

**The Motor Boys International**



**-4 CONROD (modern)**  
2024 T3 Dural

**-8 CONROD (Orig.)**  
Steel H&T

**-7 CONROCKET (Original)**  
Steel on both ends

**-2 CYLINDER**  
Cast Iron or Steel

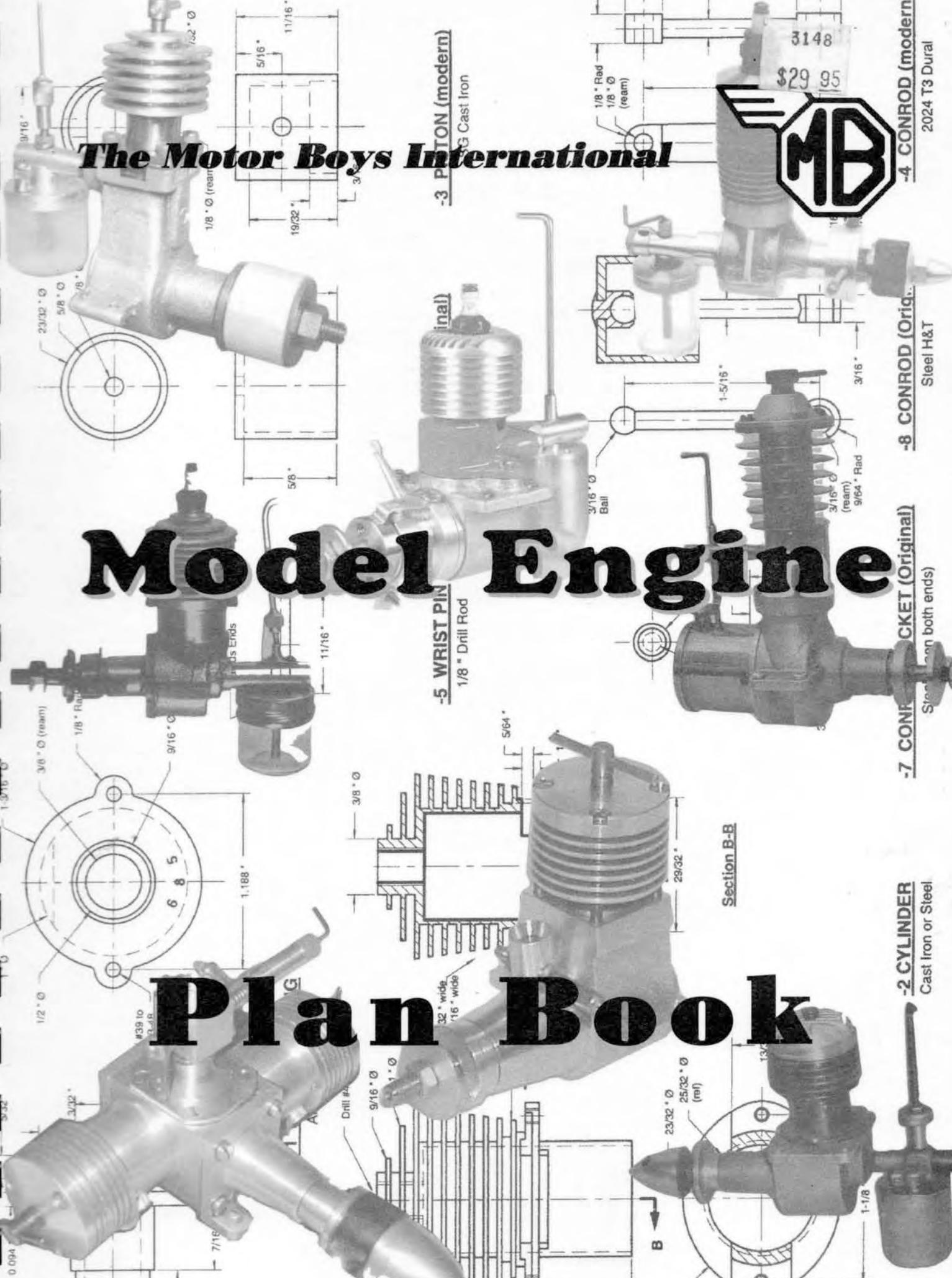
# Model Engine

# Plan Book

**-3 PISTON (modern)**  
Cast Iron

**-5 WRIST PIN**  
1/8" Drill Rod

**Section B-B**



## **PREFACE**

The Motor Boys are an informal group of men from around the world with a common hobby interest concerning the history, design, and construction of model engines.

Communication is made possible by the internet. Each one of the Motor Boys has unique talents that, when pooled into joint projects, add to the total enjoyment of their hobby.

The purpose of this book is to present some of the historic, unusual, and interesting engine designs that the Motor Boys have researched. The hope is that others will appreciate the engine designs we have presented in this book and learn to enjoy them as much as we have.

The Motor Boys are indebted to the Academy of Model Aeronautics (AMA) for publishing this book and making it available to the modeling public. All profits from this book are being given to the AMA's Junior Program. Ron Chernich did all the CAD work for the drawings and Tim Dannels arranged all the Introductions. In the development of this Book, many drawings, pages of text, and pictures have been sent around the world by the internet to coordinate the effort.

The Motor Boys are:

George Aldrich USA  
Gordon Burford Australia  
Ron Chernich Australia  
Ken Croft England  
Tim Dannels USA  
Don McClusky USA  
David Owen Australia  
Stan Pilgrim Australia  
Roger Schroeder USA  
Bert Striegler USA

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*\* Sheet #6 of the Mite drawings is intentionally omitted*

## 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

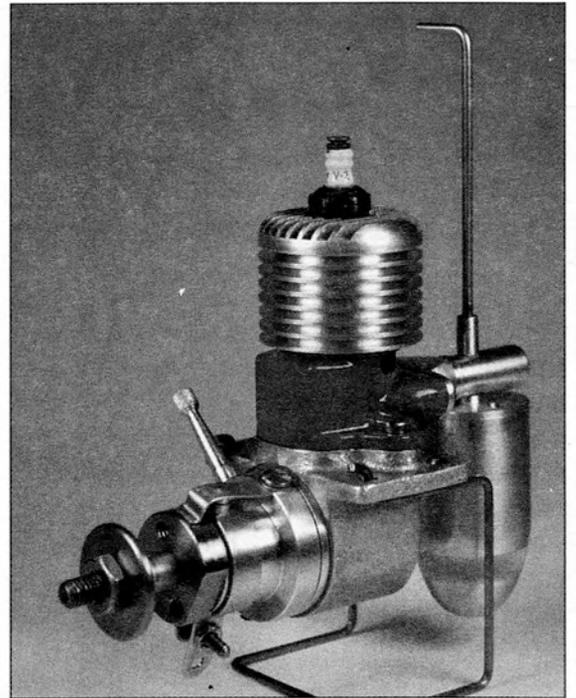
was fitted below the intake tube and the needle valve used a friction fit to prevent rotation when the engine was running. Ignition points were exposed and the operating cam was a flat cut off of the rim of the propeller drive washer. The engine had a bore and stroke of 5/8", giving a displacement of .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.

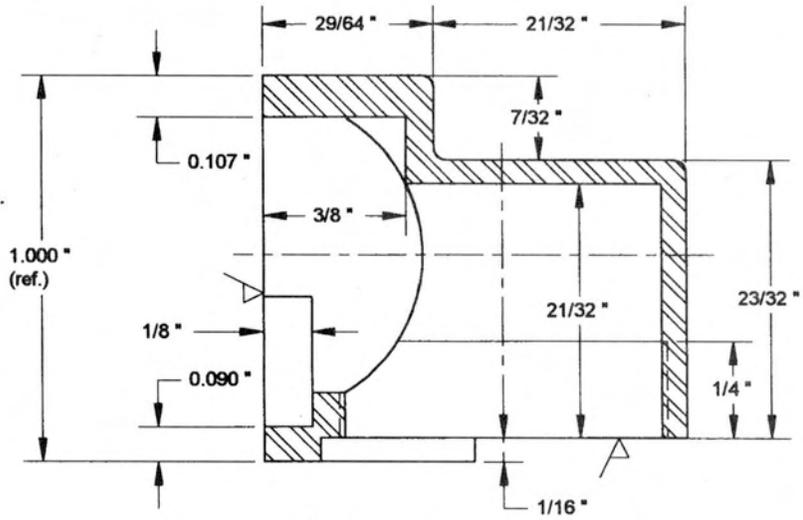
By early 1938, a number of small changes had been made to the 1937 engine. The head now had fins and some of the engines were fitted with a 1/4" sparkplug. The early 1938 engines had a metal fuel tank, while later production engines of that year sported a new plastic tank. The Motor Boys used an early 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" sparkplugs 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?

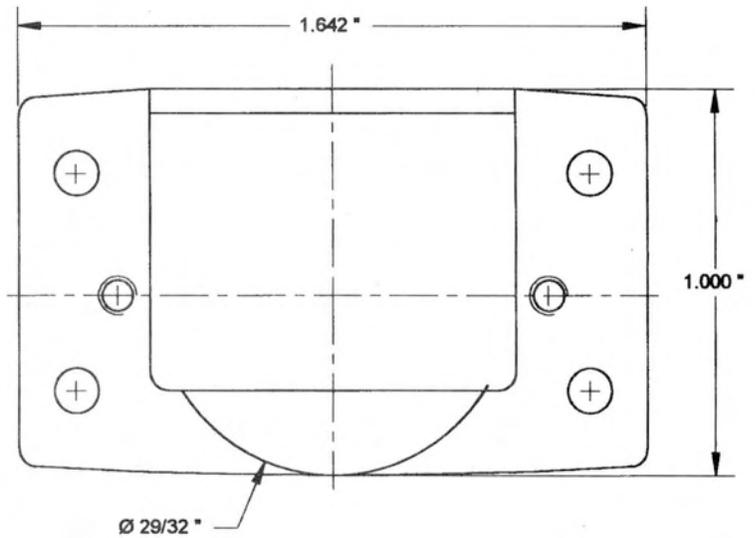
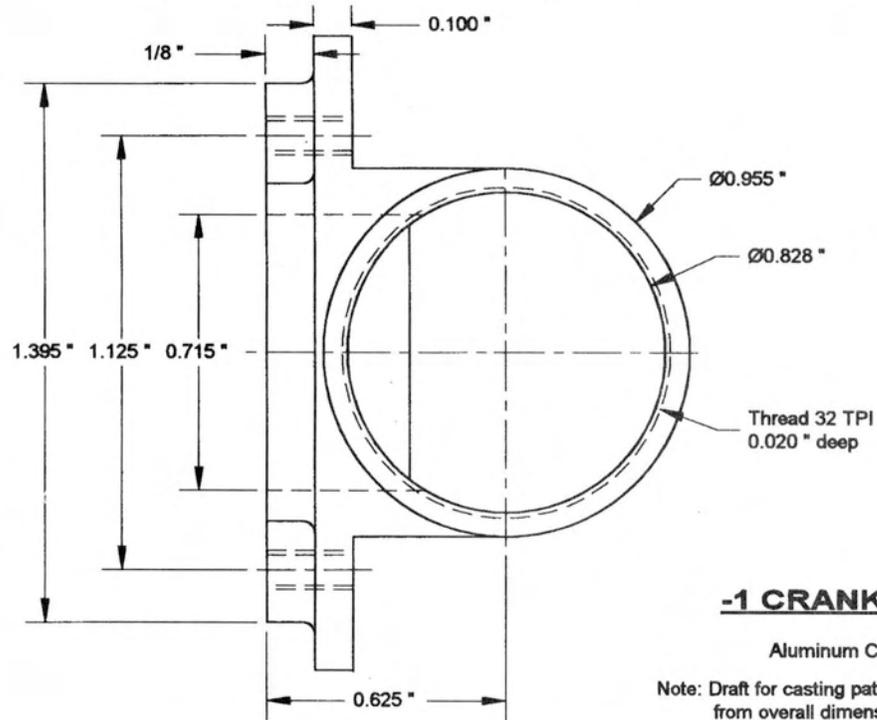
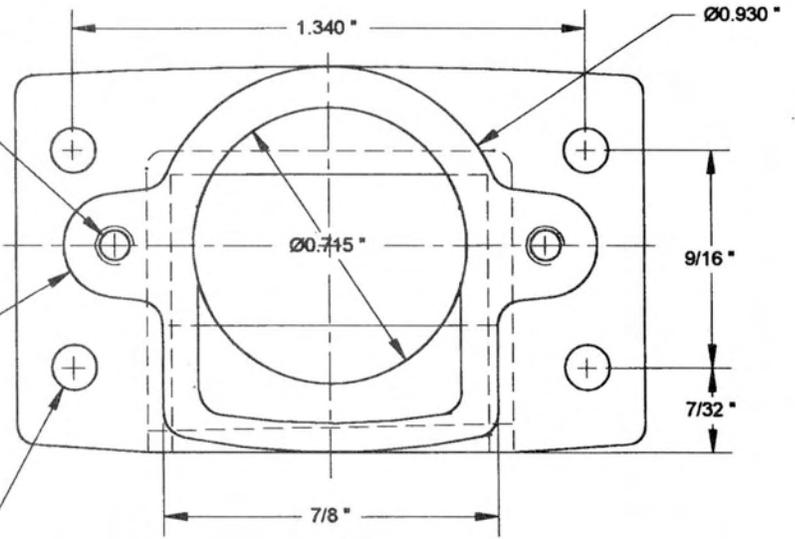
Another Trojan, the Senior, entered at least the prototype stage. It looked a lot like a greatly enlarged Trojan Jr., used both ball and roller bearings, and sported a displacement of .98 cu in. It was nicely styled, but there is no information on the production status, if any, of the Senior. Unfortunately,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





Drill #47  
Tap 3-48  
2 places



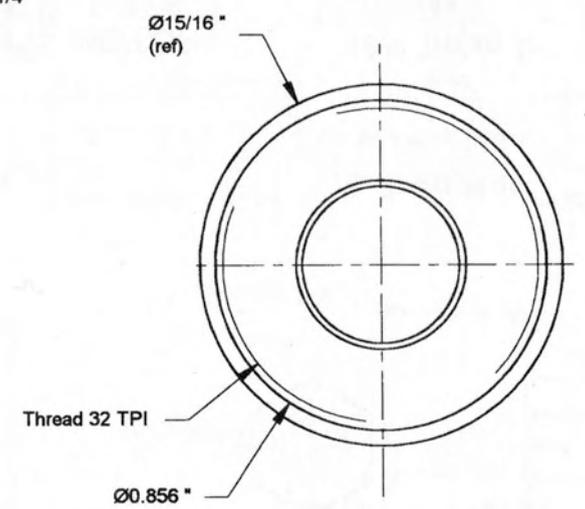
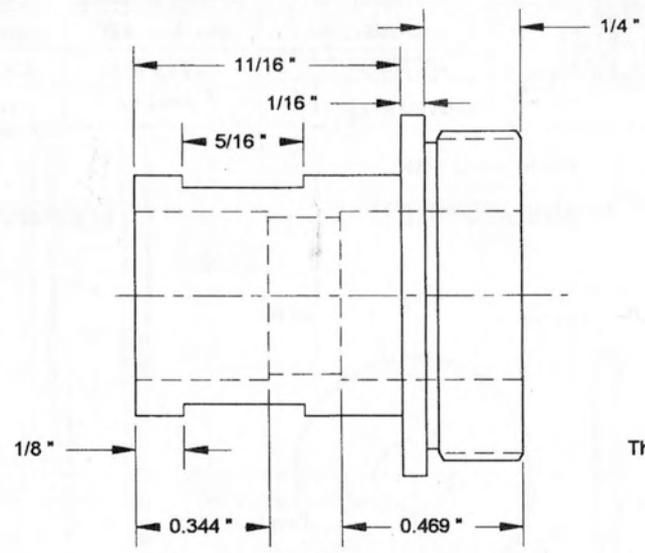
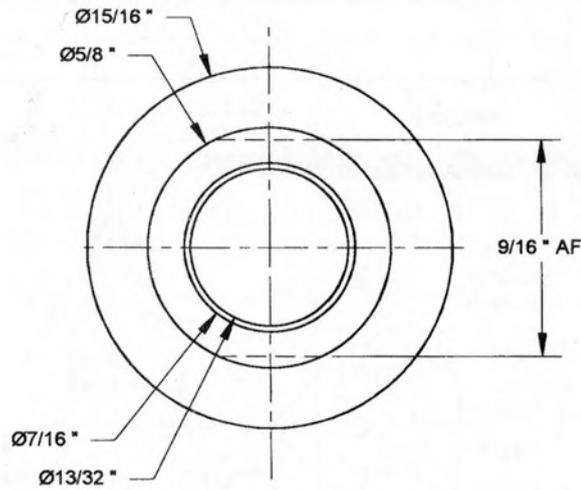
**-1 CRANKCASE**

Aluminum Casting

Note: Draft for casting pattern omitted from overall dimensions

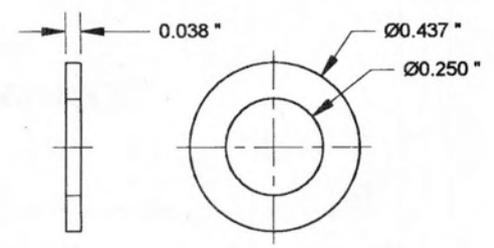
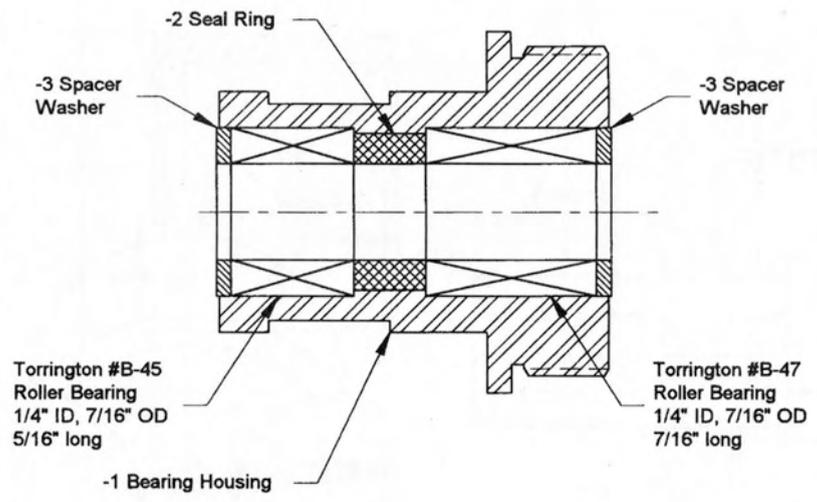
Machine

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			NUMBER
			DRAWN	<b>JM</b> Oct 1998	NEXT ASSEMBLY		Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	<b>PMB</b> 22.Jun.1999			



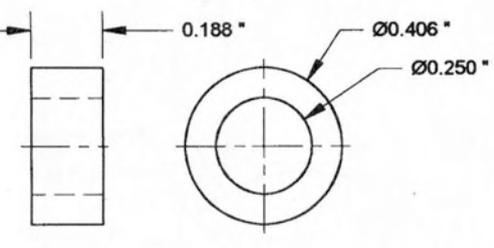
**-1 BEARING HOUSING**

Aluminum Casting



**-3 SPACER WASHER**

Bronze (2 required)



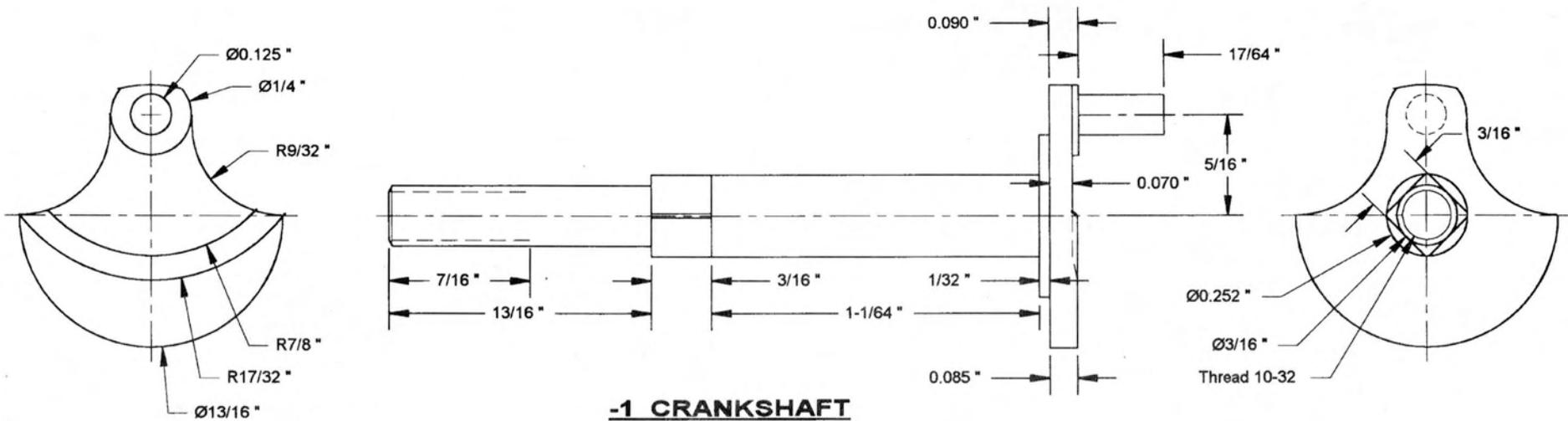
**-2 SEAL RING**

Teflon

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			DRAWN	<b>JM</b> Oct 1998	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB</b> 22.Jun.1999	

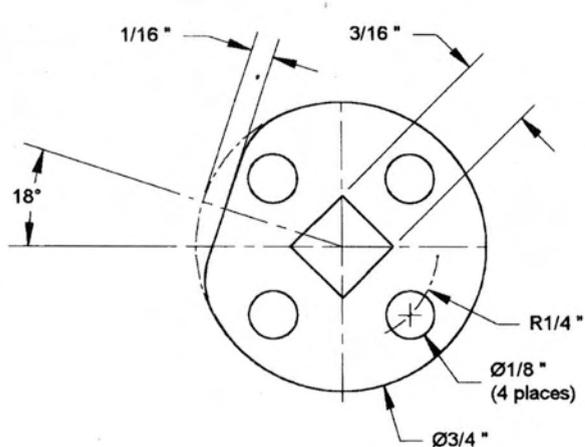


NAME	1938 Trojan Jr.
NUMBER	Sheet 2 - Bearing Housing



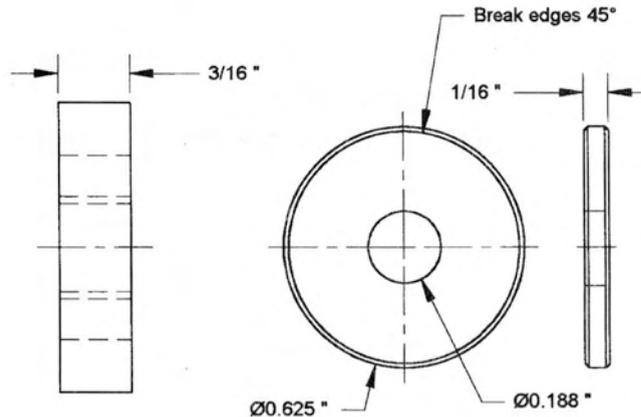
**-1 CRANKSHAFT**

Tool Steel



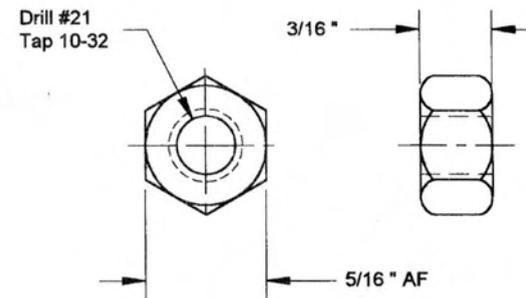
**-2 CAM/PROP DRIVE WASHER**

Tool Steel



**-4 Prop Washer**

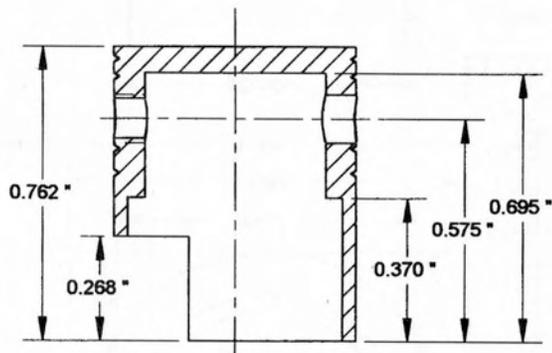
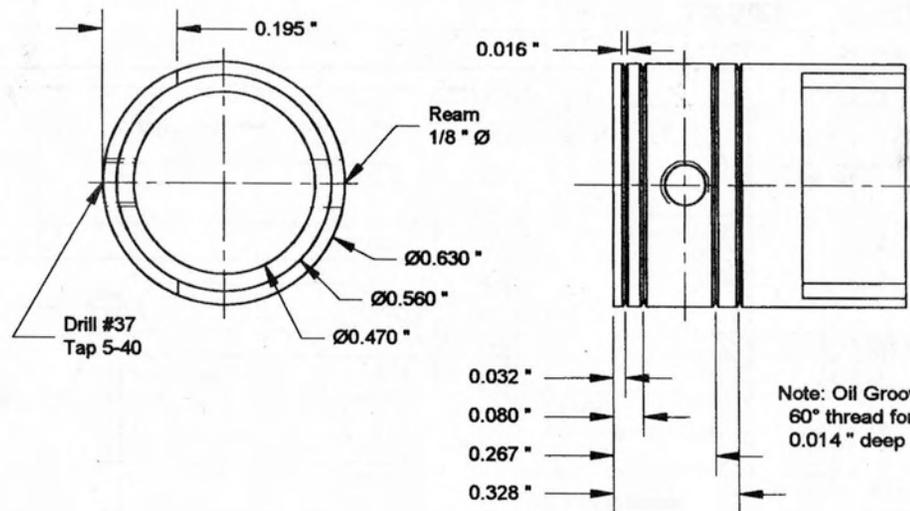
Steel (Case Harden)



**-3 Prop Nut**

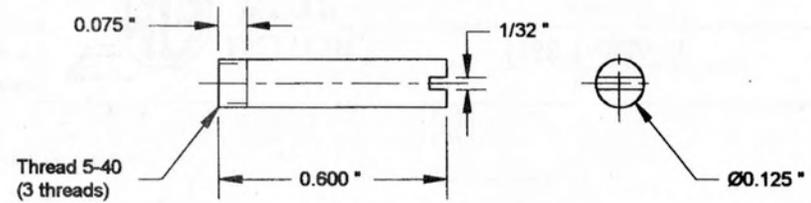
Hex Steel (Case Harden)

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			1938 Trojan Jr.
			DRAWN	<b>JM</b> Oct 1998			NUMBER
DATE	CHANGE	BY	CAD	<b>PMB</b> 22.Jun.1999			<b>Sheet 3 - Crankshaft</b>



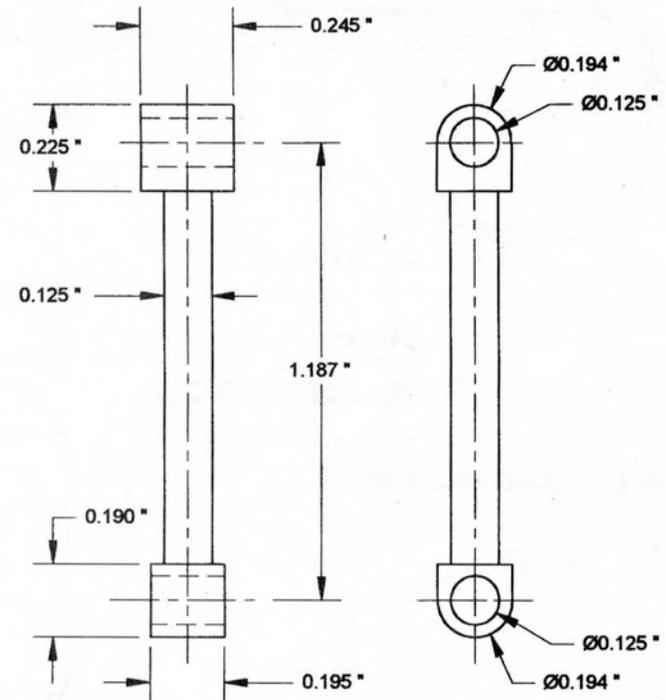
### -1 PISTON

Cast Iron



### -3 WRIST PIN

Drill Rod



### -2 CON ROD

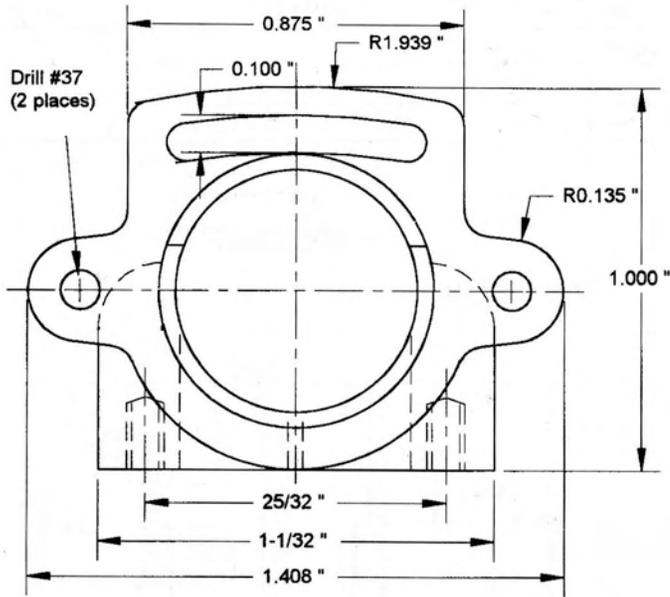
Tobin Bronze

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

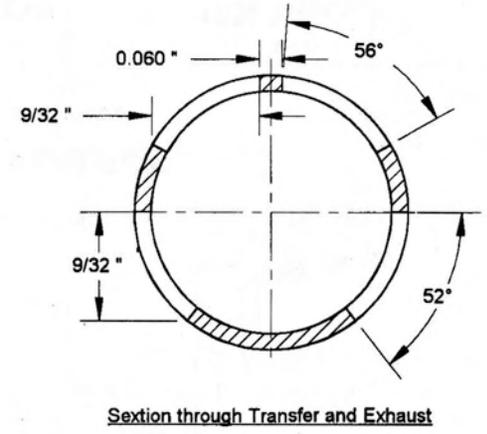
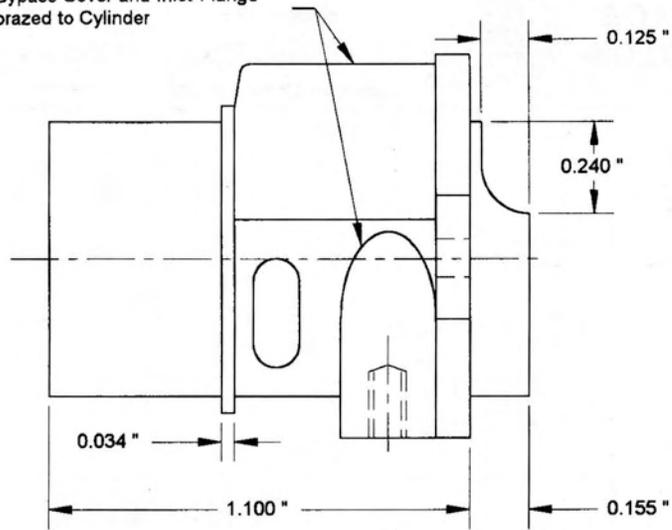


NAME  
**1938 Trojan Jr.**

NUMBER  
**Sheet 4 - Piston and Con Rod**

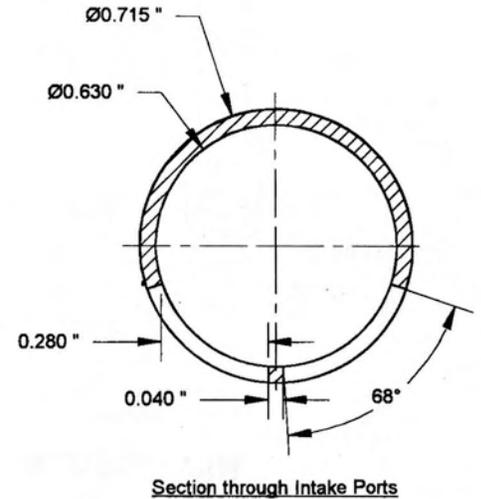
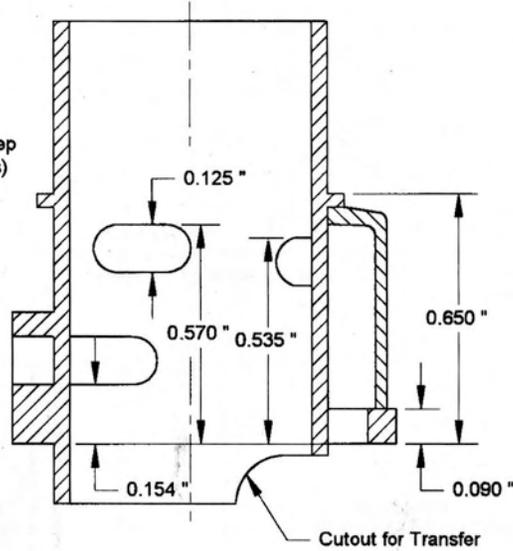
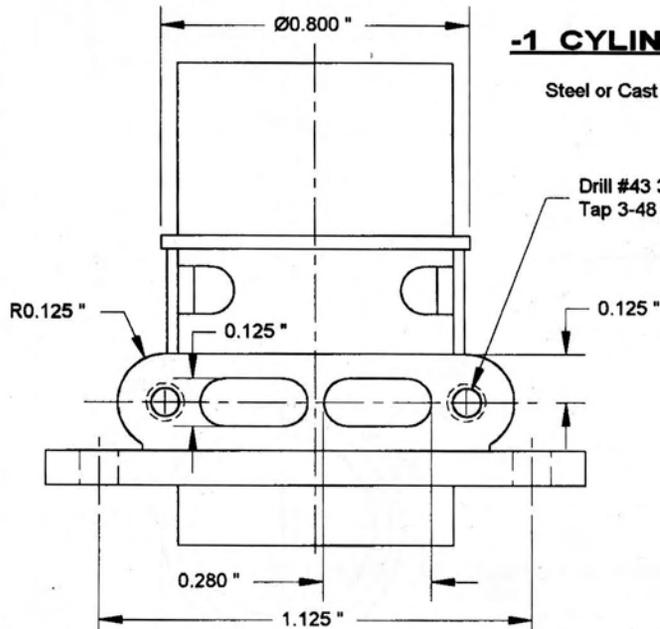


Bypass Cover and Inlet Flange  
brazed to Cylinder

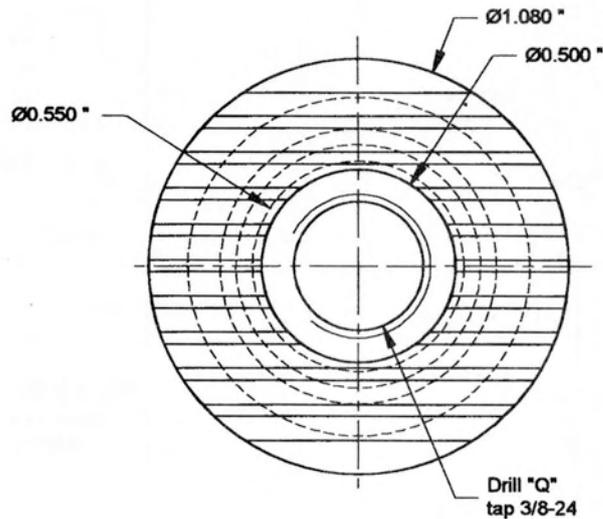
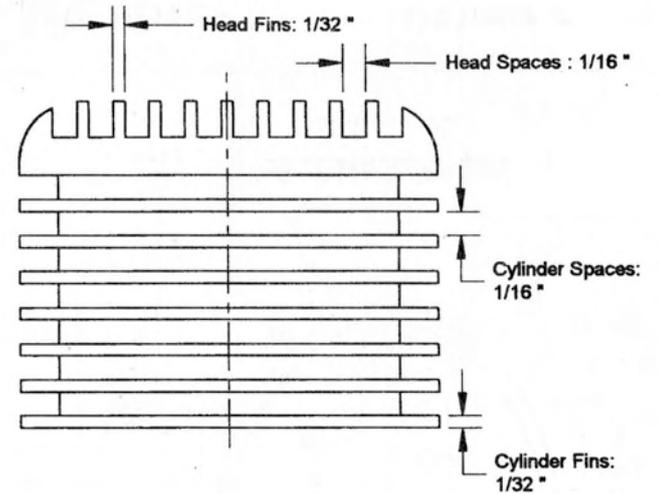
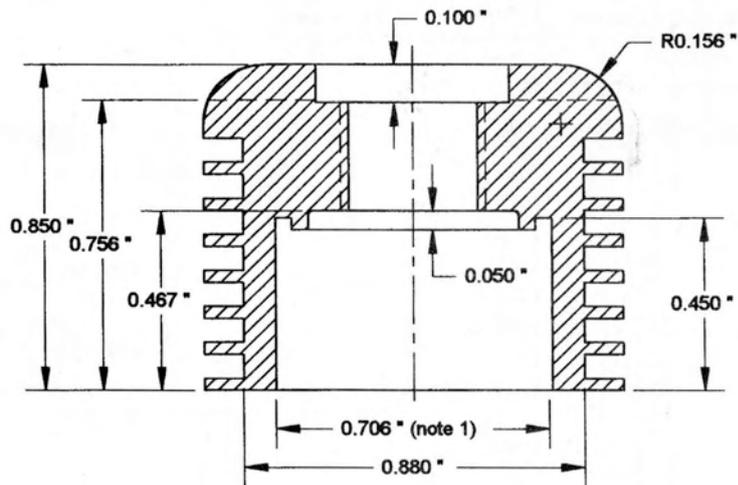


**-1 CYLINDER**

Steel or Cast Iron



		MATL	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME	1938 Trojan Jr.
		SCALE	<b>2 X SIZE</b>			NEXT ASSEMBLY	NUMBER
		DRAWN	<b>JM</b> Oct 1998				
DATE	CHANGE	BY	CAD	<b>PMB</b> 22 Jun. 1999			

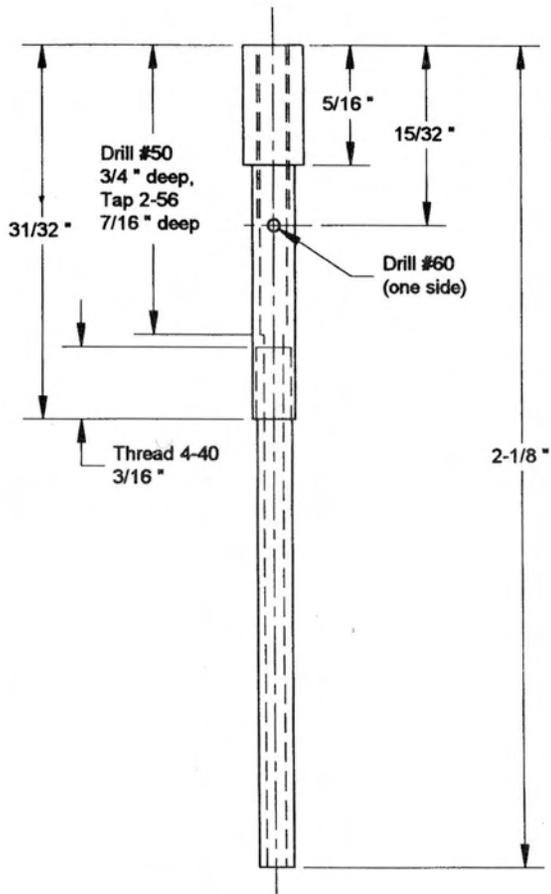


### -1 CYLINDER HEAD

Aluminum

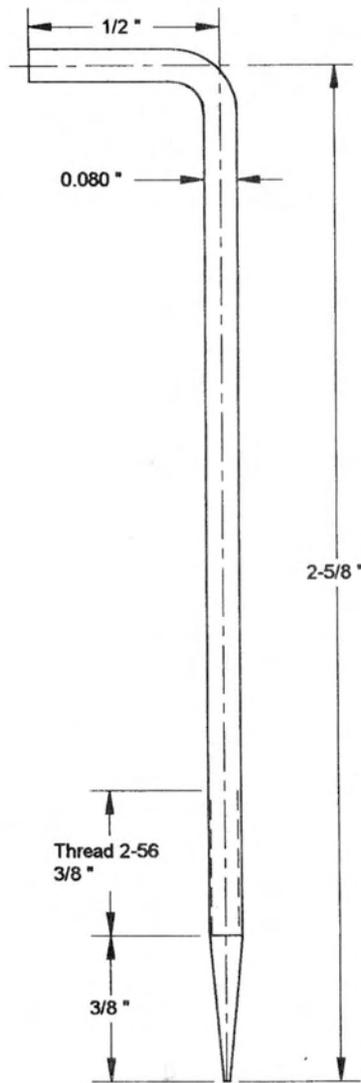
Note 1: Machine for 0.002" interference fit with 5-1 Cylinder. Heat and shrink fit.

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



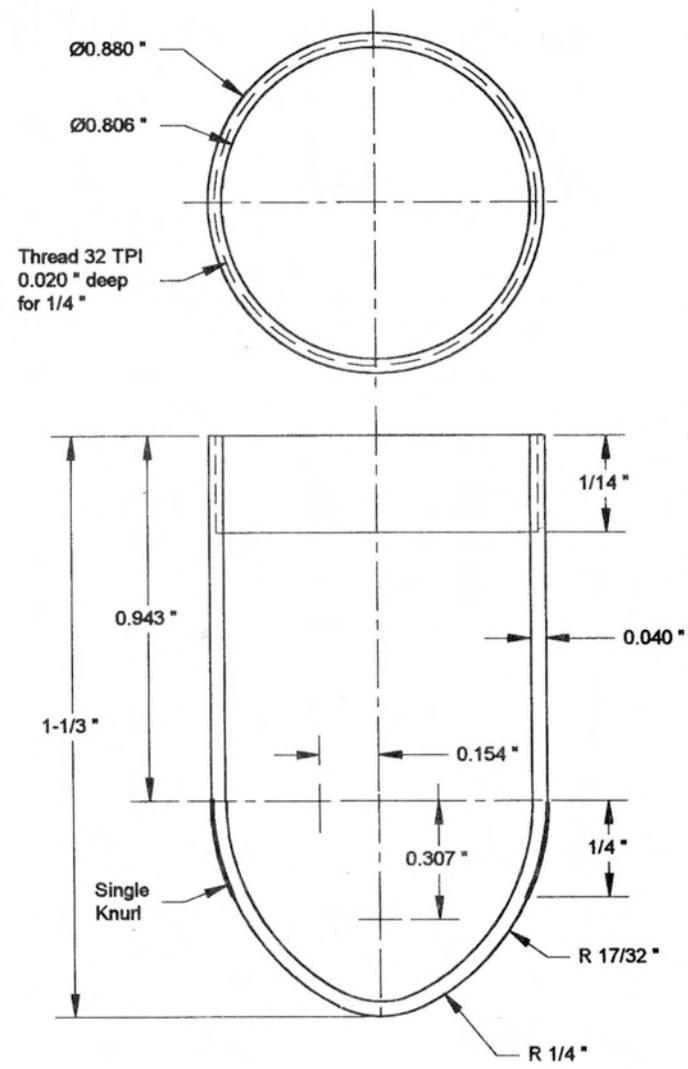
**-1 SPRAY BAR**

Brass



**-2 NEEDLE VALVE**

Steel (or Du-Bro threaded rod)



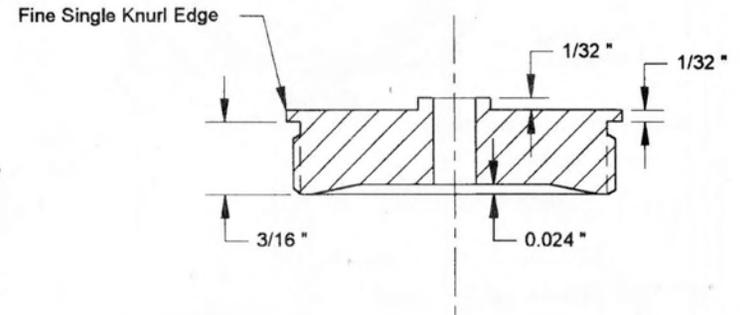
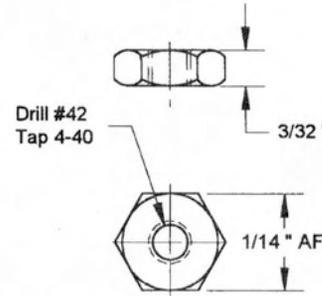
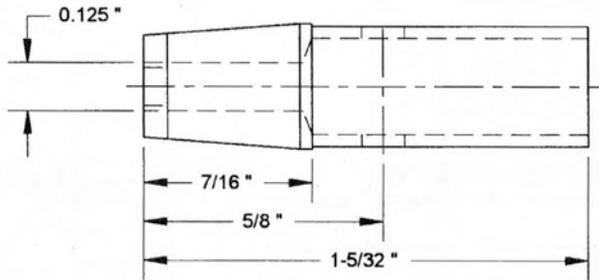
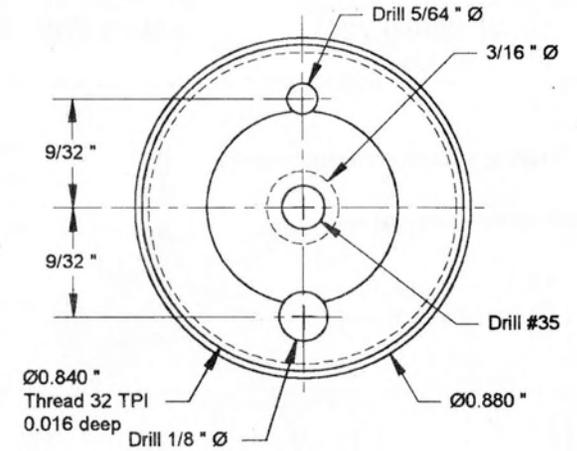
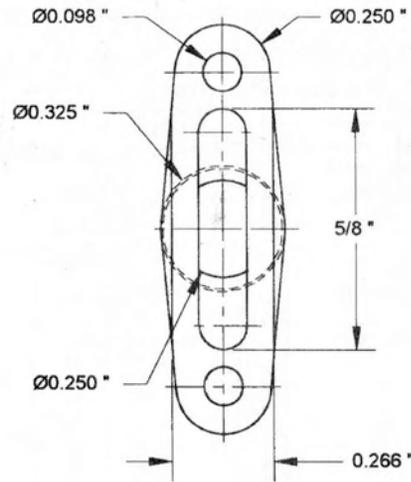
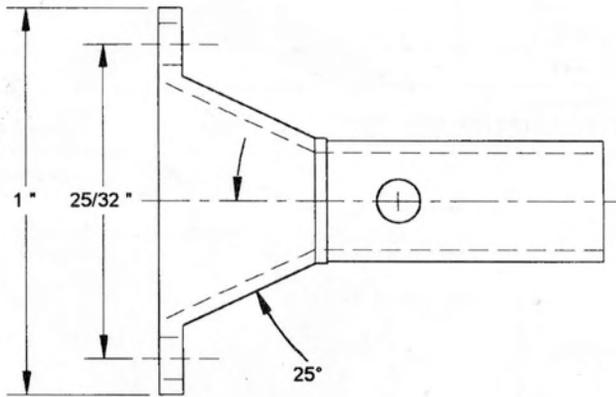
**-3 FUEL TANK**

Aluminum Casting

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			SCALE	2 X SIZE	
			DRAWN	JM Oct 1998	
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999	



NAME	1938 Trojan Jr.
NUMBER	Sheet 7 - Fuel System



### -1 VENTURI

Aluminum Casting

### -2 LOCK NUT

Hex Brass

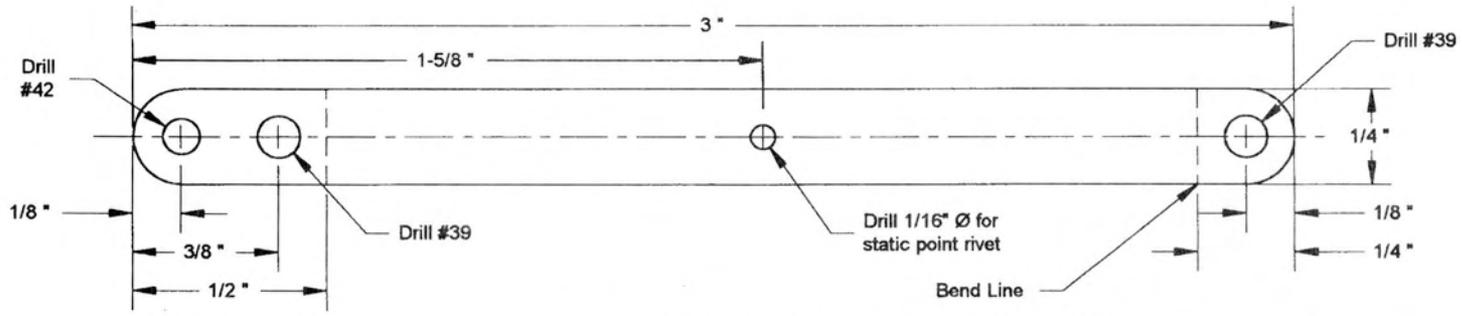
### -3 Tank Cover

Aluminum Casting

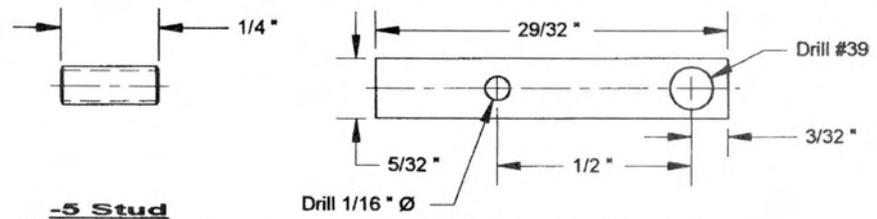
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			SCALE	<b>2 X SIZE</b>	
			DRAWN	<b>JM</b> Oct 1998	
DATE	CHANGE	BY	CAD	<b>PMB</b> 22 Jun. 1999	NEXT ASSEMBLY



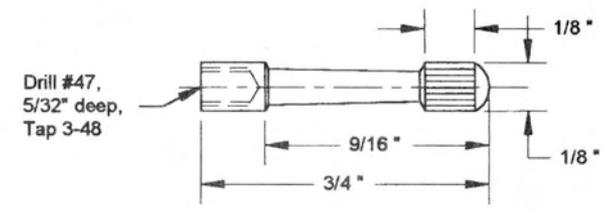
NAME	<b>1938 Trojan Jr.</b>
NUMBER	<b>Sheet 8 - Fuel System</b>



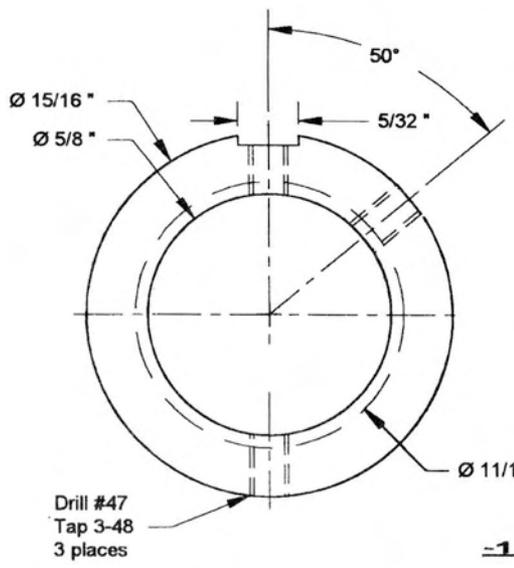
**-3 STATIONARY POINT STRAP**  
0.020" Brass



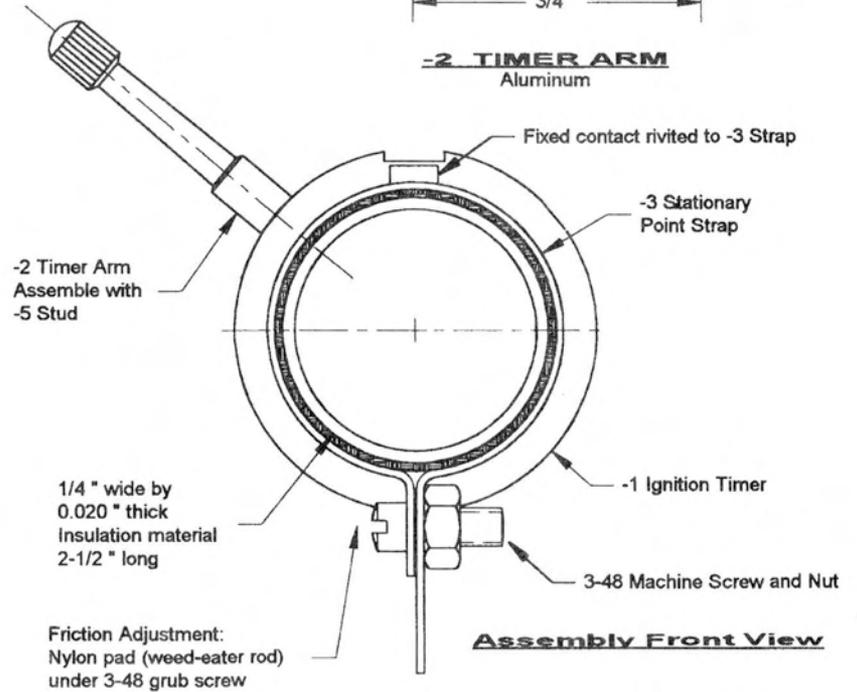
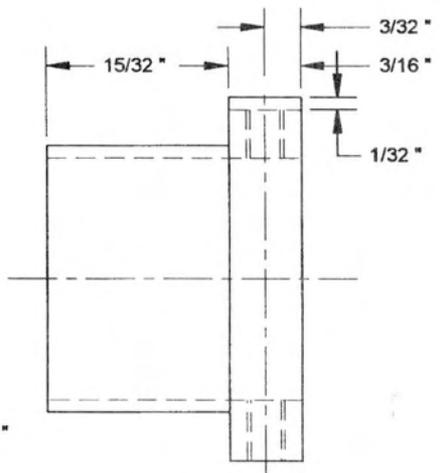
**-4 MOVING POINT**  
0.025" Brass or Spring Steel



**-2 TIMER ARM**  
Aluminum



**-1 IGNITION TIMER**  
Aluminum

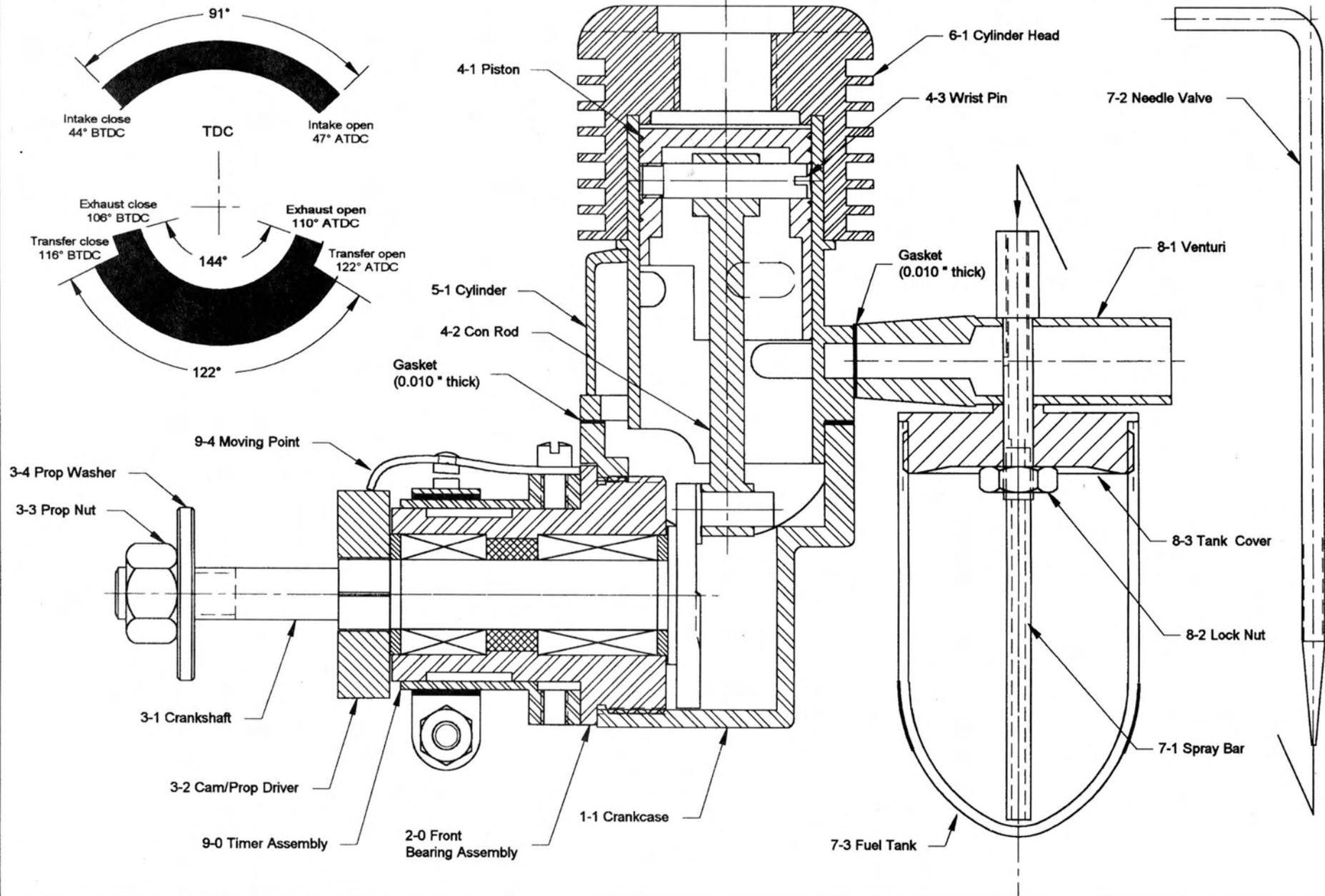
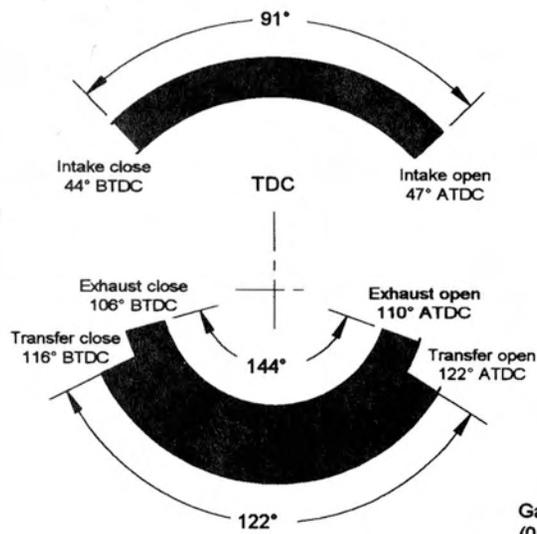


**Assembly Front View**

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
5 Jan 2000	Revise Timer arm design and positioning	BMBI	DRAWN	JM Oct 1998	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	PMB 22.Jun.1999	



NAME	1938 Trojan Jr.
NUMBER	Sheet 9 - Timer Assembly



			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	2 X SIZE	
			DRAWN	JM Oct 1998	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	PMB 22 Jun. 1999	



NAME	1938 Trojan Jr.
NUMBER	Sheet 10 - General Arrangement

## 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's 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.

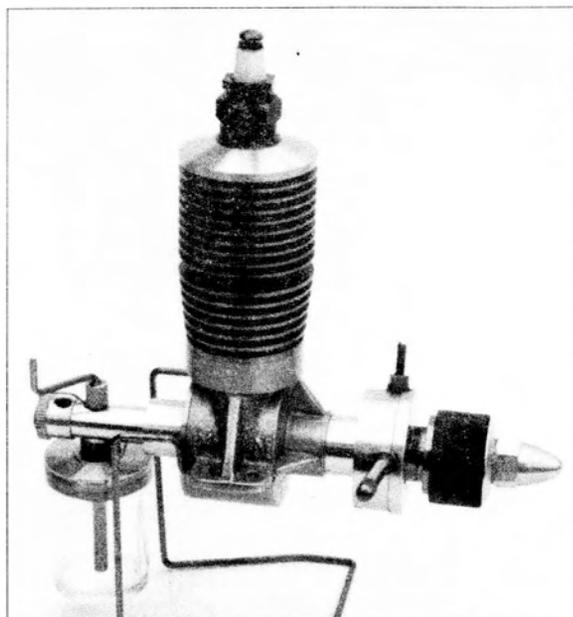
These three features were the subject of much discussion among several Motor Boys who believed that it would be difficult to run the M&M. We were all wrong.

