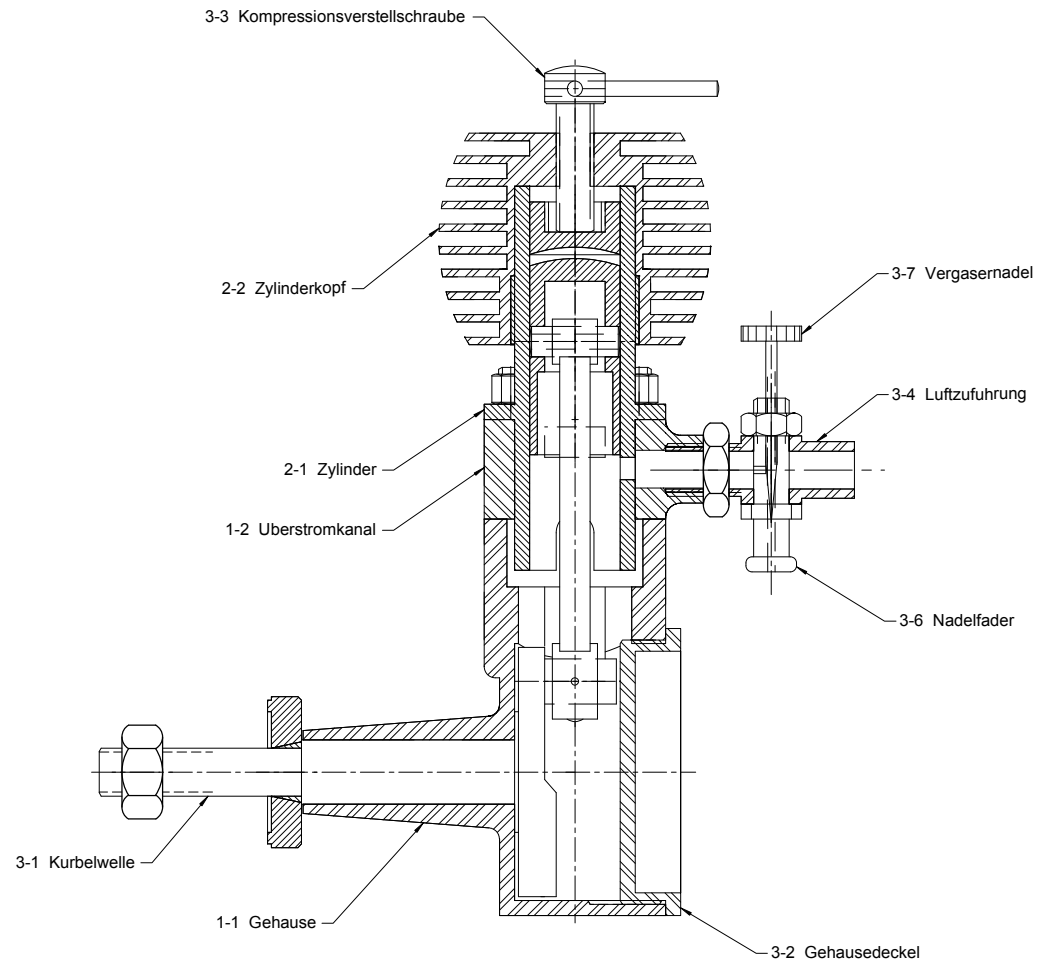
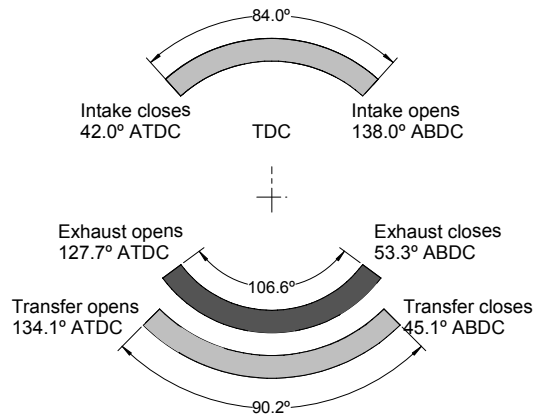
9 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NAME Ein Dieselmotot zum Selbstbauen
			SCALE	Full Size			
			DRAWN	E. Mancini 1943			
DATE	CHANGE	BY	CAD	BMBI 12-23-1998	NEXT ASSEMBLY		NUMBER Sheet 3 - Crankshaft & Carby


Ein Dieselmotor zum Selbstbauen

Konstrukter: E. Mancini, 1944

(A Diesel Motor from Selstbaum built by E.Mancini, 1944)

Hubrum (Displacement): 3.68 ccm (0.22 cu in)
Bohrung (Bore): 14 mm (0.551 in)
Hub (Stroke): 24 mm (0.945 in)



9 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	 MOTOR BOYS (INTERNATIONAL)	NAME Ein Dieselmotot zum Selbstbauen
2006-10-05	Revise crankcase for lower piston movement	BMBI	SCALE	Full Size			NUMBER Sheet 4 - General Arrangment
DATE	CHANGE	BY	CAD	BMBI 12-23-1998			

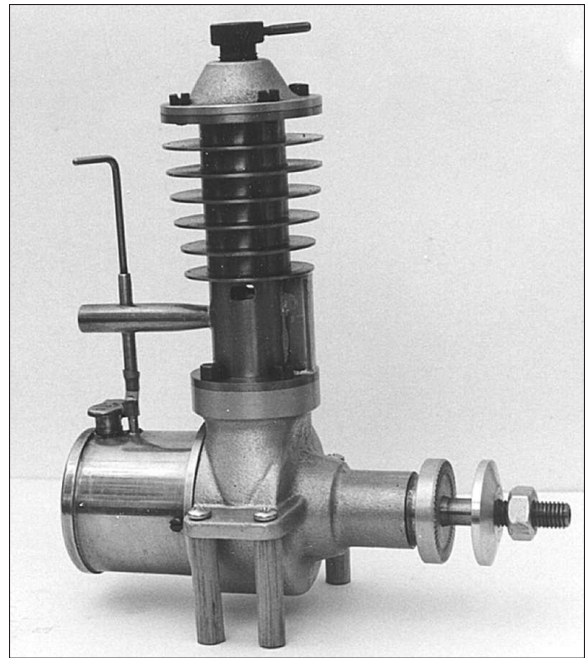


The Nova 1

by Roger Schroeder

A Nova is an astronomical event, larger than life, a liquid fueled rocket that is larger than life and a model diesel engine that is larger than life. The following pages present the Motor Boys drawings with both English and metric dimensions.

The Nova 1 has a displacement of 4.5cc (.275 cu. in.) and was designed and built by a Dutchman named I. J. v.Leeuwen in December of 1943. His plans and a short history of the engine appeared in the Dutch model magazine "*De Modelbouwer*" (The model Builder) which continued to be published during the German occupation of World War II. As such, they were the first drawings of an auto-ignition engine to be published in Holland. The title block of v.Leeuwen's drawings had the words, "voor Modelvliegtuigen, Ontwerp," which may mean it was done originally for a Belgian publication.

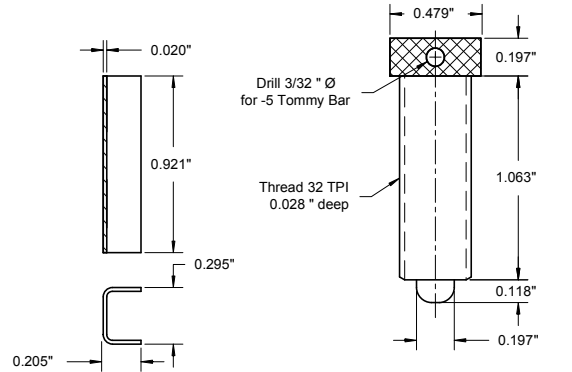
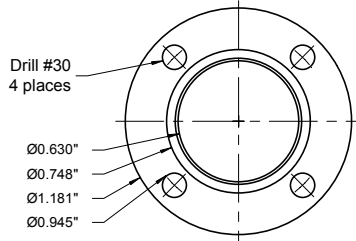
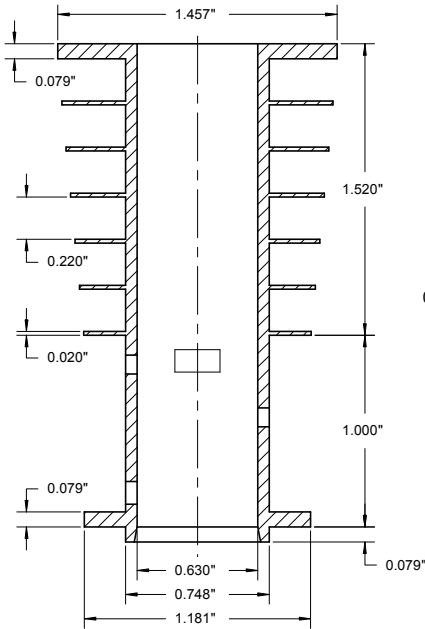
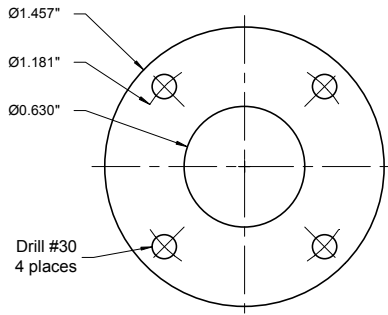


Piet de Klerk, Jr., writing about the Nova in the May 1946 issue of the English magazine, *Model Aircraft*, pointed out that during the German occupation, the Dutch modelers could not obtain petrol engines and thus turned to building their own. The Swiss had developed a compression ignition engine, the Dyno 1, in 1941 and word of its existence spread among model builders and no doubt also reached v.Leeuwen in Holland. Thus, in 1943, v.Leeuwen designed and constructed his own compression ignition engine and called it Nova 1. According to de Klerk, he later followed it with a design called the Nelri of 5cc capacity. We assume that other Dutch modelers built v.Leeuwen designs. The Nova drawing also appeared in the 1946 issue of *Model Aircraft*.

De Modelbouwer is still published, 10 times a year, in Holland by the Nederlandse Vereniging van Modelbouwers (Dutch Model Engineers Society). They have a web page and their e-mail address is: modeller@knoware.nl

After looking at the historical information, some of the Motor Boys indicated an interest in building a reproduction of the Nova. Novas have been completed by Bert Striegler, Don McClusky, Ron Chernich, Ken Croft and Roger Schroeder. All of the Motor Boys Novas run! They do 6000 rpm on a 14 in. diameter prop. Don has flown his in a Comet Clipper.

The Nova is not an easy engine to build. It is big. It measures about 5-3/8 inches from top to bottom. It is the largest .27 cu. in. engine you will ever see.

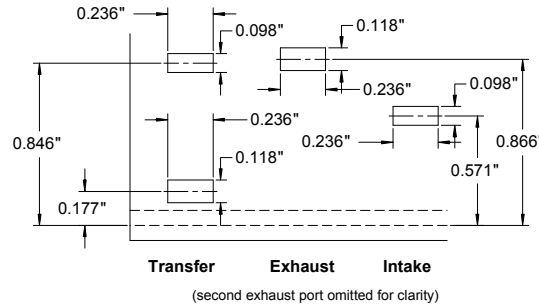


-2 BYPASS COVER

Steel

-4 COMPRESSION SCREW

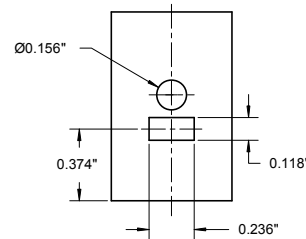
Steel



-1 CYLINDER

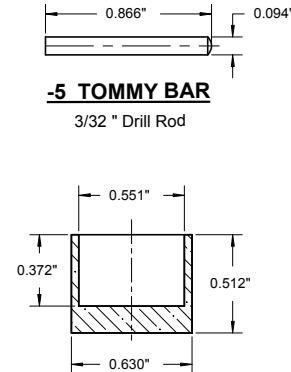
Chrome Steel

Fin	Diameter
1	1.457 "
2	1.415 "
3	1.369 "
4	1.323 "
5	1.277 "
6	1.231 "
7	1.181 "



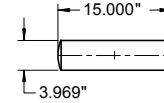
-7 PISTON

Cast Iron



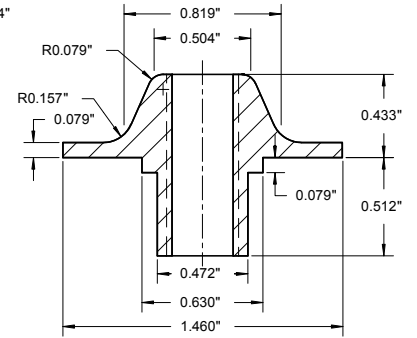
-6 CONTRA PISTON

Cast Iron



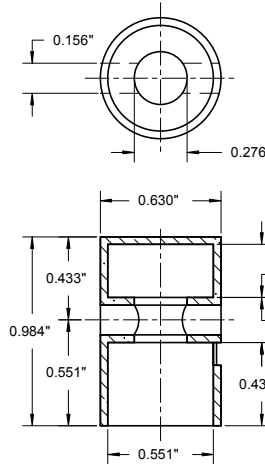
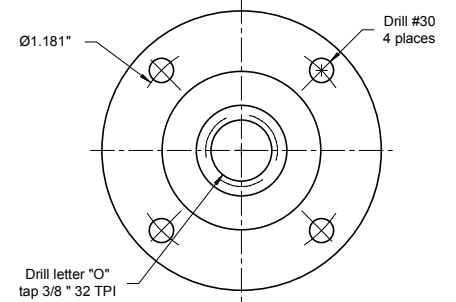
-8 WRIST PIN

5/32 " Drill Rod



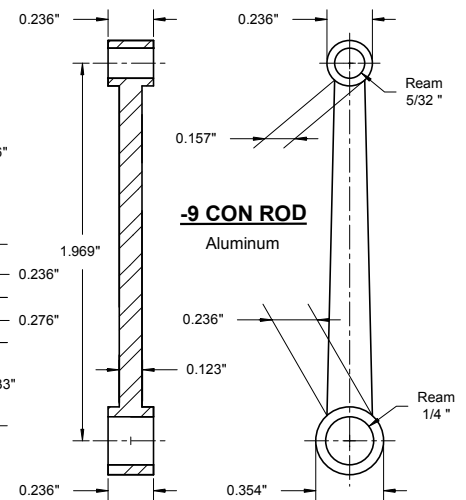
-3 CYLINDER HEAD

Aluminum



-9 CON ROD

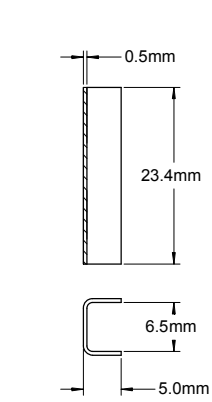
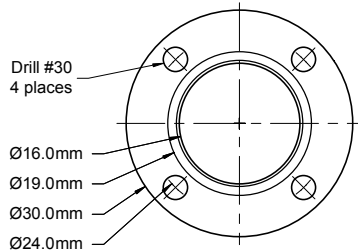
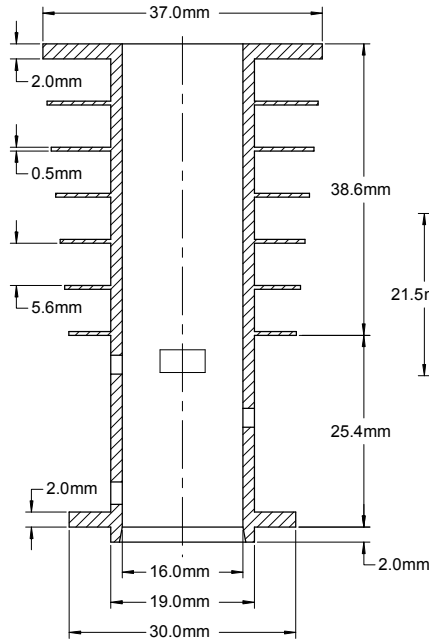
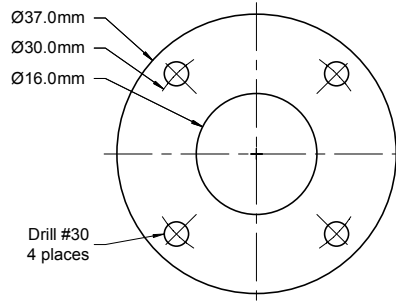
Aluminum



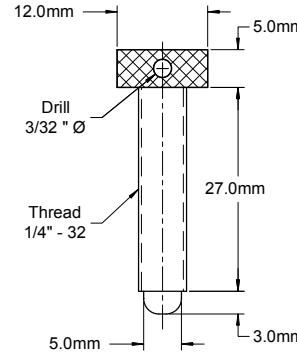
			MAT'L		DO NOT SCALE DRAWING
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
30 Jul 1998	Contrapiston crown size increased	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	PMB 3.14.1998	



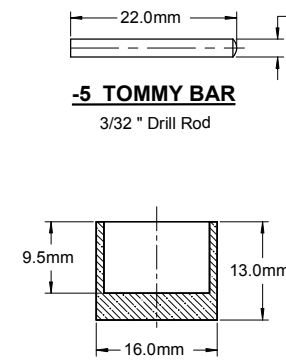
NAME	"NOVA 1" 4.5ccm Tweetakt Diesel
NUMBER	Sheet 1 - Cylinder Components



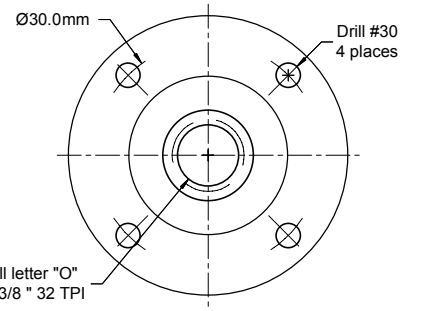
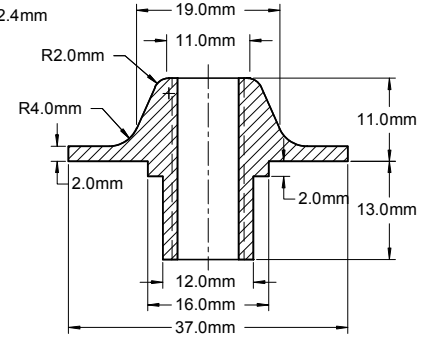
-2 BYPASS COVER
Steel



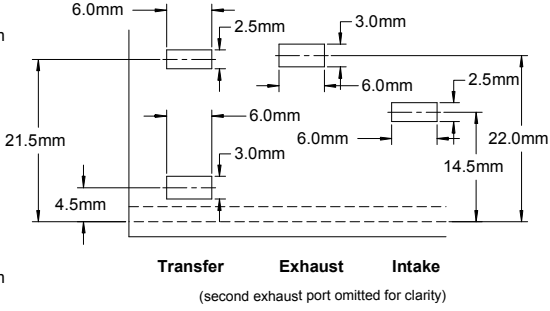
-4 COMPRESSION SCREW
Steel



-5 TOMMY BAR
3/32 " Drill Rod

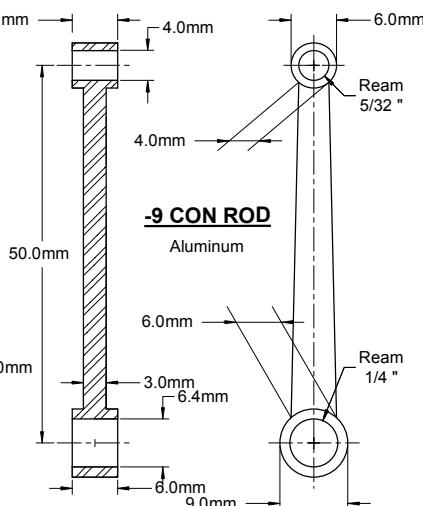
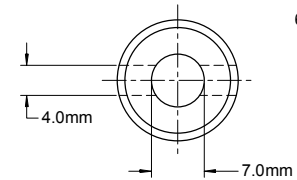


-3 CYLINDER HEAD
Aluminum



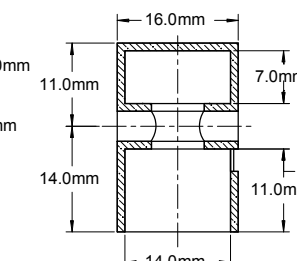
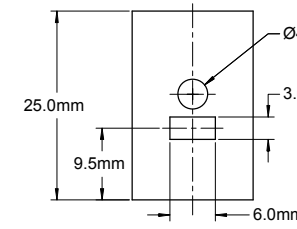
-1 CYLINDER
Chrome Steel

-7 PISTON
Cast Iron

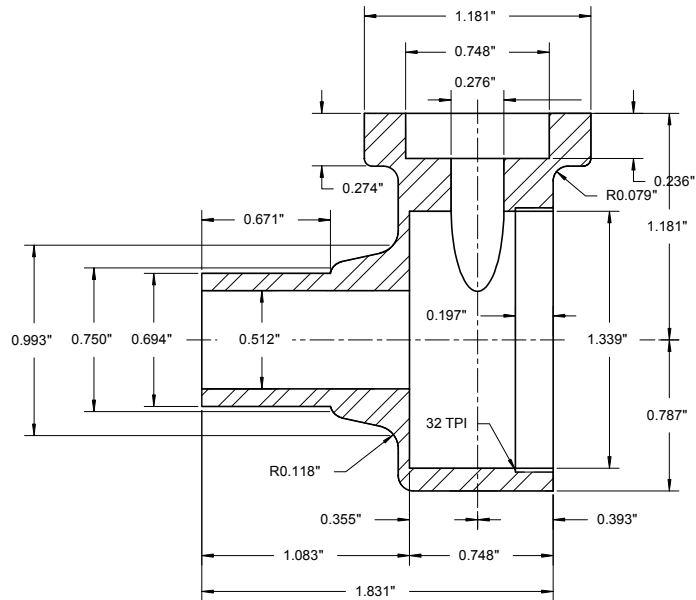


-9 CON ROD
Aluminum

Fin	Diameter
1	37.0 mm
2	35.9 mm
3	34.8 mm
4	33.6 mm
5	32.4 mm
6	31.3 mm
7	30.0 mm

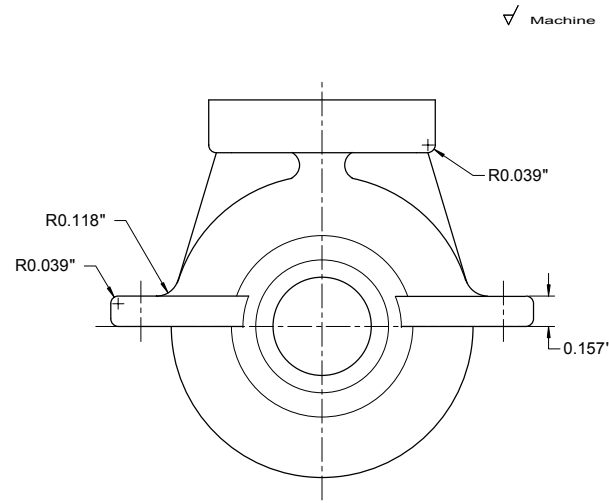
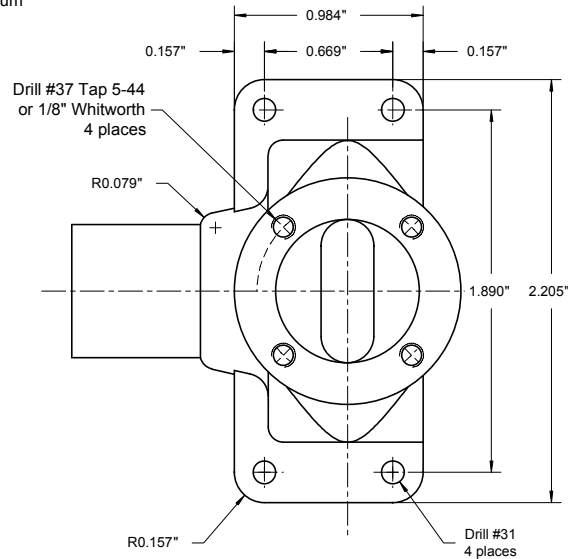


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	Full Size			"NOVA 1" 4.5ccm Tweetakt Diesel
30 Jul 1998	Contrapiston crown size increased	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 3.14.1998			Sheet 1 - Cylinder Components



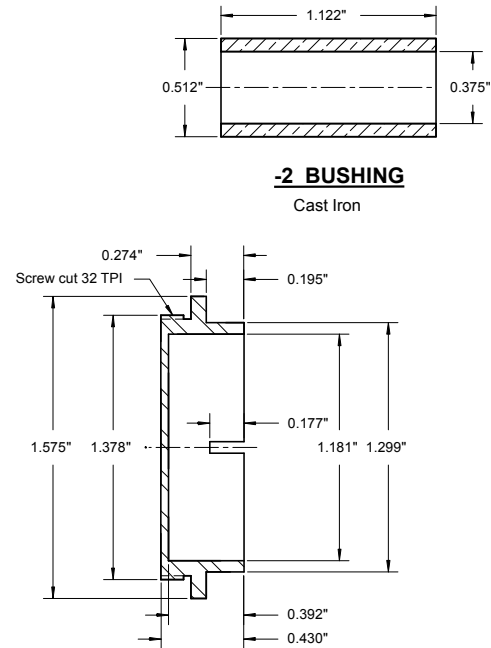
-1 CRANKCASE

Cast Aluminum



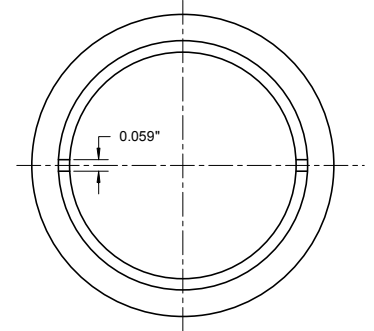
-2 BUSHING

Cast Iron



-3 BACKPLATE

Aluminum

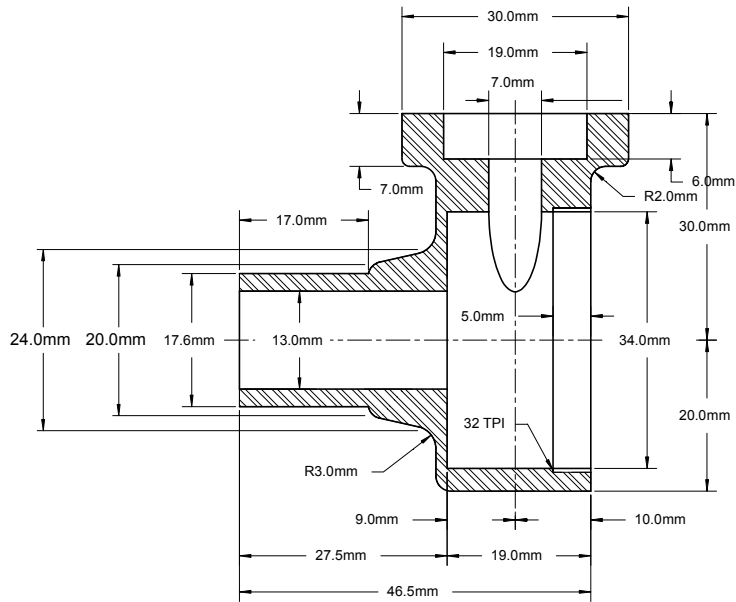


NAME
"NOVA 1" 4.5ccm Tweetakt Diesel

NUMBER
Sheet 2 - Crankcase

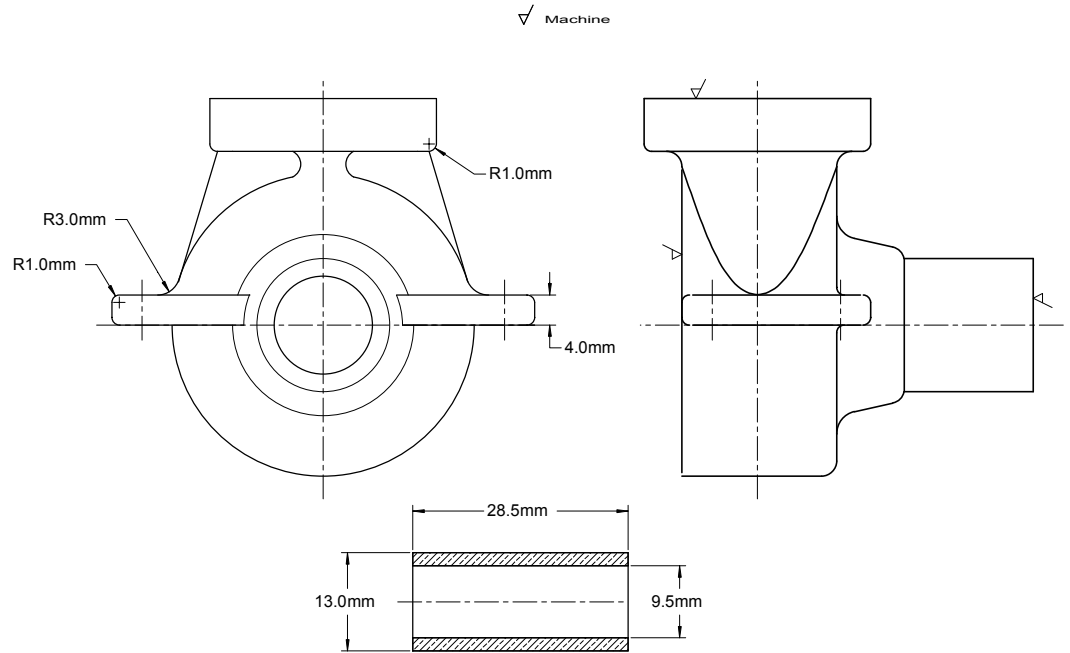
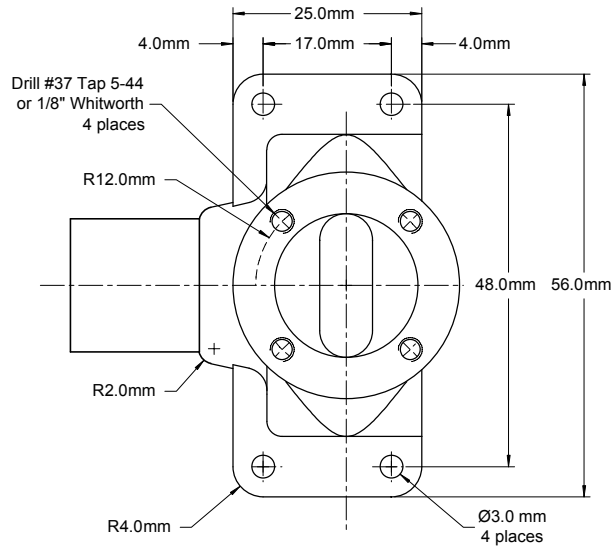
			MAT'L		DO NOT SCALE DRAWING
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
3-25-1998	Front crankcase diameter increased from 16 mm to 0.694 "	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	PMB 3.14.1998	





