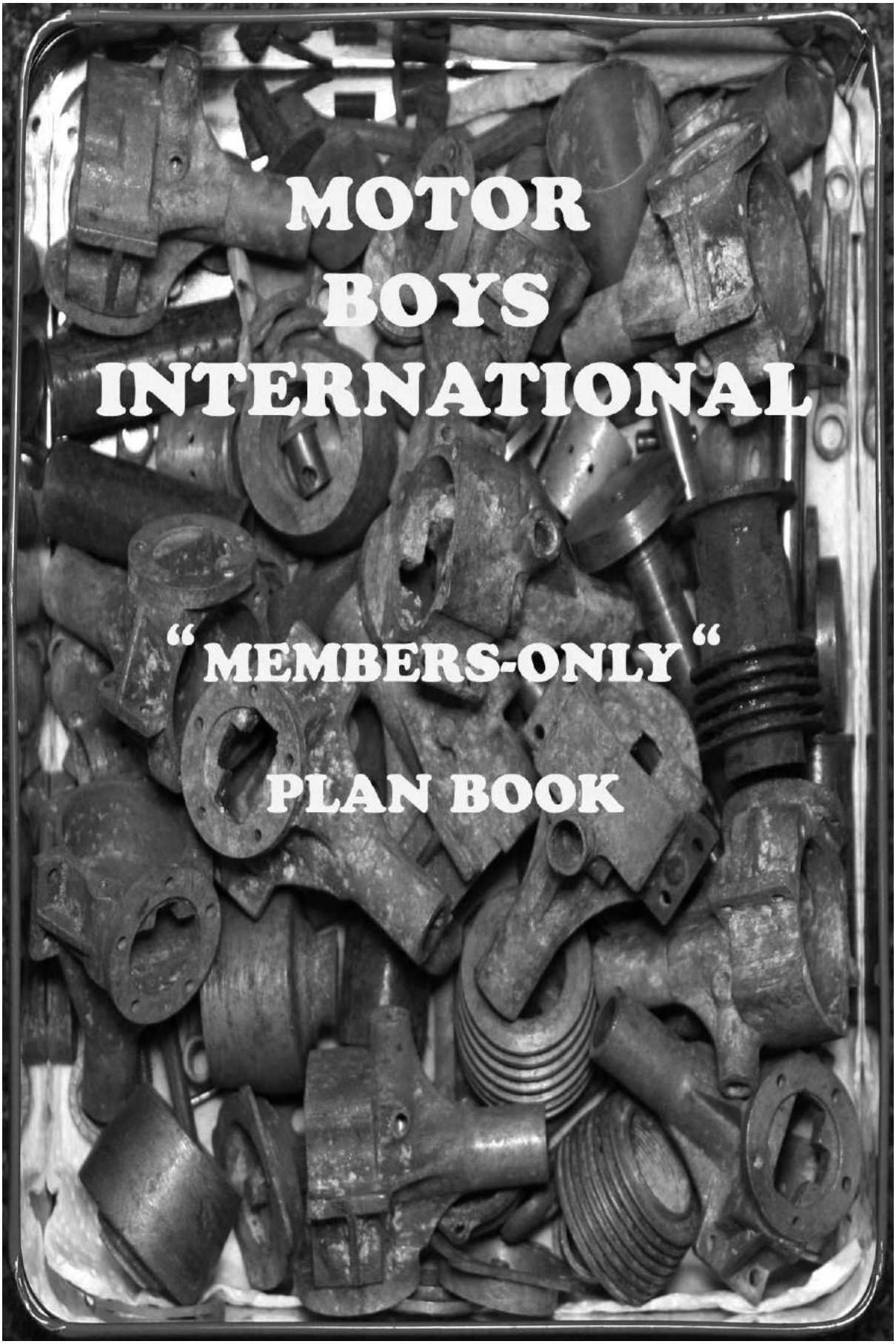

MOTOR
BOYS
INTERNATIONAL
" MEMBERS-ONLY "
PLAN BOOK

PREFACE

The *Motor Boys International* is an informal group of men from around the world with a common 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, adds to the enjoyment of their hobby.

The public face of the Motor Boys exists as the *Model Engine News* web site, the property of Ron Chernich. Sadly the loss of Ron means that the site is available but frozen. One of the products of the Boys was a significant collection of CAD engine drawings, many being available freely on the web site. Some of these drawings have been published in the now out-of-print *Model Engine Plan Book*. There was in addition a collection of plans available to the Boys themselves and to members of the public who paid a small fee to become members, and although these are on the web site, they are password protected and not freely available. These are generally known as the *members-only* plans.

The Motor Boys group, in part due to the passing of a number of members, is now inactive. It is seen as a good thing for the *members-only* drawings now to be made available to all. We believe that there are no copyright issues preventing publication.

This small volume contains all the *members-only* plans duly updated by the author with any known changes.

Most of the text and many of the images have been plagiarised from a variety of sources.

All of the plan sets were produced in CAD format by Ron Chernich.

The Motor Boys International are:-

George Aldrich	USA [deceased].
Gordon Burford	Australia [deceased]
Ron Chernich	Australia [deceased]
Ken Croft	England [now France]
Tim Dannels	USA
Don McClusky	USA [deceased]
David Owen	Australia [deceased]
Stan Pilgrim	Australia
Roger Schroeder	USA [deceased]
Bert Striegler	USA

Ken Croft

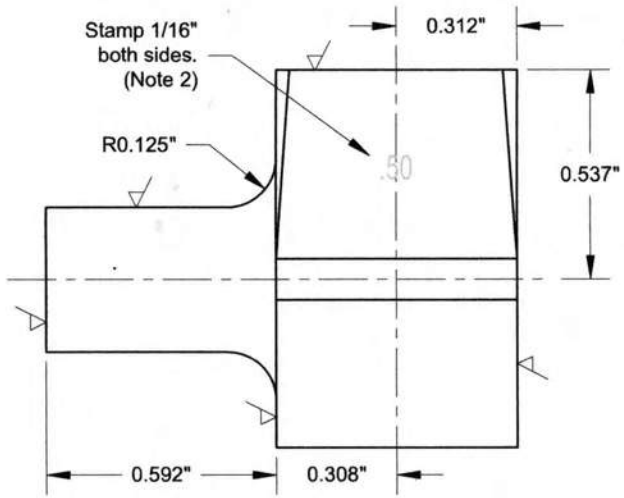
TABLE OF CONTENTS

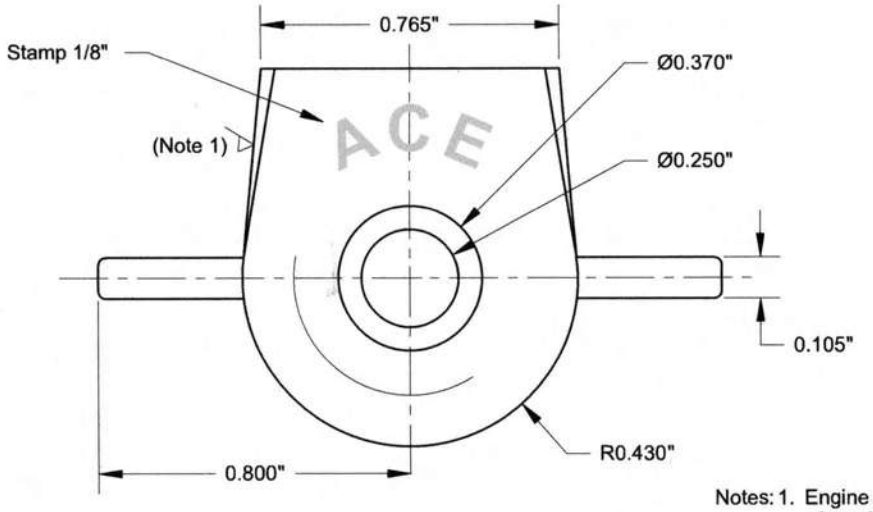
The ACE 0.5cc diesel

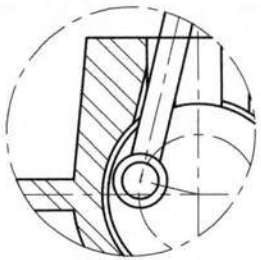
The ACE 0.5cc diesel was commissioned by Harry York, owner and manager of *Model Aircraft Supplies Ltd*, 171 New Kent Road, London SE1. The first press announcement for the engine we have been able to find appeared in the April 1947 issue of *Model Aircraft*. The first actual advertisement for the engine appeared in the June 1947 issue of *Model Aircraft* carrying the price £4-10-0. So we can say that Britain's first 0.5cc diesel appeared in mid 1947 and lasted about two years.

Reproduction castings have been available in the past and hence reproductions of this engine occasionally appear on auction sites.

Originals of the Ace are very rare.





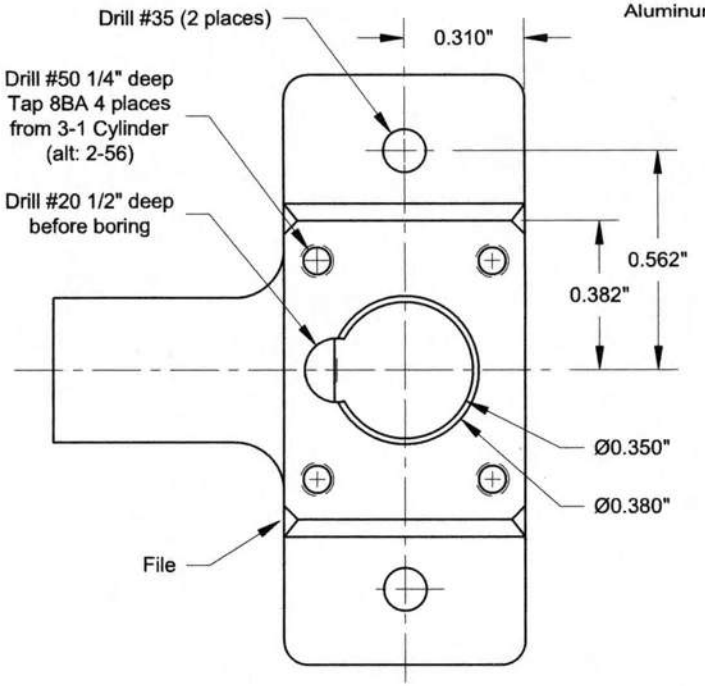


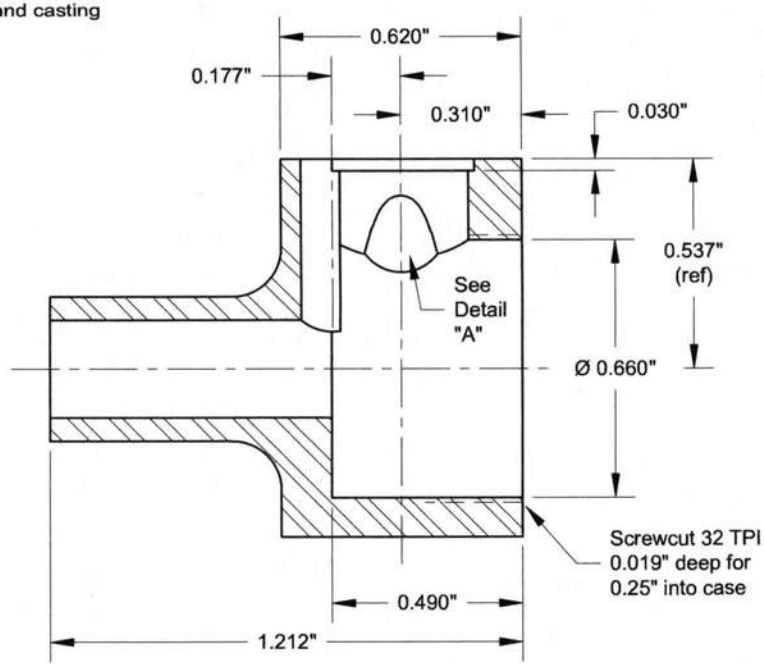
Detail "A"

Relief for conrod swing
(file or mill approx 14°)

-1 Crankcase

Aluminum sand casting



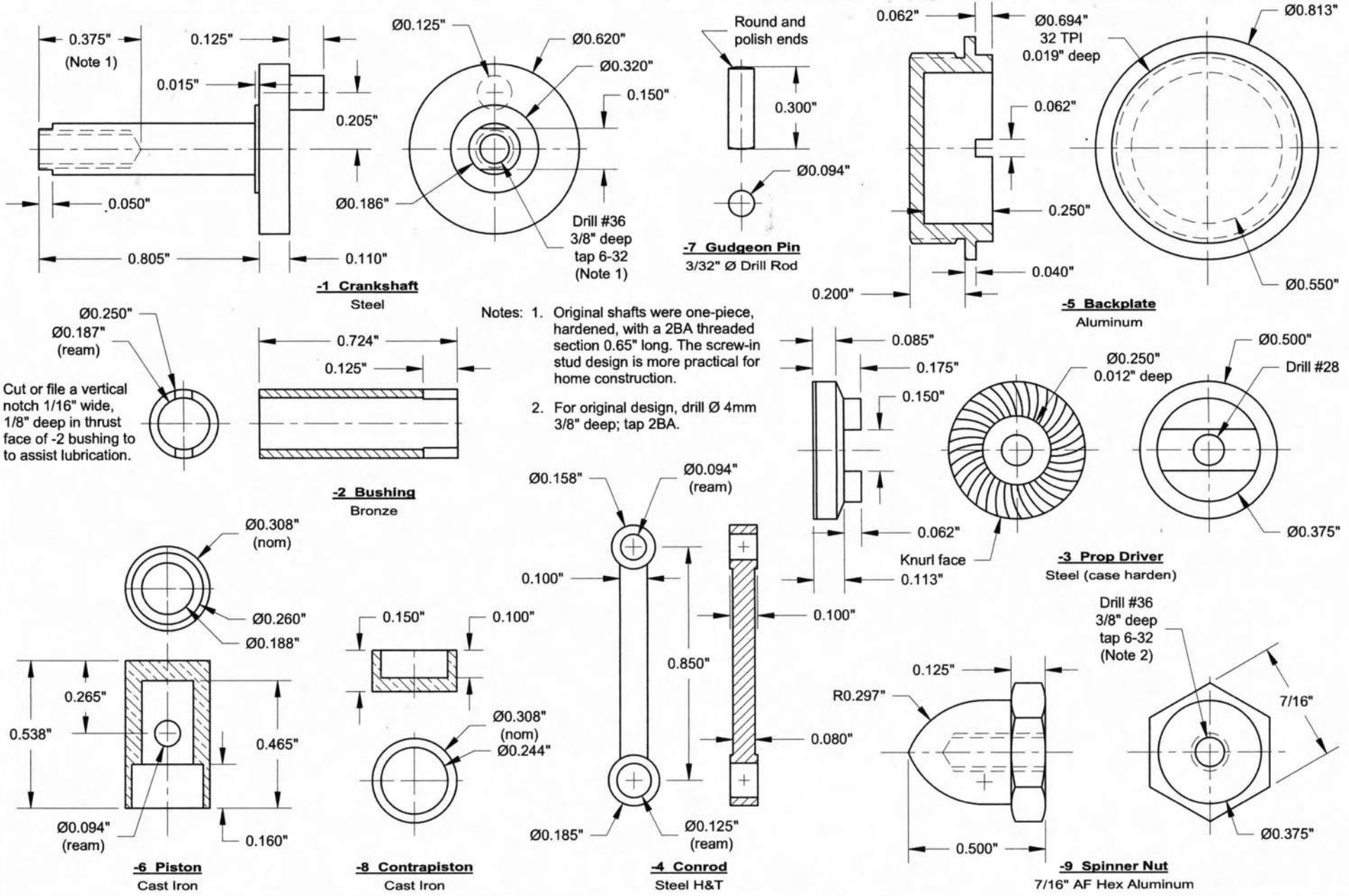


Notes: 1. Engine mounting lugs and underside of crankcase were left as-cast. The remainder of the case was machined or filed. The slope of the case sides is approximately 5°.

2. A serial number was stamped under the ".50" on the right side only.

▽ Machine

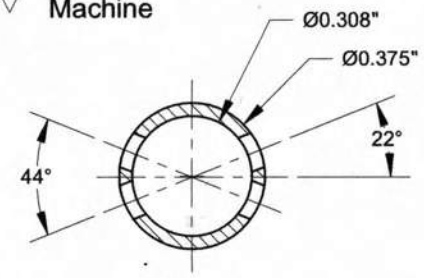
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **ACE**
2009-02-28	Add UNC altrenate threads	BMBI	SCALE	**2 X SIZE**			NUMBER **Sheet 1 - Crankcase**
2009-01-11	Add 2-2 thread depth; fix stamping details	BMBI	DRAWN	EMB			
DATE	CHANGE	BY	CAD	BMBI 2007-10-16			



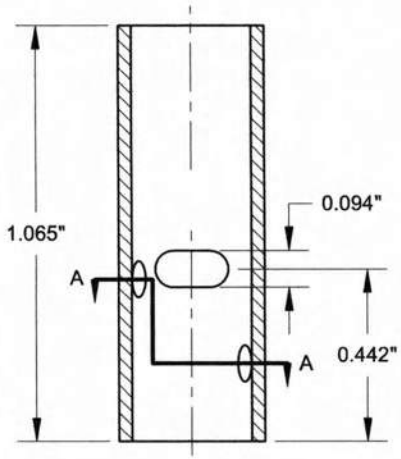
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME
					WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		ACE
2009-02-23	Shaft stud data revised.	BMBI	SCALE	2 X SIZE			NUMBER
2009-01-11	Note regarding shaft lubrication added.	BMBI	DRAWN	EMB			Sheet 2 - Moving Bits
DATE	CHANGE	BY	CAD	BMBI 2007-10-16			

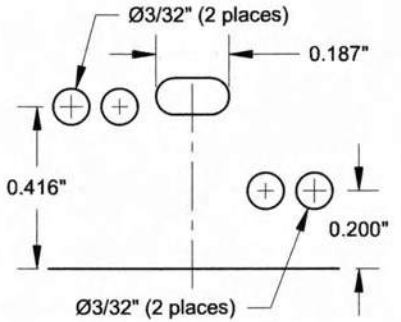
Machine

Notes:
1. Spot from -3 Cylinder Head. The radial position of the holes was somewhat arbitrary on original engines.
2. Originals used Aluminium for compression screw with a steel Tommy bar. All steel construction is recommended for a longer, trouble-free life.
3. As-cast diameter of stub approx 11/32"
4. -2 Liner shrunk into -1 Cylinder aligning at top.