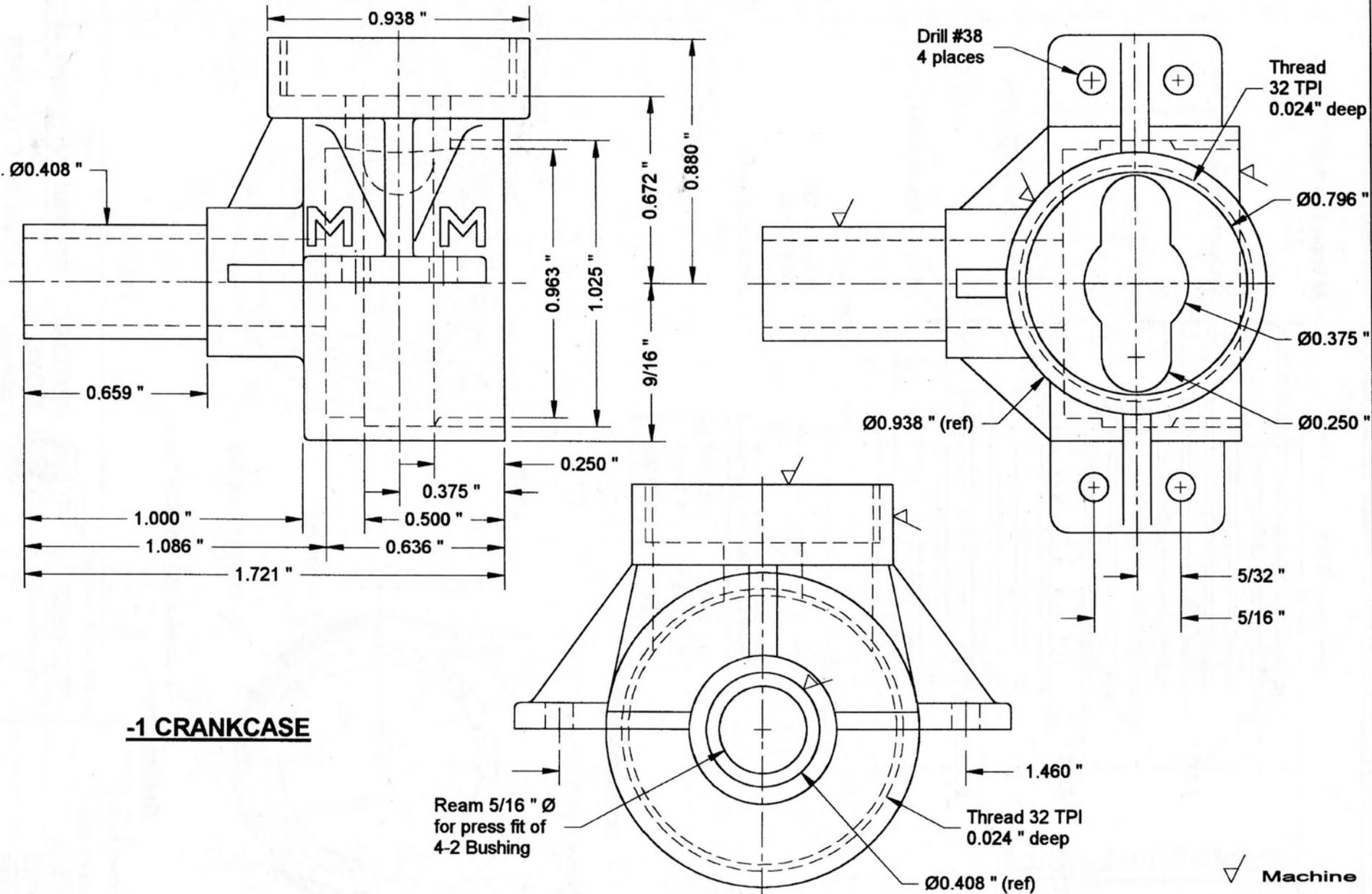
The Piston Valve Motor was only offered in 1939. In 1940 M&M offered an engine similar in appearance to the 1939 model, but it no longer had the piston valve. Production apparently ended with the 1940 model. Ads in the May 1940 and May 1941 issues of Model Airplane News promote sales of air wheels but 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.





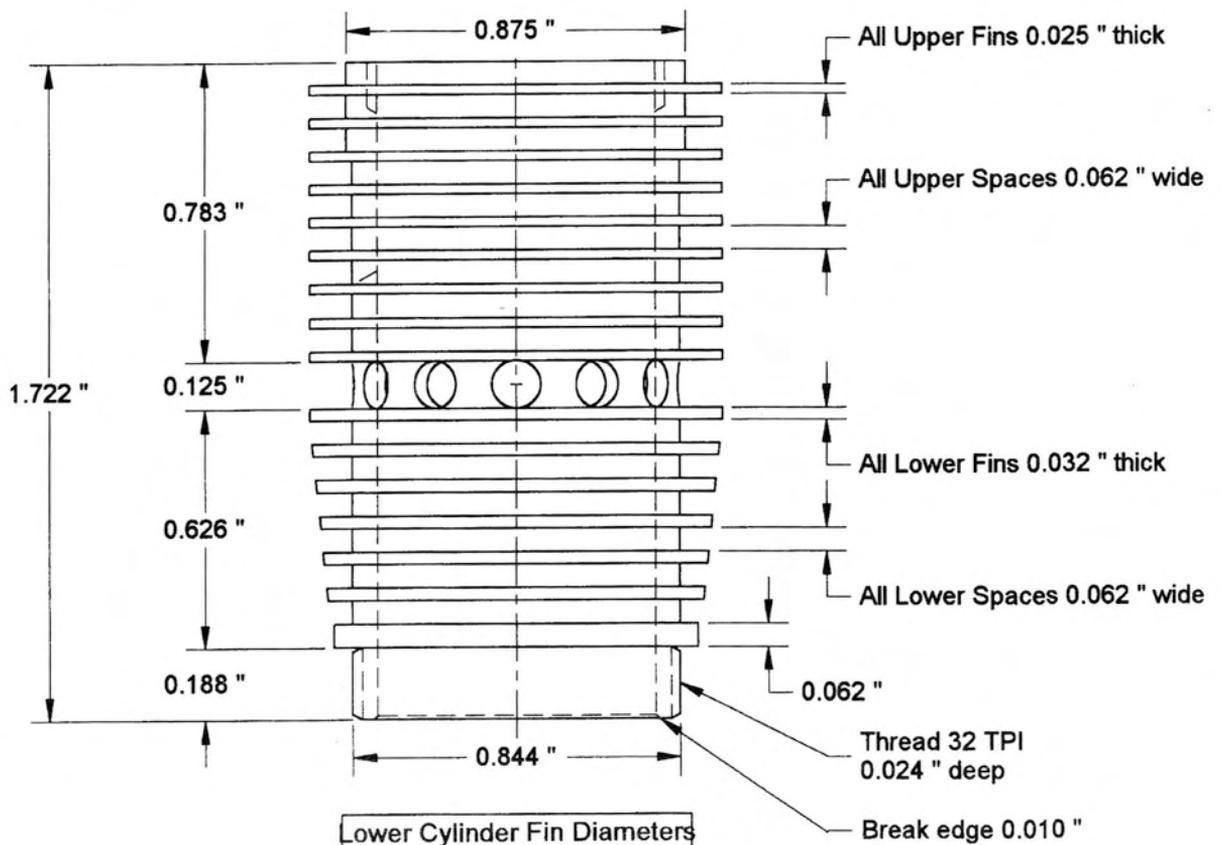
**-1 CRANKCASE**

			MAT'L	Aluminum Casting	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
22 Mar 1998	Redrawn from actual casting	PMB	DRAWN	RMB	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	PMB 2-22-1998	



NAME  
**1939 M&M Piston Valve .29**

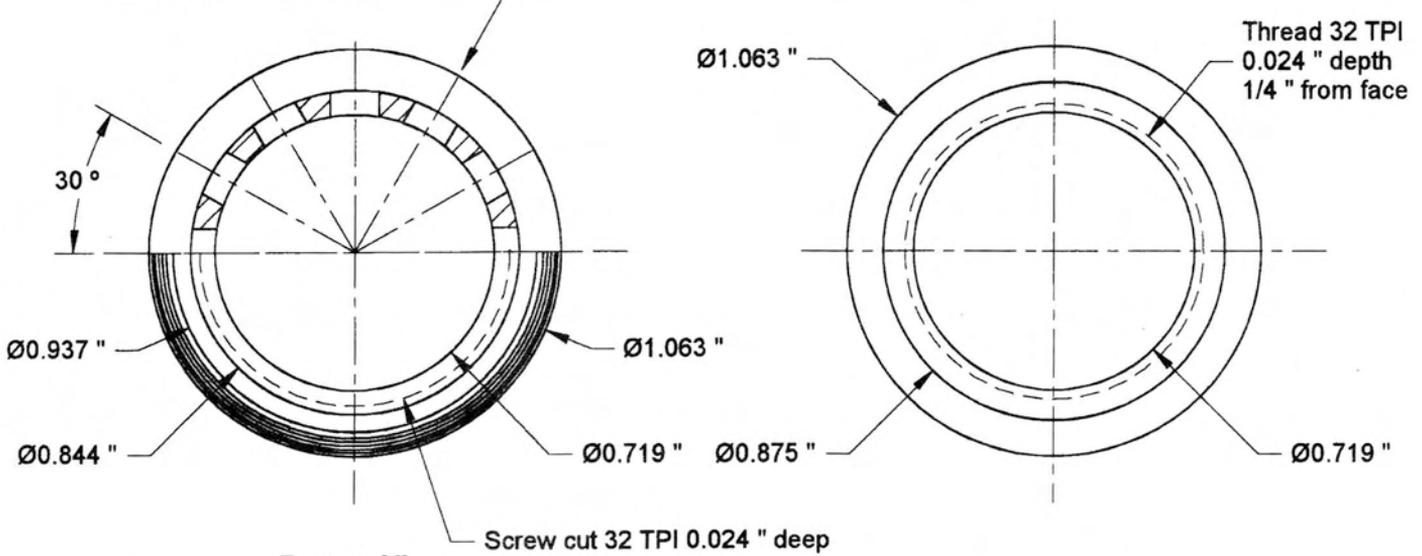
NUMBER  
**Sheet 1 - CRANKCASE**



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**

12 x 1/8 " Ø Holes equally spaced



**Bottom View**

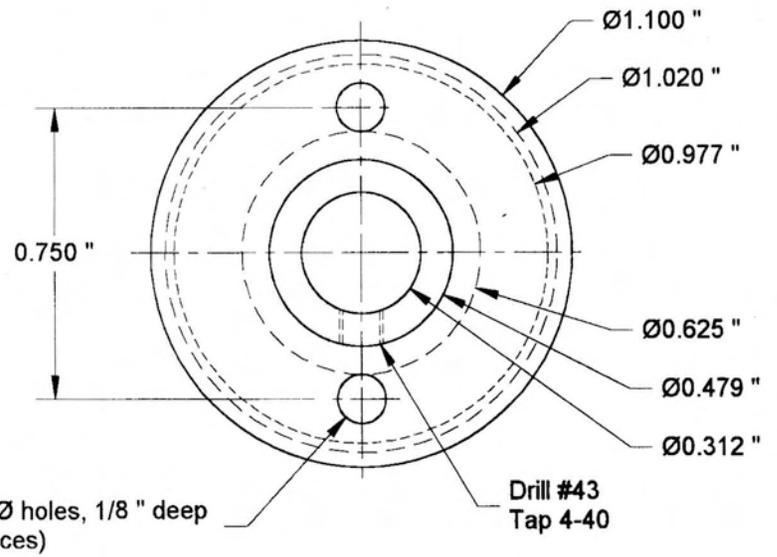
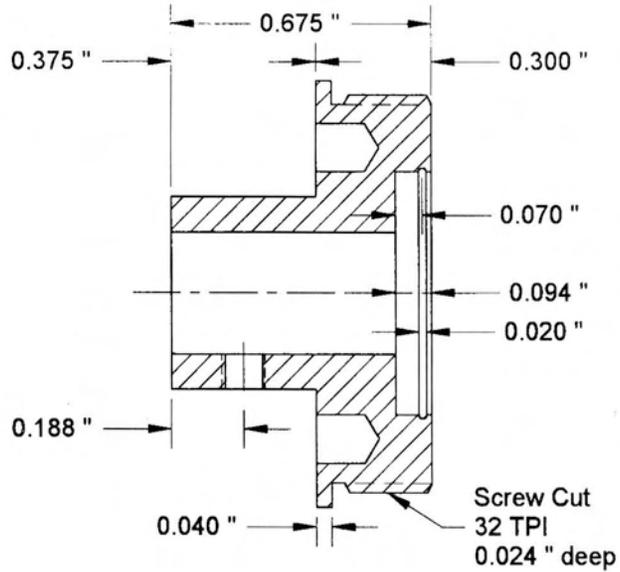
**Top View**

24 Oct '99	Correction by EMB
MAT'L	<b>Leaded Steel</b>
SCALE	<b>2 X SIZE</b>
DRAWN	<b>RMB</b>
CAD	<b>PMB</b>

DO NOT SCALE DRAWING  
WORK TO DIMENSIONS  
ALL DIMENSIONS  
ARE IN INCHES  
NEXT ASSEMBLY

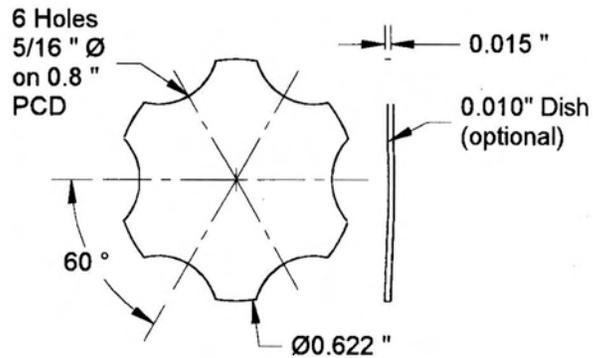


NAME	1939 M&M Piston Valve .29
NUMBER	Sheet 2 - CYLINDER



**-1 BACKPLATE**

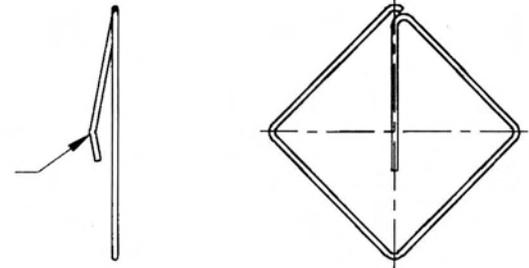
Aluminum Sand Casting



**-2 CLACK VALVE**

Aluminum

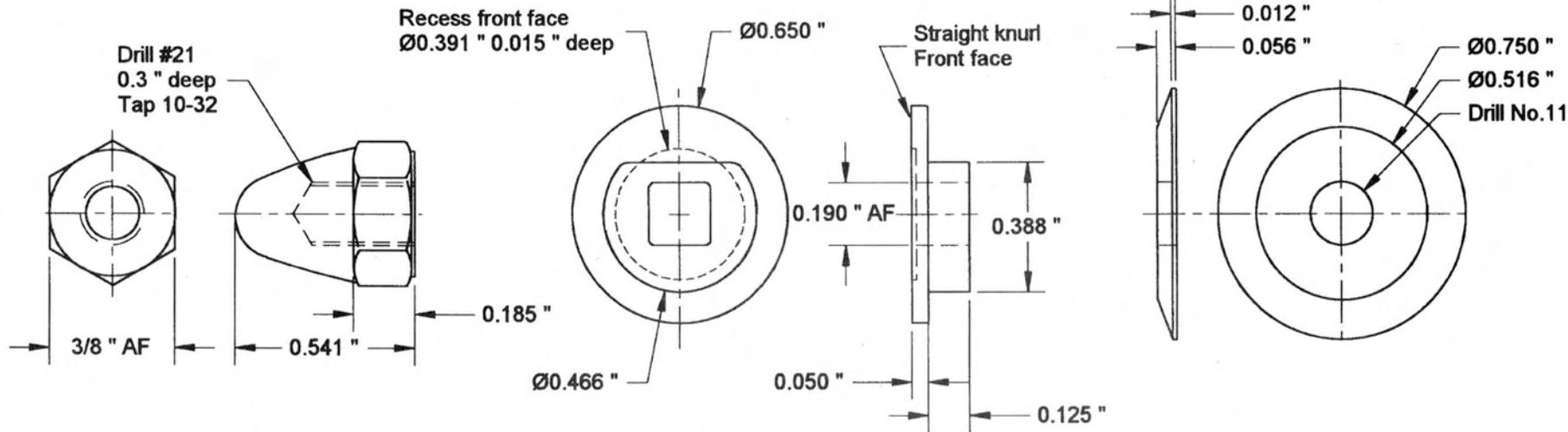
Bend to place light or no pressure on -2 Clack Valve in -1 Backplate



**-3 Clack Valve Retainer**

0.015" Music Wire

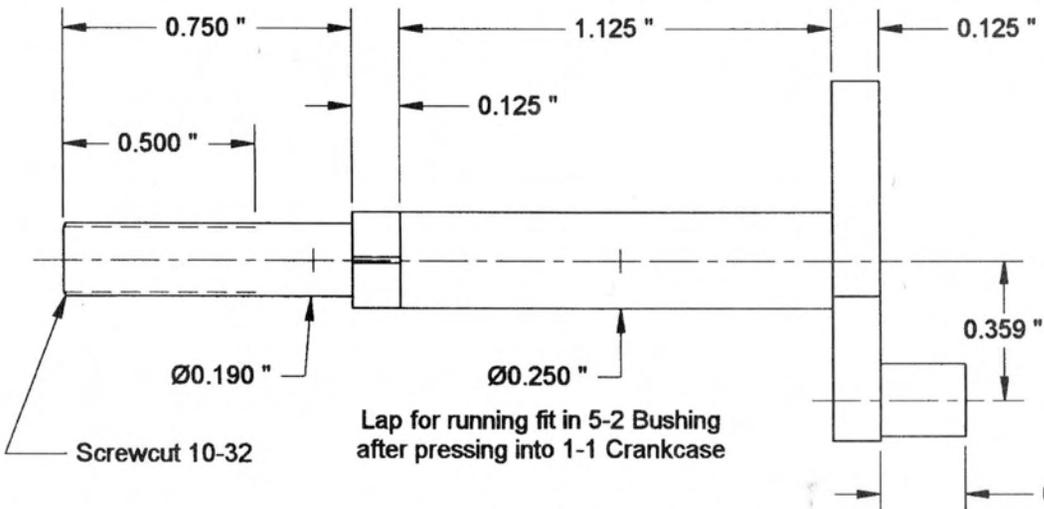
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	2 X SIZE			1939 M&M Piston Valve .29
24 Oct 1999	Corrections by EMB		DRAWN	KCMB	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 2-21-1998			Sheet 3 - BACKPLATE ASSY



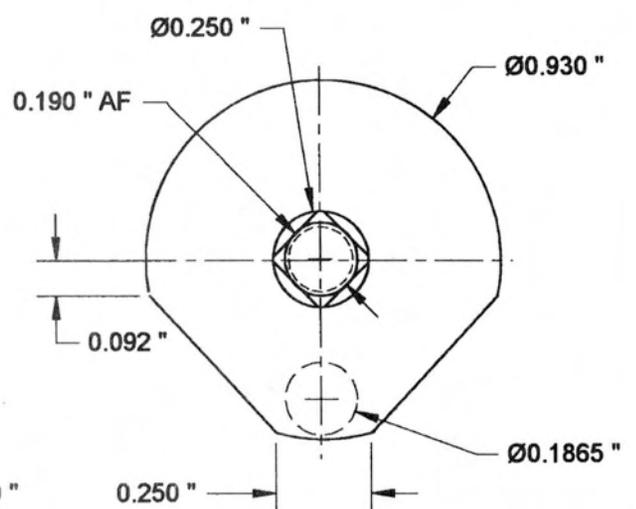
**-2 ACORN NUT**  
(Aluminum)

**-3 CAM**  
Steel (case harden)

**-4 PROP WASHER**  
Aluminum



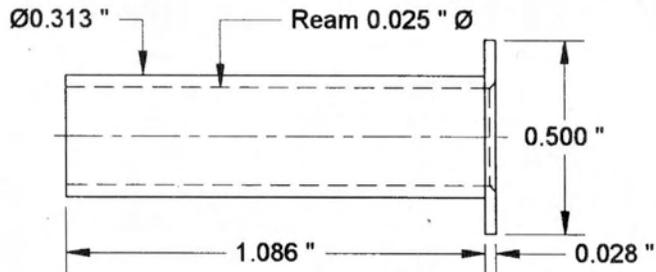
**-1 CRANKSHAFT**  
Steel



Original crank fabricated in three pieces

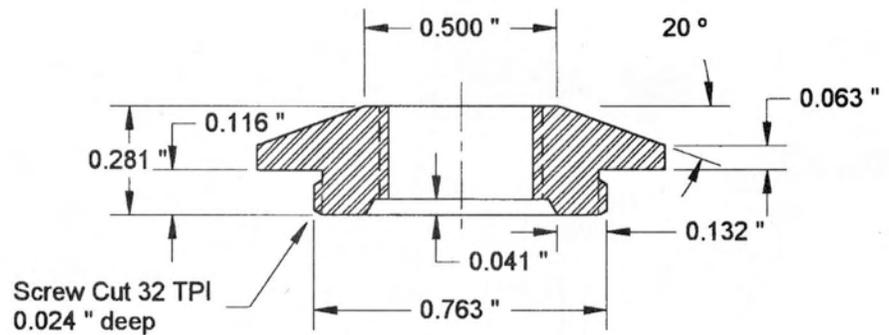
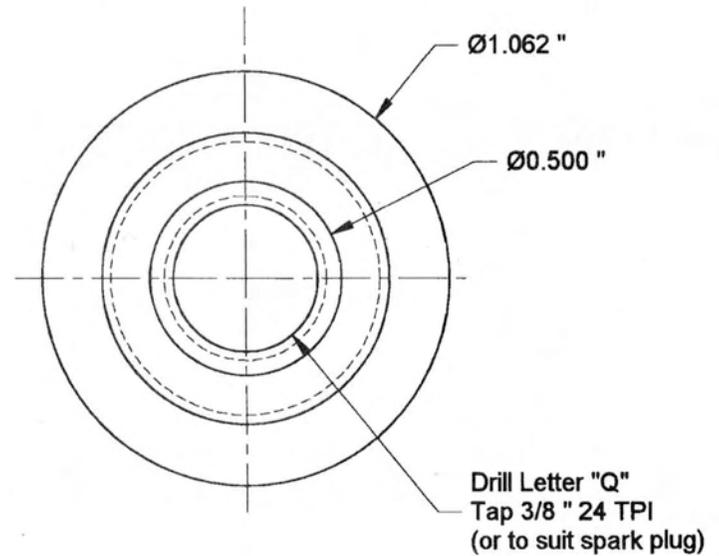
18

24 Oct 1999	Corrections by EMB		MAT'L	As Noted	DO NOT SCALE DRAWING	 <b>MOTOR BOYS</b> (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			<b>Sheet 4 - DRIVE TRAIN</b>



**-2 BUSHING**

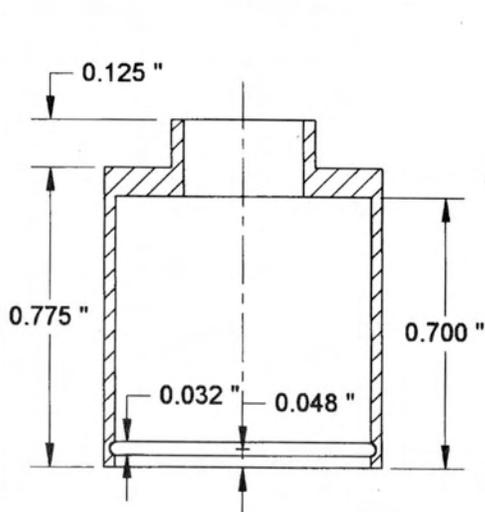
Bronze



**-1 CYLINDER HEAD**

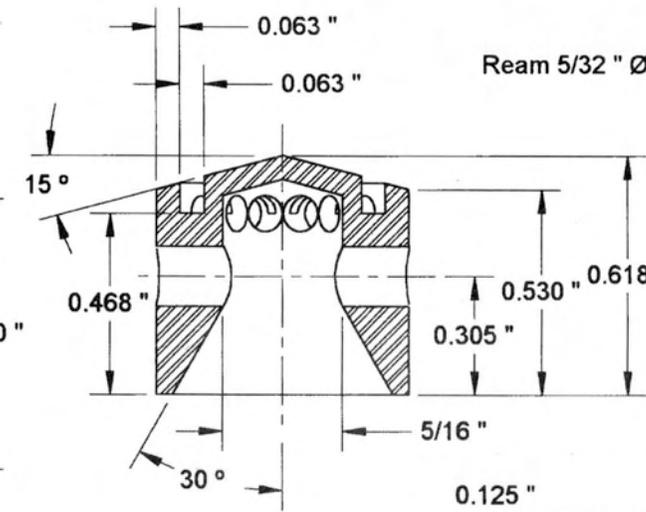
(Aluminum)

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
24 Oct 1999	Corrections by EMP		SCALE	<b>2 X SIZE</b>			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	



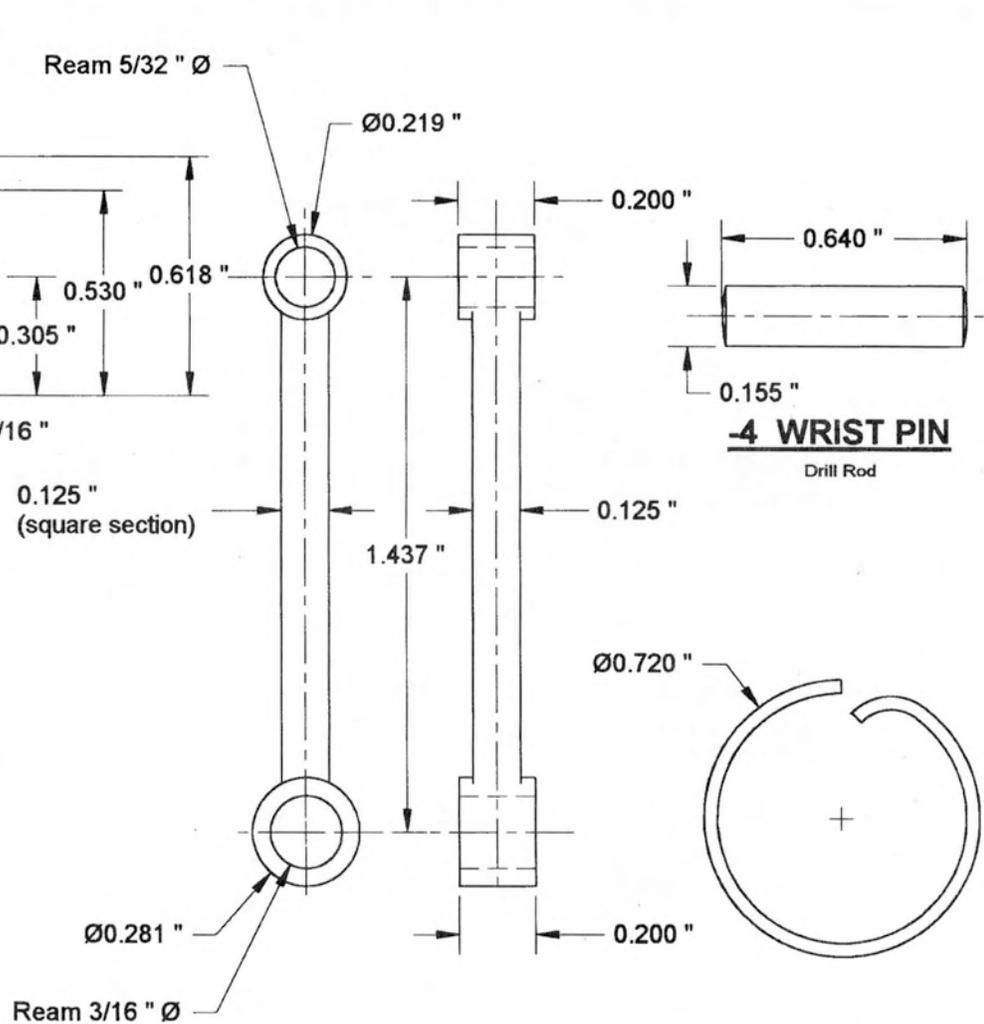
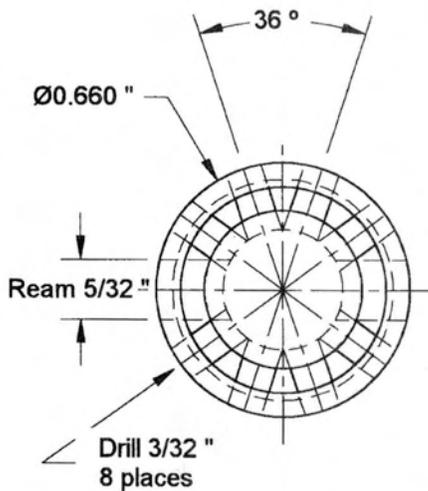
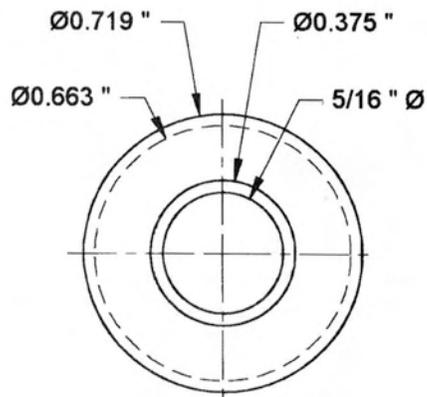
**-1 PISTON**

Cast Iron



**-2 PISTON VALVE**

Aluminium



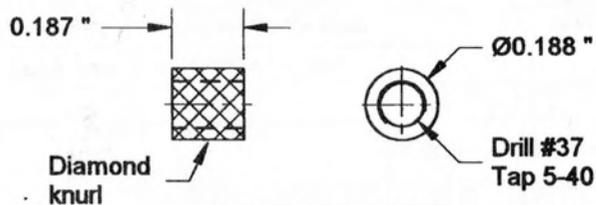
**-3 CONNECTING ROD**

2024 Aluminium

**-5 VALVE CIRCLIP**

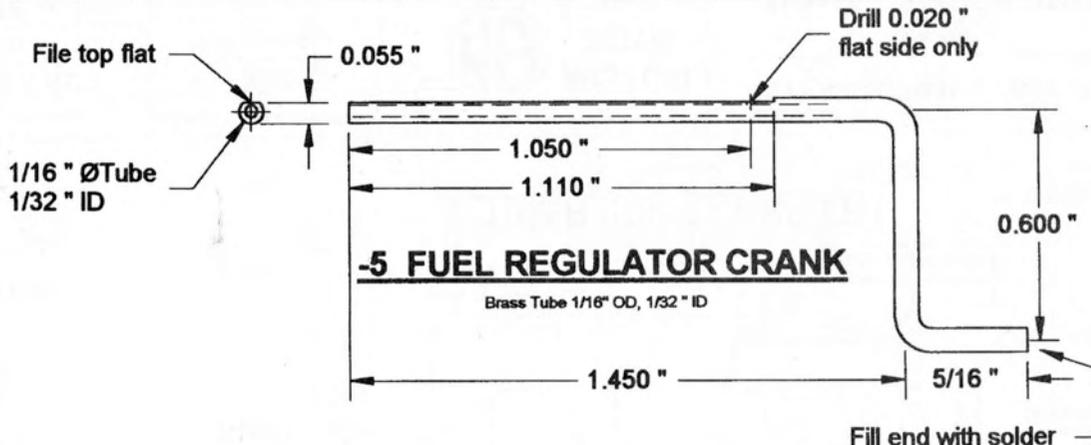
0.020" Music Wire

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
24 Oct 1999	Corrections by EMB		SCALE	<b>2 X SIZE</b>			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		<b>Sheet 6 - PISTON ASSEMBLY</b>	



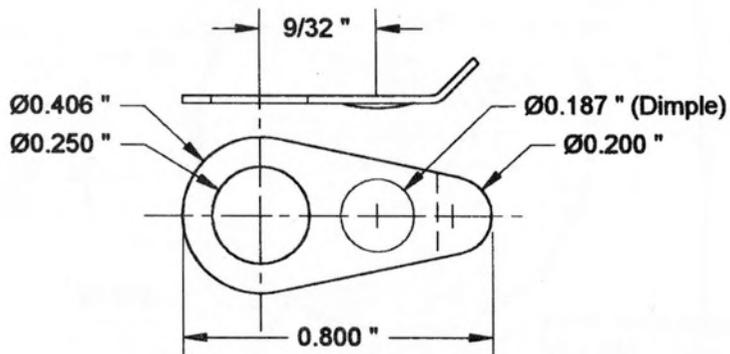
**-6 GLAND NUT**

Aluminium



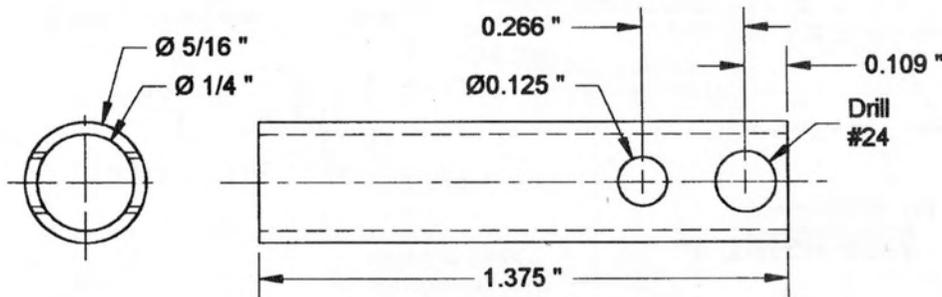
**-5 FUEL REGULATOR CRANK**

Brass Tube 1/16" OD, 1/32" ID



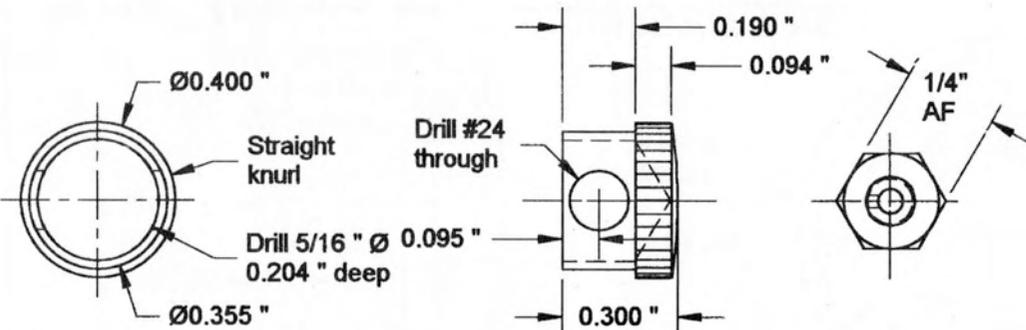
**-4 FUEL FILLER SHUTTER**

Aluminium shim 0.020" thick



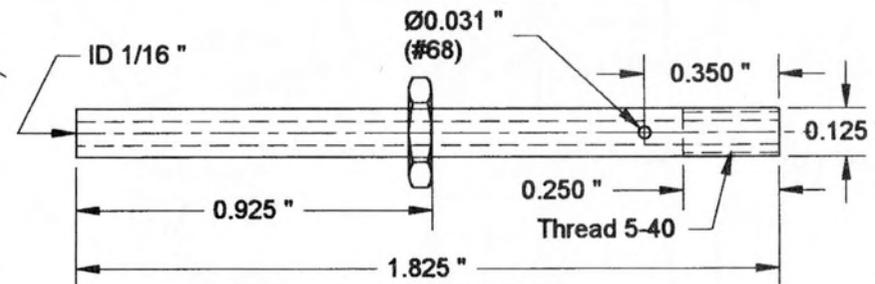
**-1 INTAKE TUBE**

Aluminium Tube 5/16" OD, 1/4" ID



**-2 CHOKE CAP**

Aluminium



**-2 SPRAY BAR**

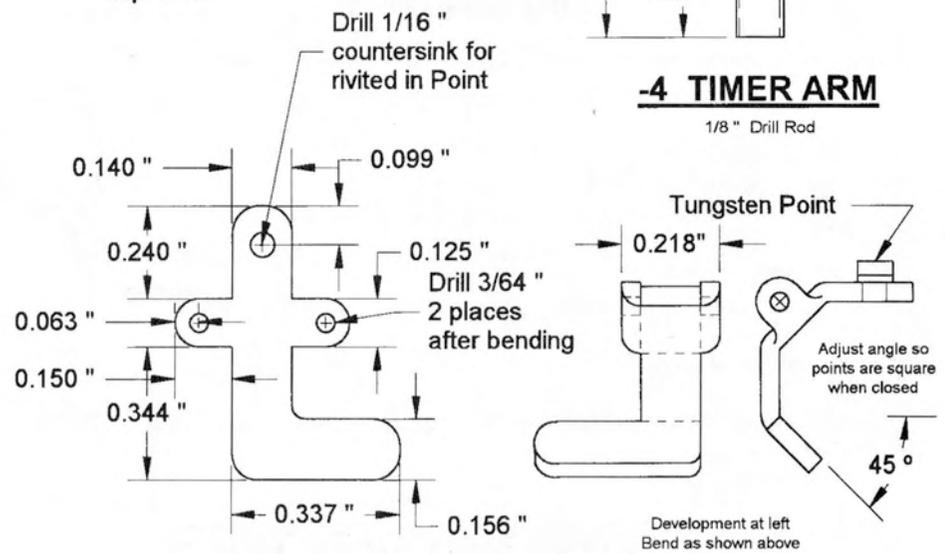
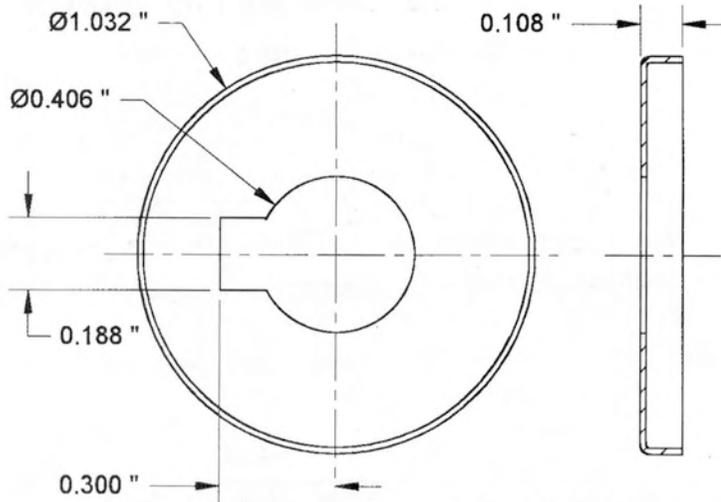
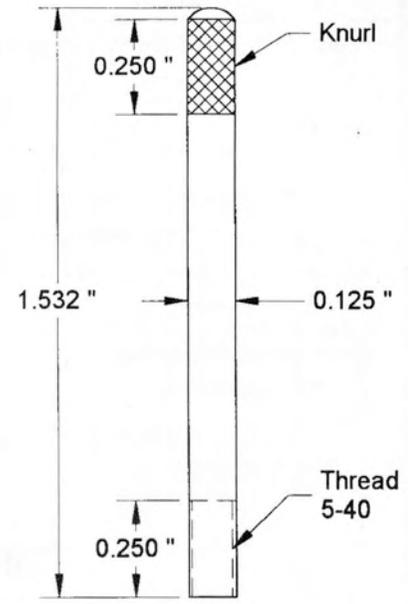
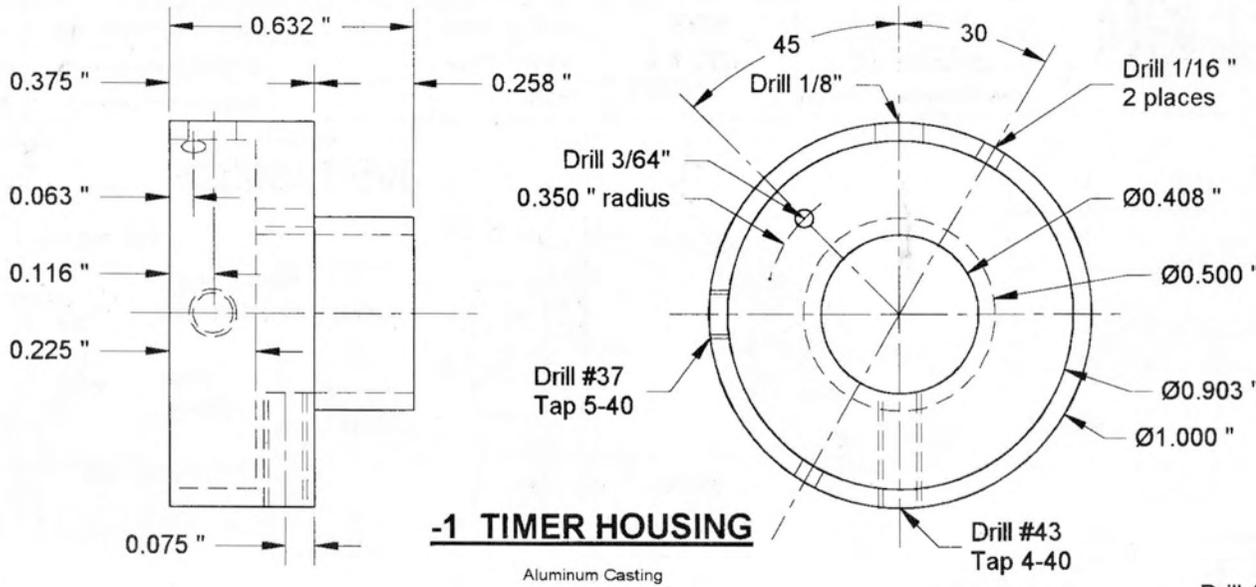
Brass

24 Oct 1999	Corrections by EMB		MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
22 Mar 1998	Corrections from RMB!	PMB	SCALE	2 X SIZE	
3 Mar 1998	Corrections from KMB!	PMB	DRAWN	RMB	
DATE	CHANGE	BY	CAD	PMB	



NAME  
**1939 M&M Piston Valve .29**

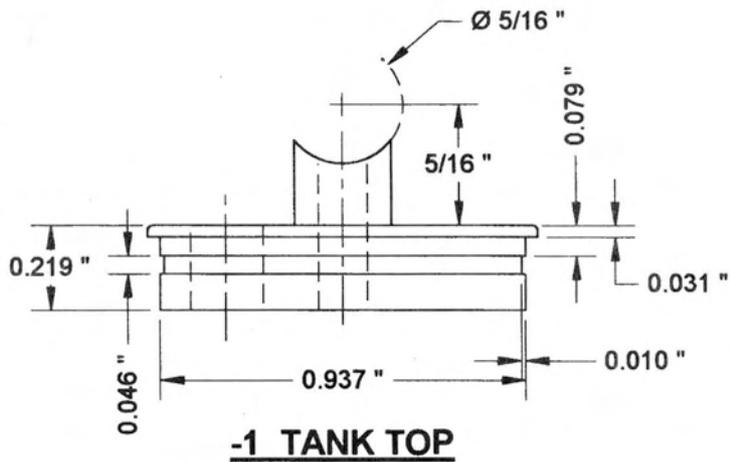
NUMBER  
**Sheet 7 - FUEL SYSTEM**



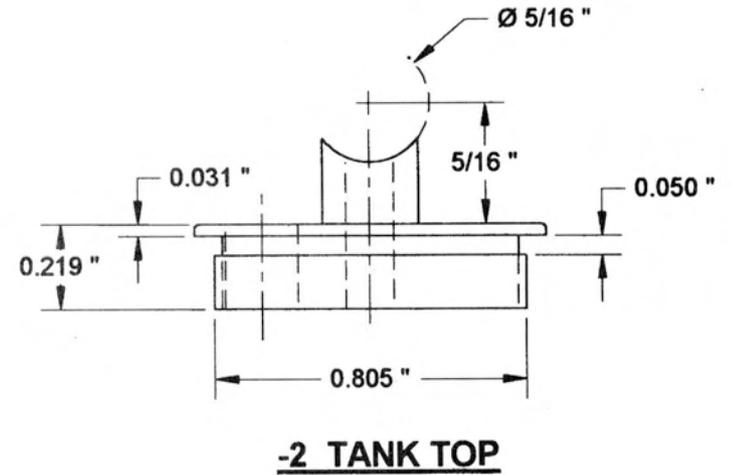
24 Oct 1999	Corrections by EMB		MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
3 Mar 1998	Corrections from KMBI	PMB	SCALE	2 X SIZE	
DATE	CHANGE	BY	DRAWN	RMB	
			CAD	PMB 2-22-1998	NEXT ASSEMBLY



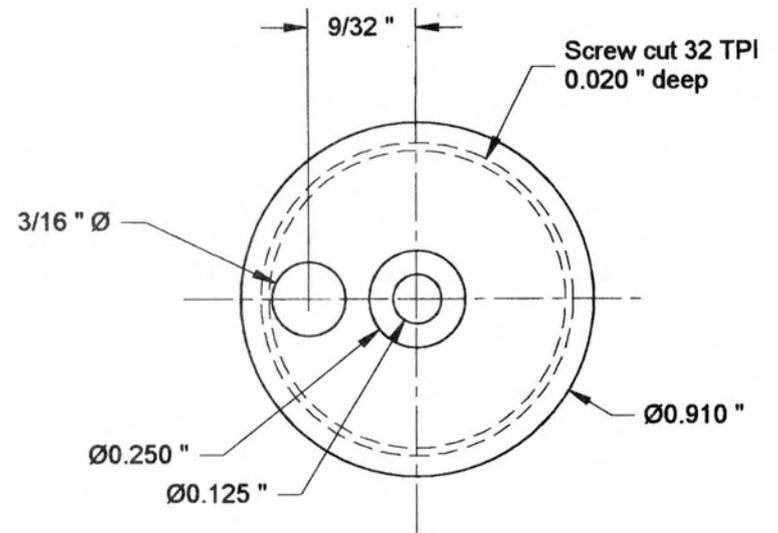
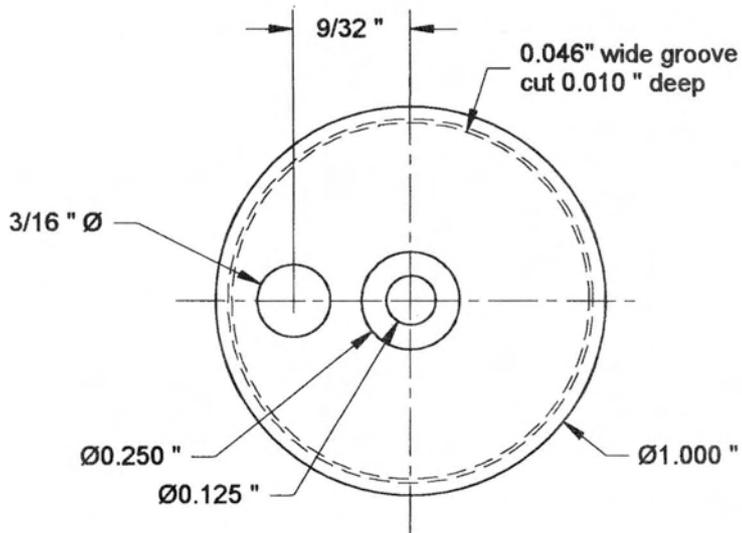
NAME	1939 M&M Piston Valve .29
NUMBER	Sheet 8 - IGNITION TIMER



Dimensions shown are for  
"Aunt Jimima"  
Syrup Cap Tank



Dimensions shown are for  
5-4 Replica Fuel Tank

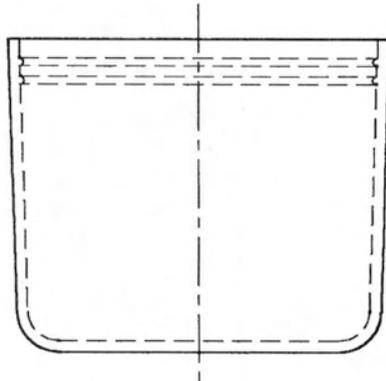


			MATL	Aluminum Sand Casting	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	<b>2 X SIZE</b>	
			DRAWN	<b>KCMB</b>	
DATE	CHANGE	BY	CAD	<b>PMB</b> 2-21-1998	



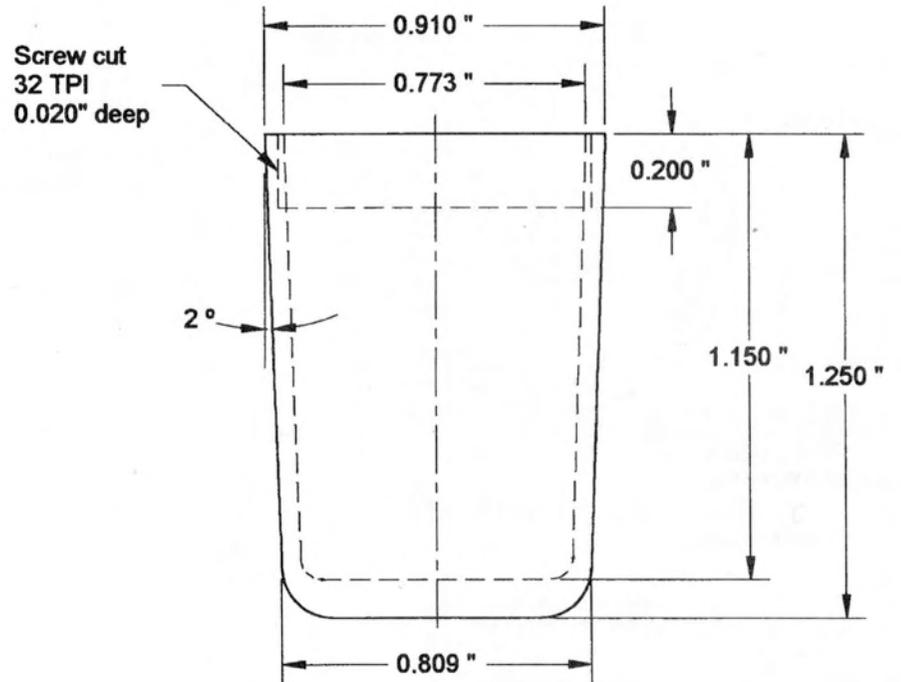
NAME  
**1939 M&M Piston Valve .29**

NUMBER  
**Sheet 9 - TANK TOP OPTIONS**



**-1 FUEL TANK**

"Aunt Jimima" Syrup Bottle Cap

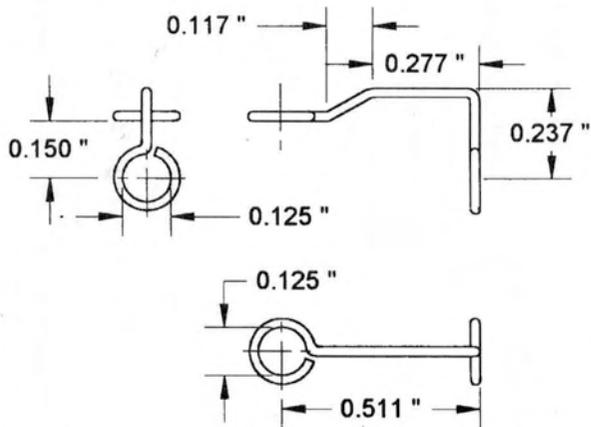


**-2 FUEL TANK**

Plastic

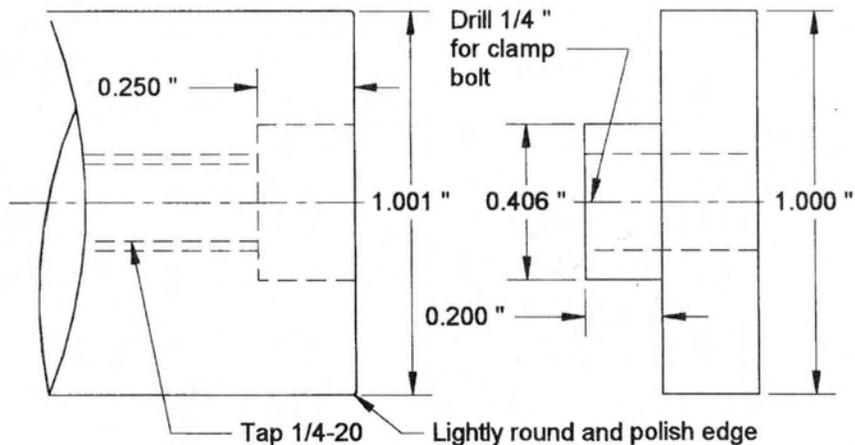
24

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



**-1 Choke Cap Retainer**

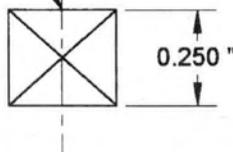
0.024" Music Wire



**-4 Timer Cover Spinning Fixture**

Mild steel

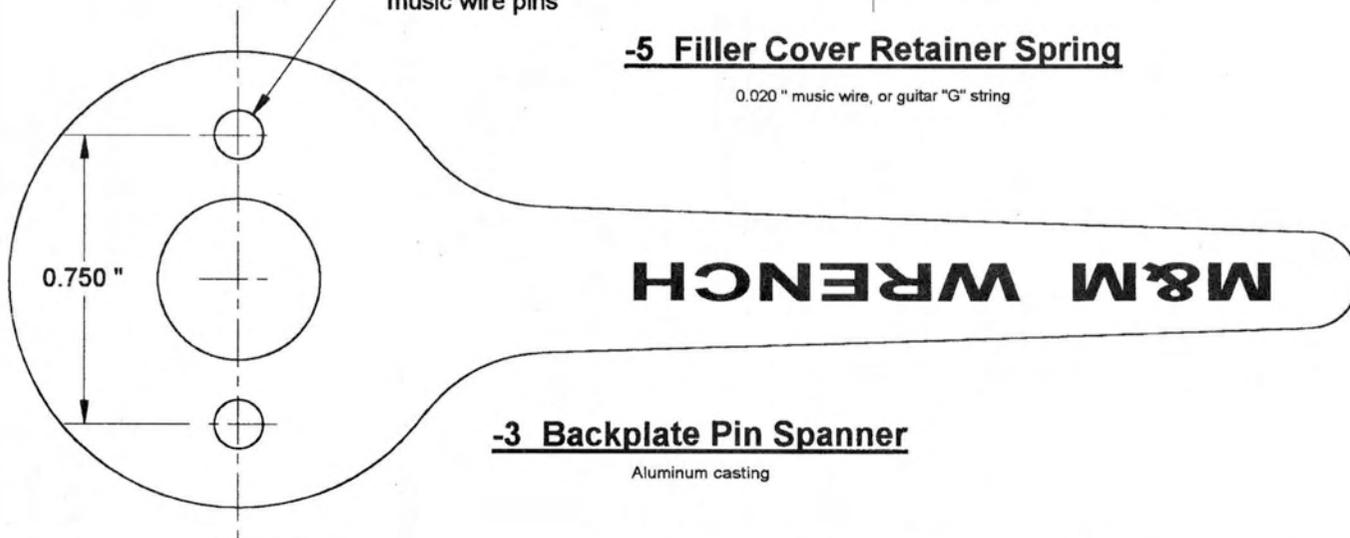
Coil spring  
4 turns 0.020" wire, 1/4" ID



**-5 Filler Cover Retainer Spring**

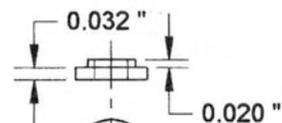
0.020" music wire, or guitar "G" string

Drill 2 places for press fit of Ø0.125" music wire pins



**-3 Backplate Pin Spanner**

Aluminum casting



Ø0.125" — Drill #44 for 2-56 point  
Ø0.187"

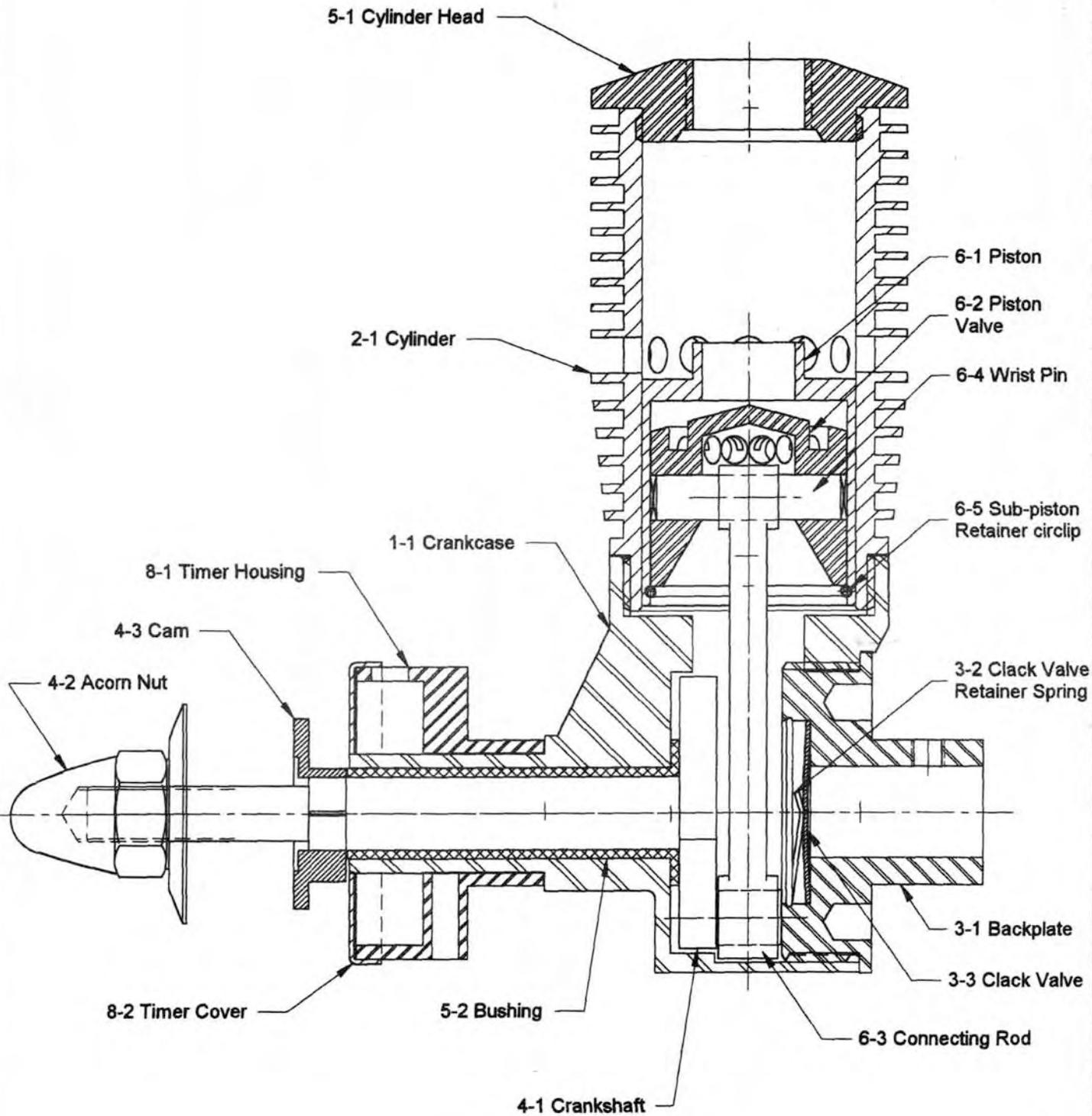
**-6 Fixed Point Bush (2 off)**

Phenolic or Nylon

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
			DRAWN	<b>RMB</b>	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB</b> 2-22-1998	