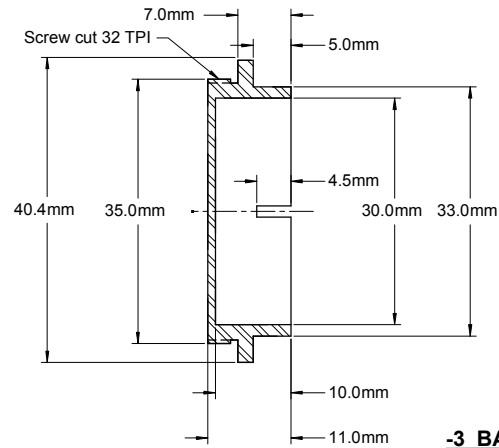
-1 CRANKCASE

Cast Aluminum



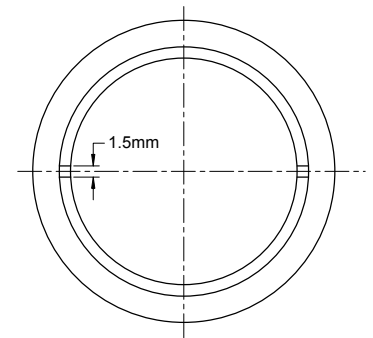
-2 BUSHING


Cast Iron



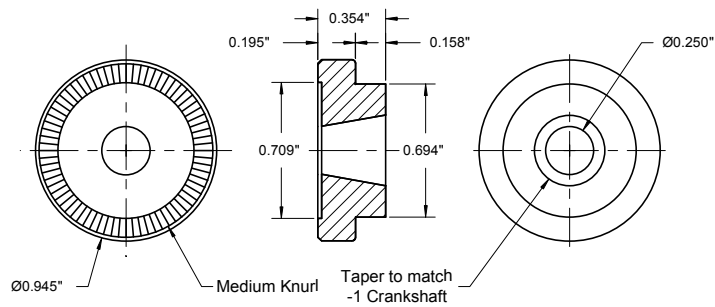
-3 BACKPLATE

Aluminum



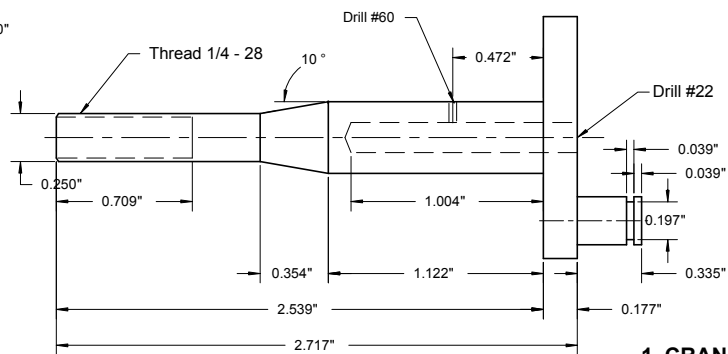
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	Full Size			"NOVA 1" 4.5ccm Tweetakt Diesel
3-25-1998	Front crankcase diameter increased from 16 mm to 0.694 "	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 3.14.1998			Sheet 2 - Crankcase

CC BY NC ND



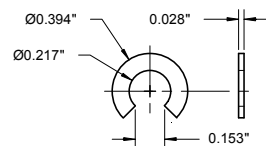
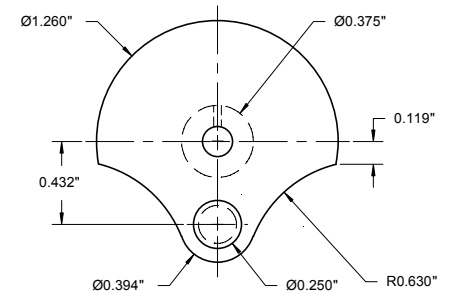
-2 PROP DRIVER

Steel



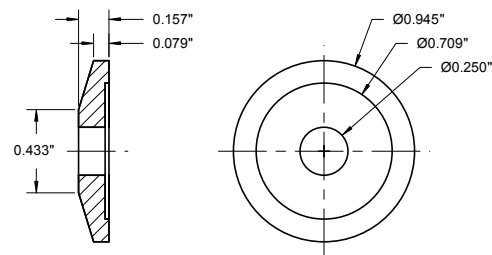
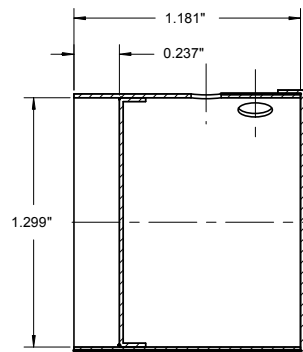
-1 CRANKSHAFT

Steel



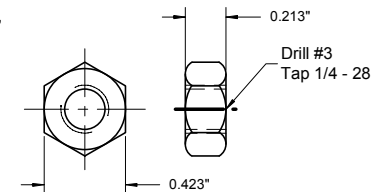
-5 CIRCLIP

Drill Rod



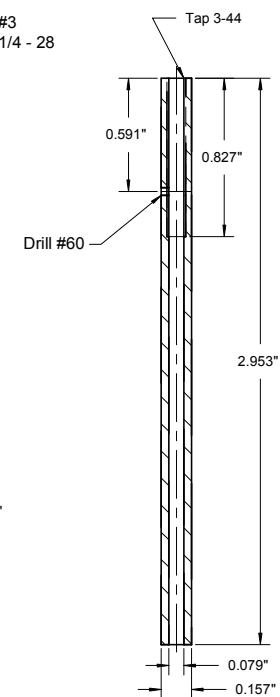
-4 PROP WASHER

Steel



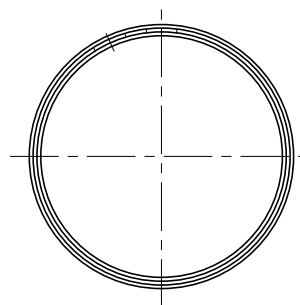
-3 PROP NUT

Hex Steel



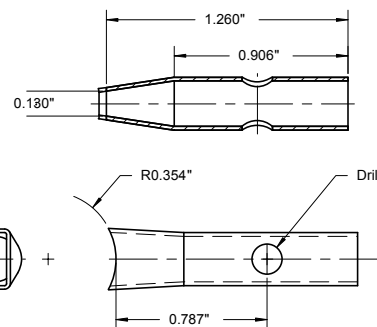
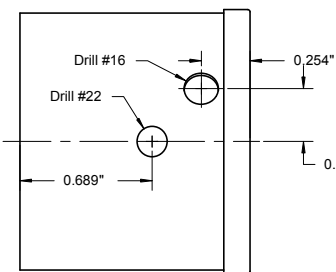
-9 NEEDLE VALVE

3/32 " Drill Rod



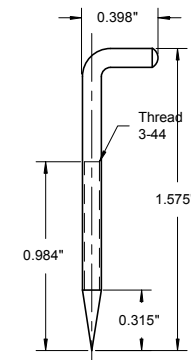
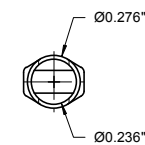
-8 FUEL TANK

0.5mm Shim Brass




-6 INTAKE TUBE

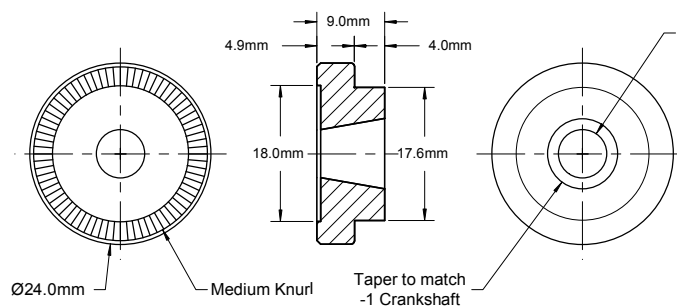
Brass



-7 SPRAY BAR

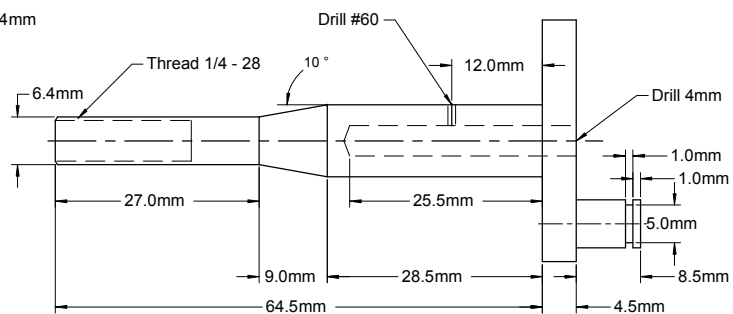
5/32 " Brass Tubing

			MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME "NOVA 1" 4.5ccm Tweetakt Diesel
			SCALE	2 X SIZE			
30 Jul 1998	Taper of crankshaft dimensioned	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 3.14.1998			NUMBER Sheet 3 - Drive Train



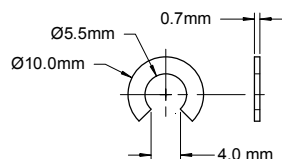
-2 PROP DRIVER

Steel



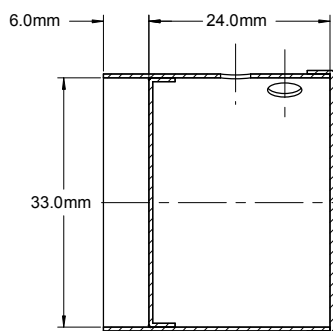
-1 CRANKSHAFT

Steel



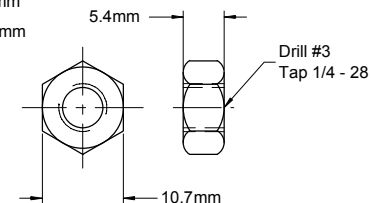
-5 CIRCLIP

Drill Rod



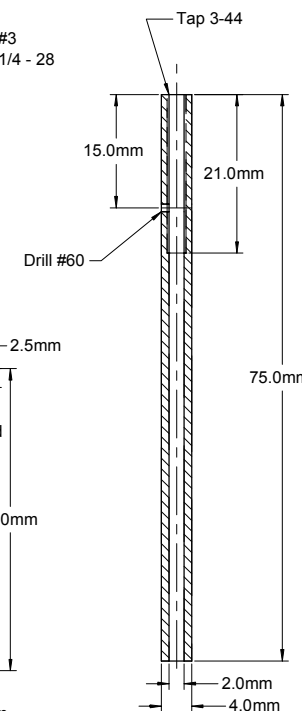
-4 PROP WASHER

Steel



-3 PROP NUT

Hex Steel

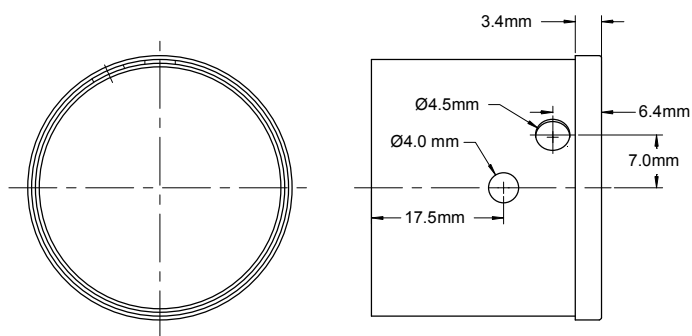


-9 NEEDLE VALVE

3/32 " Drill Rod

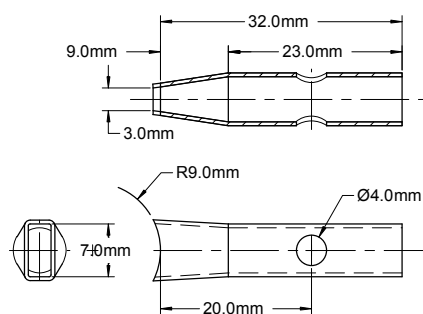
-7 SPRAY BAR

Brass Tubing




-8 FUEL TANK

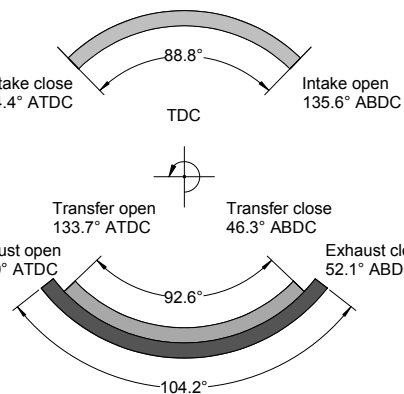
0.5mm Shim Brass



-6 INTAKE TUBE

Brass

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME "NOVA 1" 4.5ccm Tweetakt Diesel
			SCALE	Full Size			NUMBER Sheet 3 - Drive Train
30 Jul 1998	Taper of crankshaft dimensioned	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 3.14.1998			



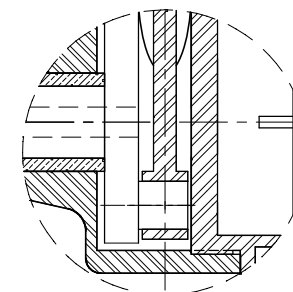
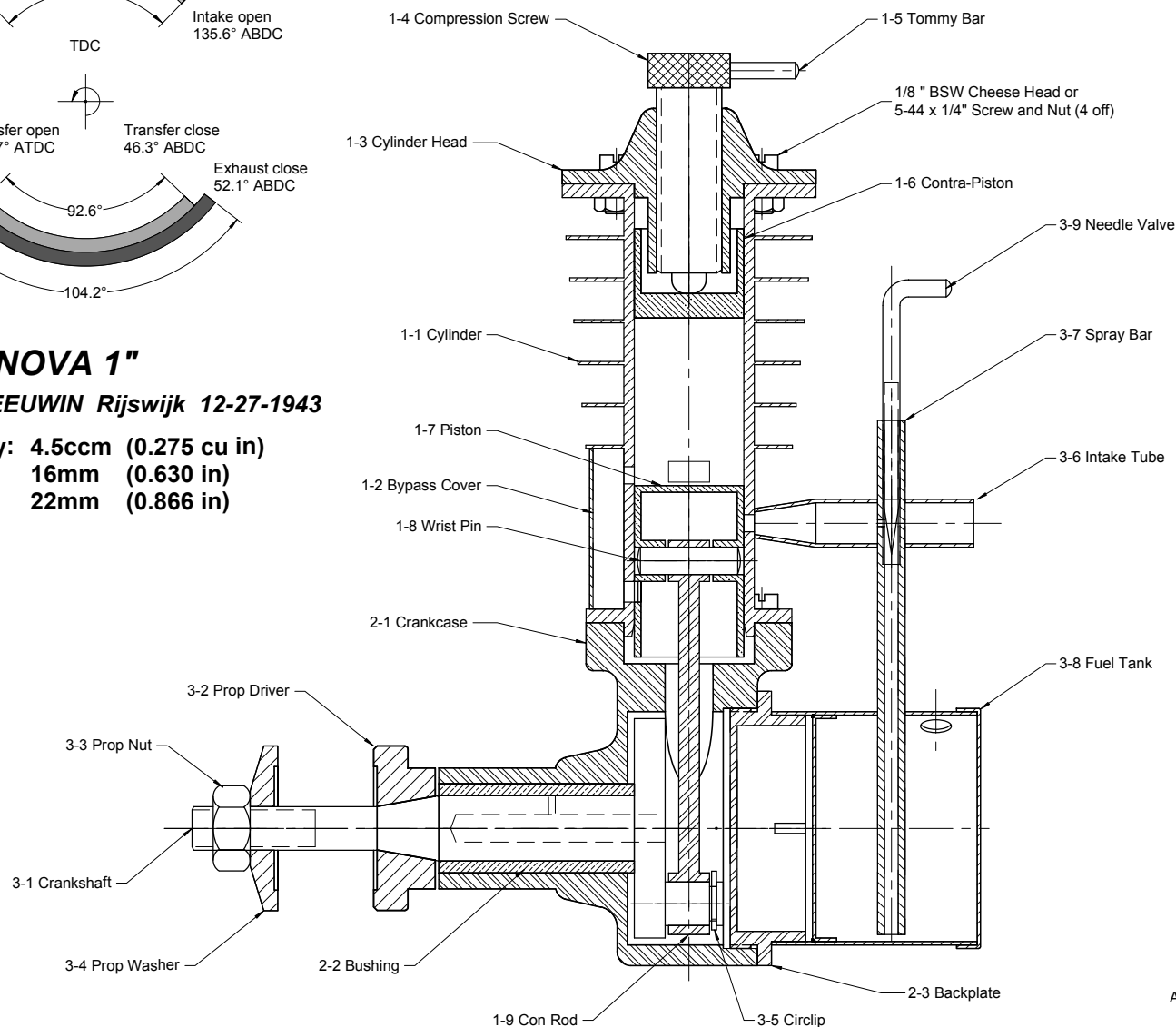
"NOVA 1"


by I.J. v.LEEUWIN Rijswijk 12-27-1943

Capacity: 4.5ccm (0.275 cu in)

Bore: 16mm (0.630 in)

Stroke: 22mm (0.866 in)



			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
2007-08-16	Standardize timing diagram	BMBI	SCALE	Full Size	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		"NOVA 1" 4.5ccm Tweetakt Diesel
July 4, 1998	Alternate design detail added.	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 3.14.1998			Sheet 4 - General Arrangement

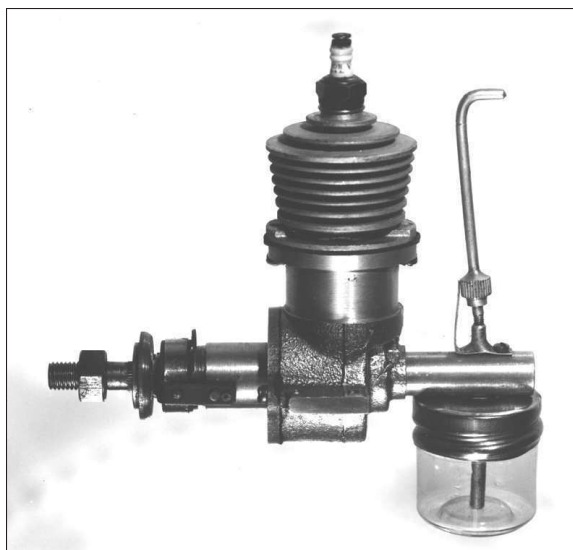


The Scrapper .29

by Tim Dannels

The Scrapper engine was manufactured by The Woodbridge Manufacturing Co. in late 1944 and early 1945. They were built in Manchester, CT, and like many of the model engines in the period when World War II was winding down, they were first built sort of on the sly - in this case in the early morning hours of the 3rd shift at the local Pratt & Whitney Aircraft Company.

The original Scrapper .29's apparently ran quite well according to the reports of owners. Most were well made and had good performance. Production figures are not known, 2000 engines is an approximation, but there seem to be quite a few in collections.

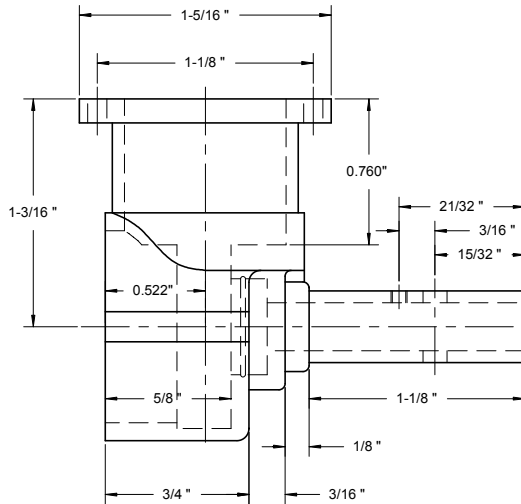
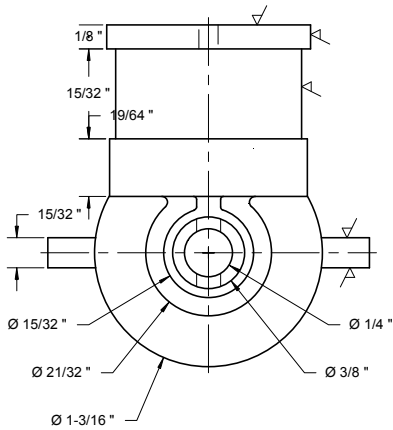


The crankcase and front shaft housing were rough sand castings with considerable machining done to clean them up. The rest of the parts are machined from bar. The cylinder is blind bore. The piston originally used featured a ball and socket arrangement somewhat like the modern Cox engines except that the socket was a separate piece, peened into the top of the piston. The Motor Boys version utilizes a standard wrist pin and rod arrangement. A poppet valve in the intake served for fuel induction, somewhat like the M&M engine.

Further development of the Scrapper by Woodbridge Manufacturing was in the form of an engine called the Super Scrapper. This engine was advertised quite extensively, but very few were actually produced beyond the prototype and experimental stages. Woodbridge was a small company and could not sell enough engines to pay the bills. Names of the designer of the Scrapper and Super Scrapper are not known.

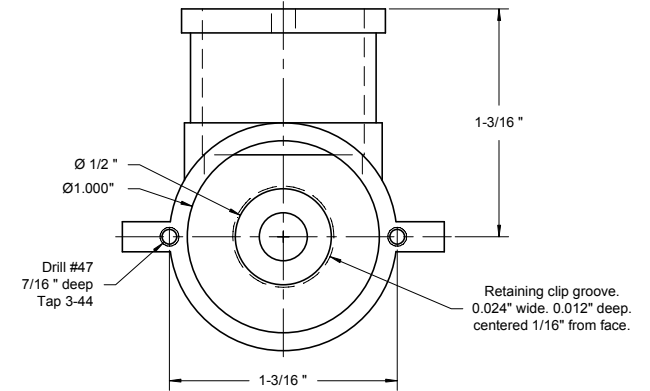
As a side note, the individuals who were building the Scrapper and then promoted the Super Scrapper tried again, a few months later in 1946, to market a model engine. This one was called the "Bobcat" and was a .42 cu. in. displacement engine. It was marketed under the company name of Stenmoor Manufacturing Co. The overall design was similar to the Super Scrapper. It had dual exhaust stacks, timer and needle valve located in the rear and a blind bore cylinder. Once more, only a few experimental and prototype engines were built. There just was not, as in the case of Woodbridge, enough money behind the company to get itself established. The glut of model engines in the immediate post-war period left no room for small speculators.

The Original Scrapper, when properly adjusted and tuned was a good performer, but sales and advertising could not match the big names like Ohlsson & Rice, McCoy, Forster, Delong and others. Like so many others, they just became entries in a historical listing.



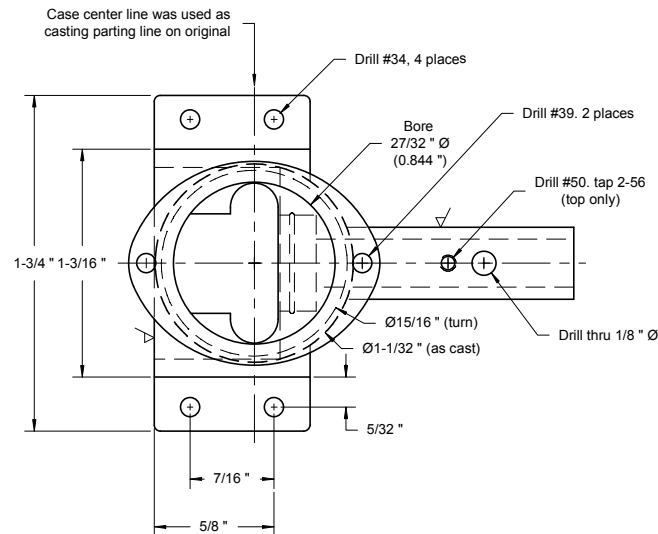
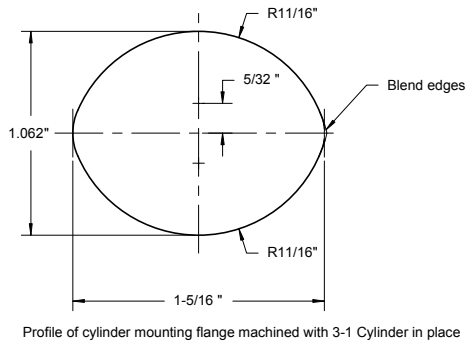
Note:

Pattern for casting could use a 1-5/16" circular flange on top of a 1-1/32" cylinder with profiles machined in later.