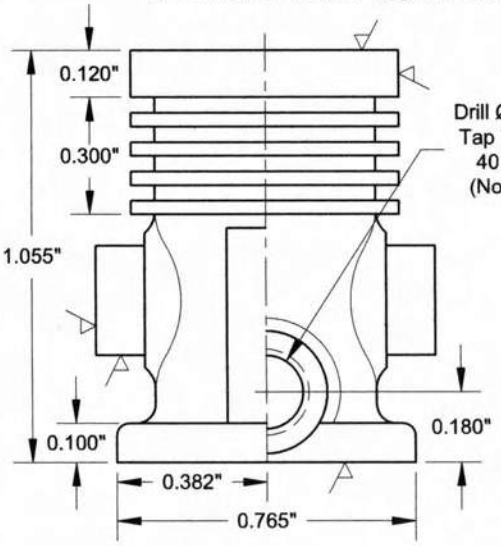


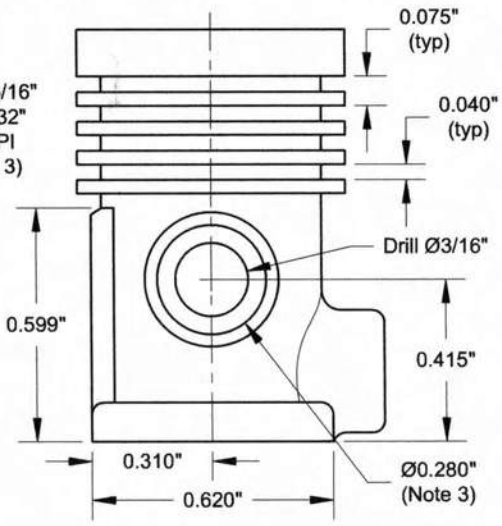
Section A-A

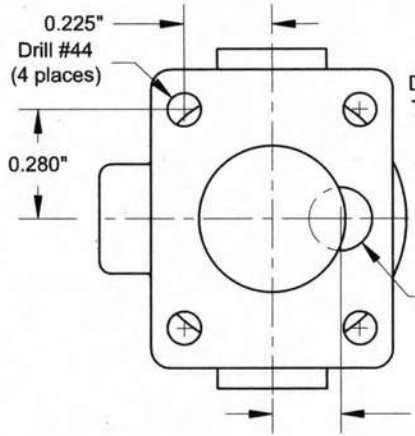


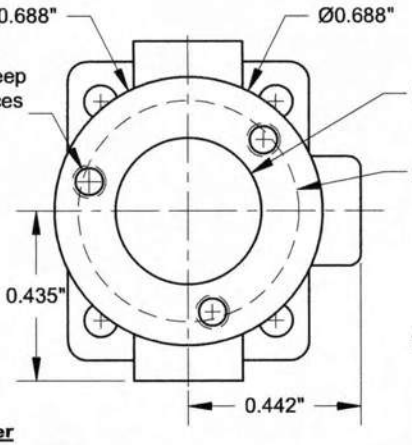


-2 Cylinder Liner
Steel (note 4)

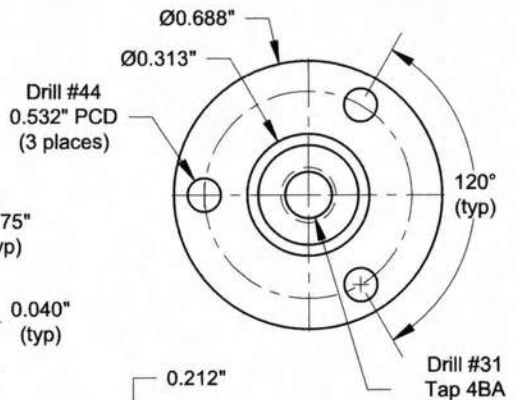


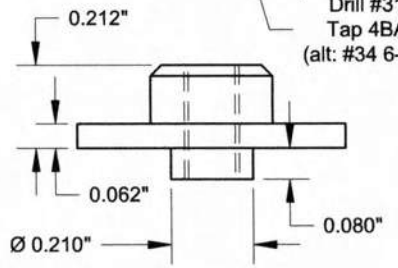




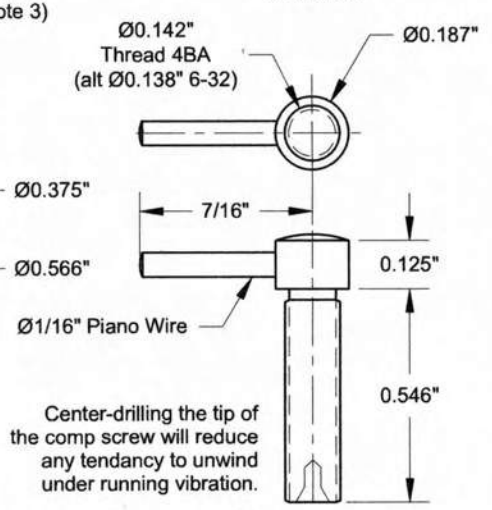


-1 Cylinder
Aluminum sand casting





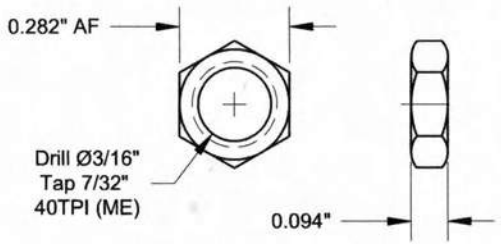
-3 Cylinder Head
Aluminum



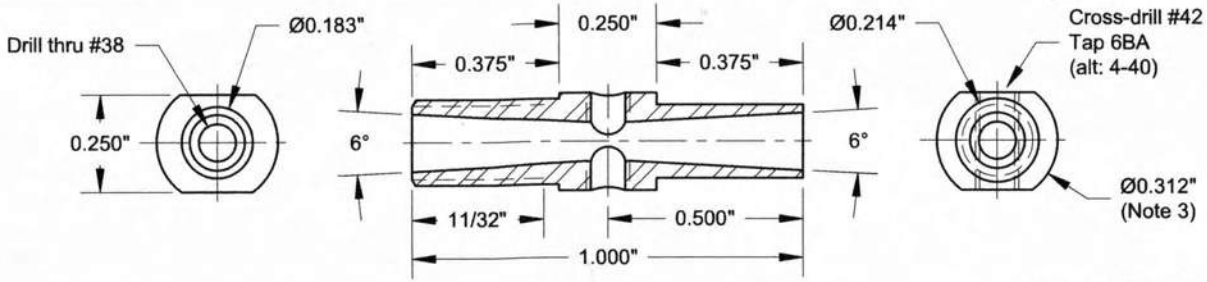
Center-drilling the tip of the comp screw will reduce any tendancy to unwind under running vibration.

-4 Compression Screw
Steel (note 2)

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME ACE
2009-02-28	Add UNC altrenate threads	BMBI	SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
2009-01-11	Add head bolts PCD detail.	BMBI	DRAWN	EMB			NUMBER Sheet 3 - Cylinder
DATE	CHANGE	BY	CAD	BMBI 2007-10-16			

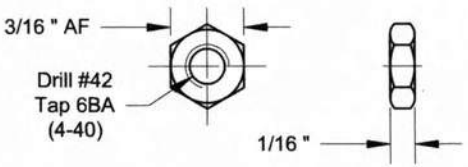


-2 Venturi Jam Nur
9/32" AF Hex Brass

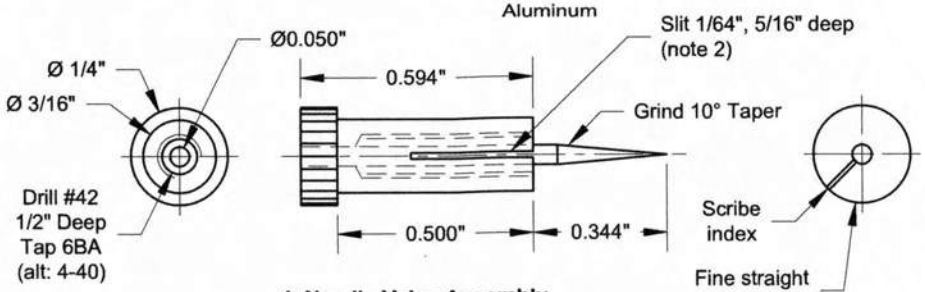


-1 Venturi
Aluminum

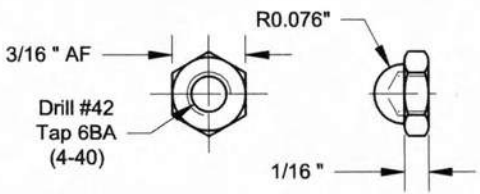
Notes:
1. Early engines were fitted with a Gitts style filler cap.
2. Original thimbles slit to knob. Shortened to prevent air leaks.
3. Original turned from Ø 0.250" stock. Size iIncreased with milled flats for better seats.



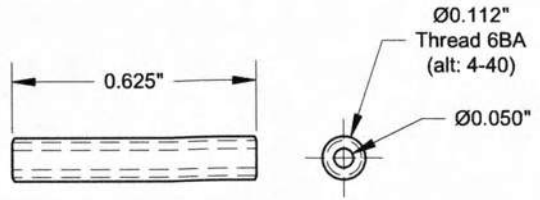
-7 Hex Nut
3/16" AF Hex Brass
(2 reqd)



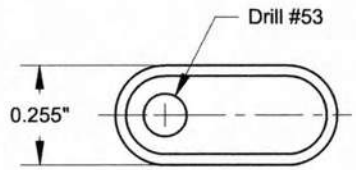
-4 Needle Valve Assembly
Aluminum with Ø0.050" Piano Wide Needle

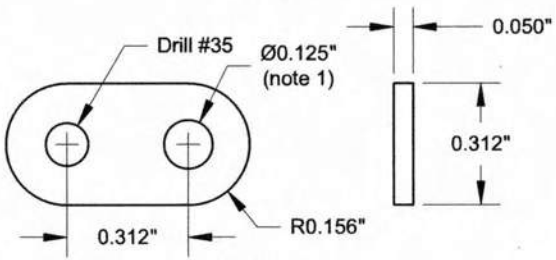


-9 Acorn Nut
Brass

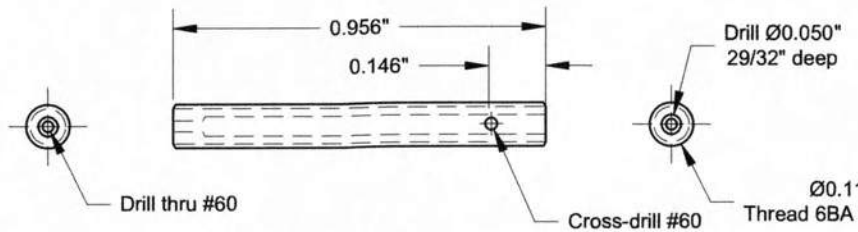


-3 Spray Bar
Modified 6BA or 4-40 Brass Screw

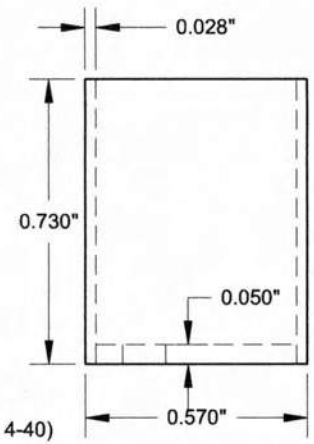




-4 Tank Top
Aluminum Sheet

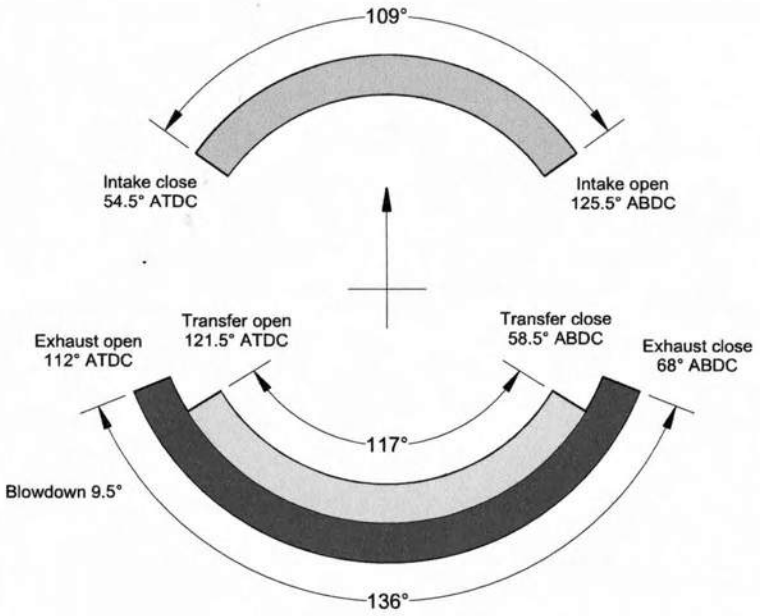


-8 Fuel Pickup
Modified 6BA or 4-40 Brass Screw



-6 Fuel Tank
Transparent Plastic

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME
2009-02-28	Add UNC altrenate threads	BMBI	SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		MAS ACE .5cc
2009-01-11	Revise venturi and thimble (notes 2&3)	BMBI	DRAWN	EMB			NUMBER
DATE	CHANGE	BY	CAD	BMBI 2008-12-24			Sheet 4 - Fuel Susyem



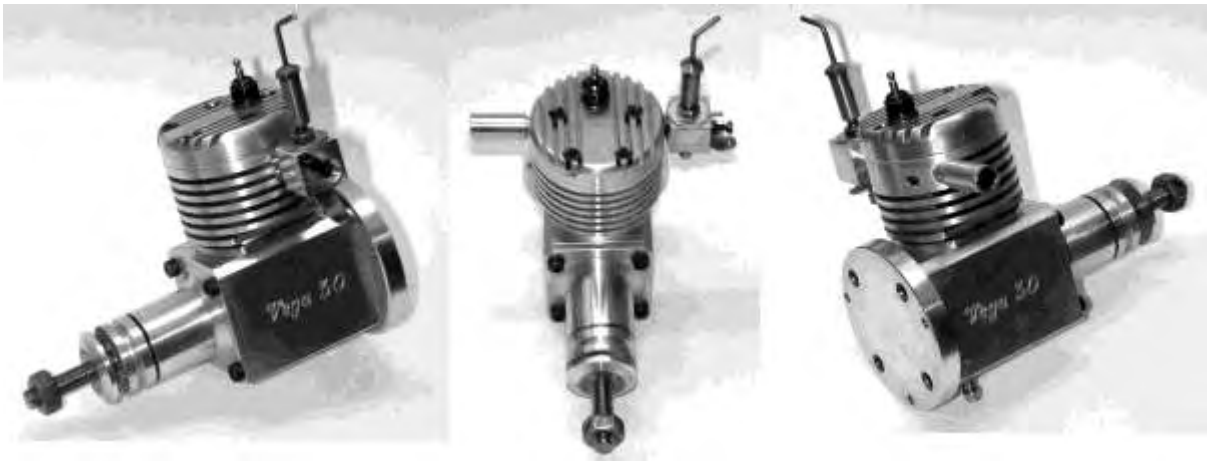
"ACE 0.5"

Commissioned by Harry York for sale through Model Aircraft Supplies, circa 1947,

Stroke:	0.410" (10.41 mm)
Bore:	0.308" (7.82 mm)
Capacity:	0.501cc (0.31 cuin)

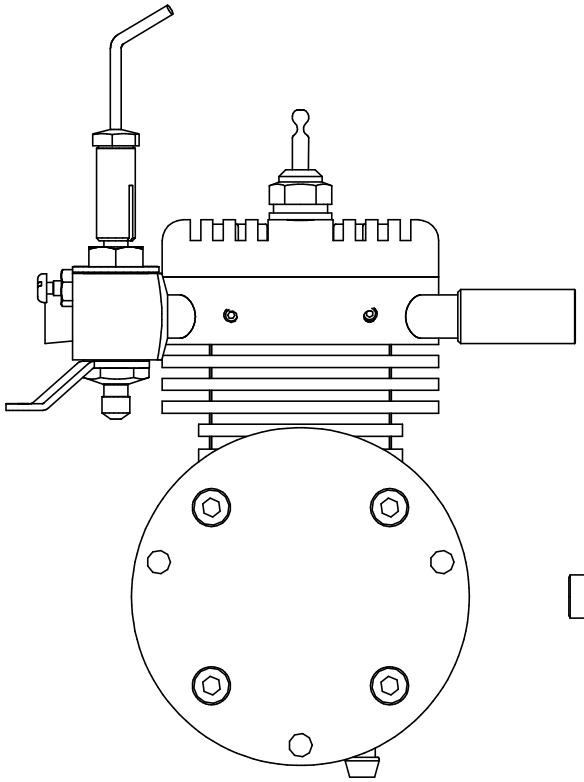
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME MAS ACE .5cc
			SCALE	2 X SIZE			
			DRAWN	EMB			NUMBER Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2007-10-16			

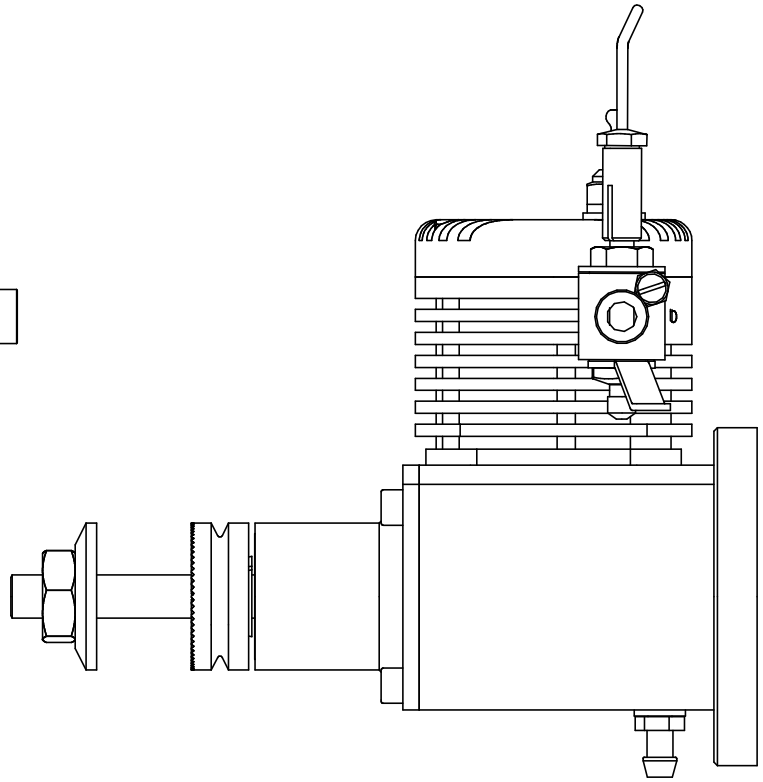
The VEGA 30 4-stroke glow-plug engine.

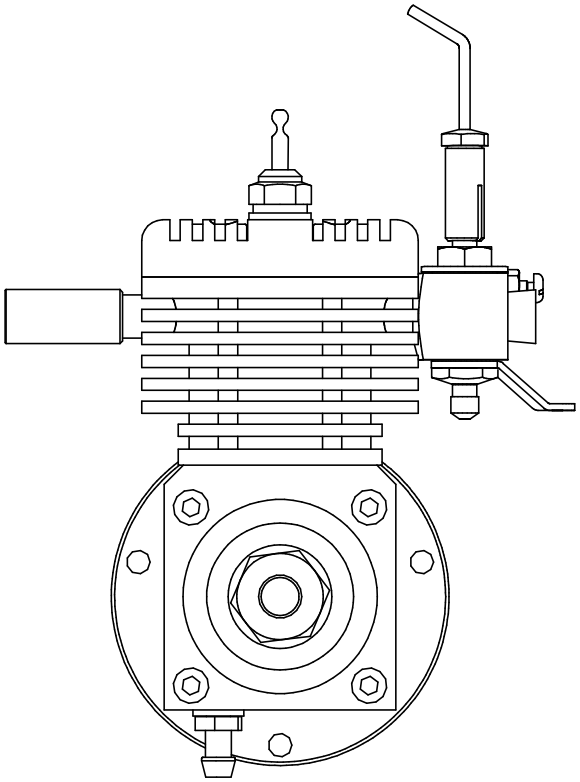


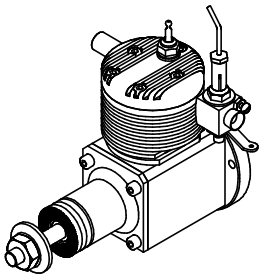
The Vega range was designed and built from the late 1980's through to the mid 1990's by John Harbone of Birmingham, England. His intent was to provide a range of engines for sport or scale flying that would be quiet and reliable. They were manufactured in small quantities from bar-stock until ill-health forced an end to the venture. The rights to all the designs were sold on with the intention that they continue in production, but sadly, this did not eventuate.

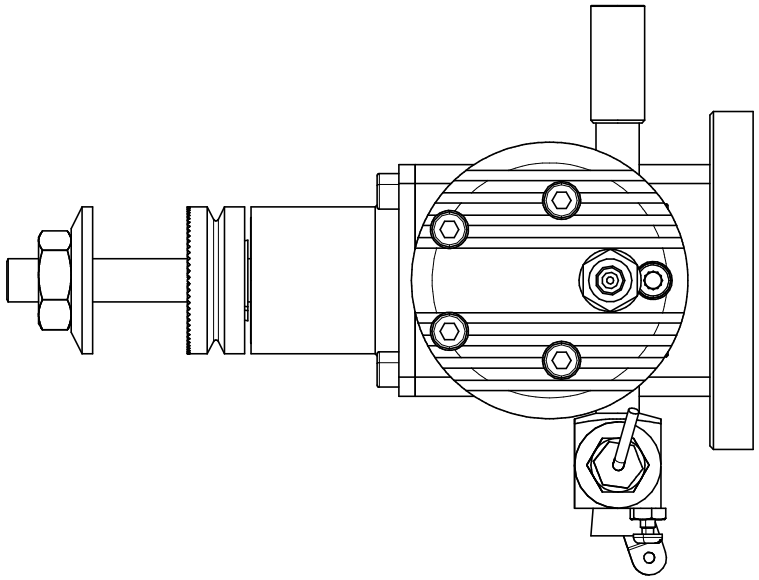
The initial models were all side-valve four-strokes. The range also included a .61, .25 and a horizontally opposed, alternate firing twin using the .25 cylinders to give .50 cu in total displacement. Towards the end of production, .61 and .91 cu in displacement over-head valve (OHV) prototypes were made although they did not reach "production". All models are comparatively rare today, but they do appear occasionally as collectables. Each model was offered in two versions. On type "A", the carburettor and exhaust were oriented to the rear of the engine, while type "B" placed then on the side of the head. Company advertising stressed the enclosed valve gear, free from tappet adjustment, the compact size, "solid" (bar-stock) construction, quiet running, and ability to idle for long periods with instant throttle response.