NAME  
**1939 M&M Piston Valve .29**  
NUMBER  
**Sheet 11 - Tools and Springs**

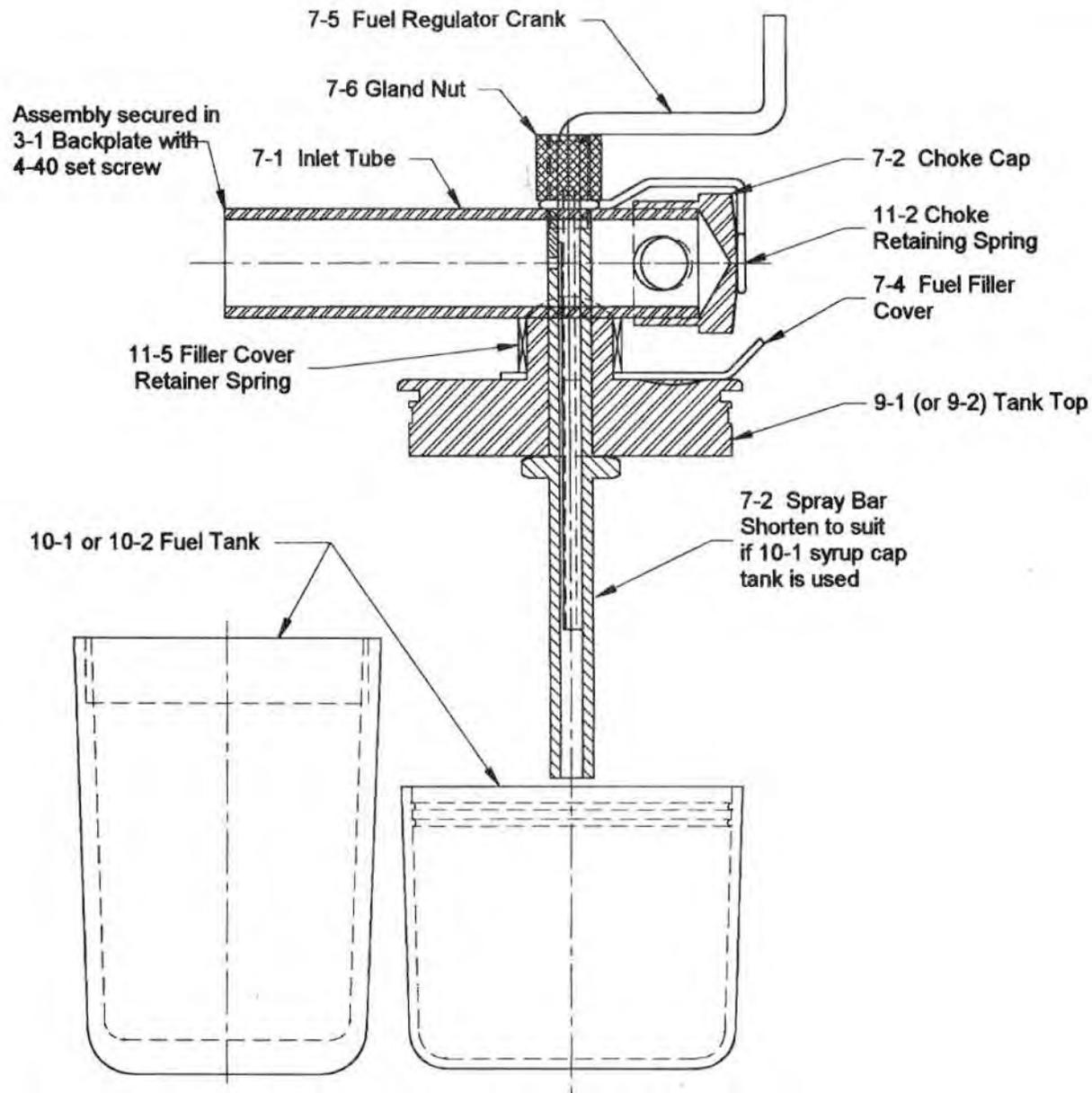


MAT'L	
SCALE	<b>2 X SIZE</b>
DRAWN	<b>RMB</b>
CAD	<b>PMB</b>

**DO NOT SCALE DRAWING**  
 WORK TO DIMENSIONS  
 ALL DIMENSIONS  
 ARE IN INCHES  
 NEXT ASSEMBLY



NAME	<b>1939 M&amp;M Piston Valve .29</b>
NUMBER	<b>Sheet 12 - General Arrangement</b>



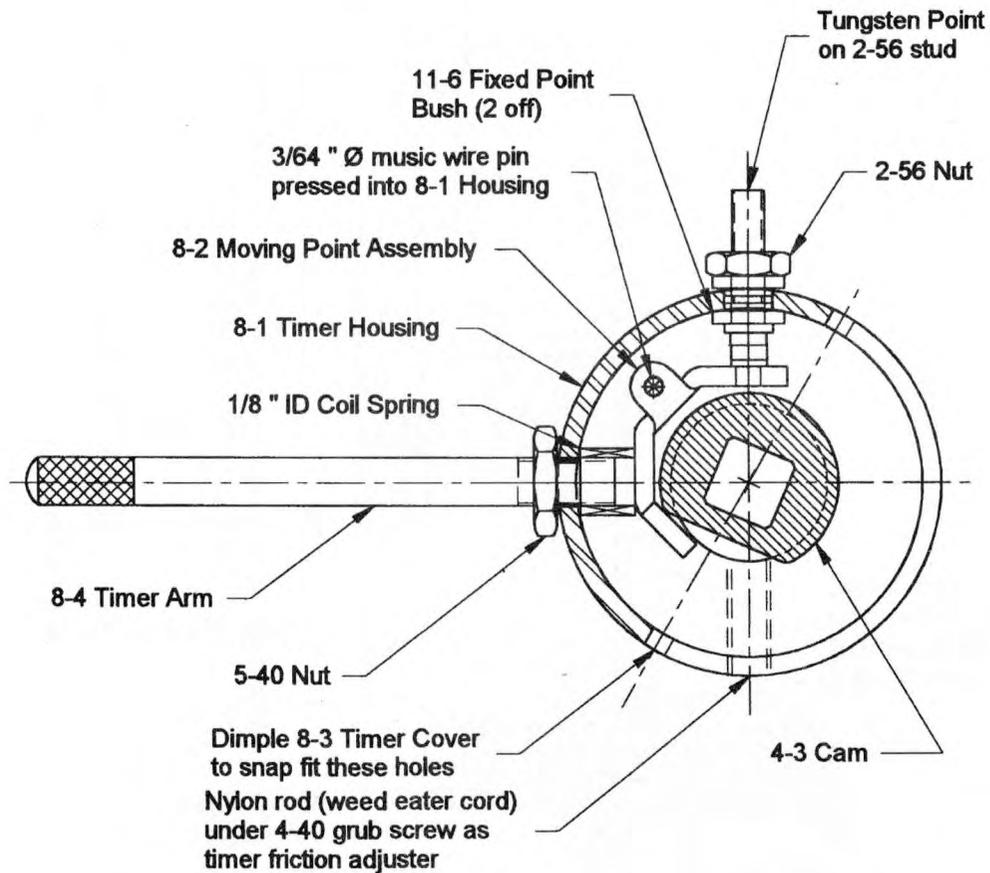
27

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
			DRAWN	<b>RMB</b>	
DATE	CHANGE	BY	CAD	<b>PMB</b> 2-22-1998	NEXT ASSEMBLY



NAME  
**1939 M&M Piston Valve .29**

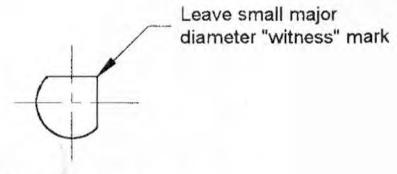
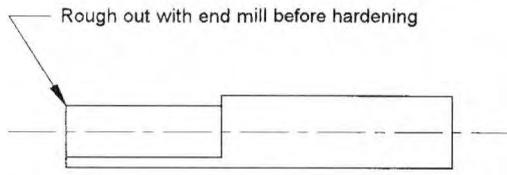
NUMBER  
**Sheet 13 - Fuel System GA**



## IGNITION TIMER ASSEMBLY

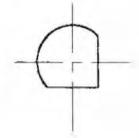
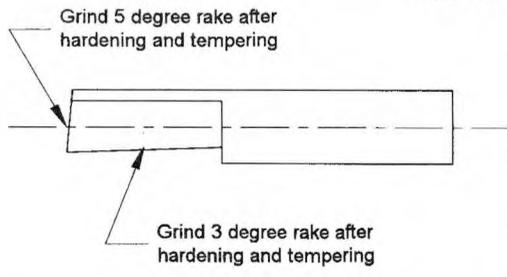
(8-3 Cover omitted for clarity)

			MATL	As Noted	<b>DO NOT SCALE DRAWING</b> <small>WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES</small>	 <b>MOTOR BOYS</b> <small>(INTERNATIONAL)</small>	NAME <b>1939 M&amp;M Piston Valve .29</b>
			SCALE	<b>2 X SIZE</b>		NEXT ASSEMBLY	NUMBER <b>Sheet 14 - Timer GA</b>
DATE	CHANGE	BY	CAD	<b>PMB</b> 2-22-1998			



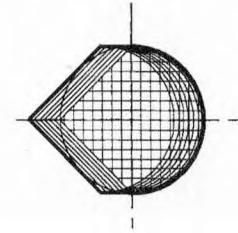
**-1 Square Corner Broaching Cutter**

3/16 Dia Water Hardening Drill Rod



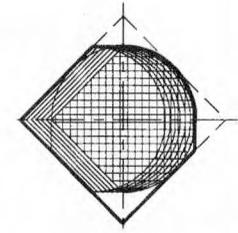
**Corner Formation Process**

← Direction of feed between cuts



Cross section of broached hole after nibbling out first corner.

(cross-hatched area shows tool cross section)



Cross section after indexing work piece through 90 degrees and completing second corner.

Note one side now completely formed.

1. Mount cam in 3 jaw self-centering chuck with flange against jaws to hold against broaching forces. Drill through 3/16 " dia.
2. Mount tool in cross-slide mounted key-way cutter with point facing operator and sides at precisely 45 degrees to the lathe bed.
3. Stroke cutter through cam, winding cross slide towards operator approx 0.002" at a time until correct depth is reached for the corner
4. Rotate chuck by 90 degrees and repeat step 3 for other 3 corners.  
(headstock dividing attachment used, but a block under each jaw in turn of a 4 chuck jaw would do as well)

For a view of the key-way slotting tool used to drive the broach, see:  
<http://www.fotec.co.uk/mehs/hemingway/contents.htm>

29

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			M&M Cam Broach
			DRAWN	<b>BMB</b> 1-12-99			NUMBER
DATE	CHANGE	BY	CAD	<b>PMB</b> 1-12-99			Sheet 1

## Australian MATE Diesel

by David Owen

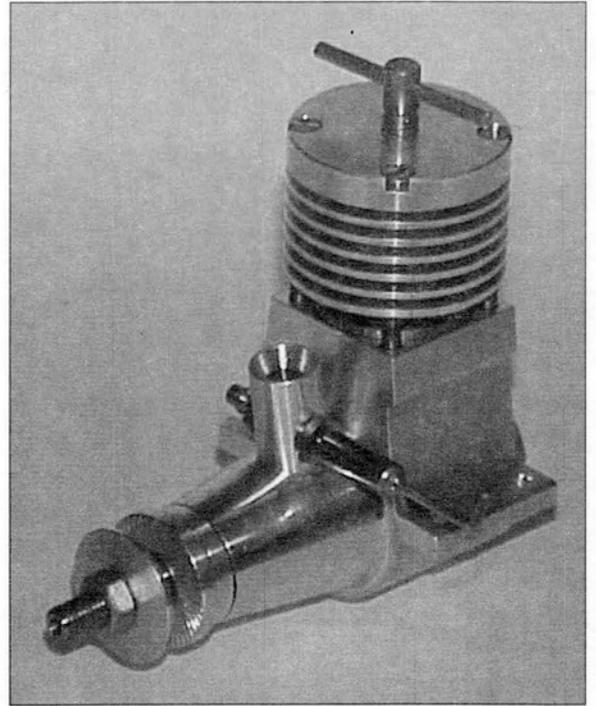
The Australian MATE 2cc Diesel was designed in 1989. It is a simple, crankshaft rotary-valve engine with radial porting and a plain-bearing crankshaft, typical of the many thousands of small diesels used for sport flying since the late 1940s.

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.

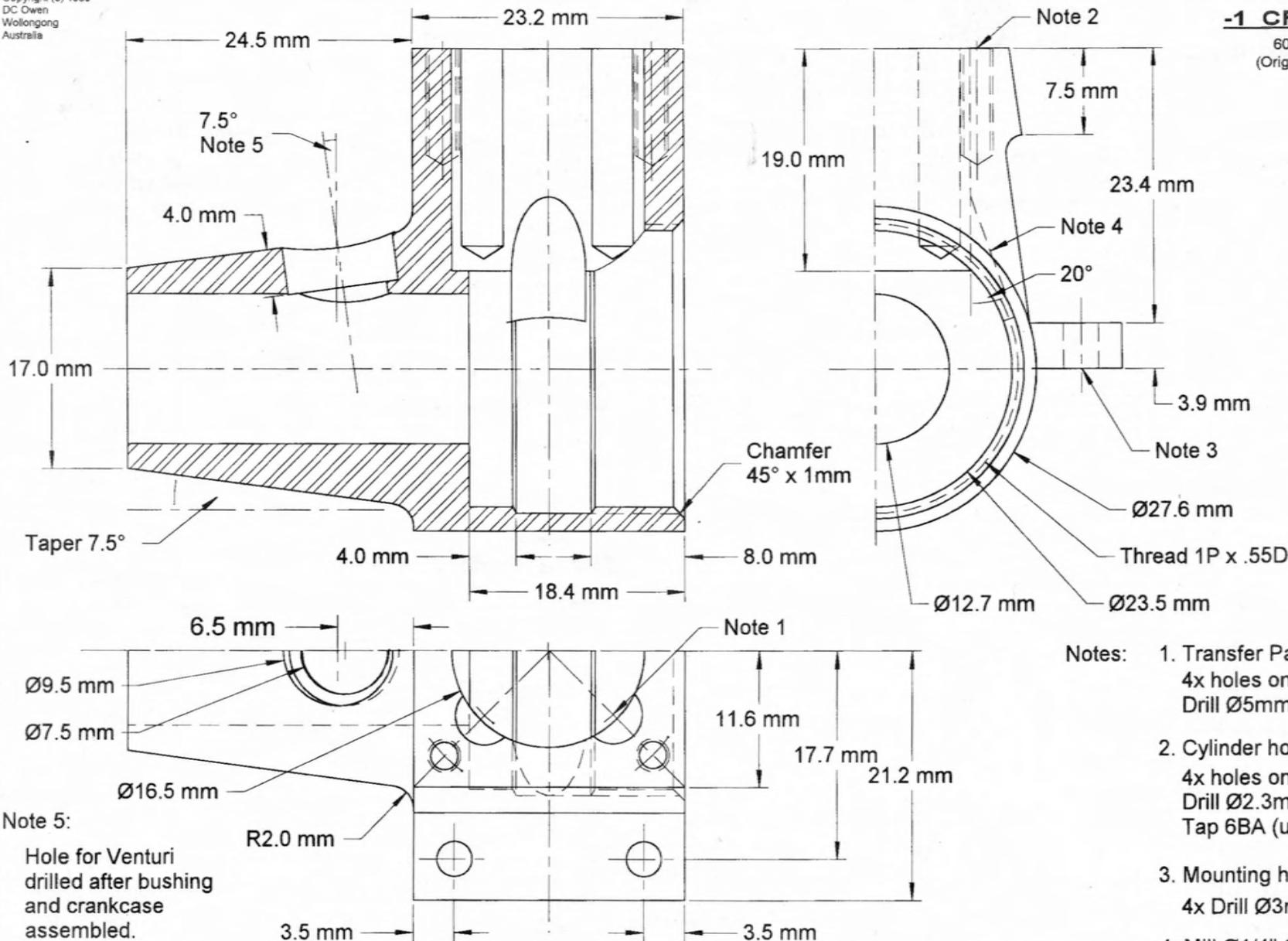
The MATE extruded crankcase section is no longer available. However, several engines have been built to the MATE design, with crankcases machined from solid. The crankcase drawings do show sufficient detail for this approach. In addition, MATEs have been built in glow and spark-ignition versions by more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



- Notes:
1. Transfer Passages:  
4x holes on 15.5mm PCD  
Drill Ø5mm 18mm deep.
  2. Cylinder hold-down:  
4x holes on 25.2mm PCD  
Drill Ø2.3mm 10mm deep  
Tap 6BA (use 3-2 Jig)
  3. Mounting holes:  
4x Drill Ø3mm.
  4. Mill Ø1/4" Conrod clearance.

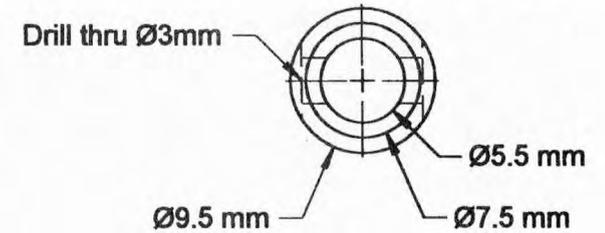
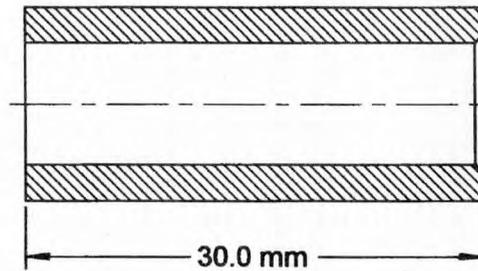
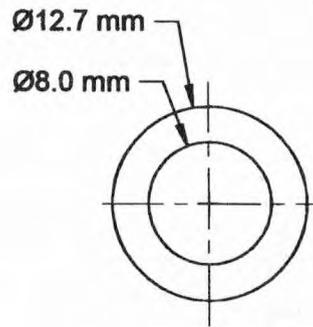
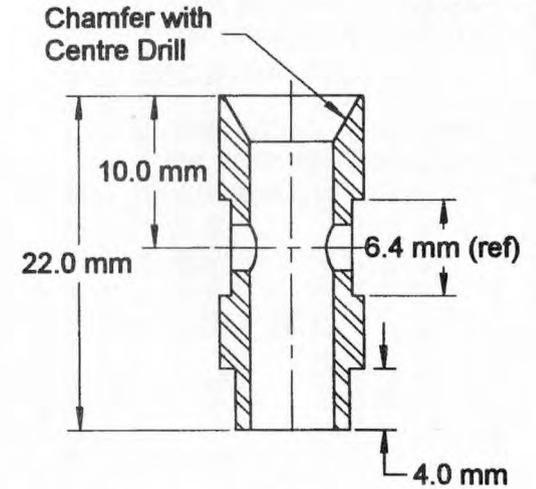
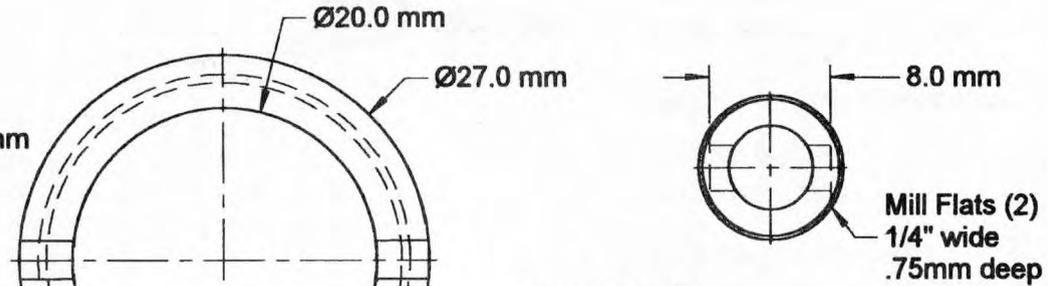
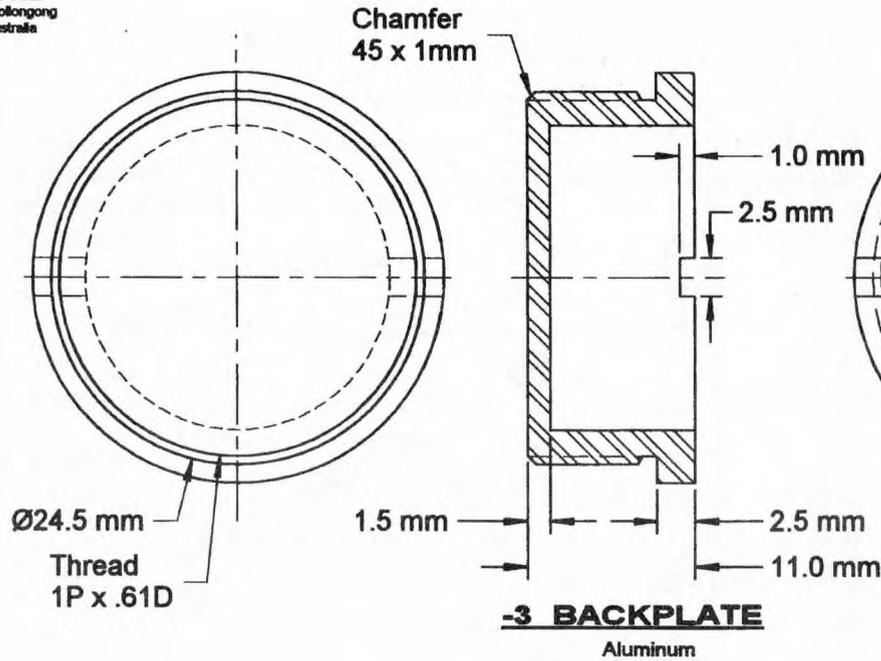
Note 5:  
Hole for Venturi  
drilled after bushing  
and crankcase  
assembled.

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



NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 1 - Crankcase**



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

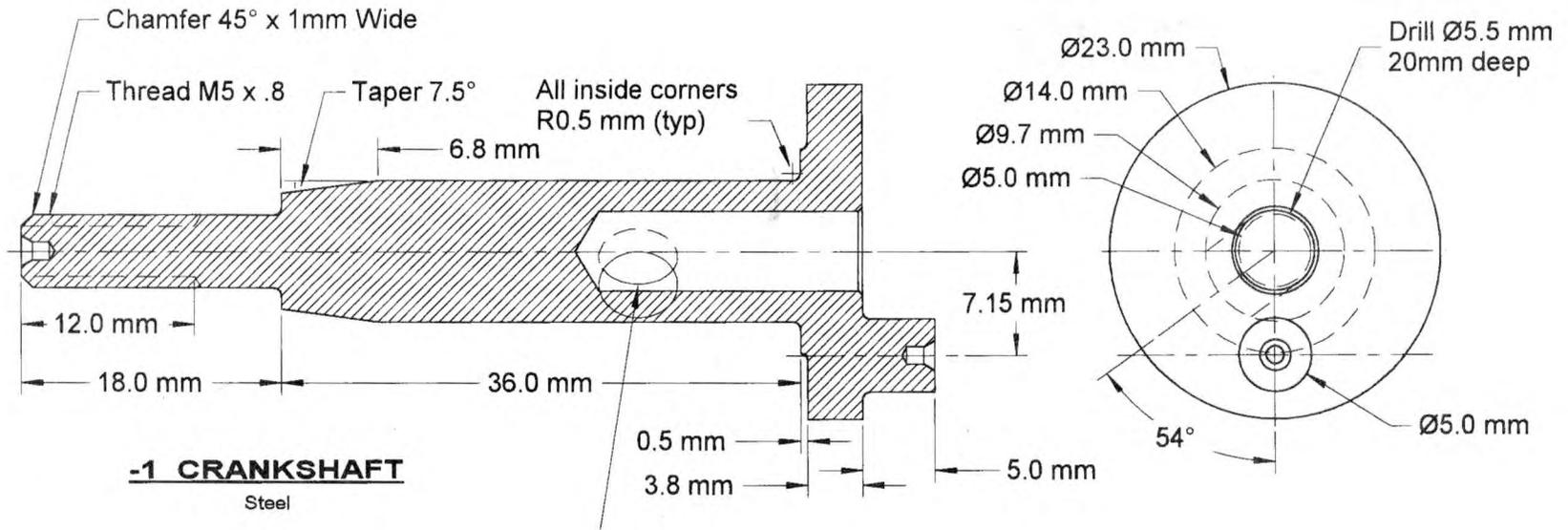
Note: -2 Venturi is assembled to 1-1 Crankcase and -1 Bearing with Lok-Tite before finishing crankshaft bore to size.

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



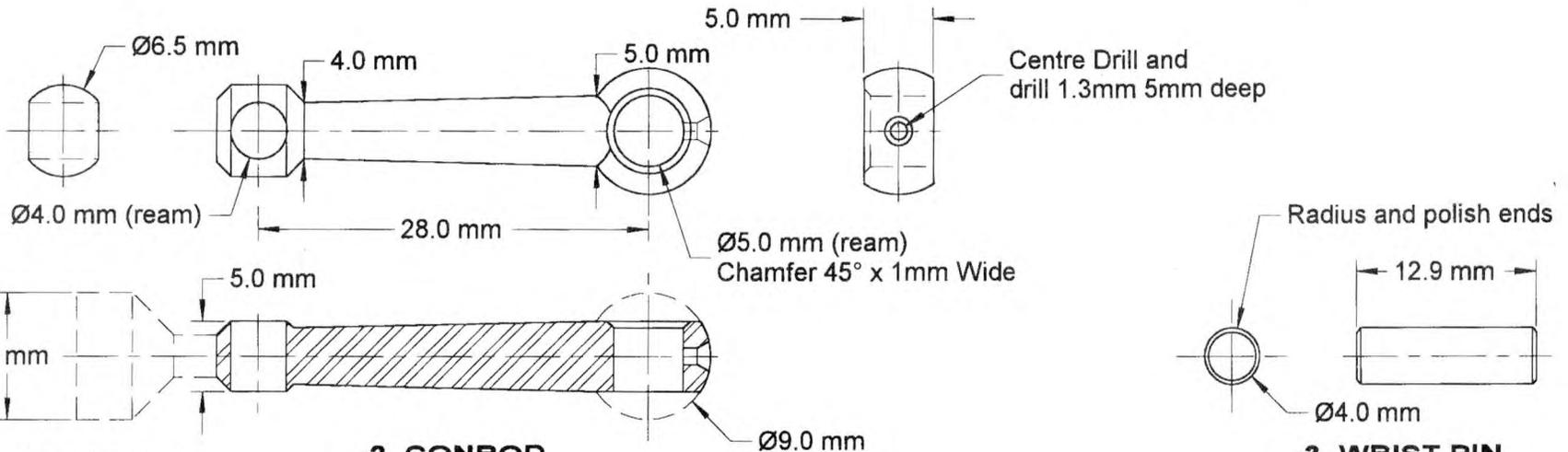
NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 2 - Crankcase extra**



**-1 CRANKSHAFT**  
Steel

Inlet port located and drilled Ø5.5mm after assembly



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

**-2 CONROD**  
Aluminum

**-3 WRIST PIN**  
Drill Rod

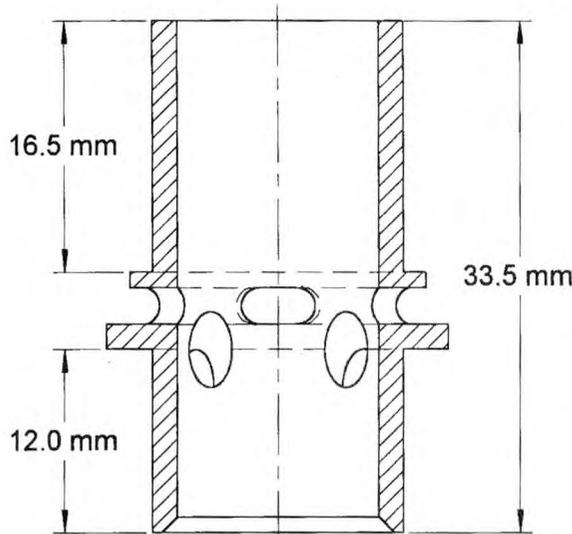
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	2 X SIZE	
			DRAWN	DCO 27 Apr 1989	
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	



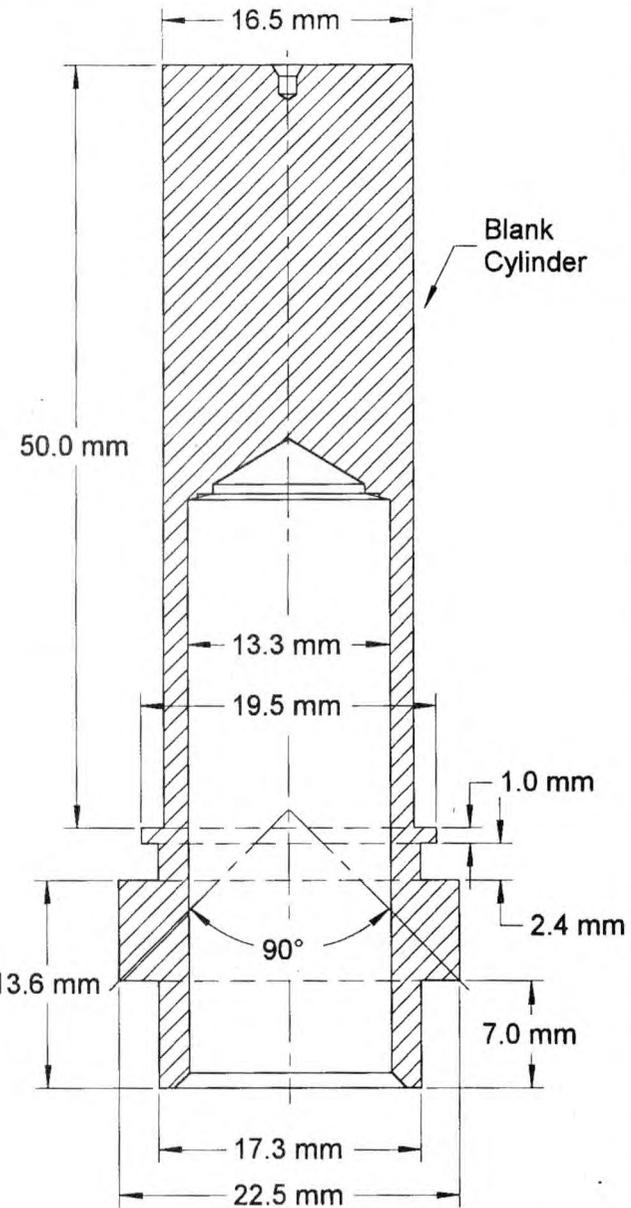
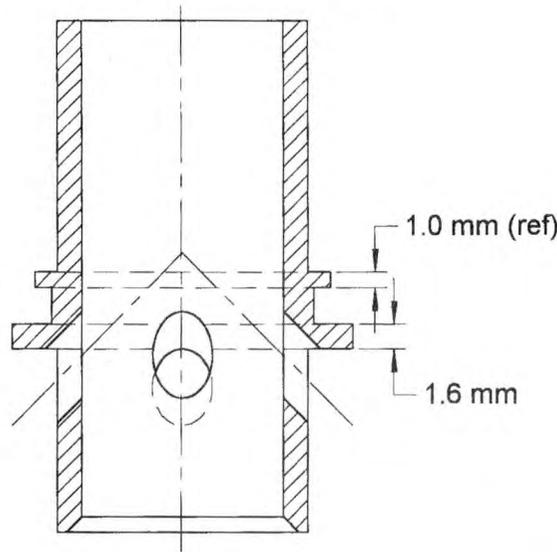
NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 3 - Crankshaft**

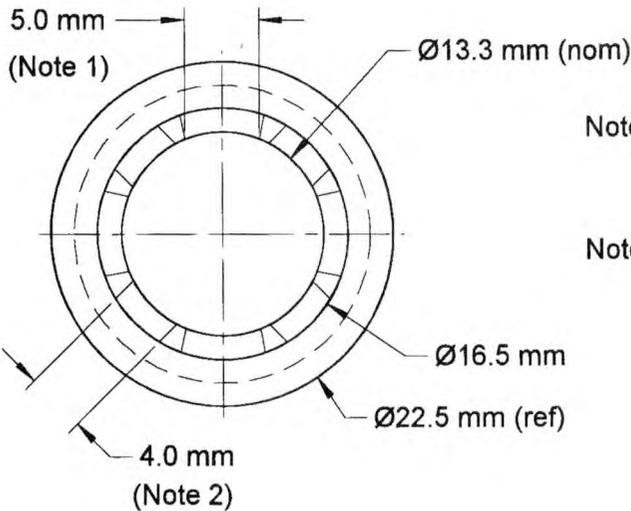
Section Through Exhaust Ports



Section through Transfer Ports  
(Exhaust ports omitted for clarity)



Blank  
Cylinder



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.

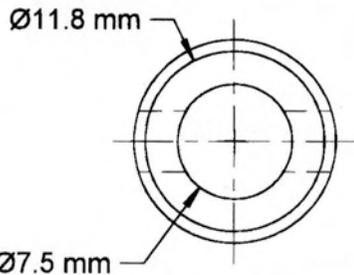
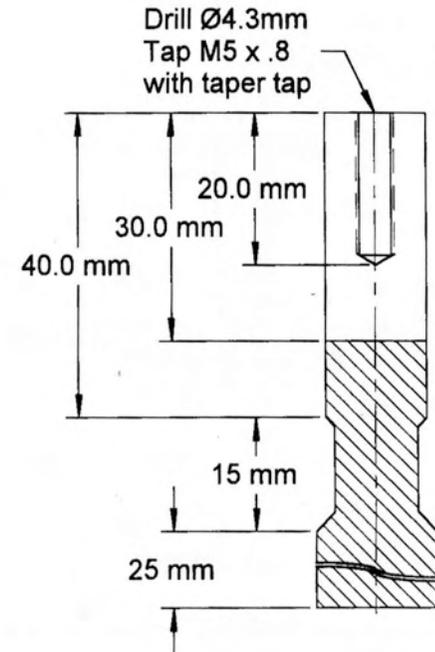
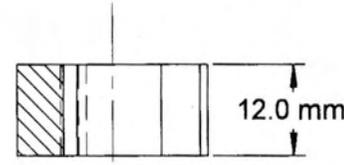
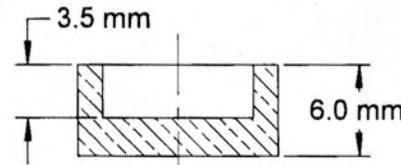
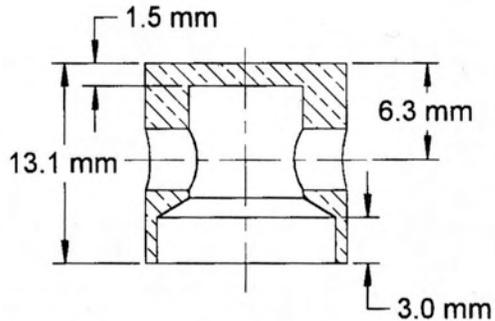
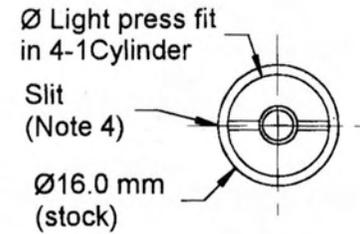
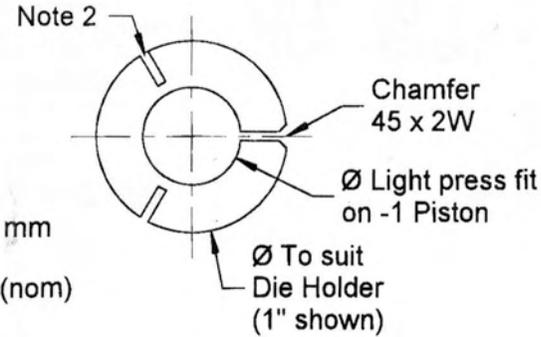
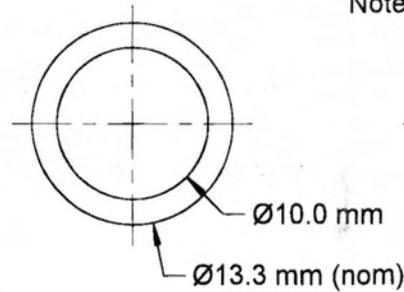
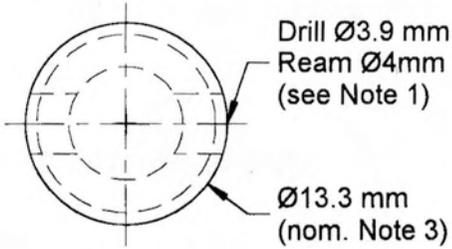
**-1 CYLINDER**  
Steel

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	<b>2 X SIZE</b>	
			DRAWN	DCO 27 Apr 1989	
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	



NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 4 - Cylinder**



**-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  $120^\circ$  spacing.  
Note only one slot  
cut through to bore.

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

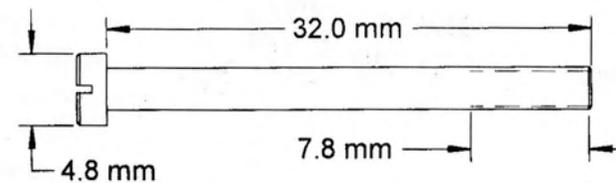
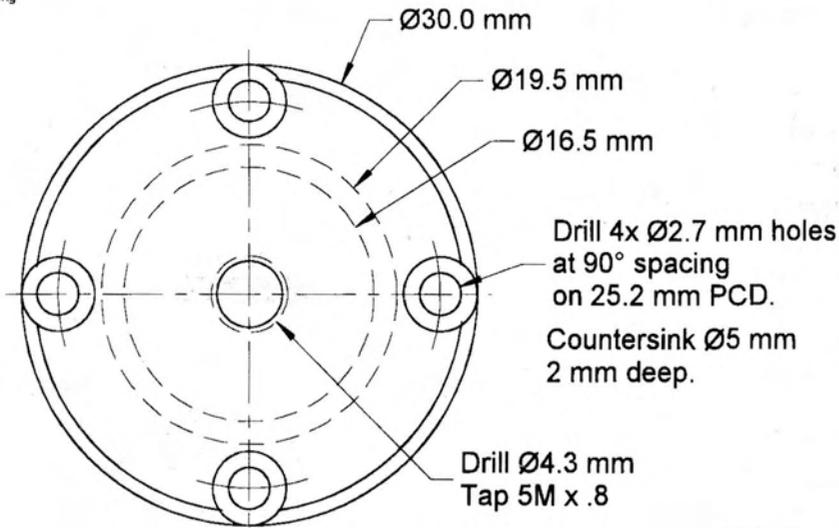
4: Use M5 socket head  
grub screw to expand lap.

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
			DRAWN	DCO 27 Apr 1989	
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	NEXT ASSEMBLY



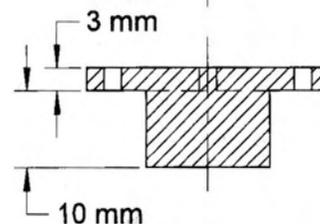
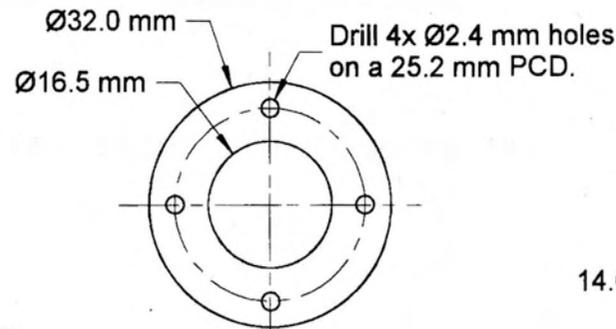
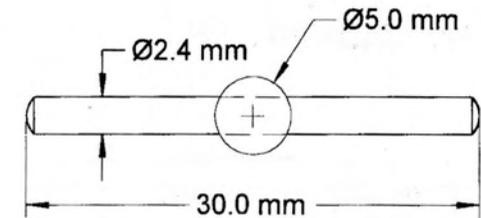
NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 5 - Pistons**



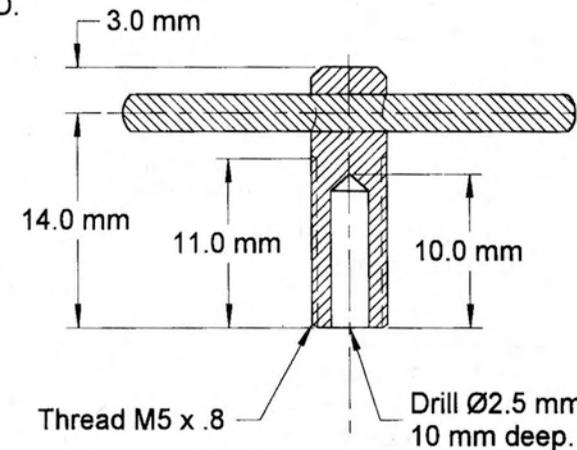
**-4 CYLINDER SCREW**

6BA Cheesehead Screws (4 required)



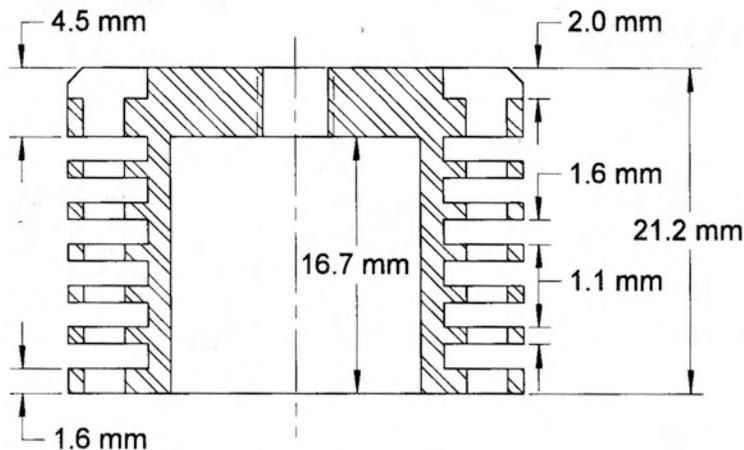
**-3 DRILLING JIG**

Steel  
(Scale 1:1)



**-2 COMPRESSION SCREW**

Drill Rod



**-1 COOLING FIN**

Aluminum

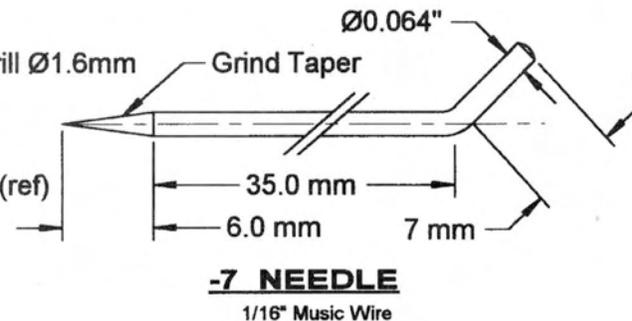
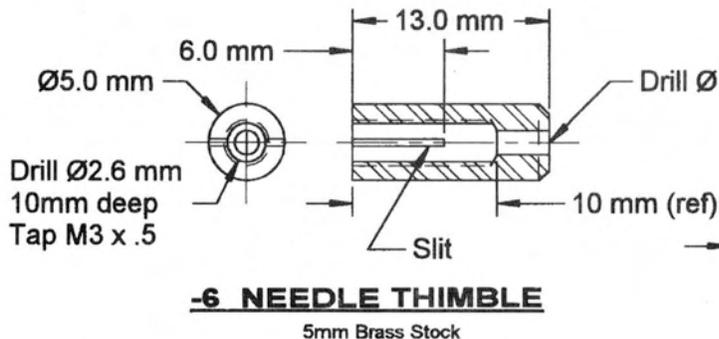
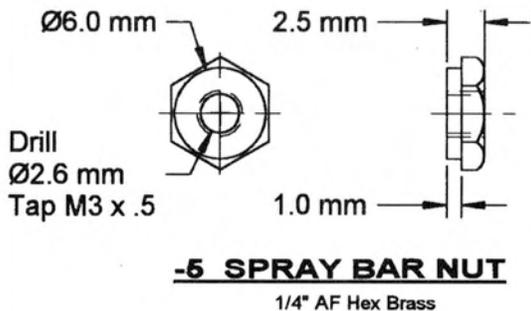
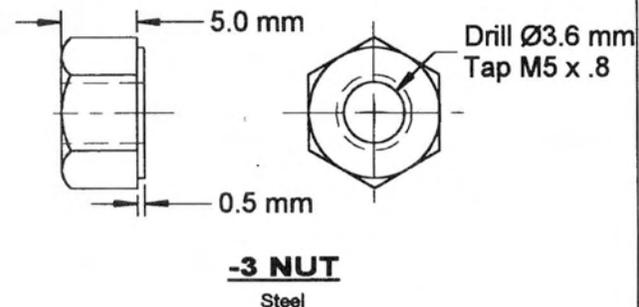
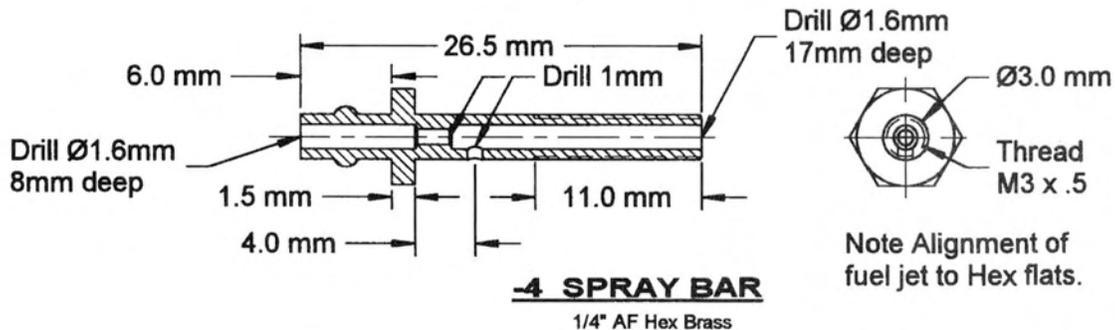
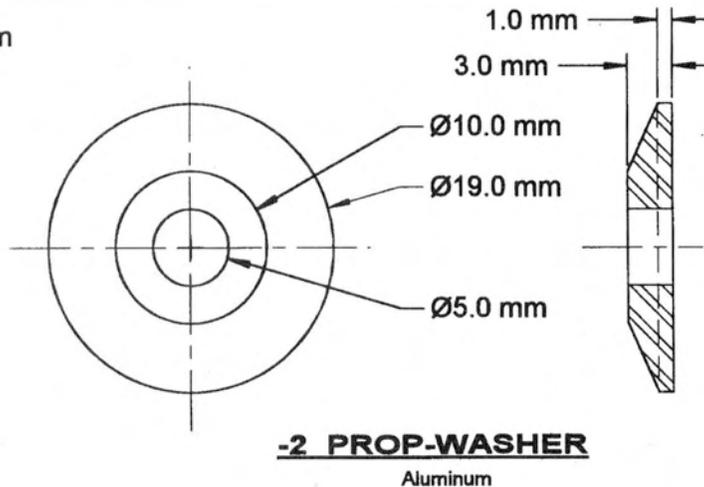
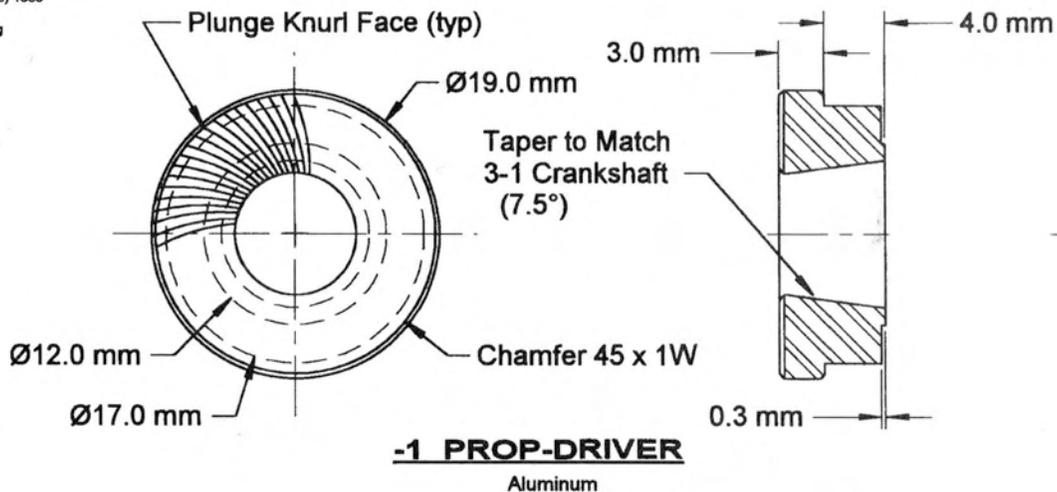
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	2 X SIZE	
			DRAWN	DCO 27 Apr 1989	
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	NEXT ASSEMBLY



NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 6 - Cylinder Head**

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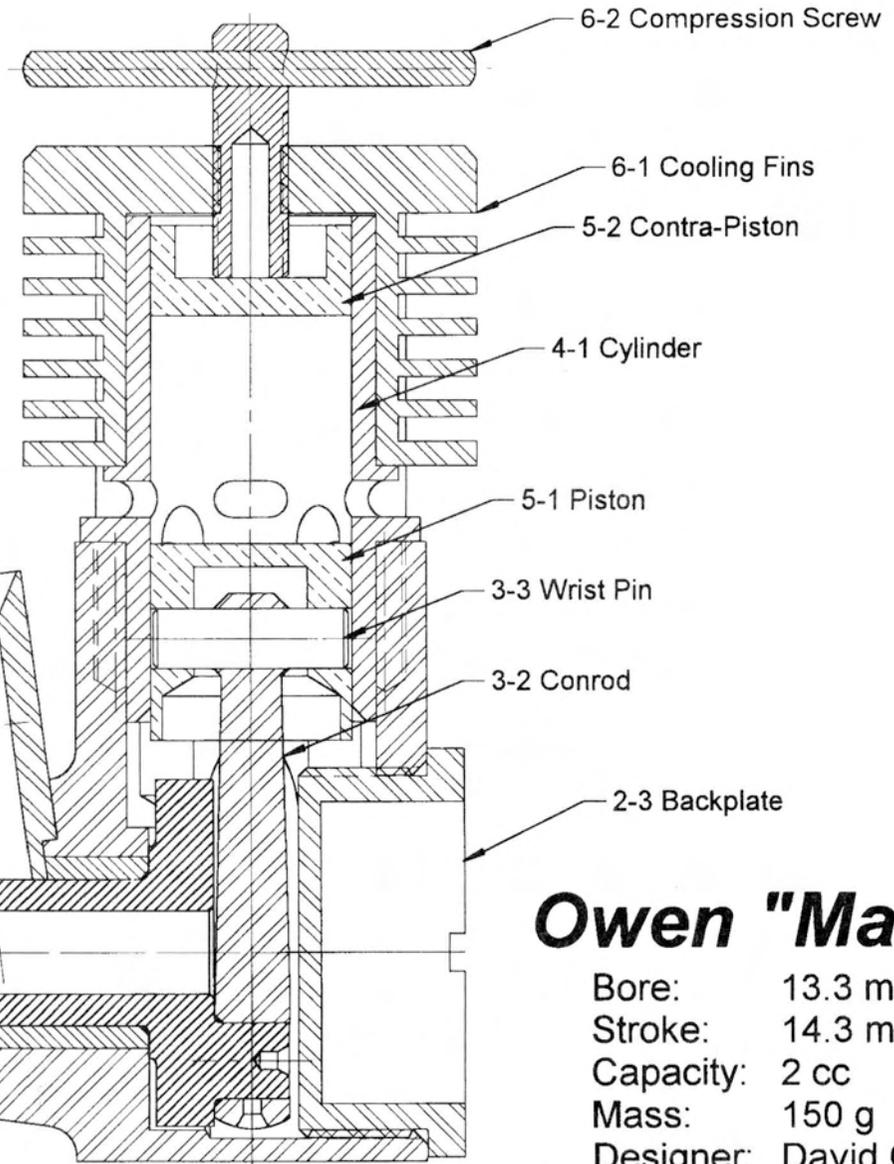
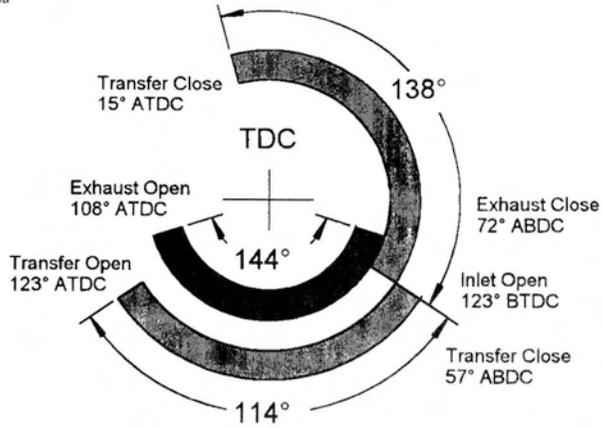


			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	<b>2 X SIZE</b>	
			DRAWN	DCO 27 Apr 1989	
DATE	CHANGE	BY	CAD	BMBI Jan 7 2000	



NAME  
**OWEN MATE 2cc Diesel**

NUMBER  
**Sheet 7 - Needle Valve**



# Owen "Mate"

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

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

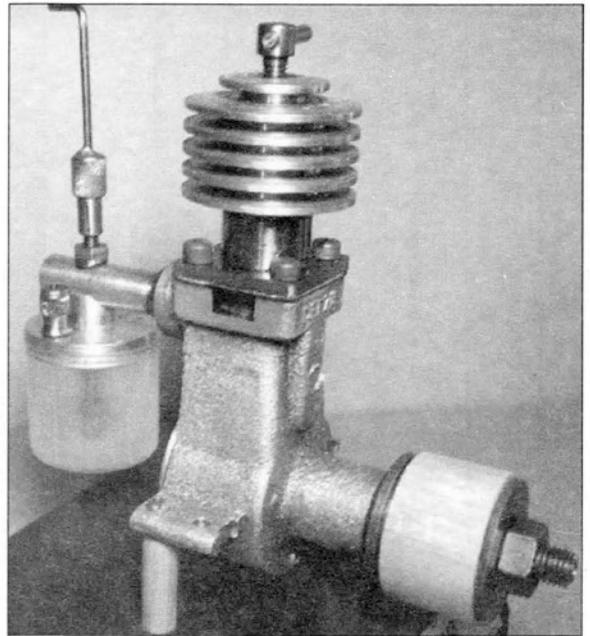


NAME	<b>OWEN MATE 2cc Diesel</b>
NUMBER	<b>Sheet 8 - General Arrangement</b>

## 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.



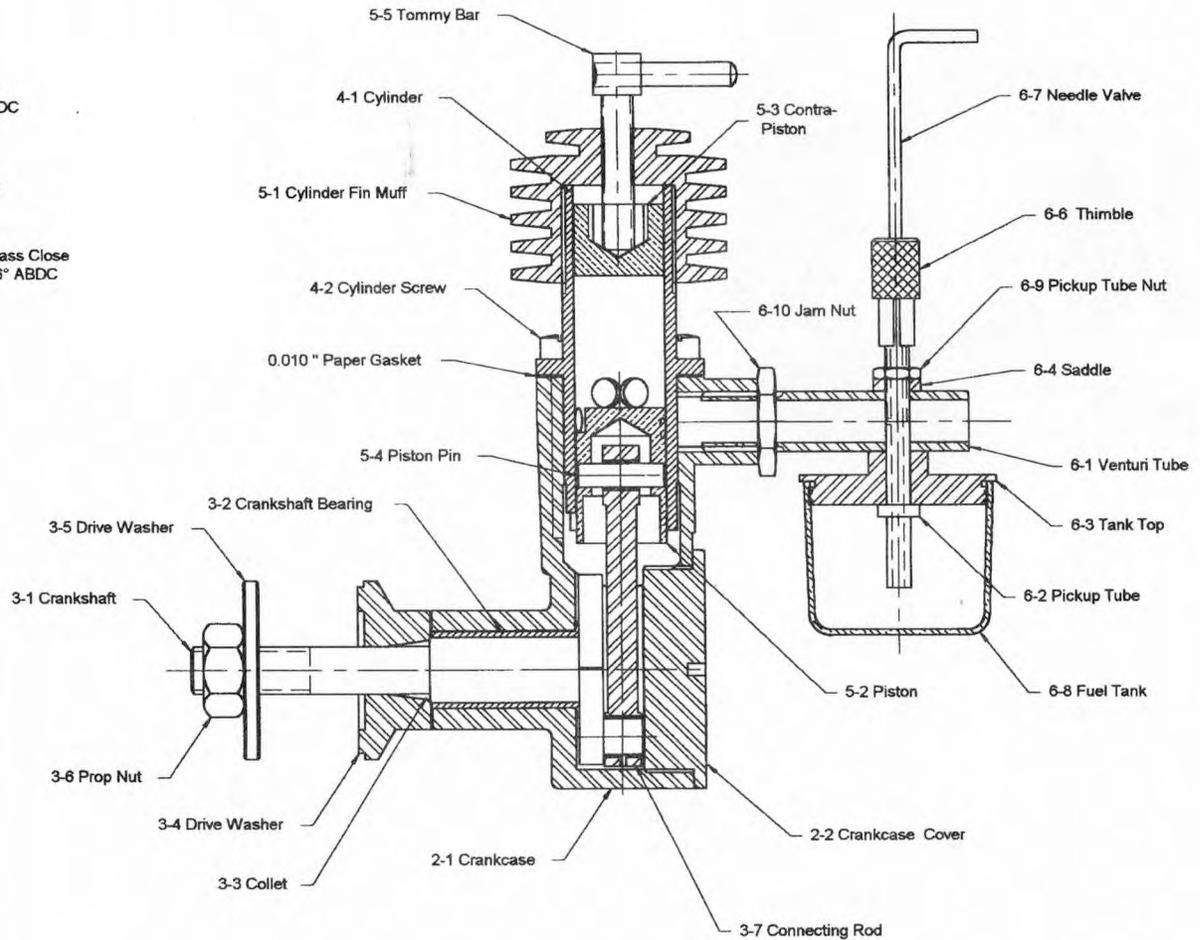
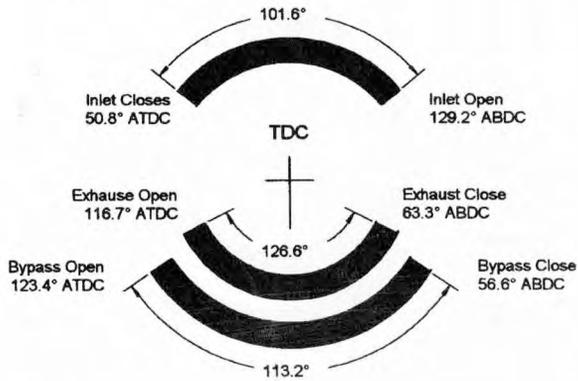
The name of Gotham Hobby is closely linked with America's Hobby Center (AHC) because both organizations were founded by brothers of the Winston family. AHC was started by four Winston brothers before WW 2. When WW 2 started, two brothers took their share of AHC and went into the service. When they returned 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.