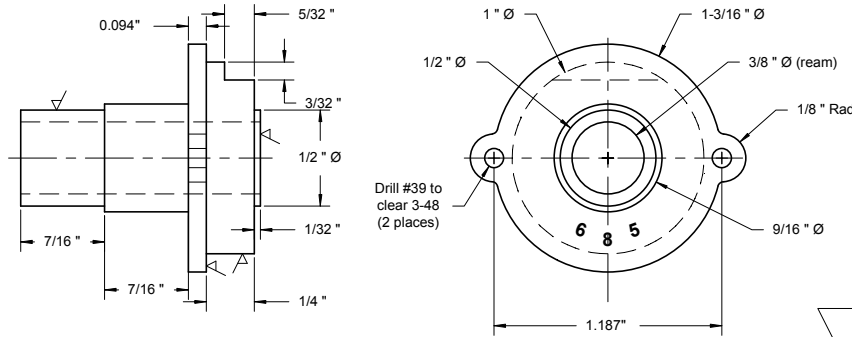
-1 CRANKCASE

Aluminum Casting

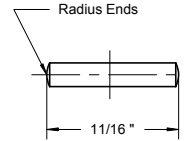


Machine

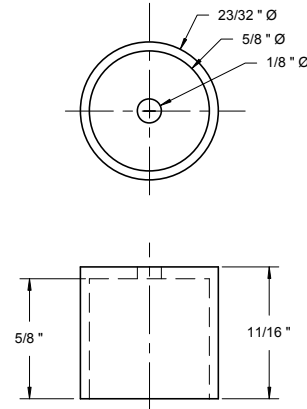
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME SCRAPPER .29
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMBI 1-5-1999	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI 1.17.1999			Sheet 1 - Crankcase



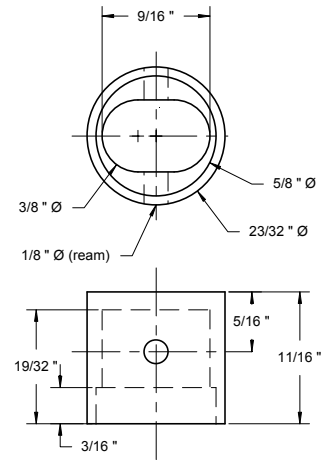
-1 FRONT BEARING
Aluminum Casting



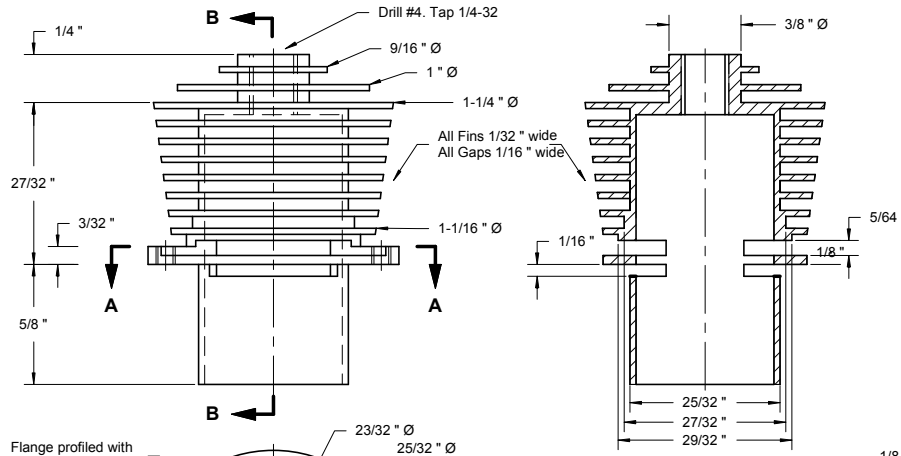
-5 WRIST PIN
1/8" Drill Rod



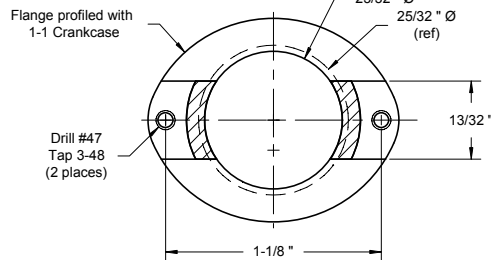
-6 PISTON (Original)
SG Cast Iron



-3 PISTON (modern)
SG Cast Iron



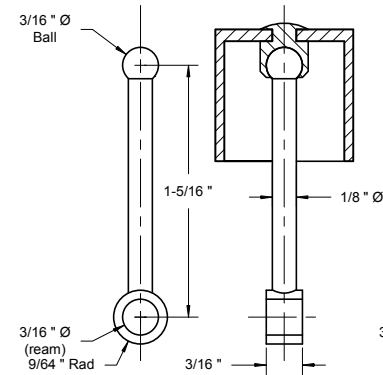
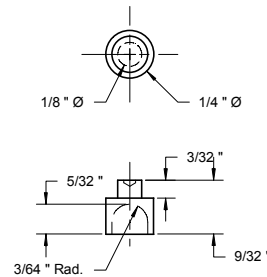
Section B-B



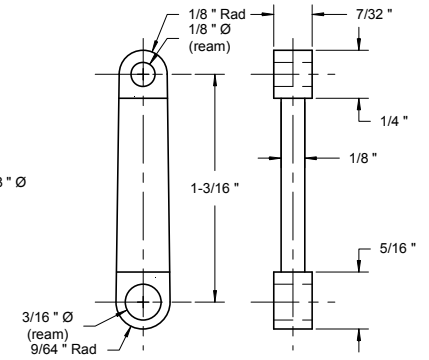
Section A-A

-2 CYLINDER
Cast Iron or Steel

-7 CONROD SOCKET (Original)
Steel (peen both ends)



-8 CONROD (Original)
Steel H&T



-4 CONROD (modern)
2024 T3 Dural

Machine

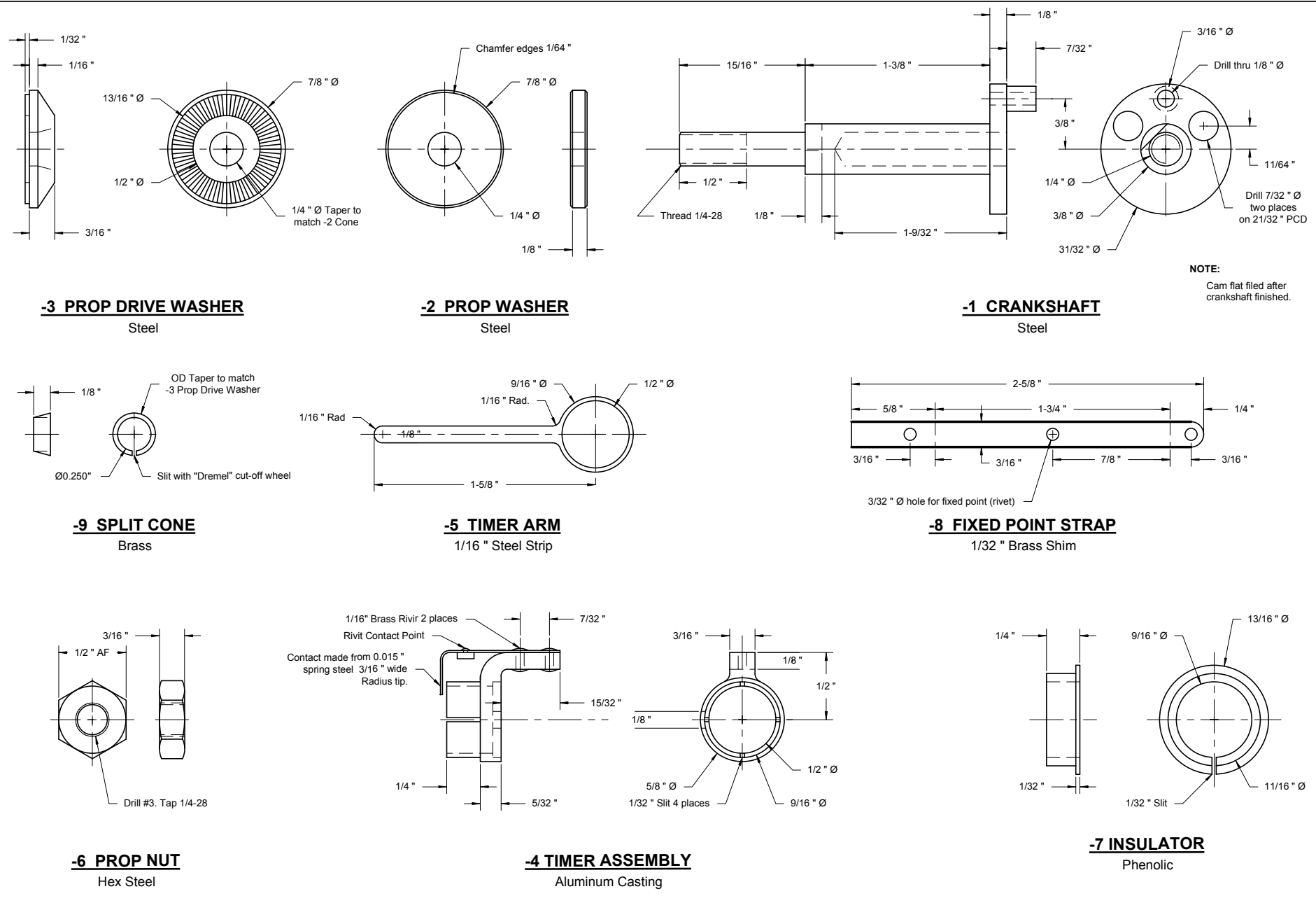



NAME
SCRAPPER .29

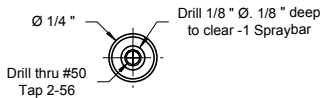
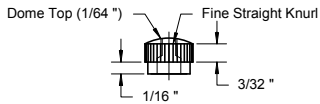
NUMBER
Sheet 2 - Cylinder and Housing

			MAT'L	As Noted	DO NOT SCALE DRAWING
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	RMBI 1-5-1999	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	BMBI 1.17.1999	

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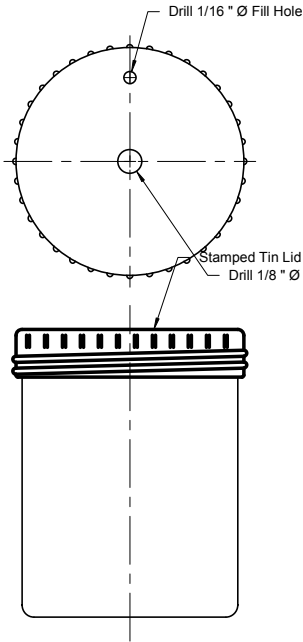
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME SCRAPPER .29
			SCALE	FULL SIZE			NUMBER Sheet 3 - Crankshaft and Timer
			DRAWN	RM 1-5-1999			
DATE	CHANGE	BY	CAD	BM 1.17.1999	NEXT ASSEMBLY		



Solder to -4 Needle Valve after running position determined

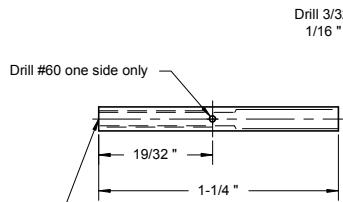
-5 THIMBLE

Brass



-6 FUEL TANK

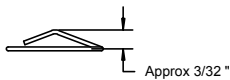
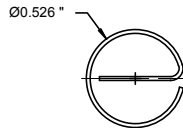
Screw top jar



Drill thru #50. Tap 2-56 to #60 hole. Insert 3/32 inch diameter brass tube and solder.

-1 SPRAYBAR

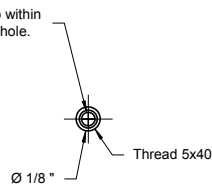
Brass



Adjust center bar to allow -8 Clack Valve 1/32 inch fore-aft movement.

-9 VALVE RETAINER

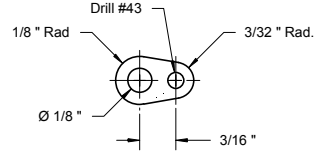
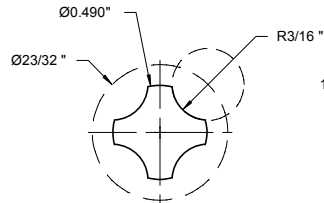
.020 Music Wire



(development)

-3 RATCHET

.010 Shim



-1 Spraybar, -2 Ratchet and -3 Lug are soldered together on final assembly so Spraybar hole is centered in venturi. (see Sheet 5)

-8 CLACK VALVE

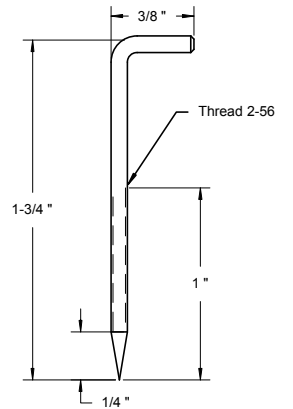
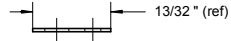
.016 Brass Shim



Lap rear side flat on 800 grit paper over glass surface plate.

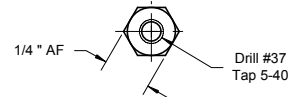
-2 SOLDER LUG

.010 Shim



-4 NEEDLE VALVE


2-56 "Du-Bro" Push Rod

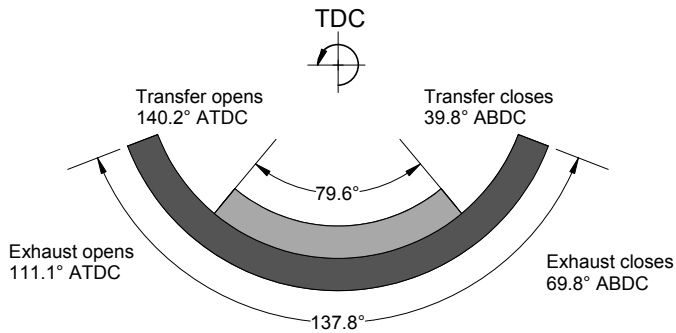


-7 SPRAY BAR NUT

1/4 inch AF Hex Brass

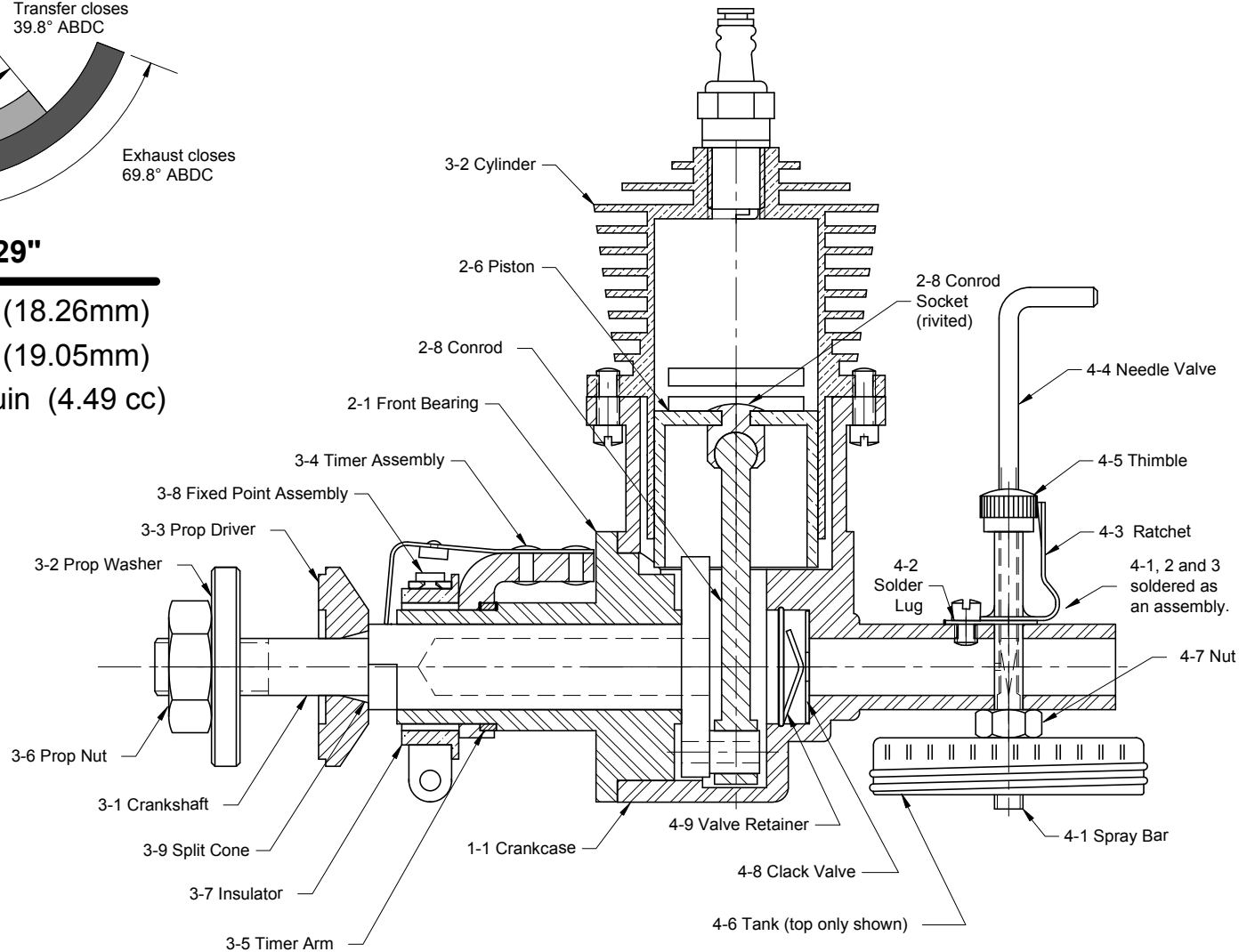



			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME SCRAPPER .29
			SCALE	FULL SIZE			
			DRAWN	RMBI 1-5-1999			NUMBER
DATE	CHANGE	BY	CAD	BMBI 1.17.1999	NEXT ASSEMBLY		Sheet 4 - Fuel System



Scrapper "29"

Bore: 0.719 " (18.26mm)
Stroke: 0.750 " (19.05mm)
Capacity: 0.304 cuin (4.49 cc)



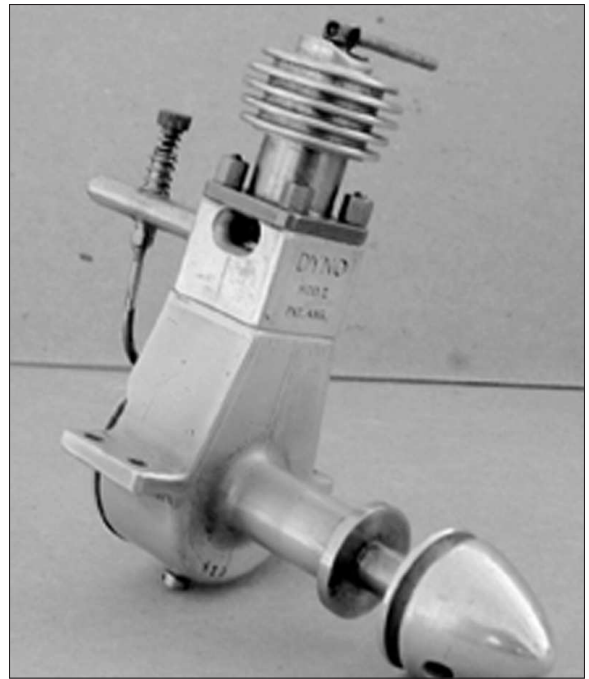
2007-08-10	Correct timing diagram and rearrange layout	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME SCRAPPER .29
			SCALE	1.5 x Full Size	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
			DRAWN	RMB 1997-12-21	NEXT ASSEMBLY		Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	PMB 1998-01-01			

THE SWISS DYN0

by Roger Schroeder

The Dyno 2.04 diesel was commercially produced in Switzerland from 1941 through 1944. Other compression ignition engines appeared, also in Switzerland, before WW 2, but enjoyed less success and fewer sales. The Dyno achieved the success in Europe that the Brown Junior enjoyed in the USA. Far fewer Dynos were produced, thus they are rare.

Before the Dyno there was another diesel engine in Switzerland, the Etha 8.25cc, produced probably in 1937 and 1938. The Etha is considered to be the first commercially produced diesel engine. It was sold in a model shop in Zurich along with the Dyno. The Etha was very heavy, vibrated, and was difficult to start. On the other hand, the Dyno was (for that time) light, easy to start, and ran smoothly. Thus it was a commercial success, but the Etha was not. The Dyno was so successful, that it influenced model diesel engines designs for about 20 years. The Deezil, shown elsewhere in this book, has unmistakable Dyno characteristics.

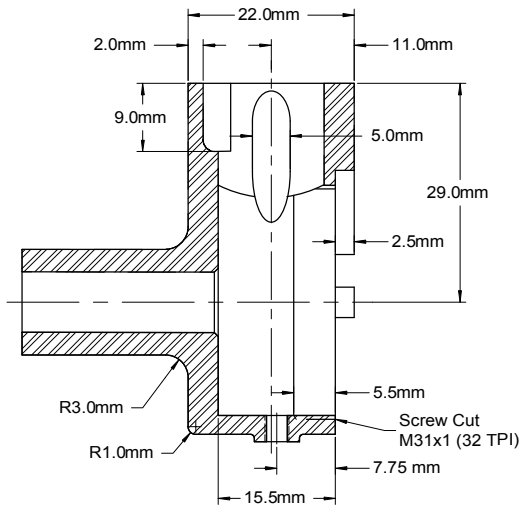
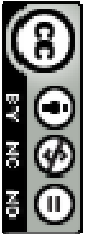


The Dyno has a displacement of 2.04cc, a bore of 12mm and a stroke of 18mm. It weighs 190 grams, or about 7 ounces. The cylinder is steel and the threaded-on head with cooling fins is aluminum. The crankcase is aluminum. The piston, contra-piston and connecting rod are steel. The connecting rod is bushed.

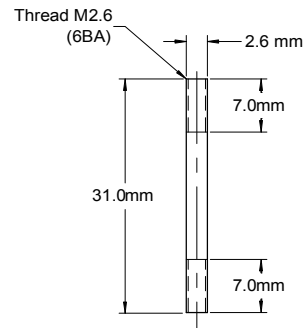
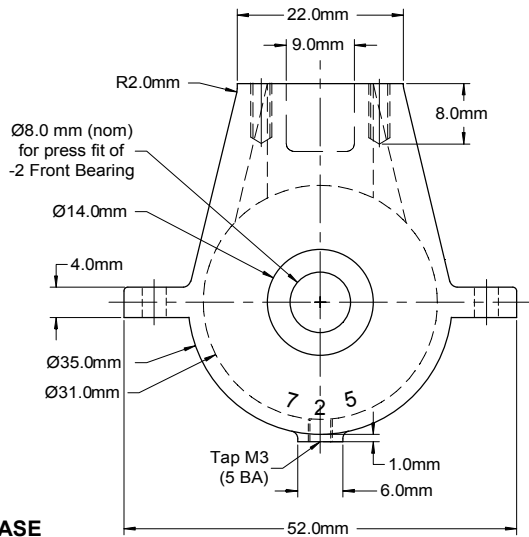
Early in WW2, Jim Noonan, a modeler from Wisconsin, was called into the Army. When he left, he took some of his favorite engines with him as a "little bit of home." Jim was in the Italian campaign that made its way from Africa up through Italy. Jim reached Rome and was granted a few days leave. He looked up the local model shop, made friends with some Italian modelers, and conducted a swap meet. He traded an American Atom for a used Dyno. He brought this Dyno home after the war along with some other European diesels. He became a diesel advocate and introduced many Americans to diesel engines by publishing pictures and descriptions of his engines. They appeared in Bill Winter's "Aircraft Plan Book", Winter Edition, which is believed to have been printed in 1946.

The Dyno pictured above is the engine that Jim brought back from Italy. Lightly scribed on the rear is "Rome 1944". It is easy to start and is a strong runner.

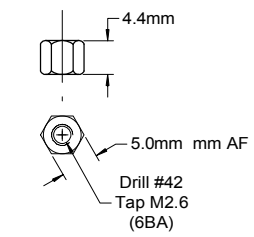
Ron Chernich produced the Dyno drawings from earlier drawings by others and from descriptions provided by Dyno owners. The drawings are considered to be an accurate representation of the original Dyno.



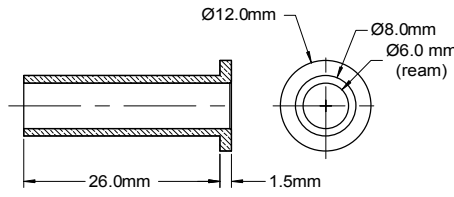
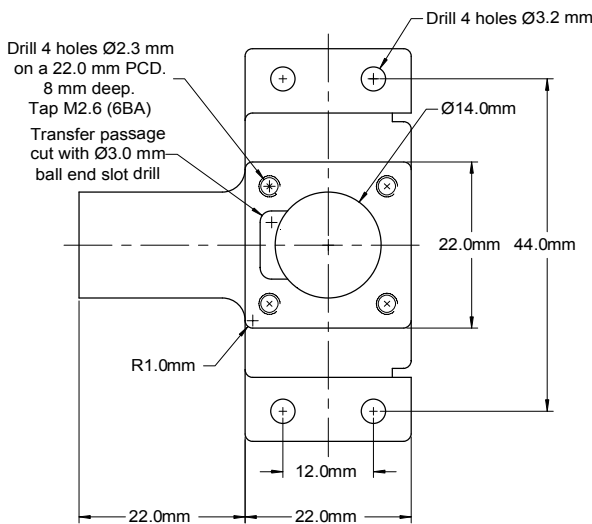
-1 CRANKCASE
Aluminum Casting



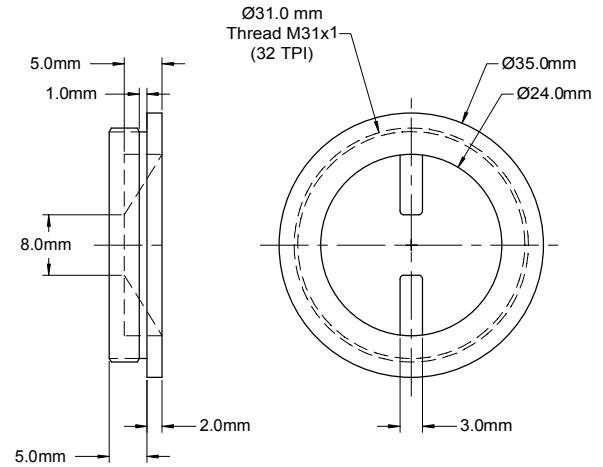
-4 STUD
Steel (4 reqd)




-5 NUT
Brass (4 reqd)

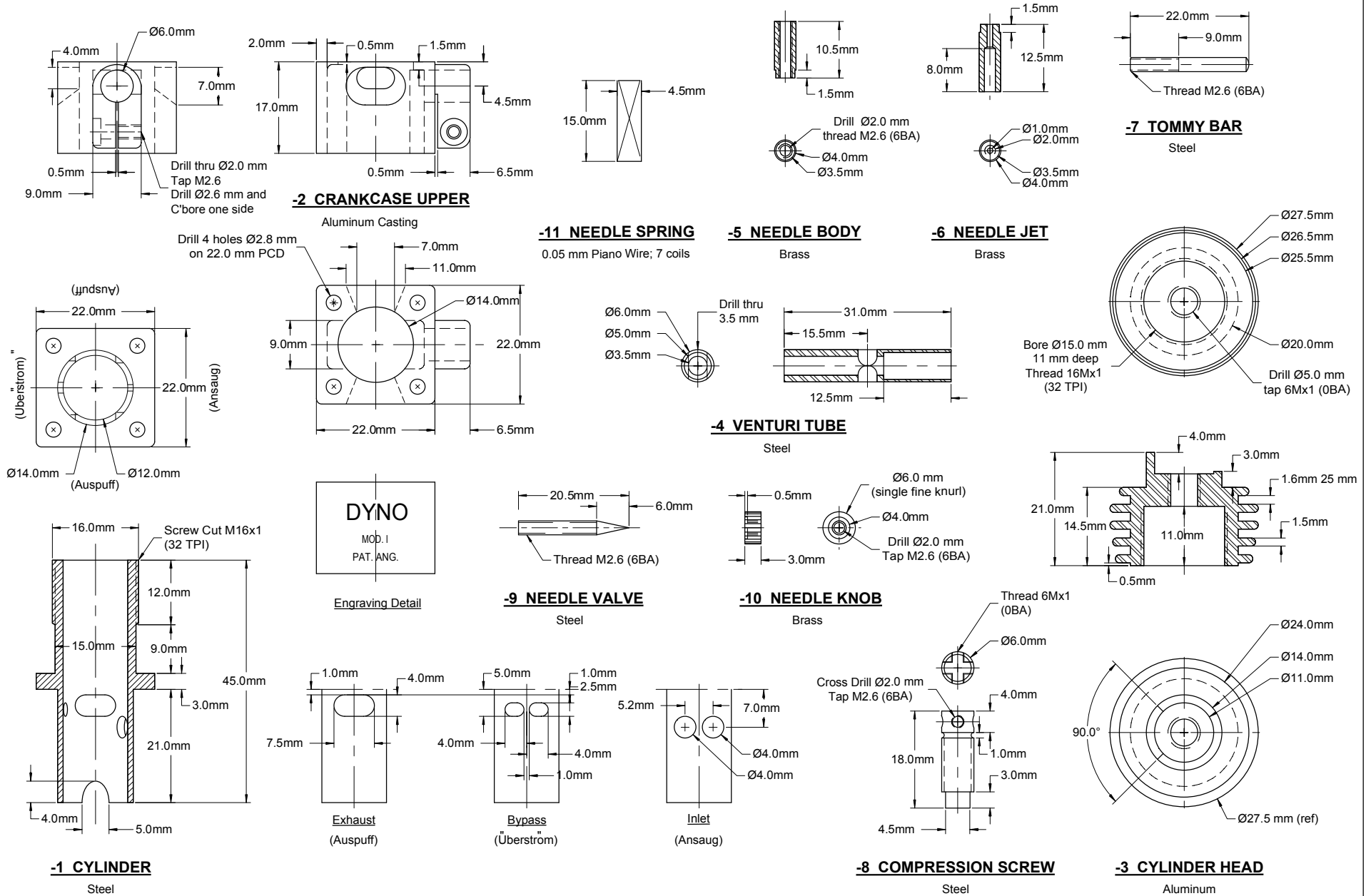



-2 FRONT BEARING
Cast Iron

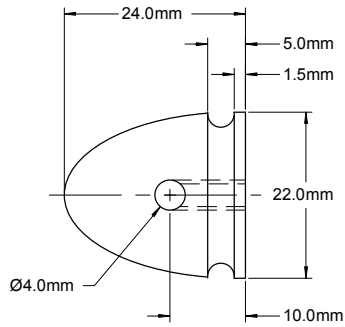


-3 BACKPLATE
Aluminum Casting

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Klemenz-Schenk DYNO 1
			SCALE	Full Size			
			DRAWN				NUMBER Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	PMB			

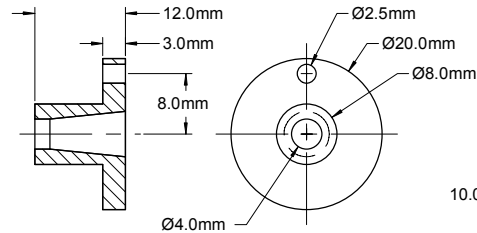


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	 MOTOR BOYS (INTERNATIONAL)	NAME Klemenzen-Schenk DYNO 1
			SCALE	Full Size			
			DRAWN				NUMBER
DATE	CHANGE	BY	CAD	PMB			Sheet 2 - Cylinder



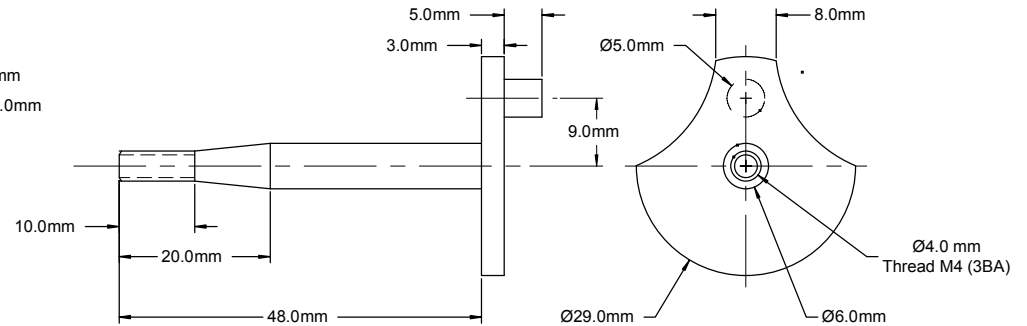
-3 SPINNER NUT

Aluminum



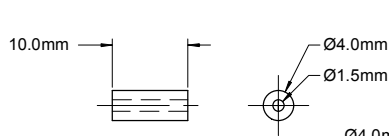
-2 DRIVE WASHER

Steel



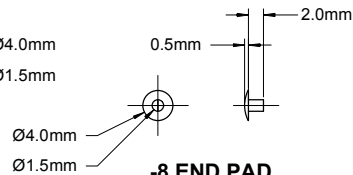
-1 CRANKSHAFT

Steel



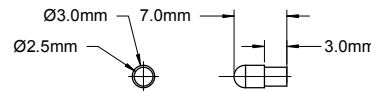
-7 GUDGEON PIN

Drill Rod (H&T)