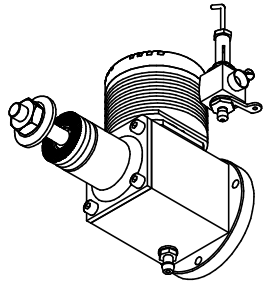




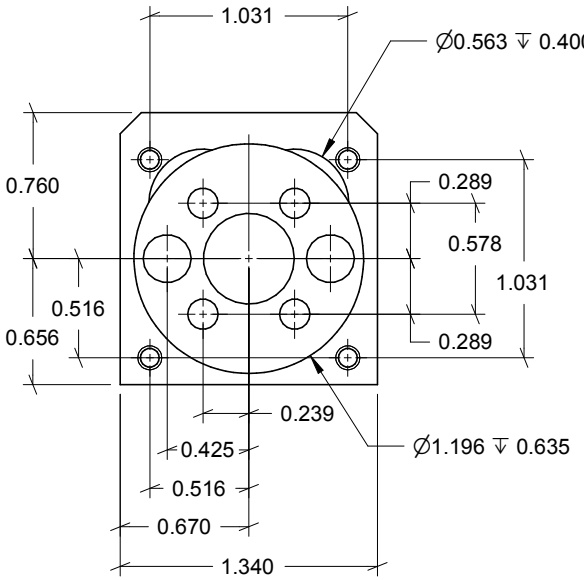


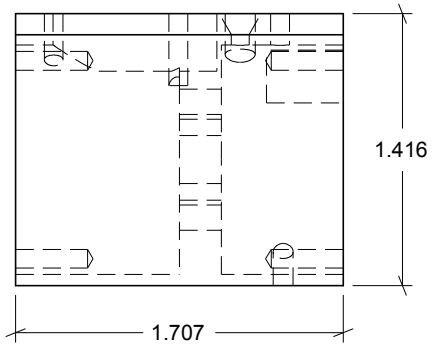


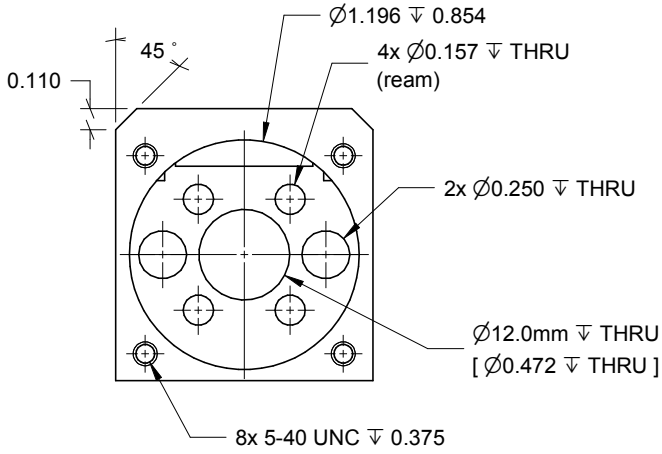


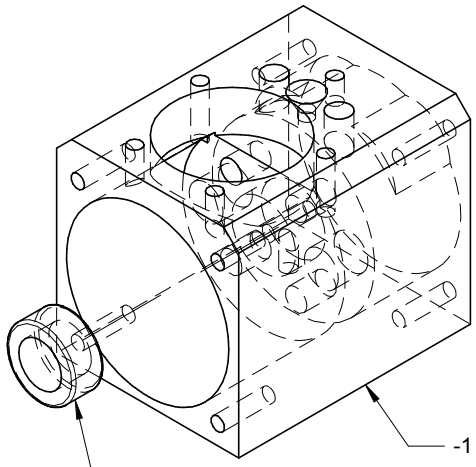


MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-02-24	Scale: 0.9 : 1
Material:		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - 3 View			Sheet: 00

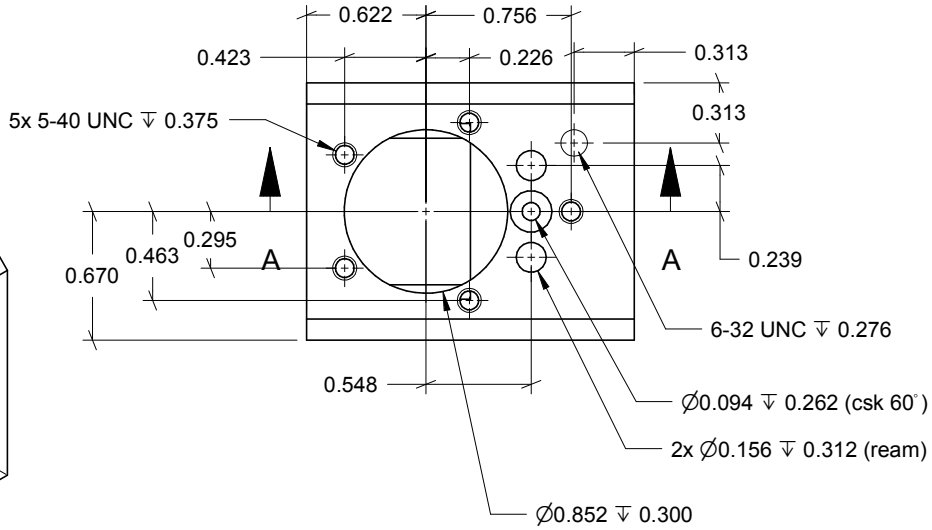


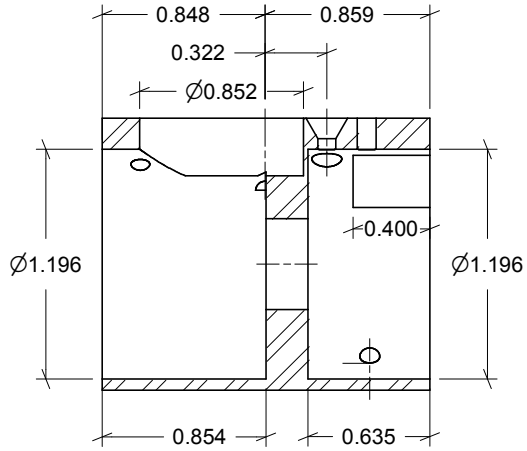






-2 Stock Oiltte bush press fit in -1
(4mm ID x 12mm OD), thin as required.

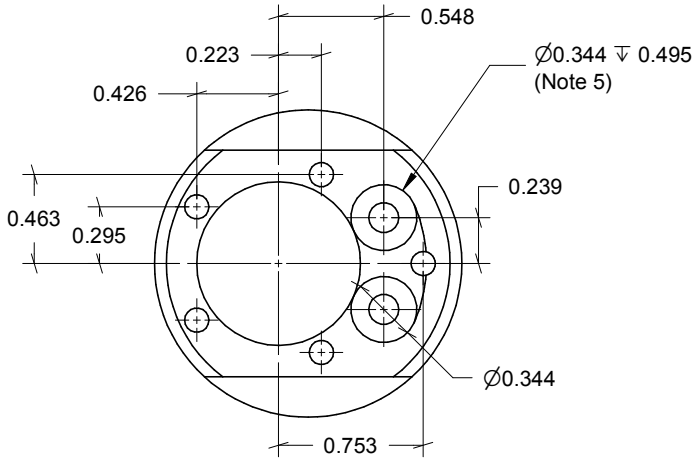


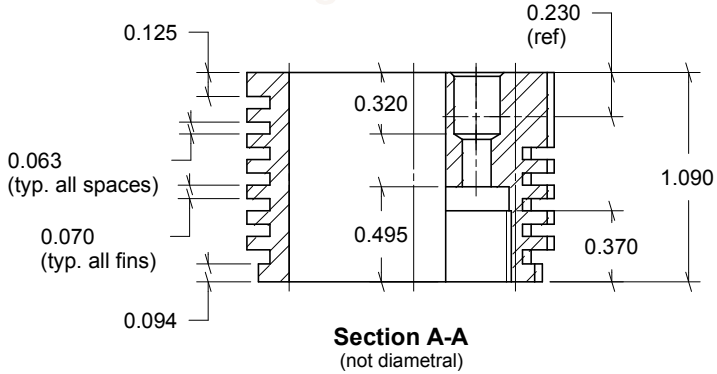


Section A-A

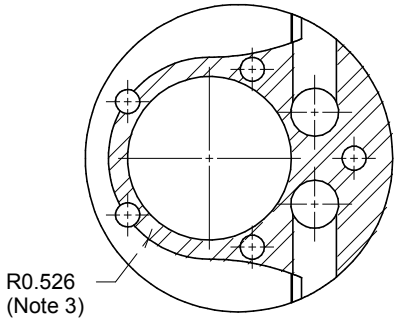
2008-03-07 Bring tappet axis in line with 2-1 Cylinder valve bores.

MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-01-18	Scale: 1 : 1
Material: Aluminum 6061-T6		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Crankcase			Sheet: 01.1

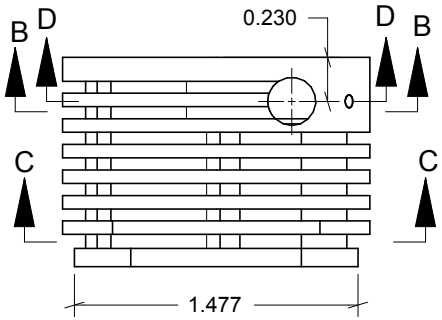




Section A-A
(not diametral)

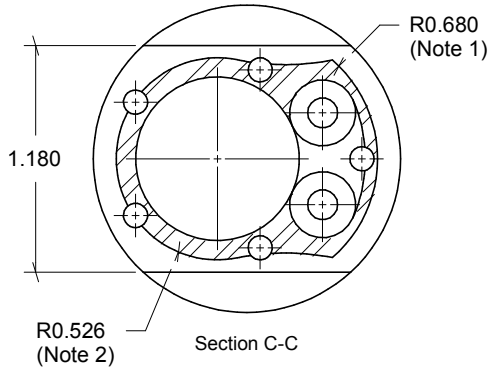


Section B-B

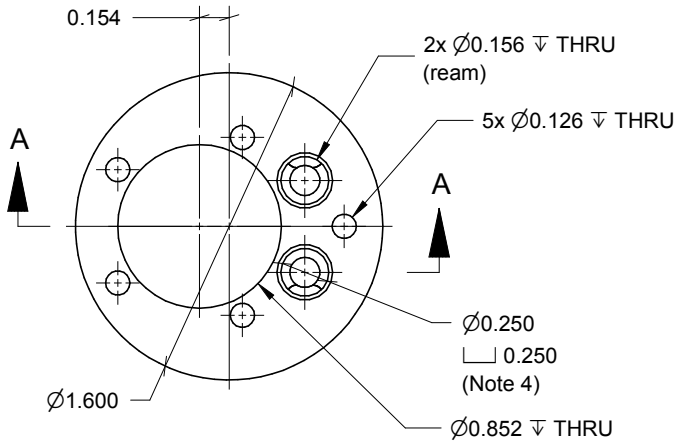


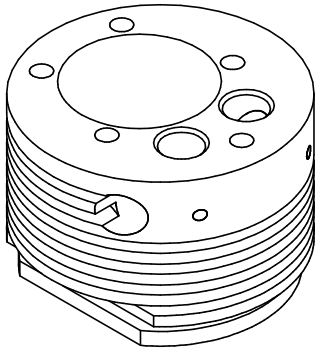
Notes:

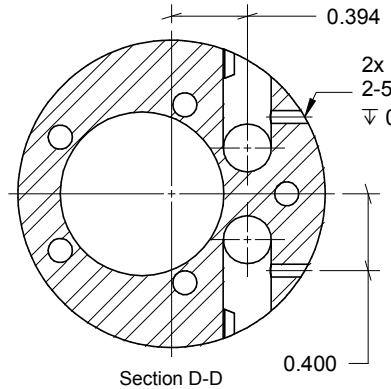
1. Cut lower five fin spaces 0.200 deep concentric with Cylinder Fin blank to dimensions shown.
2. Deepen lower five spaces with a 1/16" thick 2.5" dia. slitting saw rotated through an arc of 200° around the cylinder liner bore.
3. Upper two spaces are cut like the lower five spaces on a reduced arc of 180°.
4. Chamfer valve seats 45° at same setting to produce a seat no more than 0.016" wide.
5. Plunge cutter 0.495" deep concentric with reamed valve guide holes. Raise to 0.370" deep and join pockets concentric with cylinder liner bore to create space for insertion of valve retainer clips.



Section C-C



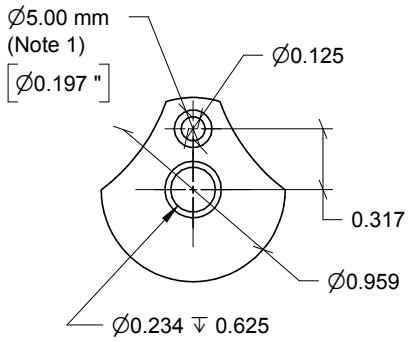


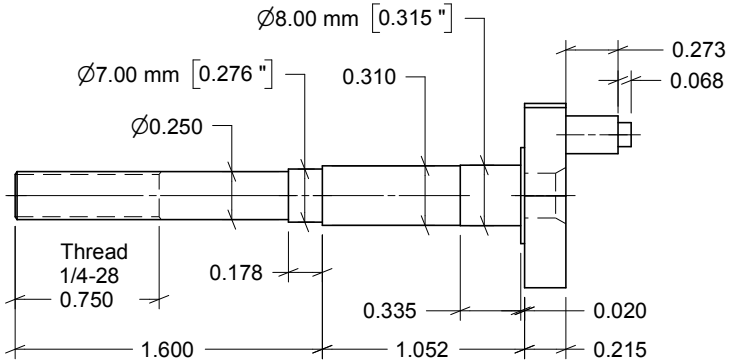


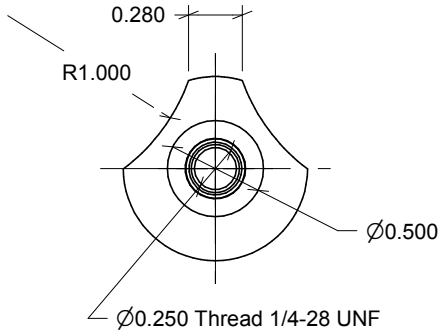
Section D-D

MOTOR BOYS (INTERNATIONAL)	CAD By: *BMBI*	Date: 208-01-18	Scale: 1 : 1
Material: Aluminum 2024			*All dimensions are inches unless otherwise stated.*
Title: Vega 30 - Cylinder Jacket			Sheet: 02.1

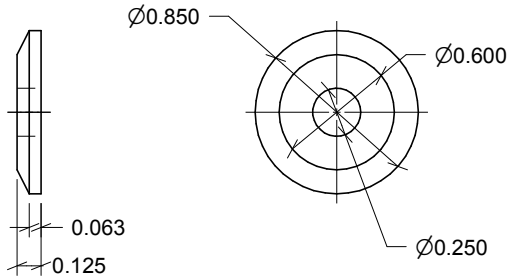
2008-03-07 Revise Section A-A and Notes.







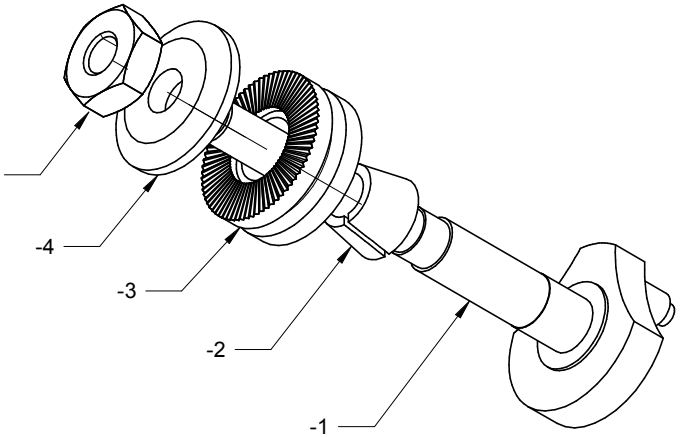
-1 CRANKSHAFT
(Steel 4140)

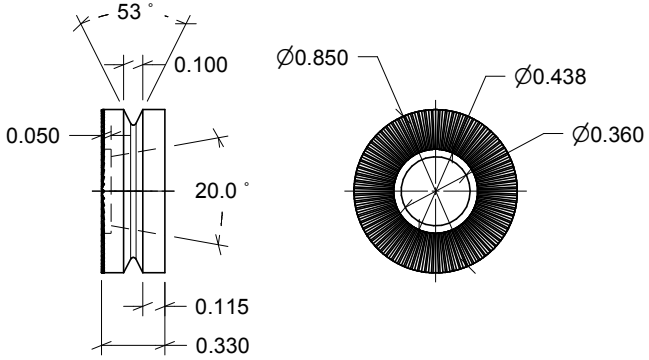


-4 PROP WASHER
(Aluminum 2024-T4)

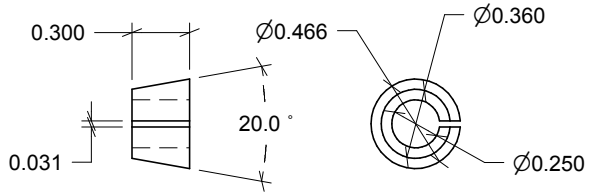
Notes:

1. Crankpin on original engines was fashioned from a Ø5.00mm steel roller and pressed into the crankshaft after hardening.
2. Straight knurl shown. Originals used a left-hand spiral knurl.