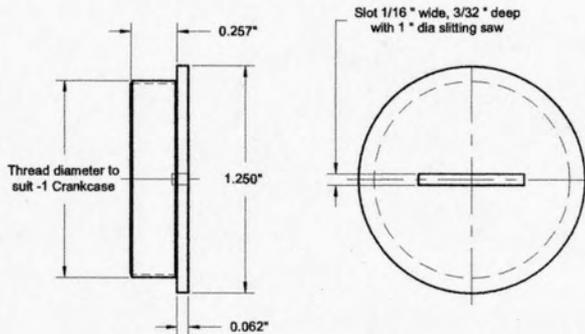
**DEEZIL Timing Diagram**



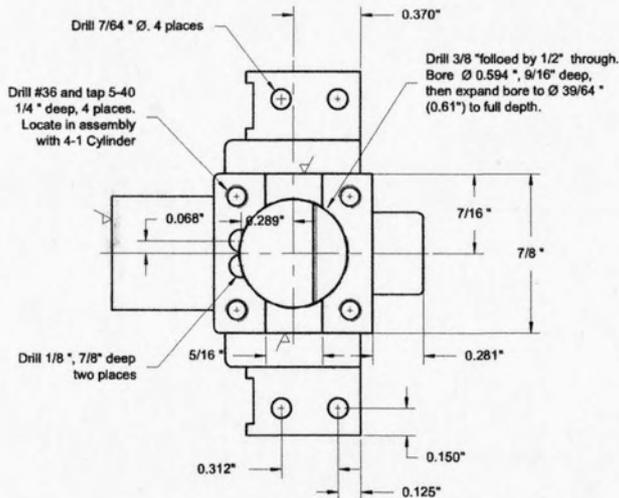
**GOTHAM HOBBY "DEEZIL"**

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

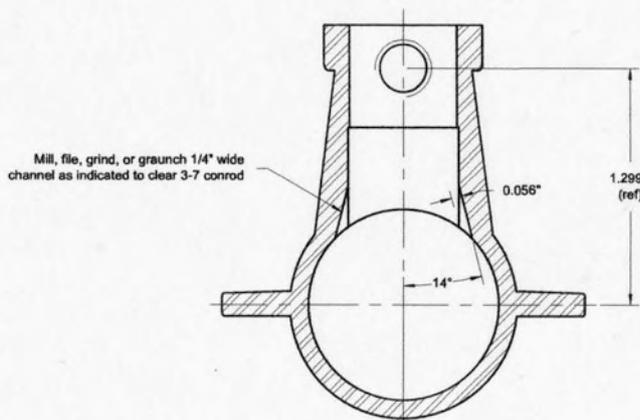
			MAT'L		DO NOT SCALE DRAWING	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>FULL SIZE</b>	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		<b>GOTHAM HOBBY "DEEZIL" ENGINE</b>
15 Jan 2000	Timing diagram added	BMBI	DRAWN	<b>RJS</b> Feb 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	<b>BMBI</b> Jan 1999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



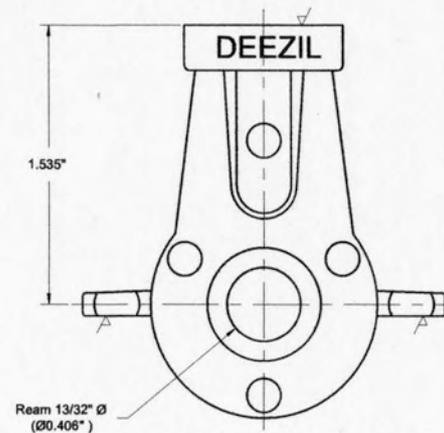
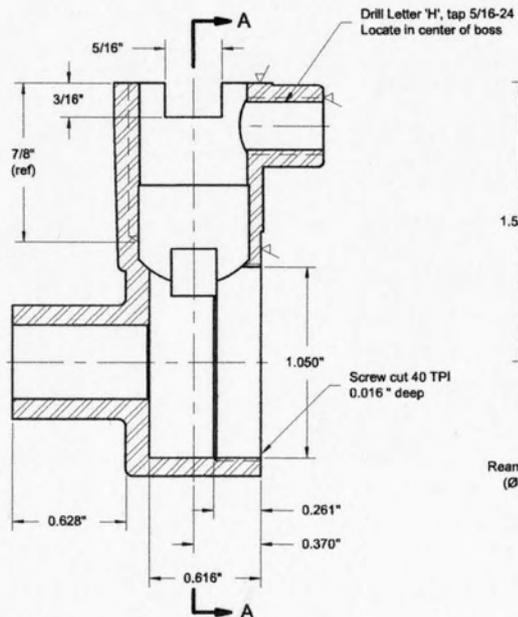
**-2 CRANKCASE COVER**  
Aluminum Casting



**-1 CRANKCASE**  
Aluminum Casting



Section A-A

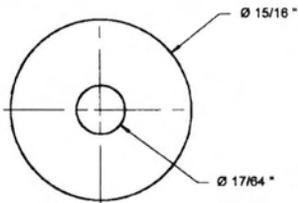


Machine

41 update

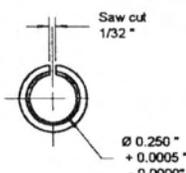
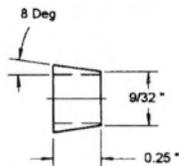
			MAT'L		<b>DO NOT SCALE DRAWING</b>		NAME
2012-09-07	Add Section A-A with conrod clearance; correct lower cylinder bore diameter dimension.	BMBI	SCALE	<b>FULL SIZE</b>	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		<b>GOTHAM HOBBY "DEEZIL" ENGINE</b>
2008-11-17	Add missing tap drill size; standardize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

5/64" (0.078")



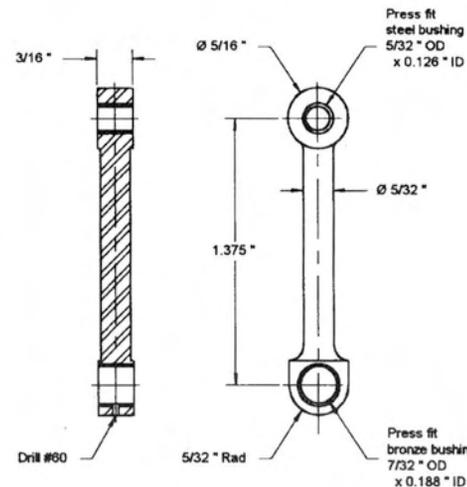
**-5 FRONT WASHER**

Steel (case harden)



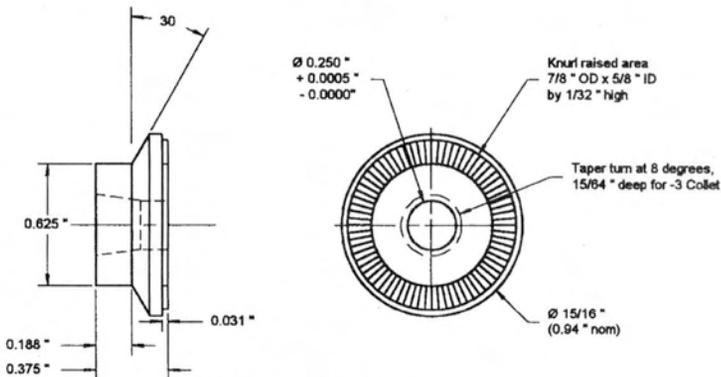
**-3 COLLET**

Soft Brass



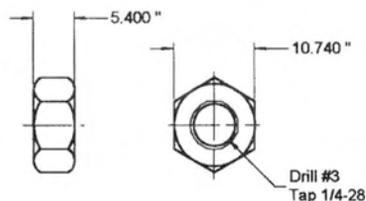
**-7 CONNECTING ROD**

Alloy Aluminum



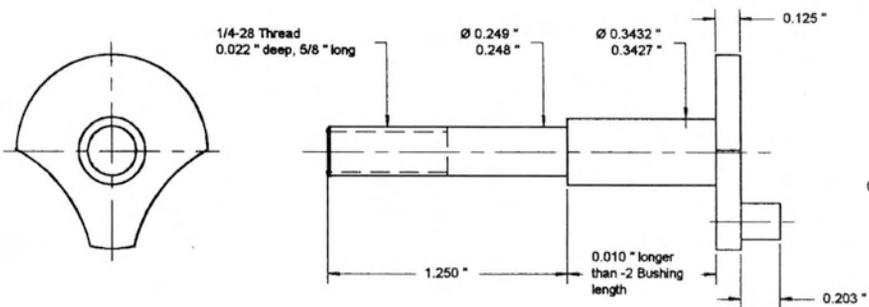
**-4 DRIVE WASHER**

Aluminum



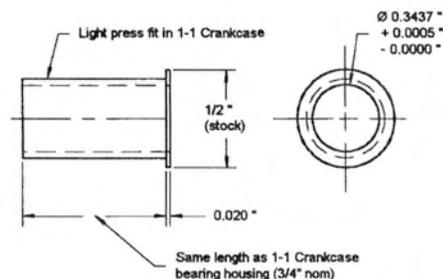
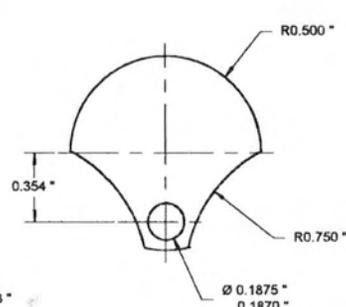
**-6 PROP NUT**

1/2" AF Hex Steel



**-1 CRANKSHAFT**

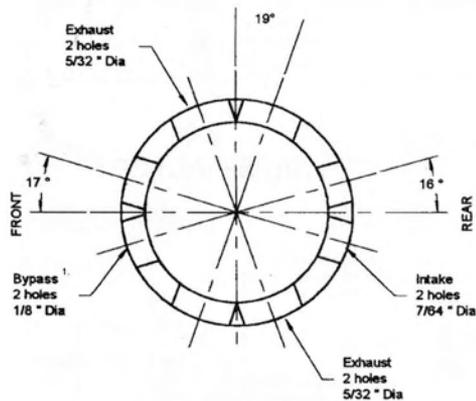
Leaded Steel



**-2 CRANKSHAFT BEARING**

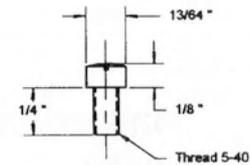
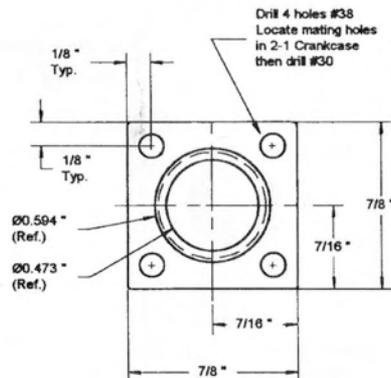
Bronze

			MAT'L	DO NOT SCALE DRAWING	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		GOTHAM HOBBY "DEEZIL" ENGINE
			DRAWN	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD			SHEET 3 - CRANKSHAFT AND ROD



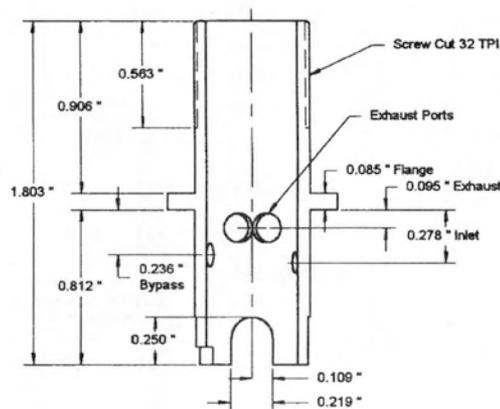
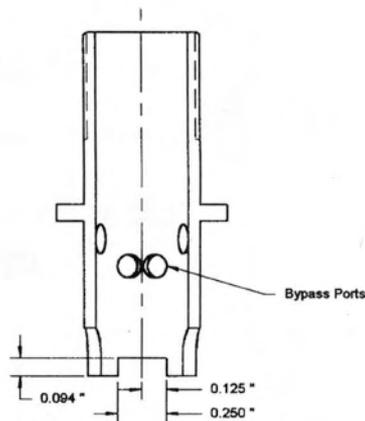
**PORT DETAILS**

2 X size  
Ports are shown  
in a single plane



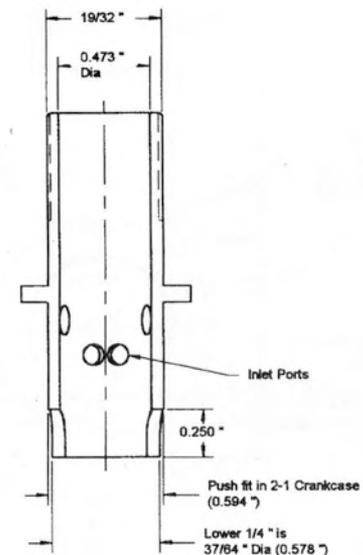
**-2 CYLINDER SCREW**

Steel (four required)



**-1 CYLINDER**

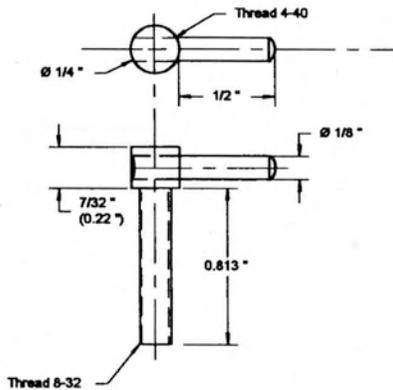
Leaded Steel



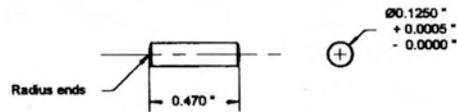
Note 1:

Leave a bridge between the  
Inlet and bypass Ports.

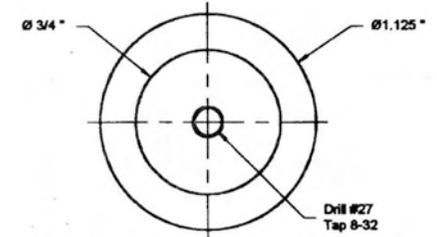
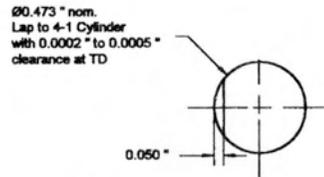
			MAT'L		DO NOT SCALE DRAWING	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>FULL SIZE</b>	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		<b>GOTHAM HOBBY "DEEZIL" ENGINE</b>
			DRAWN	<b>RJS</b> Sept 1994	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	<b>BMBI</b> Jan 1999			<b>SHEET 4 - CYLINDER</b>



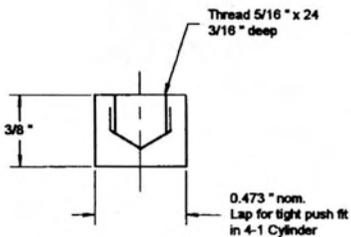
**-5 TOMMY BAR**  
Steel



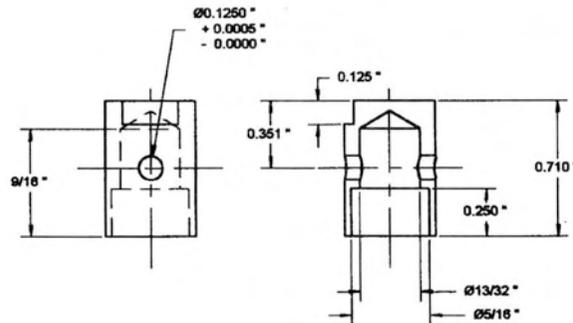
**-4 PISTON PIN**  
Bronze



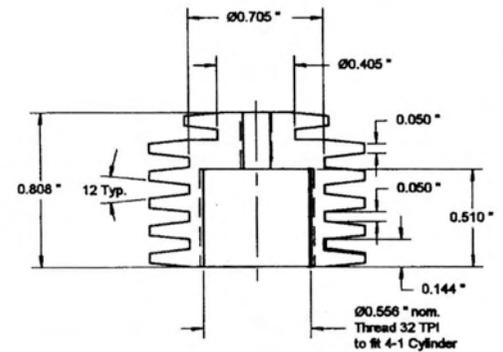
Fin spacing is 0.144 inch center to center for all fins



**-3 CONTRA PISTON**  
Steel



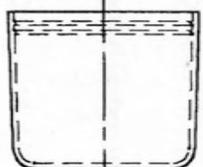
**-2 Piston**  
Leaded 4130 Steel  
or Cast Iron



**-1 CYLINDER FIN MUFF**  
Aluminum

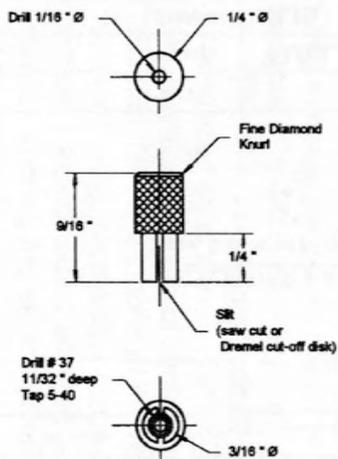
			MAT'L	DO NOT SCALE DRAWING	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		<b>GOTHAM HOBBY "DEEZIL" ENGINE</b>
			DRAWN	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD			<b>SHEET 5 - PISTONS</b>

44



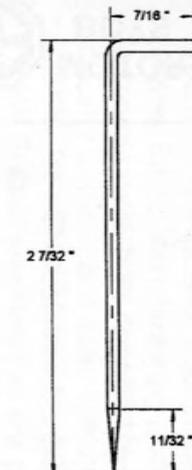
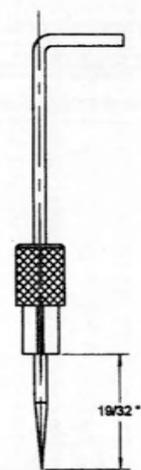
\*Kurt Gemima\* syrup top  
(or yuppie water bottle)  
No machine work necessary.

**-8 FUEL TANK**  
Plastic Injection Moulding

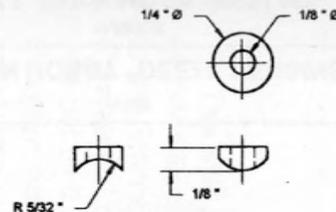


**-6 THIMBLE**  
Brass

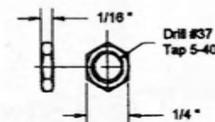
**NEEDLE VALVE ASSEMBLY**



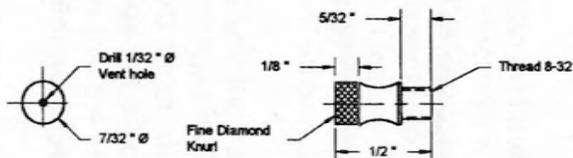
**-7 NEEDLE VALVE**  
1/16" Music Wire



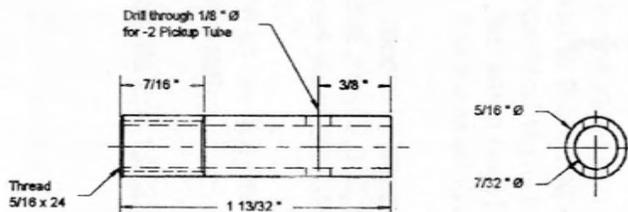
**-4 SADDLE**  
Aluminum



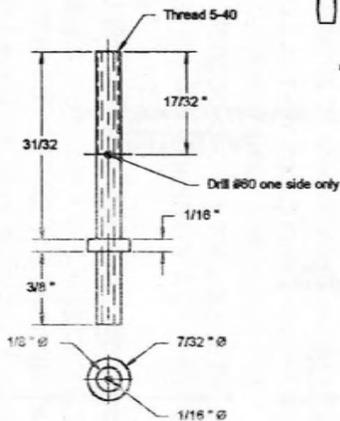
**-9 FUEL PICKUP NUT**  
1/4" AF Hex Brass



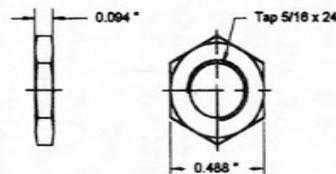
**-5 FILLER CAP**  
Brass



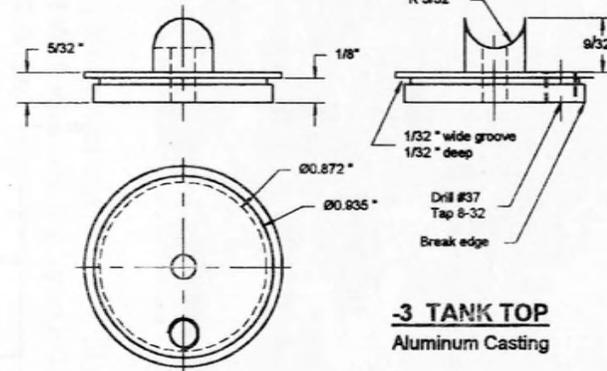
**-1 VENTURI TUBE**  
Aluminum



**-2 PICKUP TUBE**  
Brass



**-10 JAM NUT**  
1/2" AF Brass Hex



**-3 TANK TOP**  
Aluminum Casting

MAT'L

SCALE

DRAWN

DATE

**FULL SIZE**

**RJS**  
Oct 1994

**BMBI**  
Jan 1999

DO NOT SCALE DRAWING

WORK TO DIMENSIONS  
ALL DIMENSIONS  
ARE IN INCHES

NEXT ASSEMBLY



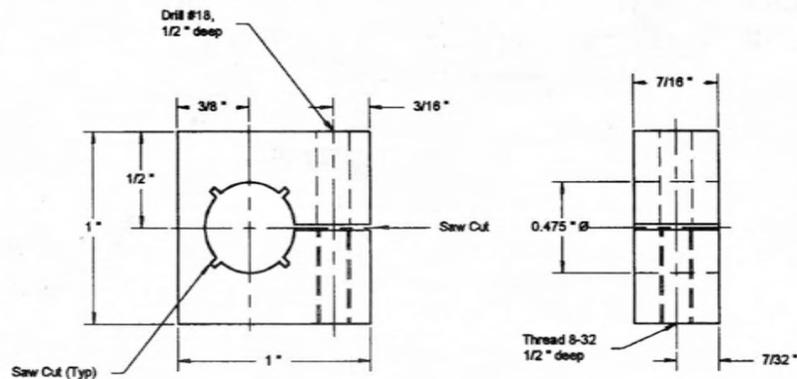
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BOYS**  
(INTERNATIONAL)

NAME

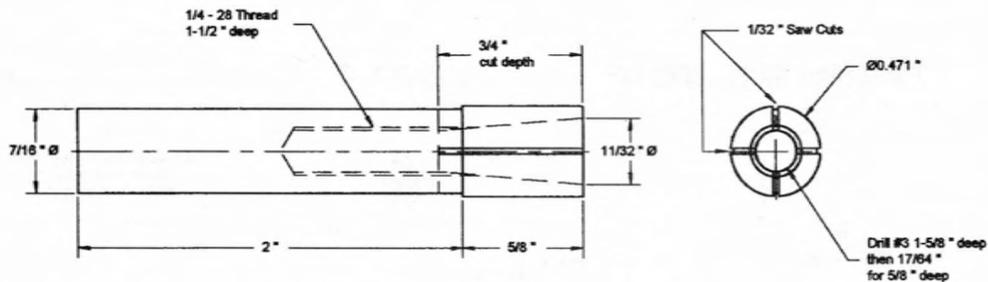
**GOTHAM HOBBY "DEEZIL" ENGINE**

NUMBER

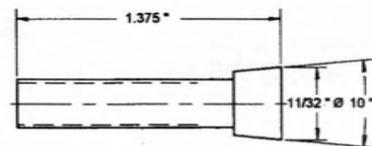
**SHEET 6 - FUEL SYSTEM COMPONENTS**



**PISTON LAP**  
Brass, Bronze, or Aluminum



**CYLINDER LAP**  
Brass, Bronze, or Aluminum



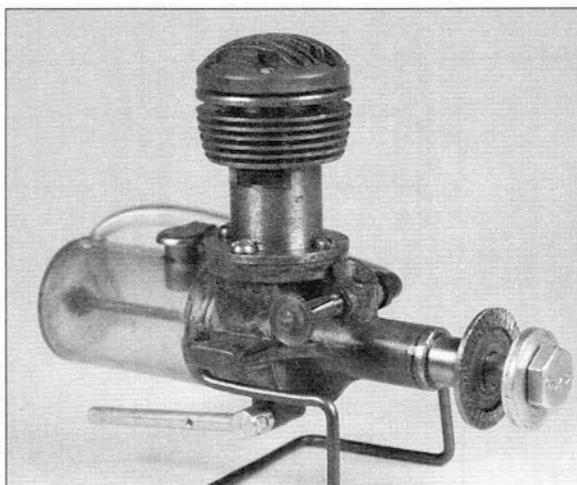
**CYLINDER LAP EXPANDER**  
Modified 1/4-28 Socket Head Screw

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

## 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."

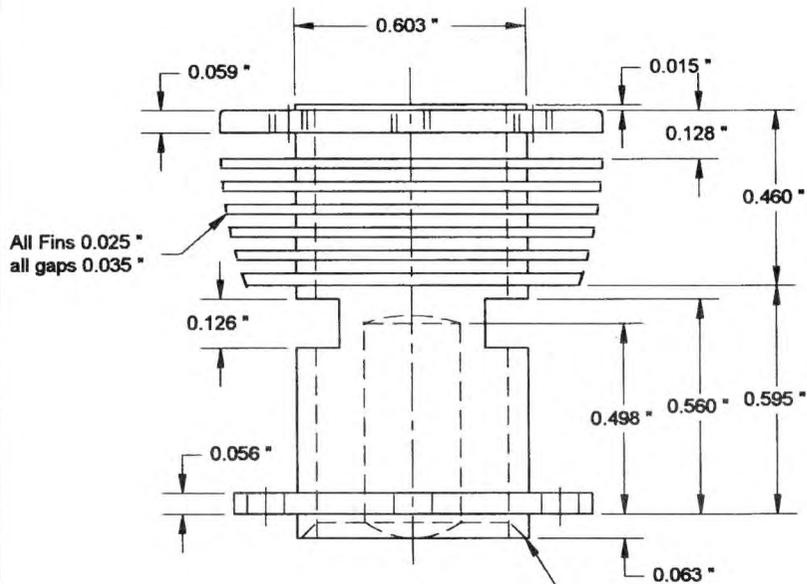
Total production of the Mite Diesel was about 6,000 units. The engine was produced in 1947 and part of 1948 before it was overwhelmed by Ray Arden's glo plug. Several glo versions of the Mite were produced, but to no avail and production of the engine ceased in 1948. The remains of the project were sold 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.

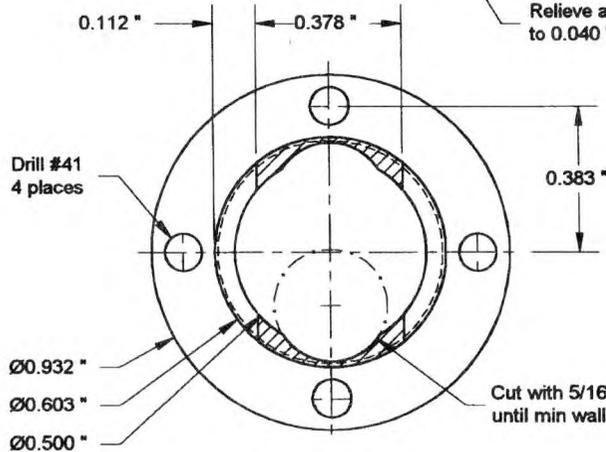
Charlie Bruce, past president of MECA, says that the Mite is still one of his favorite engines. He still uses one, but don't try to talk him out of it. You won't get it, that's for sure!

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.



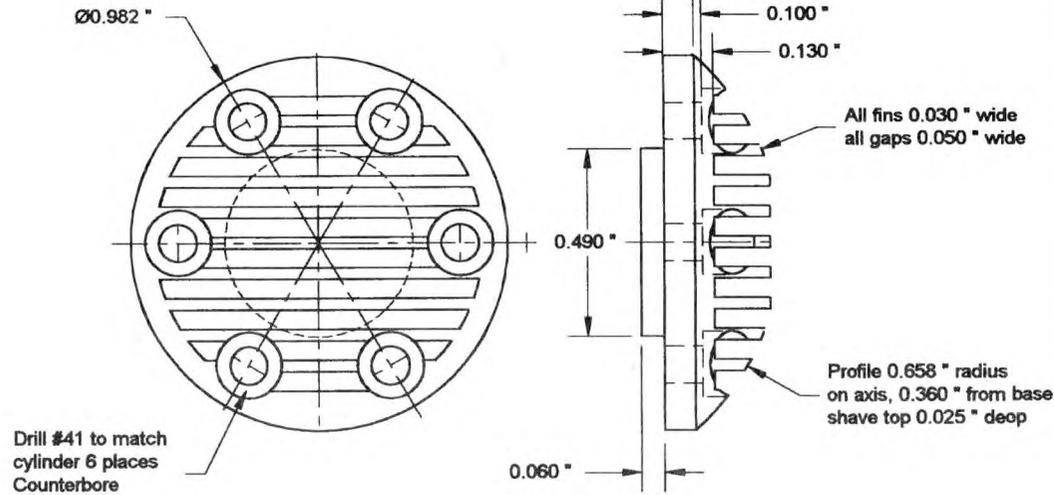
All Fins 0.025"  
all gaps 0.035"

Relieve at 45°  
to 0.040" deep

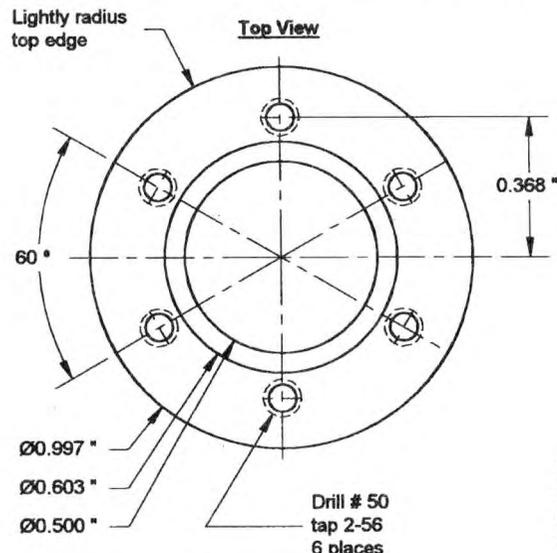


**Section thru Exhaust Ports**

**-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"

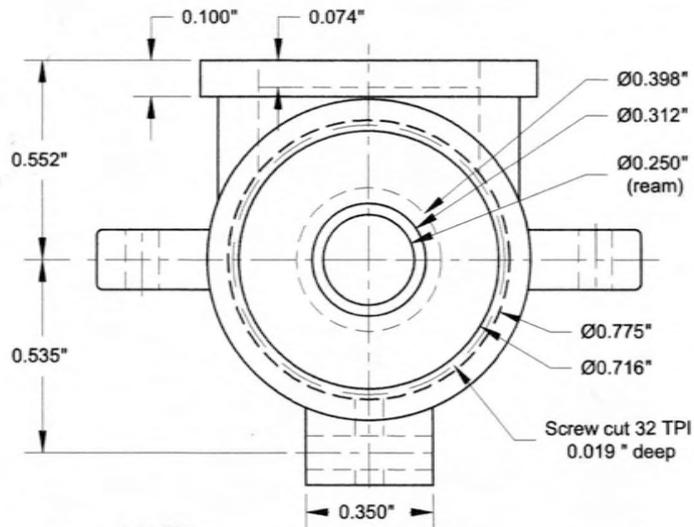
Fin profile formed on 1.130" radius center 0.630" from axis, 0.970" from bottom of cylinder flange, or blend from maximum fin diameter table above.

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	2 X SIZE	
			DRAWN	PMB 1-31-1998	
DATE	CHANGE	BY	CAD	PMB 2-22-1998	

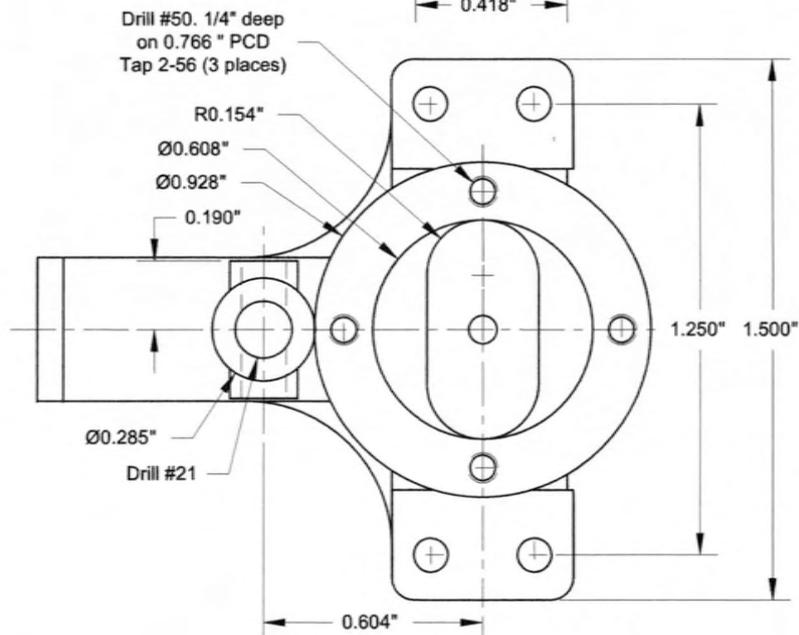
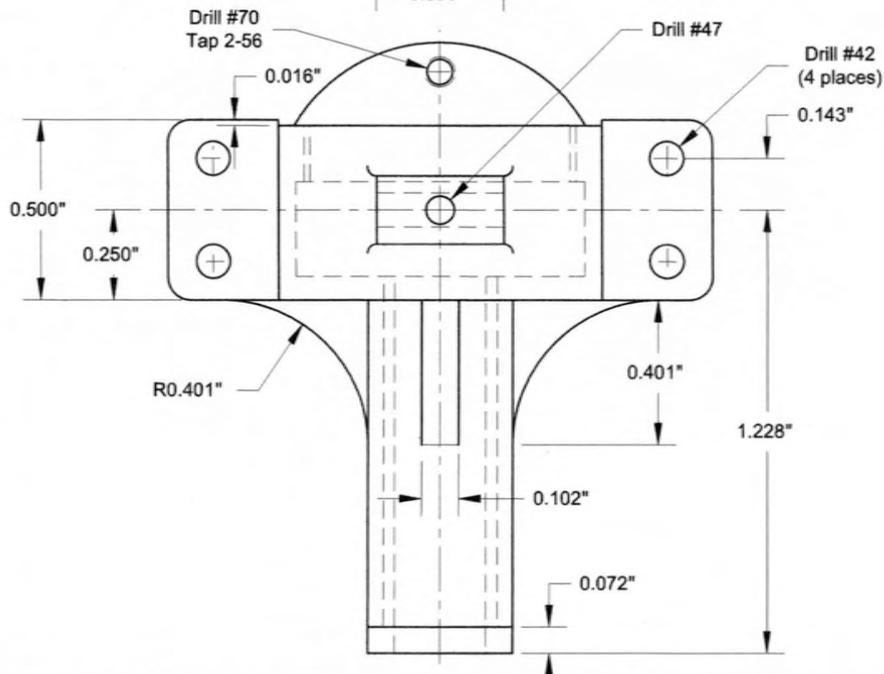
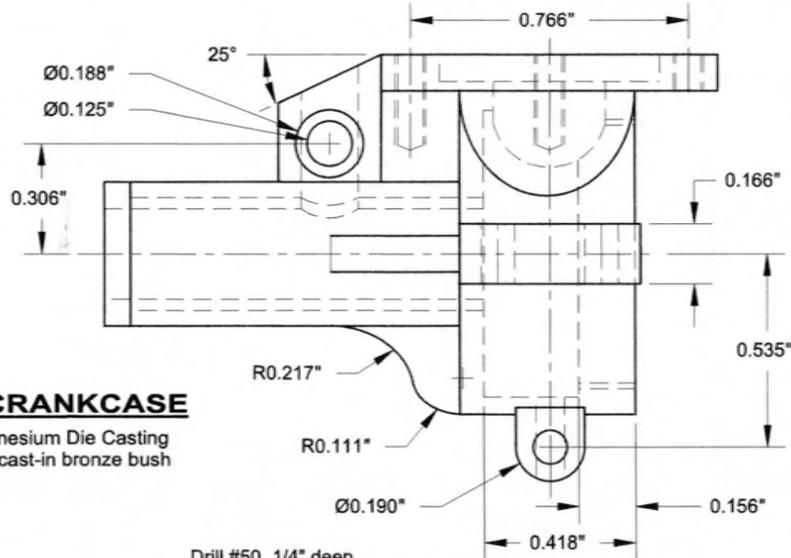


NAME  
**Mite Mfg Co .098 Diesel 1949**

NUMBER  
**Sheet 1 - Cylinder Assembly**

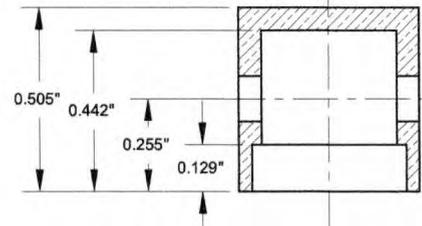
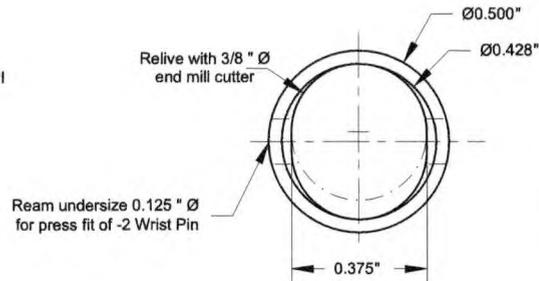
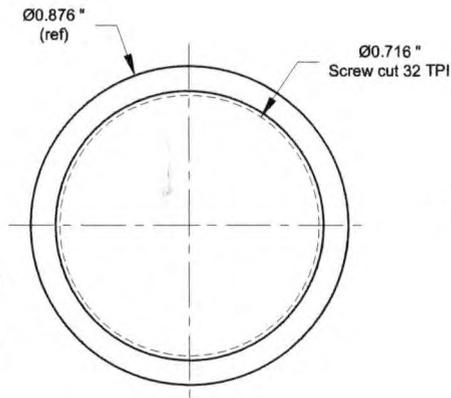
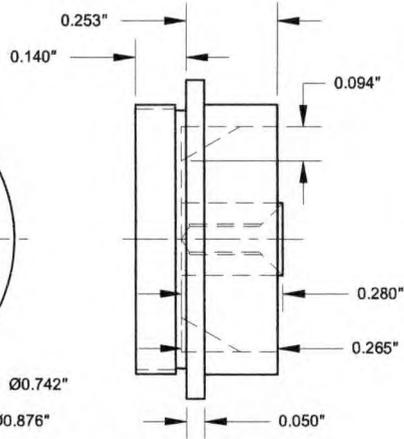
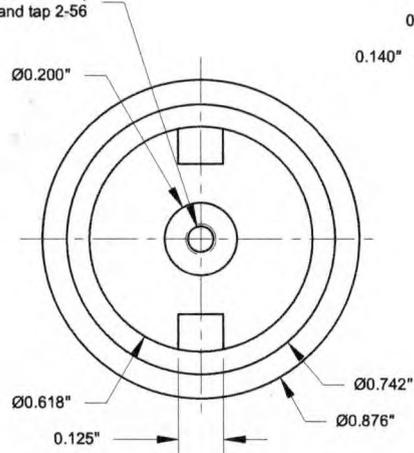


**-1 CRANKCASE**  
Magnesium Die Casting  
with cast-in bronze bush



2005-02-01	Missing dimensioning added	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			Mite Mfg Co .098 Diesel 1949
			DRAWN	RMB 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	PMB 1-1-98			Sheet 2 - Crankcase

Drill #50 1/4" deep  
Csk and tap 2-56

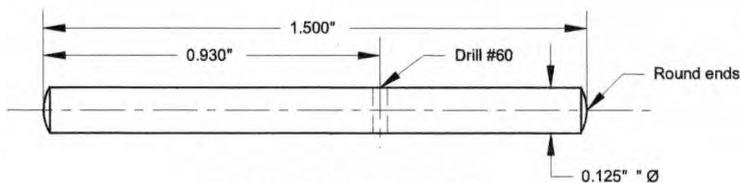


**-6 BACKPLATE**

Magnesium Casting

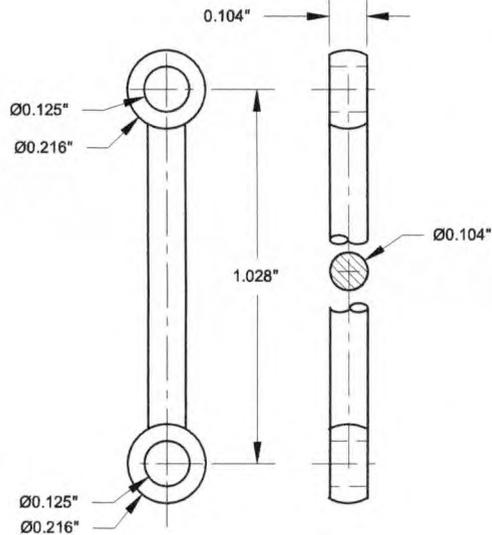
**-1 PISTON**

Cast Iron



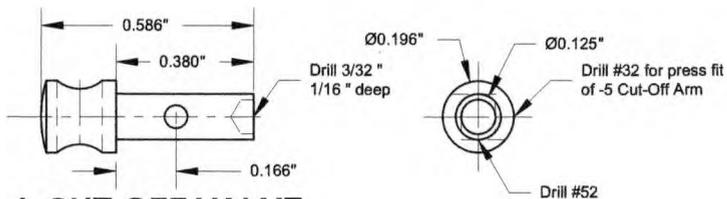
**-5 CUT-OFF ARM**

1/8" Aluminum Rod



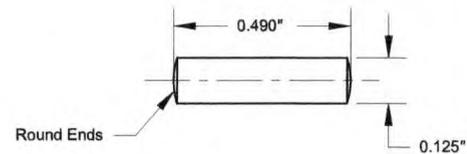
**-3 CONNECTING ROD**

Steel



**-4 CUT-OFF VALVE**

Aluminum



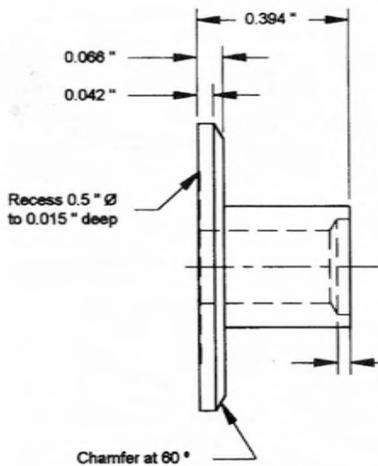
**-2 WRIST PIN**

Drill Rod

2001.5.2	Missing dimesnions added	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			Mite Mfg Co .098 Diesel 1949
			DRAWN	<b>RMB</b> 12-21-97	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	<b>PMB</b> 1-1-98			<b>Sheet 3 - Piston</b>

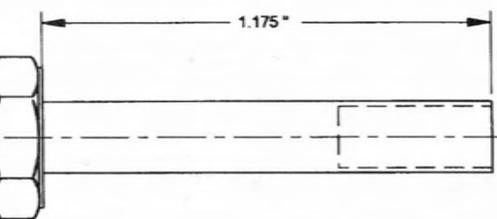
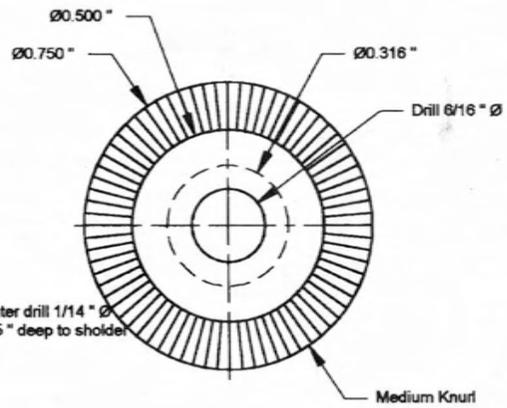
50 revised

51

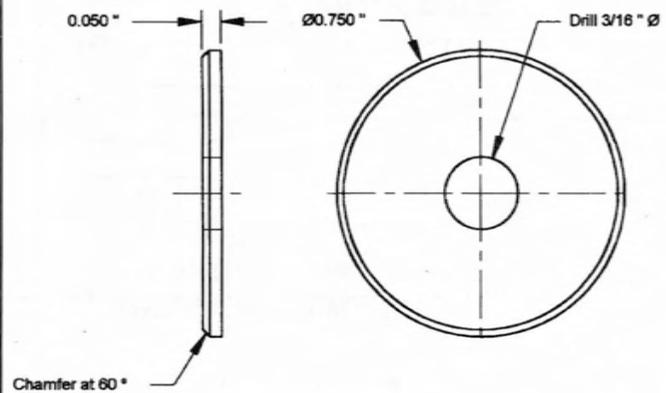


**-1 DRIVE WASHER**

Steel

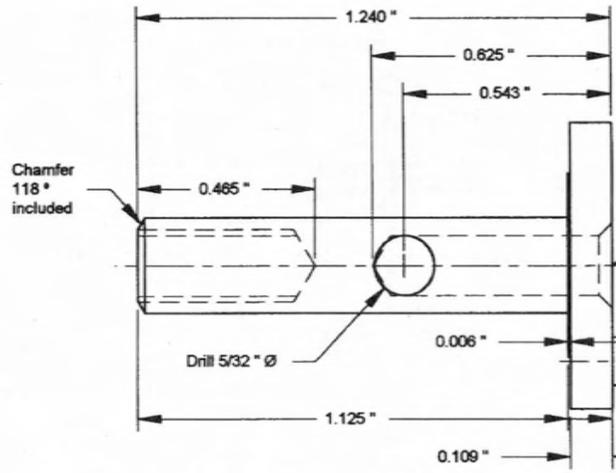


**-3 PROP BOLT**  
10-32 High Tensile Steel Bolt



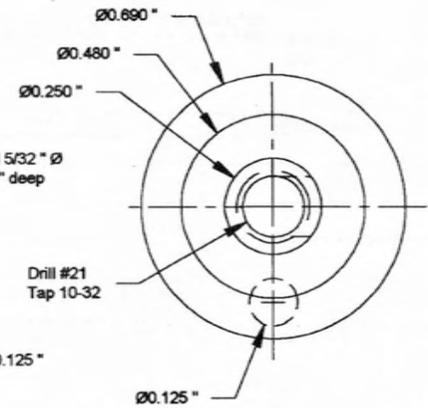
**-2 PROP WASHER**

Steel



**-4 CRANKSHAFT**

Steel



DATE	CHANGE	BY	CAD
------	--------	----	-----

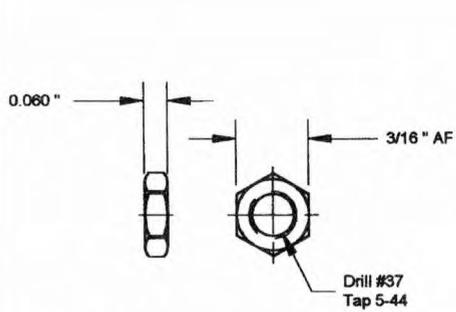
MAT'L	As Noted
SCALE	<b>2 X SIZE</b>
DRAWN	<b>PMB 1-31-1998</b>
	<b>PMB 2-22-1998</b>

**DO NOT SCALE DRAWING**  
WORK TO DIMENSIONS  
ALL DIMENSIONS  
ARE IN INCHES

NEXT ASSEMBLY

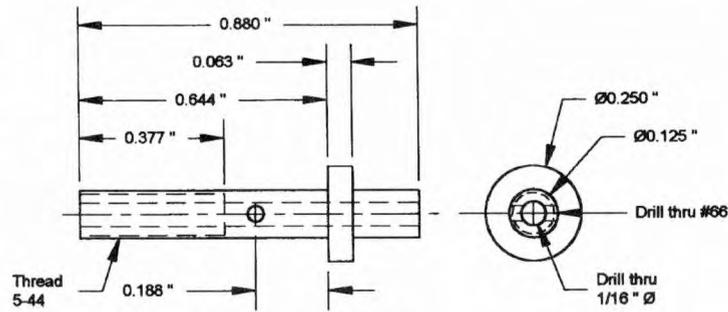


NAME	Mite Mfg Co .098 Diesel 1949
NUMBER	Sheet 4 - Drive Train



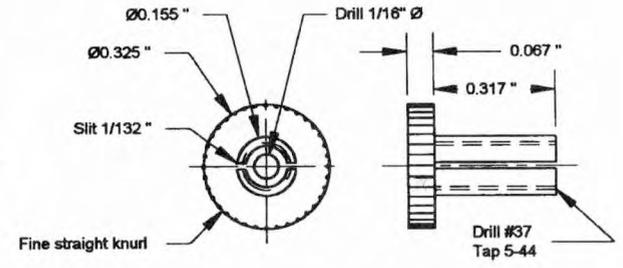
**-1 SPRAY BAR NUT**

3/16 " AF Hex Brass Rod



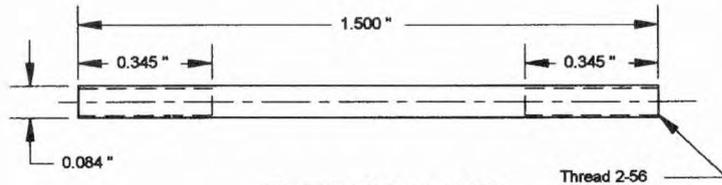
**-2 SPRAY BAR**

Brass



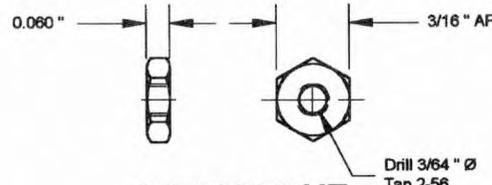
**-4 NEEDLE VALVE THIMBLE**

Brass



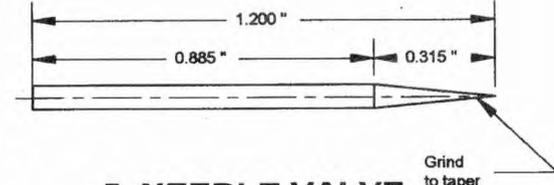
**-7 TANK STUD**

Brass Rod



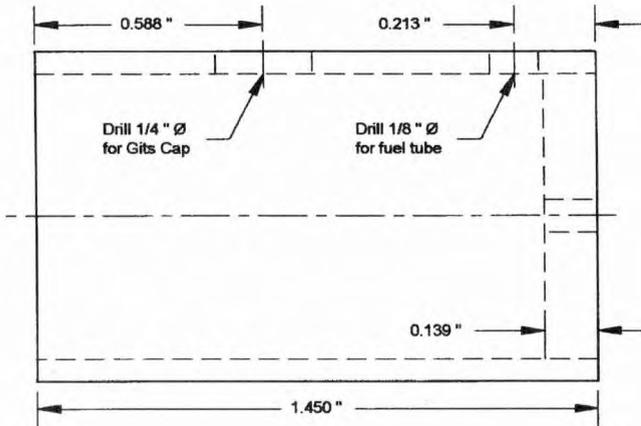
**-3 TANK NUT**

3/16 " AF Hex Brass Rod



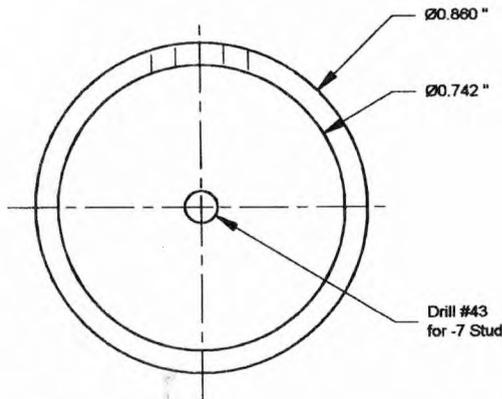
**-5 NEEDLE VALVE**

1/16 " Ø Music Wire



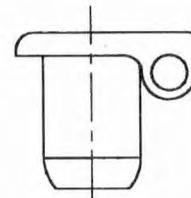
**-6 FUEL TANK**

Plastic



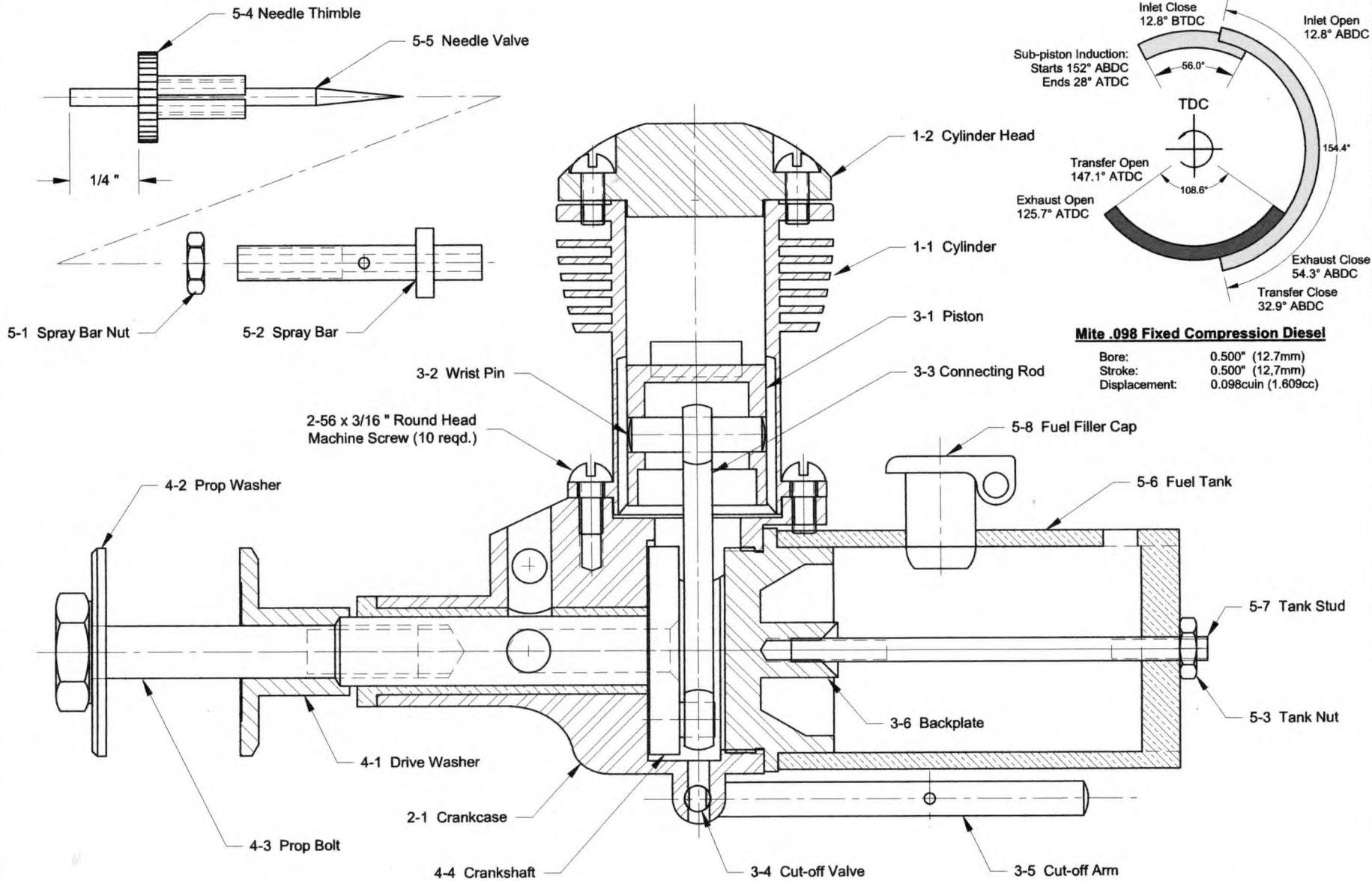
**-8 FUEL FILLER CAP**

1/4 " Gits Cap



52

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



53 update

2007-08-14	Revise and standardize timing diagram	BMBI	MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	<b>2 X SIZE</b>			<b>Mite Mfg Co .098 Diesel 1949</b>
			DRAWN	<b>PMB</b> 1-31-1998	NUMBER		
DATE	CHANGE	BY	CAD	<b>PMB</b> 2-22-1998		<b>Sheet 7 - General Arrangement</b>	

# 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!

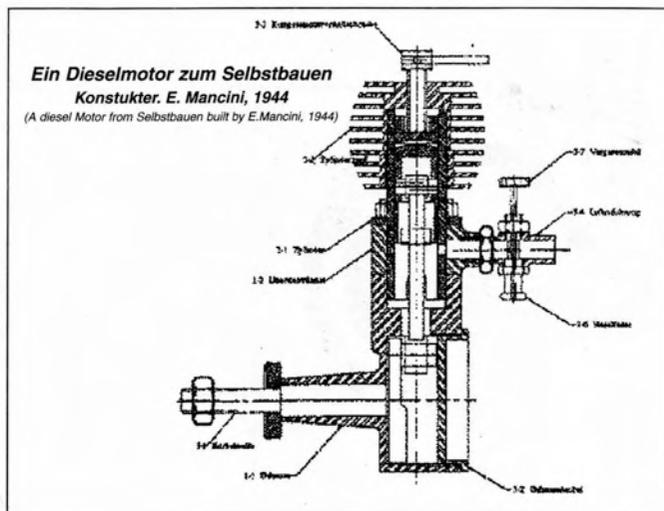
Later, Ron Chernich came up with a set of German drawings of the engine. The two sets of drawings were in general agreement and the German drawings were attributed to 'E. Mancini, 1943'. The dates were also in agreement. At first glance, the 1943 Mancini looks like a restyled Dyno, but on closer examination 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.