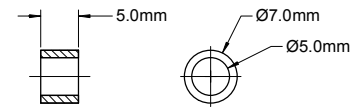
-8 END PAD

Aluminum (2 reqd)



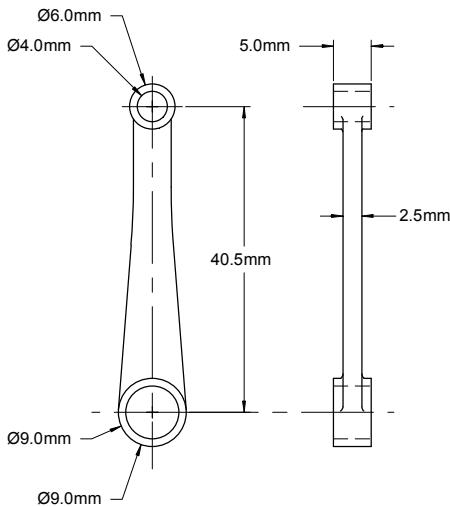
-9 DRIVE PEG

Steel



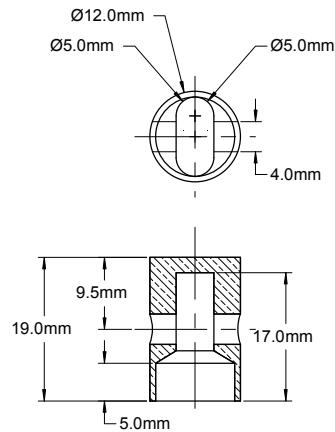
-5 BUSH

Bronze



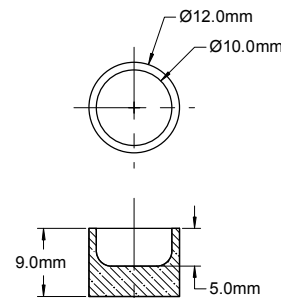
-4 CONNECTING ROD

Aluminum (dural)



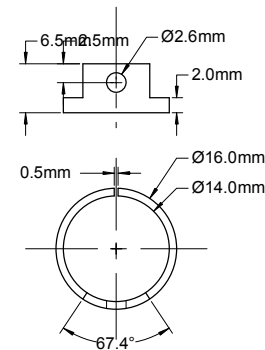
-6 PISTON

SG Cast Iron




-11 CONTRA PISTON

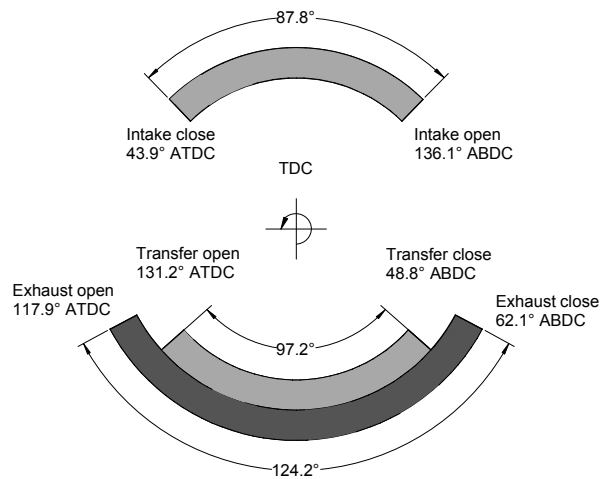
Cast Iron



-10 COMPRESSION LIMITER

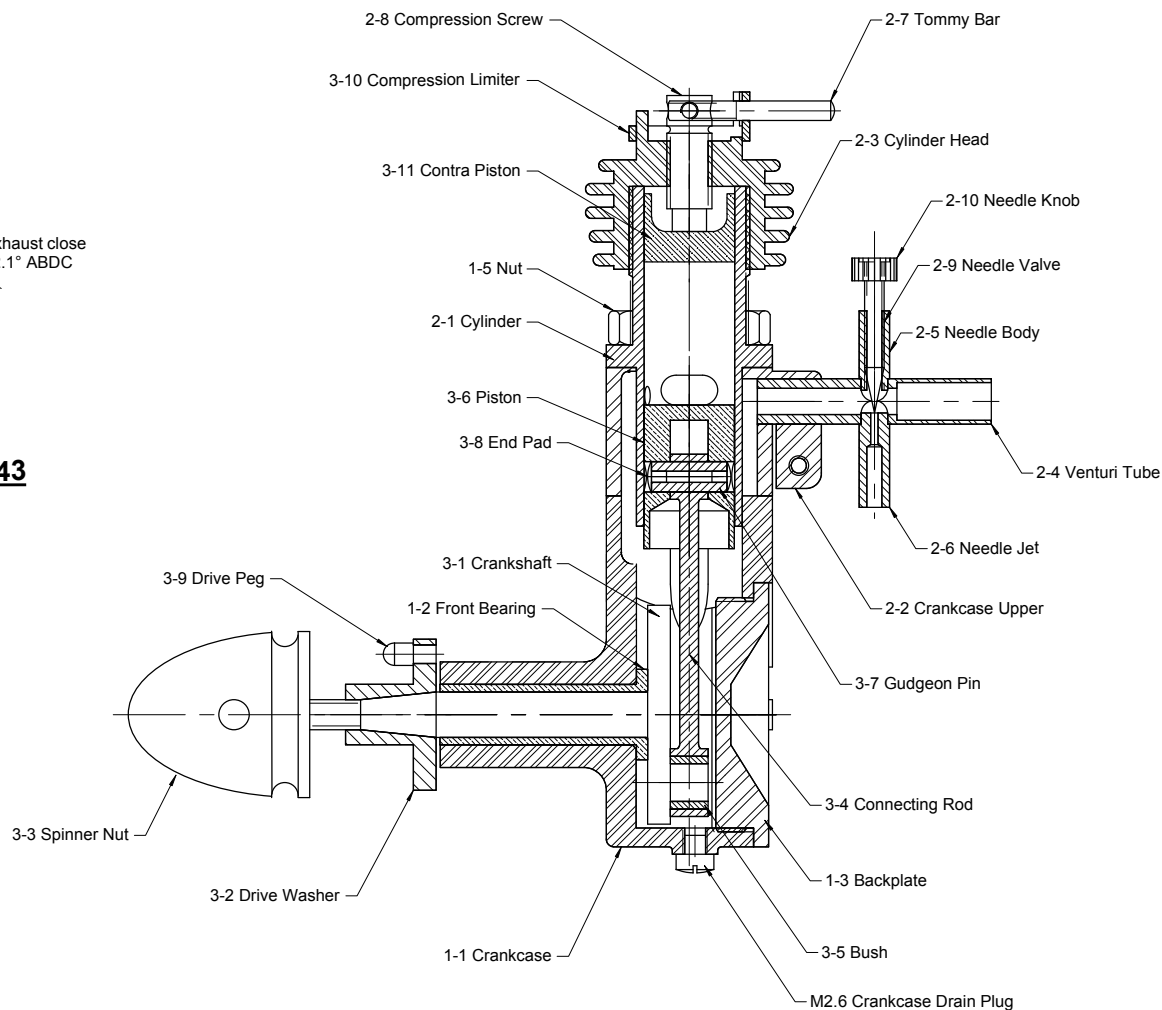
Aluminum


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Klemenz-Schenk DYNO 1
			SCALE	Full Size			
			DRAWN				NUMBER Sheet 3 - Drive Train
DATE	CHANGE	BY	CAD	PMB	NEXT ASSEMBLY		



Klemenz-Schenk DYNO 1 circa 1943

Bore: 12mm (0.472")
 Stroke: 18mm (0.709")
 Displacement: 2.04cc (0.124cuin)



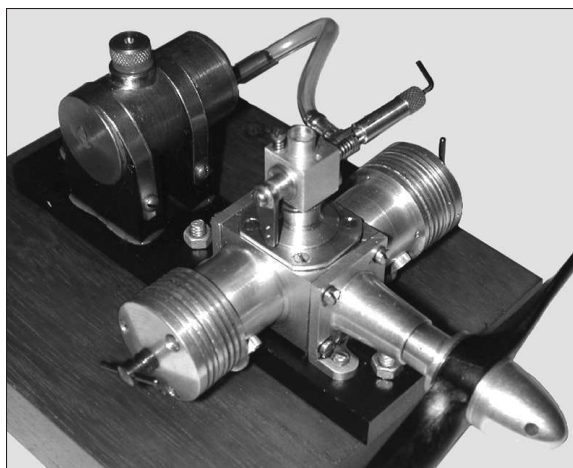
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	 MOTOR BOYS (INTERNATIONAL)	NAME Klemenz-Schenk DYNO 1
2007-08-14	Timing diagram corrected and standardized	BMBI	SCALE	Full Size			NUMBER
Jan 5 2000	Timing diagram added	BMBI	DRAWN	Nov 1 1999			Sheet 4 - General Arrangement
DATE	CHANGE	BY	CAD	PMB			



The Twin from Fig Tree Pocket

by Ron Chernich

And just where, you may well ask, is "Fig Tree Pocket" and why do twin cylinder diesels feel the need to escape from it? All good questions, well deserving of equally good answers. "Fig Tree Pocket" is a quiet, leafy outer suburb of Brisbane, itself the capitol and largest city of the state of Queensland, Australia. Within these pleasant surroundings may be found a gentleman of the old school and long time modeler, Mr Russell Watson-Will.



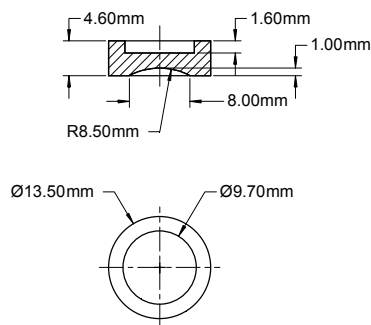
Russell, who is now retired, builds models and engines. Mostly aeronautical, but not always. A few years ago, like a sculptor, Russ regarded a large block of 2024-T4 aluminum and saw the twin cylinder diesel within, just waiting to be let out. The result is the engine detailed on the next few pages. Now it's well known that I'm a total sucker for twins. This is a personal failing I've come to terms with and even, dare I say, embraced. On seeing Russ's latest creation, I decided that even if I never built one, I simply had to have a set of drawings for it. All that remained was tricking Russ into agreeing.

Casually, I mentioned that this looked like a good choice for a Motor Boys plan set and perhaps he might allow me to take some measurements? I was saved from my having to execute my contingency plan (which involved a lot of embarrassing begging and groveling on bended knees) by Russ offering the loan of all the drawings he'd made during the design and his generous offer of help with any details that were not clear. As I said, Russ is one of nature's gentlemen.

On one point though, Russ was adamant; this was not his design. "Eh?" Wasn't it a one-of-a-kind engine? Yes. Hadn't he made it, from scratch? Yes. Then wasn't he, ipso facto, the designer? No. In his view, the general crankcase design was borrowed from the British "Craftsman Twin". The cylinders, pistons and porting were copied from a Czech MVVS diesel. The con-rod big end design was stolen from Edgar Westbury's "Ladybird" twin in-line diesel (which Russ has made from the solid) and the use of reed valve induction for horizontal opposed twins was common practice. So there was simply no way, Russ emphasized, that he could, with any degree self-respect, present the engine as his! We agreed. I would CAD-ify the engine and attribute it to him with some appropriate weasel words that did not contain the phrase "designed by."

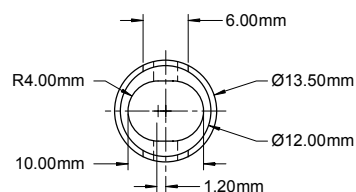
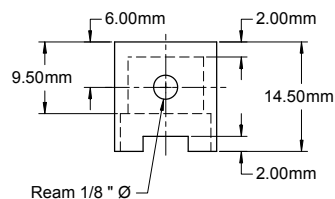
As the project came towards the end, I put "Fig Tree Pocket Twin" in the title block and handed a set of drawing to Russ for him to cast his eagle eye over. Apart from pointing out a few minor matters such as the fact that the engine as I'd drawn it would not actually turn over, he approved the plans and, with a twinkle in his eye, even the name it had taken on.

The FTP Twin is a strong runner and started so readily that Russ nearly lost fingers in the surprise. Although it requires an advanced degree of experience in model engine building in order to work out the machining sequences and to know which parts need to be precisely aligned to minimize working friction, it is not an engine for master machinists only. It could be built by any model engineer who has made a diesel or two and understands which bits are critical. Even simply studying the drawings to see how Russ went about choosing just what should go into a horizontally opposed twin diesel is rewarding in itself. I leave it to you to decide if Russell is the designer, or simply the constructor of a beautiful, unique engine.



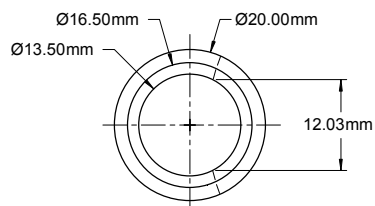
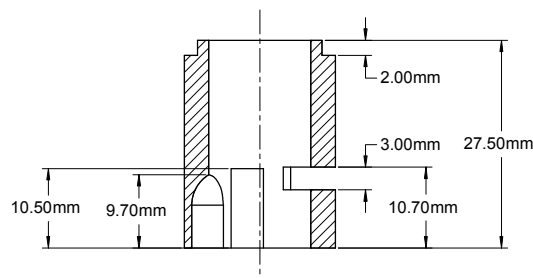
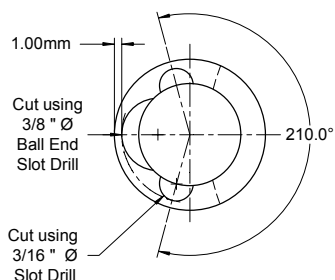
-3 CONTRA-PISTON

Cast Iron



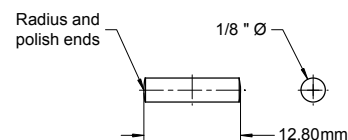
-2 PISTON

Cast Iron



-1 CYLINDER LINER

Steel

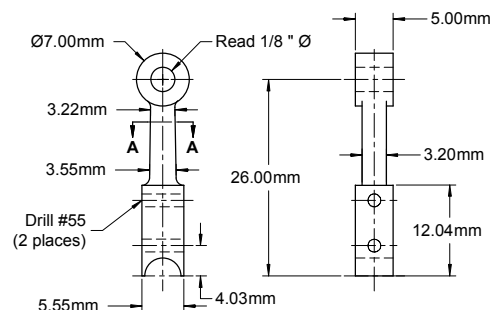


-4 WRIST PIN

1/8 " Drill Rod H&T



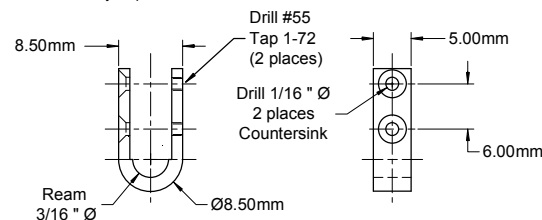
SECTION A-A (typ)



-5 CONROD

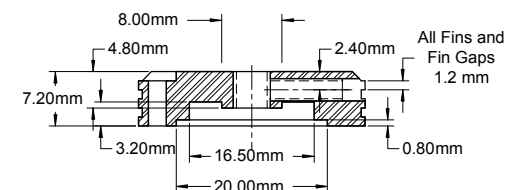
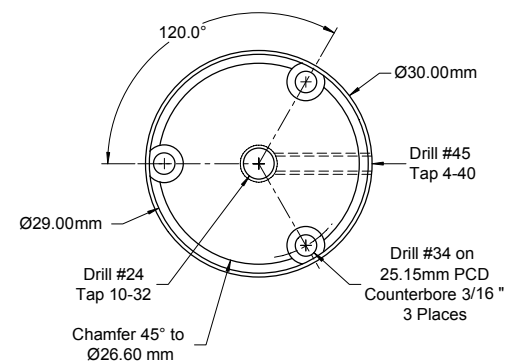
Aluminum Bronze

Sweat solder -6 Cap to -5 Conrod then drill all holes, tap and ream rod ends.
Finally, separate and open out holes in -6 Cap for 1-72 screws.



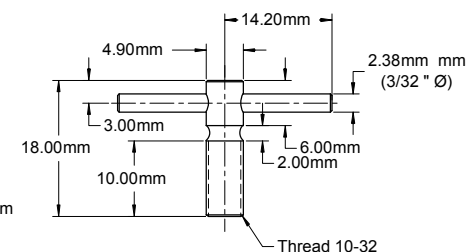
-6 CONROD CAP

Aluminum Bronze




-7 CYLINDER HEAD

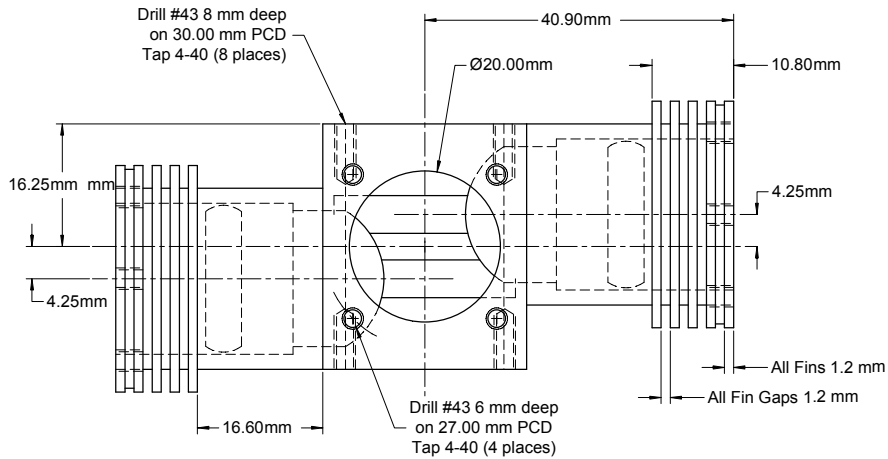
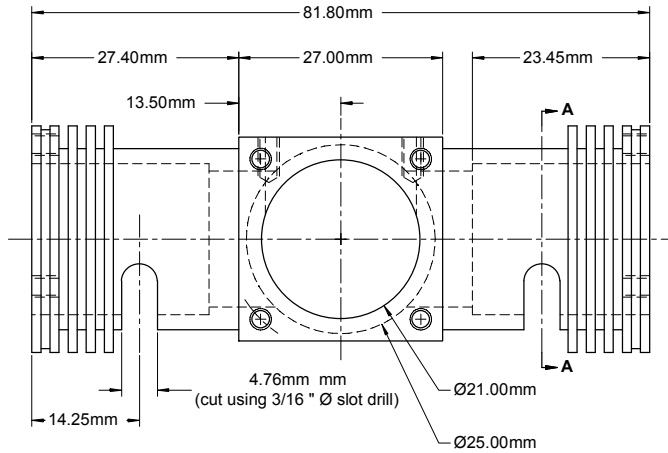
Aluminum



-8 COMPRESSION SCREW ASSY.

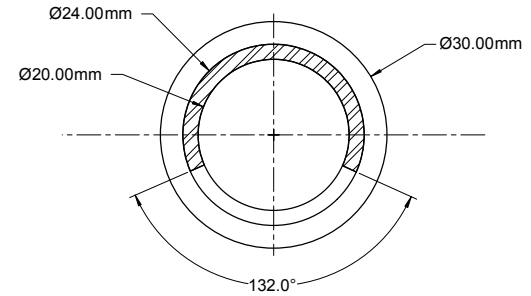
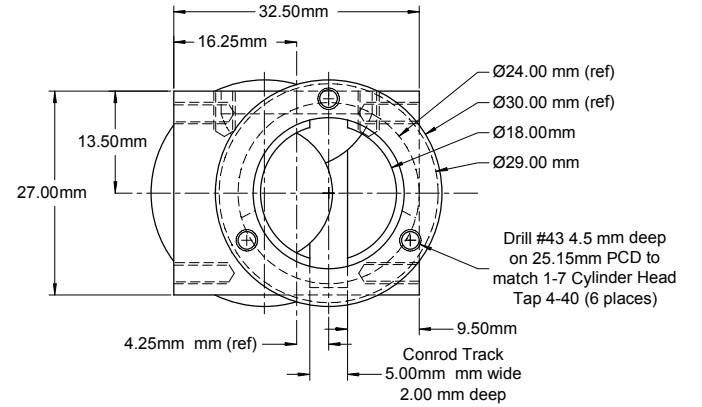
Steel (Blue Finished)

28 Oct 1999	Change big end screws to countersunk head	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
2006-02-04	Show thread on Conrod U Straps.	BMBI	SCALE	Full Size			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	RWW	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	BMBI			




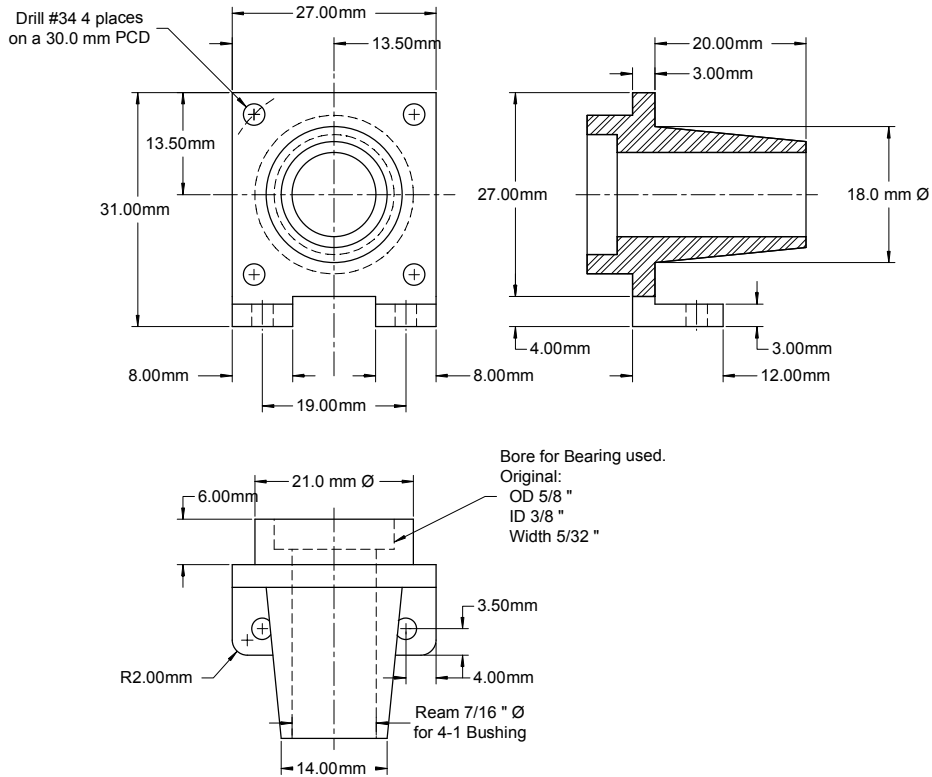
-1 CRANKCASE

Aluminum (7075 T4)



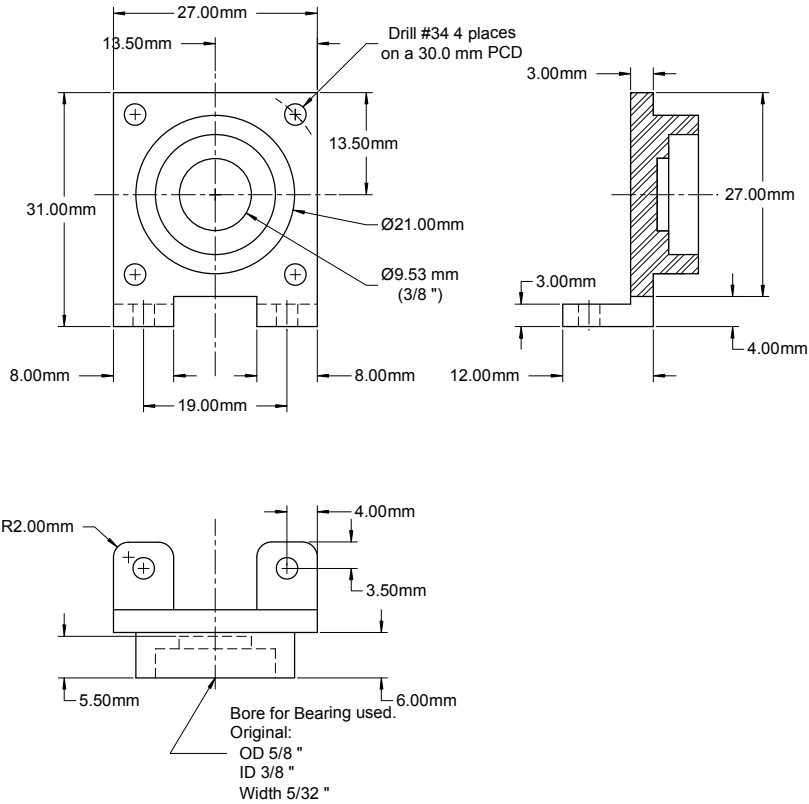
SECTION A-A

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
			SCALE	Full Size			
			DRAWN	RWW			NUMBER Sheet 2 - CRANKCASE
DATE	CHANGE	BY	CAD	BMBI			




-1 FRONT BEARING HOUSING

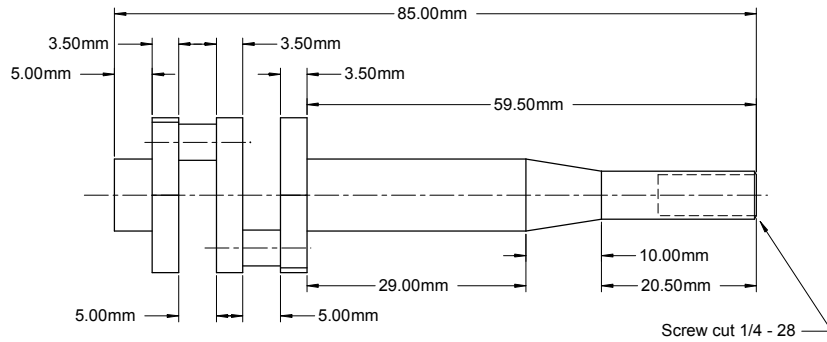
Aluminum (7075 T4)



-2 REAR BEARING HOUSING

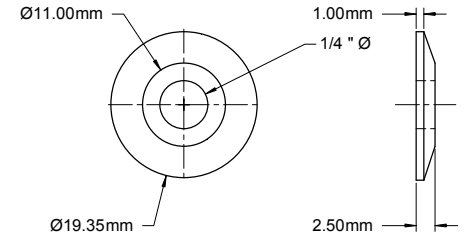
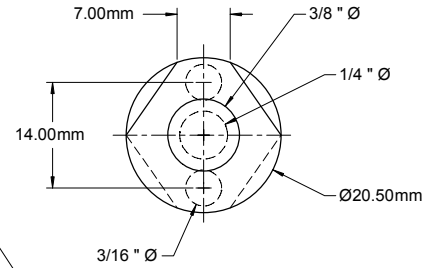
Aluminum (7075 T4)

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
			SCALE	Full Size			
			DRAWN	RWW			NUMBER Sheet 3 - CRANKCASE ENDS
DATE	CHANGE	BY	CAD	BMBI			



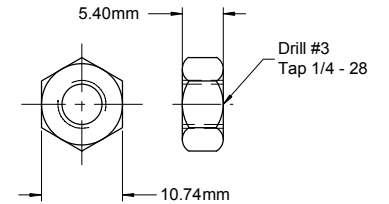
-2 CRANKSHAFT

Steel



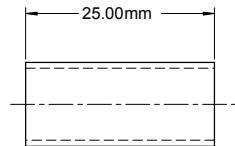
-5 PROP WASHER

Aluminum



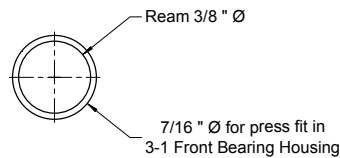
-4 PROP NUT

Hex Steel

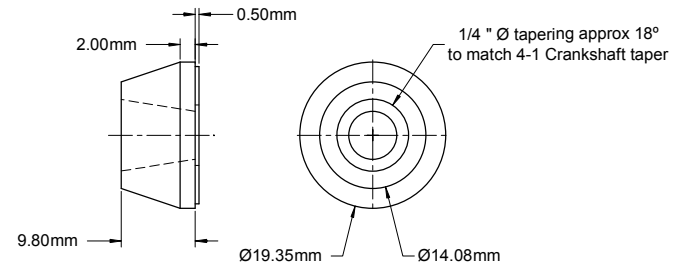
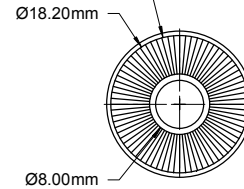


-1 BEARING

Bearing Bronze




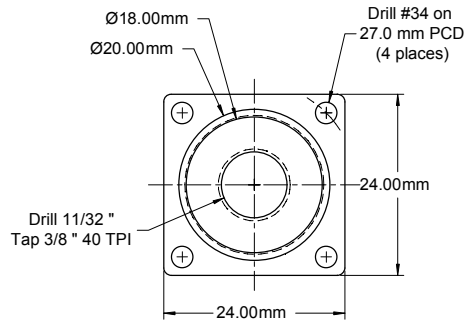
Plunge knurl with coarse straight knurl set 2° (convex) to face



-3 DRIVE WASHER

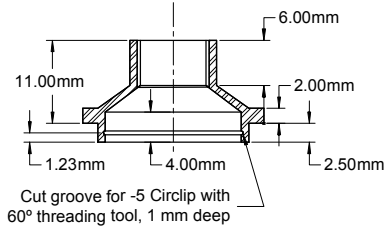
Aluminum

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
			SCALE	Full Size			
			DRAWN	RWW			NUMBER Sheet 4 - CRANKSHAFT
DATE	CHANGE	BY	CAD	BMBI			



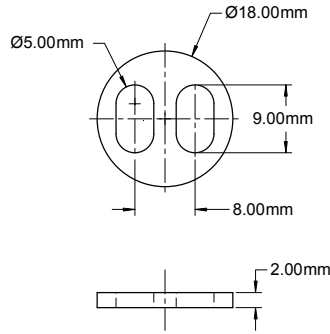
-1 REED VALVE HOUSING

Aluminum



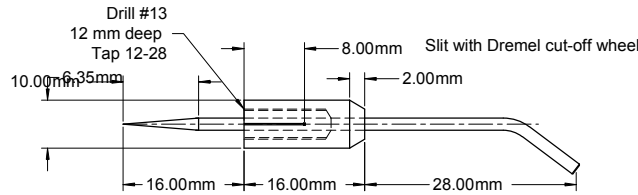
-2 REED PLATE

Aluminum



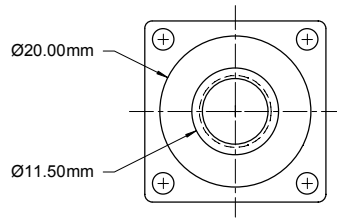
-5 CIRCLIP

1 mm Music Wire



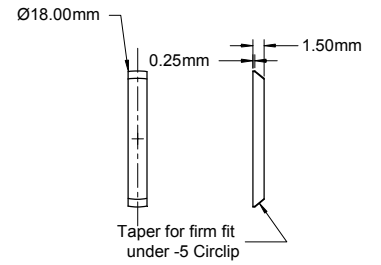
-9 NEEDLE VALVE ASSY.