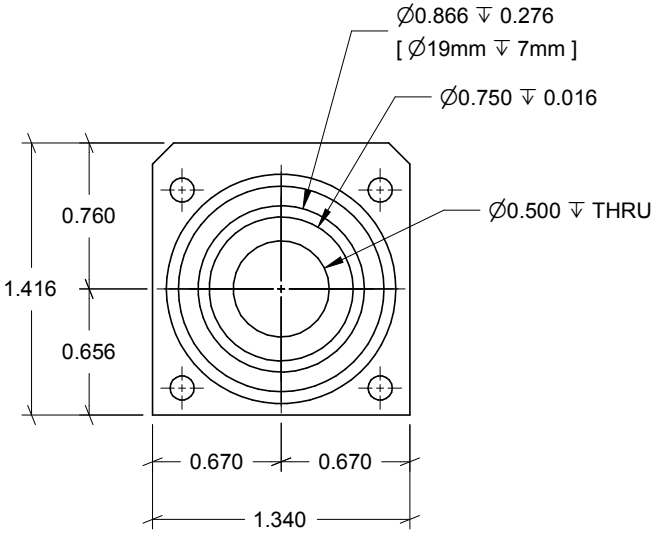


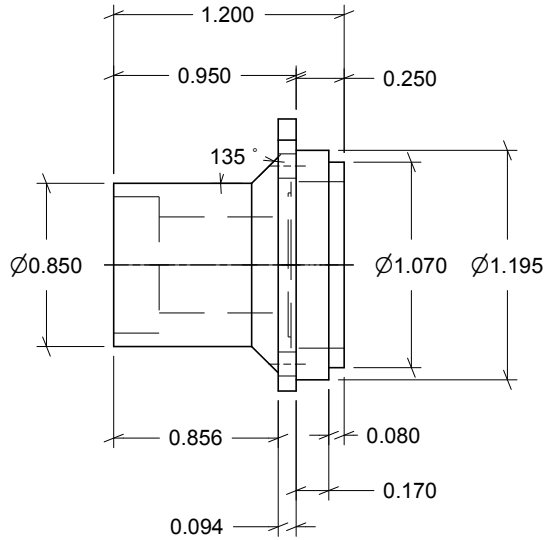
-3 PROP DRIVER
(Aluminum 2024-T4)

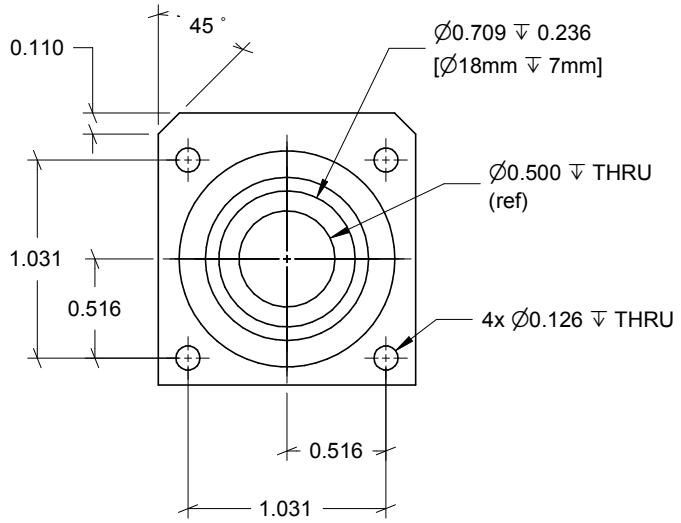


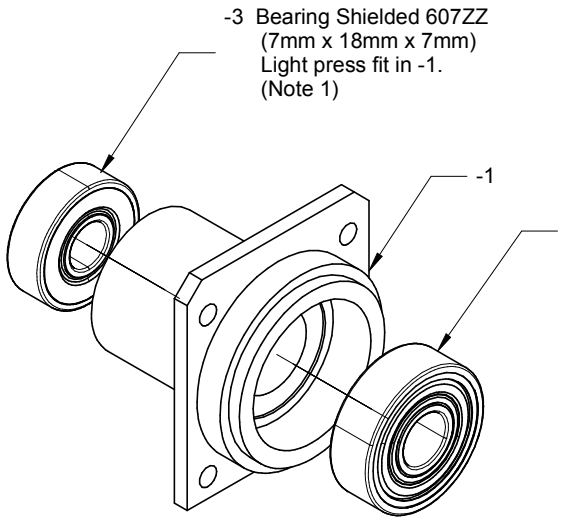
-2 SPLIT CONE
(Aluminum 2024-T4)

MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-01-18	Scale: 1 : 1
Material: As Noted.		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Crankshaft			Sheet: 03





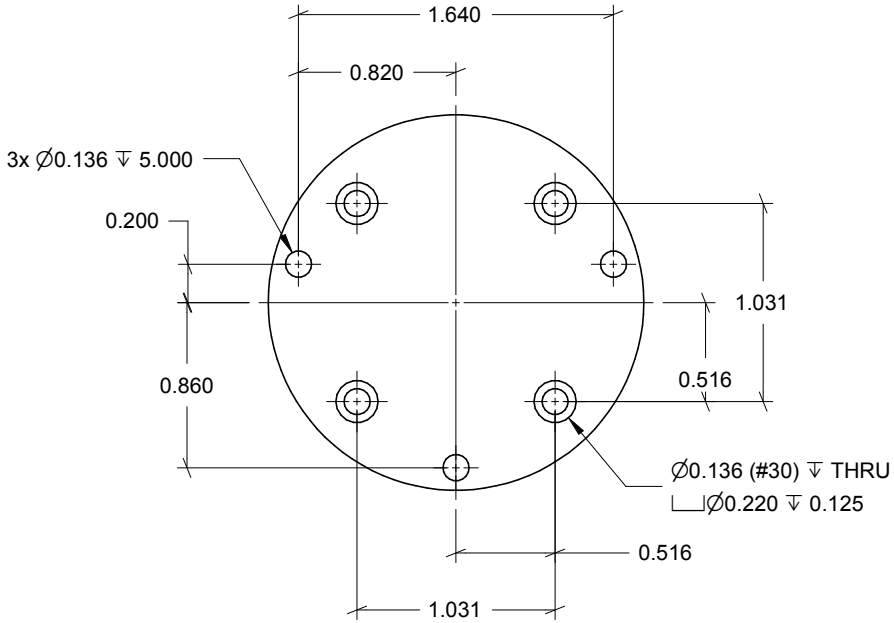


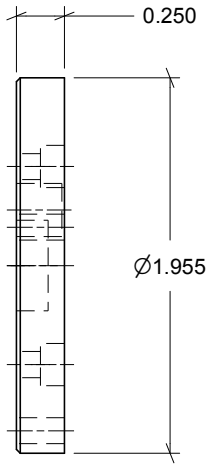


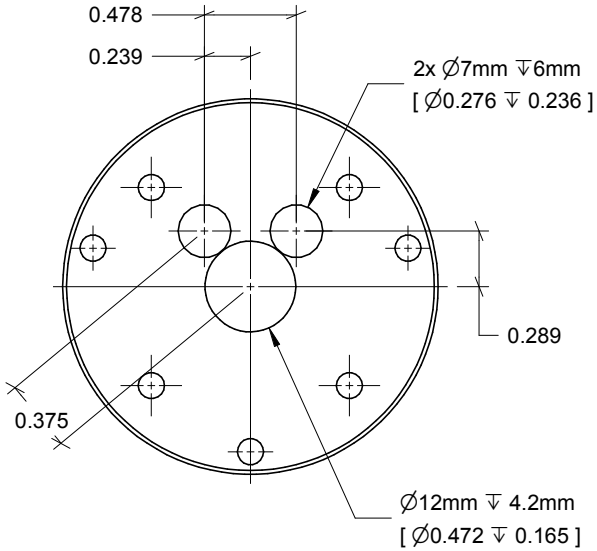
Notes:

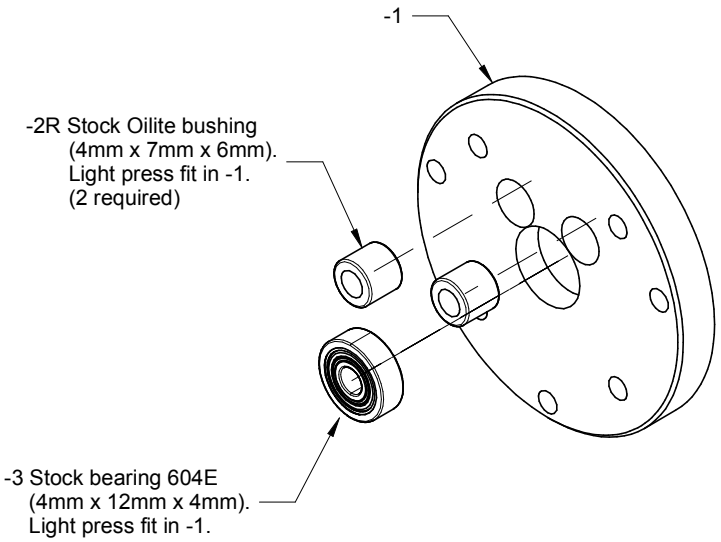
1. Original engines used an R4Z Imperial bearing in front (0.250 x 0.625 x 0.198). If this bearing is used, the front recess in the -1 Bearing Housing should be modified accordingly and the Ø7mm step on the 03-1 Crankshaft omitted.

MOTOR BOYS (INTERNATIONAL)	CAD By: *BMBI*	Date: 2008-01-18	Scale: 1 : 1
Material: Aluminum 6061			*All dimensions are inches unless otherwise stated.*
Title: Vega 30 Bearing Housing			Sheet: 04



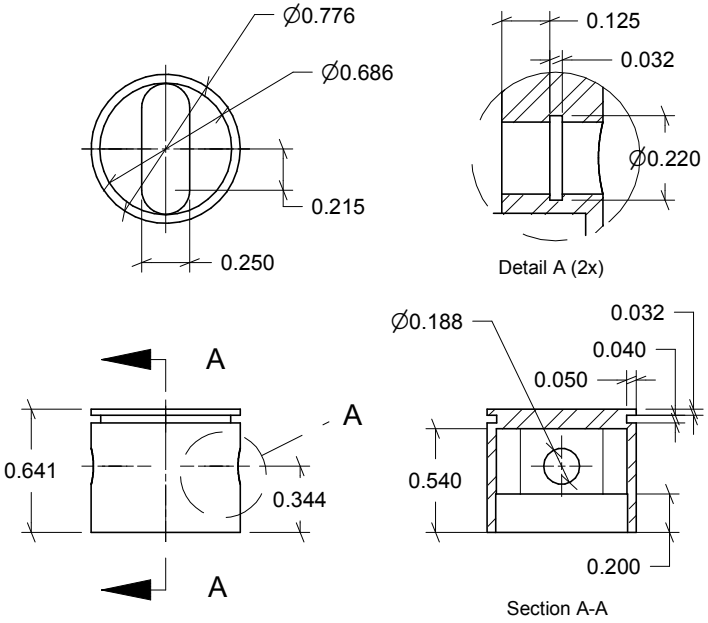




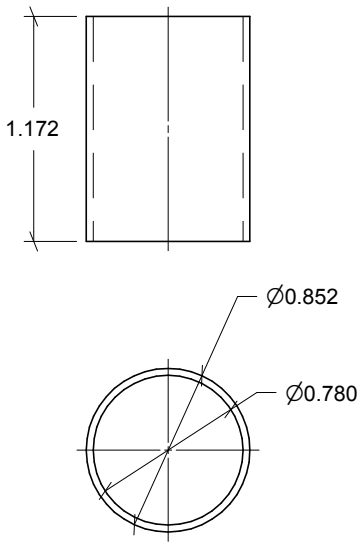


2008-03-06 Correct location of cam busing bores to match 1-1 Crankcase.

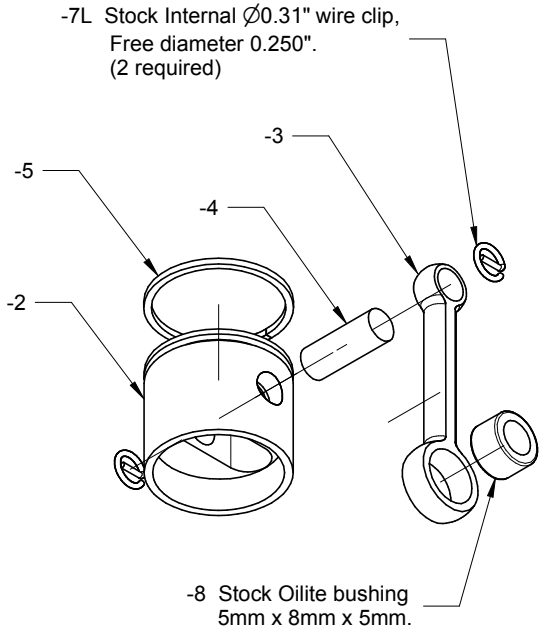
MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-01-19	Scale: 1 : 1
Material: Aluminum 6061			*All dimensions are inches unless otherwise stated.*
Title: Vega 30 - Backplate			Sheet: 05.1

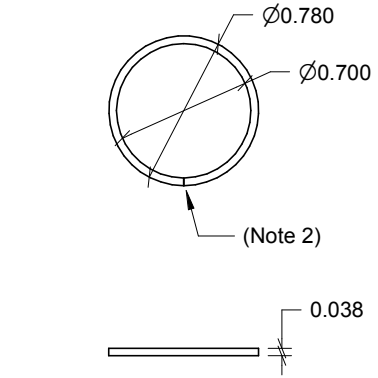


-2 PISTON
(Aluminium 2024)

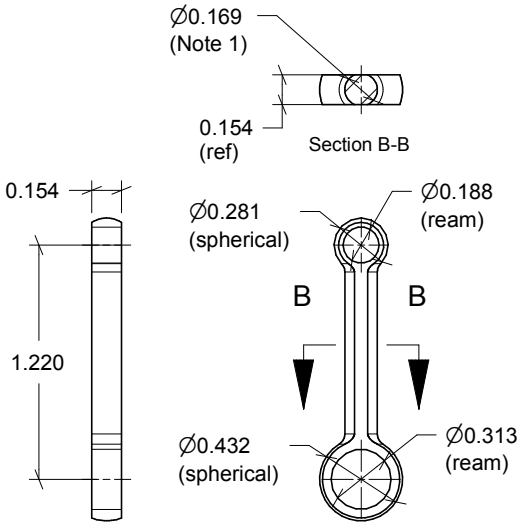


-1 CYLINDER LINER
(Fine grained CI, or "Meehanite")

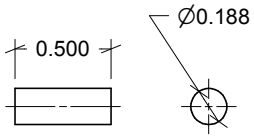




-5 COMPRESSION RING
(Fine grained CI, or "Meehanite")



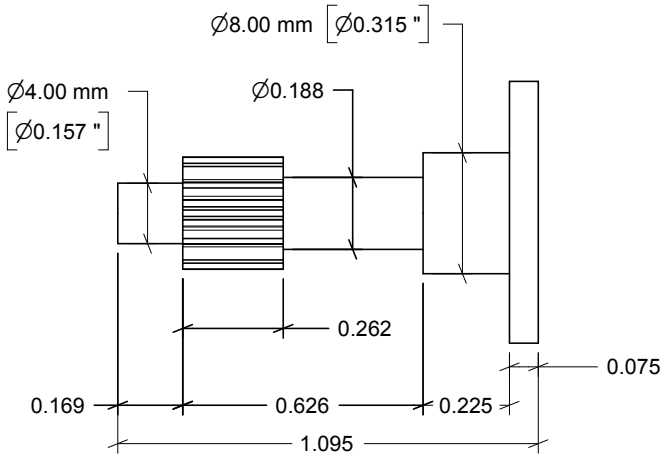
-3 CONROD
(Aluminum 2024)

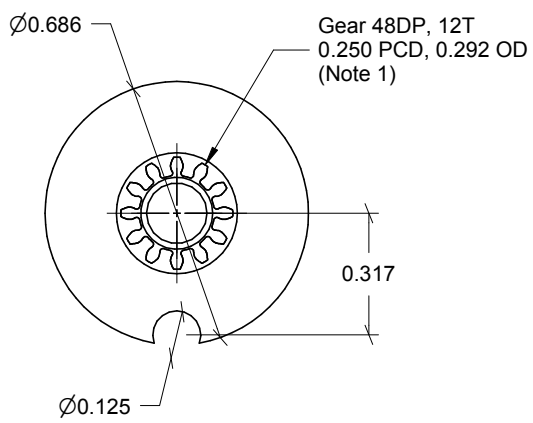


-4 WRIST PIN
(Ø3/16 Drill rod)

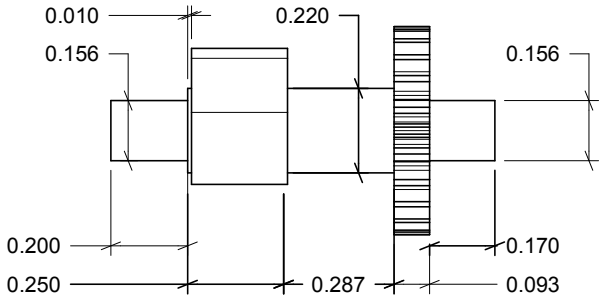
Notes:
1. Conrod ends and shank appear to have been formed by spherical turning, possibly from Ø0.5" bar before milling to width.
2. Suggested ring gap 0.093 - 0.100". Apply using your favourite method.

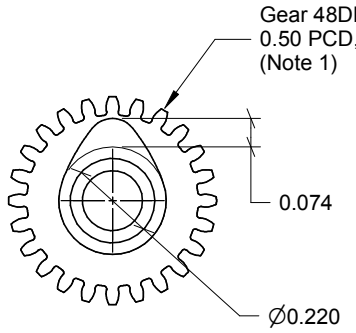
MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-01-19	Scale: 1 : 1
Material: As Stated.			*All dimensions are inches unless otherwise stated.*
Title: Vega 30 - Piston and Liner			Sheet: 06



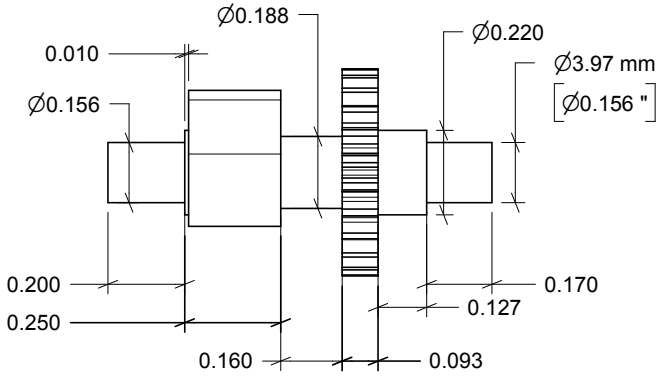


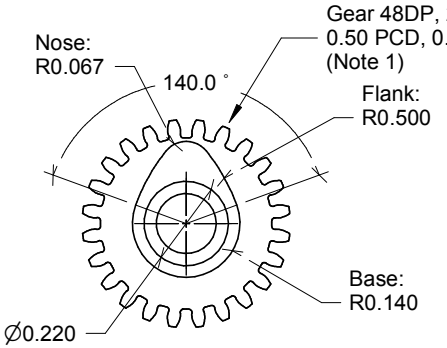
-1 FOLLOWER SHAFT
(Drill rod)



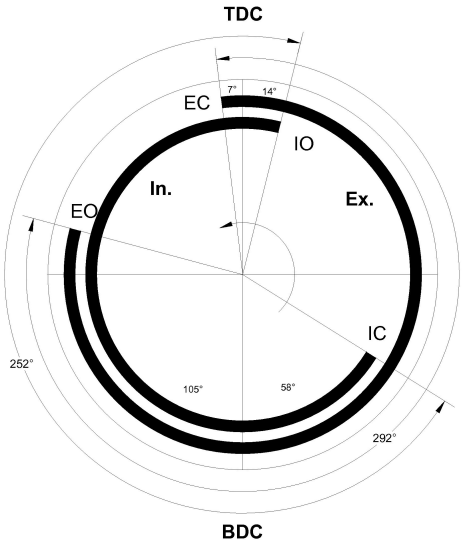


-2 EXHAUST CAM
(Drill rod)





-3 INLET CAM
(Drill rod)



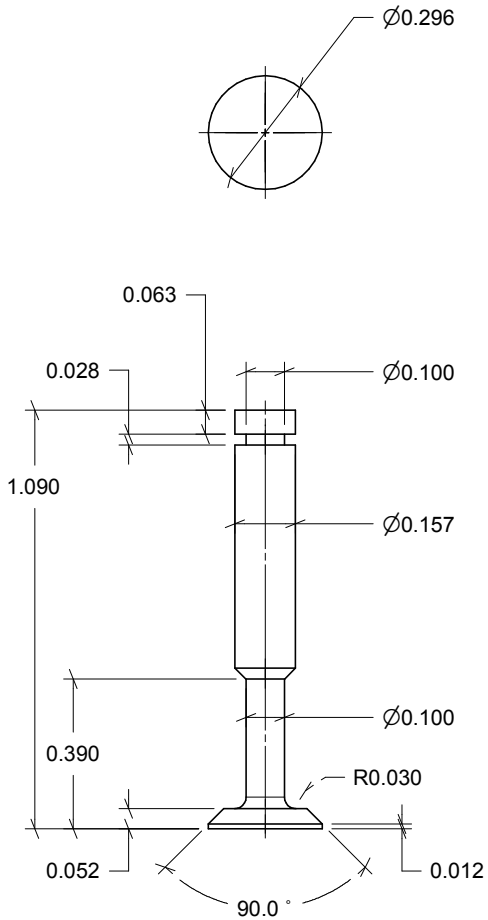
Notes:

1. All models in the Vega range used one-piece cam shafts with the gear teeth cut and cams formed before nitriding. Constructors not wishing to replicate this can simplify construction with commercially made gears pressed or glued onto the shafts. A similar approach would be permissible for the cams themselves simplifying alignment.