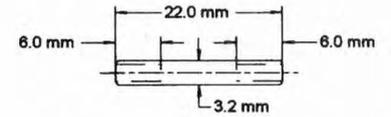
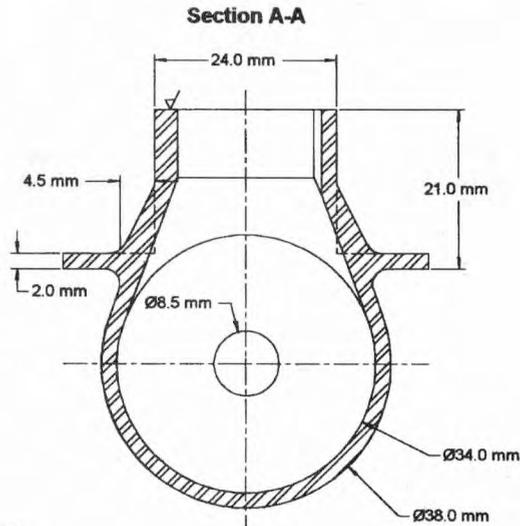
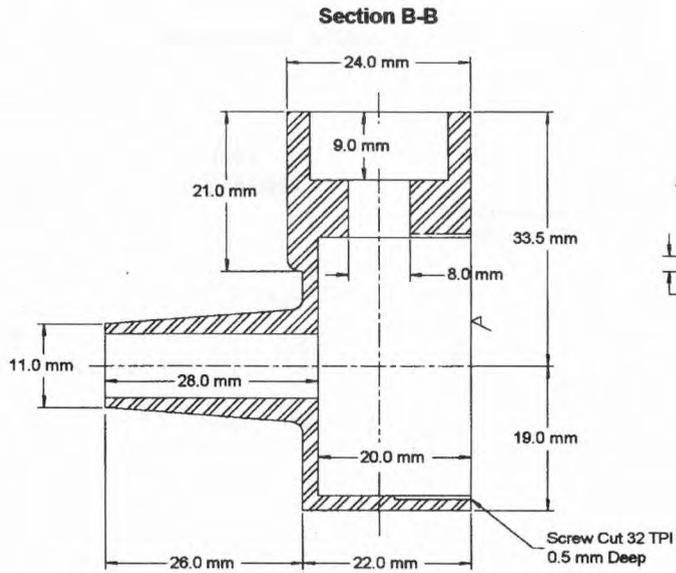
Like many early Italian diesels, the 1943 Mancini had a very long stroke. The bore was 14mm, but the stroke was a whopping 24mm, giving a displacement of 3.69cc. The crankcase is a two-part casting of similar construction to the Dyno. No tank was fitted. The engine construction was conventional, simple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

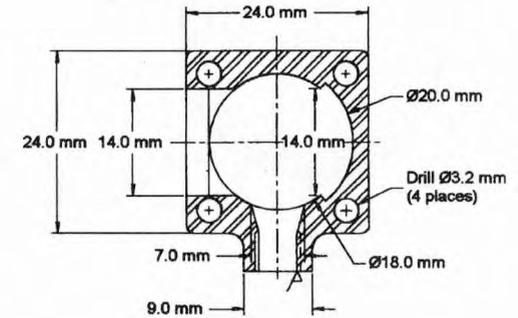
Jim Noonan wrote a famous article on Italian diesels and other obscure European engines. When his article was printed in Bill Winter's Plan Book in late 1946, many Americans heard of most of these diesel engines for the very first time. A whole new world had been discovered by Noonan on his trip through 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.

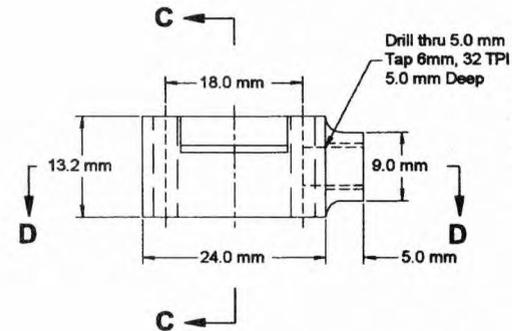
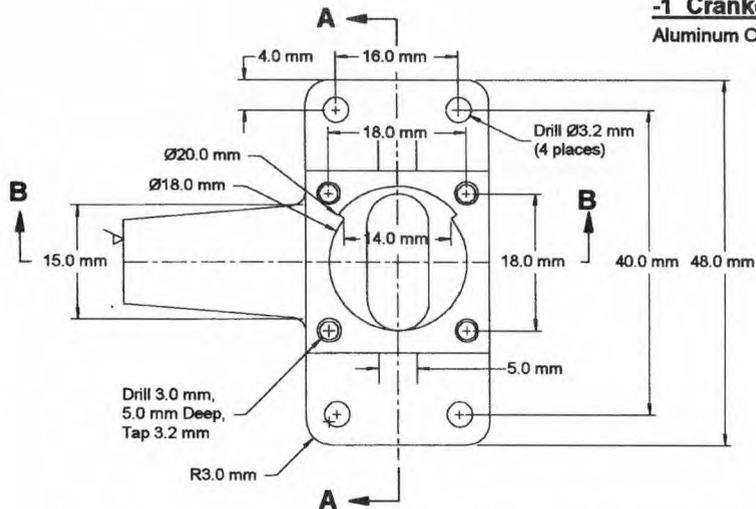




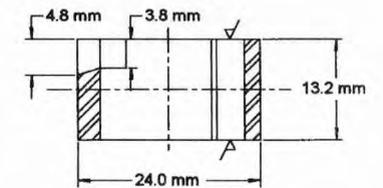
**-3 Stud (4 required)**  
Mild Steel



**-1 Crankcase**  
Aluminum Casting



**Section D-D**



**Section C-C**

**-2 Bypass**  
Aluminum Casting

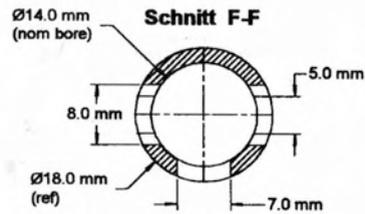
Machine

10 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>Full Size</b>	
			DRAWN	E. Mancini 1943	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>BMBI</b> 12-22-1998	

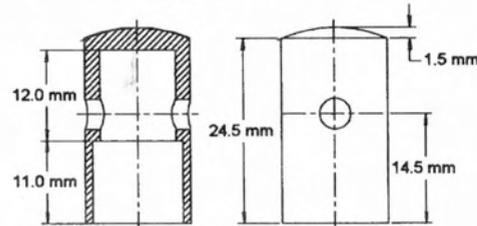
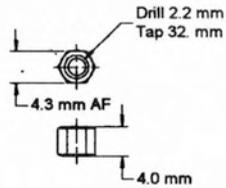


NAME  
**Ein Dieselmotor zum Selbstbauen**

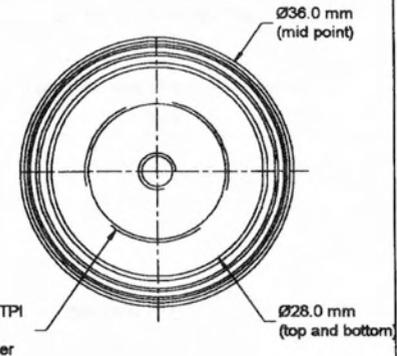
NUMBER  
**Sheet 1 - Crankcase**



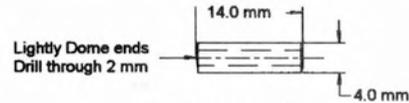
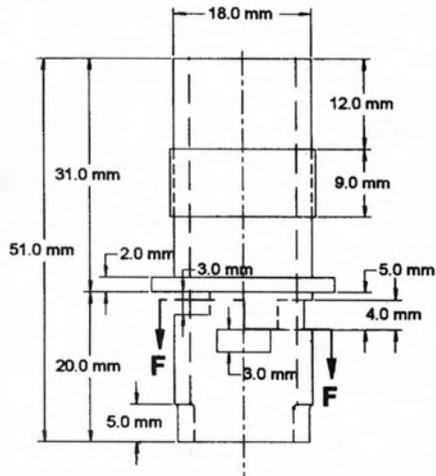
**-6 Cylinder Nut (4 required)**  
5 mm AF Hex Mild Steel



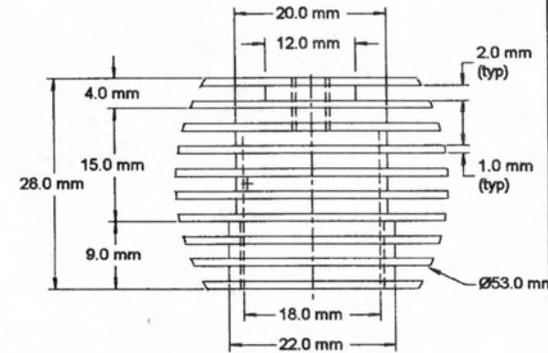
**-4 Piston**  
Cast Iron



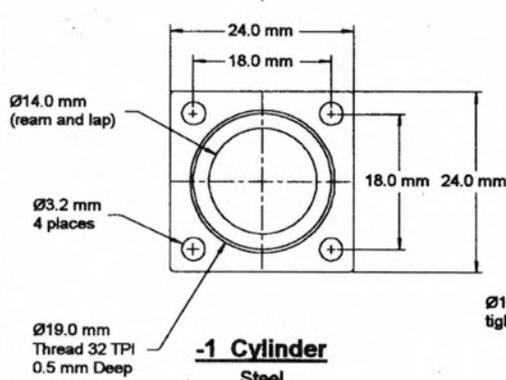
Screw cut 32 TPI  
0.5 mm deep  
to fit -1 Cylinder



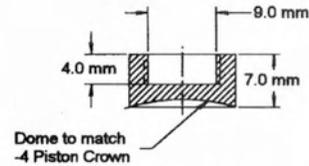
**-7 Gudgeon Pin**  
4 mm Drill Rod



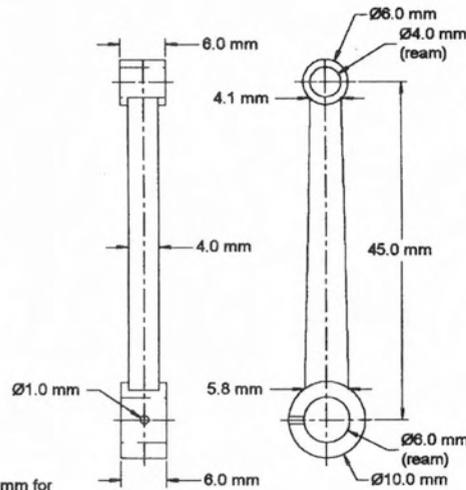
Drill 4 mm, tap Ø5.0 mm for  
3-3 Compression Lever



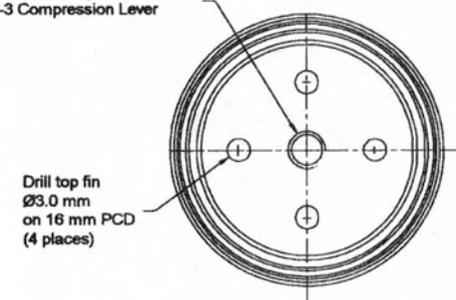
**-1 Cylinder**  
Steel



**-5 Contra-piston**  
Cast Iron

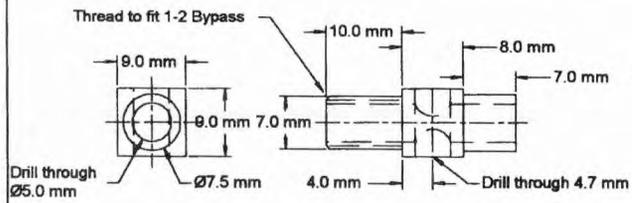


**-3 Connecting Rod**  
Duralium

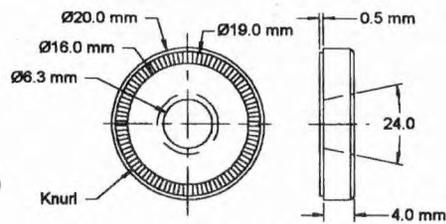


**-2 Cylinder Muff**  
Aluminum

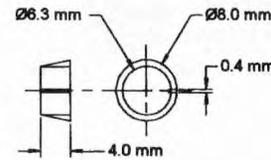
9 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	Full Size			Ein Dieselmotot zum Selbstbauen
			DRAWN	E. Mancini 1943	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI 12-23-1998			Sheet 2 - Cylinder



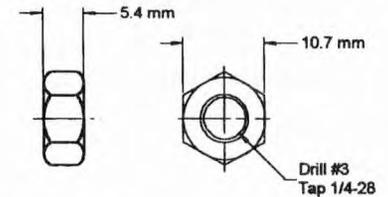
**-4 Induction Tube**  
Aluminum



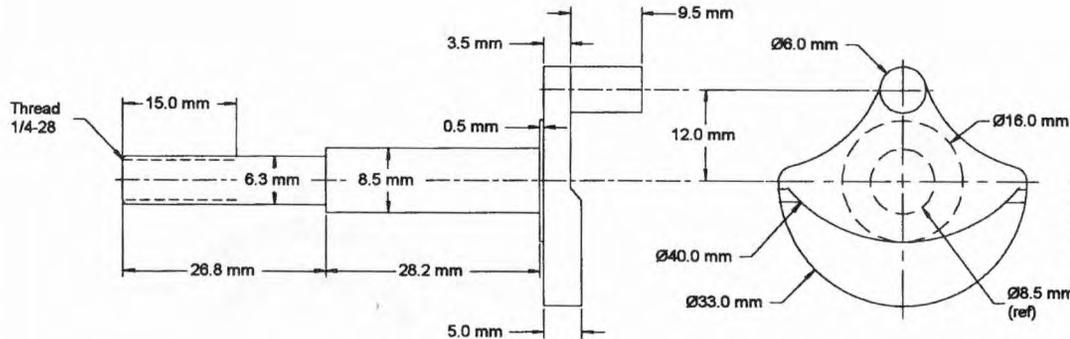
**-9 Prop Drive Washer**  
Mild Steel



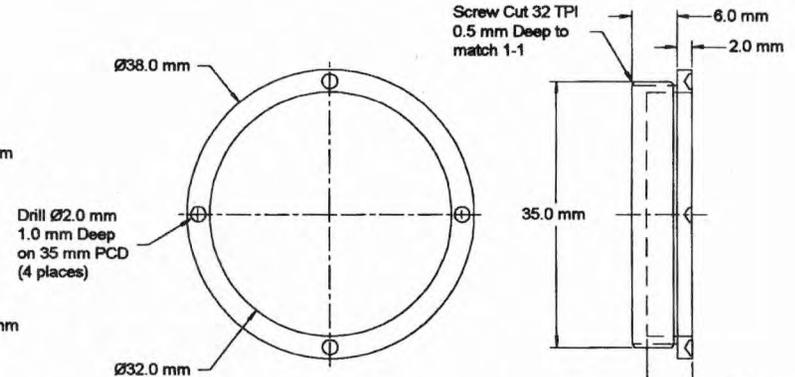
**-8 Split Cone**  
Brass



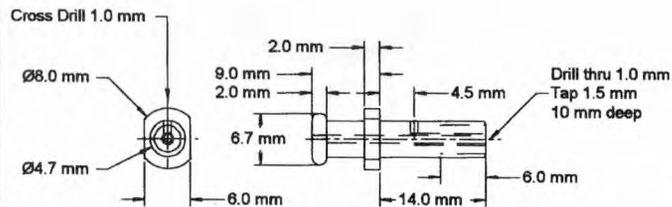
**-10 Prop Nut**  
1/2" AF Hex Steel



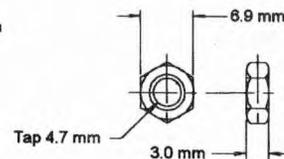
**-1 Crankshaft**  
Steel



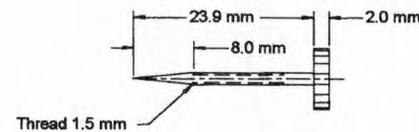
**-2 Backplate**  
Aluminum



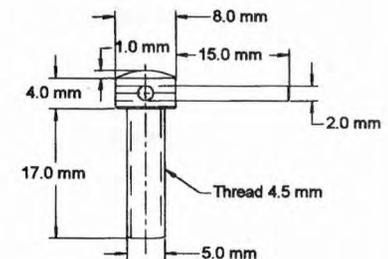
**-6 Spray Bar**  
Brass



**-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	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>Full Size</b>	
			DRAWN	E. Mancini 1943	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>BMBI</b> 12-23-1998	



NAME  
**Ein Dieselmotot zum Selbstbauen**

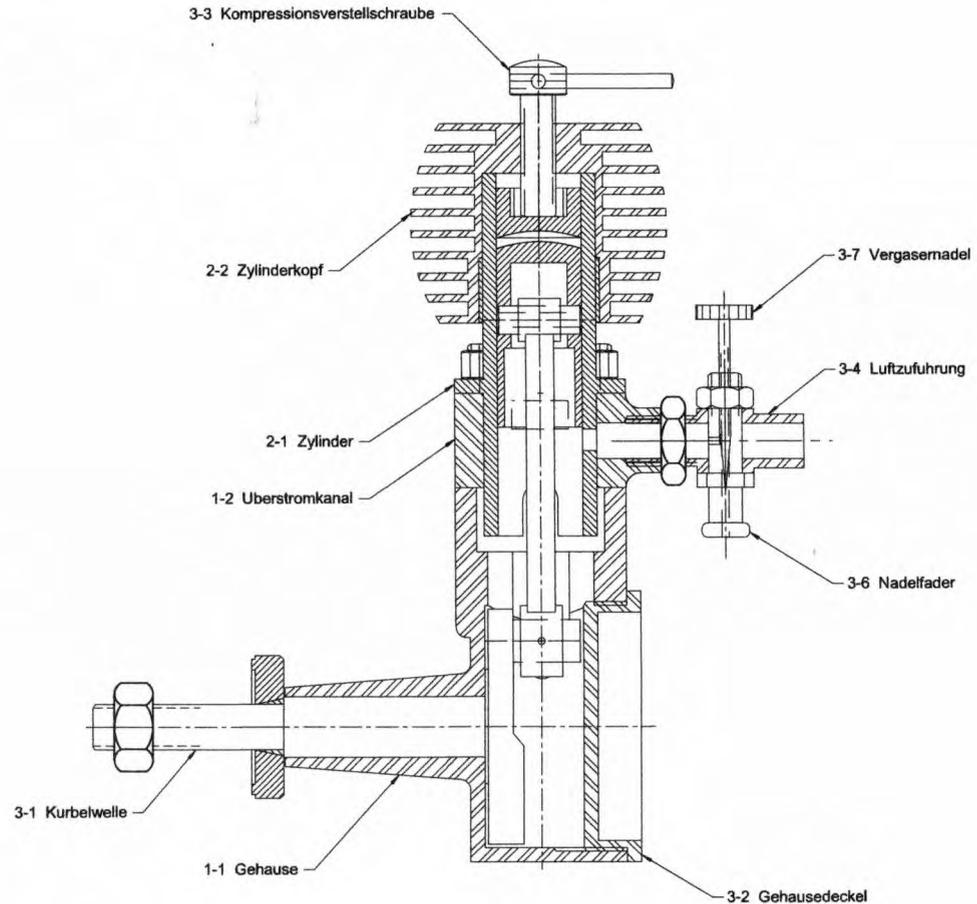
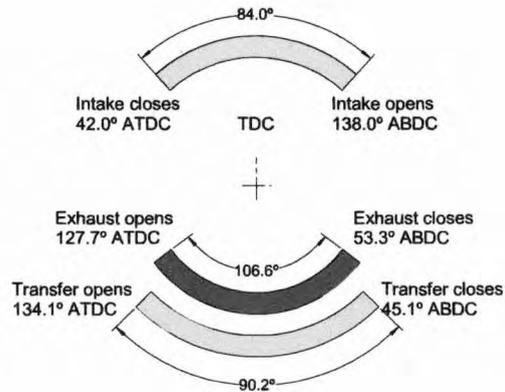
NUMBER  
**Sheet 3 - Crankshaft & Carby**

# 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)



58 update

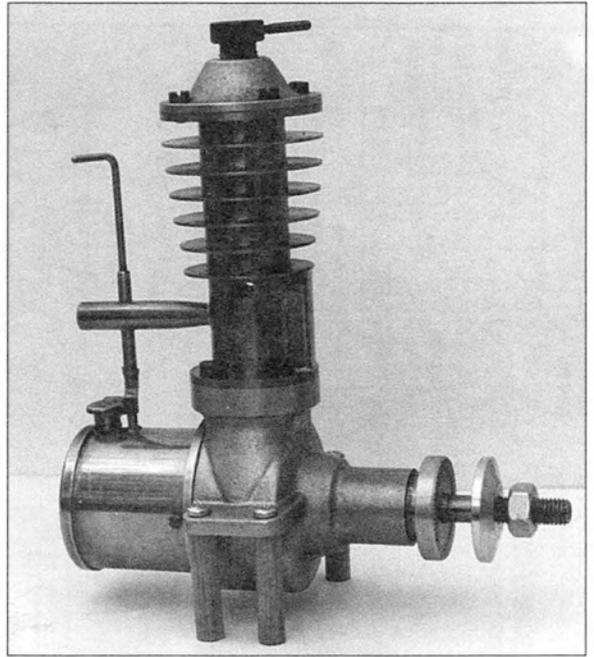
9 Feb 2000	Amended per Modele Reduit D'Avion 5/1944	BMBI	MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME Ein Dieselmotot zum Selbstbauen
2006-10-05	Revise crankcase for lower piston movement	BMBI	SCALE	<b>Full Size</b>			NUMBER Sheet 4 - General Arrangment
DATE	CHANGE	BY	CAD	E. Mancini 1943 <b>BMBI</b> 12-23-1998	NEXT ASSEMBLY		

## 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.

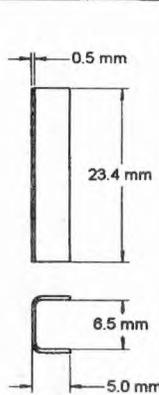
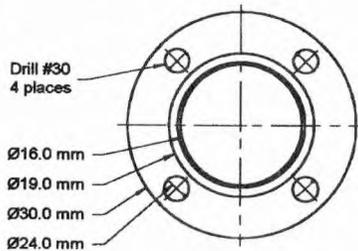
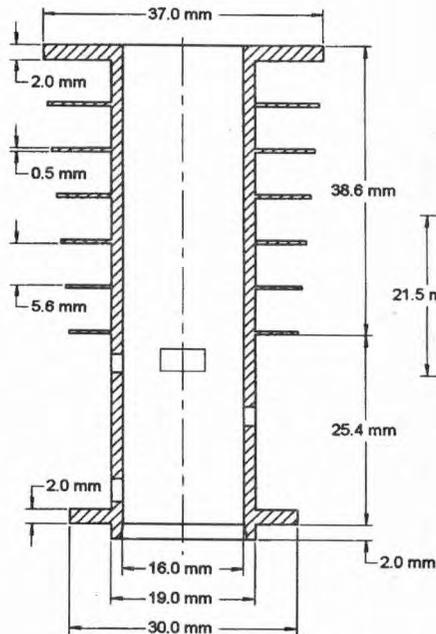
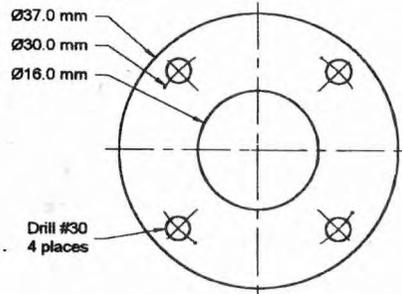


Piet de Klerk, Jr., writing about the Nova in the May 1946 issue of the English magazine, *Model Aircraft*, pointed out that during the German occupation, the Dutch modelers could not obtain petrol engines and thus turned to building their own. The Swiss had developed a compression ignition engine, the 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*.

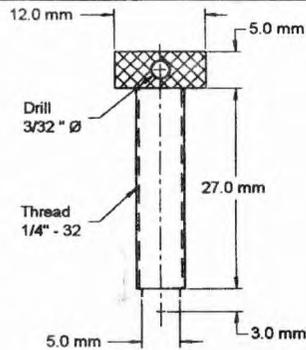
*De Modelbouwer* is still published, 10 times a year, in Holland by the Nederlandse Vereniging van Modelbouwers (Dutch Model Engineers Society). They have a web page and their e-mail address is: [modeller@knoware.nl](mailto:modeller@knoware.nl)

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.



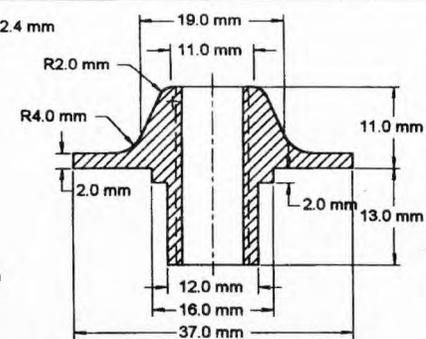
**-2 BYPASS COVER**  
Steel



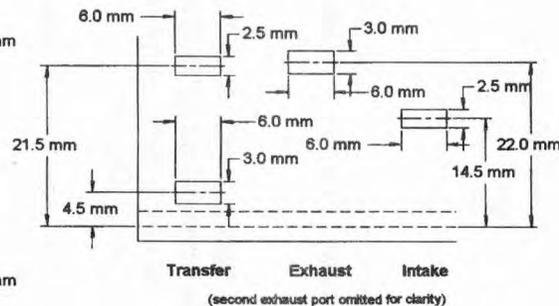
**-4 COMPRESSION SCREW**  
Steel



**-5 TOMMY BAR**  
3/32" Drill Rod



**-3 CYLINDER HEAD**  
Aluminum



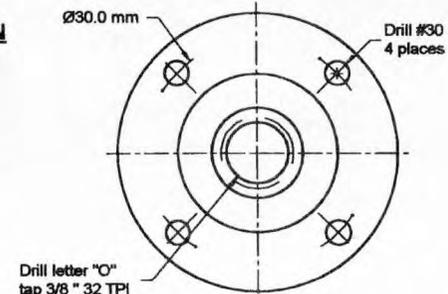
Transfer Exhaust Intake  
(second exhaust port omitted for clarity)



**-6 CONTRA PISTON**  
Cast Iron

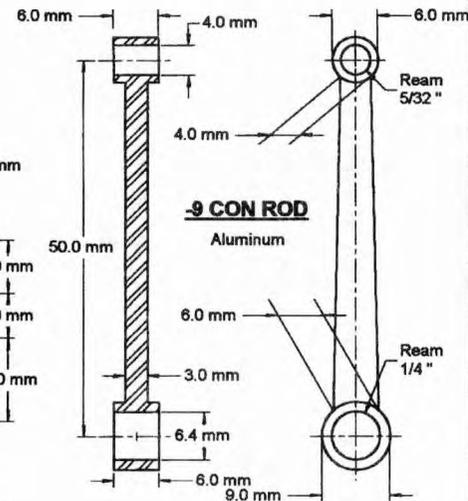
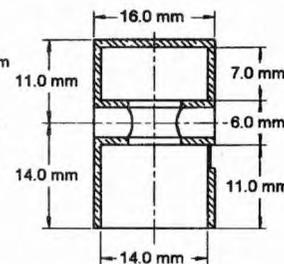
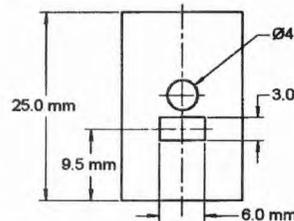
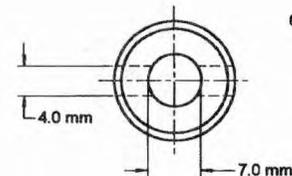


**-8 WRIST PIN**  
5/32" Drill Rod



**-1 CYLINDER**  
Chrome Steel

**-7 PISTON**  
Cast Iron



**-9 CON ROD**  
Aluminum

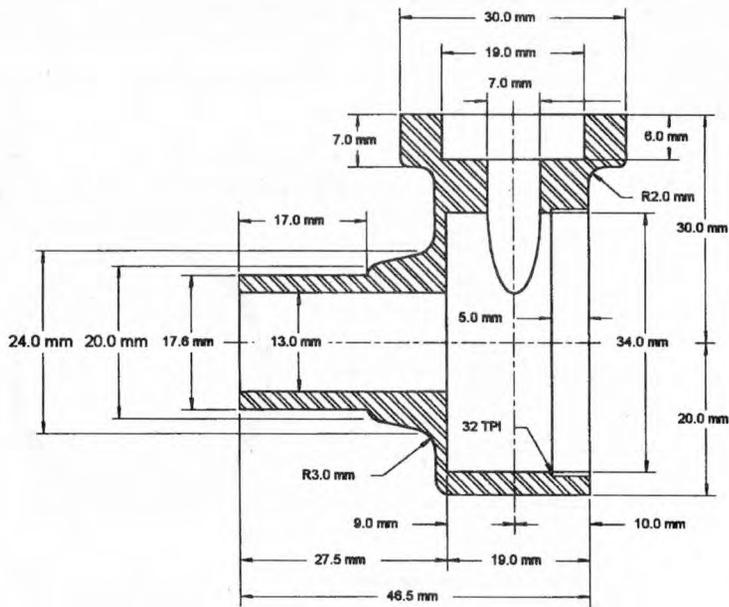
Fin	Diameter
1	37.0 mm
2	35.9 mm
3	34.8 mm
4	33.6 mm
5	32.4 mm
6	31.3 mm
7	30.0 mm

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b>
			SCALE	<b>Full Size</b>	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
30 Jul 1998	Contra piston crown size increased	PMBI	DRAWN	IJvLeeuwen 12.27.43	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB</b> 3.14.1998	

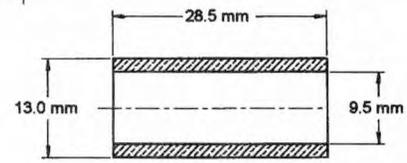
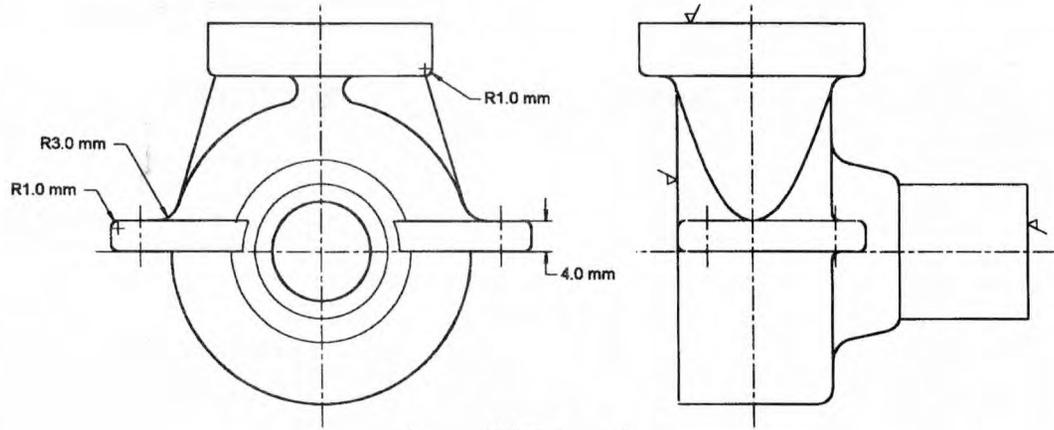


NAME  
**"NOVA 1" 4.5ccm Tweetakt Diesel**

NUMBER  
**Sheet 1 - Cylinder Components**



Machine

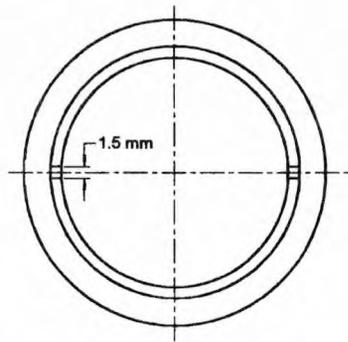
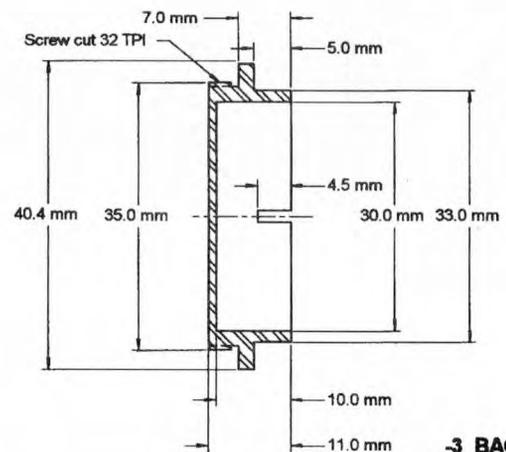
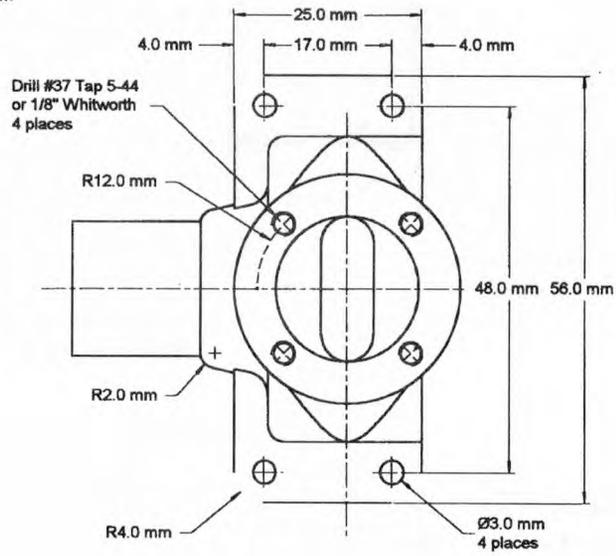


**-1 CRANKCASE**

Cast Aluminum

**-2 BUSHING**

Cast Iron



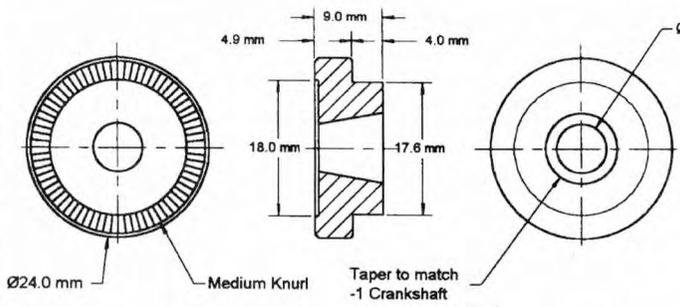
**-3 BACKPLATE**

Aluminum

			MATL	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	Full Size	
3-25-1968	Front crankcase diameter increased from 16 mm to 0.694"	PMBI	DRAWN	IJVLeeuwen 12.27.43	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB</b> 3.14.1998	

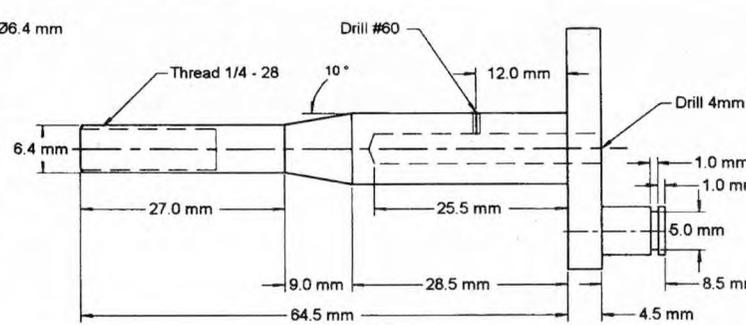


NAME	"NOVA 1" 4.5ccm Tweetakt Diesel
NUMBER	Sheet 2 - Crankcase



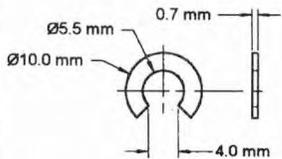
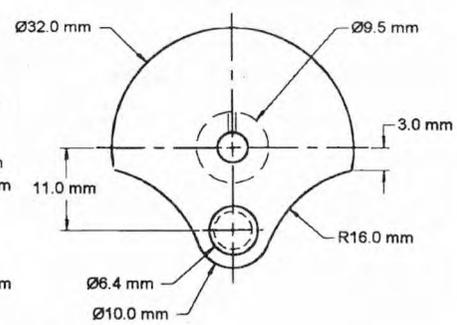
**-2 PROP DRIVER**

Steel



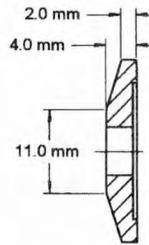
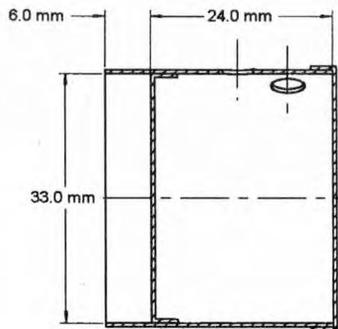
**-1 CRANKSHAFT**

Steel



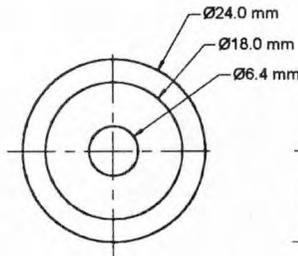
**-5 CIRCLIP**

Drill Rod



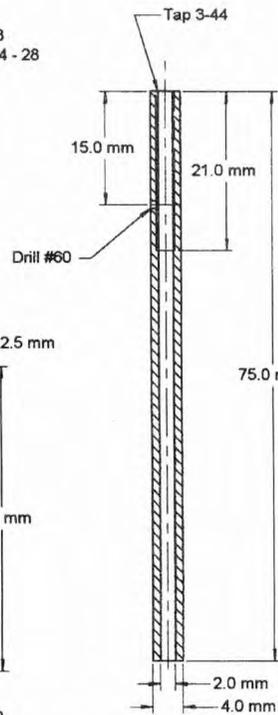
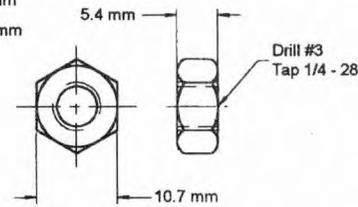
**-4 PROP WASHER**

Steel



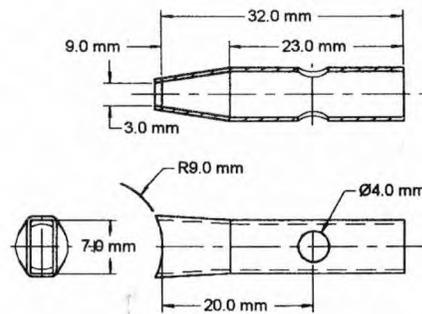
**-3 PROP NUT**

Hex Steel



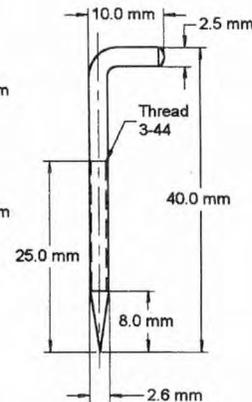
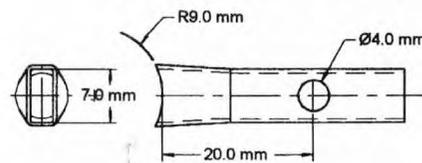
**-9 NEEDLE VALVE**

3/32" Drill Rod



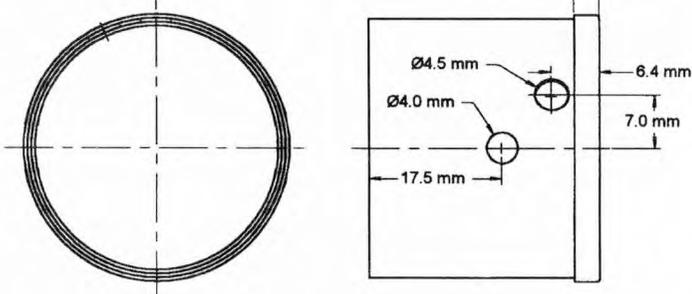
**-6 INTAKE TUBE**

Brass



**-8 FUEL TANK**

0.5mm Shim Brass

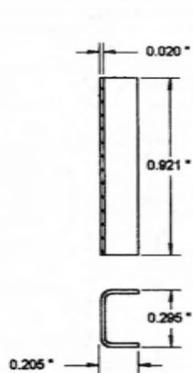
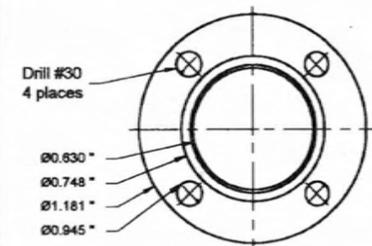
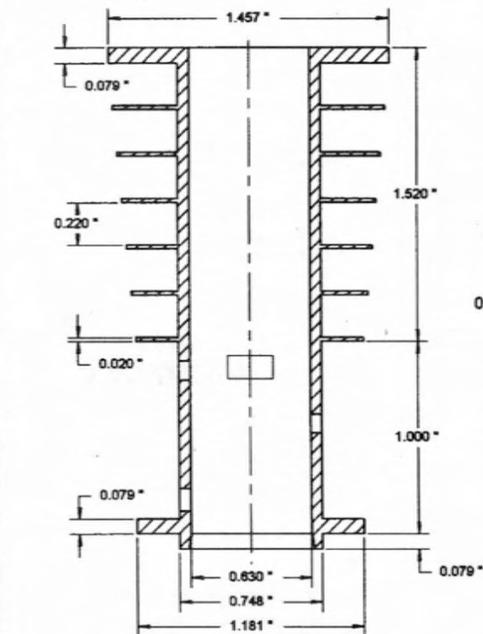
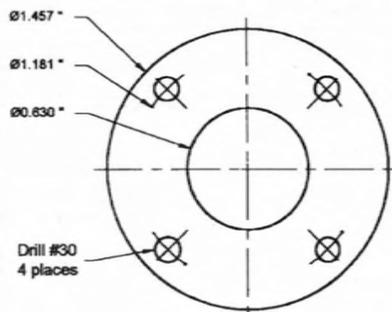


**-7 SPRAY BAR**

Brass Tubing

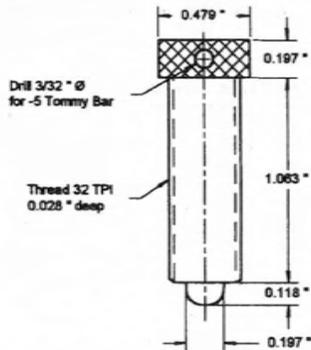
			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME	"NOVA 1" 4.5ccm Tweetakt Diesel
			SCALE	Full Size			NEXT ASSEMBLY	NUMBER
30 Jul 1998	Taper of crankshaft dimensioned	PMBI	DRAWN	JvLeeuwen 12.27.43				
DATE	CHANGE	BY	CAD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

62



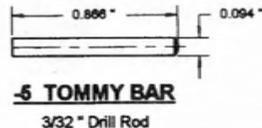
**-2 BYPASS COVER**

Steel



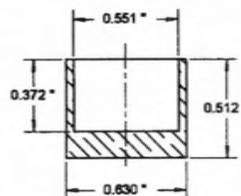
**-4 COMPRESSION SCREW**

Steel



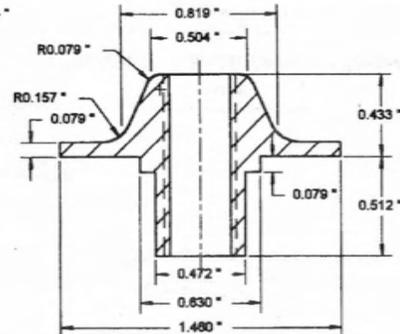
**-5 TOMMY BAR**

3/32" Drill Rod



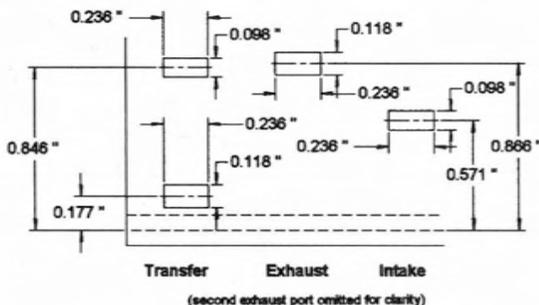
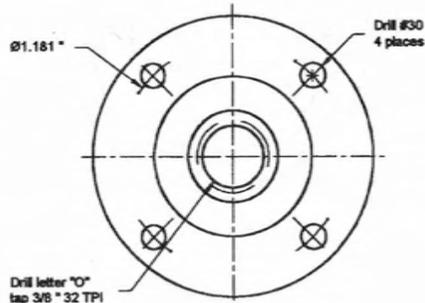
**-6 CONTRA PISTON**

Cast Iron



**-3 CYLINDER HEAD**

Aluminum



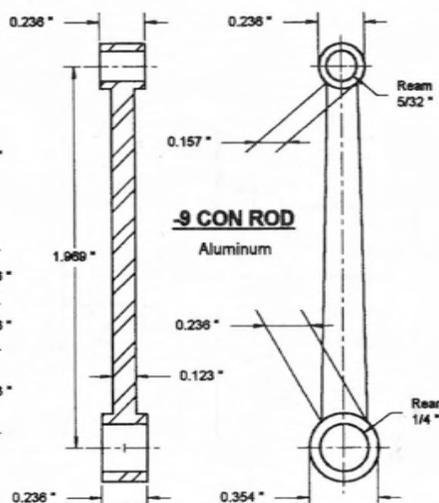
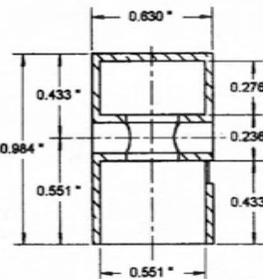
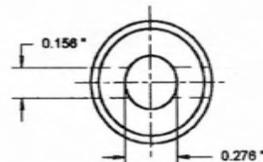
Transfer Exhaust Intake  
(second exhaust port omitted for clarity)

**-1 CYLINDER**

Chrome Steel

**-7 PISTON**

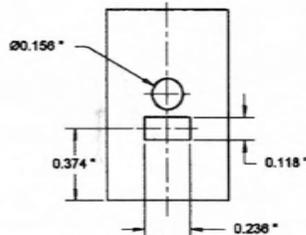
Cast Iron



**-9 CON ROD**

Aluminum

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

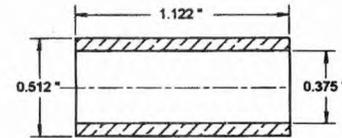
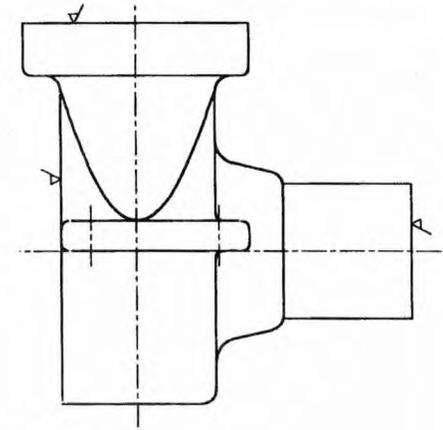
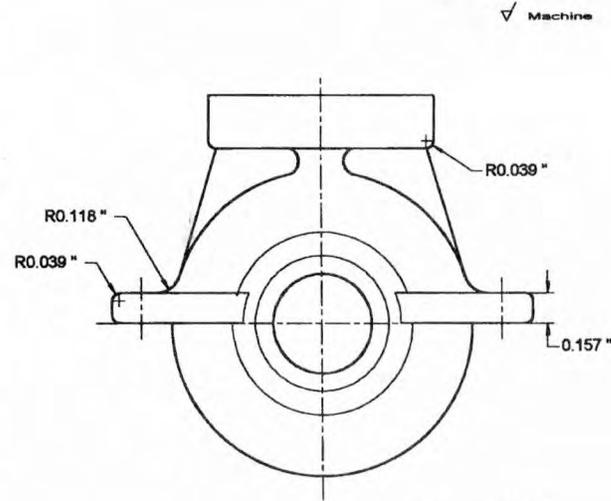
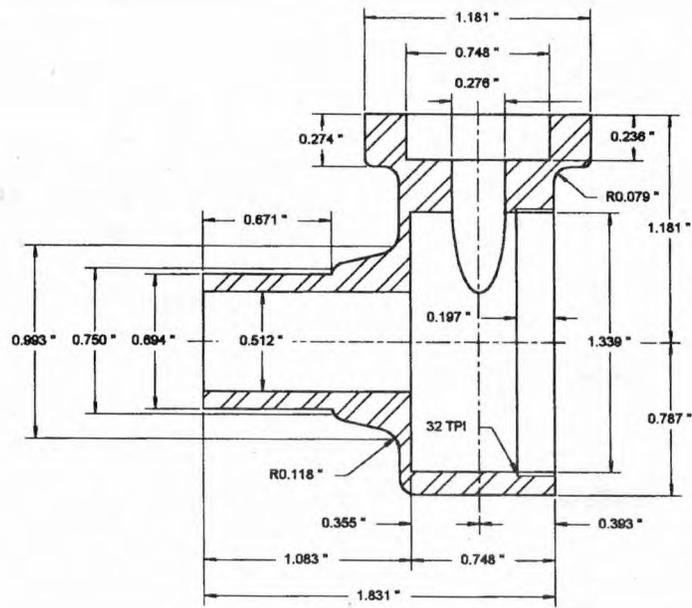


DATE	CHANGE	BY	CAD	MAT'L	SCALE	DO NOT SCALE DRAWING
30 Jul 1998	Contrapiston crown size increased	PMBI	DRAWN	IJvLeeuwen 12.27.43		WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
						NEXT ASSEMBLY
						PMB 3.14.1998



NAME  
**"NOVA 1" 4.5ccm Tweetakt Diesel**

NUMBER  
**Sheet 1 - Cylinder Components**

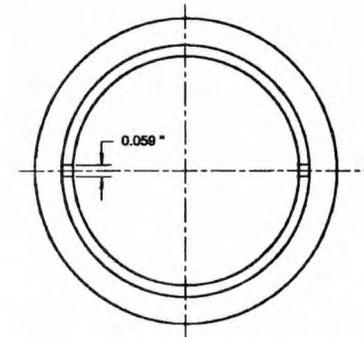
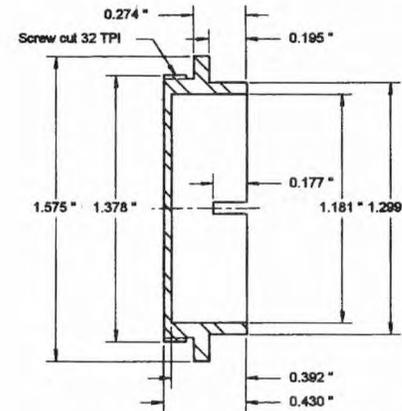
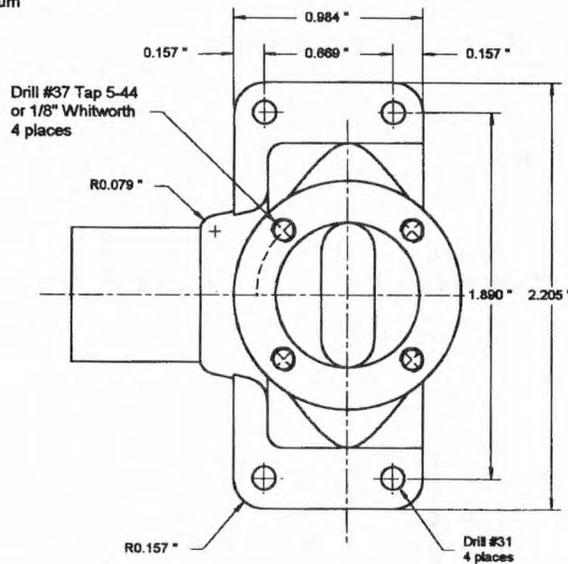


**-1 CRANKCASE**

Cast Aluminum

**-2 BUSHING**

Cast Iron



**-3 BACKPLATE**

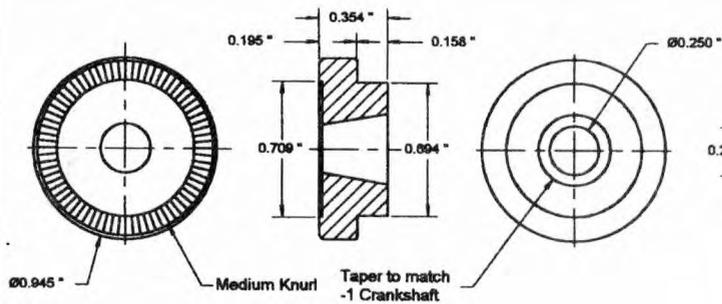
Aluminum

			MAT'L		<b>DO NOT SCALE DRAWING</b>
			SCALE		WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
3-25-1998	Front crankcase diameter increased from 16 mm to 0.694"	PMBI	DRAWN	I.v.Leeuwen 12.27.43	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB 3.14.1998</b>	



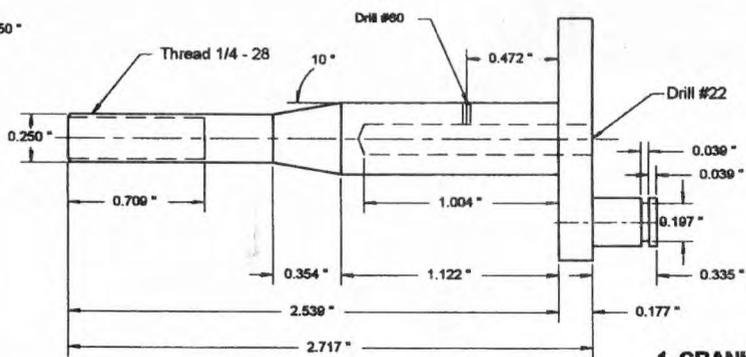
NAME  
**"NOVA 1" 4.5cm Tweetakt Diesel**

NUMBER  
**Sheet 2 - Crankcase**



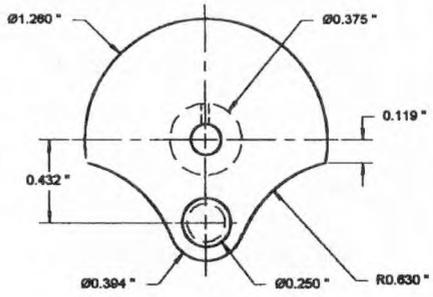
**-2 PROP DRIVER**

Steel



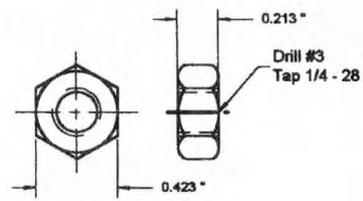
**-1 CRANKSHAFT**

Steel



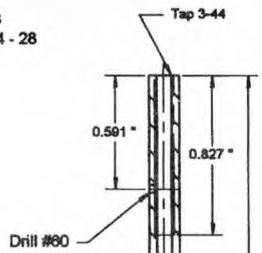
**-4 PROP WASHER**

Steel



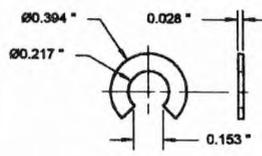
**-3 PROP NUT**

Hex Steel



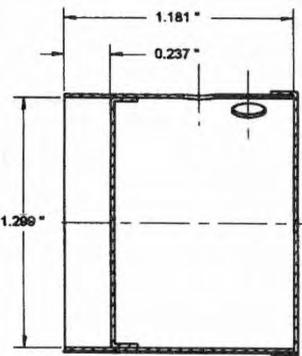
**-7 SPRAY BAR**

5/32" Brass Tubing



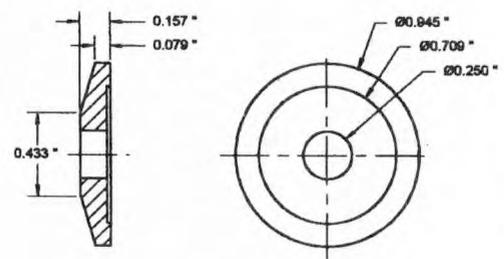
**-5 CIRCLIP**

Drill Rod



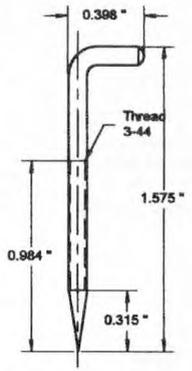
**-8 FUEL TANK**

0.5mm Shim Brass



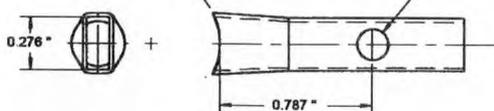
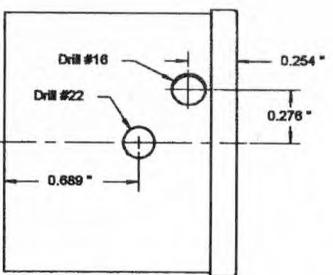
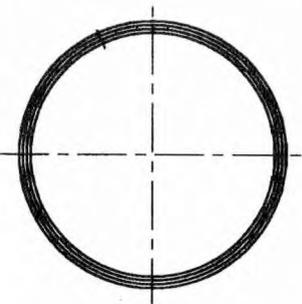
**-6 INTAKE TUBE**

Brass



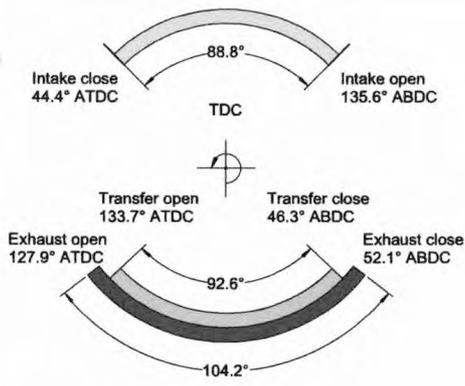
**-9 NEEDLE VALVE**

3/32" Drill Rod



			MATL		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE				"NOVA 1" 4.6ccm Tweetak Diesel
30 Jul 1998	Taper of crankshaft dimensioned	PMBI	DRAWN	I.v.Leeuwen 12.27.43	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	<b>PMB</b> 3.14.1998			Sheet 3 - Drive Train

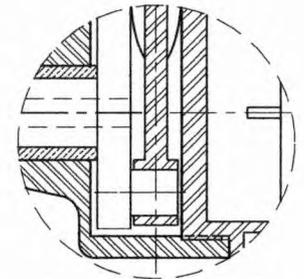
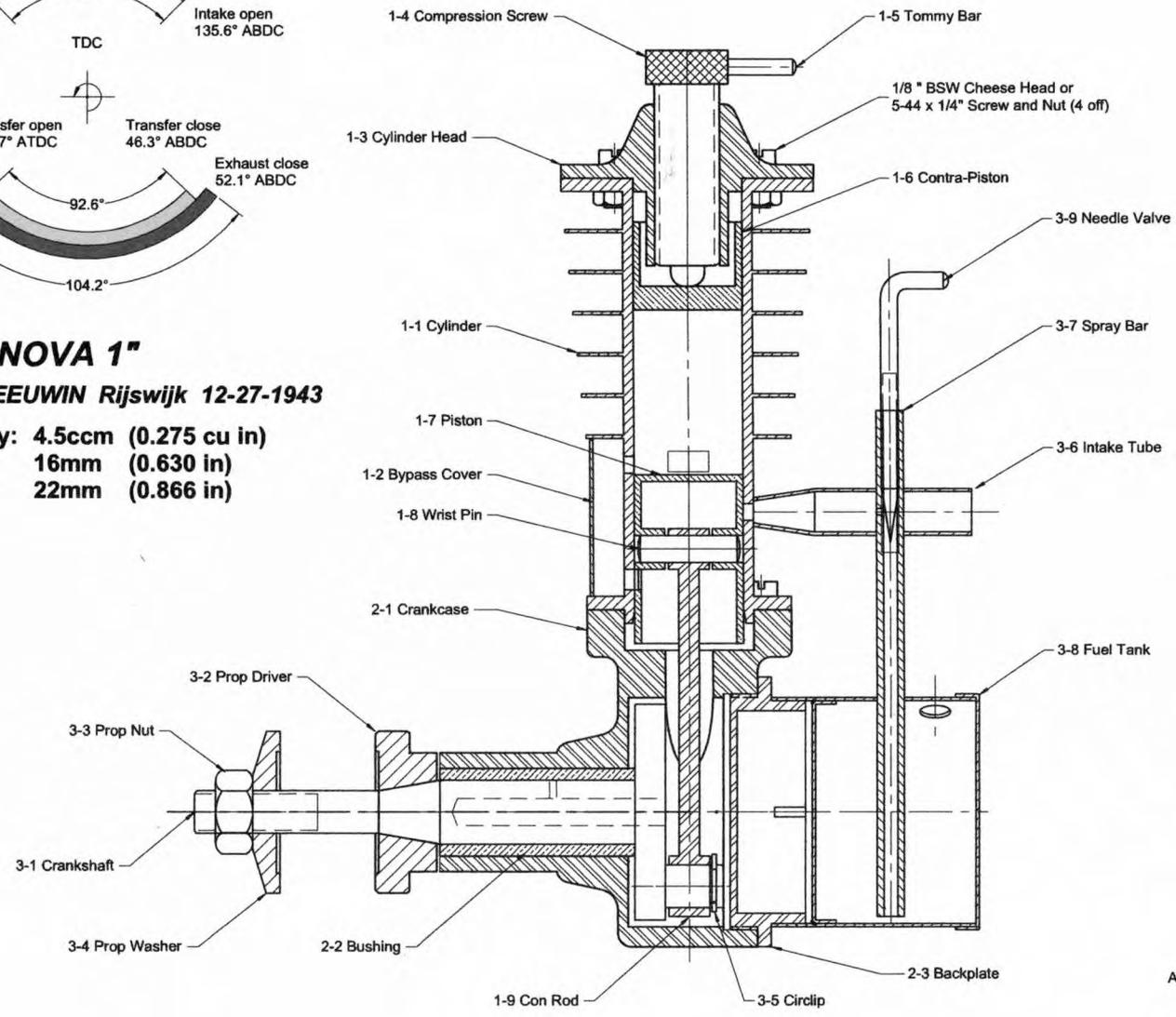
66 update



# "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)



Alternate design to facilitate assembly of connecting rod:  
 Shorten crank pin at forward end of circlip groove.  
 Increase depth of back plate by 2mm (0.080") and  
 cut deeper thread in crankcase to suit.