Brass + 1/16 inch Music Wire



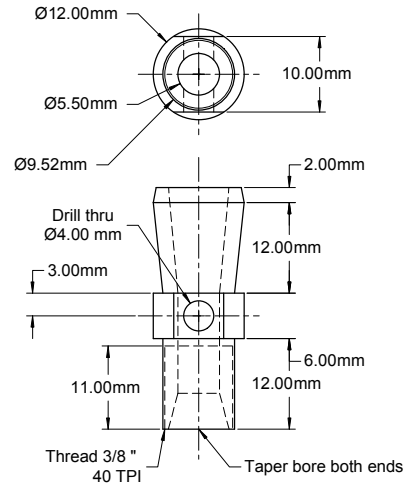
-3 REED

.002 inch Mylar



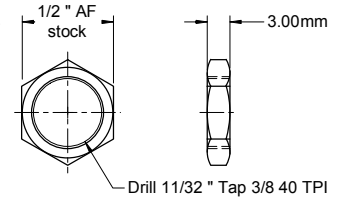
-4 REED CLAMP BAR

Aluminum



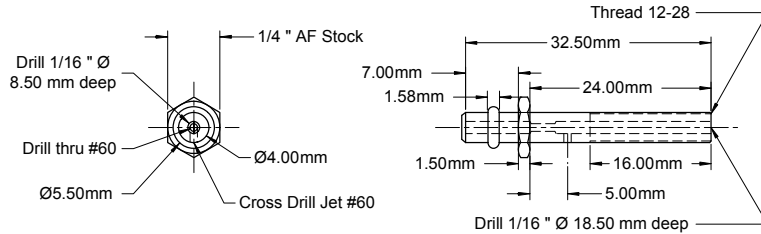
-10 VENTURI

Aluminum



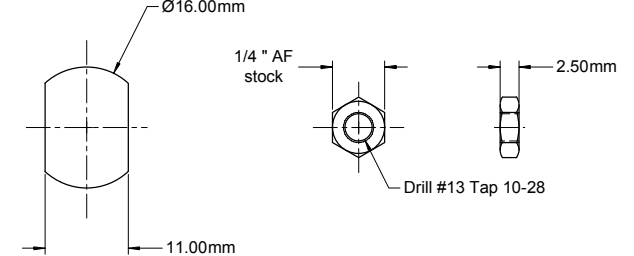
-11 VENTURI NUT

Hex Brass




-7 SPRAY BAR

Hex Brass

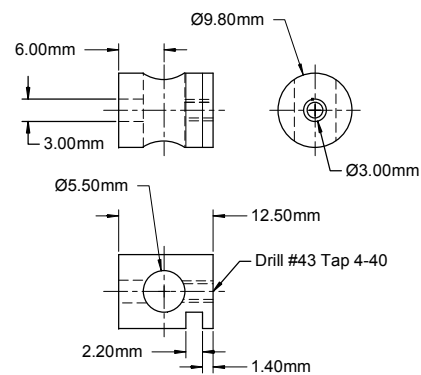
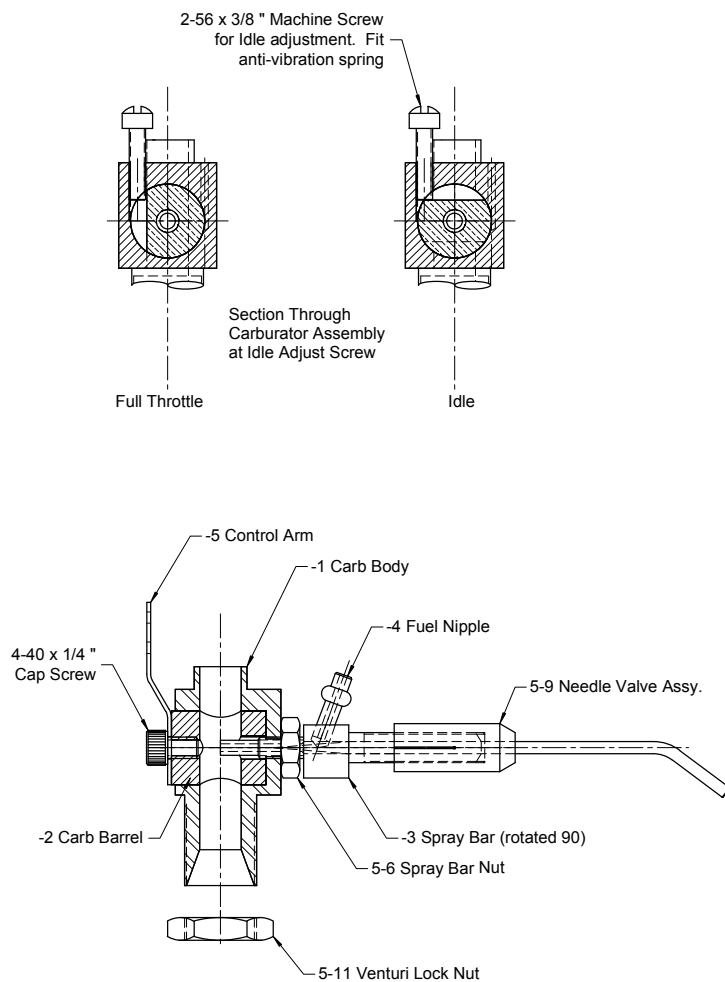


-6 SPRAYBAR NUT

Hex Brass

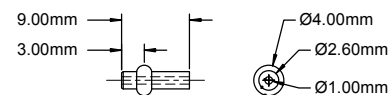
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
			SCALE	Full Size			
			DRAWN	RWW			
DATE	CHANGE	BY	CAD	BMBI	NEXT ASSEMBLY		NUMBER Sheet 5 - INDUCTION SYSTEM

CC BY NC ND



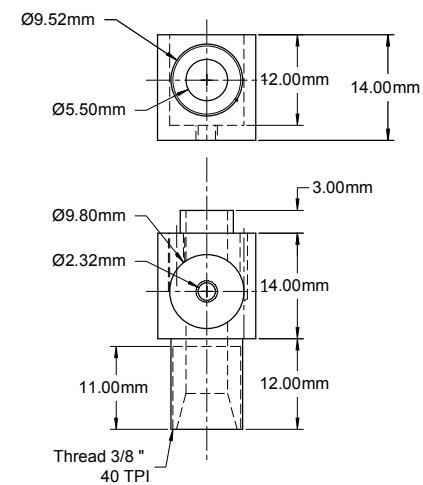
-2 CARB BARREL

Hex Brass



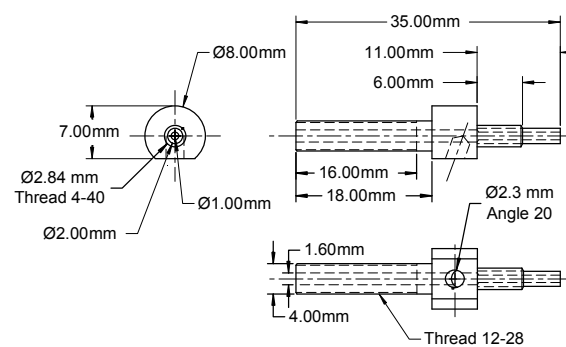
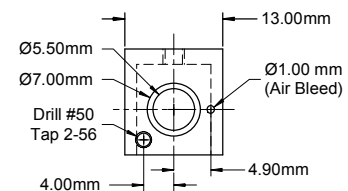
-4 FUEL NIPPLE

Brass



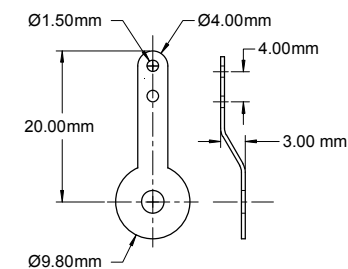
-1 CARB BODY

Aluminum




-3 CARB SPRAY BAR

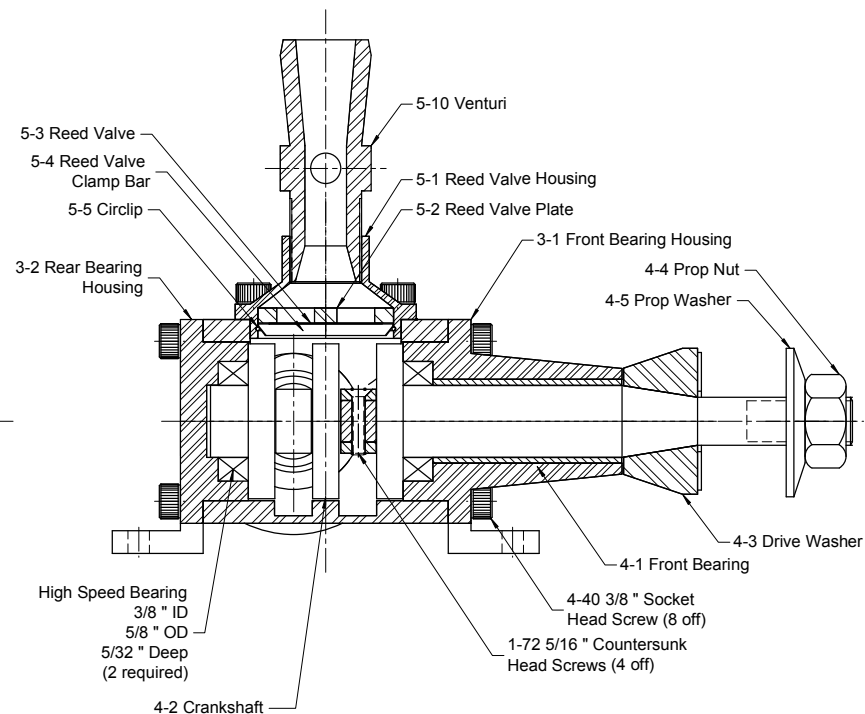
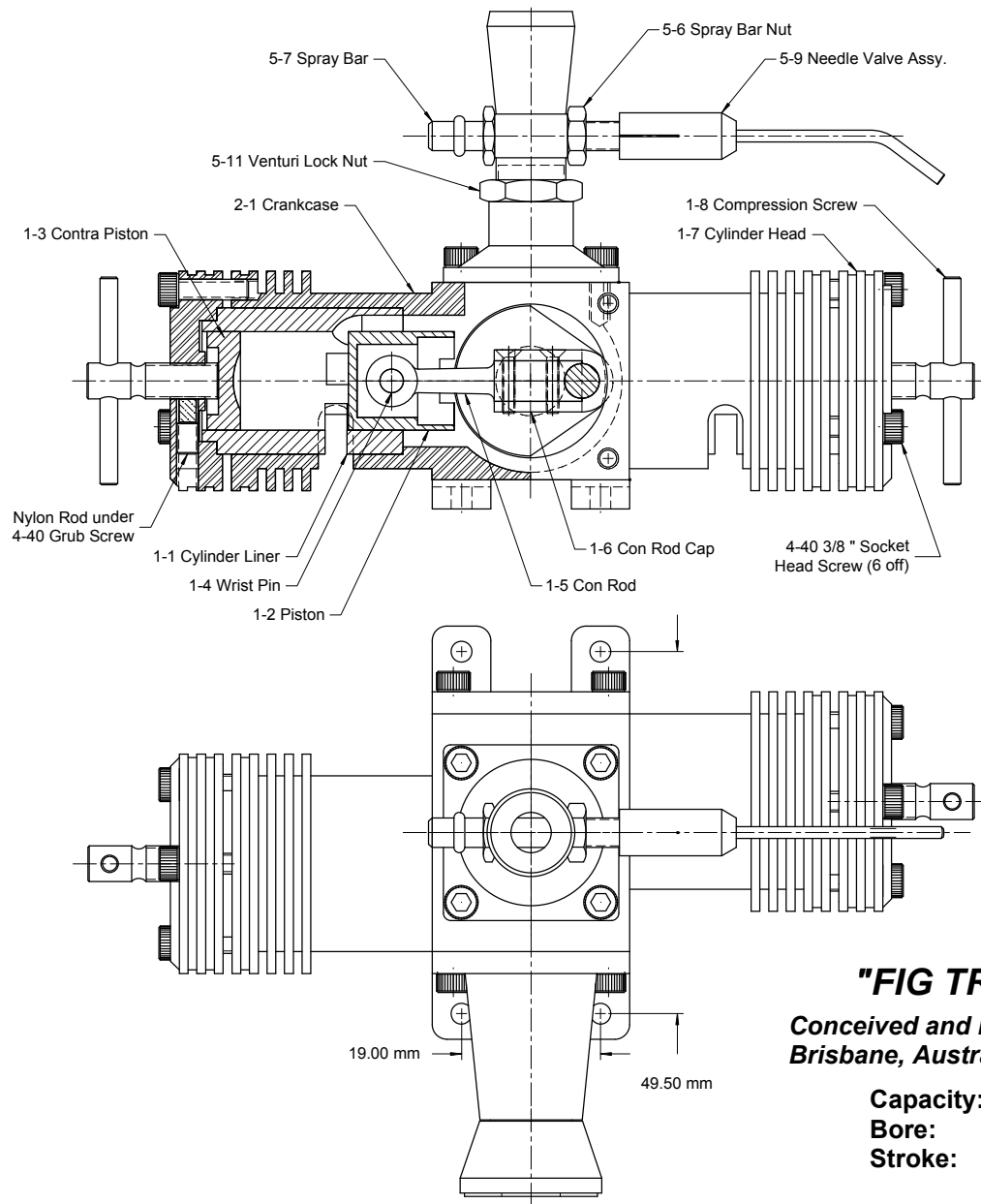
Hex Brass



-5 CONTROL ARM

1mm Steel

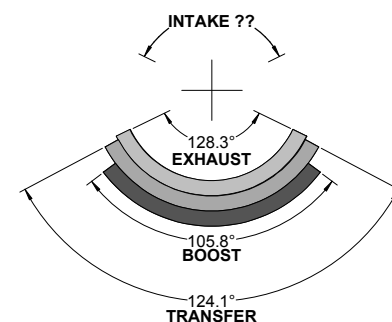
			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
			SCALE	Full Size			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	RWW	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	BMBI			NUMBER Sheet 6 - R/C CARBURATOR




"FIG TREE POCKET TWIN"

Conceived and built by Russell Watson-Will,
Brisbane, Australia, 1998.

Capacity: 4.00 ccm (0.245 cu in)
Bore: 13.5 mm (0.531 in)
Stroke: 14 mm (0.551 in)



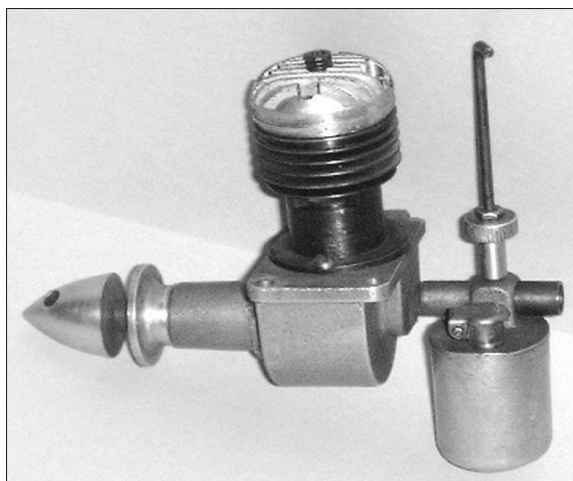
28 Oct 1999	Change big end screws to countersunk head	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME Fig Tree Pocket Twin
2006-02-04	Change big end screws to permit assembly	BMBI	SCALE	Full Size			NUMBER Sheet 7 - GENERAL ARRANGEMENT
DATE	CHANGE	BY	CAD	RWW BMBI			

Vivell Precision .09 Diesel

by Tim Dannels

One of the more prominent names in modeling, especially on the West Coast, was Vivell. From 1944 through around 1952, Vivell engines and products were very popular. Strangely, Vivell was not a manufacturer. Earl Vivell was a hobby shop owner, avid modeler and business promoter.

As early as 1943, as WWII was winding down, Earl was looking for a product line he could call his own. Of course he knew most of the manufacturers and engine people in the area. He discovered that the Comet Company in Chicago was going to drop the 35 engine that Jack Keener was making for them. After discussing the situation, Earl got Jack to make some changes to the design and he advertised "A Few Small Class C Engines Left". They weren't really left over, but with a few changes to the left over Comet engines, the Vivell line of engines was born.



The Vivell 35 went through numerous design changes and in late 1946 was joined by the Vivell "Forty Niner", this time a continuation of the Thermite and Little Dynamite designs of Jim Brown, another of the well known West Coast engine men.

Earl Vivell was on a roll. His engine line was expanding and his hobby business was doing very well. He was right in the middle of the post-war modeling boom. A Twin was added and was produced in several models. By 1948 he added a line of small engines under the "Precision" heading.

This was a series of .09 Diesels, fixed and variable compression, along with .09 glow engines, some with front rotary valve. A small run of .035 glow and diesel engines was added and there was even a little .020 glow engine.

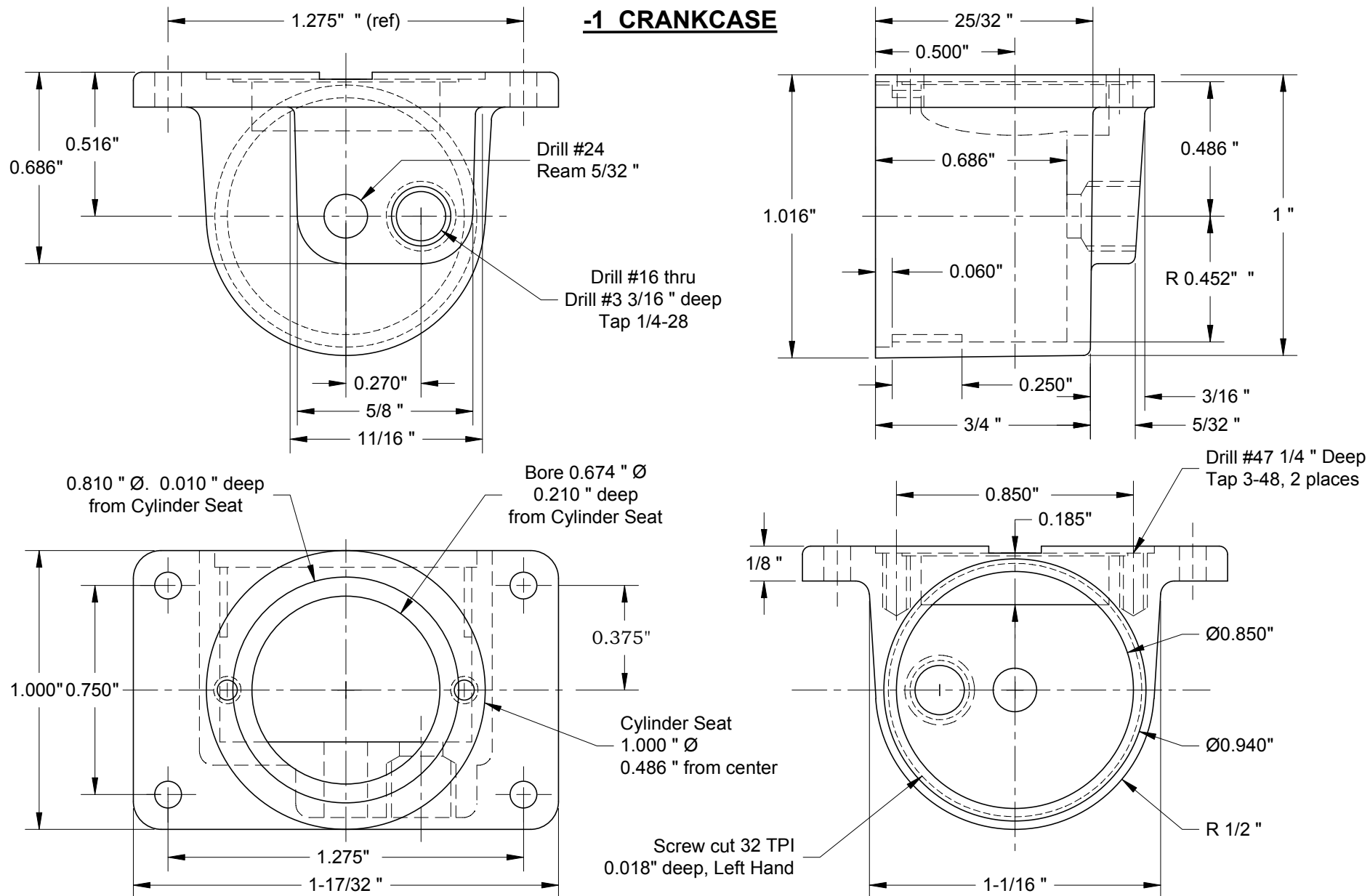
The Twins and the little .09, .035 or .020 engines were also designed and built by Jack Keener. We know that the twin was styled after the Fergusson Condor Twin which was one of Earl's favorite engines. This engine he used in his radio control models because it would carry the weight of the radios of that time period.


The Motor Boys version of the Vivell Precision .09 diesel follows the original very closely. Sand cast case, front housing and tank top, bar stock head with internal contra piston, rear disc rotary and machined tank. An interesting feature is the screwed in front plate which uses left hand threads to keep from coming out as the engine is running. Original engines used an allen head set screw type of compression adjustment, but the plans show either the allen head or a "tommy bar" adjuster.

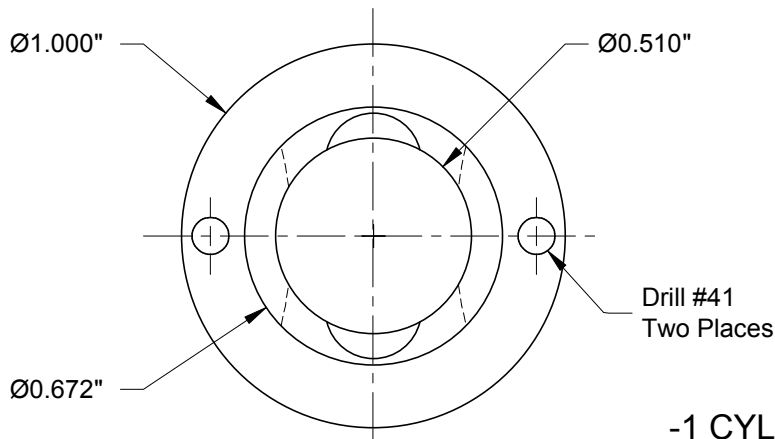
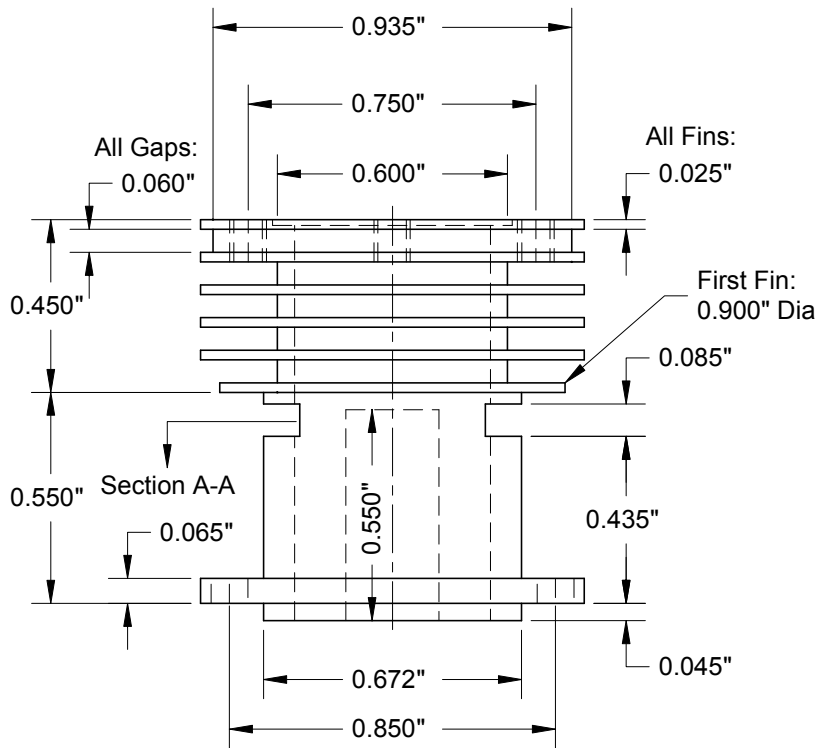
As a side note, the Jack Keener mentioned above was the designer and builder of the Brat and Madewell engines, beginning way back in 1937. The Madewell line began with little .14 cu. in. engines before the war and ended up with the .49 size that was so popular in the late 1940's. It was an unusual situation, Jack was building Vivell 35's for Earl Vivell and Madewell 49's for himself all at the same time. This was one reason Earl turned to Jim Brown for his .49. Even with the apparent conflict in products, Earl and Jack remained good friends and business associates.



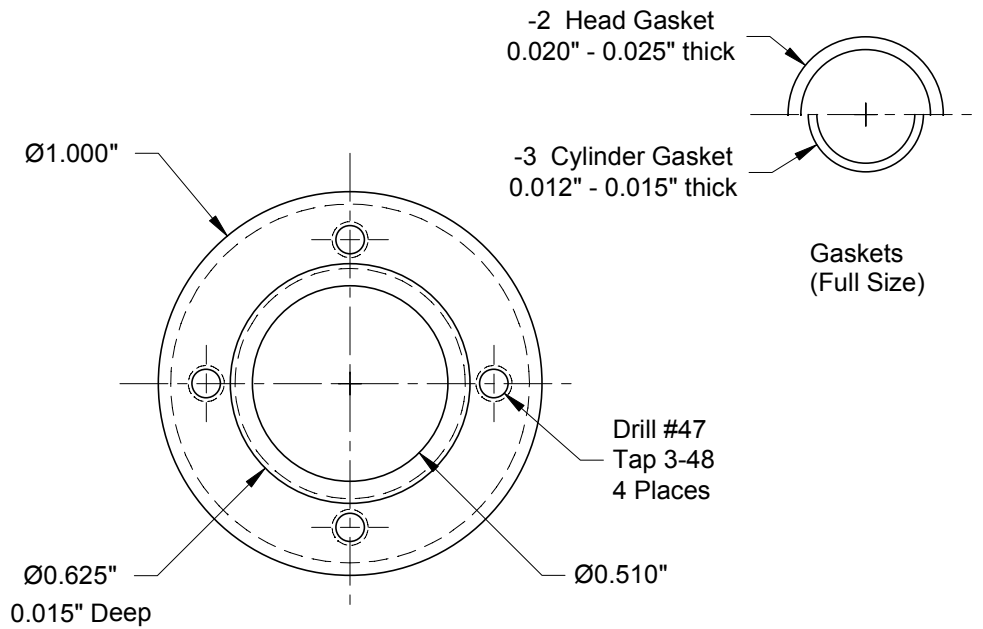
-1 CRANKCASE



2009-10-03	Inlet drilling amended yet again	BMBI	MAT'L	Aluminum Casting	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
8 Apr 1998	Inlet drilling detail amended	PMB	SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER Sheet 1 - CRANKCASE
6 Jan 1998	Internal Crankcase recess removed	PMB	DRAWN	RMB 12-21-97	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 1-5-98			

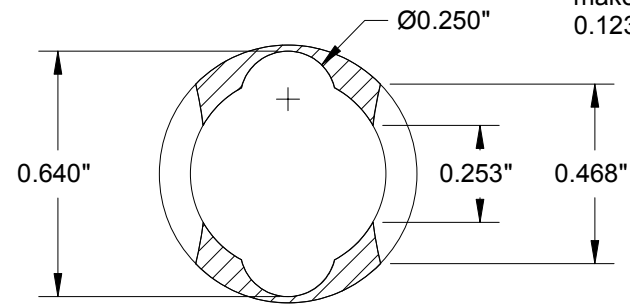


-1 CYLINDER



Exhaust Ports:


Use 2" Dia. Slitting Saw to make plunge cut, 0.123" deep.