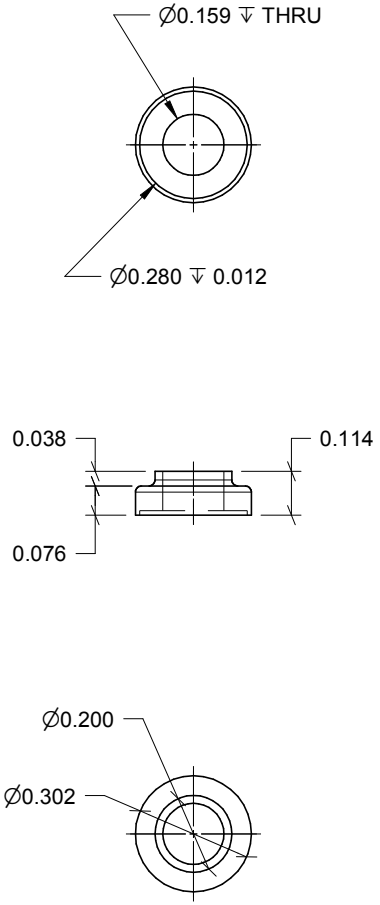
2. Inlet and exhaust cams have the same profile:
   Base Circle: Ø 0.240"
   Flank Radius: 0.500"
   Nose Radius: 0.067"
   Lift: 0.074"
   Angle: 140°

3. The inlet and exhaust durations in the timing diagram represents measurements taken from a single engine. The difference in exhaust and inlet durations is due to the variation in tappet length and hence, clearance.

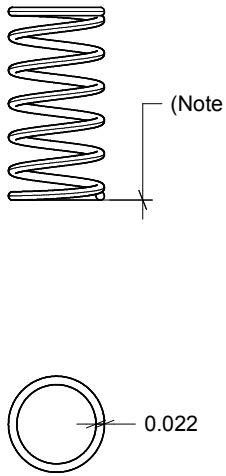
MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-01-21	Scale: 2 : 1
Material: As Noted		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Camshafts			Sheet: 07



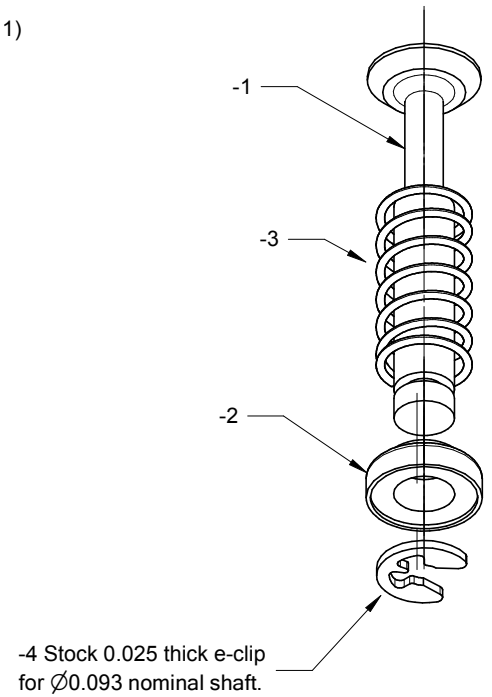
-1 POPPET VALVE
(Stainless Steel)



-2 VALVE CAP
(Bronze)

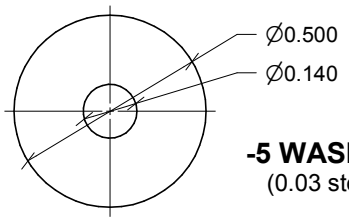


-3 VALVE SPRING
(Ø0.022 Stainless wire)

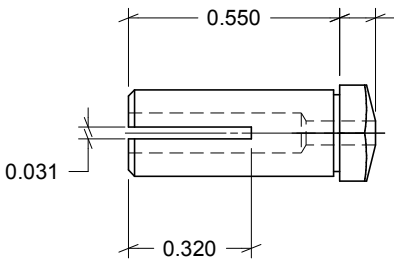


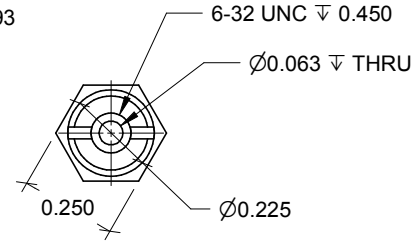
Notes: 1. Valve springs wound with Ø 1/4" outside diameter; five (5) complete turns with a free length 0f 1/2" and closed, unground ends.

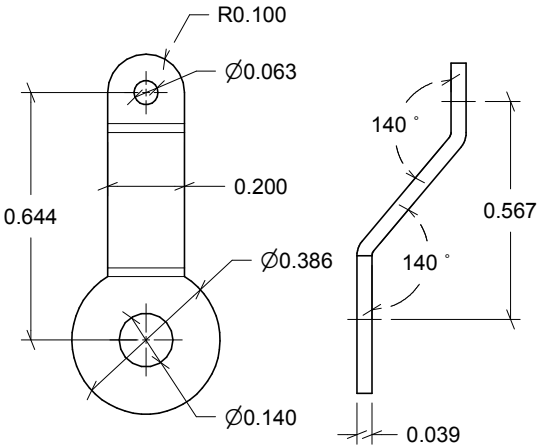
MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-01-19	Scale: 2 : 1
Material: As Noted		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Valve Gear			Sheet: 08



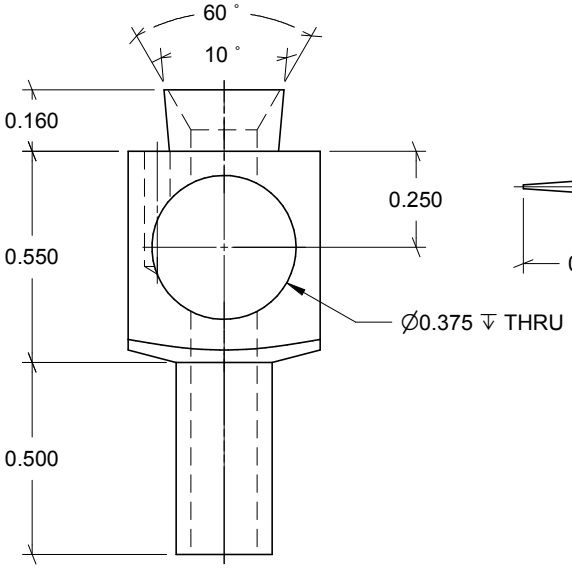
-5 WASHER
(0.03 steel)



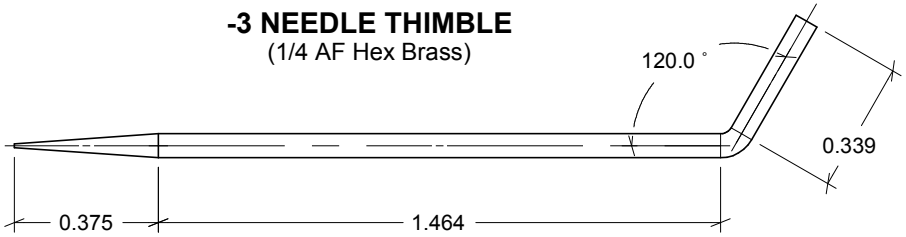




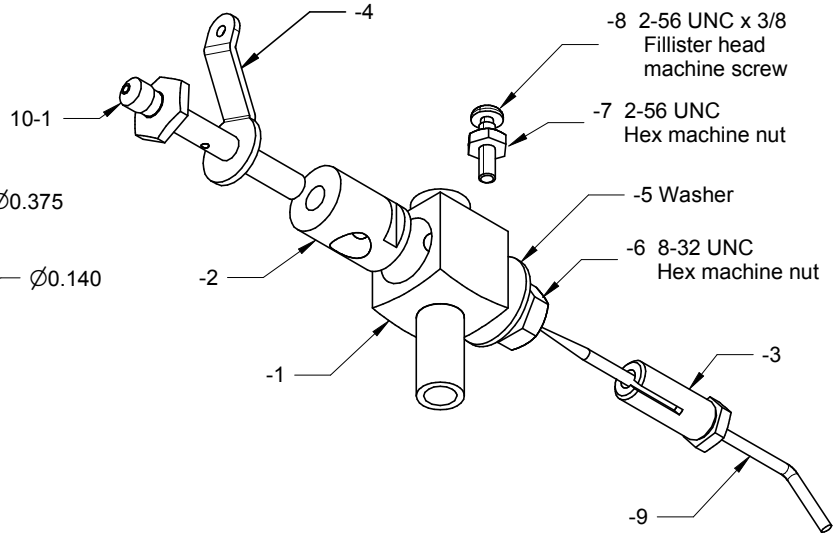
-4 THROTTLE ARM
(1mm sheet steel)

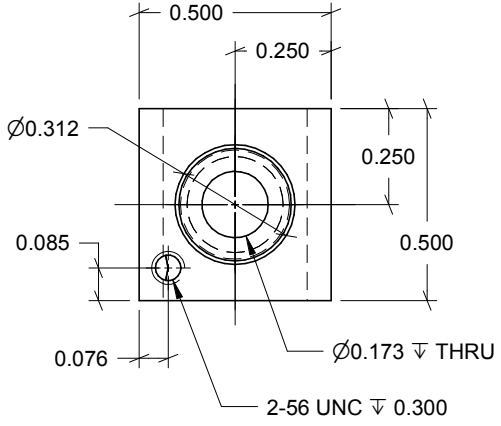


-3 NEEDLE THIMBLE
(1/4 AF Hex Brass)

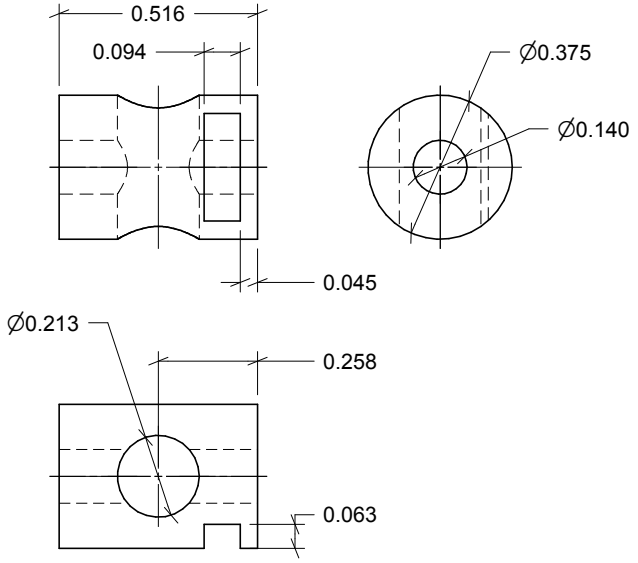


-9 NEEDLE
(Ø1/16 Music wire)



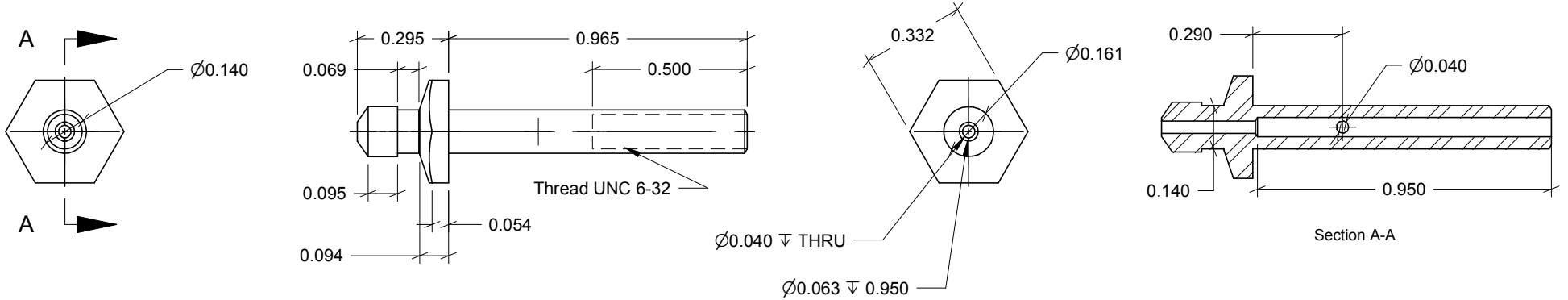


-1 THROTTLE BODY
(Aluminum 6061)

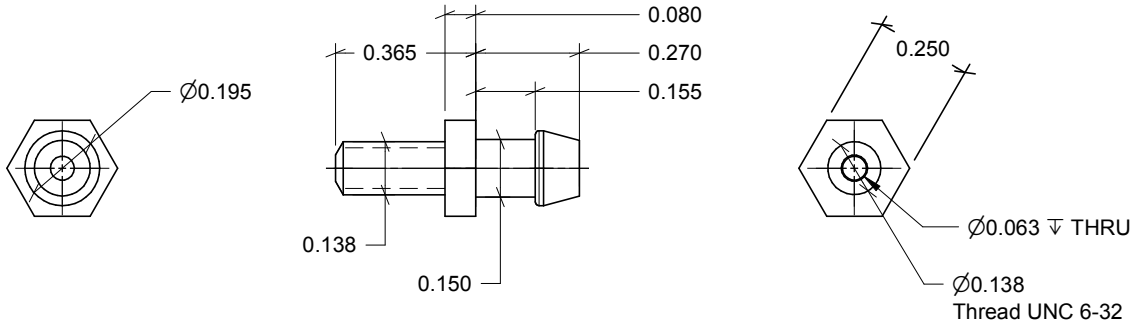


-2 THROTTLE BARREL
(Brass)

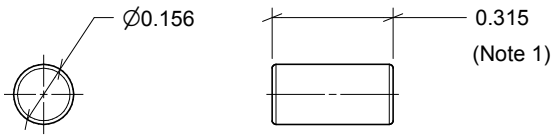
MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-01-20	Scale: 2 : 1
Material: As Noted.		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Carburetor			Sheet: 09



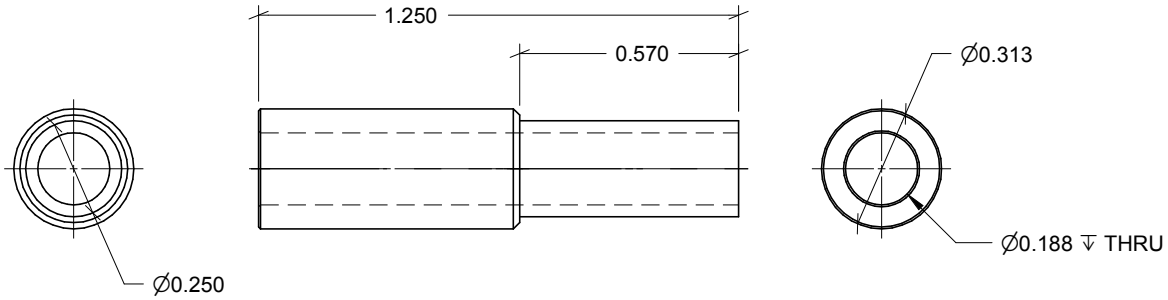
-1 Spraybar
(Hex brass)



-2 Crankcase Vent
(Hex brass)



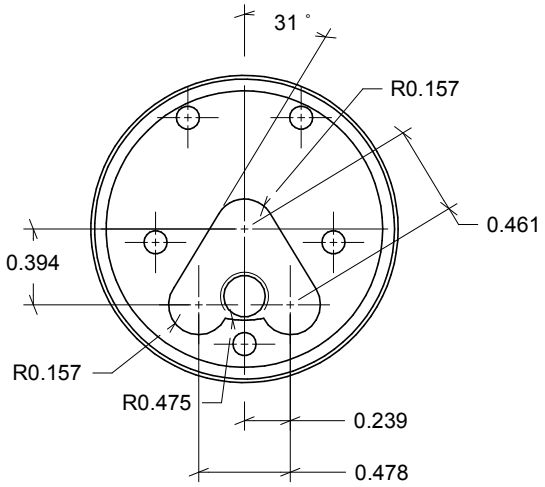
-3 Tappet
(Ø5/32" Roller)

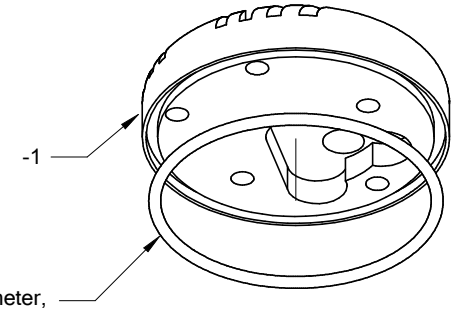


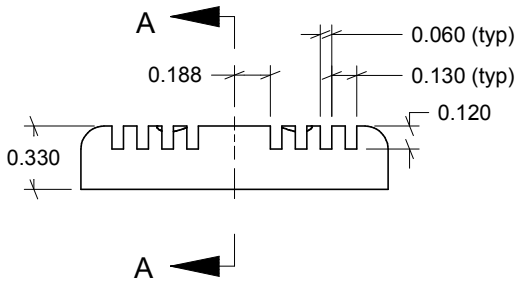
-4 Exhaust Pipe
(aluminum)

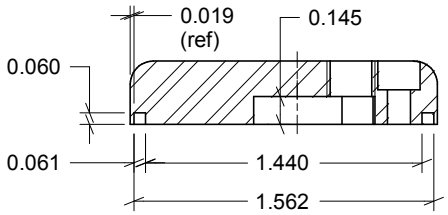
Notes: 1. Dimension shown is nominal. Tappet length ground to provide 0.005" clearance to valve when fully closed.

MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-02-23	Scale: 2 : 1
Material: As Noted			*All dimensions are inches unless otherwise stated.*
Title: Vega 30 - Misc.			Sheet: 10

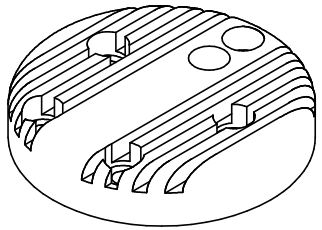


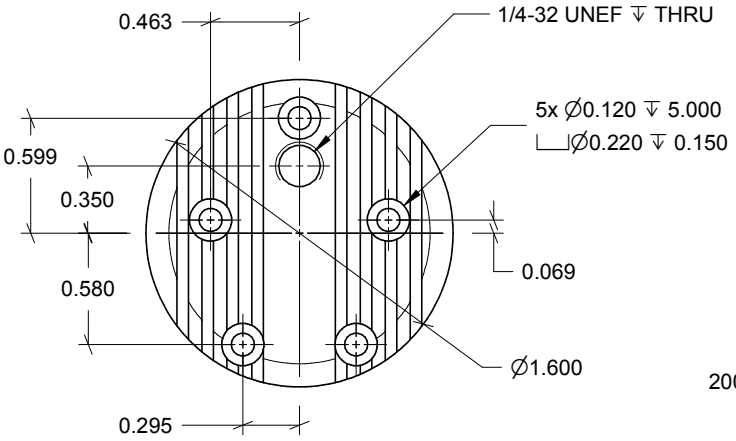






Section A-A

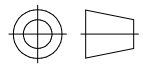


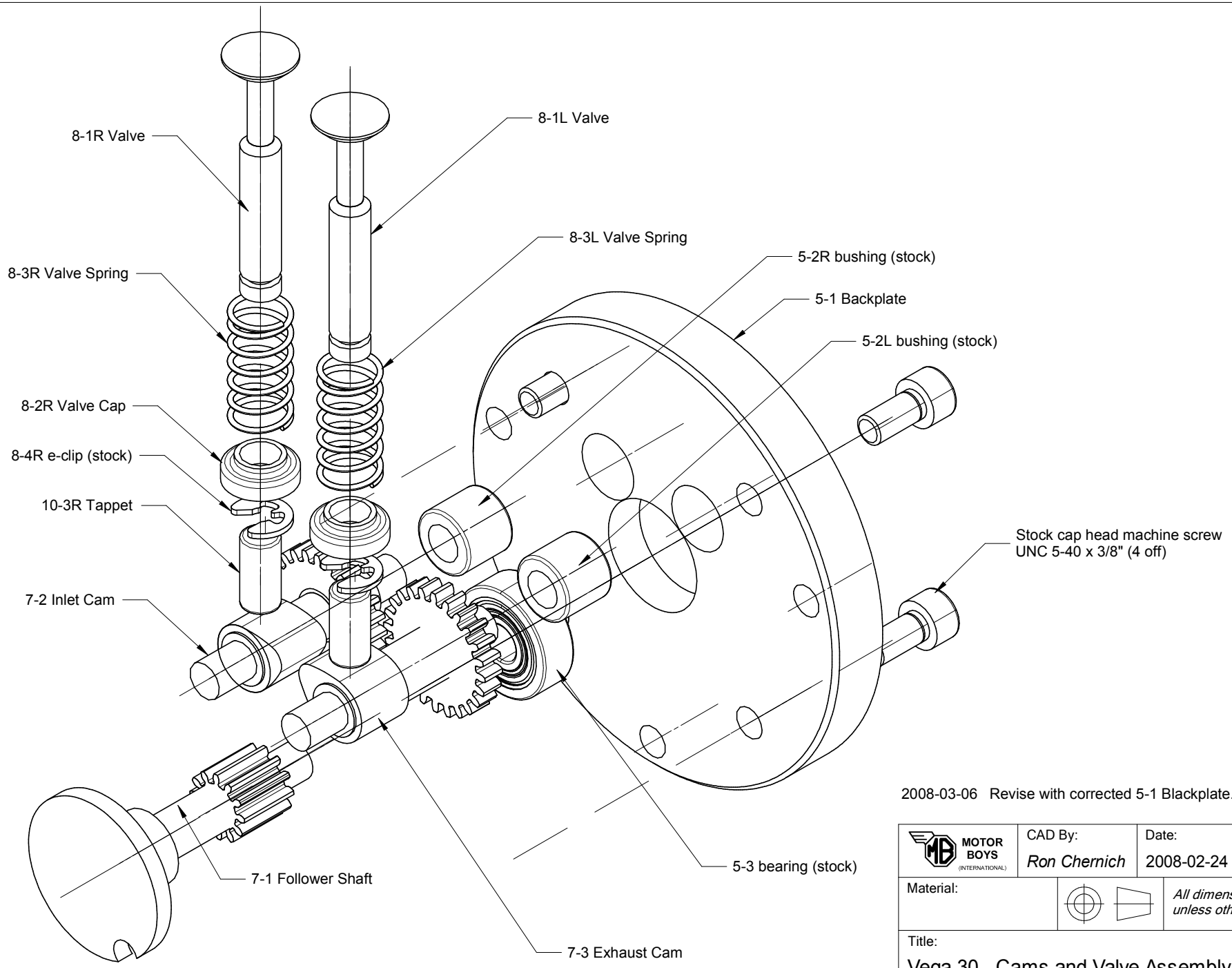


Mill cavity with ∅ 5/16" cutter:

1. Mount head on a rotary table centered under mill spindle.
2. Rotate so Y axis is 31° from fore-aft position.
3. Plunge 0.145" deep and mill out for 0.461".
4. Return to center, rotate 31° to otther side and repeat step 3.
5. Move cuter axis to 0.319" from center and rotate the table to connect the two slots. Remove the remaining island.