2007-08-16	Standardize timing diagram	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
July 4, 1998	Alternate design detail added.	PMBI	SCALE	Full Size	
DATE	CHANGE	BY	CAD	PMB 3.14.1998	



NAME	"NOVA 1" 4.5ccm Tweetakt Diesel
NUMBER	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.

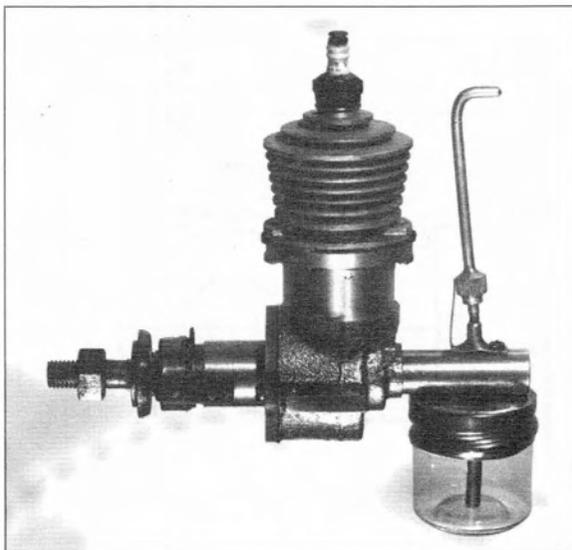
The original Scrapper .29's apparently ran quite well according to the reports of owners. Most were well made and had good performance. Production figures are not known, 2000 engines is an approximation, but there seem to be quite a few in collections.

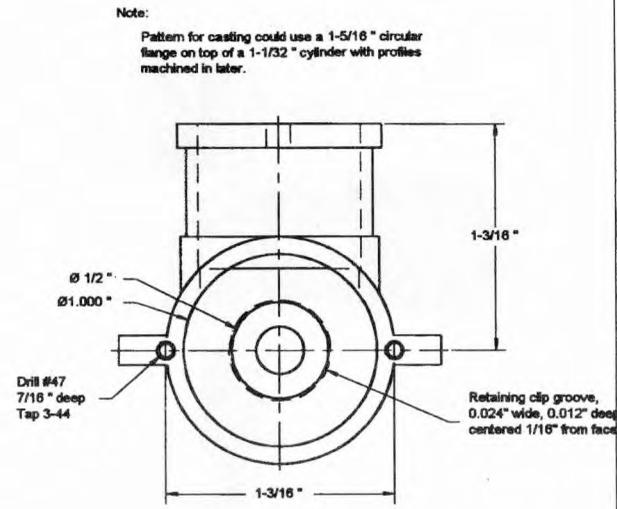
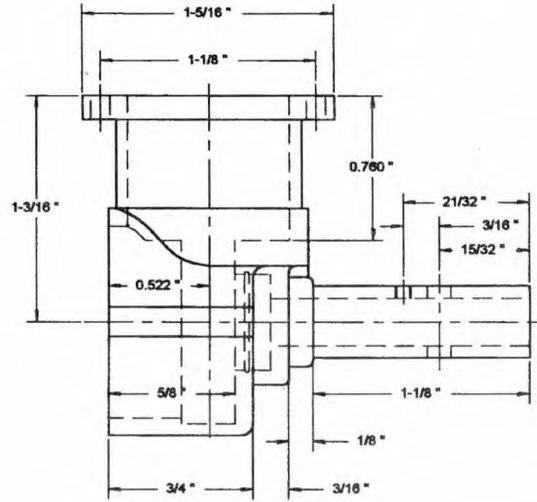
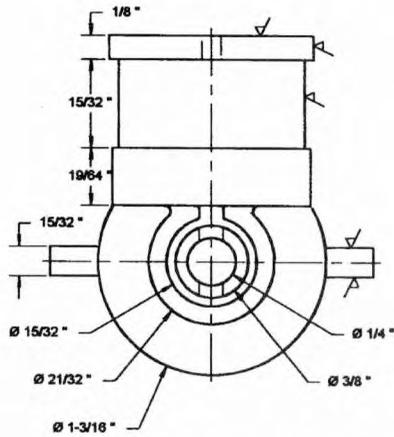
The crankcase and front shaft housing were rough sand castings with considerable machining done to clean them up. The rest of the parts are machined from bar. The cylinder is blind bore. The piston originally used featured a ball and socket arrangement somewhat like the modern Cox engines except that 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.

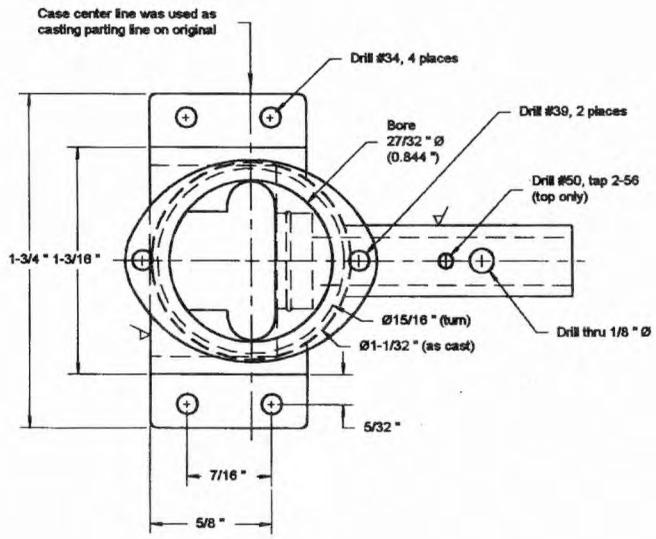
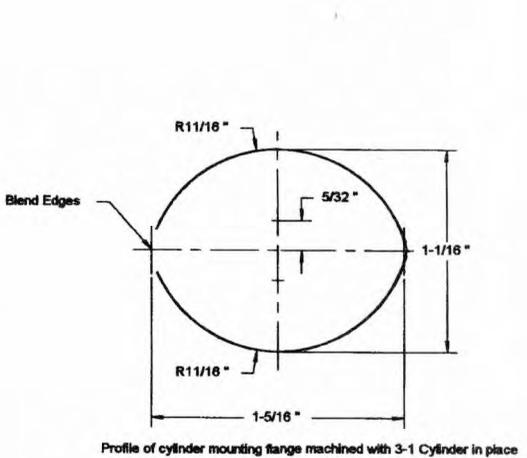
As a side note, the individuals who were building the Scrapper and then promoted the Super Scrapper tried again, a few months later in 1946, to market a model engine. This one was called the "Bobcat" and was a .42 cu. in. displacement engine. It was marketed under the company name of Stenmoor Manufacturing 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.



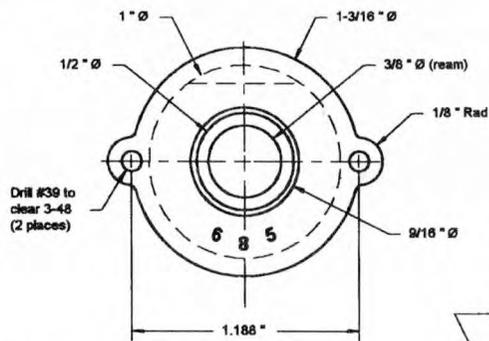
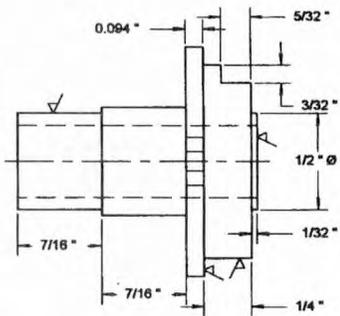


**-1 CRANKCASE**  
Aluminum Casting



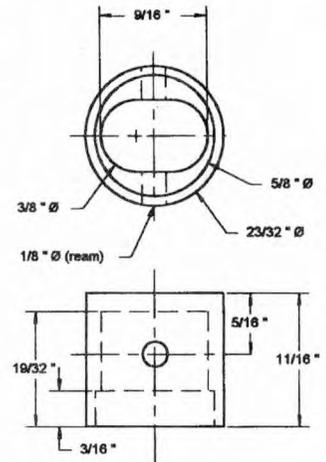
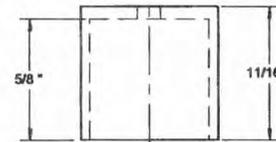
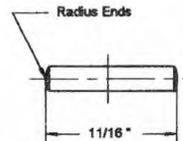
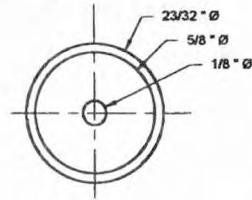
Machine

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



Drill #39 to clear 3-48 (2 places)

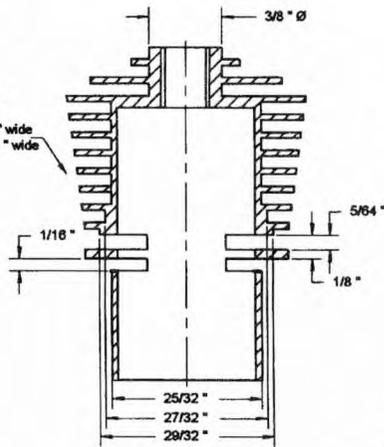
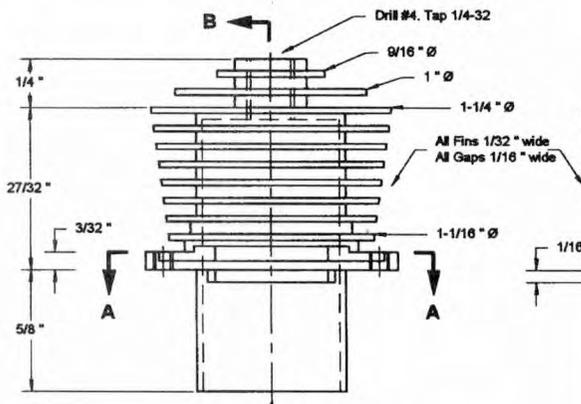
**-1 FRONT BEARING**  
Aluminum Casting



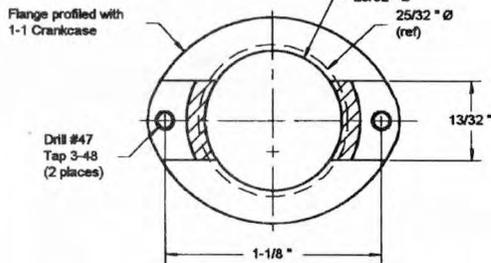
**-5 WRIST PIN**  
1/8" Drill Rod

**-6 PISTON (Original)**  
SG Cast Iron

**-3 PISTON (modern)**  
SG Cast Iron

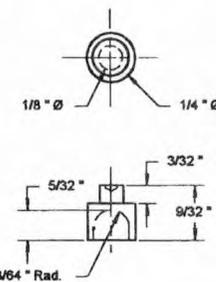


**Section B-B**

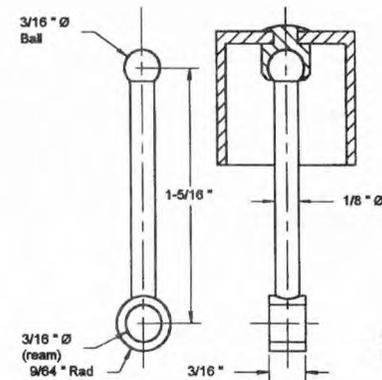


**Section A-A**

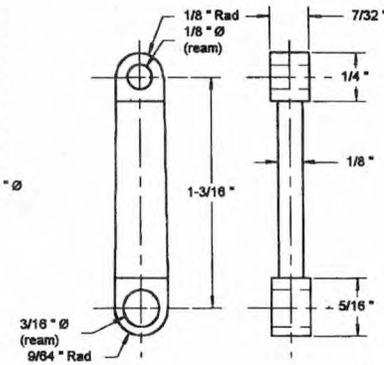
**-2 CYLINDER**  
Cast Iron or Steel



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



**-8 CONROD (Original)**  
Steel H&T



**-4 CONROD (modern)**  
2024 T3 Dural

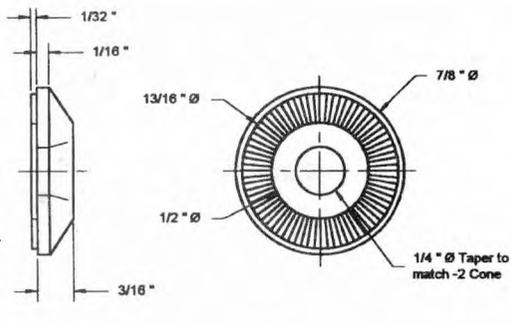
Machine

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



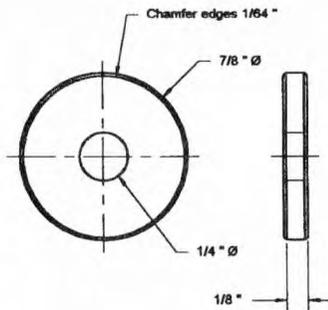
NAME  
**SCRAPPER .29**

NUMBER  
**Sheet 2 - Cylinder and Housing**



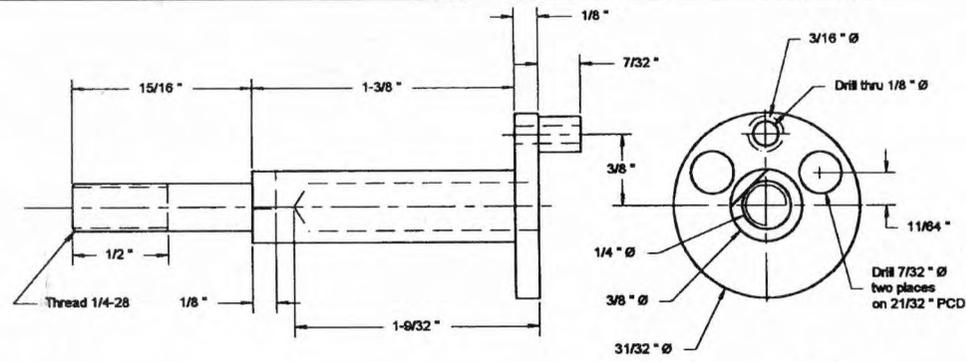
**-3 PROP DRIVE WASHER**

Steel



**-2 PROP WASHER**

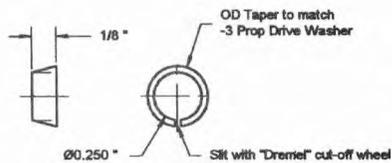
Steel



**-1 CRANKSHAFT**

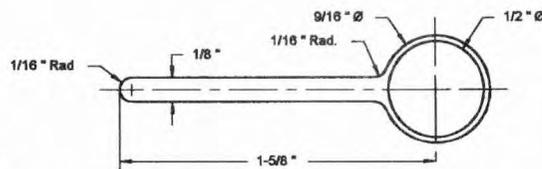
Steel

NOTE:  
Cam flat filed after  
crankshaft finished.



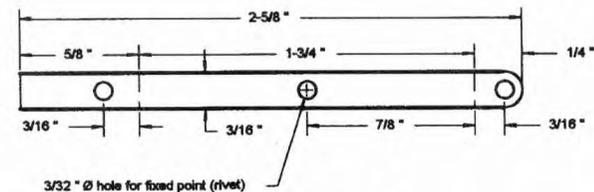
**-9 SPLIT CONE**

Brass



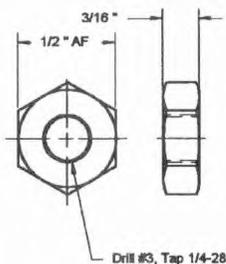
**-5 TIMER ARM**

1/16" Steel Strip



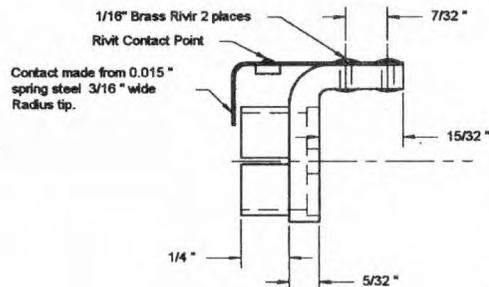
**-8 FIXED POINT STRAP**

1/32" Brass Shim



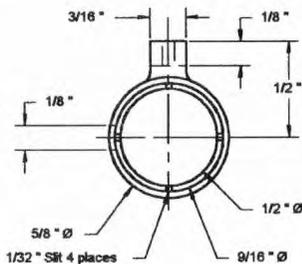
**-6 PROP NUT**

Hex Steel



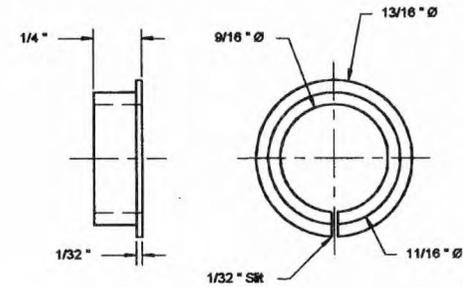
**-4 TIMER ASSEMBLY**

Aluminum Casting



**-7 INSULATOR**

Phenolic

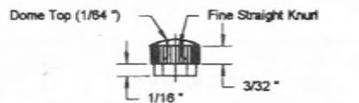


			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES NEXT ASSEMBLY
			SCALE	FULL SIZE	
			DRAWN	RMBI 1-5-1999	
DATE	CHANGE	BY	CAD	BMBI 1.17.1999	

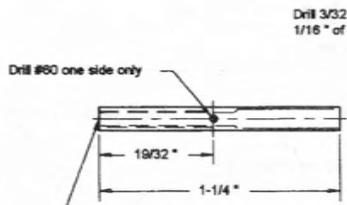


NAME	SCRAPPER .29
NUMBER	Sheet 3 - Crankshaft and Timer

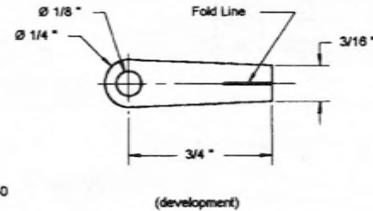
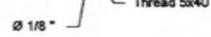
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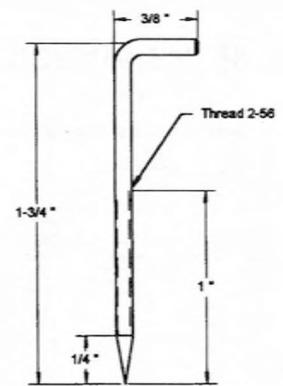
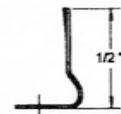
Solder to -4 Needle Valve after running position determined



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

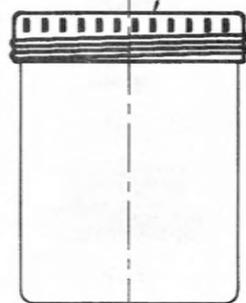
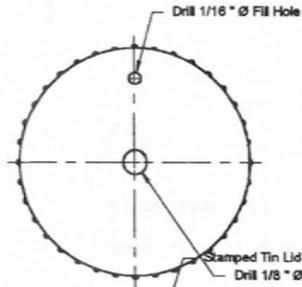


(development)



**-5 THIMBLE**

Brass

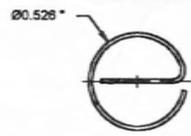


**-6 FUEL TANK**

Screw top jar

**-1 SPRAYBAR**

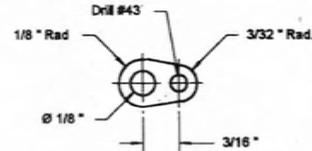
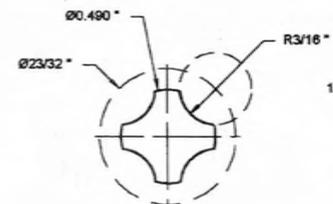
Brass



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

**-3 RATCHET**

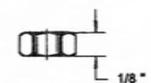
.010 Shim



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

**-4 NEEDLE VALVE**

2-56 "Du-Bro" Push Rod



**-9 VALVE RETAINER**

.020 Music Wire

**-8 CLACK VALVE**

.016 Brass Shim

**-2 SOLDER LUG**

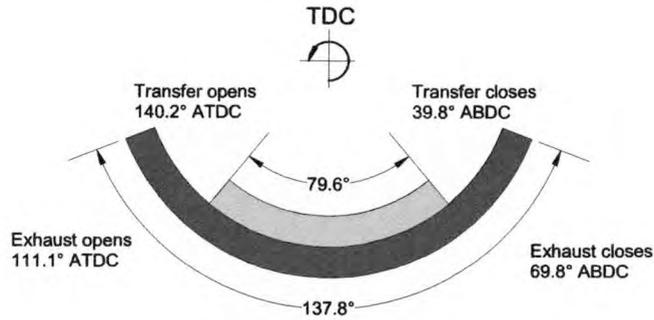
.010 Shim

**-7 SPRAY BAR NUT**

1/4 inch AF Hex Brass

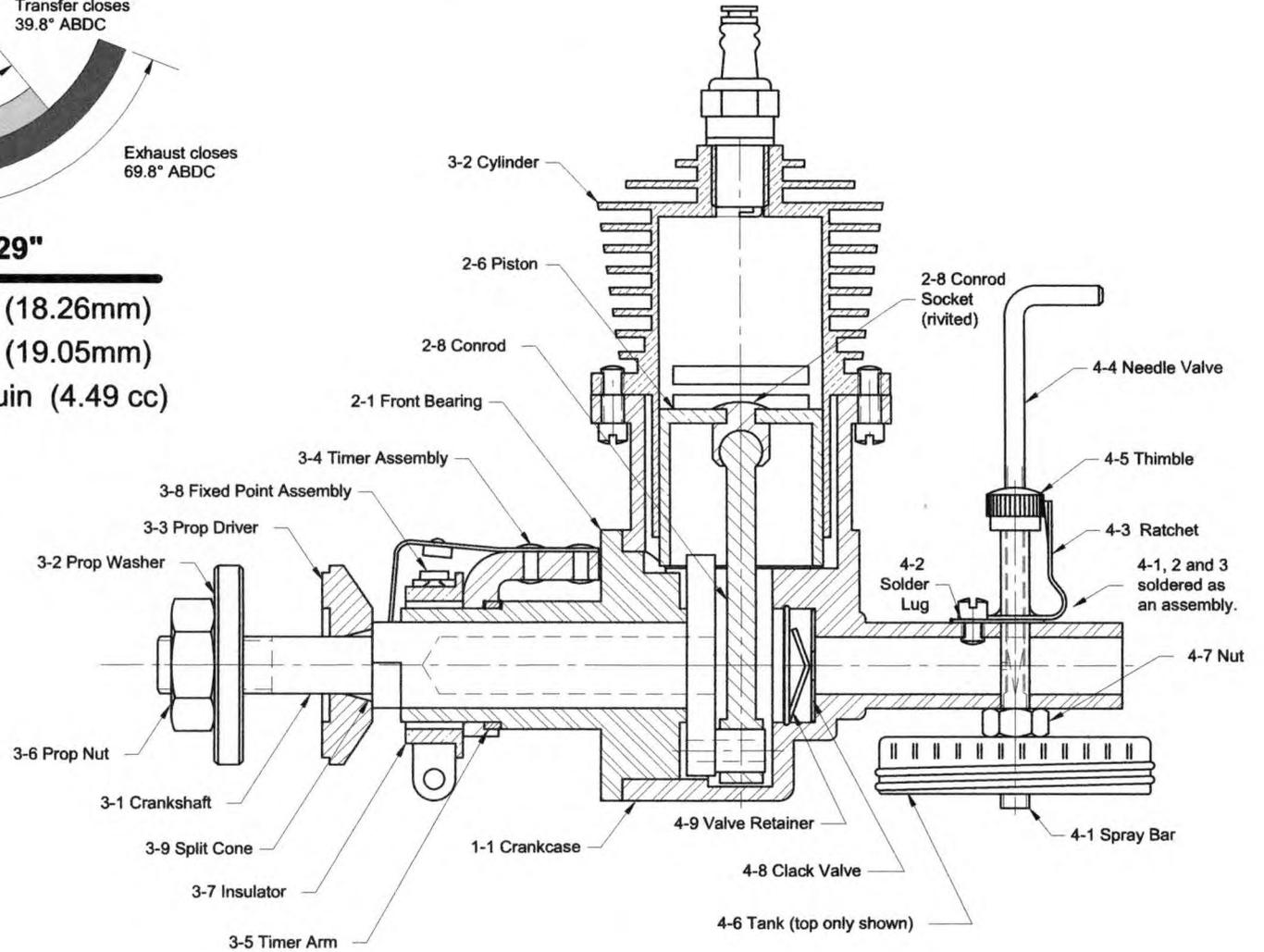
			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME <b>SCRAPPER .29</b>
			SCALE	<b>FULL SIZE</b>			NEXT ASSEMBLY
DATE	CHANGE	BY	DRAWN	<b>RMBI</b> 1-5-1999			<b>Sheet 4 - Fuel System</b>
			CAD	<b>BMBI</b> 1.17.1999			

72 update



### 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 WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME <b>SCRAPPER .29</b>	
			SCALE	<b>1.5 x Full Size</b>			NEXT ASSEMBLY	NUMBER
DATE	CHANGE	BY	CAD	<b>PMB 1997-12-21</b> <b>PMB 1998-01-01</b>				<b>Sheet 5 - General Arrangement</b>

## THE SWISS DYNO

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.

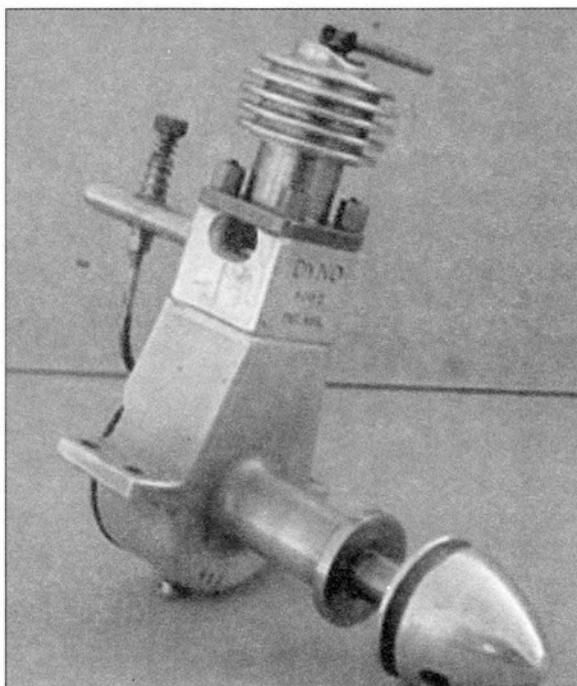
Before the Dyno there was another diesel engine in Switzerland, the Etha 8.25cc, produced probably in 1937 and 1938. The Etha is considered to be the first commercially produced diesel engine. It was sold in a model shop in Zurich along with the Dyno. The Etha was very heavy, vibrated, and was difficult 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.

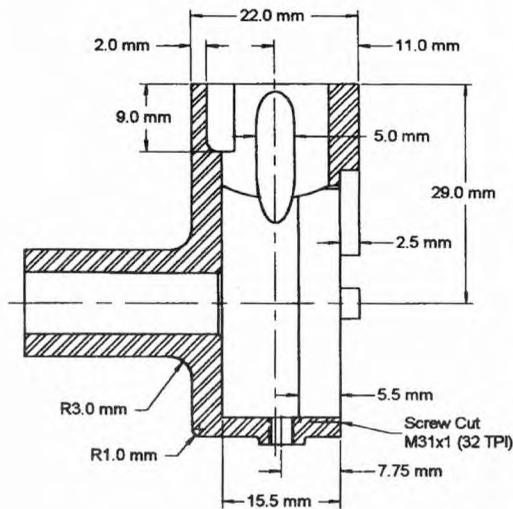
The Dyno has a displacement of 2.04cc, a bore of 12mm and a stroke of 18mm. It weighs 190 grams, or about 7 ounces. The cylinder is steel and the threaded-on head with cooling fins is aluminum. The crankcase is aluminum. The piston, contra-piston and connecting rod are steel. The connecting rod is bushed.

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.

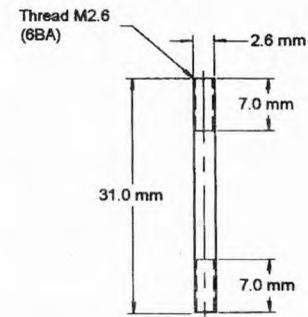
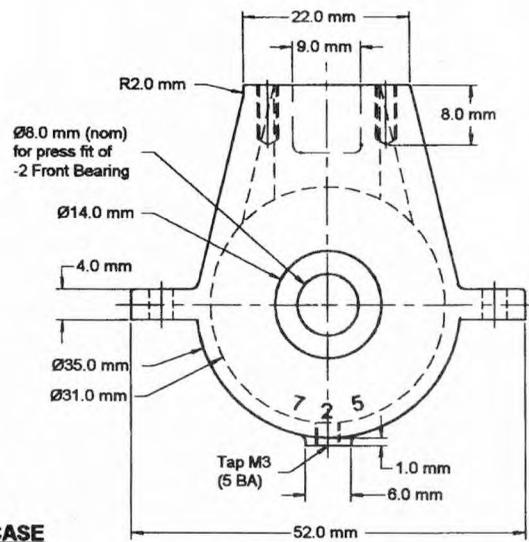
The Dyno pictured above is the engine that Jim brought back from Italy. Lightly scribed on the rear is "Rome 1944". It is easy to start and is a strong runner.

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.

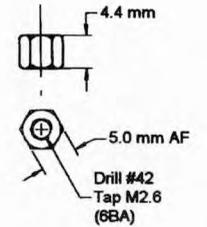




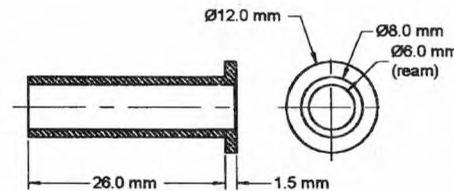
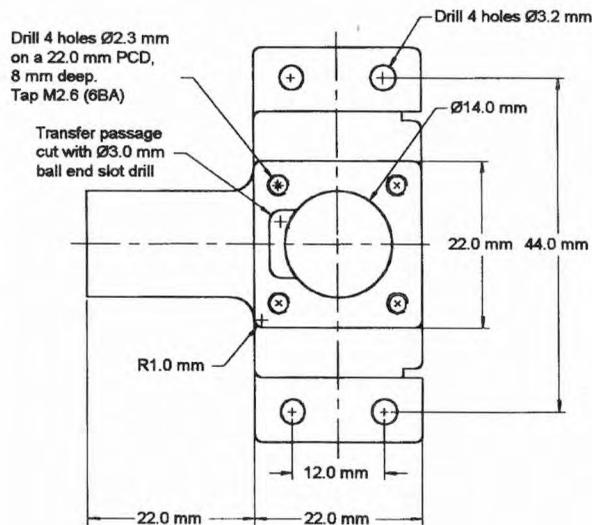
**-1 CRANKCASE**  
Aluminum Casting



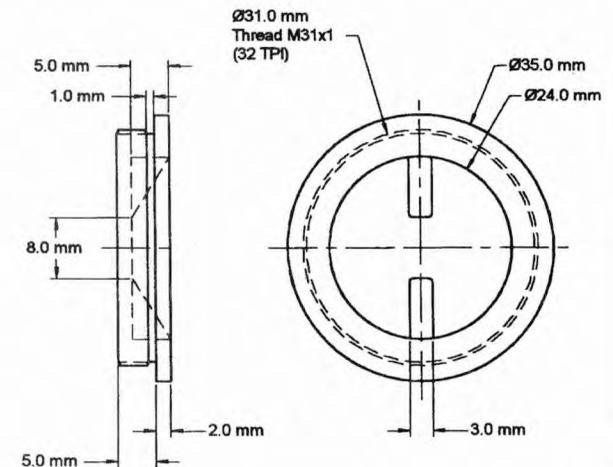
**-4 STUD**  
Steel (4 reqd)



**-5 NUT**  
Brass (4 reqd)



**-2 FRONT BEARING**  
Cast Iron



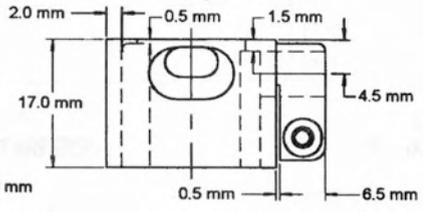
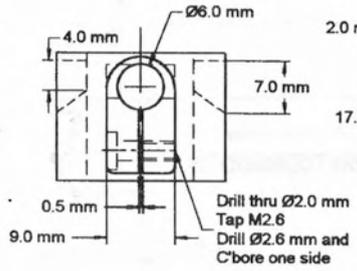
**-3 BACKPLATE**  
Aluminum Casting

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>Full Size</b>	
			DRAWN		
DATE	CHANGE	BY	CAD	<b>PMB</b>	NEXT ASSEMBLY



NAME  
**Klemenz-Schenk DYNO 1**

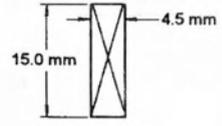
NUMBER  
**Sheet 1 - Crankcase**



**-2 CRANKCASE UPPER**

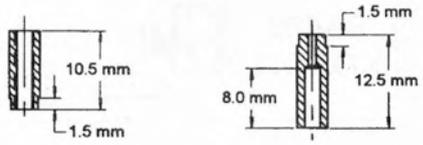
Aluminum Casting

Drill 4 holes Ø2.8 mm on 22.0 mm PCD



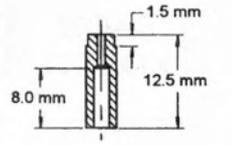
**-11 NEEDLE SPRING**

0.05 mm Piano Wire; 7 coils



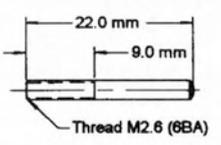
**-5 NEEDLE BODY**

Brass



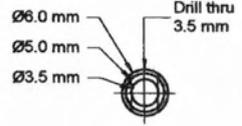
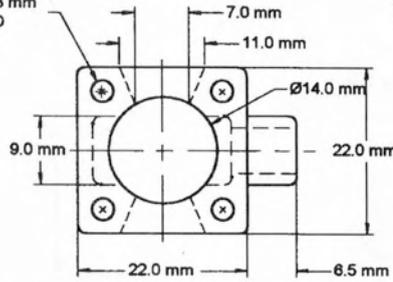
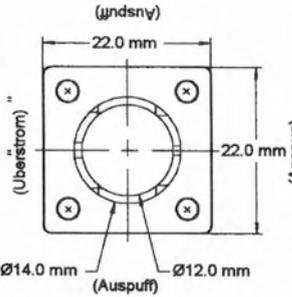
**-6 NEEDLE JET**

Brass



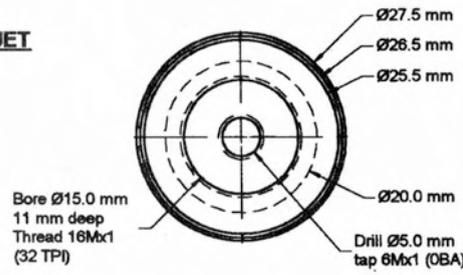
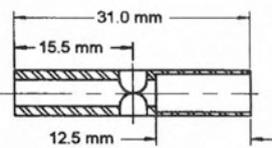
**-7 TOMMY BAR**

Steel



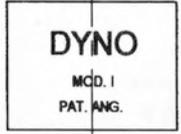
**-4 VENTURI TUBE**

Steel

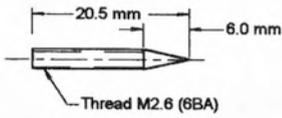


Bore Ø15.0 mm 11 mm deep Thread 16Mx1 (32 TPI)

Drill Ø5.0 mm tap 6Mx1 (6BA)

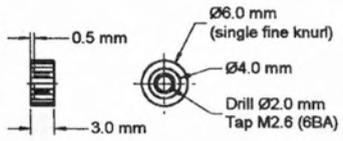


Engraving Detail



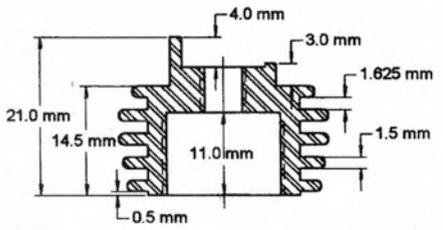
**-9 NEEDLE VALVE**

Steel



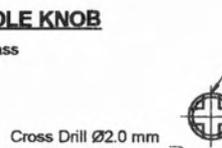
**-10 NEEDLE KNOB**

Brass

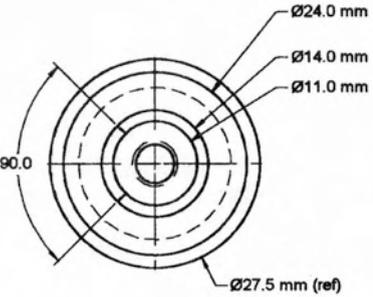


**-8 COMPRESSION SCREW**

Steel

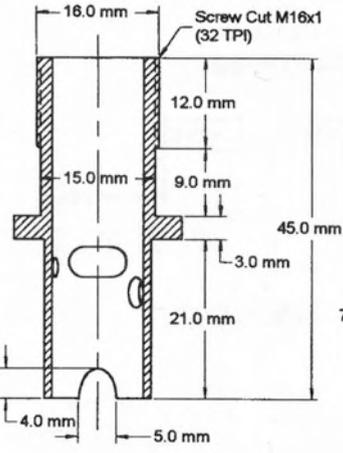


Cross Drill Ø2.0 mm Tap M2.6 (6BA)



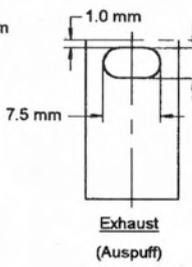
**-3 CYLINDER HEAD**

Aluminum

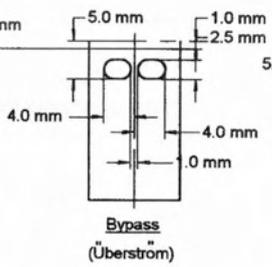


**-1 CYLINDER**

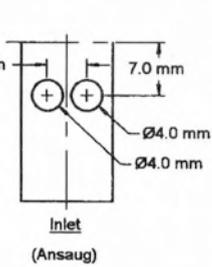
Steel



Exhaust (Ausuff)



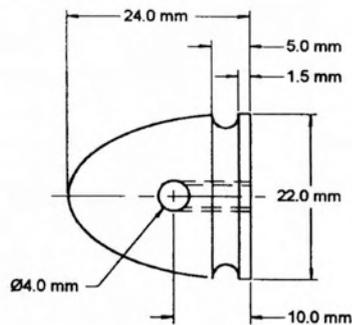
Bypass (Überstrom)



Inlet (Ansaug)

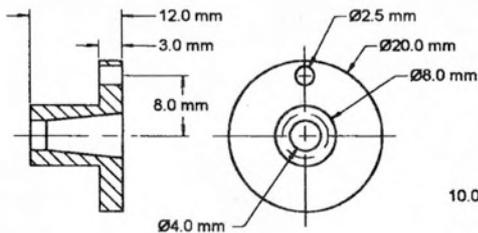
75

			MATL	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME	Klemenz-Schenk DYNO 1
			SCALE	Full Size			NEXT ASSEMBLY	NUMBER
DATE	CHANGE	BY	CAD	PMB				



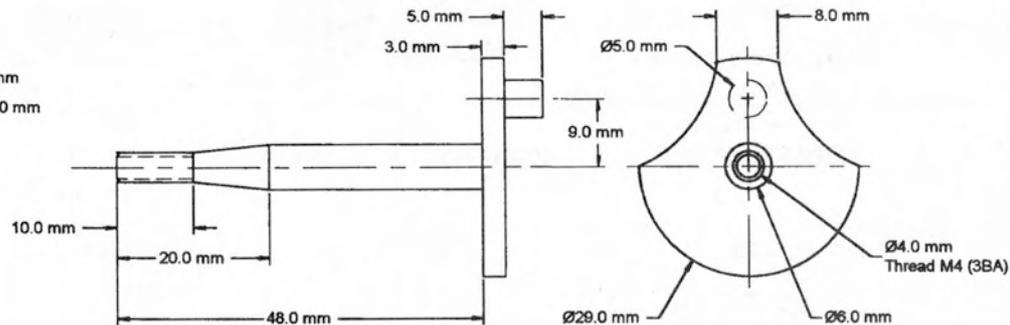
**-3 SPINNER NUT**

Aluminum



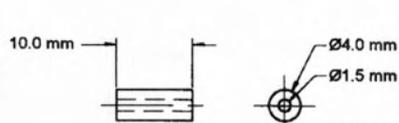
**-2 DRIVE WASHER**

Steel



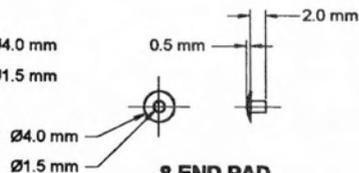
**-1 CRANKSHAFT**

Steel



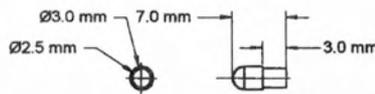
**-7 GUDGEON PIN**

Drill Rod (H&T)



**-8 END PAD**

Aluminum (2 reqd)



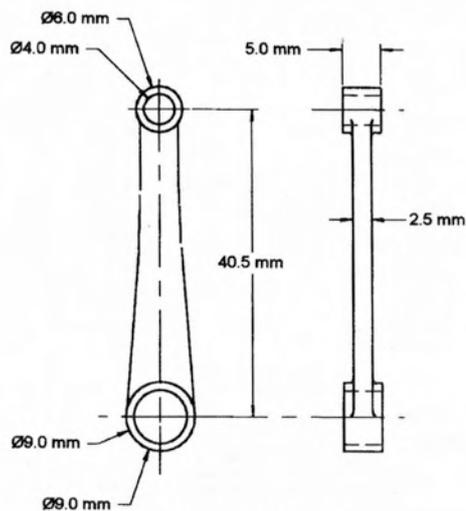
**-9 DRIVE PEG**

Steel



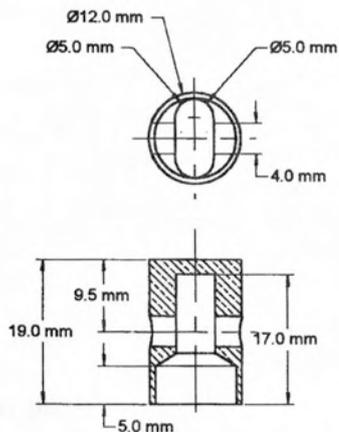
**-5 BUSH**

Bronze



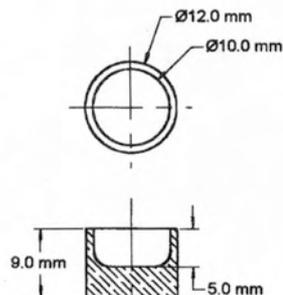
**-4 CONNECTING ROD**

Aluminum (dural)



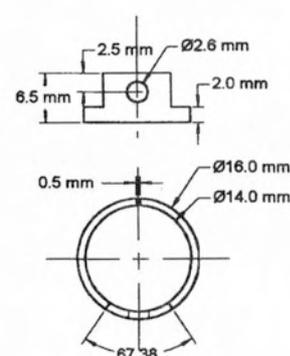
**-6 PISTON**

SG Cast Iron



**-11 CONTRA PISTON**

Cast Iron

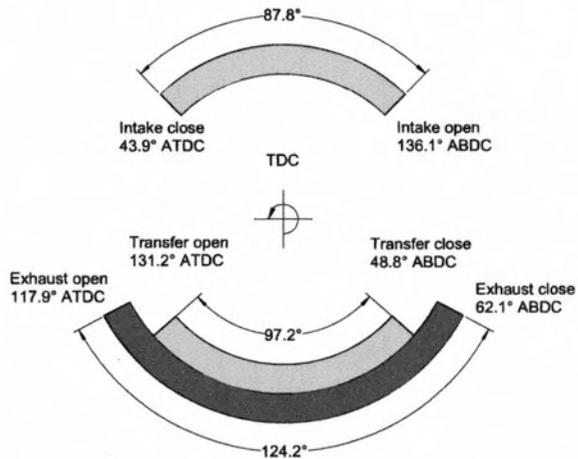


**-10 COMPRESSION LIMITER**

Aluminum

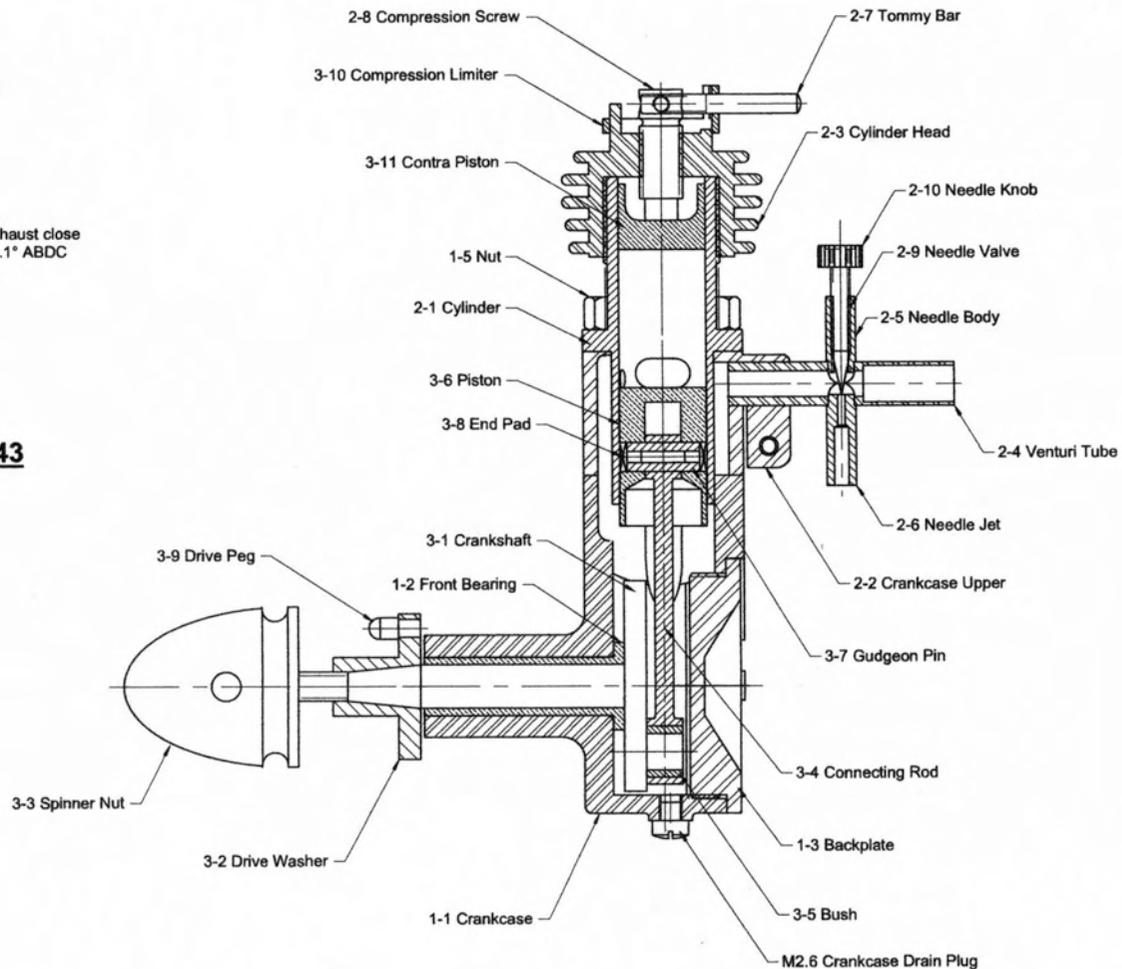
76

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



### Klemenz-Schenk DYNO 1 circa 1943

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

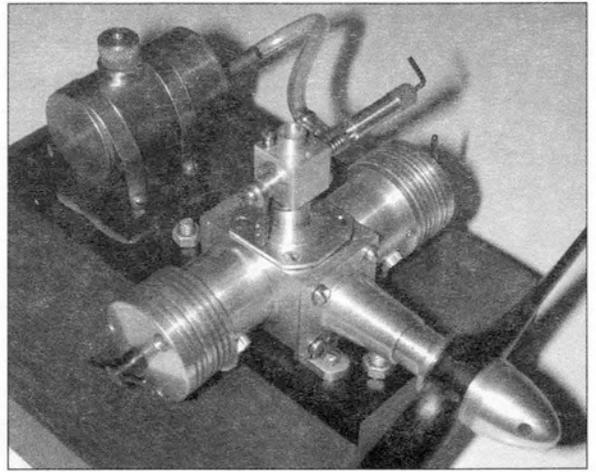


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
2007-08-14	Timing diagram corrected and standardized	BMBI	SCALE	<b>Full Size</b>			NEXT ASSEMBLY
Jan 5 2000	Timing diagram added	BMBI	DRAWN	Nov 1 1999	NUMBER		
DATE	CHANGE	BY	CAD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

## 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.

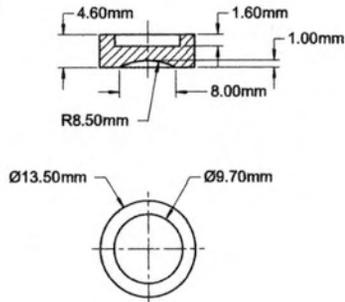
Casually, I mentioned that this looked like a good choice for a Motor Boys plan set and perhaps he might allow me to take some measurements? I was saved from my having to execute my contingency plan (which involved a lot of embarrassing begging and groveling on bended knees) by Russ offering the loan 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.

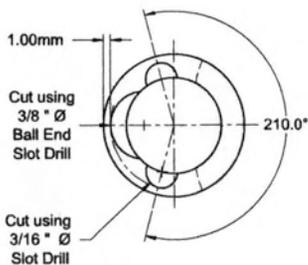
The FTP Twin is a strong runner and started so readily that Russ nearly lost fingers in the surprise. Although it requires an advanced degree of experience in model engine building in order to work out the machining sequences and to know which parts need to be precisely aligned to minimize working friction, 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.

79 update



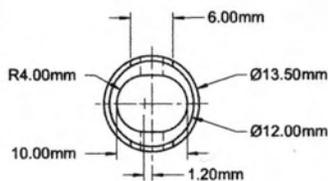
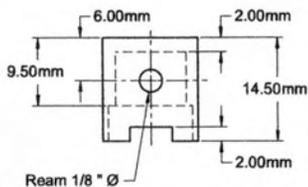
**-3 CONTRA-PISTON**

Cast Iron



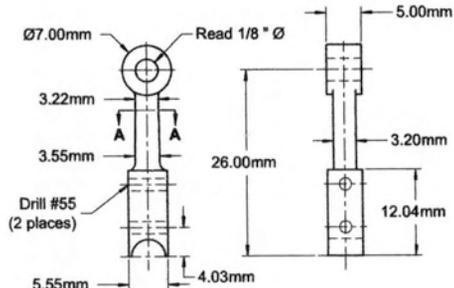
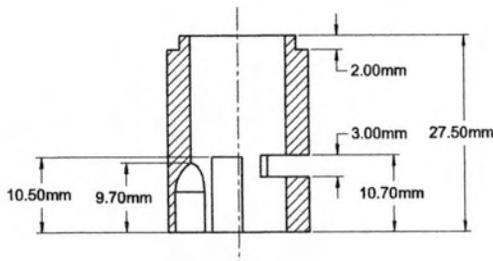
**-1 CYLINDER LINER**

Steel



**-2 PISTON**

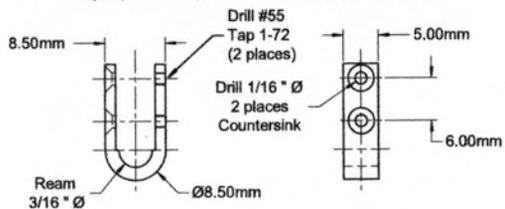
Cast Iron



**-5 CONROD**

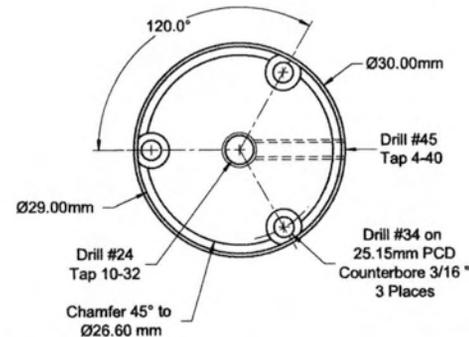
Aluminum Bronze

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.