Section A-A

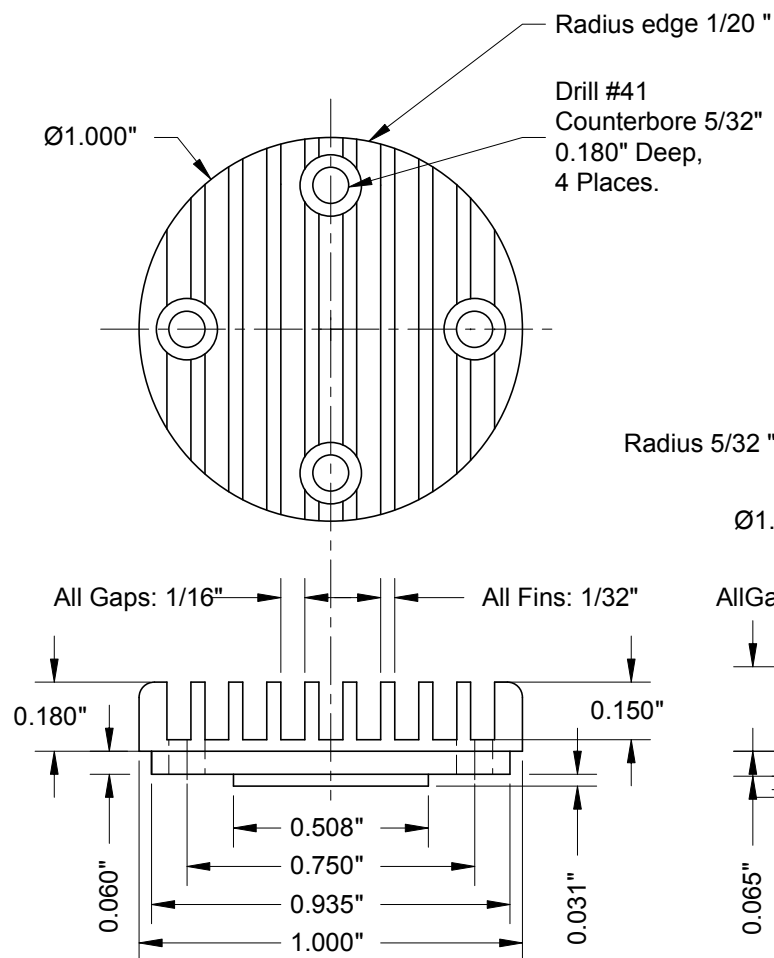
Transfer Ports:

Use 1/4" Dia. End Mill cut 0.065" into wall.

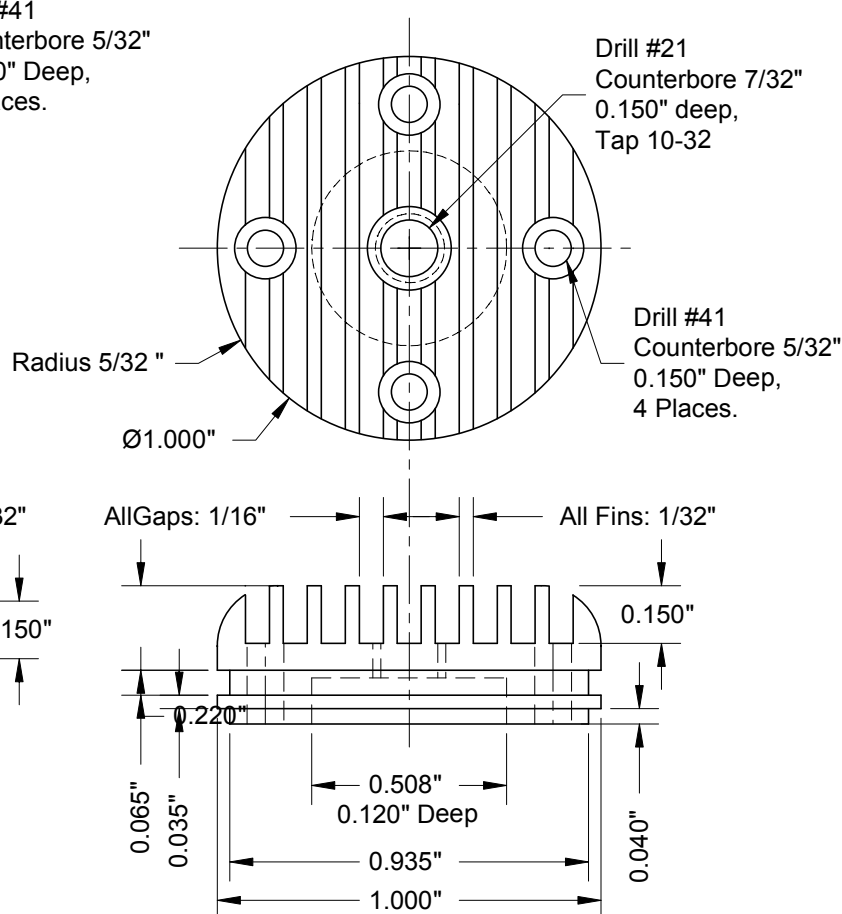
			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB			Sheet 2 - Cylinder



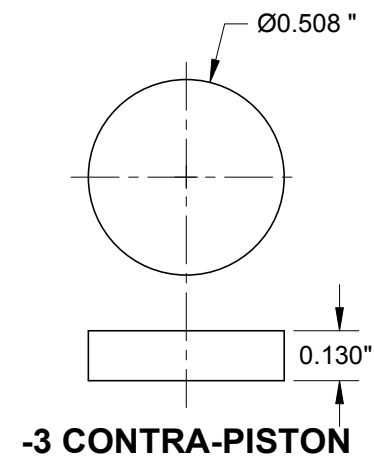
Fastener List		
1	10-32 x 5/16"	Compression Screw
1	3-48 x 7/8"	Tank
2	3-48 x 3/16"	Cheese Head Cylinder
4	3-48 x 5/16"	Cyl. Head (Variable)
4	3-48 x 3/16"	Cyl. Head (Fixed)



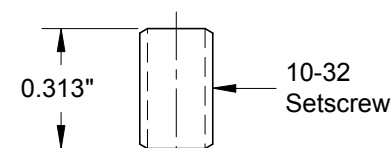
-1 MODEL 09F HEAD



-2 MODEL 09V HEAD

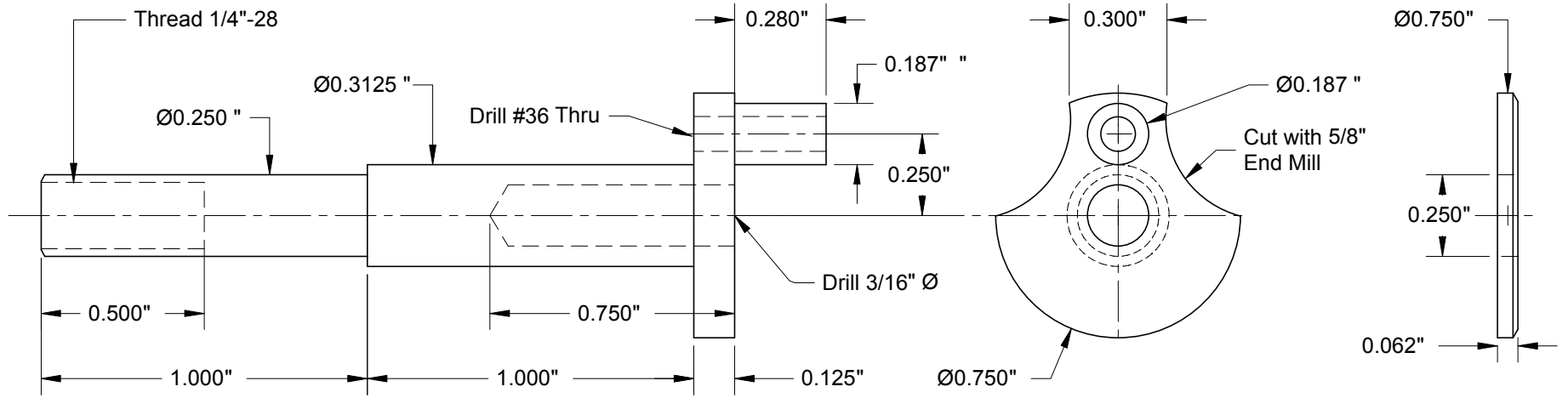


-3 CONTRA-PISTON



-4 COMPRESSION SCREW

			MAT'L	Aluminum	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 1-1-98			Sheet 3 - CYLINDER HEAD

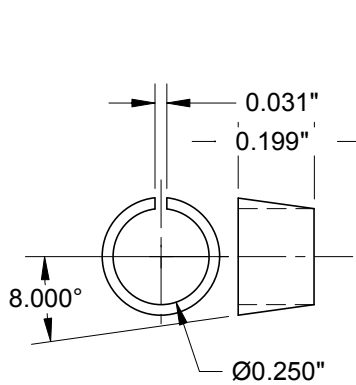


-1 CRANKSHAFT

Steel

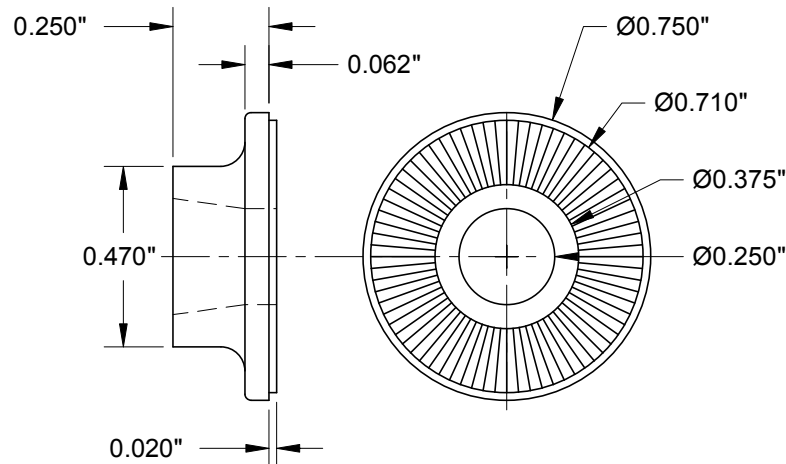
-5 PROP WASHER

Aluminum



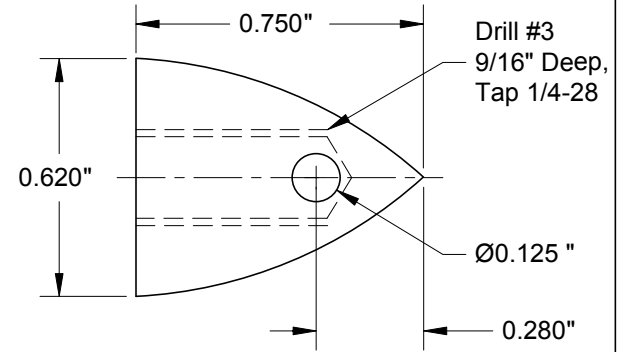
-2 COLLET

Brass




-3 DRIVE WASHER

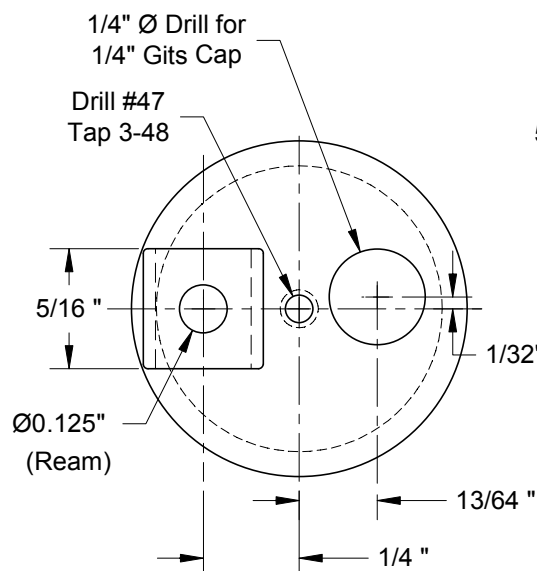
Aluminium



-4 SPINNER NUT

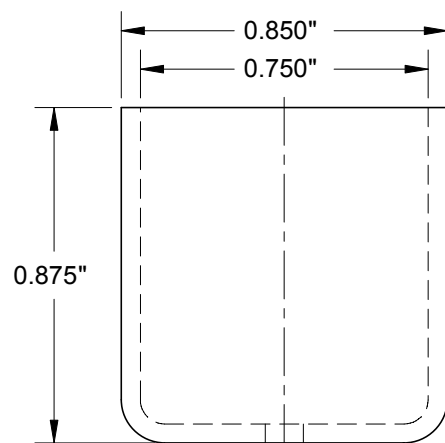
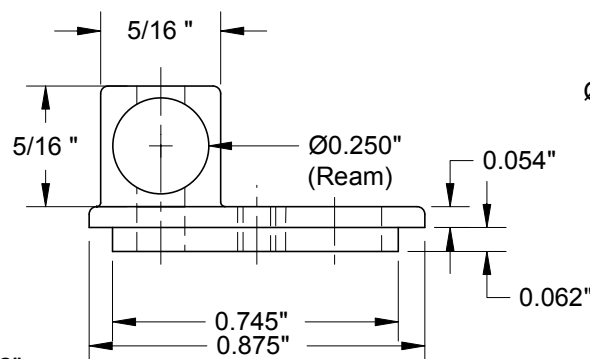
Aluminium

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 1-1-98			Sheet 4 - Crankshaft Assembly



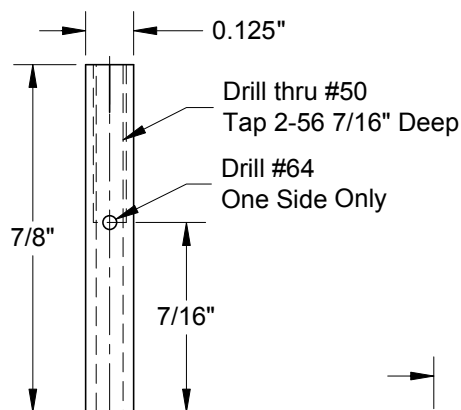
-2 TANK TOP

Aluminum



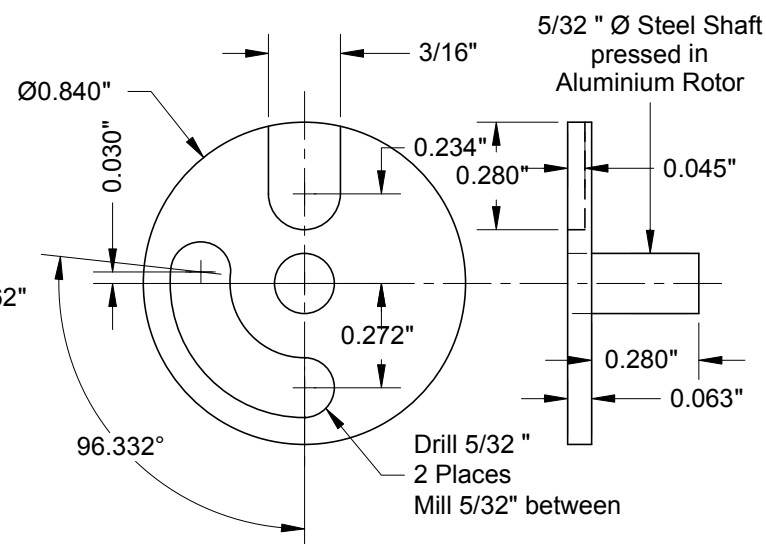
-3 TANK

Aluminum



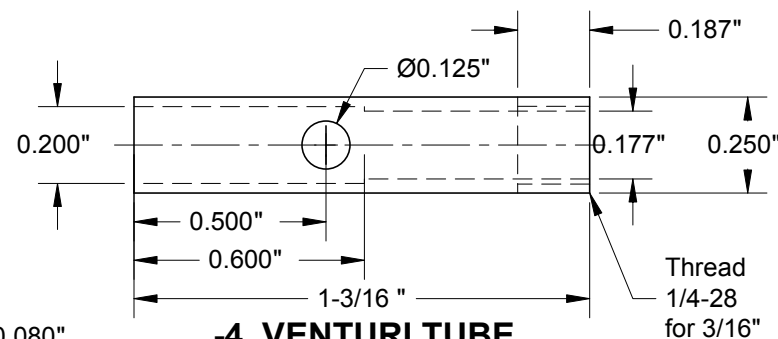
-5 SPARY BAR

Brass



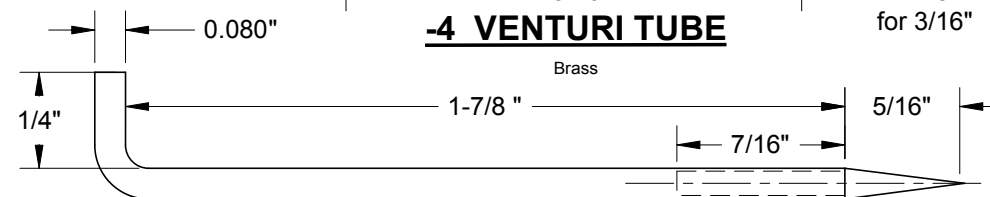
-1 INDUCTION ROTOR ASSEMBLY

Aluminum




-4 VENTURI TUBE

Brass




-6 NEEDLE VALVE

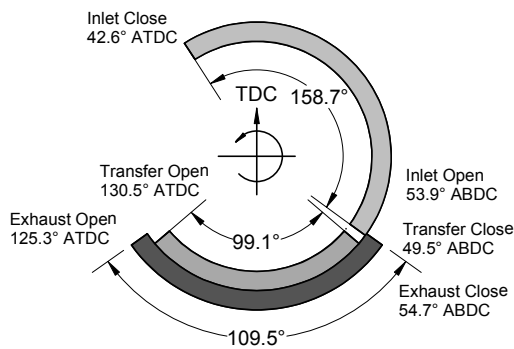
Aluminum Wire

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER Sheet 5 - Fuel Induction System
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 1-1-98			



			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	PMB 1-1-98			

Sheet 6 - Bushing and Piston



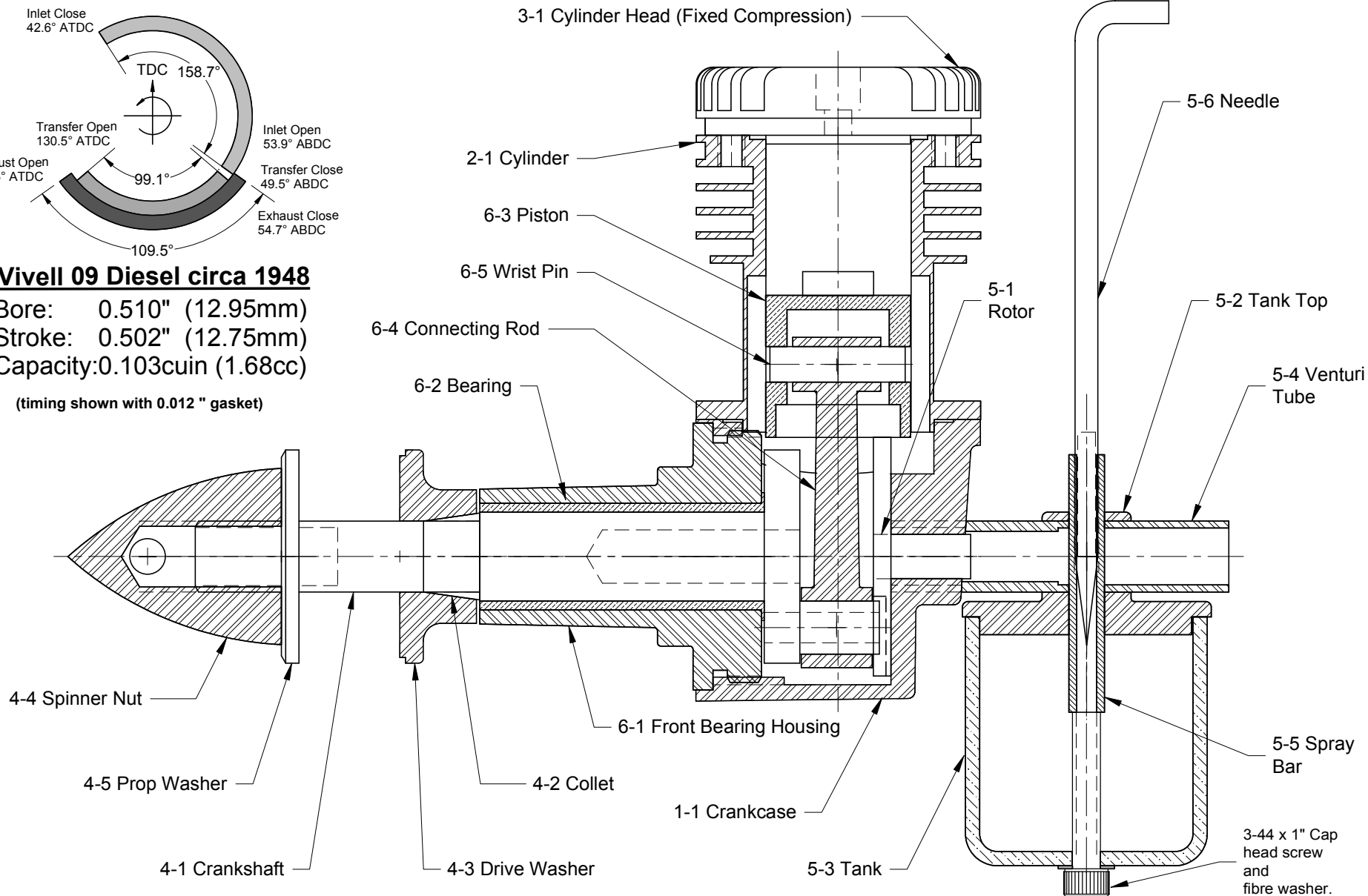
Vivell 09 Diesel circa 1948


Bore: 0.510" (12.95mm)

Stroke: 0.502" (12.75mm)

Capacity: 0.103 cu in (1.68cc)

(timing shown with 0.012" gasket)

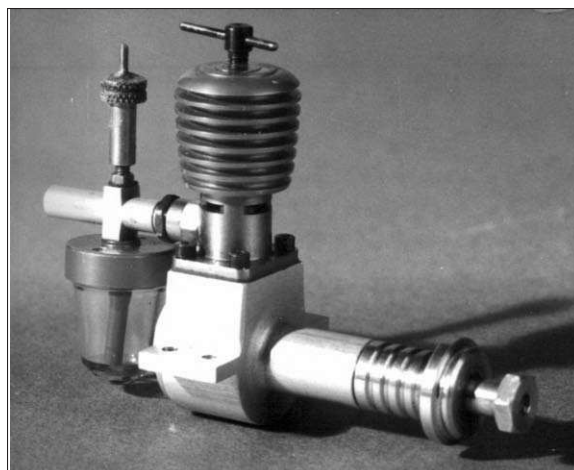


2007-08-14	Revise and standardize timing diagram	BMBI	MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME VIVELL 09 DIESEL
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 1-1-98			Sheet 7 - General Arrangement

The Weaver/Ransom 1cc Diesel

by Ron Chernich

In June 1952, a British magazine named *Model Maker* commenced a series of articles titled "A 1c.c. C.I. Engine". This series described a simple Compression Ignition engine (aka "diesel") for home construction. The design was called the "Weaver/Ransom" after the designer and draftsman, respectively. The magazine ceased publication in the early 60's, but the engine is still remembered in MICE circles, being often referred to simply as "The Weaver".



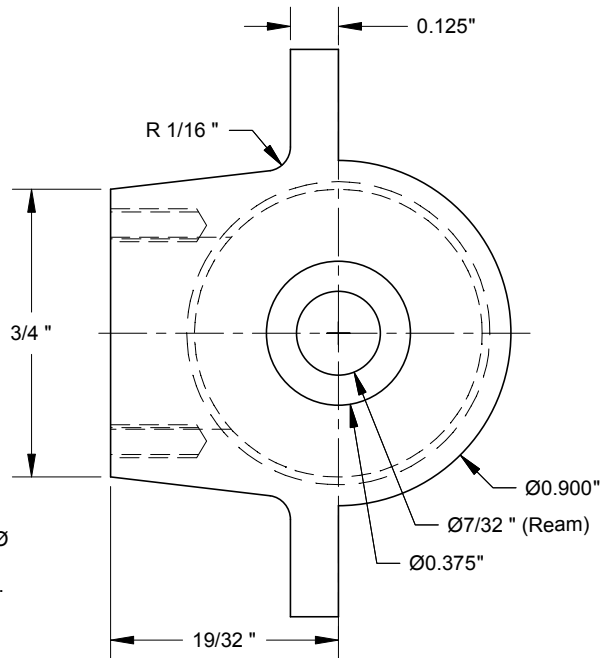
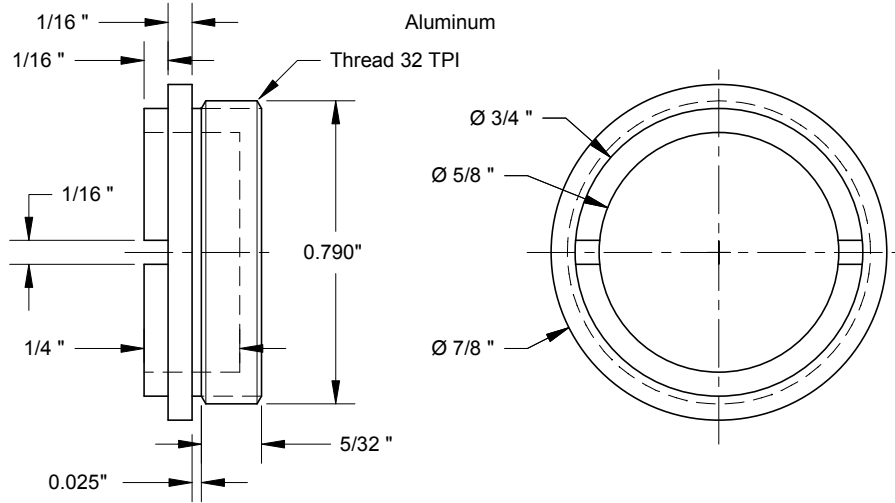
The subject of the magazine article was built and described by Mr Ransom to a design developed over several years by Arthur Weaver for use in rail car racing. This is similar to modern, electric slot-cars, except that the guide is a raised rail rather than a slot. It was conducted indoors on portable oval tracks and I can only imagine the sound and smell that must have ensued. It all seems somehow seems very "gentlemanly", and very "British".

The engine was fully described over three issues and was fully fabricated; that is, no castings were employed. The transfer system is also unusual. An undercut "transfer belt" is fed by five tiny semicircular channels arrayed around the front of the lower cylinder. These are formed by pressing an aluminium plug into the bored cylinder, then drilling blind holes to the belt height at the intersection of the two metals. As the aluminium is softer than the steel cylinder, any wandering of the drill will be towards the plug, and thus safe. The rest of the design is quite conventional.

Weaver's design was published with a flywheel, but I'd seen an example of this engine doing a good impression of a Mills .75 at our local free flight field—that is, starting on the first flip and swinging a large prop at whatever rpm the flier wanted; from a powerful two-stroke to a comfortable, under-compressed, rich, low-rpm four cycle. The builder was none other than Russell Watson-Will, the designer of the boxer diesel that also appears in this book. That's his second Weaver at the head of this page, and it was he who convinced me that hogging a crankcase for the Weaver from a solid block was no big deal. He was right and I ended up building three of the things, curing any apprehension I had over this construction method. We hope this re-draw of the Weaver plans prompts others to have a go too.