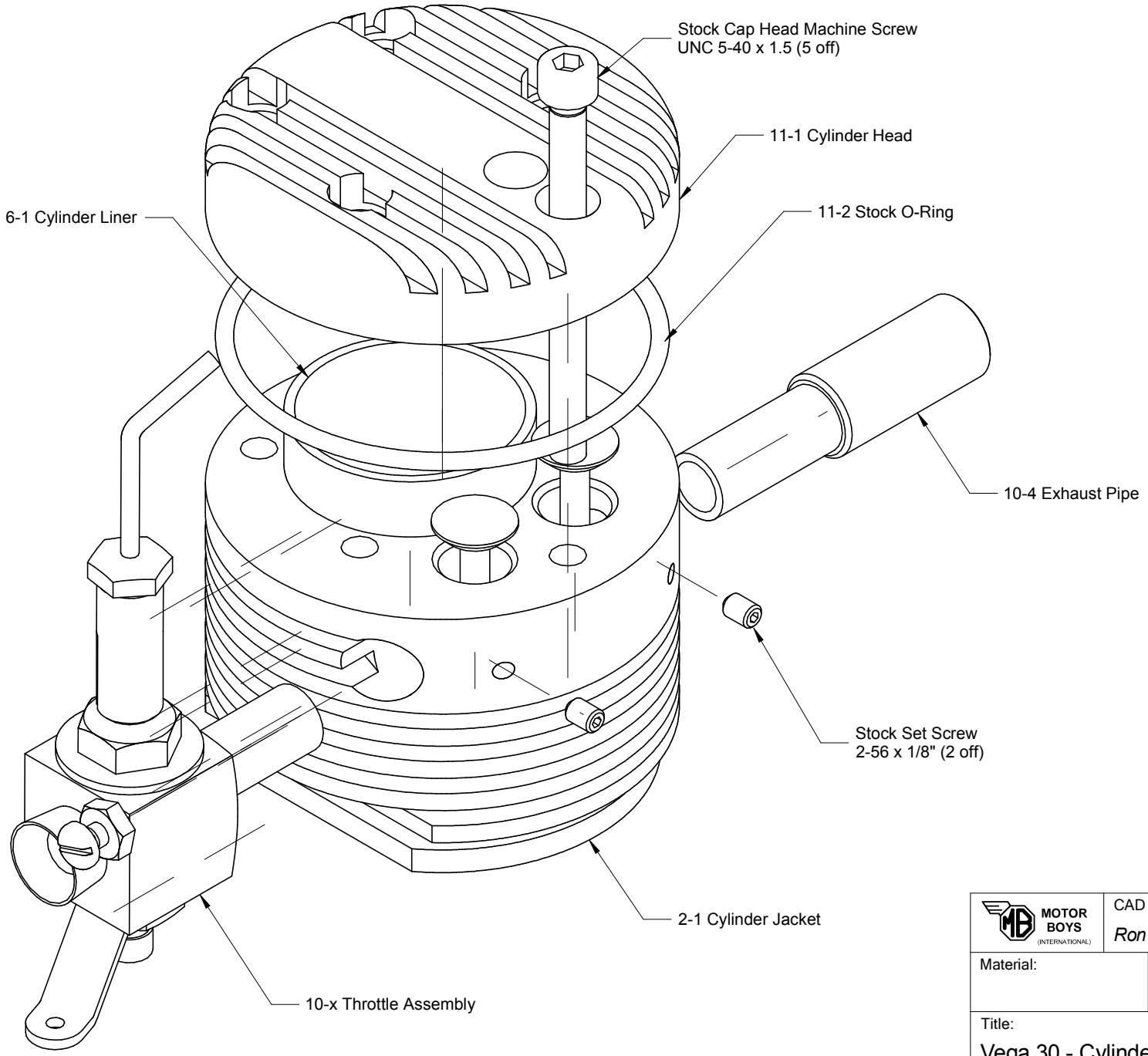
2008-03-07	Correct placement of valve pockets to align with 2-1 Cylinder valve axis.
2008-03-06	Correct drawing number in title block.

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-01-20	Scale: 1 : 1
Material: Aluminum 6061-T6		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Cylinder Head			Sheet: 11.2.1



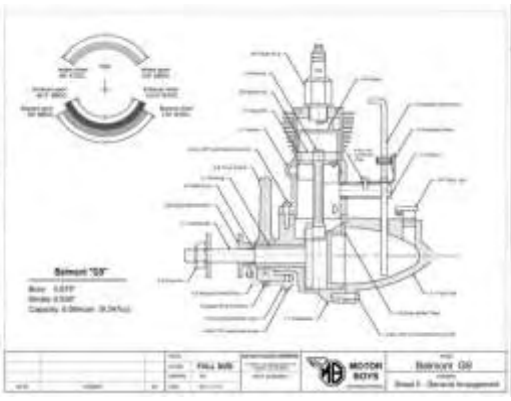
2008-03-06 Revise with corrected 5-1 Blackplate.

MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-02-24	Scale: 2 : 1
Material:		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Cams and Valve Assembly			Sheet: 12.1

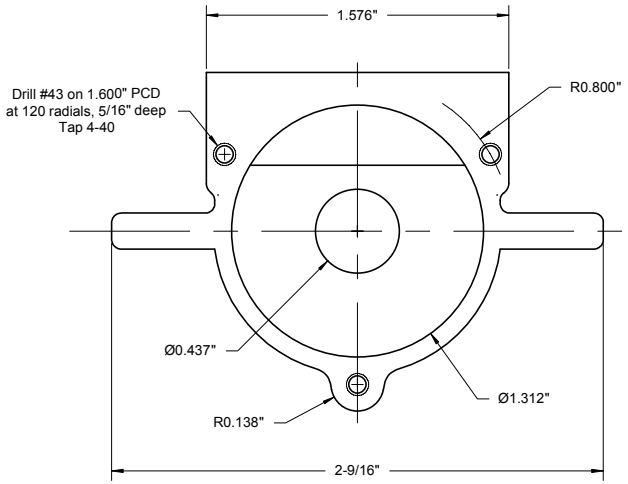


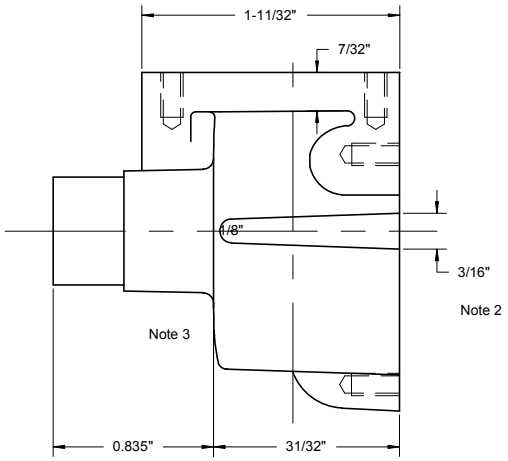
MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-02-27	Scale: 2 : 1
Material:		*All dimensions are inches unless otherwise stated.*	
Title: Vega 30 - Cylinder Assembly			Sheet: 13

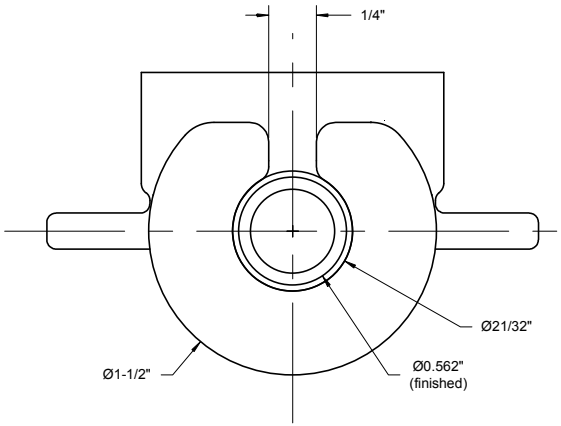
BELMONT [or IMP] G9 ignition engine.

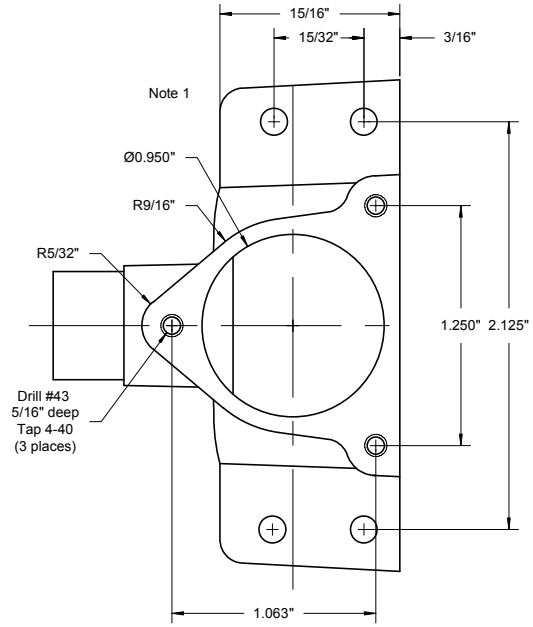


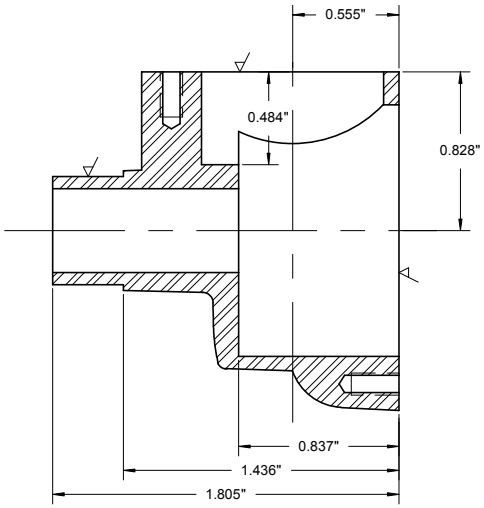
This engine was first advertised in 1939 by "International Models [Products]" of New York as the "G9". The ads quoted a bore of 7/8" and stroke of 15/16". Later, the manufacturer seems to have moved to Boston, changed their name to "Belmont Miniature Motors" and the engine became known simply as the *Belmont*. No ad we've been able to trace ever stated the capacity, only the bore and stroke, although Model Airplane News in their annual gas engine round-up for 1940 and 1941 quote the calculated capacity. The engine had disappeared from sale by 1942, precisely when, we don't know. Based on photos accompanying the various advertisements, it appears the G9 had a cast, streamlined tank, while the "Belmont" had a cylindrical tank secured under the venturi tube as per common practice.











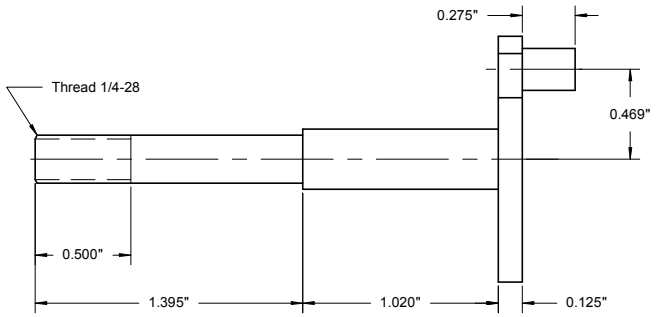
Notes:
1. Dimensions shown give maximum external dimensions. Crankcase was cast as a plug with no separation lines so all draft angles reduce dimensions towards the front.
2. Note engine lugs are symetrical around crankcase center line. These were un-machined on the original resulting in a natural two degrees of downthrust when mounted flat.
3. Front face of case lightly domed approx 1/32".

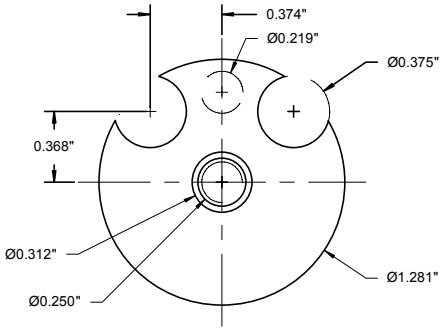
-1 CRANKCASE

Aluminum Casting

▽ Machine

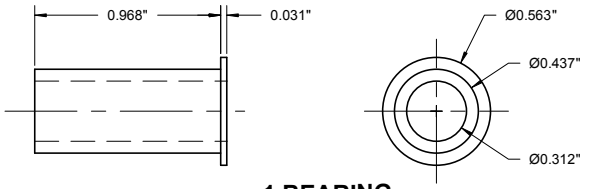
			MAT'L		DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME Belmont G9
			SCALE	FULL SIZE			
			DRAWN	RC	NEXT ASSEMBLY		NUMBER Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	2011-11-18			





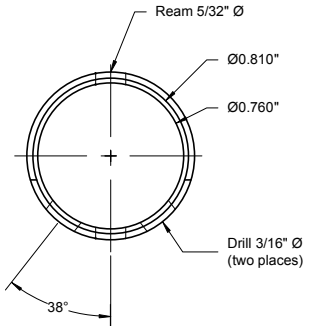
-2 CRANKSHAFT

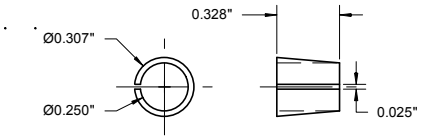
Steel



-1 BEARING

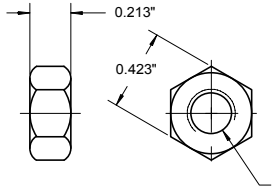
Bronze





-3 SPLIT CONE

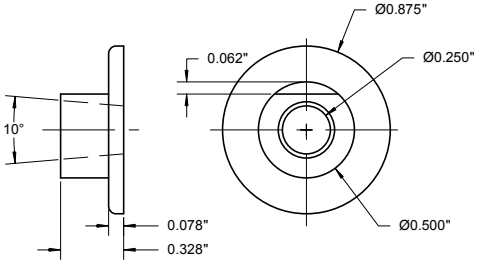
Brass



Drill #3
Tap 1/4-28

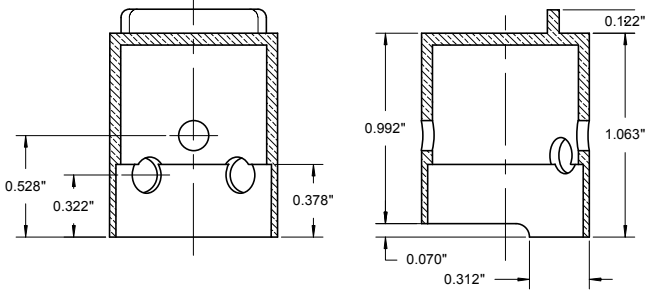
-9 PROP NUT

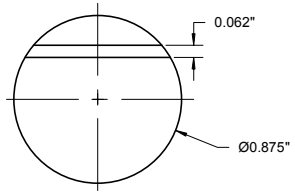
7/16 " AF Hex Steel



-4 DRIVE WASHER/CAM

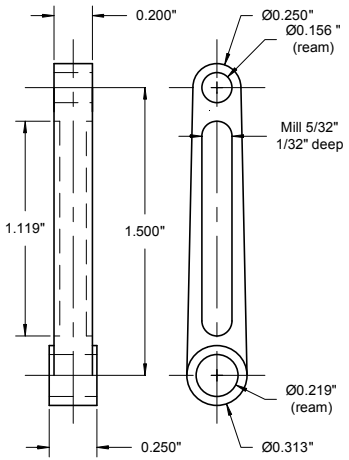
Steel (case harden)





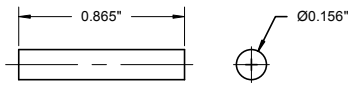
-8 PISTON

Steel



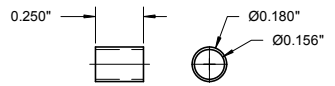
-5 CON ROD

Aluminum



-7 WRIST PIN

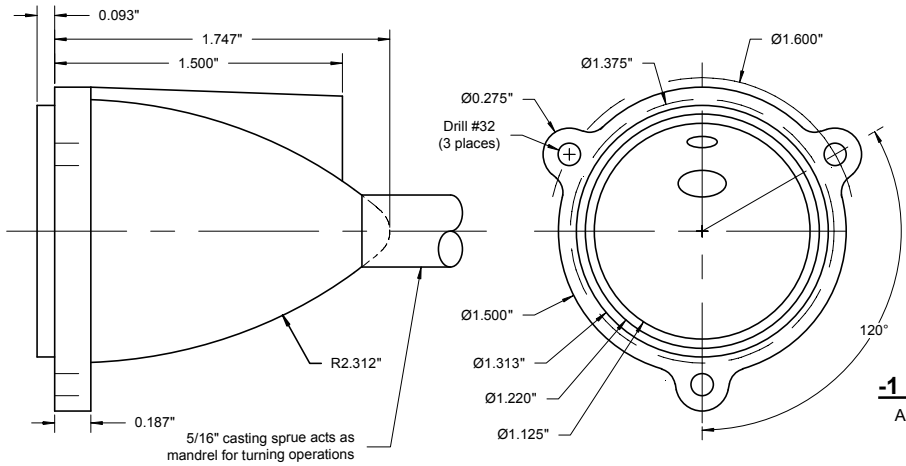
Drill Rod



-6 SPACER

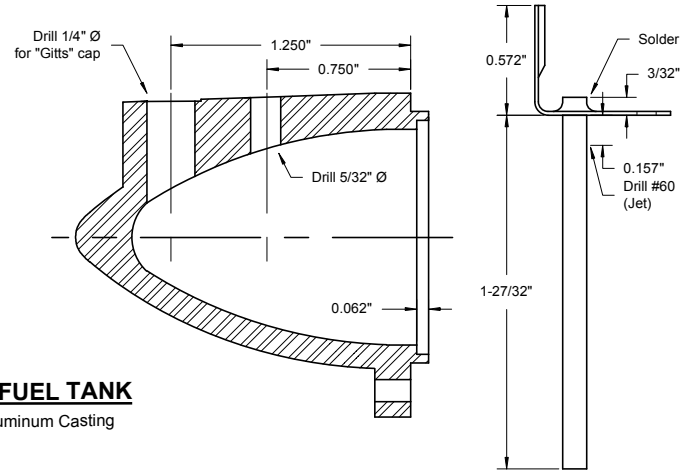
Brass (2 reqd.)