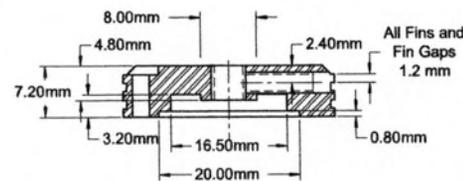
**-6 CONROD CAP**

Aluminum Bronze



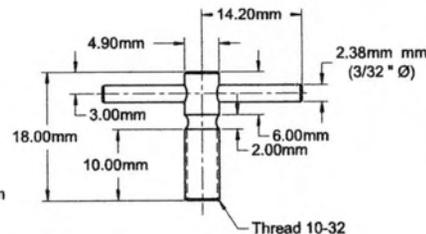
**-7 CYLINDER HEAD**

Aluminum



**-8 COMPRESSION SCREW ASSY.**

Steel (Blue Finished)



28 Oct 1999	Change big end screws to countersunk head	BMBI	MAT'L	As Noted
2006-02-04	Show thread on Conrod U Straps.	BMBI	SCALE	<b>Full Size</b>
			DRAWN	<b>RWW</b>
DATE	CHANGE	BY	CAD	<b>BMBI</b>

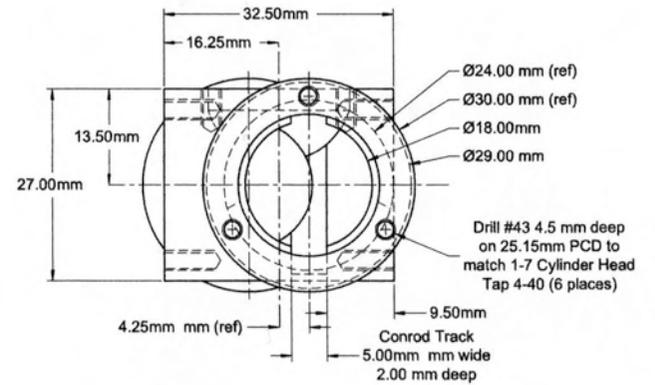
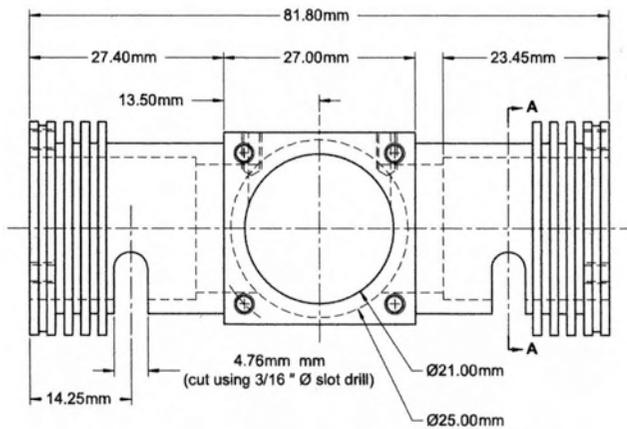
**DO NOT SCALE DRAWING**

WORK TO DIMENSIONS  
ALL DIMENSIONS  
ARE IN INCHES

NEXT ASSEMBLY

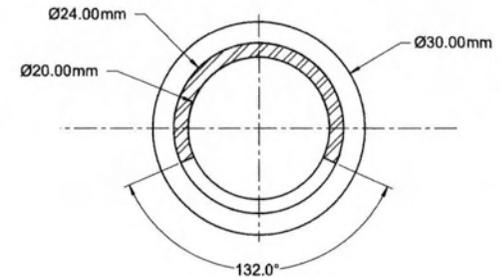
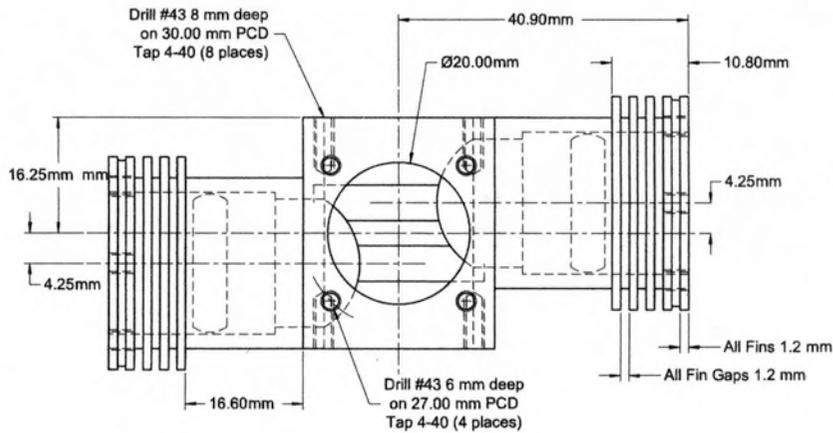
**MOTOR BOYS**  
(INTERNATIONAL)

NAME	<b>Fig Tree Pocket Twin</b>
NUMBER	<b>Sheet 1 - CYLINDER</b>



**-1 CRANKCASE**

Aluminum (7075 T4)

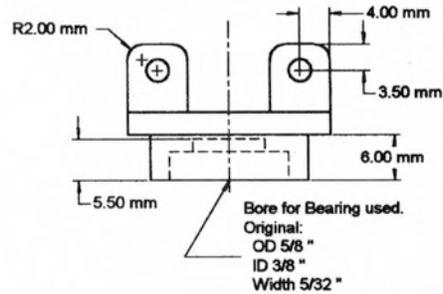
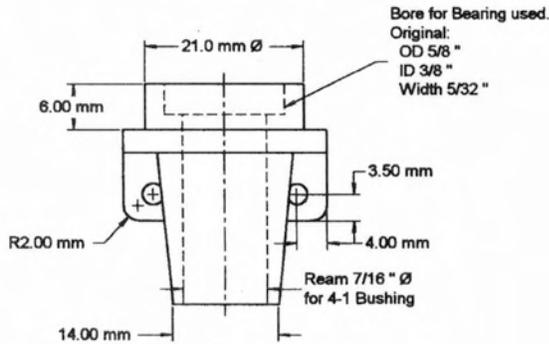
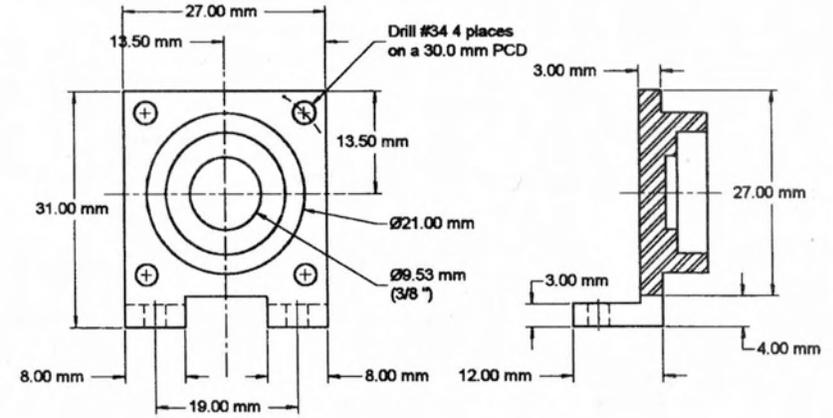
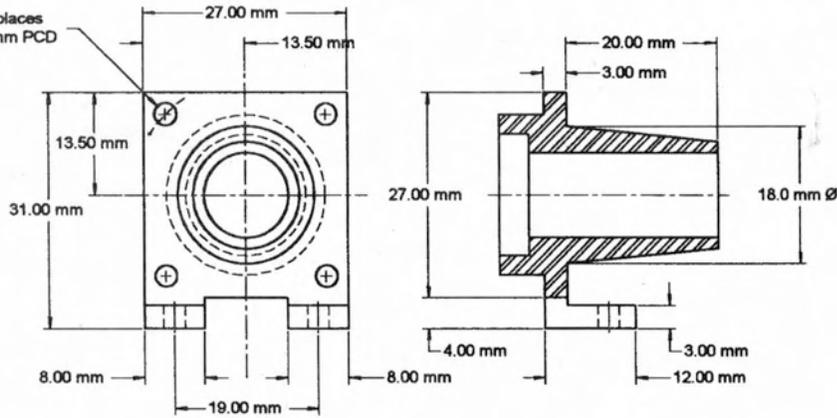


**SECTION A-A**

80 update

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

Drill #34 4 places  
on a 30.0 mm PCD



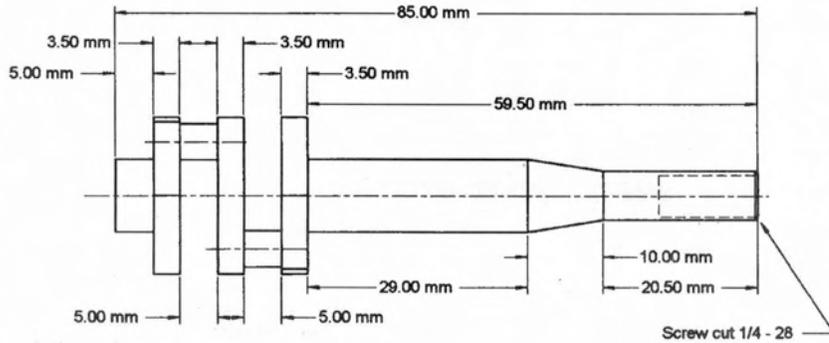
**-1 FRONT BEARING HOUSING**

Aluminum (7075 T4)

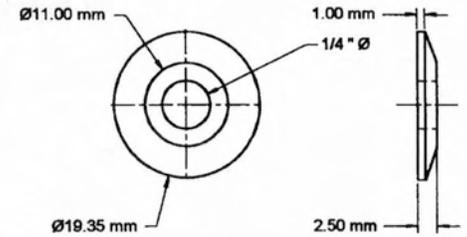
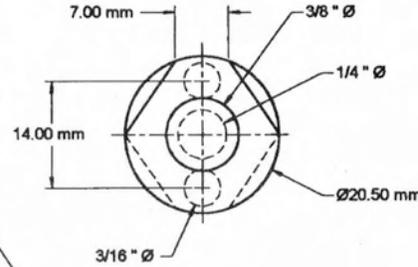
**-2 REAR BEARING HOUSING**

Aluminum (7075 T4)

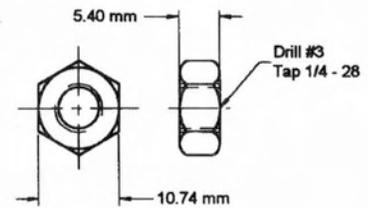
			MATL	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
			SCALE	Full Size			Fig Tree Pocket Twin
			DRAWN	RWW	NEXT ASSEMBLY		NUMBER
DATE	CHANGE	BY	CAD	BMBI			Sheet 3 - CRANKCASE ENDS



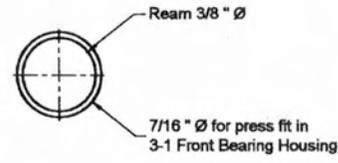
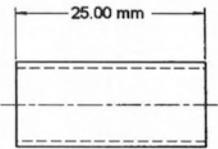
**-2 CRANKSHAFT**  
Steel



**-5 PROP WASHER**  
Aluminum

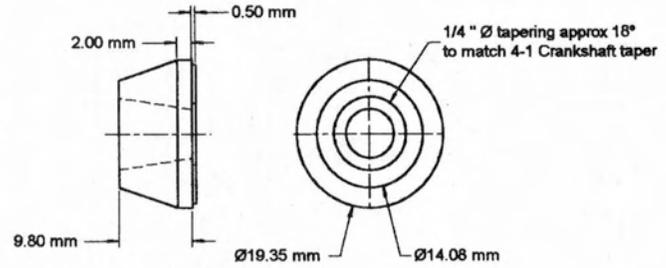
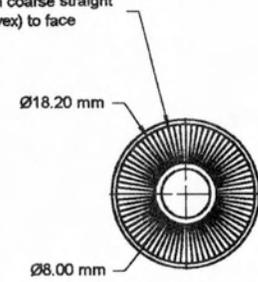


**-4 PROP NUT**  
Hex Steel



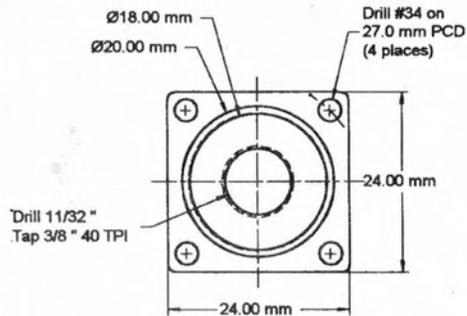
**-1 BEARING**  
Bearing Bronze

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



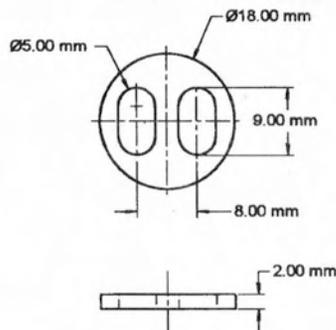
**-3 DRIVE WASHER**  
Aluminum

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



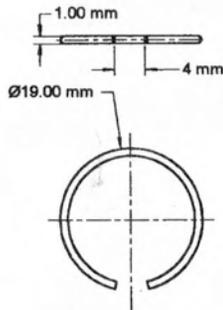
**-1 REED VALVE HOUSING**

Aluminum



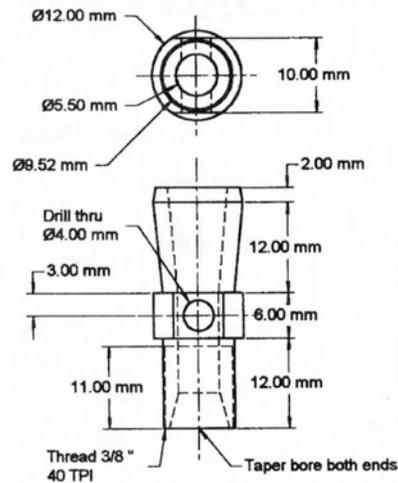
**-2 REED PLATE**

Aluminum



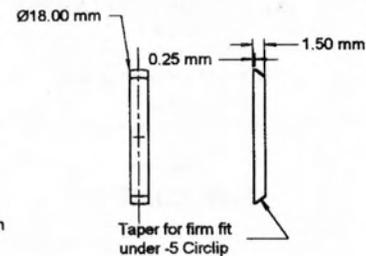
**-5 CIRCLIP**

1 mm Music Wire



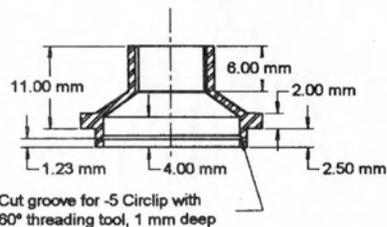
**-10 VENTURI**

Aluminum



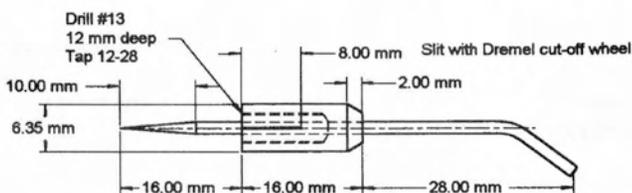
**-4 REED CLAMP BAR**

Aluminum



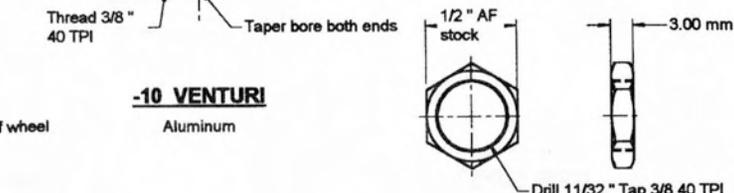
**-9 NEEDLE VALVE ASSY.**

Brass + 1/16" Music Wire



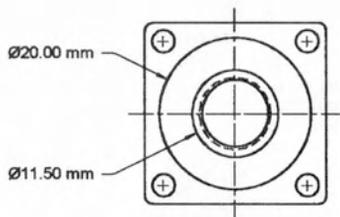
**-7 SPRAY BAR**

Hex Brass



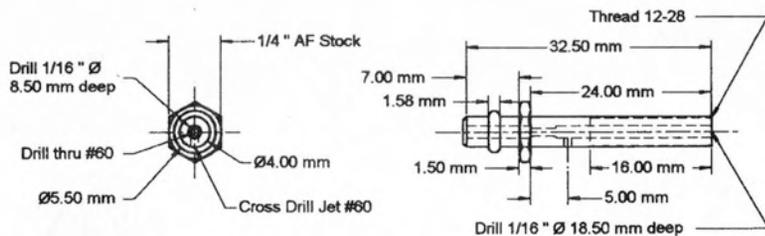
**-11 VENTURI NUT**

Hex Brass



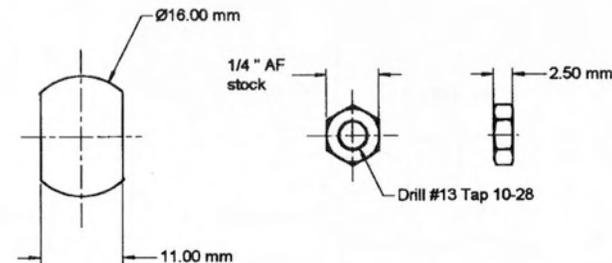
**-1 REED VALVE HOUSING**

Aluminum



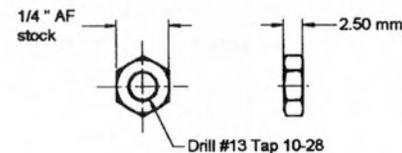
**-7 SPRAY BAR**

Hex Brass



**-3 REED**

0.002" Mylar



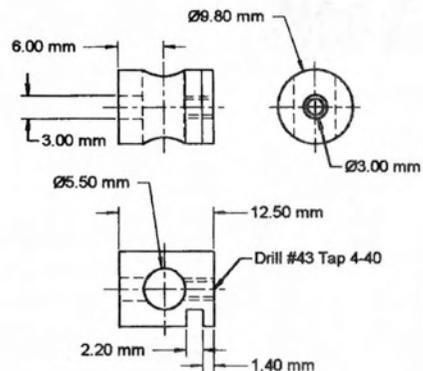
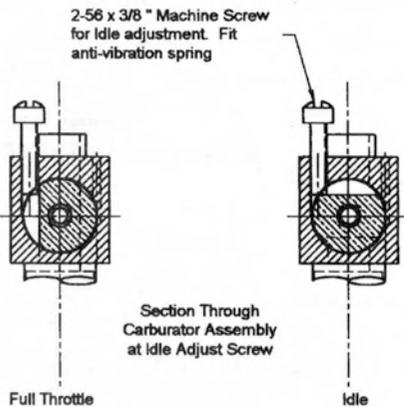
**-6 SPRAYBAR NUT**

Hex Brass

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>Full Size</b>	
			DRAWN	<b>RWW</b>	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>BMBI</b>	

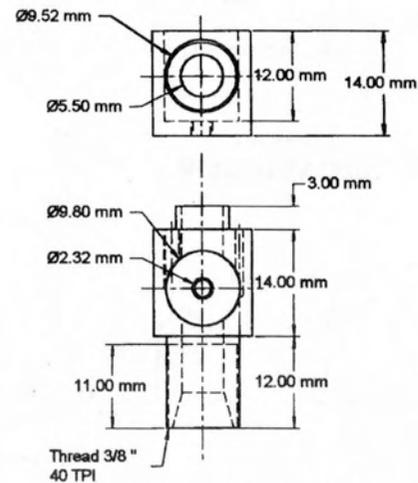


NAME	<b>Fig Tree Pocket Twin</b>
NUMBER	<b>Sheet 5 - INDUCTION SYSTEM</b>



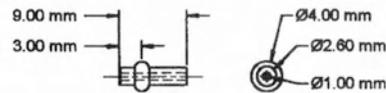
**-2 CARB BARREL**

Hex Brass



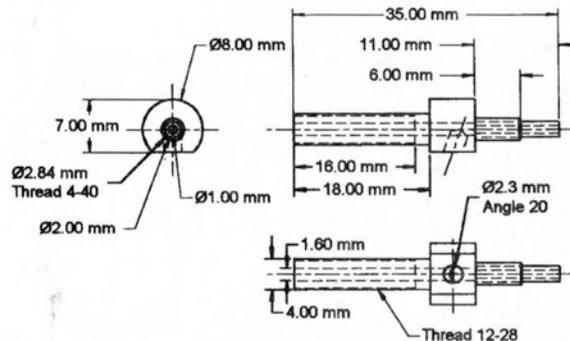
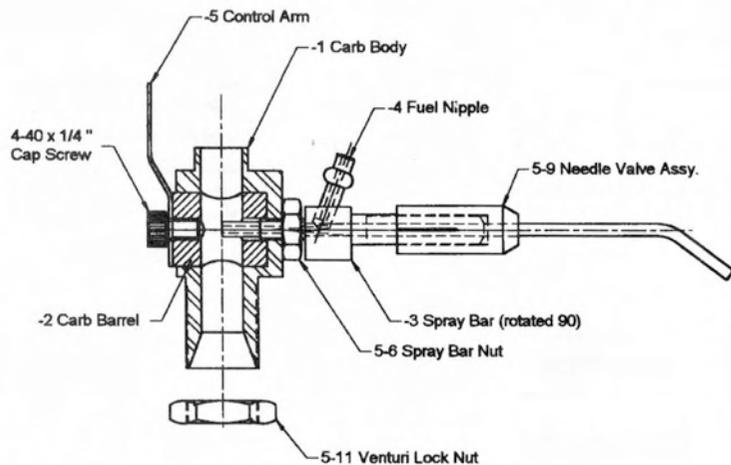
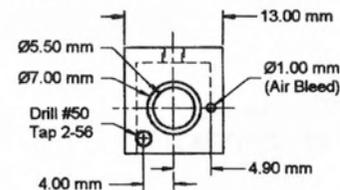
**-1 CARB BODY**

Aluminum



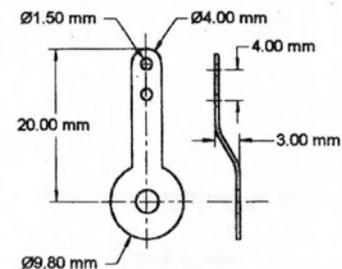
**-4 FUEL NIPPLE**

Brass



**-3 CARB SPRAY BAR**

Hex Brass



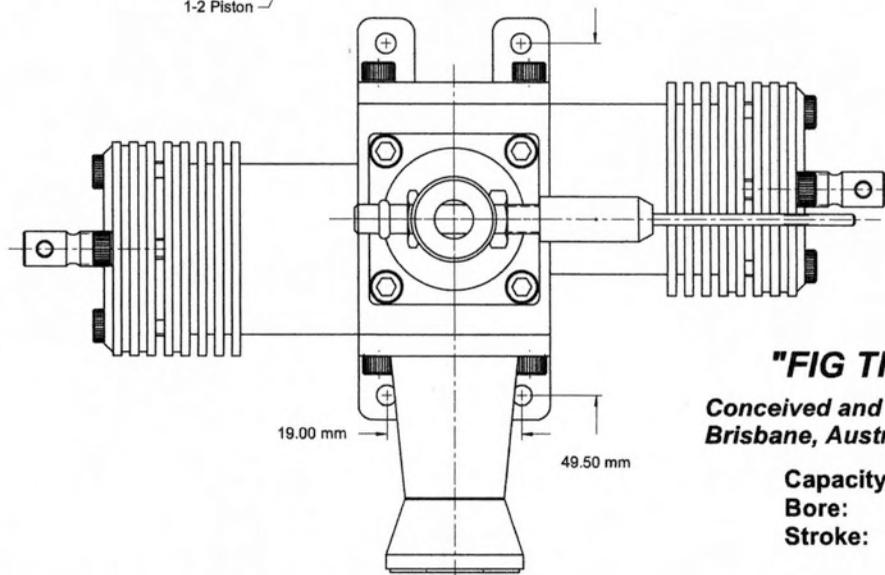
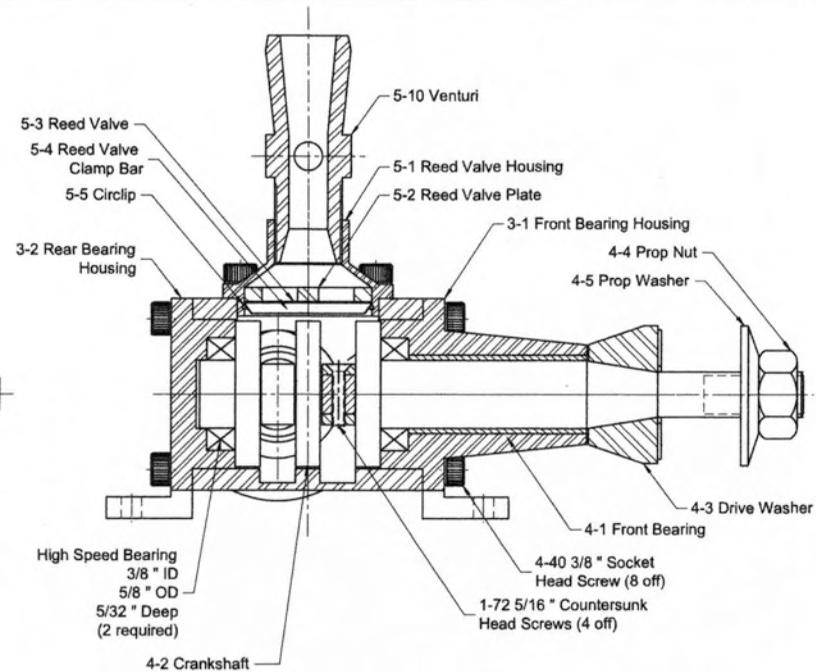
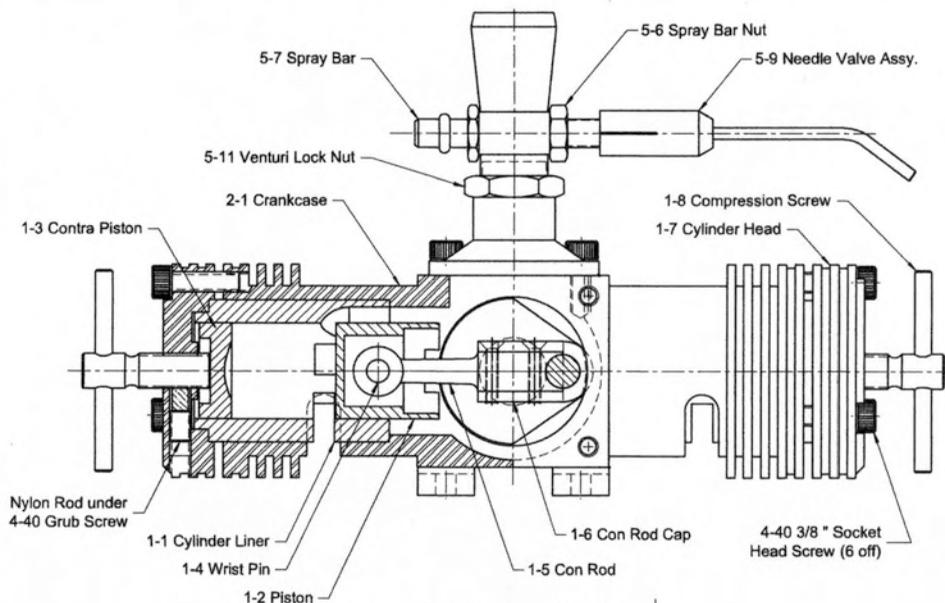
**-5 CONTROL ARM**

1mm Steel

			MATL	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>Full Size</b>	
			DRAWN	<b>RWW</b>	
DATE	CHANGE	BY	CAD	<b>BMBI</b>	NEXT ASSEMBLY



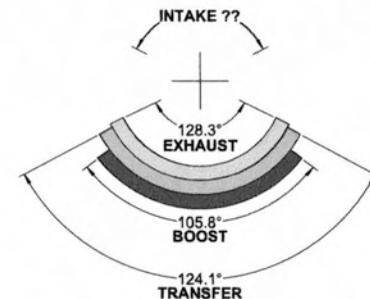
NAME	<b>Fig Tree Pocket Twin</b>
NUMBER	<b>Sheet 6 - R/C CARBURATOR</b>



## "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 NEXT ASSEMBLY
2006-02-04	Change big end screws to permit assembly	BMBI	SCALE	Full Size	
			DRAWN	RWW	
DATE	CHANGE	BY	CAD	BMBI	



**MOTOR  
BOYS**  
(INTERNATIONAL)

NAME  
**Fig Tree Pocket Twin**

NUMBER  
**Sheet 7 - GENERAL ARRANGEMENT**

## 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.

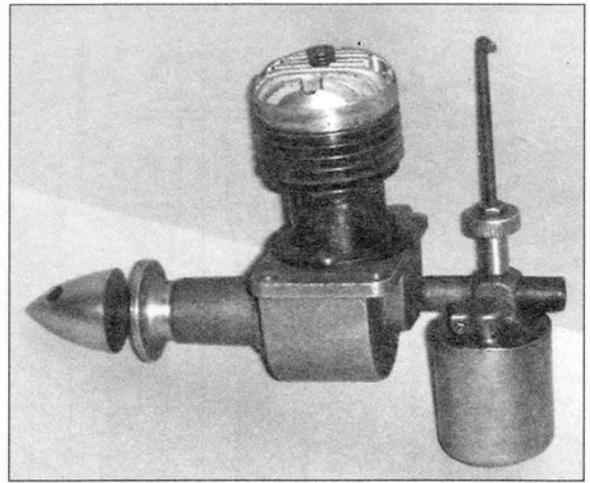
Earl Vivell was on a roll. His engine line was expanding and his hobby business was doing very well. He was right in the middle of the post-war modeling boom. A Twin was added and was produced in several models. By 1948 he added a line of small engines under the "Precision" heading.

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.

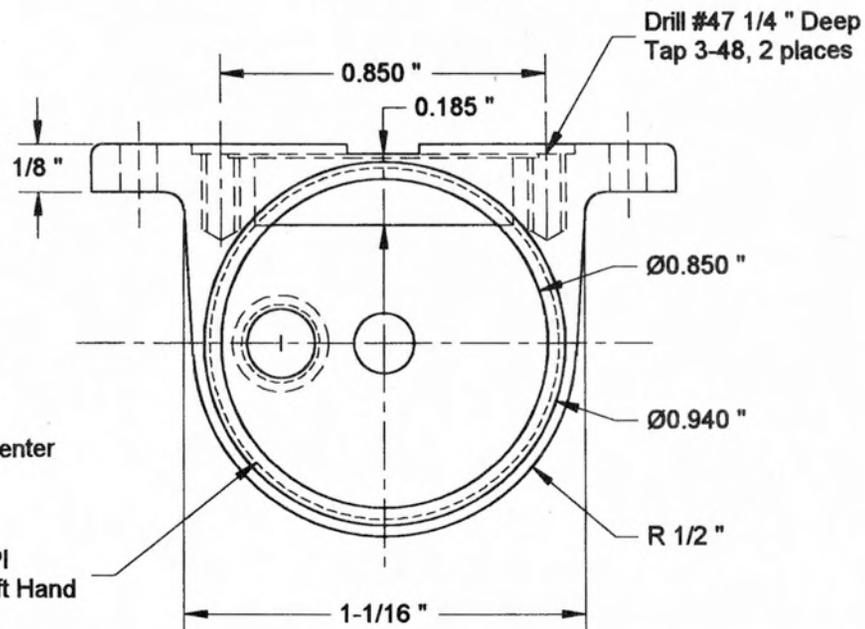
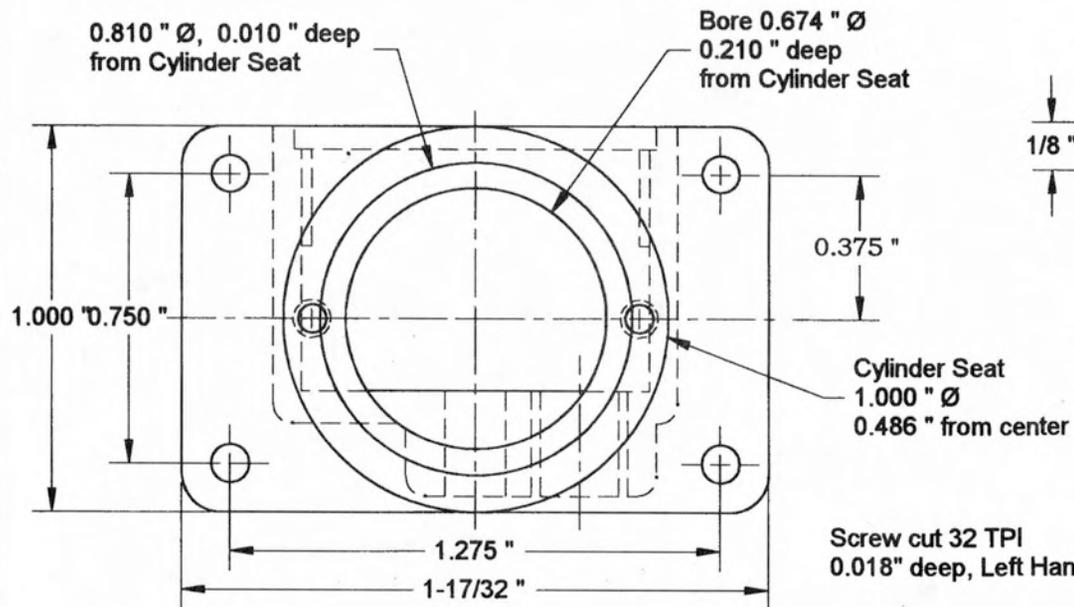
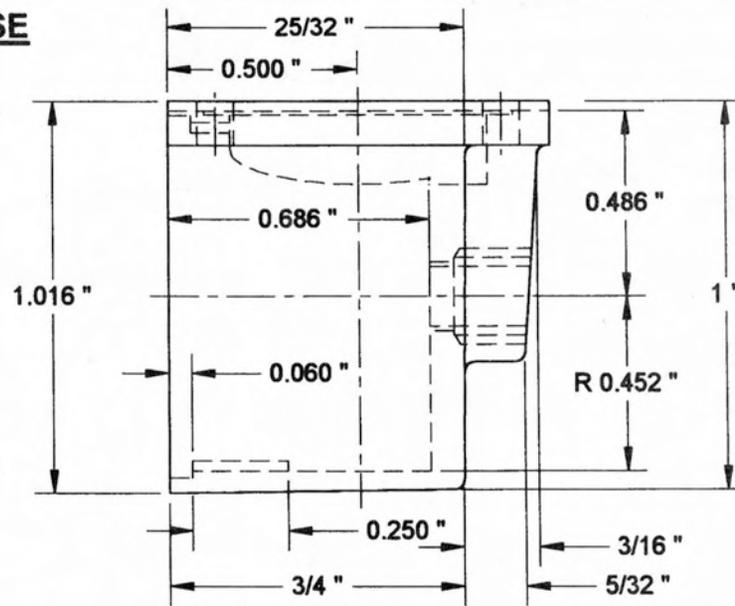
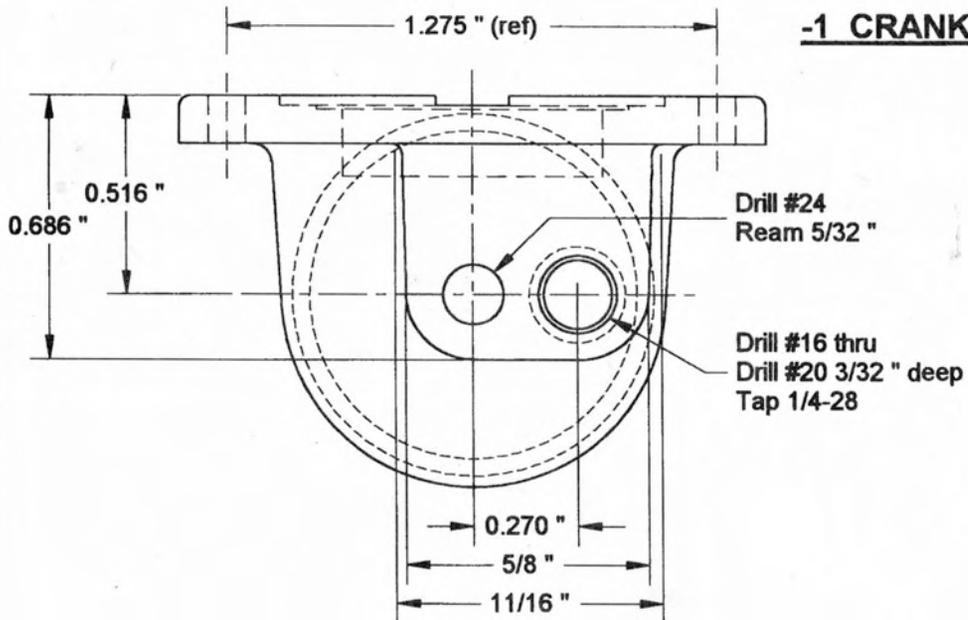
The Twins and the little .09, .035 or .020 engines were also designed and built by Jack Keener. We know that the twin was styled after the Fergusson Condor Twin which was one of Earl's favorite engines. This engine he used in his radio control models because it would carry the weight of the radios of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



			MAT'L	Aluminum Casting	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
8 Apr 1998	Inlet drilling detail amended	PMB	SCALE	<b>2 X SIZE</b>	
6 Jan 1998	Internal Crankcase recess removed	PMB	DRAWN	<b>RMB</b> 12-21-97	NEXT ASSEMBLY
DATE	CHANGE	BY	CAD	<b>PMB</b> 1-5-98	

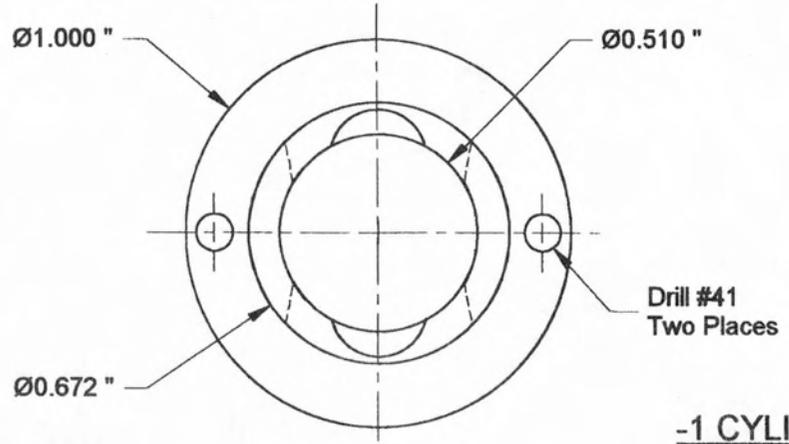
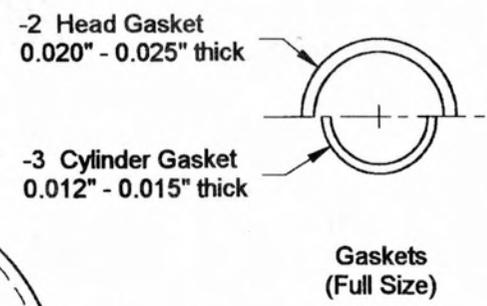
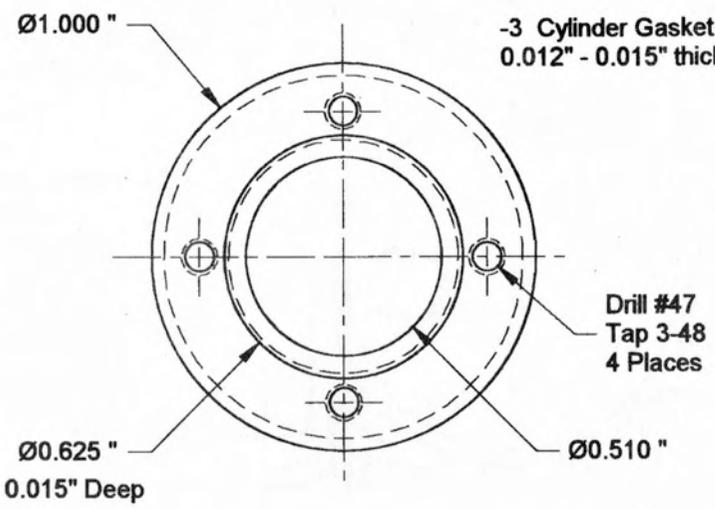
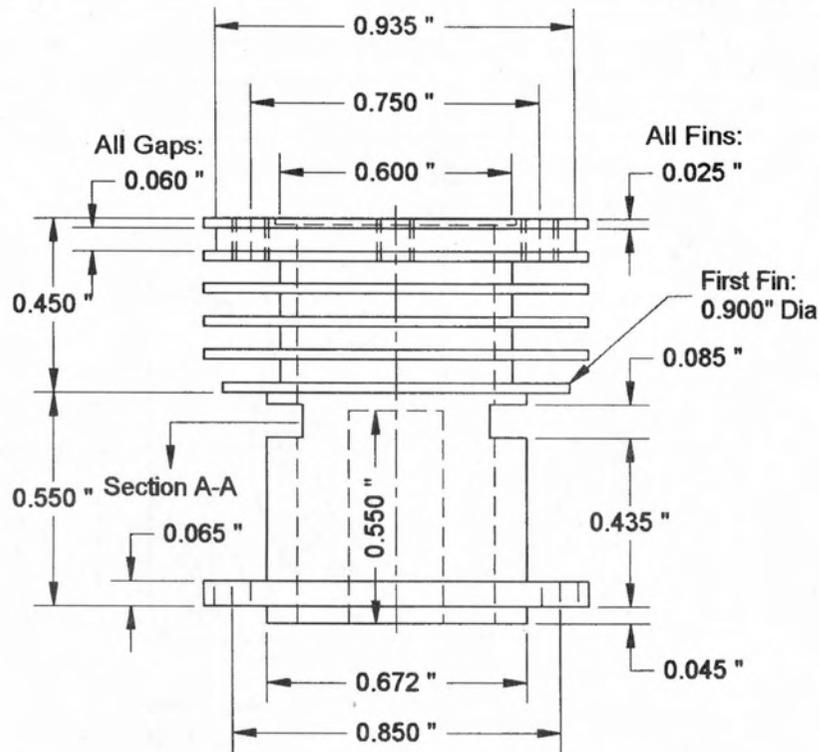


NAME  
**VIVELL 09 DIESEL**

NUMBER  
**Sheet 1 - CRANKCASE**

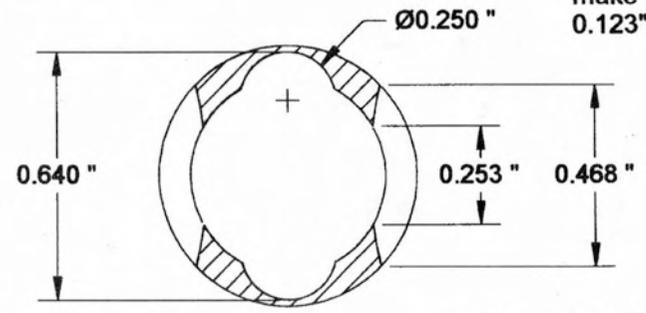
87

88



**-1 CYLINDER**

**Exhaust Ports:**  
 Use 2" Dia. Slitting Saw to make plunge cut, 0.123" deep.

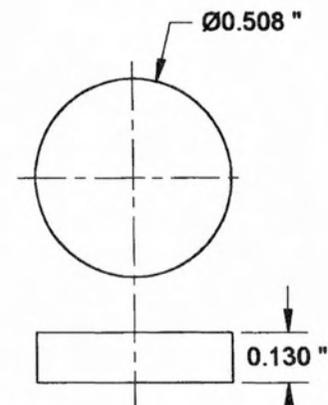
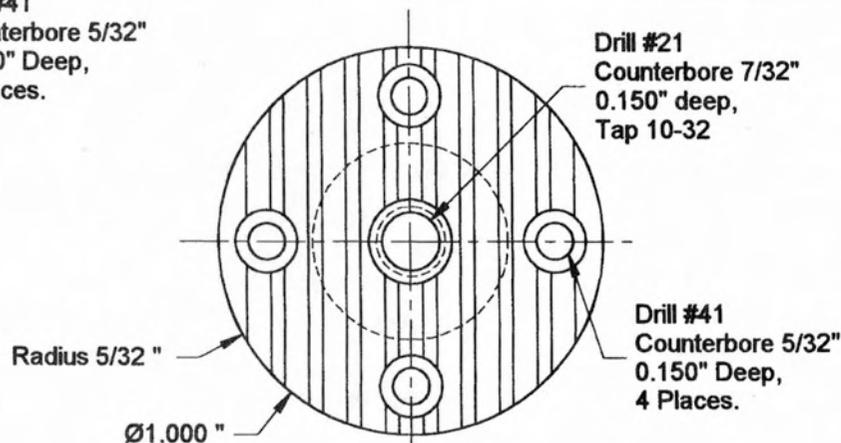
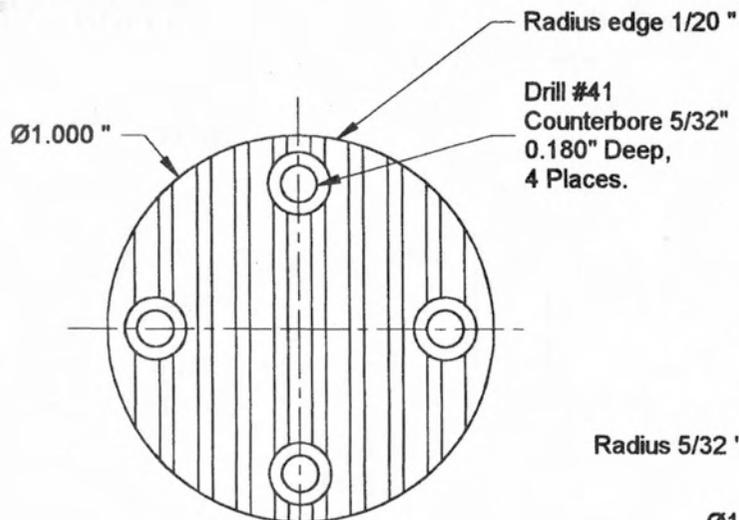


**Section A-A**

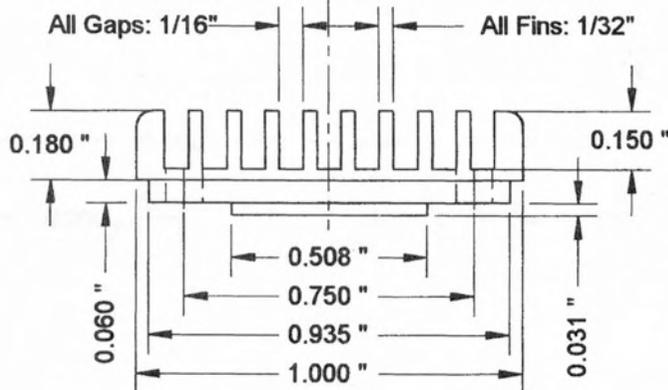
**Transfer Ports:**  
 Use 1/4" Dia. End Mill cut 0.065" into wall.

		MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME
		SCALE	<b>2 X SIZE</b>			NUMBER
		DRAWN	<b>RMB</b>			<b>Sheet 2 - Cylinder</b>
DATE	CHANGE	BY	CAD	<b>PMB</b>		

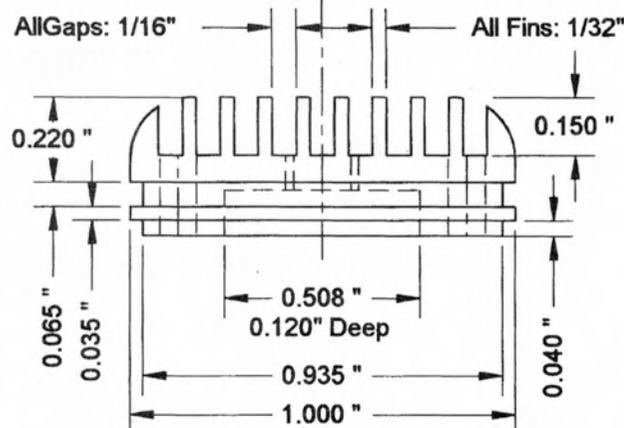
Fastener List		
1	10-32 x 5/16"	Compression Screw
1	3-48 x 7/8"	Tank
2	3-48 x 3/16"	Cheese Head Cylinder
4	3-48 x 5/16"	Cyl. Head (Variable)
4	3-48 x 3/16"	Cyl. Head (Fixed)



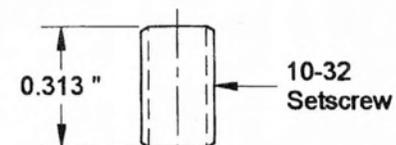
**-3 CONTRA-PISTON**



**-1 MODEL 09F HEAD**



**-2 MODEL 09V HEAD**



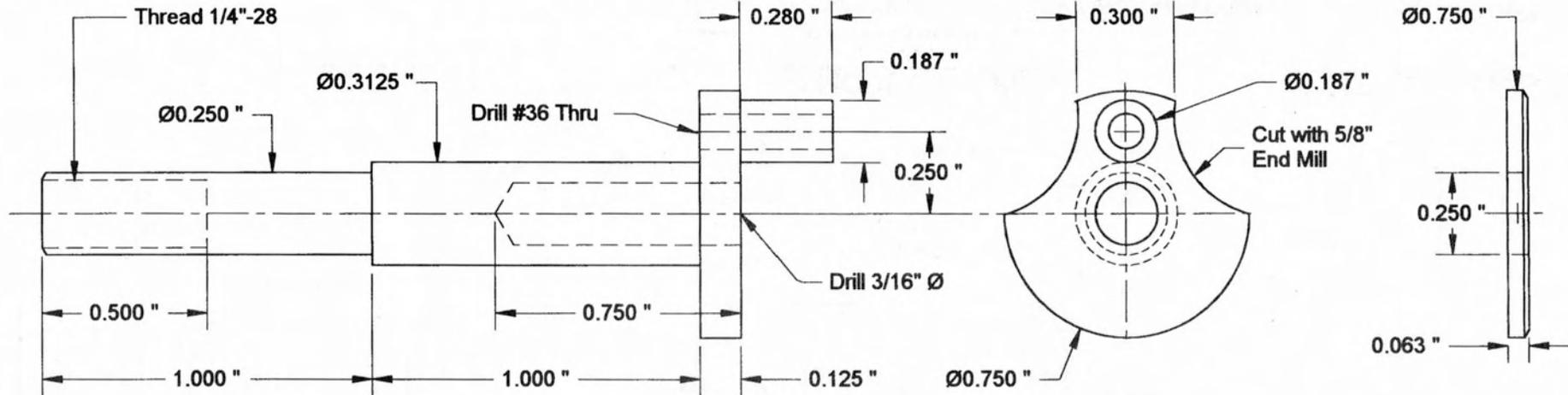
**-4 COMPRESSION SCREW**

			MAT'L	Aluminum	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	2 X SIZE	
			DRAWN	RMB 12-21-97	
DATE	CHANGE	BY	CAD	PMB 1-1-98	NEXT ASSEMBLY



NAME  
**VIVELL 09 DIESEL**

NUMBER  
**Sheet 3 - CYLINDER HEAD**

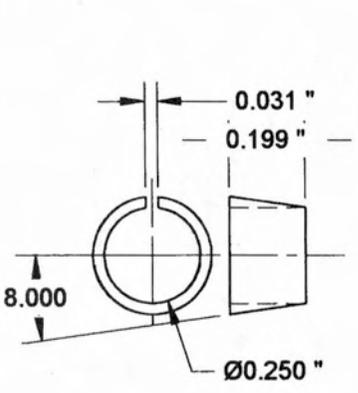


**-1 CRANKSHAFT**

Steel

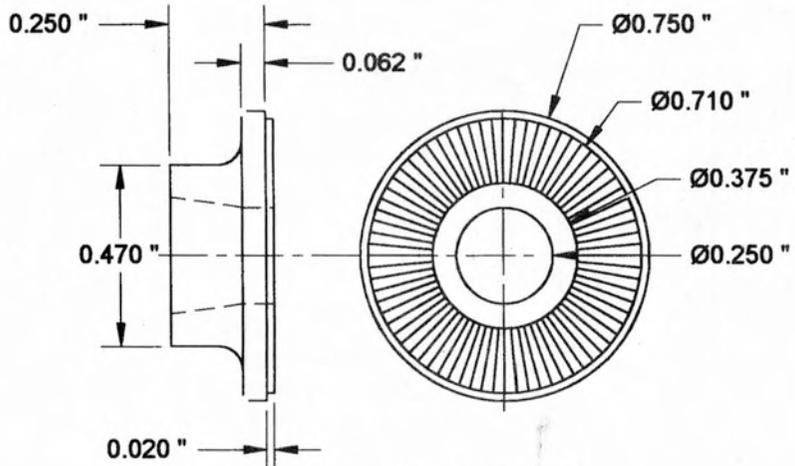
**-5 PROP WASHER**

Aluminum



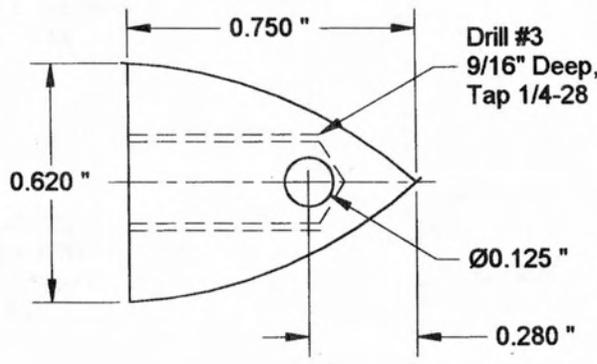
**-2 COLLET**

Brass



**-3 DRIVE WASHER**

Aluminium



**-4 SPINNER NUT**

Aluminium

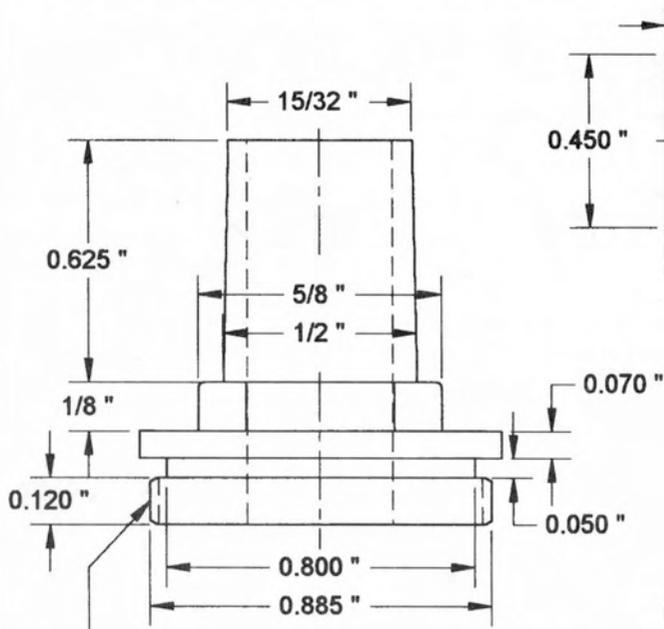
			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
			DRAWN	<b>RMB</b> 12-21-97	
DATE	CHANGE	BY	CAD	<b>PMB</b> 1-1-98	NEXT ASSEMBLY



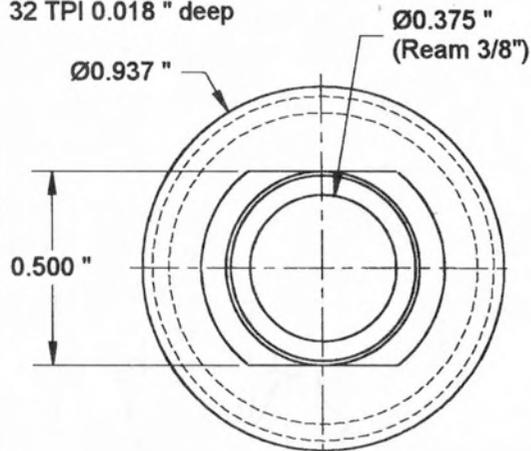
NAME	<b>VIVELL 09 DIESEL</b>
NUMBER	<b>Sheet 4 - Crankshaft Assembly</b>

06



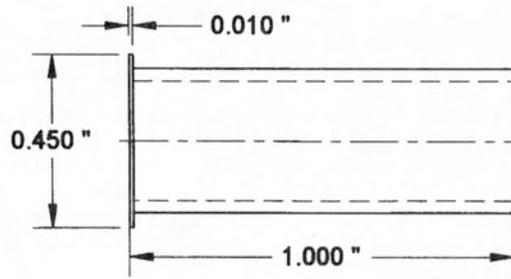


Screw cut Left Hand  
32 TPI 0.018" deep



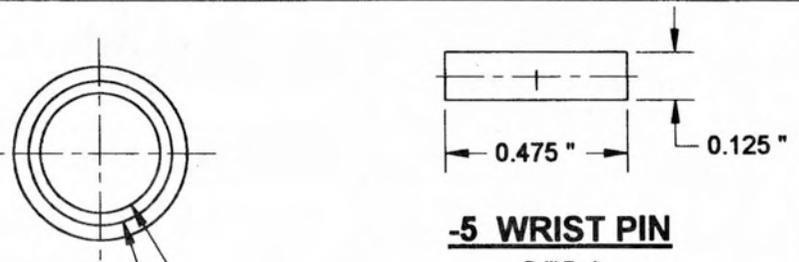
**-1 FRONT BEARING HOUSING**

Aluminum Casting



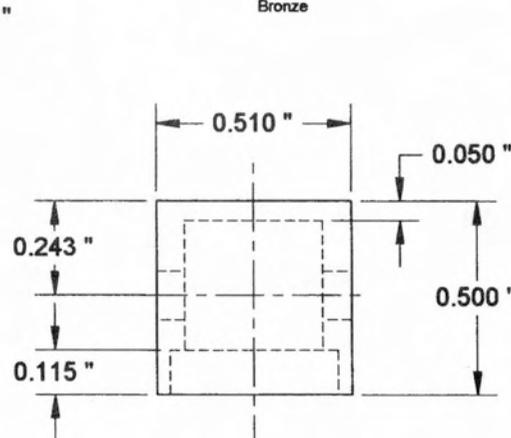
**-2 BEARING**

Bronze



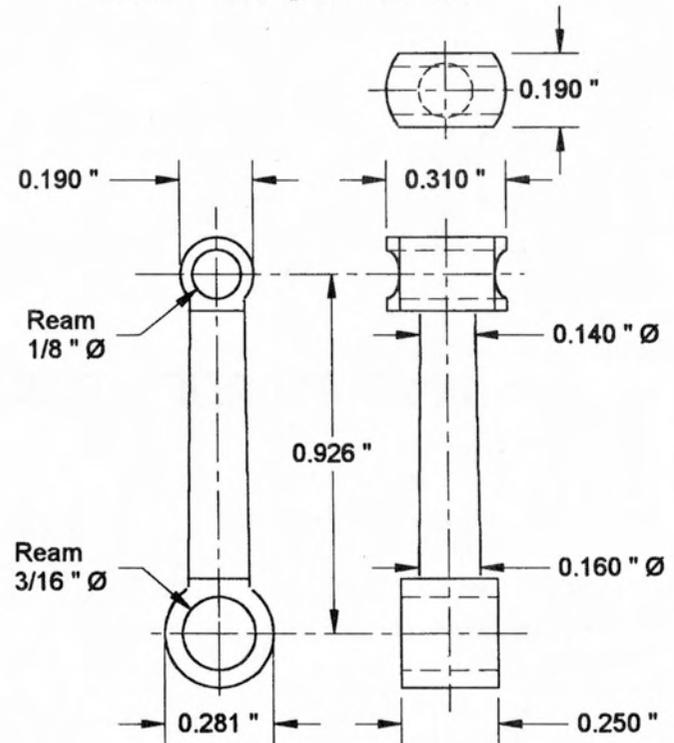
**-5 WRIST PIN**

Drill Rod



**-3 PISTON**

Cast Iron



**-4 CONNECTING ROD**

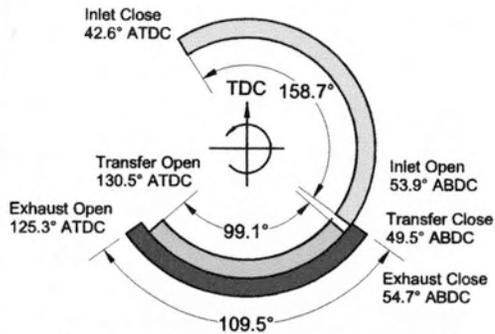
Aluminum

MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
SCALE	<b>2 X SIZE</b>	
DRAWN	<b>RMB</b> 12-21-97	
DATE	<b>PMB</b> 1-1-98	
BY	CAD	NEXT ASSEMBLY



NAME	<b>VIVELL 09 DIESEL</b>
NUMBER	<b>Sheet 6 - Bushing and Piston</b>

3-1 Cylinder Head (Fixed Compression)



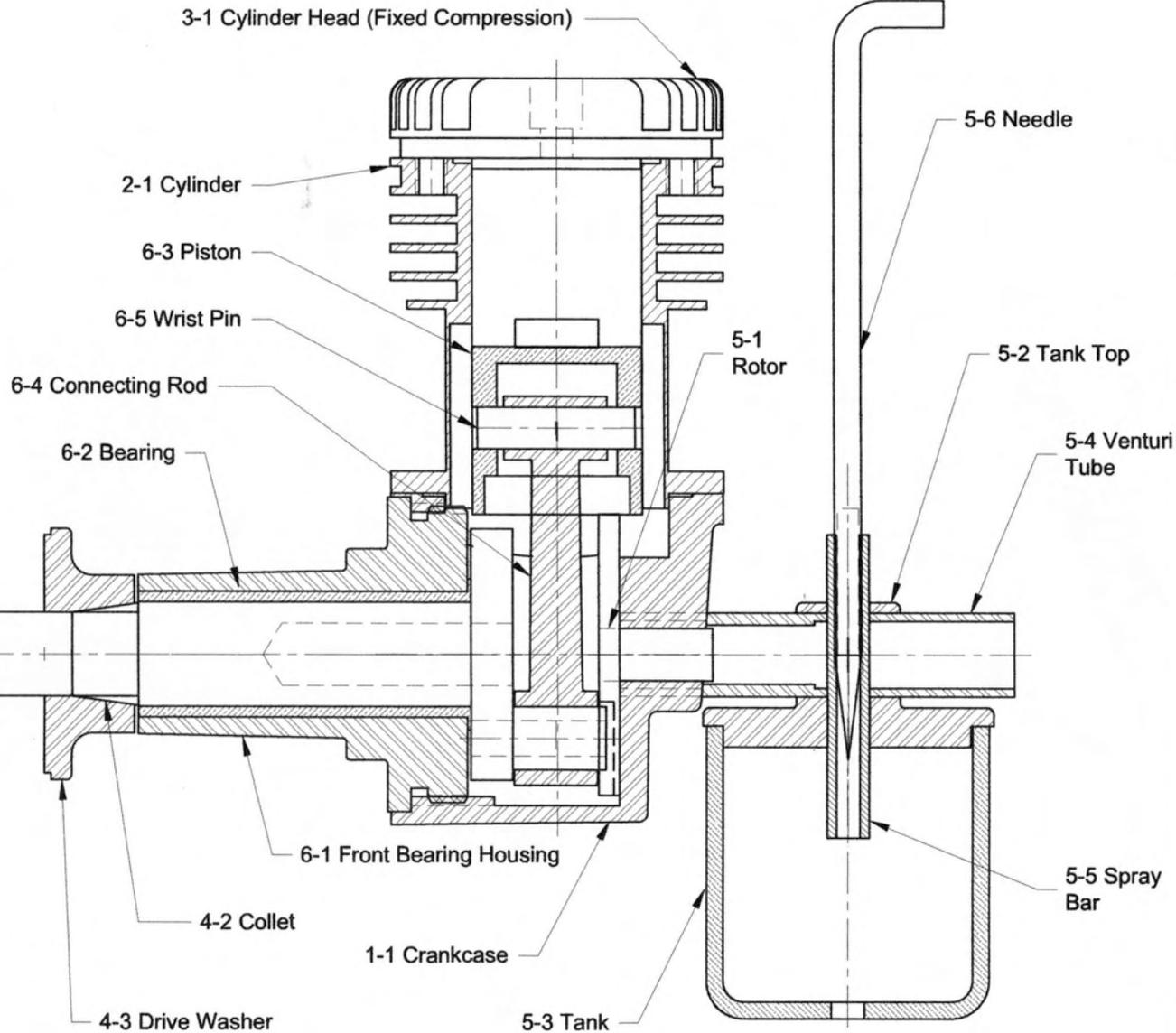
**Vivell 09 Diesel circa 1948**

Bore: 0.510" (12.95mm)

Stroke: 0.502" (12.75mm)

Capacity: 0.103cuin (1.68cc)

(timing shown with 0.012" gasket)



93 update

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

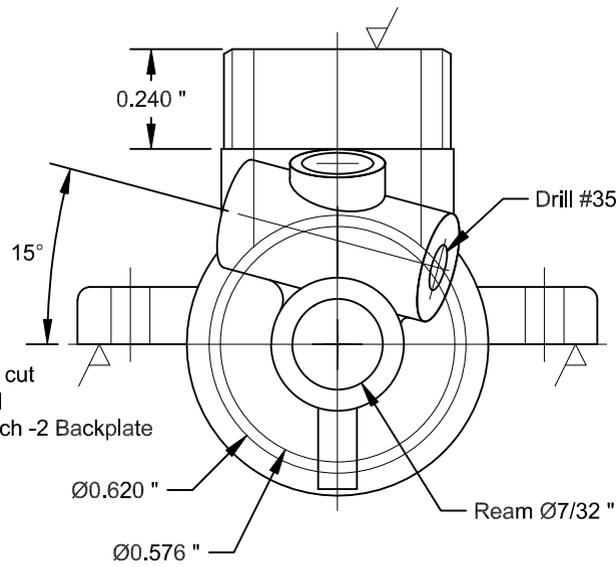
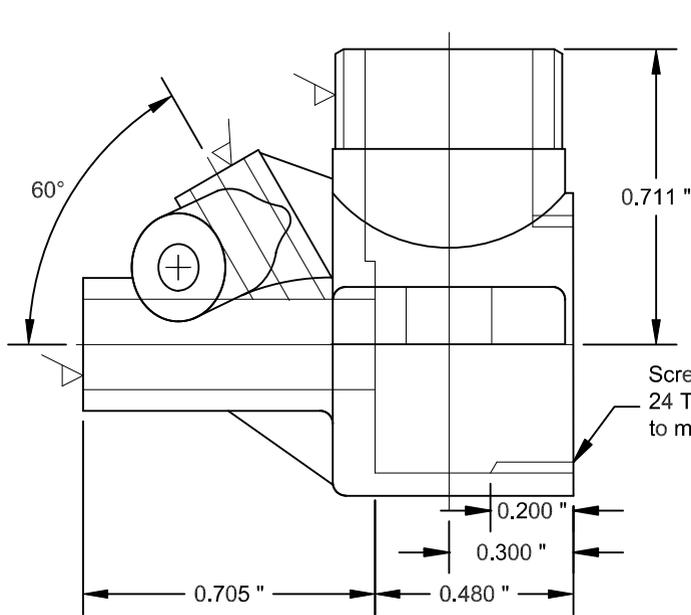
# THE E. D. BABY

by Ron Chernich

In the early years of the 1950's, British engine manufacturers turned their attention to the small diesels market, most likely in response to interest sparked by the eruption of "1/2 A" glow engines in the USA. The choice of compression ignition over glow was logical, given that this was the predominant type of motor being used by modellers in England and her colonies at the time. Consequently, it was the type with which both they and their customers were most familiar, and even though their small diesels were more expensive than their larger

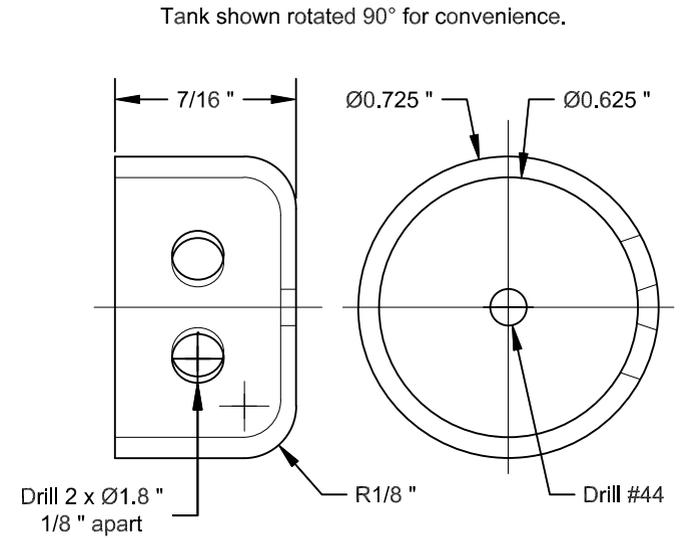


counterparts, and required more experience with regards to handling, all manufacturers' products were market successes. With a broad range of choices available, individual aeromodellers could support their favoured maker: Allbon with their 0.5cc Dart, Frog with the Frog 50, Elfin with their now rare and highly prized bulkhead mount Elfin 50, and Electronic Developments (ED) with a slightly smaller 0.46cc diesel. Here we have ED's product, announced first in Aeromodeller of April, 1952, and appropriately dubbed the "Baby".