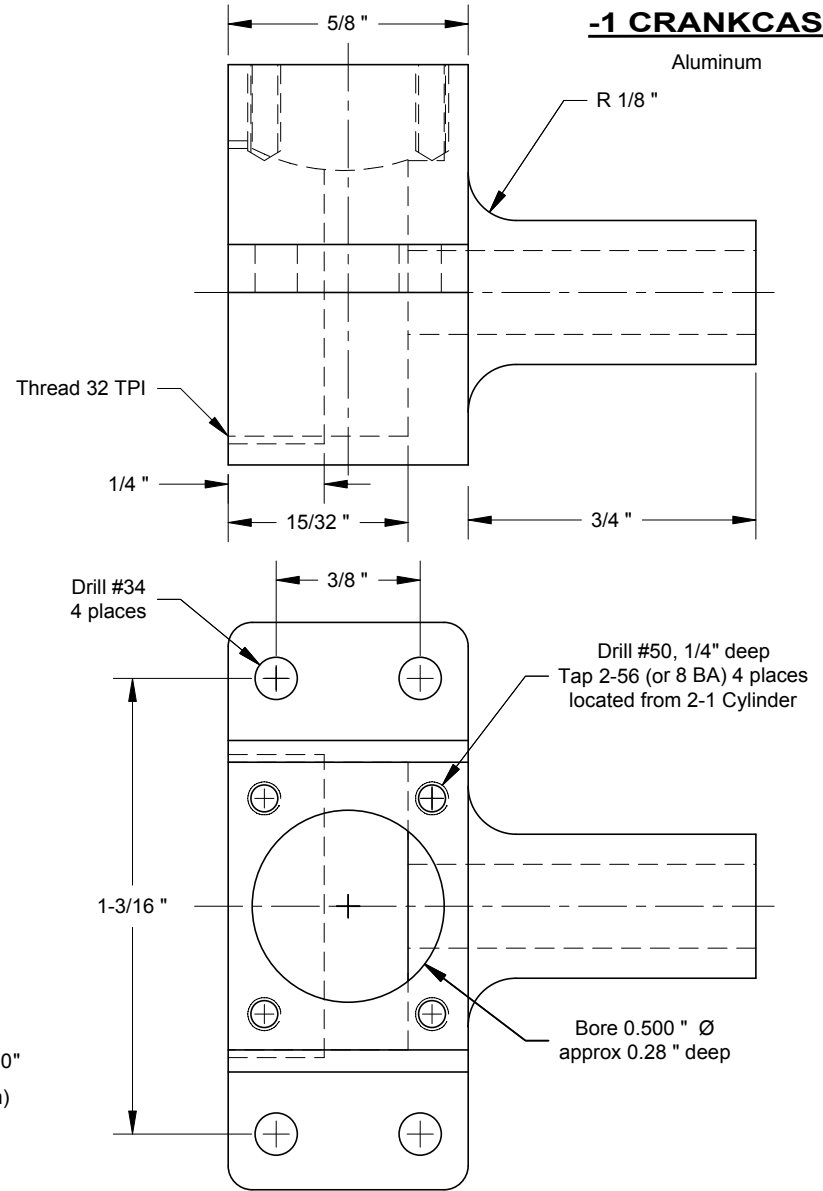
-2 BACKPLATE




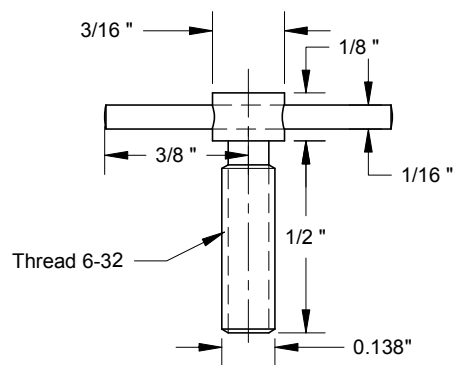
Note:

-1 Crankcase is turned from 1-1/2" Ø (or 40mm) bar stock. Material used will set overall width at mounting lugs.

-1 CRANKCASE

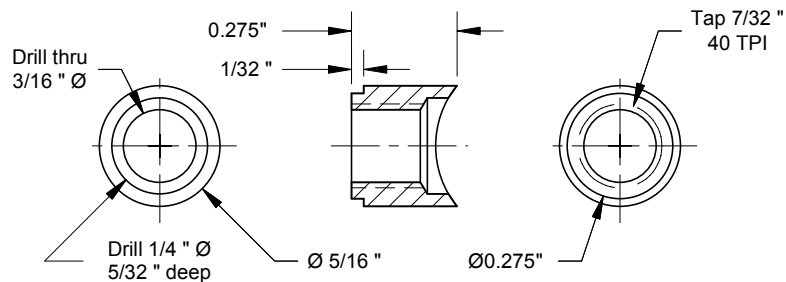


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME WEAVER 1cc CI Engine
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER Sheet 1 - Crankcase
			DRAWN	WW Ransom, 1952	NEXT ASSEMBLY		
DATE	CHANGE	BY	CAD	BMBI May 11, 1999			



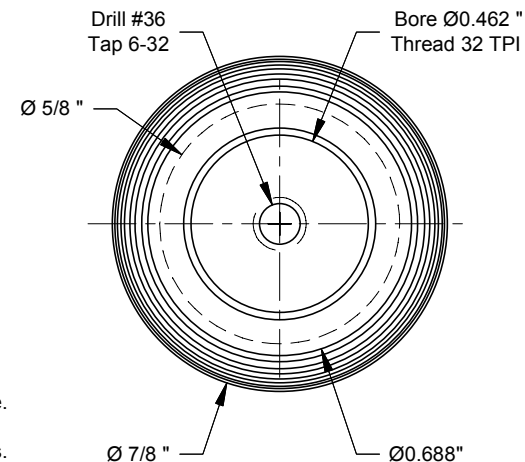
-4 COMPRESSION SCREW

Steel



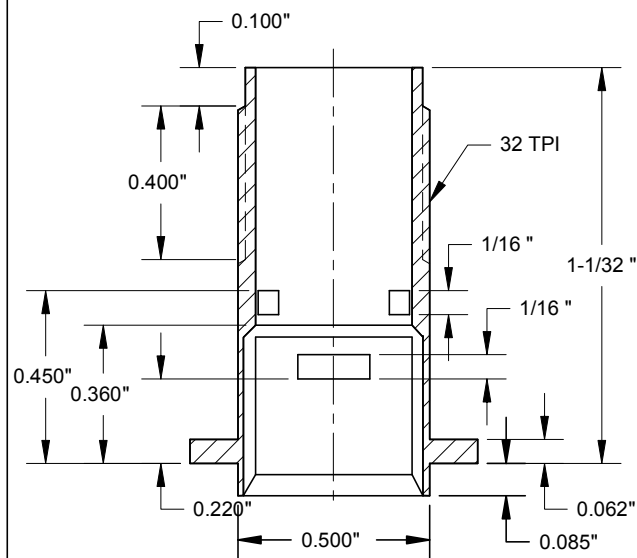
-2 INTAKE BOSS

Steel



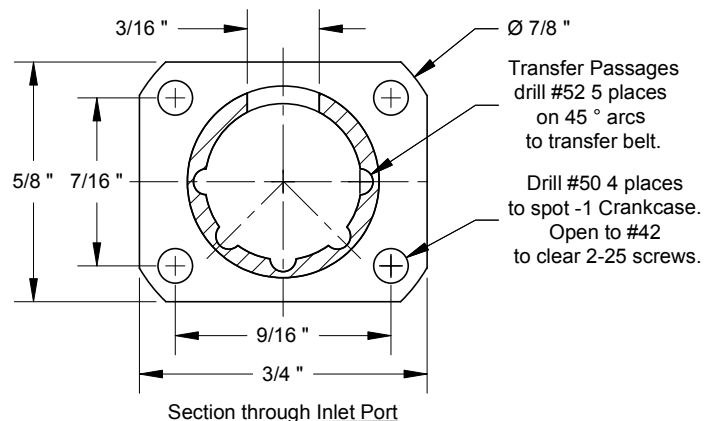
-3 CYLINDER HEAD

Aluminum

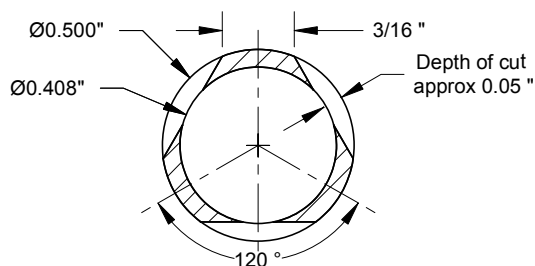


-1 CYLINDER

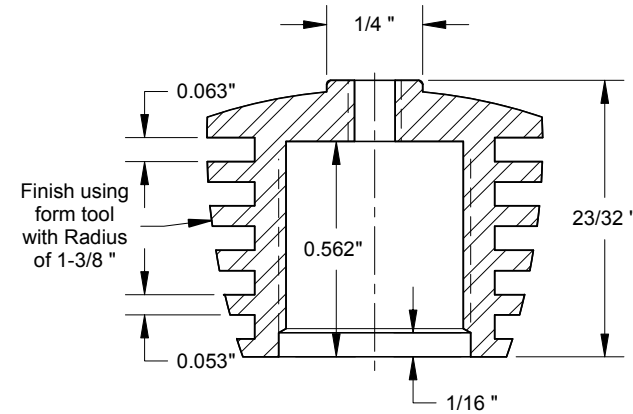
Steel



Section through Inlet Port



Section through Exhaust Ports



**MOTOR
BOYS**
(INTERNATIONAL)

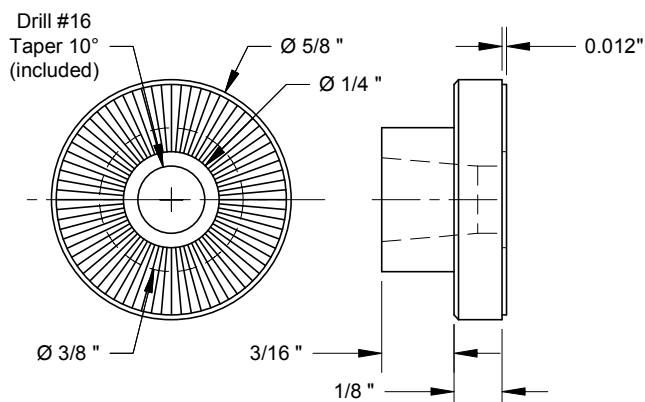
NAME
WEAVER 1cc CI Engine

NUMBER
Sheet 2 - Cylinder

			MAT'L	As Noted	DO NOT SCALE DRAWING
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	WW Ransom, 1952	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	BMBI May 11, 1999	

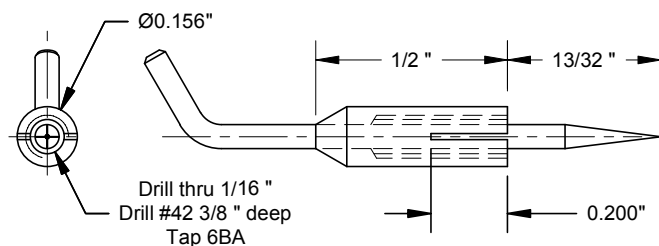


CC BY NC ND



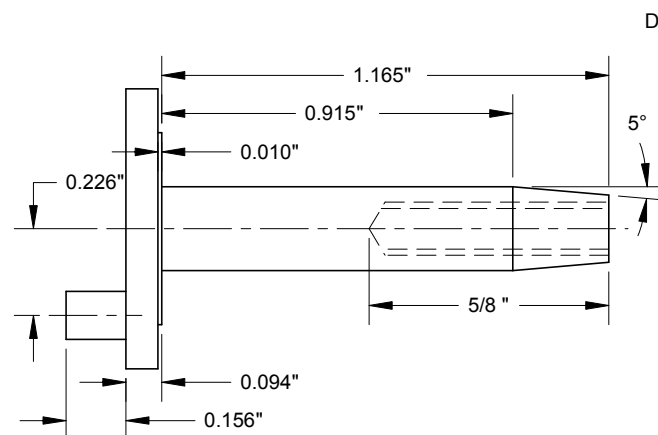
-2 PROP DRIVER

Aluminum



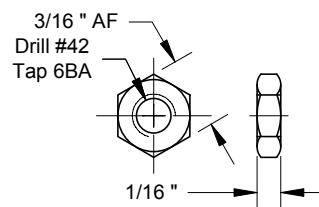
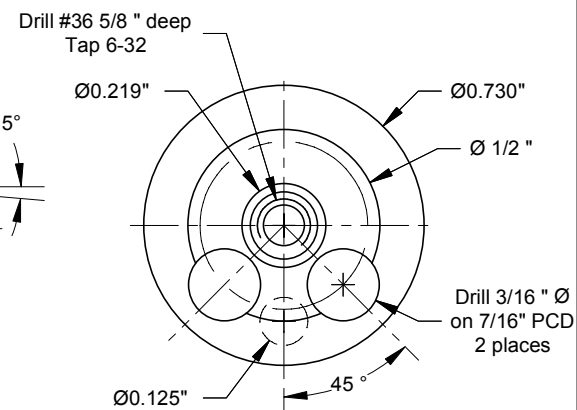
-8 NEEDLE VALVE ASSY.

1/16 " Music Wire; Brass Thimble



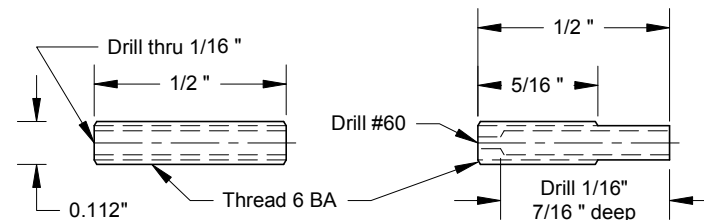
-1 CRANKSHAFT

Steel



-7 SPRAY BAR NUT

Hex Brass 3/16 " AF (2 reqd)

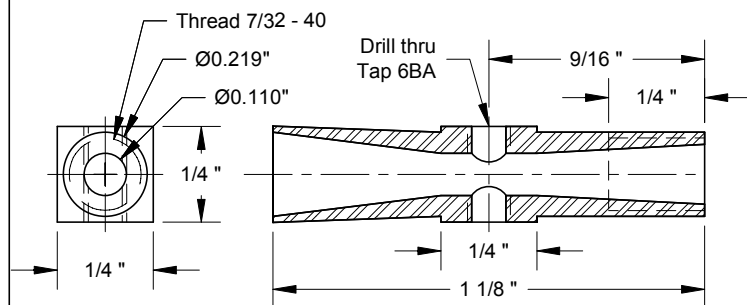


-5 SPRAY BAR

6BA Brass Screw

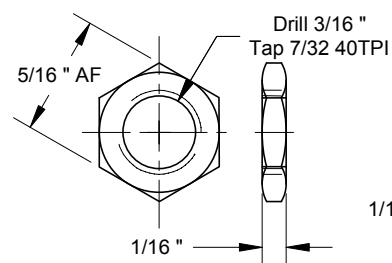
-6 SPRAY JET

6BA Brass Screw



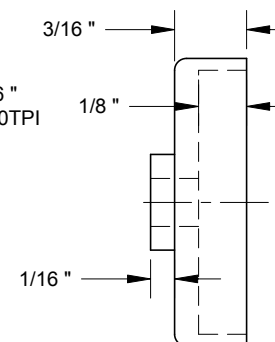
-3 VENTURI

Aluminum



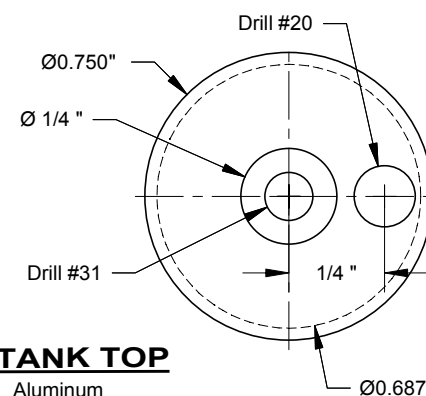
-4 VENTURI NUT


Hex Brass 5/16 " AF

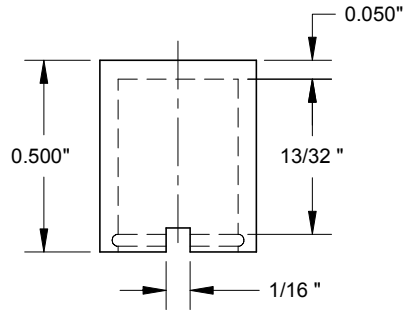
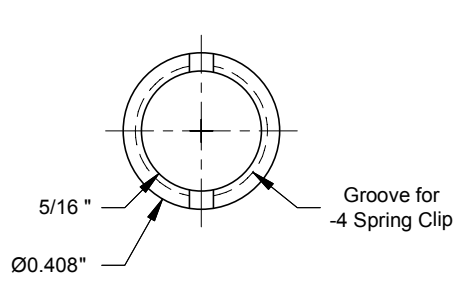


-9 TANK TOP

Aluminum

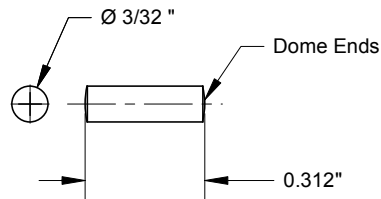


			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME
			SCALE	2 X SIZE			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	VW Ransom, 1952	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI May 11, 1999			Sheet 3 - Fuel System



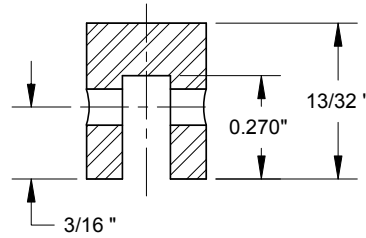
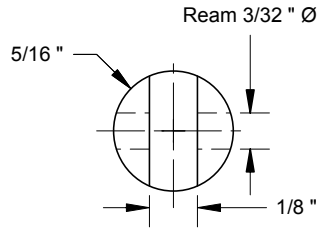
-1 PISTON

SG Cast Iron



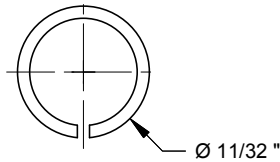
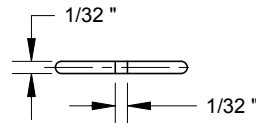
-3 GUDGEON PIN

3/32 " Ø Drill Rod
(use with -2 Piston Fork)



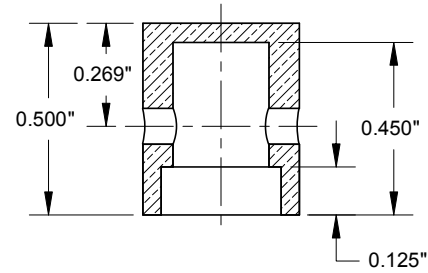
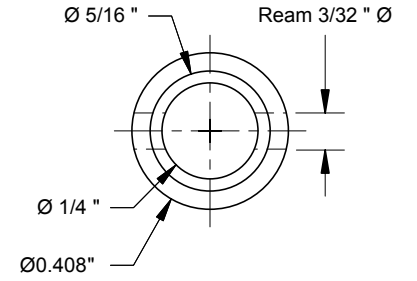
-2 PISTON FORK

Aluminum
(use with -1 Piston)



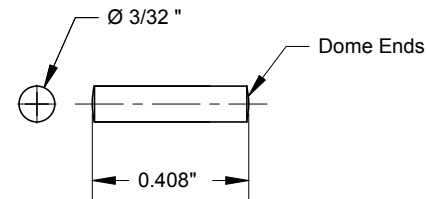
-4 SPRING CLIP

1/32 " Music Wire
(use with -1 Piston)



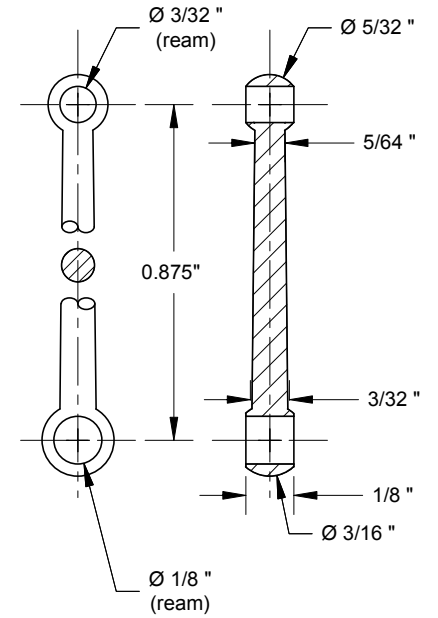
-7 PISTON

SG Cast Iron
(alternate for -1)



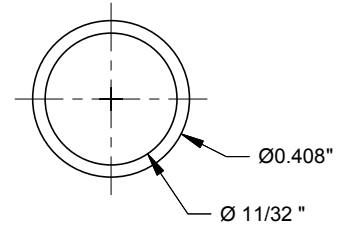
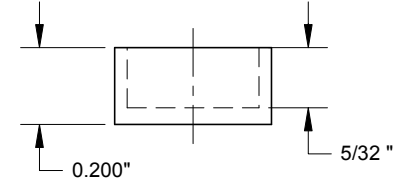
-8 GUDGEON PIN

3/32 " Ø Drill Rod
(use with -7 Piston)




-5 CONNECTING ROD

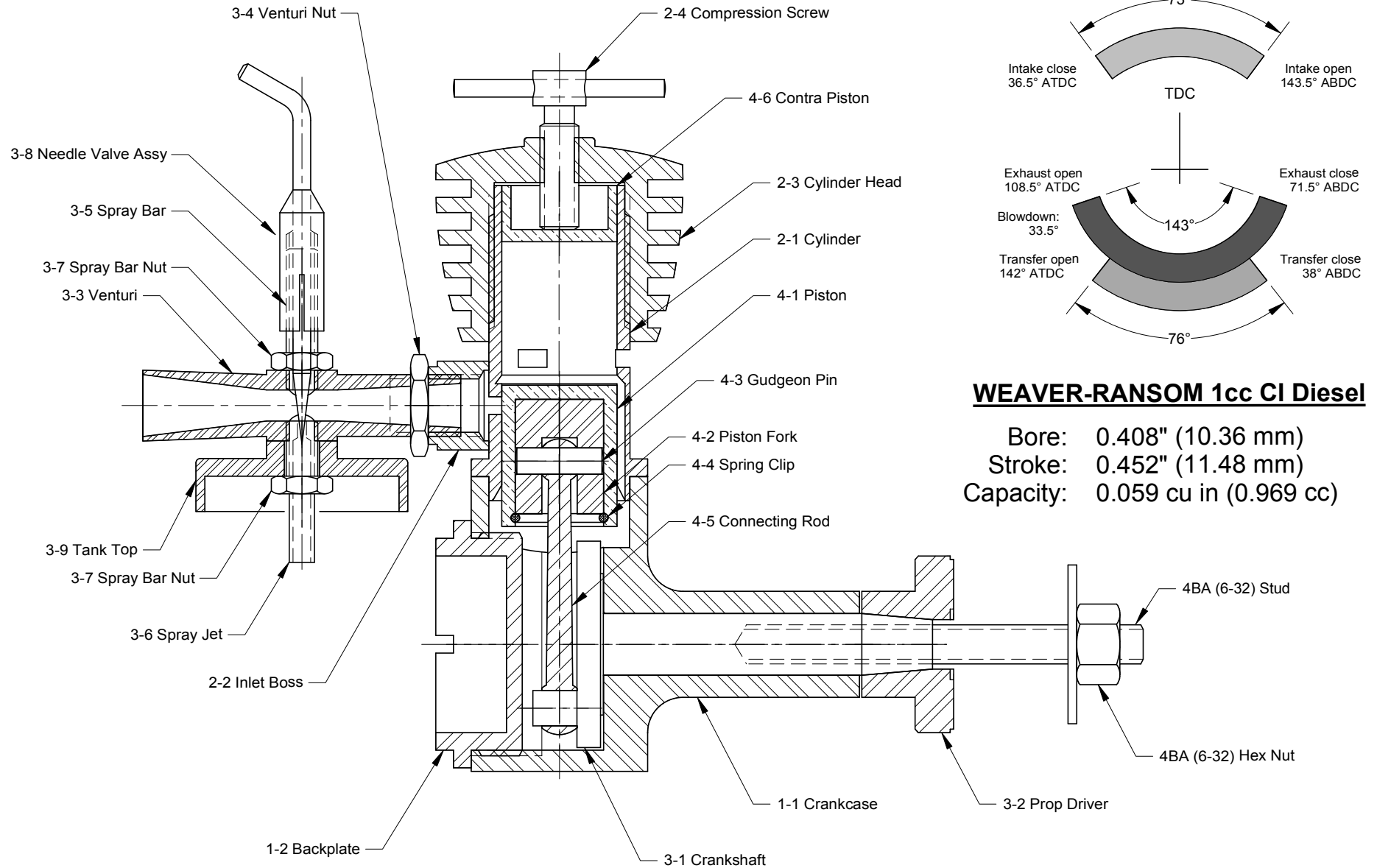
Gauge Plate H&T



-6 CONTRA PISTON


SG Cast Iron

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME WEAVER 1cc CI Engine
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	WW Ransom, 1952	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI May 11, 1999			Sheet 4 - Pistons and Rod



WEAVER-RANSOM 1cc CI Diesel

Bore: 0.408" (10.36 mm)
Stroke: 0.452" (11.48 mm)
Capacity: 0.059 cu in (0.969 cc)

			MAT'L	As Noted	DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME WEAVER 1cc CI Engine
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
			DRAWN	WW Ransom, 1952	NEXT ASSEMBLY		Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI May 11, 1999			

The ED 0.46cc Baby

by Ron Chernich

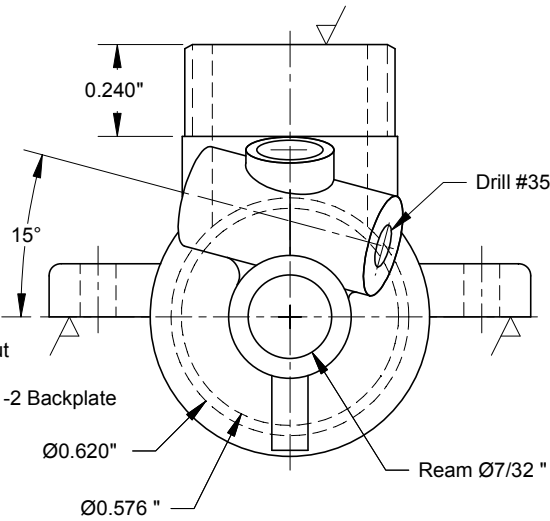
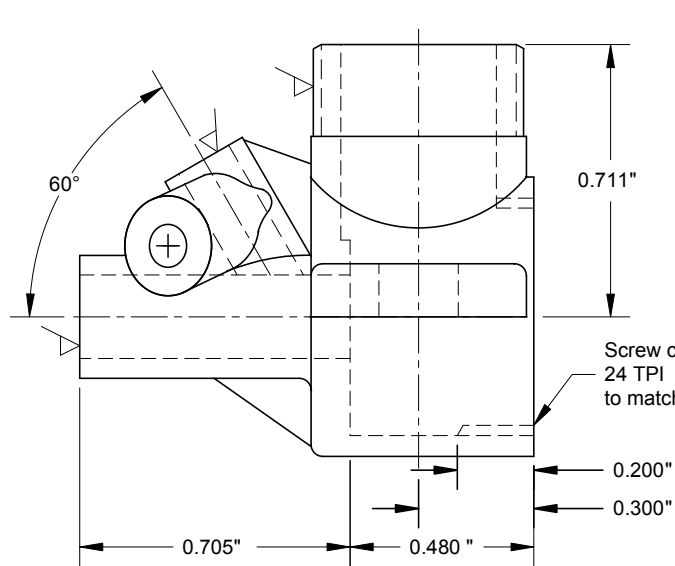
In 2000, Bob Washburn, editor of the well respected magazine, *Strictly Internal Combustion (Strictly I.C.)*, shook up his readers by publishing a blank page with an ominous note in the middle saying that he had insufficient material to fill the issue and that contributions were urgently required. This was more shock treatment than reality, but it prodded me into action, proposing to Roger Schroeder a twice size version of the ED Baby. Roger's reply was, "why not make it full size?", so we did. I drew the plans, Roger poured castings, we both poured blood, sweat and tears into the construction article and made multiple prototypes, only to have SIC cease publication before it appeared! But Tim Dannels came to the rescue and our comprehensive build series finally appeared in the pages of *Engine Collectors' Journal*.



We learned a lot in the process, including a fact we should have known; that as size goes down, the criticality of fits goes up! In total, we built four prototypes and while all eventually ran and ran well, I have to say that this little engine is totally unsuitable for the beginner model engineer. But for the builder with a few larger diesels under their belt, it is a great little engine to build and operate.

The production version was made by Electronic Developments Ltd, "ED" for short, one of Britain's most respected post-war manufacturers. Called the "Baby" for obvious reasons, it was first announced in the March 1952 issue of the *Aeromodeller* and formed their entry in the small engine boom taking place on both sides of the Atlantic. It featured front rotary shaft induction with the needle valve swept distinctly upwards and rearwards; a nice feature given the nearness of the needle to the prop of such a small engine—although this effectively prevents the needle and spraybar from being swapped side for side. Another notable feature of the engine is the ocean-liner like "port-hole" exhausts, eight in number. While they look great, they make the engine hard to port-prime and easy to flood when you do finally prime it! Later models revised the ports and all variations are shown on our plans.