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Belmont G9
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RC	NEXT ASSEMBLY		NUMBER: Sheet 2 - Moving Parts
DATE	CHANGE	BY	CAD	2011-11-18			



-1 FUEL TANK

Aluminum Casting

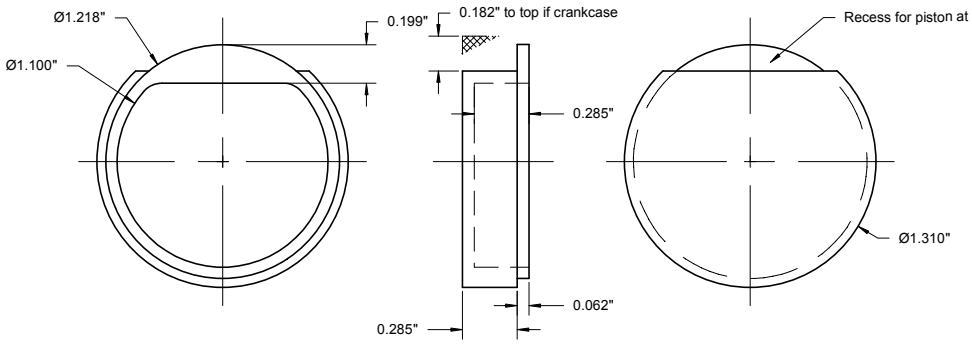


-4 SPRAYBAR

Brass fabrication

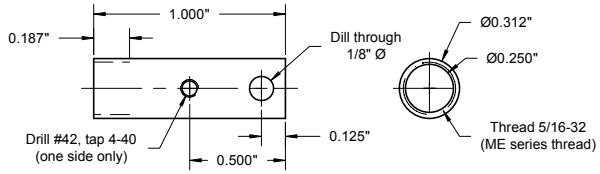
-5 NEEDLE VALVE

Steel Fabrication



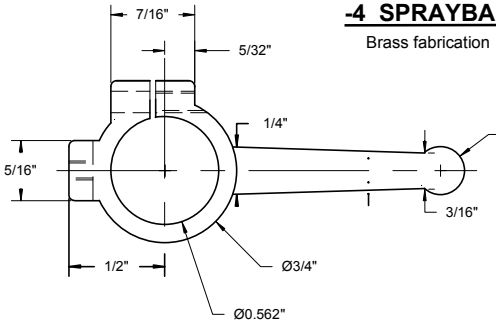
-2 CASE STUFFER PLATE

Aluminum Casting



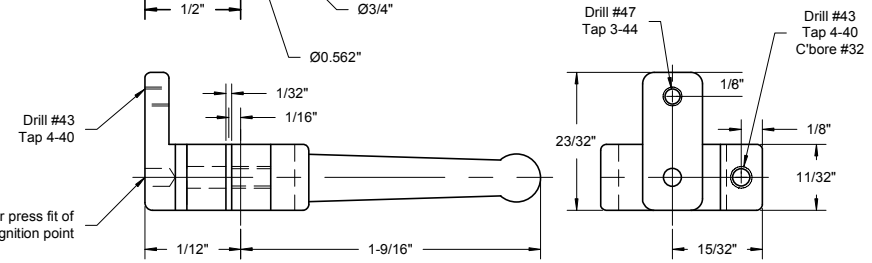
-3 VENTURI

Aluminum



-6 TIMER FRAME

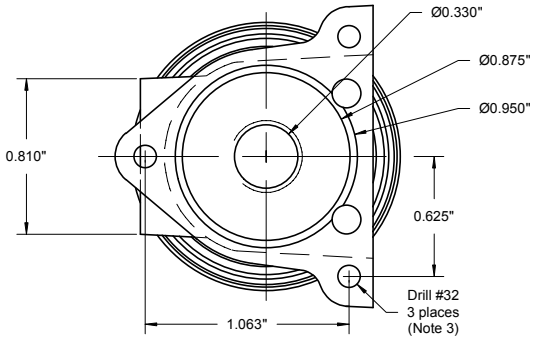
Aluminum Casting

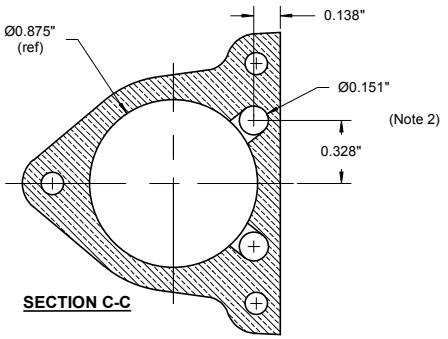


			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Belmont G9
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RC	NEXT ASSEMBLY		NUMBER: Sheet 3 - Tank and Timer
DATE	CHANGE	BY	CAD	2011-11-18			

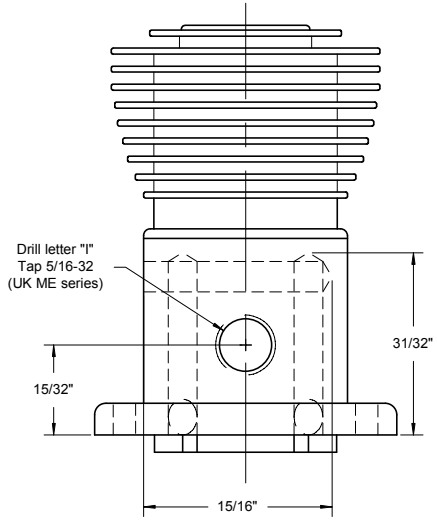
Fin	Diameter
1	1.000"
2	1.400"
3	1.365"
4	1.335"
5	1.280"
6	1.063"

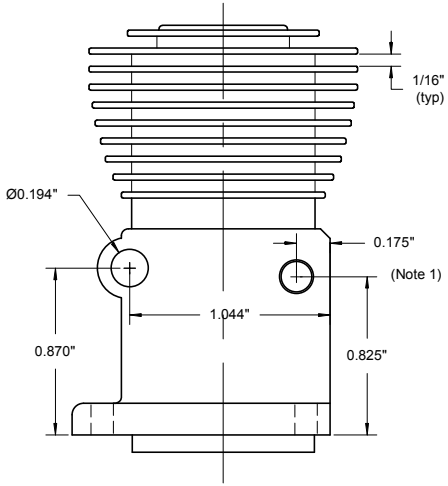
Notes:
1. Hole drilled #20 15/16" deep, then counterbored #16, 3/32" deep and plugged with a .177 cal BB.
2. Drill transfer passages #24, 31/32" deep.
3. Mounting hole pattern and flange dimension to correspond with 1-1 CRANKCASE.
4. Transfer engress ports milled through wall into blind drilled passages should correspond with holes in piston skirt at BDC. This operation apparently done by hand on original engine.

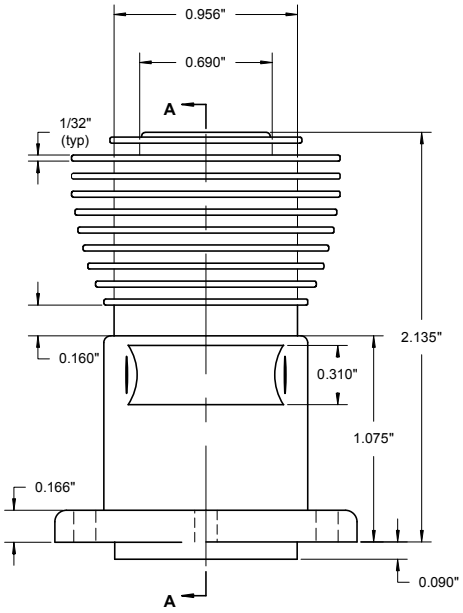


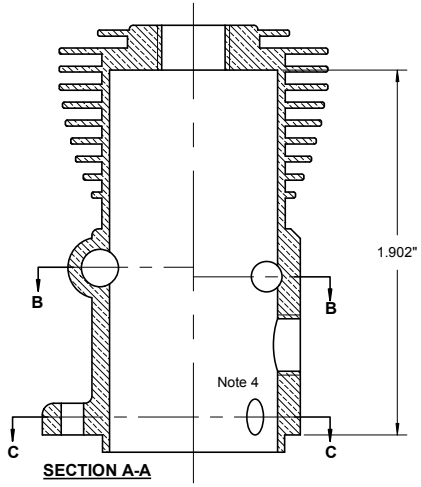


SECTION C-C



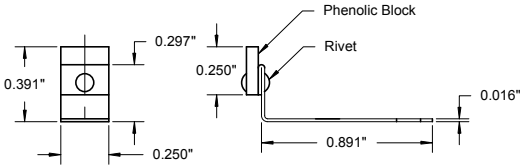


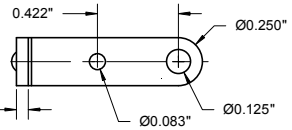




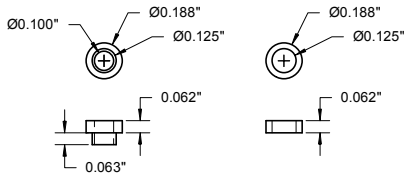
SECTION A-A

-1 CYLINDER
Iron Casting

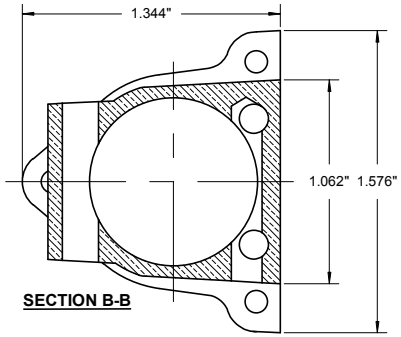




-2 MOVING CONTACT
Fabrication

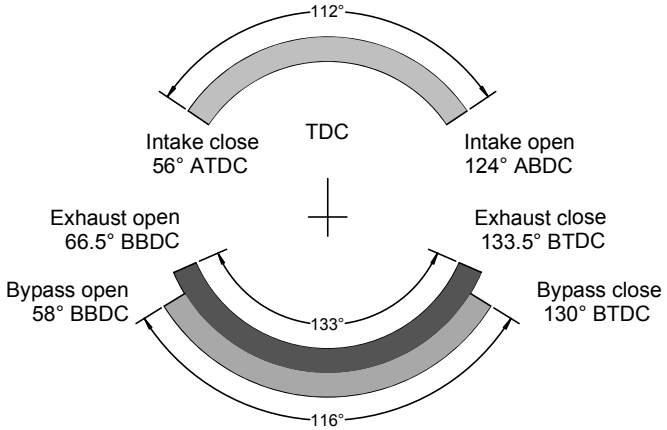


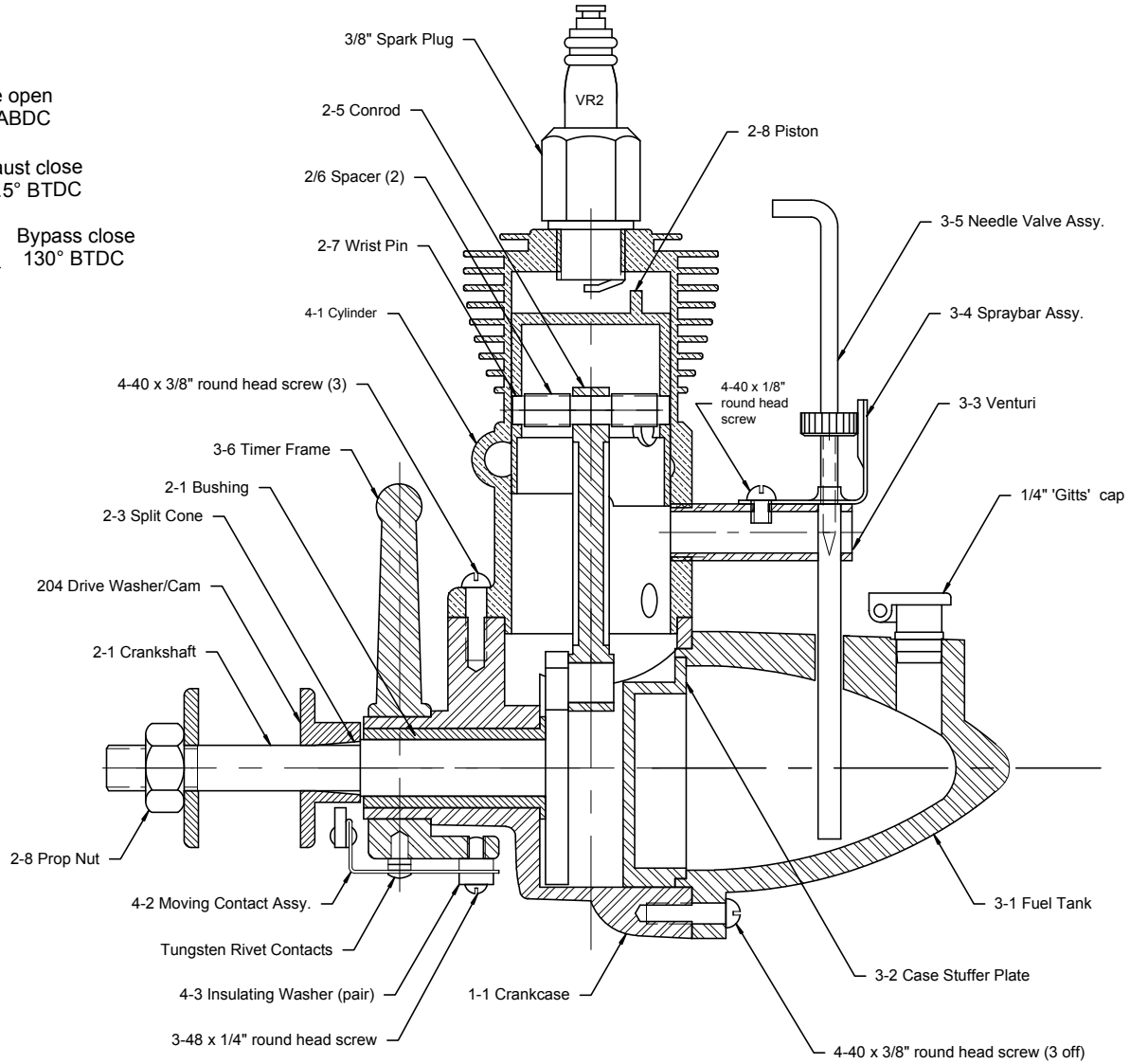
-3 INSULATING WASHER
Phenolic (1 each)



SECTION B-B

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Belmont G9
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RC	NEXT ASSEMBLY		NUMBER: Sheet 4 - Cylinder
DATE	CHANGE	BY	CAD	2011-11-18			



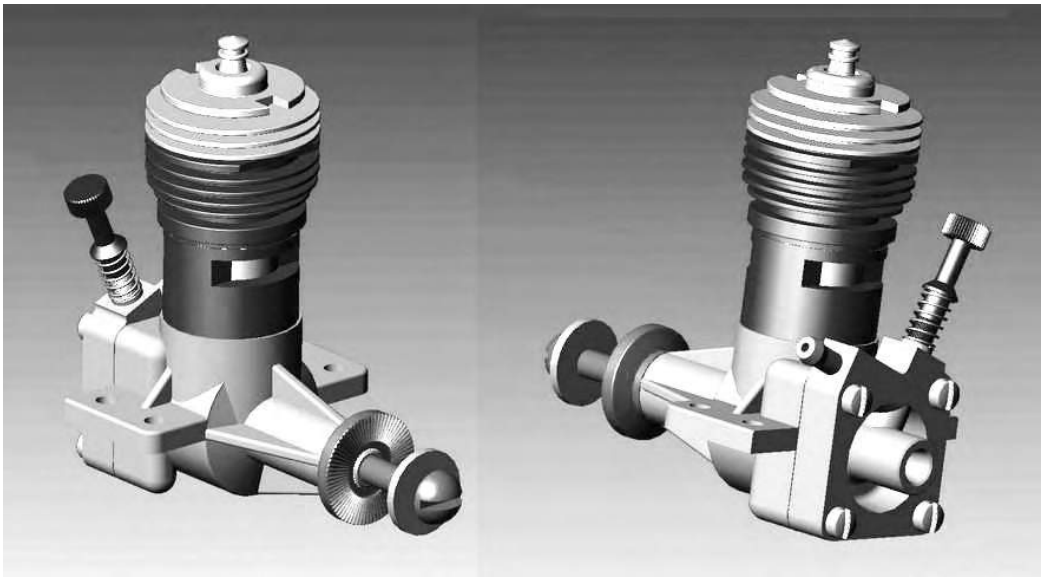


Belmont "G9"

Bore: 0.875"
Stroke: 0.938"
Capacity: 0.564cuin (9.247cc)

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Belmont G9
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RC	NEXT ASSEMBLY		NUMBER: Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	2011-11-18			

BLACK MAMBA [after the Keilkraft COBRA]

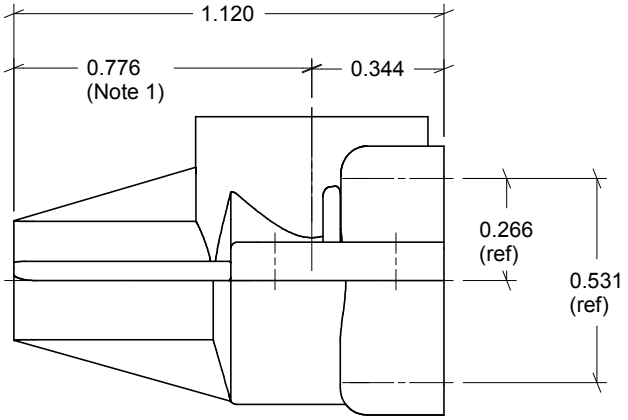


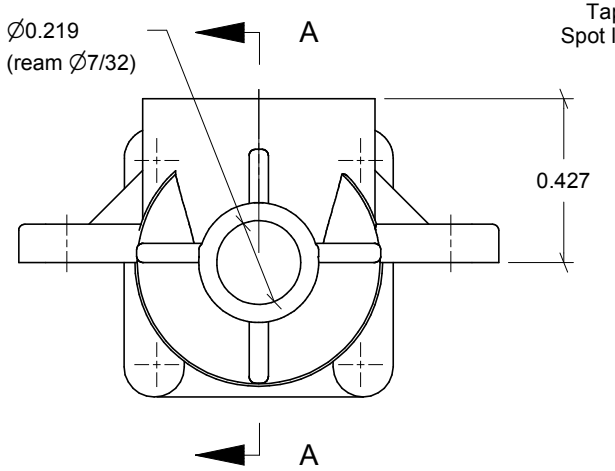
I have no idea what purpose this design is meant to serve and I even wonder if Ron had been on the magic mushrooms when he thought it up! There are shed loads of Cox-type 049 glows to be had for the price of peanuts, so why another one? And what satisfaction is to be had from building an engine when the vital parts are just parts of a production engine? That is hardly any achievement at all. In the event there is no evidence that anything became of this design; I do not believe any engines were ever built, nor even were crank-cases made available. I include the design simply because it was one of Ron's free "members only" plans. The above are simply CAD productions.

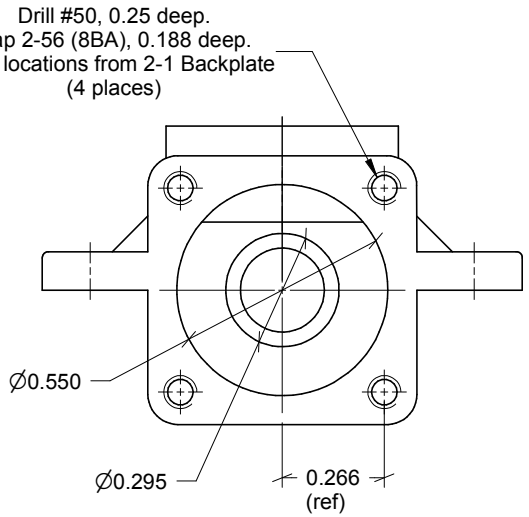
Rant over, so here is Ron Chernich's own explanation.

From looking at the web server logs, the Keilkraft Cobra 049 which featured as Engine of the Month for April 2008 really struck a resonant chord with MEN readers. So after talking it over, I've made a set of plans for what we are going to call the ***Mamba***. This will be a Cobra look-alike using Cox 049 parts in a sand cast case. The plan is a little different from our usual fully detailed, model engine construction set, but still runs to eight 3D CAD pages even though the stock Cox parts are not detailed. The plans show two different styles for backplate machining to suit the old beryllium copper reed with wire circlip retainer, or the newer synthetic reed and plastic retainer cage. The letter style makes for much easier machining, so would be the one to scavenge if you can. I'd also try to get a Cox Black Widow cylinder and piston assembly in preference to the old single transfer Baby Bee, or even the twin slit QZ exhaust version.