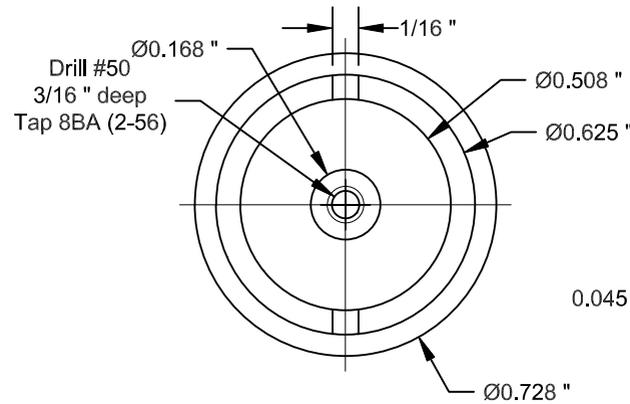
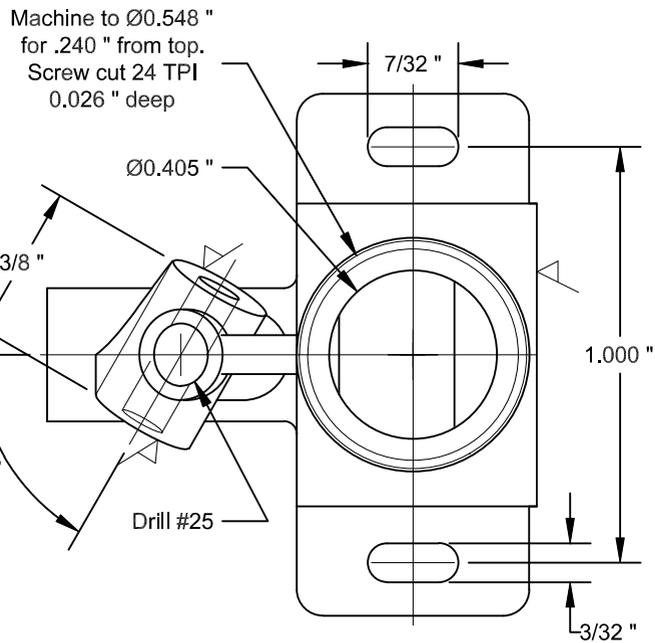
**-1 CRANKCASE**

Aluminum Sand Casting



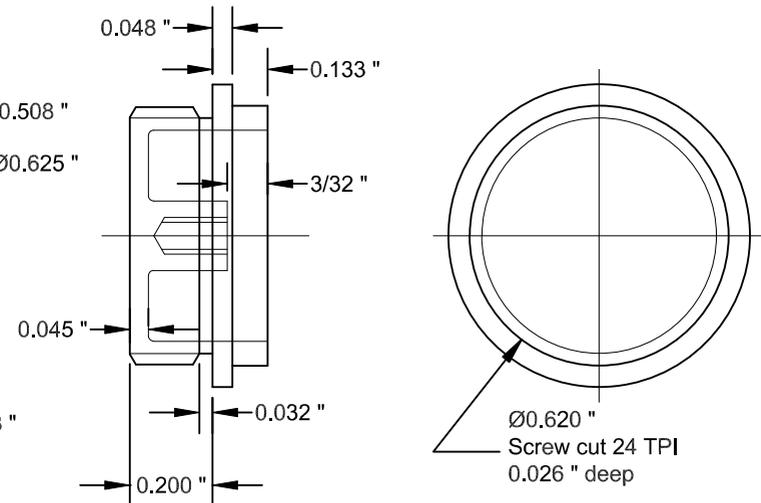
**-3 FUEL TANK**

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



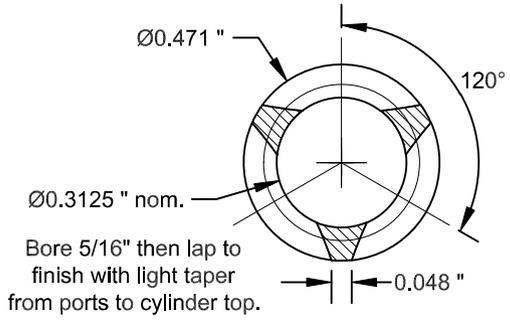
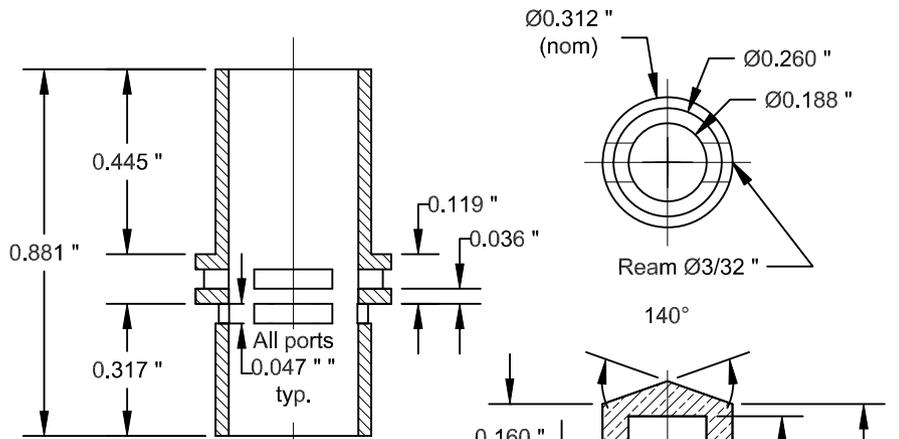
**-2 BACKPLATE**

Aluminum Sand Casting

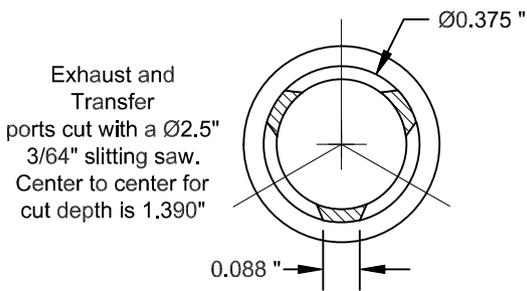


Machine

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	<b>Classic Model Airplane Engines</b> Copyright (c) 2000. All right reserved worldwide.	NAME
			SCALE	<b>2 X SIZE</b>			ED "Baby" Replica
2000.6.7	Correct venturi height in front view	BMBI	DRAWN	RC Jan 18, 1997			NUMBER
DATE	CHANGE	BY	CAD	BMBI 2000.04.14		<b>Sheet 1 - Crankcase</b>	



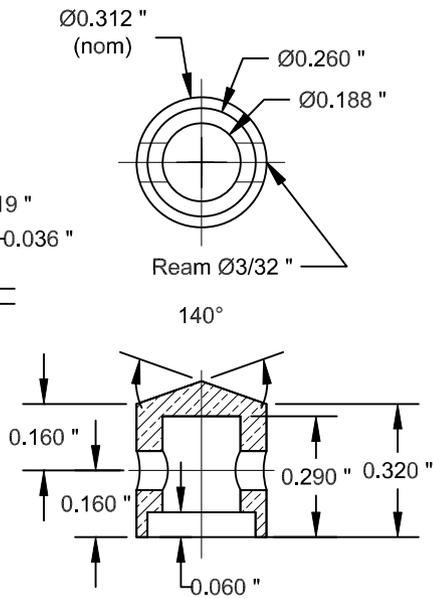
**Section through Exhaust Ports**



**Section through Transfer Ports**

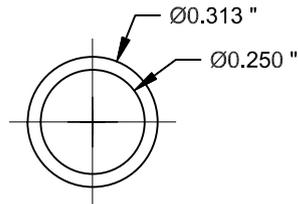
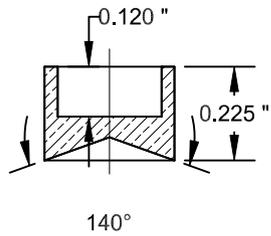
**-1 CYLINDER**

Steel



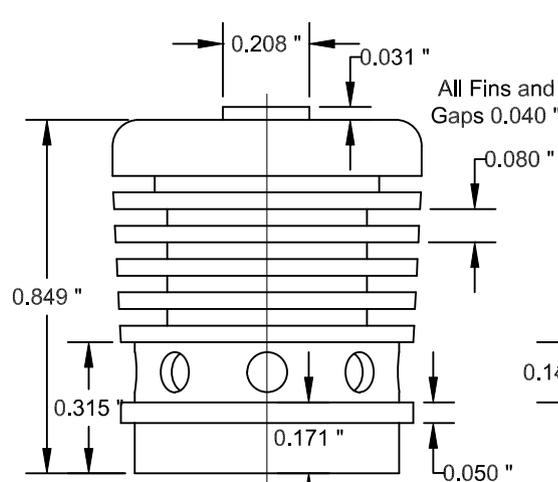
**-3 CONTRA PISTON**

SG Cast Iron



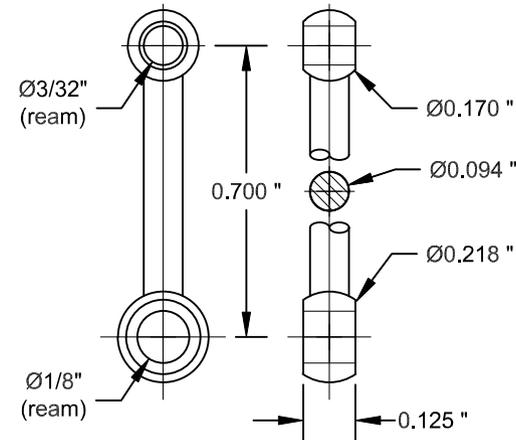
**-4 PISTON**

SG Cast Iron



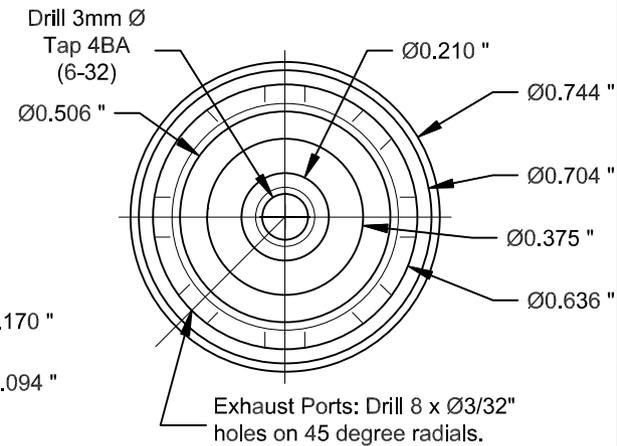
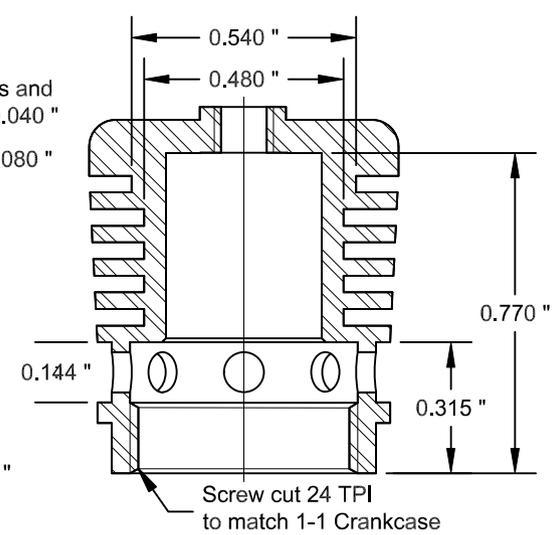
**-6 WRIST PIN**

0.290" Brass Rod



**-5 CONROD**

7/32" Ø Drill Rod (H&T)

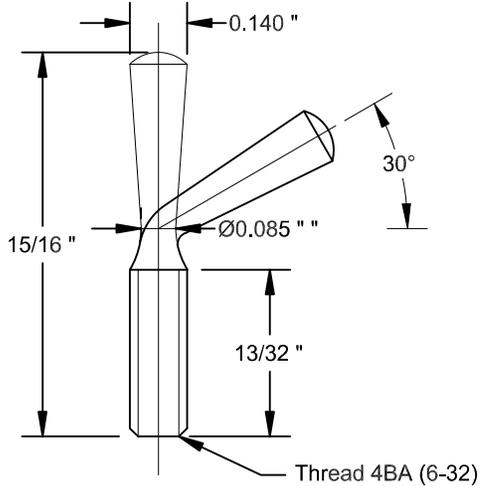


Cylinder fins taper at approximately six degrees from the 0.704" diameter above the exhaust ports.

**-2 CYLINDER HEAD**

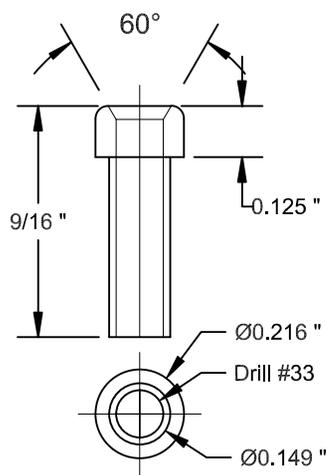
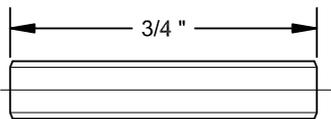
Aluminum

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b>	<b>Classic Model Airplane Engines</b>	NAME
			SCALE	<b>2 X SIZE</b>			WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			DRAWN	<b>RC</b> Jan 18, 1997	NEXT ASSEMBLY	Copyright (c) 2000. All right reserved worldwide.	NUMBER
DATE	CHANGE	BY	CAD	<b>BMBI</b> 2000.04.14			<b>Sheet 2 - Cylinder/Piston</b>



**-3 COMP SCREW**

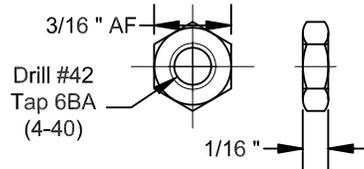
Steel



**-4 VENTURI**

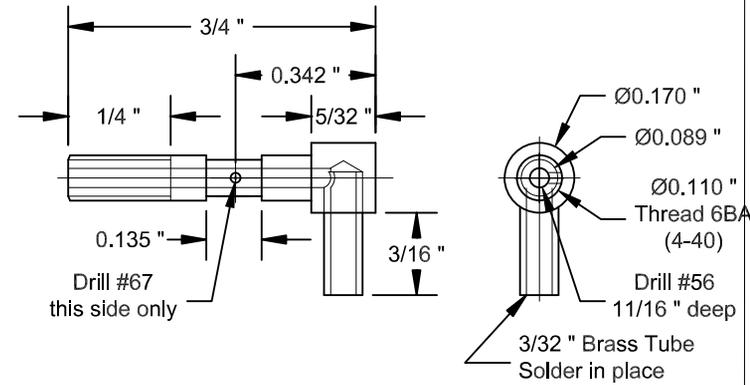
Aluminum

-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

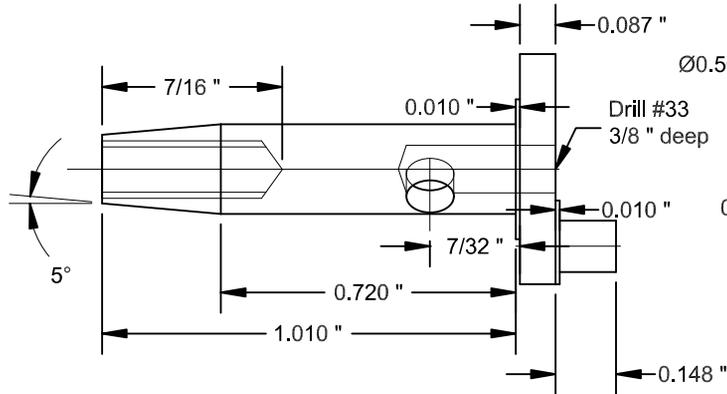


**-5 SPRAY BAR**

Brass

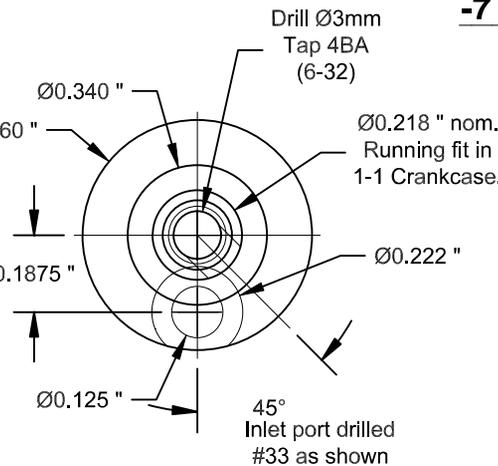
**-8 CRANKSHAFT STUD**

cut from 4BA (6-32) screw



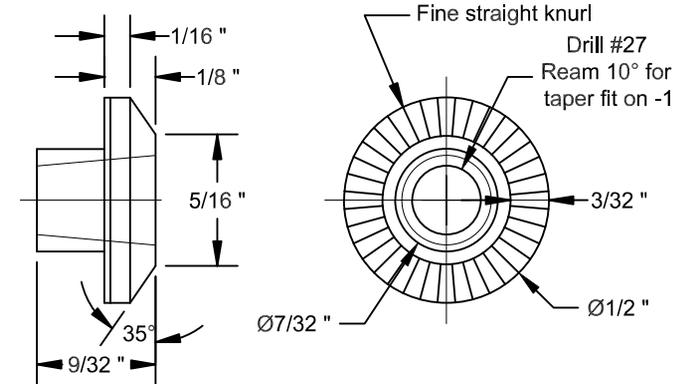
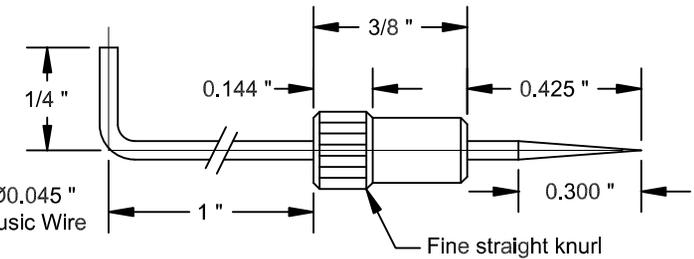
**-1 CRANKSHAFT**

Steel



**-7 NEEDLE VALVE**

Brass



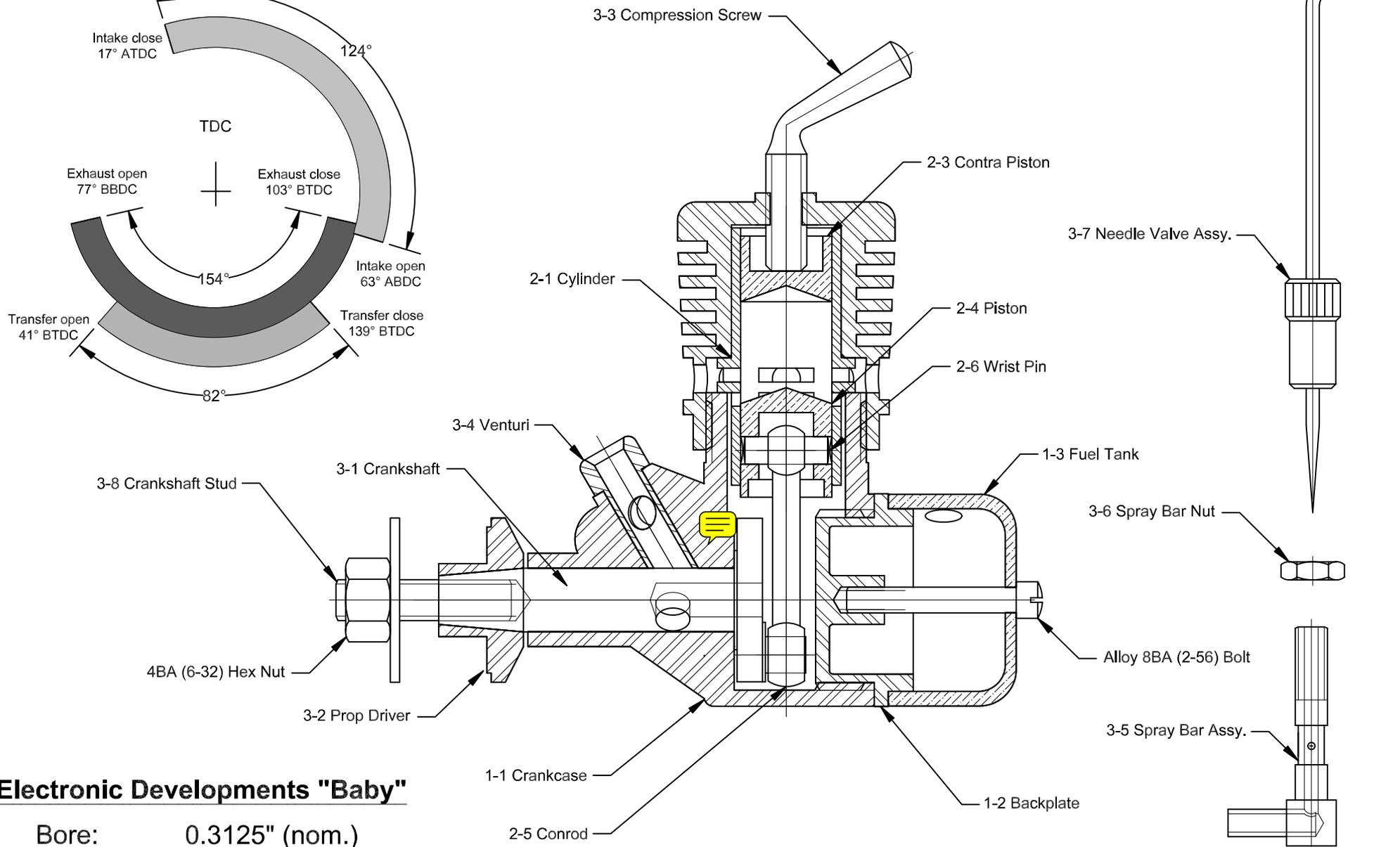
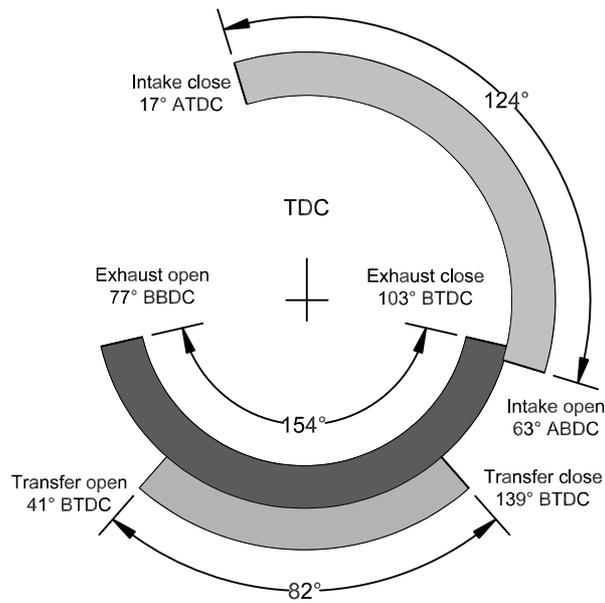
**-2 PROP DRIVER**

Aluminum

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
2000.6.7	Redimensioned -1 from thrust face datum	BMBI	SCALE	<b>2 X SIZE</b>	
2000.6.5	-1 shortened .020"; -4 lengthened 0.013"	BMBI	DRAWN	<b>RC</b> Jan 18, 1997	
DATE	CHANGE	BY	CAD	<b>BMBI</b> 2000.04.14	

**Classic Model  
Airplane Engines**  
Copyright (c) 2000.  
All right reserved worldwide.

NAME	<b>ED "Baby" Replica</b>
NUMBER	<b>Sheet 3 - Crankshaft</b>



**Electronic Developments "Baby"**

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

			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	<b>Classic Model Airplane Engines</b> Copyright (c) 2000. All right reserved worldwide.	NAME
			SCALE	<b>2 X SIZE</b>			ED "Baby" Replica
200.6.5	Corrected inlet timing.	BMBI	DRAWN	RC Jan 18, 1997	NEXT ASSEMBLY	NUMBER	
DATE	CHANGE	BY	CAD	<b>BMBI</b> 2000.04.14		<b>Sheet 4 - General Arrangement</b>	

# THE “WEAVER”

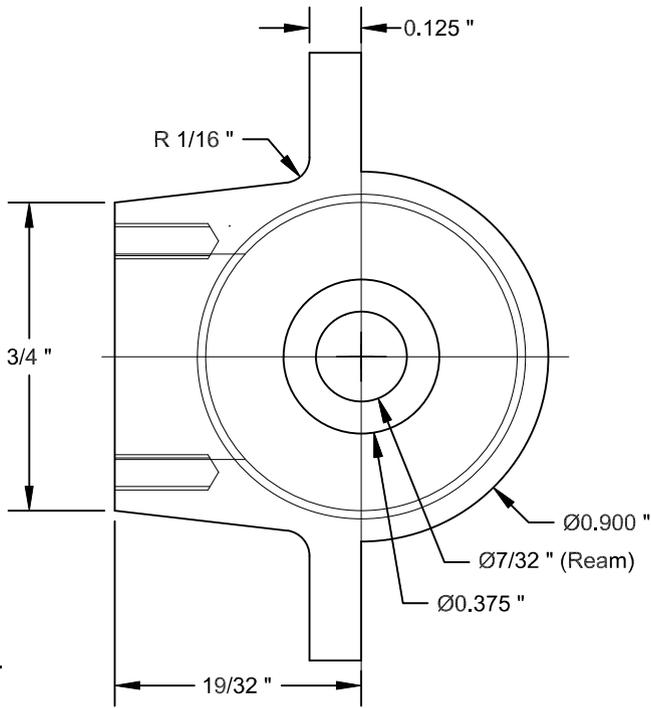
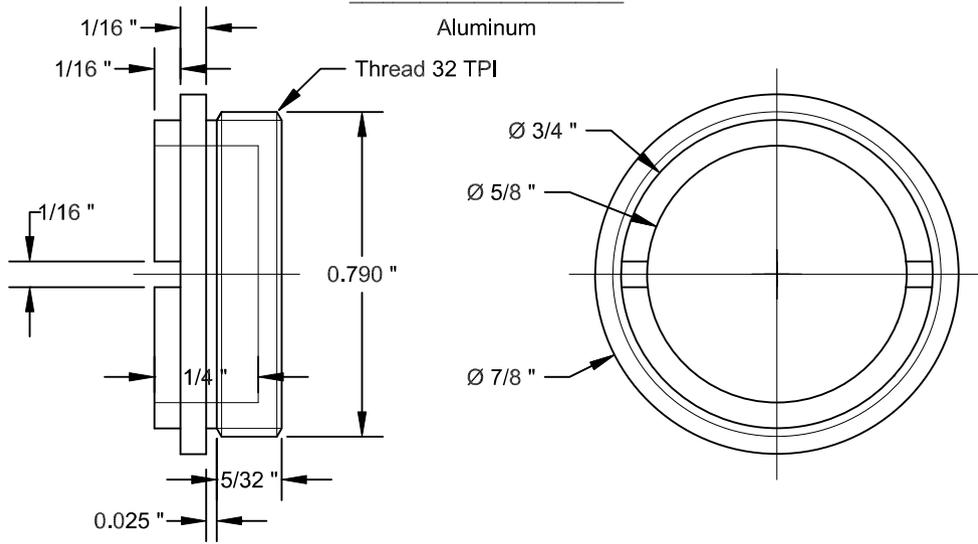
By Ron Chernich

In June 1952, the British magazine *Model Maker* commenced a series of articles titled “A 1 c.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. *Model Maker* was then part of the *Model Engineer*, *Aeromodeller*, etc stable but alas, ceased publication sometime in the early 60's. The engine however is still remembered in builder's circles, being often referred to simply as "The Weaver". This little engine was built and described by Mr Ransom to a design developed over several years by Arthur Weaver for use in Rail Car racing.

Now tether cars are not exactly my cup of tea, but the thought of a 1cc diesel powered tether car somehow seems very "gentlemanly" and very "British". The engine was fully described over three issues to be fully fabricated, that is, no castings were employed. While the original plans and instructions are in circulation, they are probably still subject of copyright held by a succession of owners of the venerable names (currently, this is Nexus Special Interest Publishing), so I'll respect that right and post no scans of the text here.



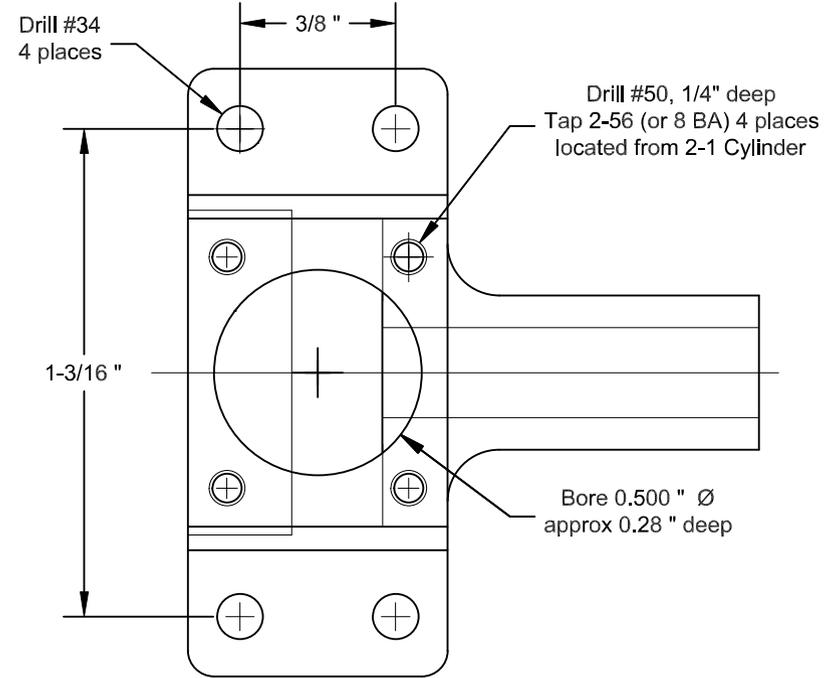
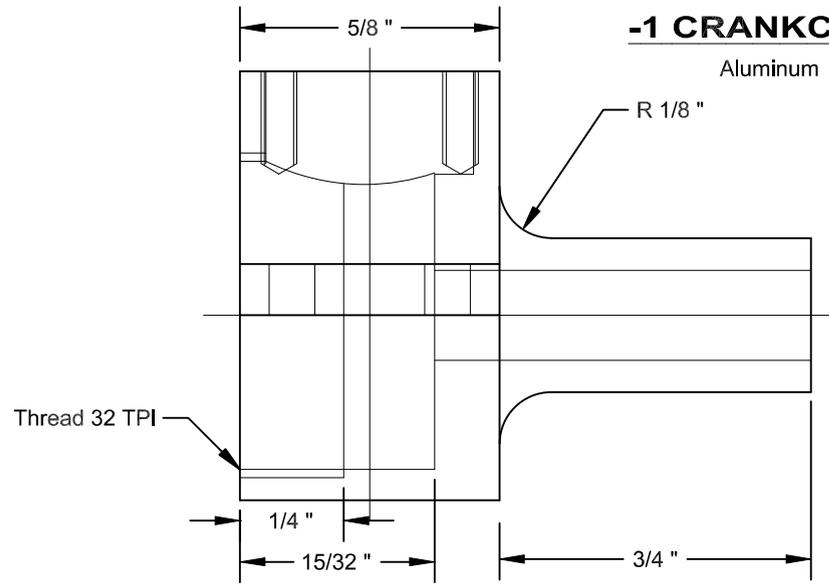
## -2 BACKPLATE



**Note:**

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

## -1 CRANKCASE



MAT'L	As Noted
SCALE	<b>2 X SIZE</b>
DRAWN	WW Ransom, 1952
BY	CAD
	BMBI May 11, 1999

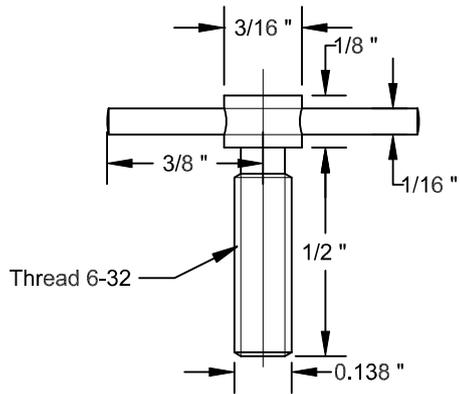
**DO NOT SCALE DRAWING**  
 WORK TO DIMENSIONS  
 ALL DIMENSIONS  
 ARE IN INCHES  
 NEXT ASSEMBLY



NAME  
**WEAVER 1cc CI Engine**

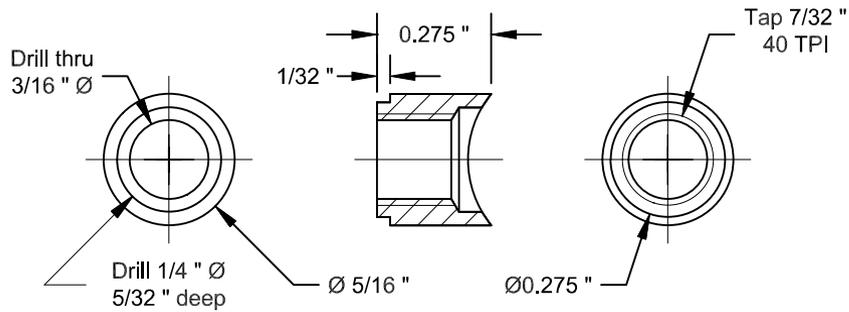
NUMBER  
**Sheet 1 - Crankcase**

DATE	CHANGE	BY	CAD
------	--------	----	-----



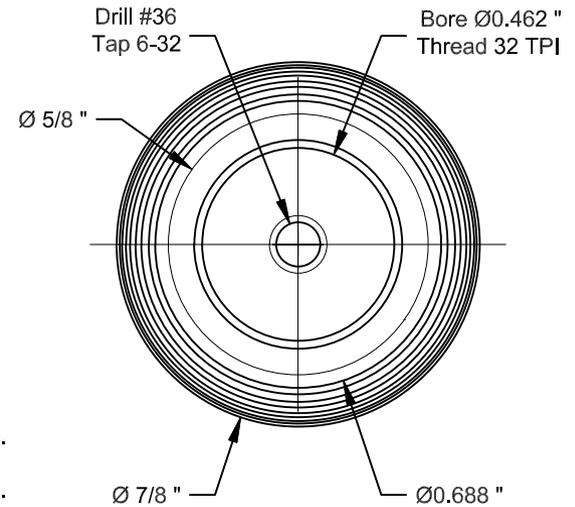
**-4 COMPRESSION SCREW**

Steel



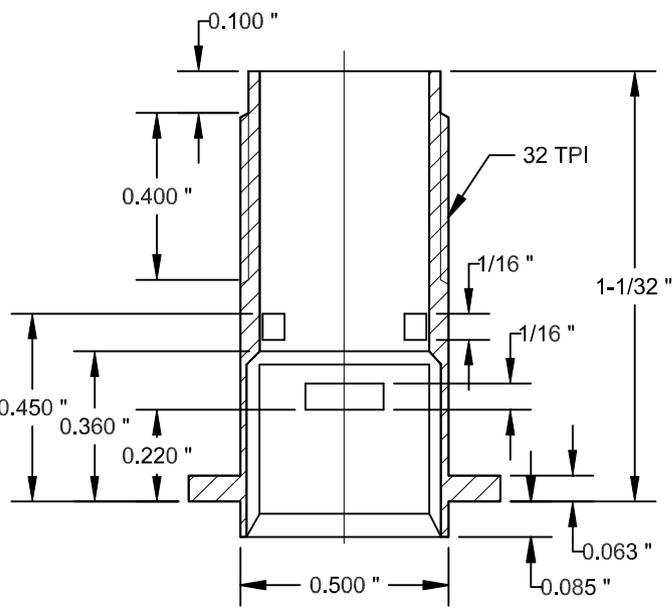
**-2 INTAKE BOSS**

Steel



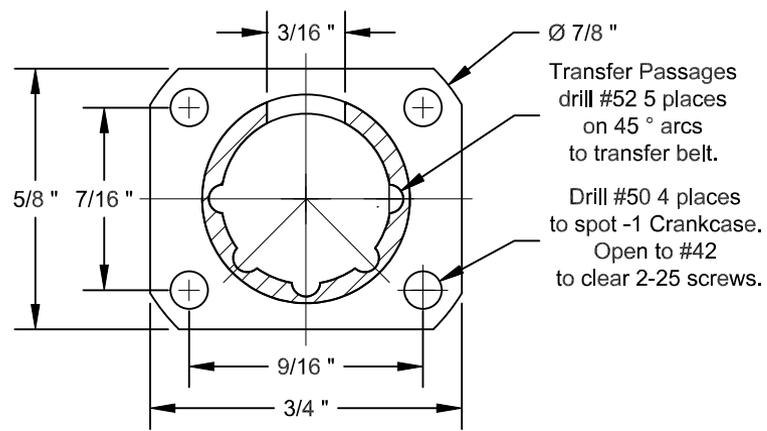
**-3 CYLINDER HEAD**

Aluminum

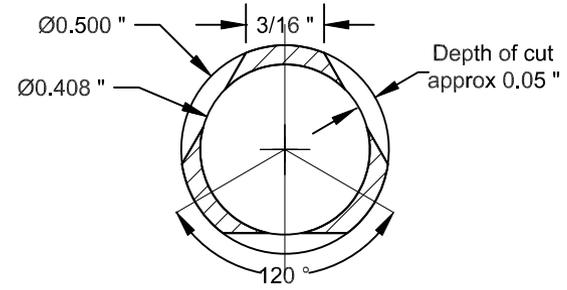


**-1 CYLINDER**

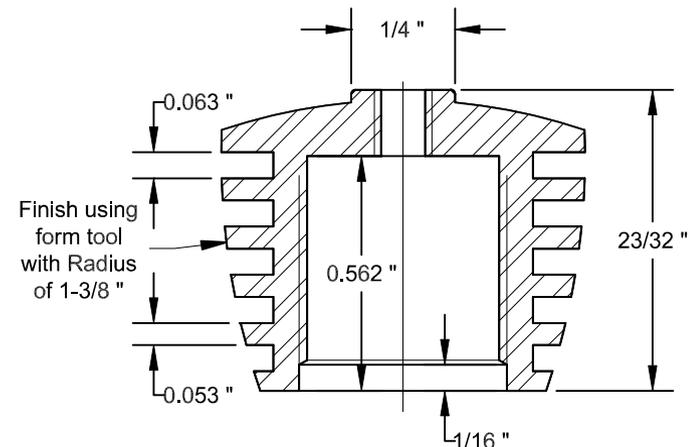
Steel



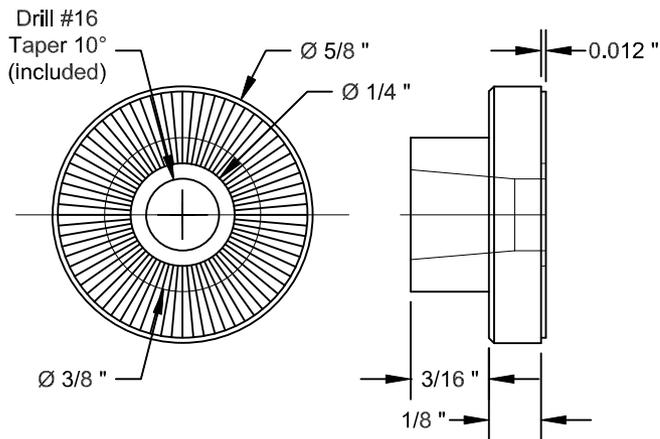
**Section through Inlet Port**



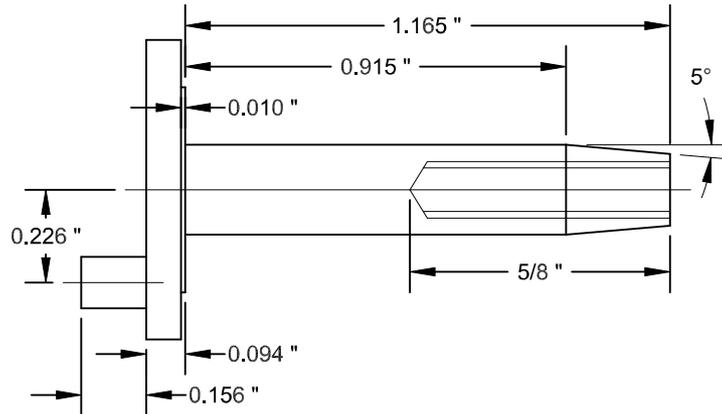
**Section through Exhaust Ports**



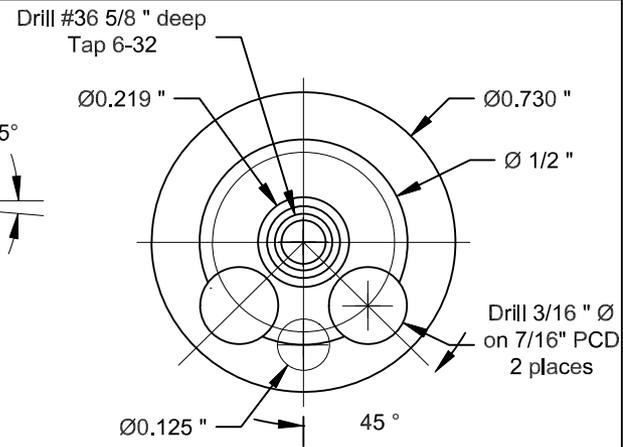
			MAT'L	As Noted	<b>DO NOT SCALE DRAWING</b> <small>WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES</small>	 <b>MOTOR BOYS</b> (INTERNATIONAL)	NAME	<b>WEAVER 1cc CI Engine</b>
			SCALE	<b>2 X SIZE</b>			NEXT ASSEMBLY	NUMBER
DATE	CHANGE	BY	CAD	BMBI May 11, 1999				



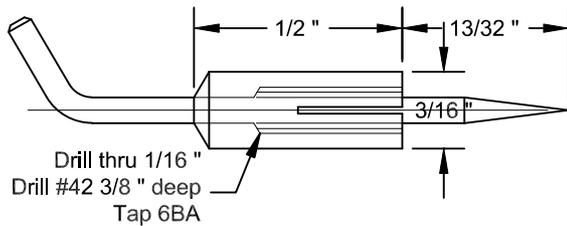
**-2 PROP DRIVER**  
Aluminum



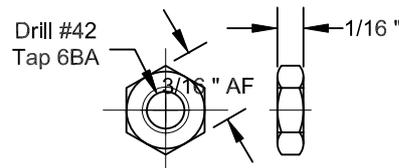
**-1 CRANKSHAFT**  
Steel



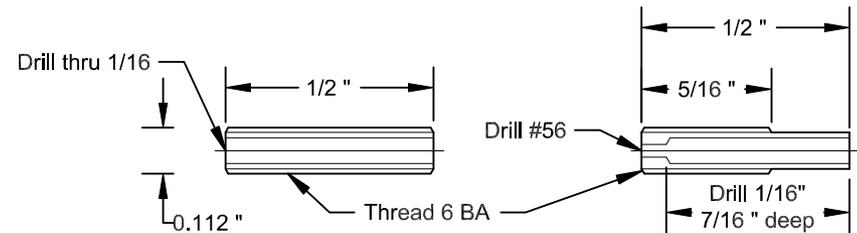
**-9 TANK TOP**  
Aluminum



**-8 NEEDLE VALVE ASSY.**  
1/16" Music Wire; Brass Thimble

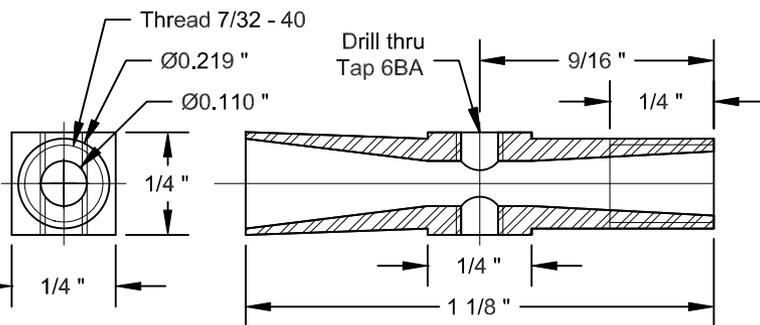


**-7 SPRAY BAR NUT**  
Hex Brass 3/16" AF (2 reqd)

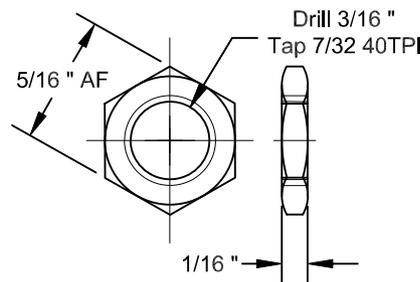


**-5 SPRAY BAR**  
Brass

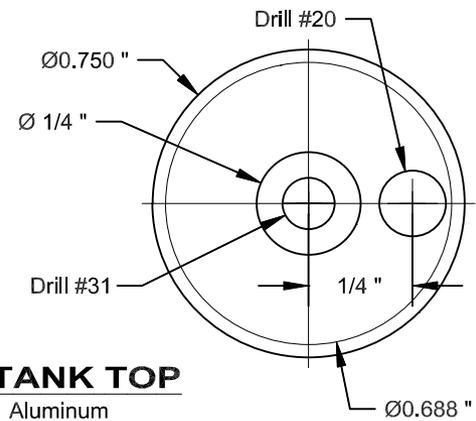
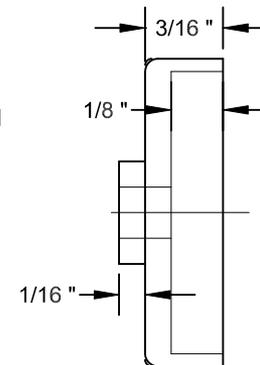
**-6 SPRAY JET**  
Brass



**-3 VENTURI**  
Aluminum



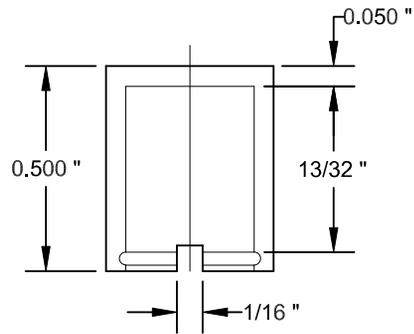
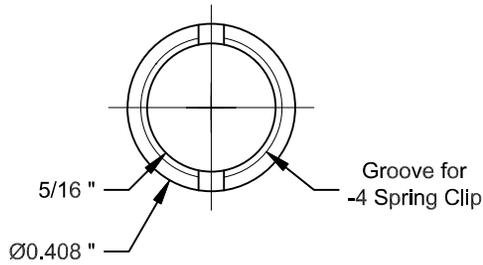
**-4 VENTURI NUT**  
Hex Brass 5/16" AF



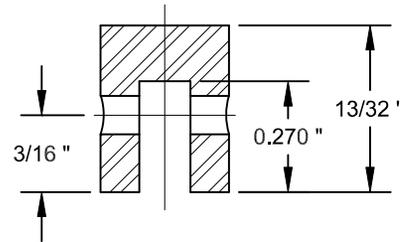
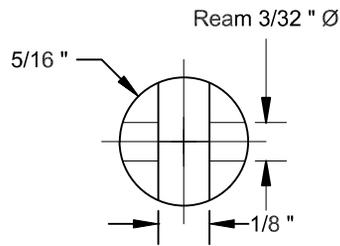
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES
			SCALE	<b>2 X SIZE</b>	
			DRAWN	WW Ransom, 1952	
DATE	CHANGE	BY	CAD	BMBI May 11, 1999	NEXT ASSEMBLY



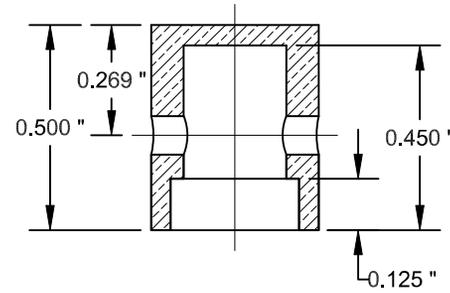
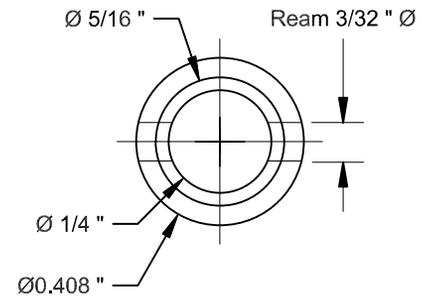
NAME	<b>WEAVER 1cc CI Engine</b>
NUMBER	<b>Sheet 3 - Fuel System</b>



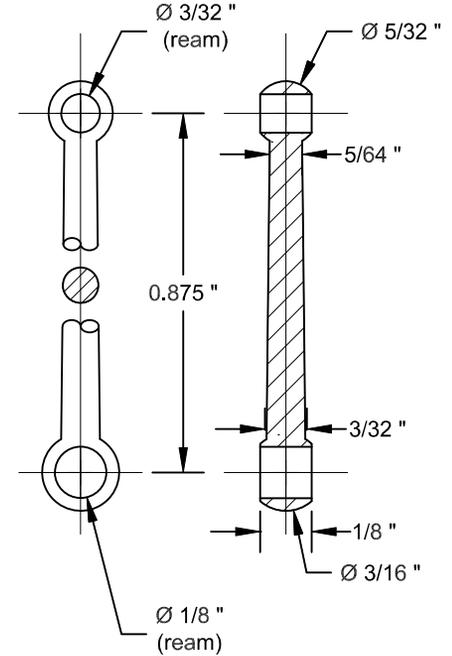
**-1 PISTON**  
SG Cast Iron



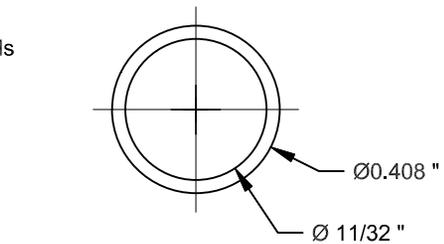
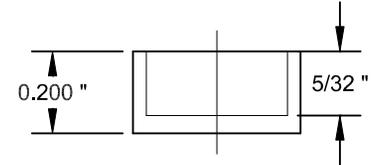
**-2 PISTON FORK**  
Aluminum  
(use with -1 Piston)



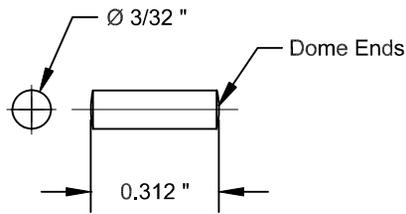
**-7 PISTON**  
SG Cast Iron  
(alternate for -1)



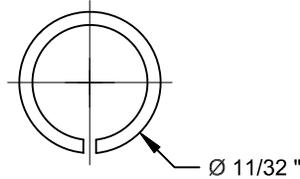
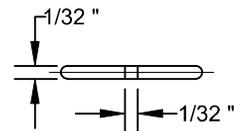
**-5 CONNECTING ROD**  
Gauge Plate H&T



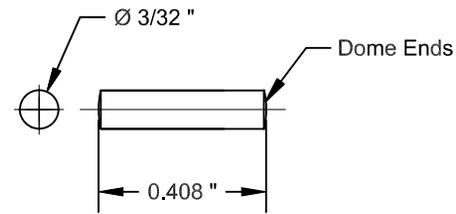
**-6 CONTRA PISTON**  
SG Cast Iron



**-3 GUDGEON PIN**  
3/32"  $\varnothing$  Drill Rod  
(use with -2 Piston Fork)



**-4 SPRING CLIP**  
1/32" Music Wire  
(use with -1 Piston)



**-8 GUDGEON PIN**  
3/32"  $\varnothing$  Drill Rod  
(use with -7 Piston)

**DO NOT SCALE DRAWING**

WORK TO DIMENSIONS  
ALL DIMENSIONS  
ARE IN INCHES

NEXT ASSEMBLY



NAME  
**WEAVER 1cc CI Engine**

NUMBER  
**Sheet 4 - Pistons and Rod**

DATE

CHANGE

BY

CAD

BMBI May 11, 1999

MAT'L

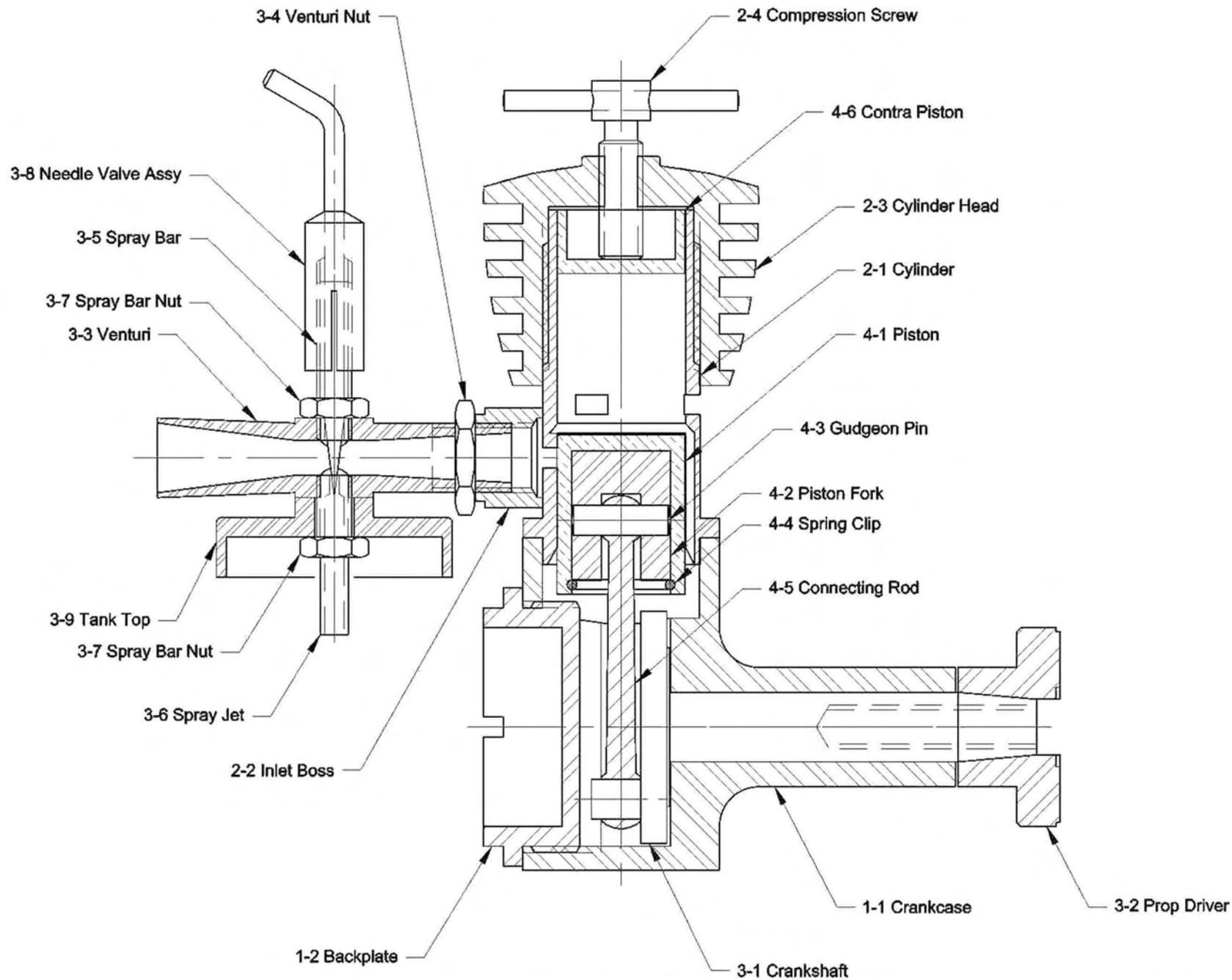
As Noted

SCALE

**2 X SIZE**

DRAWN

WW Ransom, 1952



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