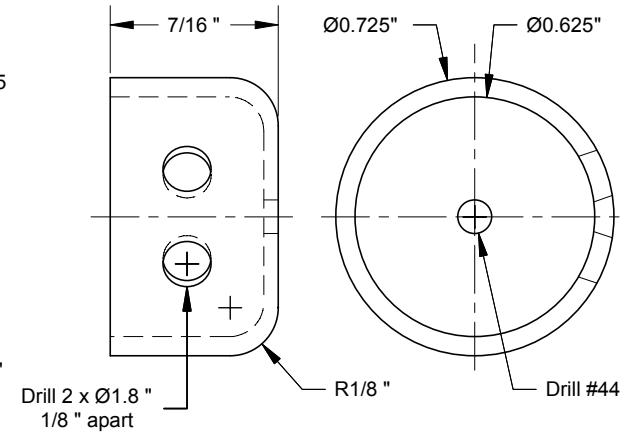
One of the great things about model engineering is the way you never cease to learn and refine your knowledge and skills. I built two Babies using the traditional steel and cast-iron cylinder and piston combination, with a "pinch" fit of the piston at TDC. Friction is the enemy of small engine success and I now know that a steel piston in a steel liner with almost no taper runs far better. This combination requires superior skills with the lap and hone, but the result is also superior, as the example I built this way attests. Naturally, skill and experience fitting pistons to finely honed liners is required, but the cost of material is almost nothing, so don't be afraid to junk a pair and try again. If you'd like to build one, Roger can supply the castings and the full build article can be read on the Model Engine News web site (see the Preface page for the Internet address).



-1 CRANKCASE

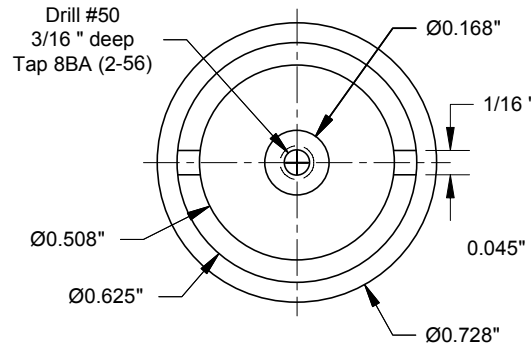
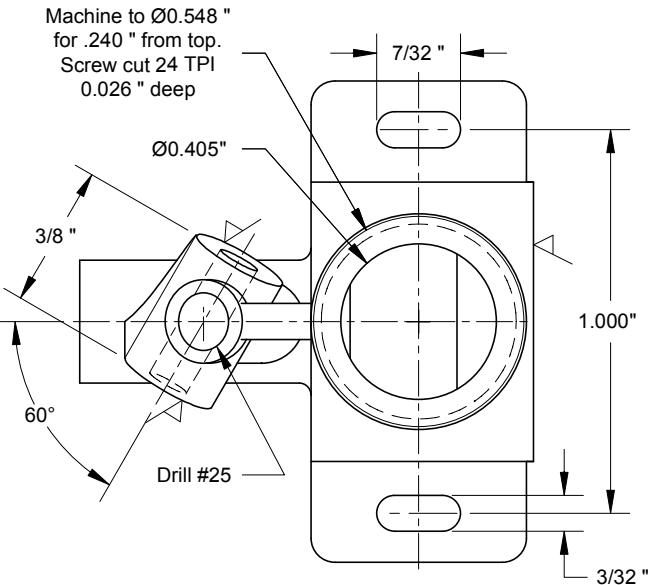
Aluminum Sand Casting

Tank shown rotated 90° for convenience.



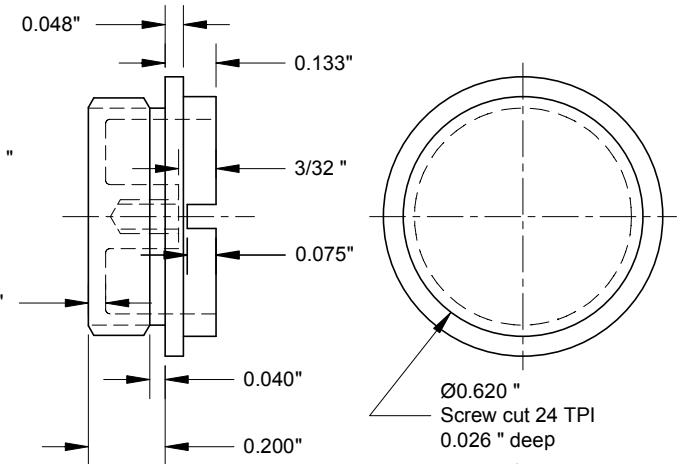
-3 FUEL TANK

Moulded 1/16" Acrylic
(colored green or yellow)




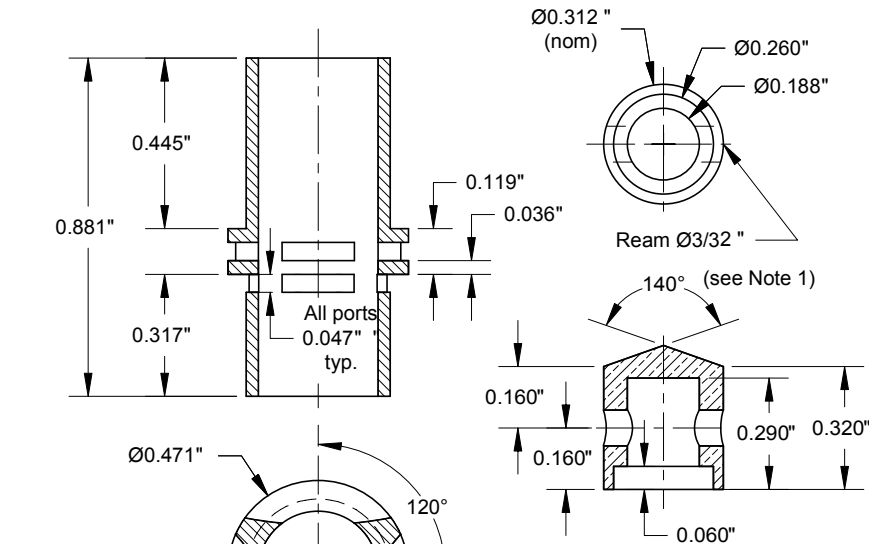
-2 BACKPLATE

Aluminum Sand Casting



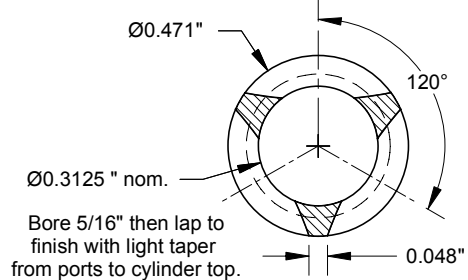
Machine

			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME ED "Baby" Replica
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
2000.06.07	Correct venturi height in front view	BMBI	DRAWN	RC Jan 18, 1997	NEXT ASSEMBLY		Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI 2000.04.14			

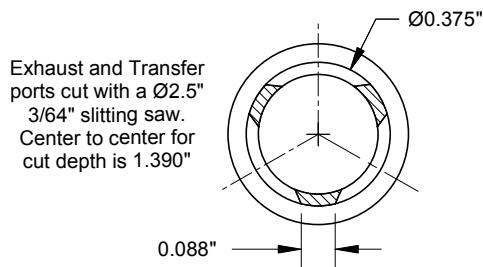


-4 PISTON

SG Cast Iron



Section through Exhaust Ports



Section through Transfer Ports

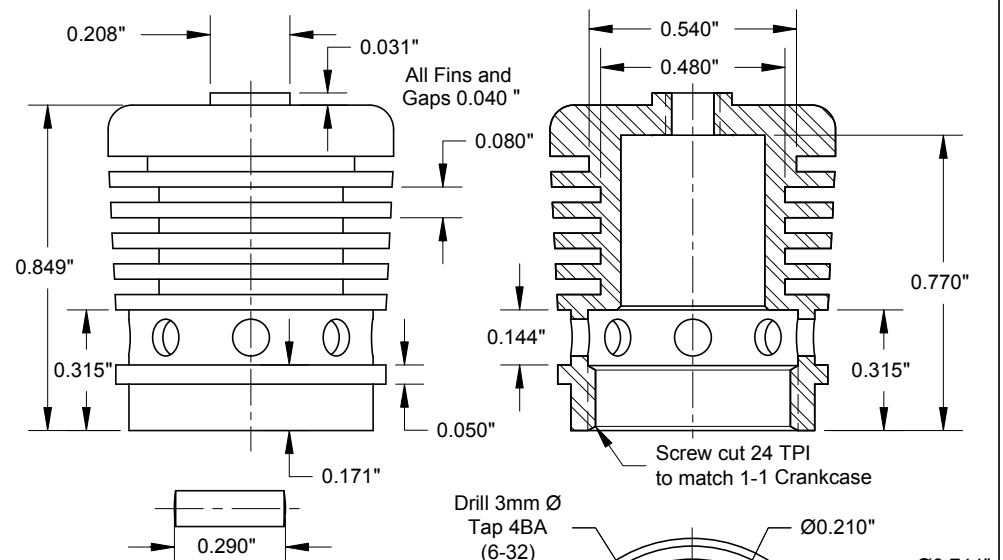
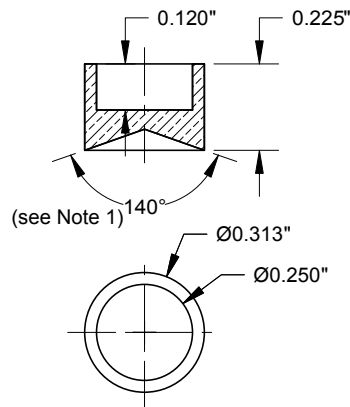
Note 1:
Conical crown and recess shown on -4 Piston and -3 Contra Piston may be omitted for simplicity. (as they were on the Mk II)

-1 CYLINDER

Steel

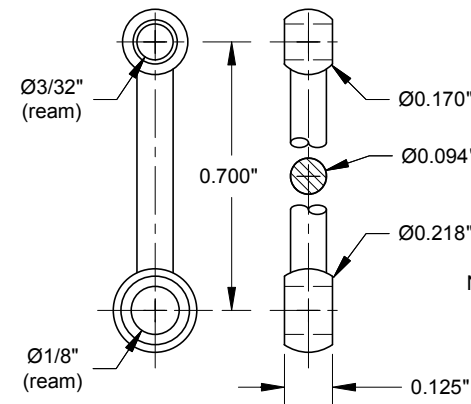
-3 CONTRA PISTON

SG Cast Iron



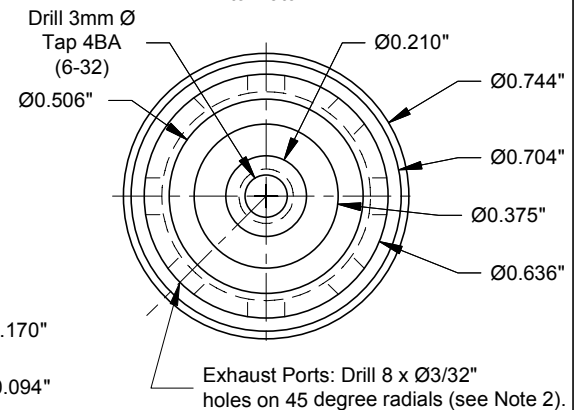
-6 WRIST PIN

Ø3/32" Brass Rod



-5 CONROD

7/32" Ø Drill Rod (H&T optional)



Exhaust Ports: Drill 8 x Ø3/32" holes on 45 degree radials (see Note 2).
Cylinder fins taper at approximately six degrees from the 0.704" diameter above the exhaust ports.

Note 2:

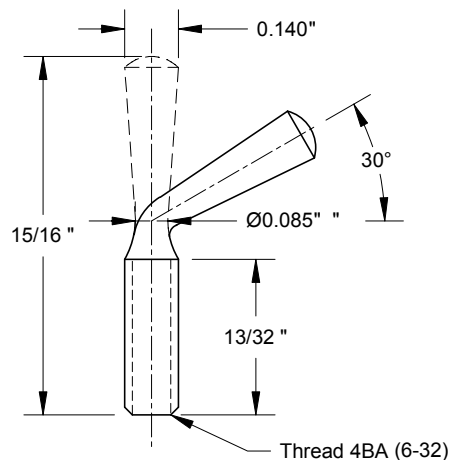
Some later ED Baby cylinders had the land between adjacent pairs of exhaust ports milled out with a 3/32" Ø slot drill to increase area and make priming through the ports easier.

-2 CYLINDER HEAD

Aluminum

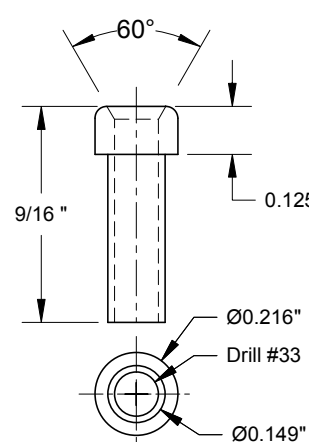
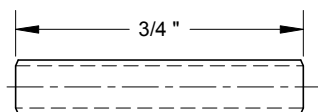
			MAT'L		DO NOT SCALE DRAWING		NAME
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		ED "Baby" Replica
2000.10.27	Notes 1 and 2 added.	BMBI	DRAWN	RC Jan 18, 1997	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI 2000.04.14			Sheet 2 - Cylinder/Piston





-3 COMP SCREW

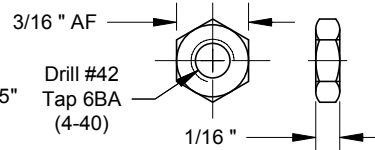
Steel



-4 VENTURI

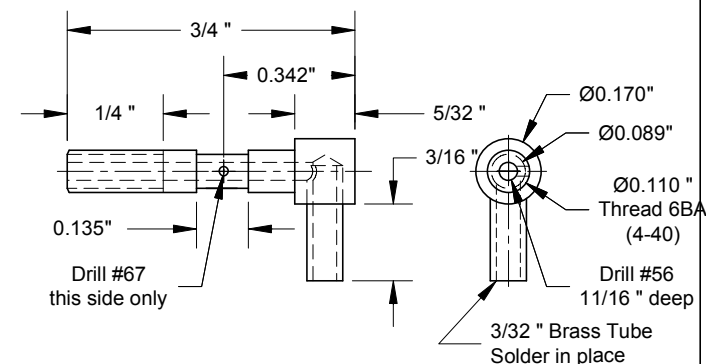
Aluminum

-4 Venturi is fitted to 1-1 Crankcase before holes for -5 Spray Bar and 2-1 Crankshaft are drilled and reamed.



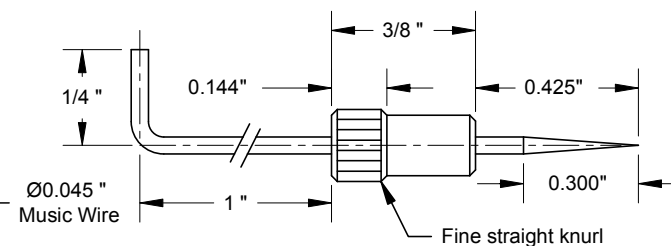
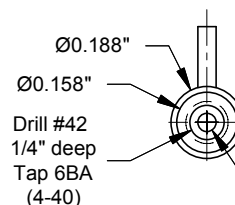
-6 SPRAY BAR NUT

Brass



-5 SPRAY BAR

Brass

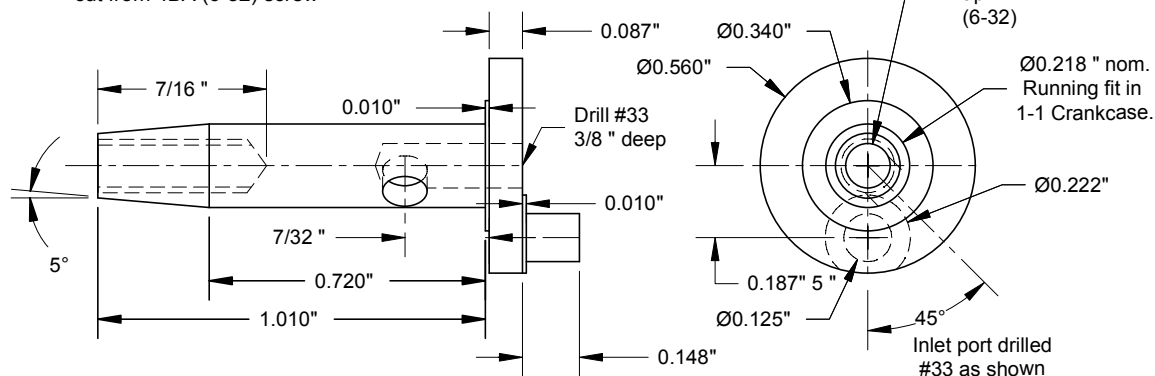


-7 NEEDLE VALVE

Brass

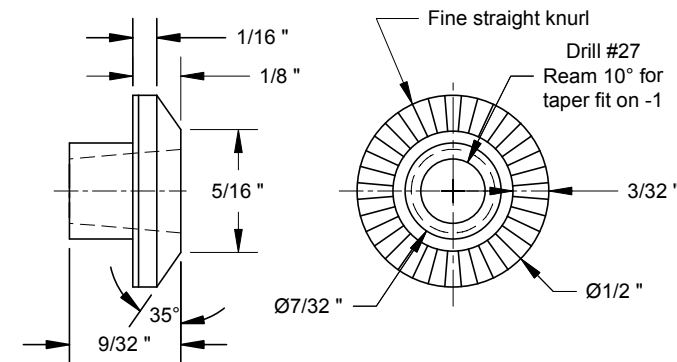
-8 CRANKSHAFT STUD

cut from 4BA (6-32) screw




-1 CRANKSHAFT

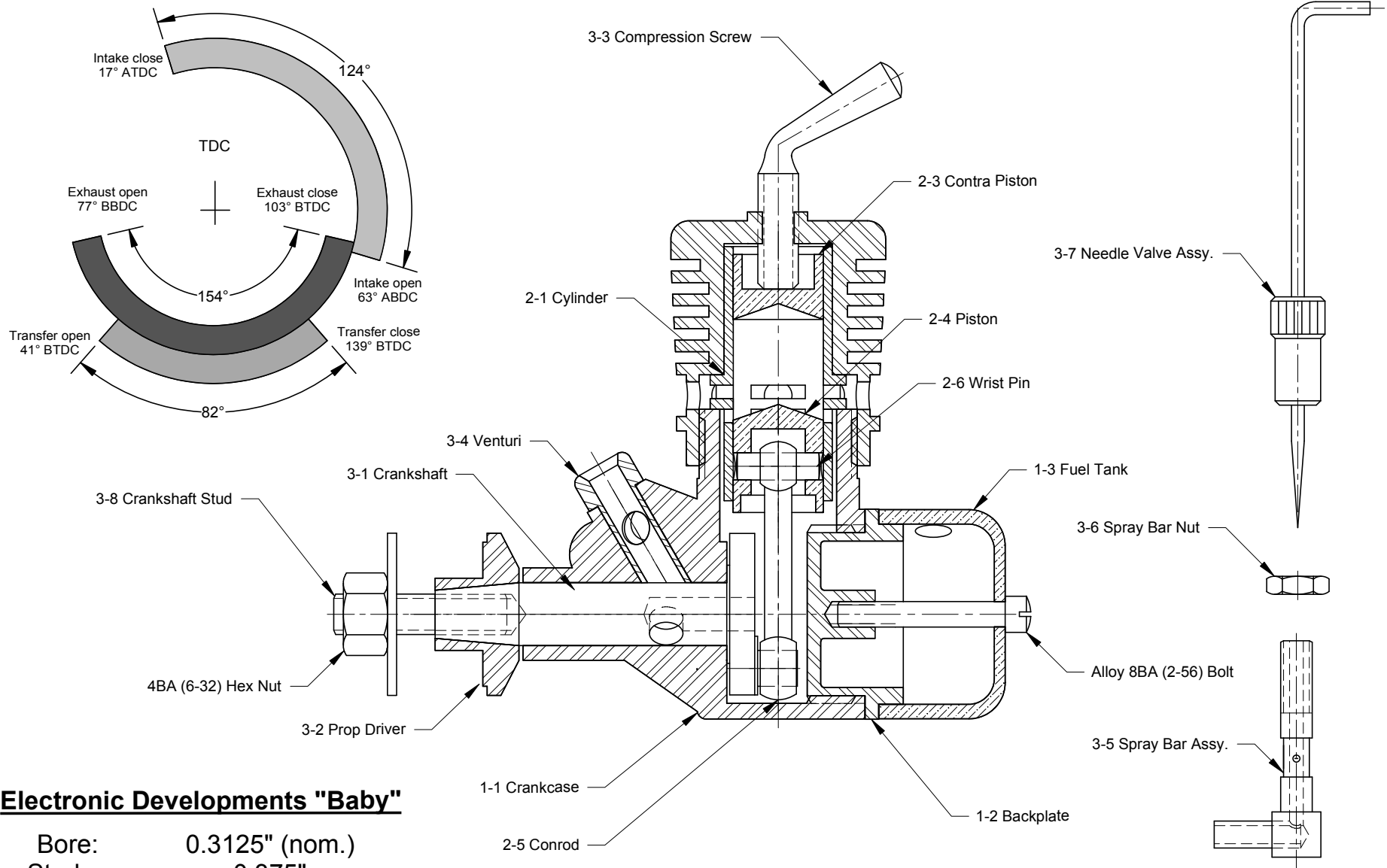
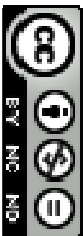
Steel



-2 PROP DRIVER


Aluminum

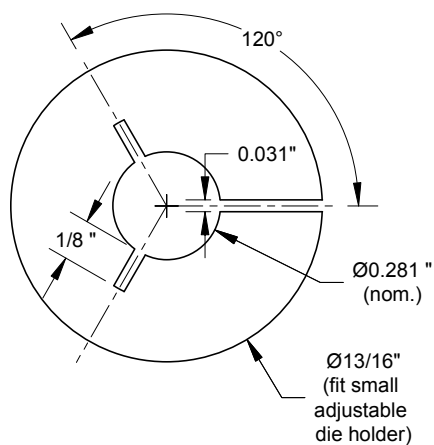
			MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 MOTOR BOYS (INTERNATIONAL)	NAME
2000.06.07	Redimensioned -1 from thrust face datum	BMBI	SCALE	2 X SIZE			ED "Baby" Replica
2000.06.05	-1 shortened .020"; -4 lengthened 0.013"	BMBI	DRAWN	RC Jan 18, 1997	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI 2000.04.14			Sheet 3 - Crankshaft



Electronic Developments "Baby"

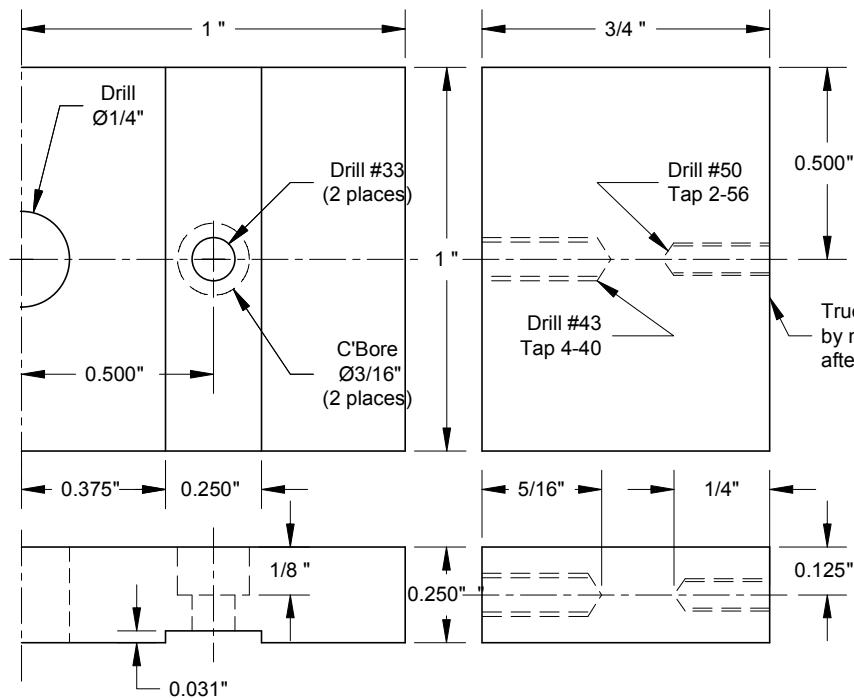
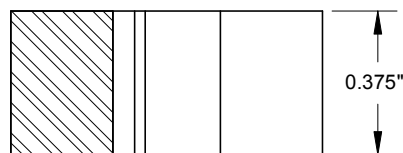
Bore: 0.3125" (nom.)
Stroke: 0.375"
Capacity: 0.029 cu in (0.47 cc)

			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME ED "Baby" Replica
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		NUMBER
2000.06.05	Corrected inlet timing.	BMBI	DRAWN	RC Jan 18, 1997	NEXT ASSEMBLY		Sheet 4 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2000.04.14			



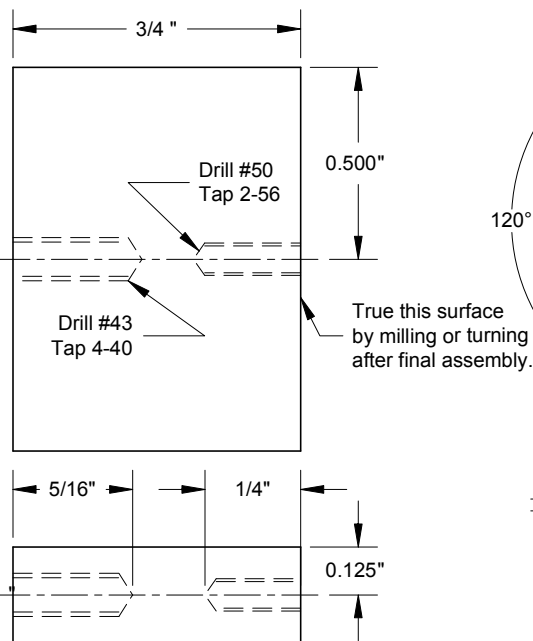
-6 PISTON LAP

Aluminum



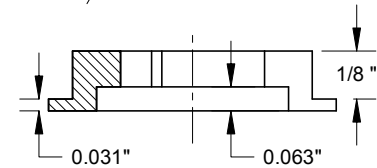
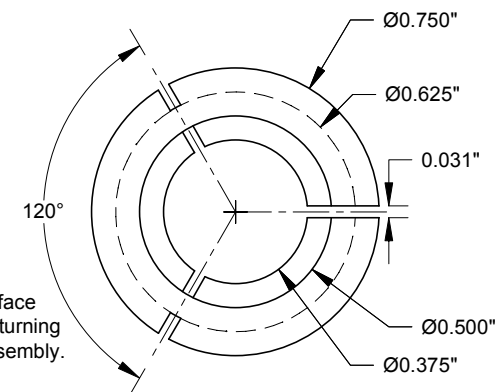
-1 JIG BASE

1/4" Aluminum Plate



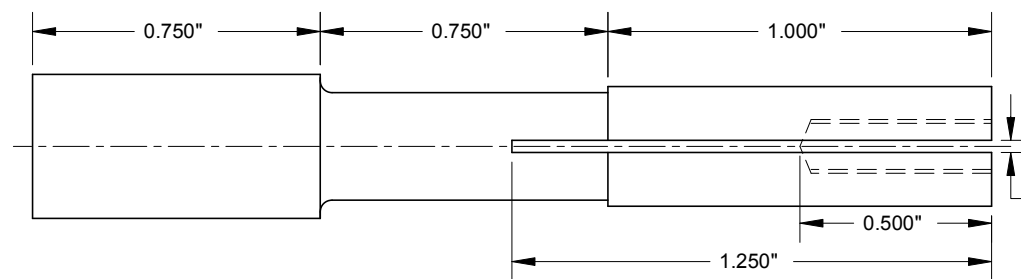
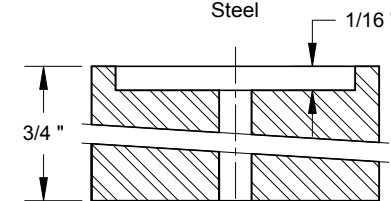
-2R JIG SIDE

1/4" Aluminum Plate



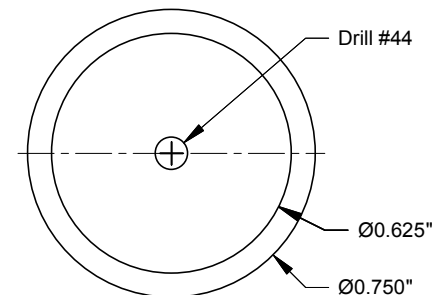
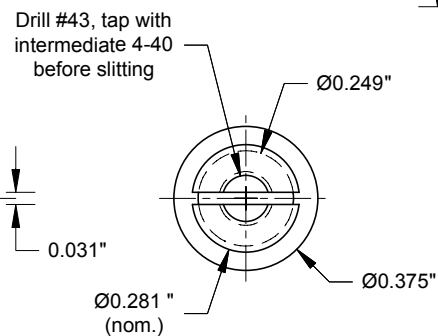
-4 POT CHUCK

Step




-3 CYLINDER LAP

Aluminum



-5 BACKPLATE FIXTURE

Aluminum

			MAT'L		DO NOT SCALE DRAWING	 MOTOR BOYS (INTERNATIONAL)	NAME ED "Baby" Replica
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RC 2000.06.10	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI 2000.06.10			Sheet 5 - Jigs and Tooling