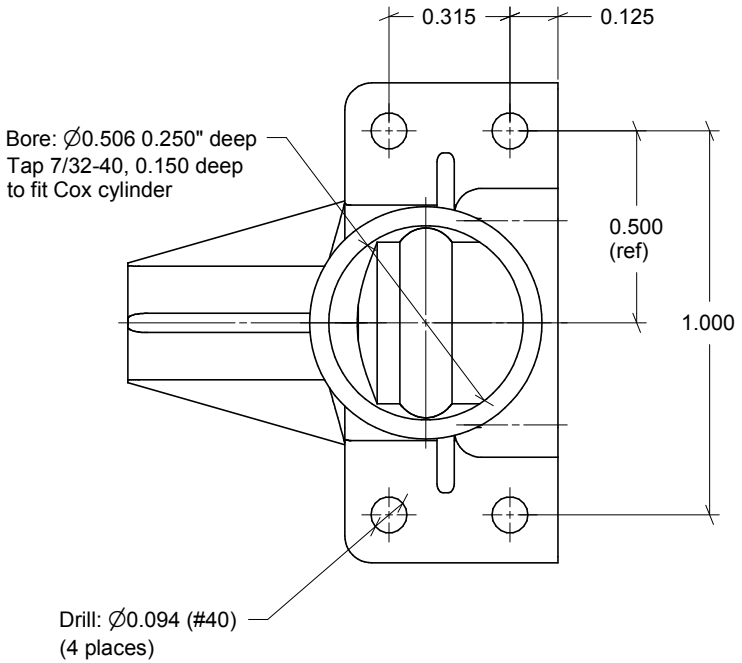
The plans include details of a jig that will greatly simplify one of the critical areas, namely how to align and drill all the holes for the needle valve bush, fuel jet and fuel nipple using a lathe only. All work could be easily accomplished on a small tabletop machine like the excellent little Sherline and the jig drawing has been dimensioned for this lathe. Owners of larger machines can easily adapt the jig from the data provided. Builders will need castings for the crankcase and backplate. Dirk Tollenaar who supplies the Bob Shore PeeWee kit is looking into supplying these, and an option, if practical, to include a finished needle valve bush tapped with the unusual and very fine 4-80 thread.

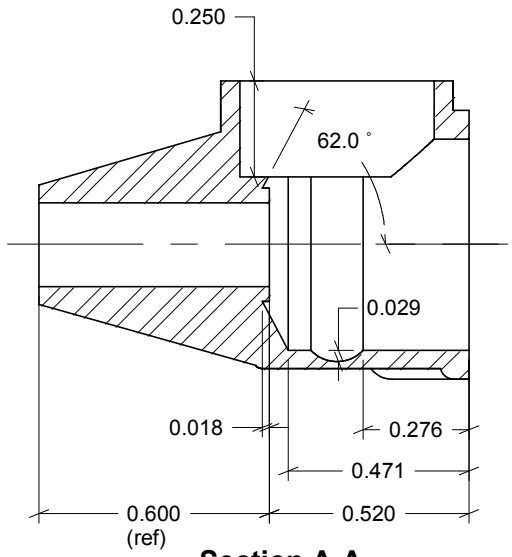




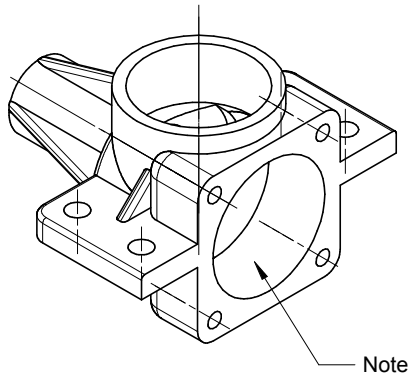


Notes:
1. Adjust for approx 0.010 free-play between the case front and prop drive washer.
2. Bore 0.520 deep with ∅0.375 two-flute milling cutter.
Drill and ream ∅ 7.32 for crankshaft.
Open to ∅ 0.550, 0.471 deep. Finish with 7-1 D-Bit reamer.





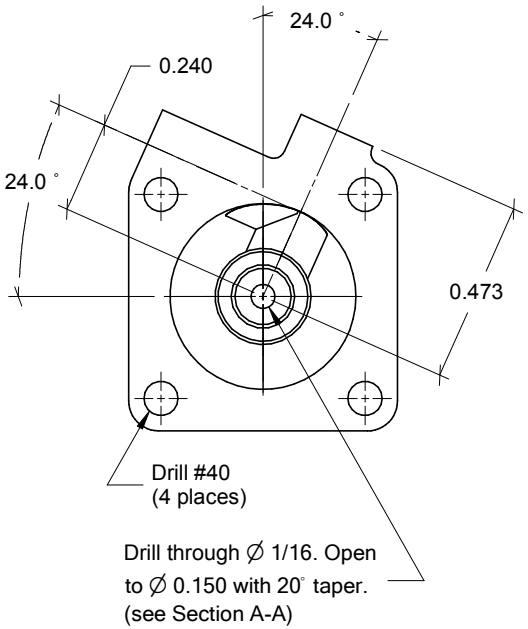
Section A-A

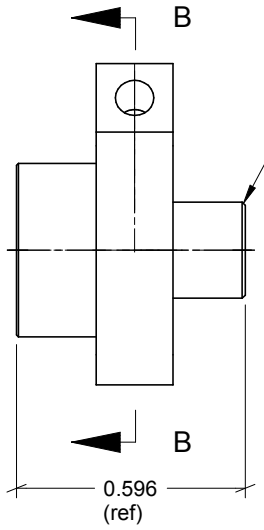


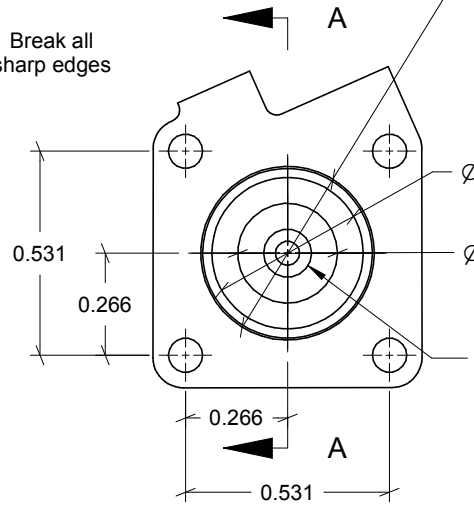
-1 Crankcase

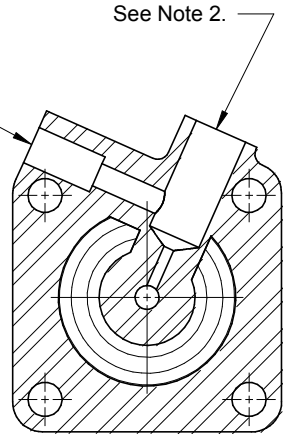
Aluminum Casting

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-06-20	Scale: 2 : 1
Material: Aluminum Casting		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Crankcase Machining			Sheet: 01





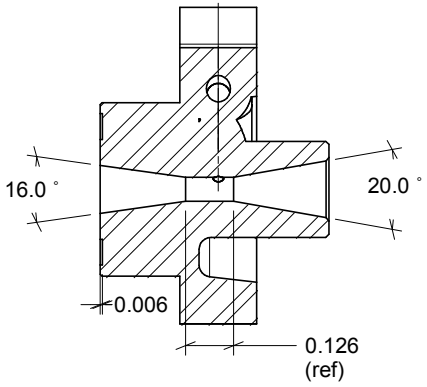




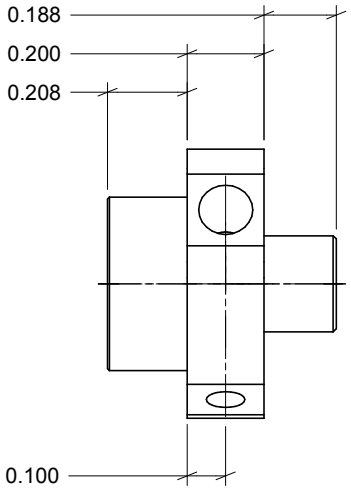
Section B-B

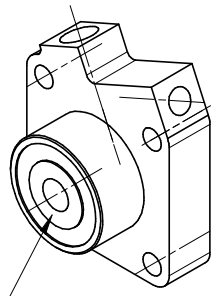
Notes:

1. Dimensions shown are for the later plastic style of Cox reed valve and retainer cage.
2. Drill ∅ 0.140 (#28), 0.300 deep to shoulder.
   Drill through ∅ 0.028 (#70).
3. Drill through ∅ 1/16.
   Counterbore ∅ 0.100 (#39), 3/16 deep.



Section A-A

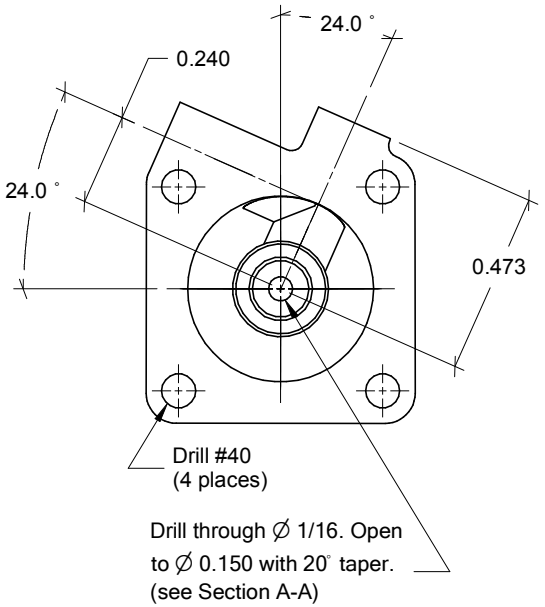


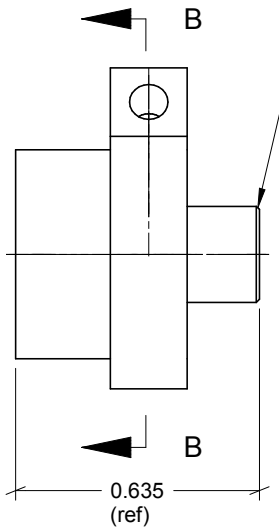


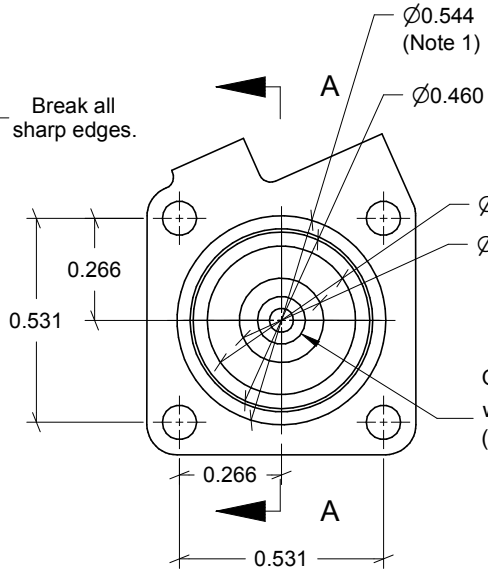
01 - Backplate

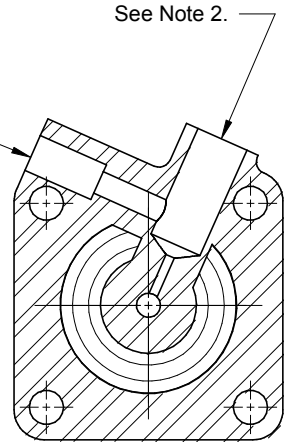
Aluminum Casting

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-06-20	Scale: 2 : 1
Material: Aluminum Casting		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Backplate			Sheet: 02A



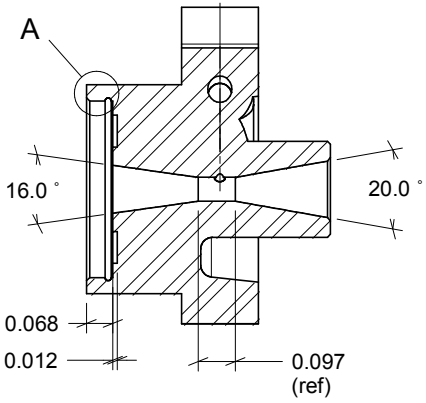




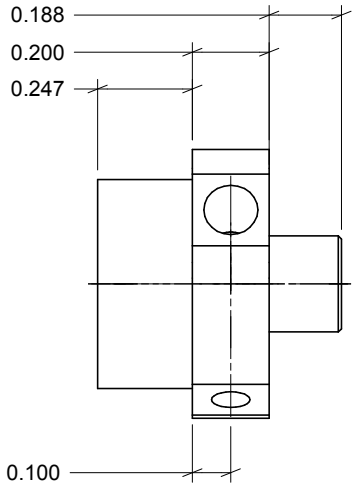


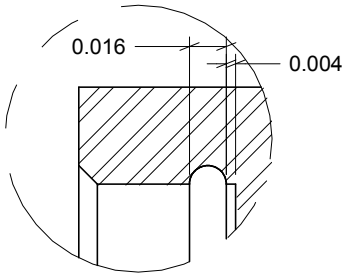
Section B-B

Notes:
1. Dimensions shown are for the older style of bronze Cox reed valve and spring retainer.
2. Drill ∅ 0.140 (#28), 0.300 deep to shoulder. Drill through ∅ 0.028 (#70).
3. Drill through ∅ 1/16. Counterbore ∅ 0.100 (#39), 3/16 deep.

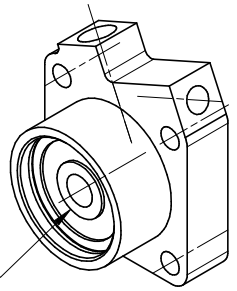


Section A-A



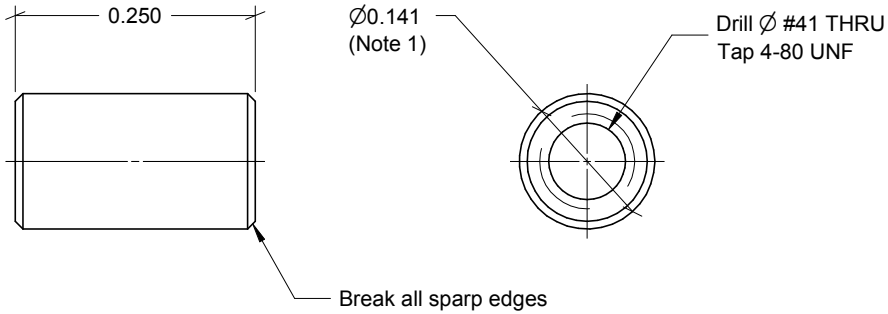


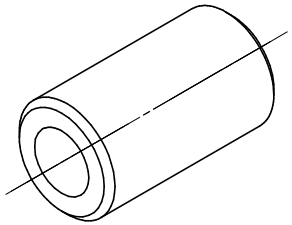
Detail A
(scale 12:1)



01 - Backplate
Aluminum Casting

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-06-20	Scale: 2 : 1
Material: Aluminum Casting		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Alternate Backplate			Sheet: 02B

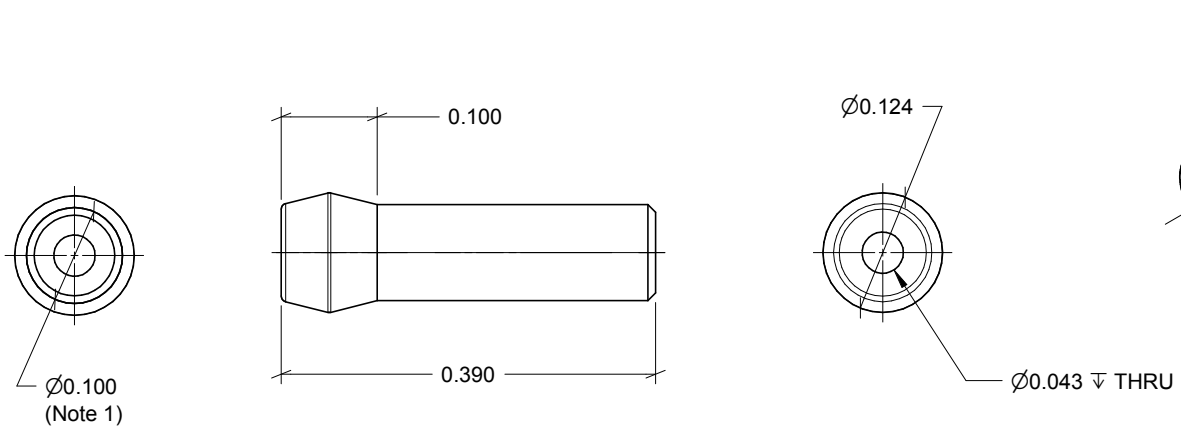


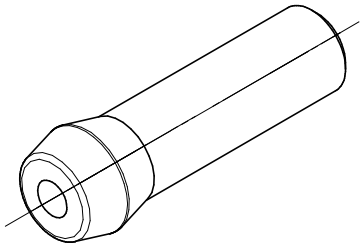


-1 Needle Bush

Brass

Notes:
1. Turn for light press fit in 02-1 Backplate.

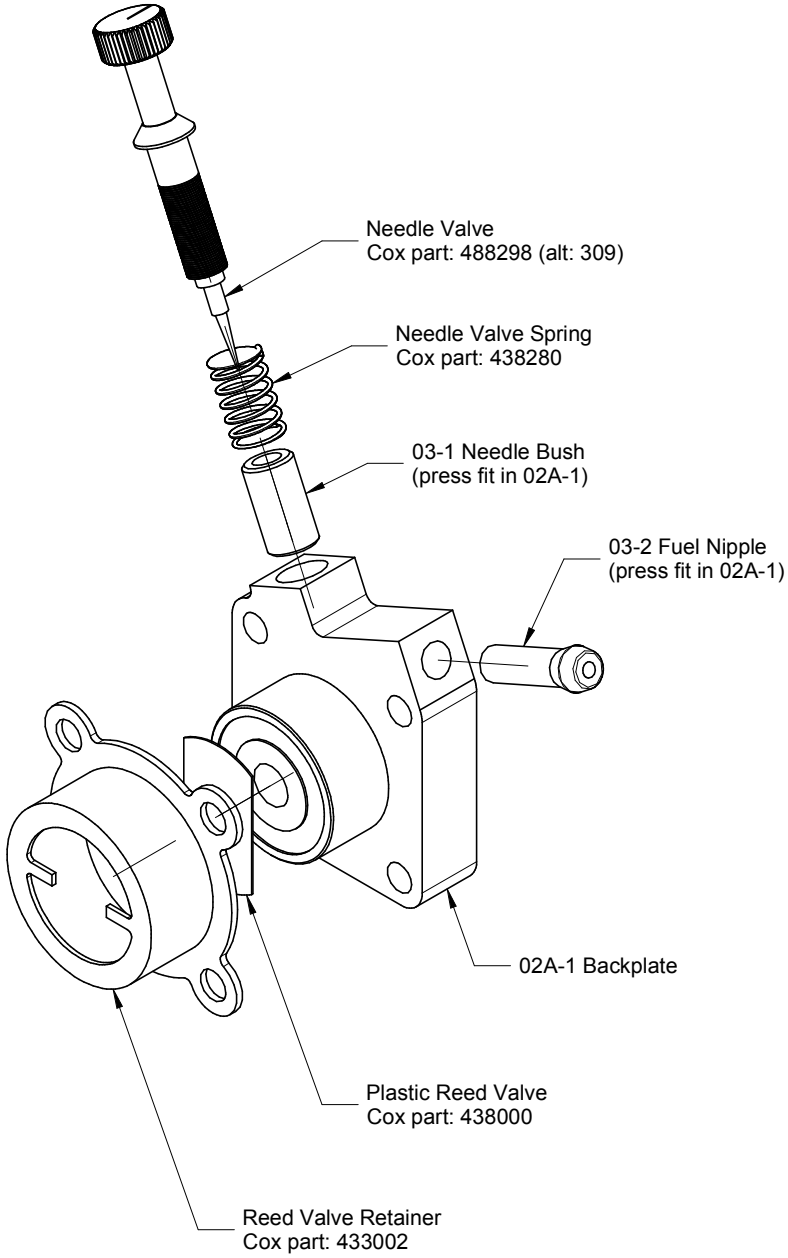


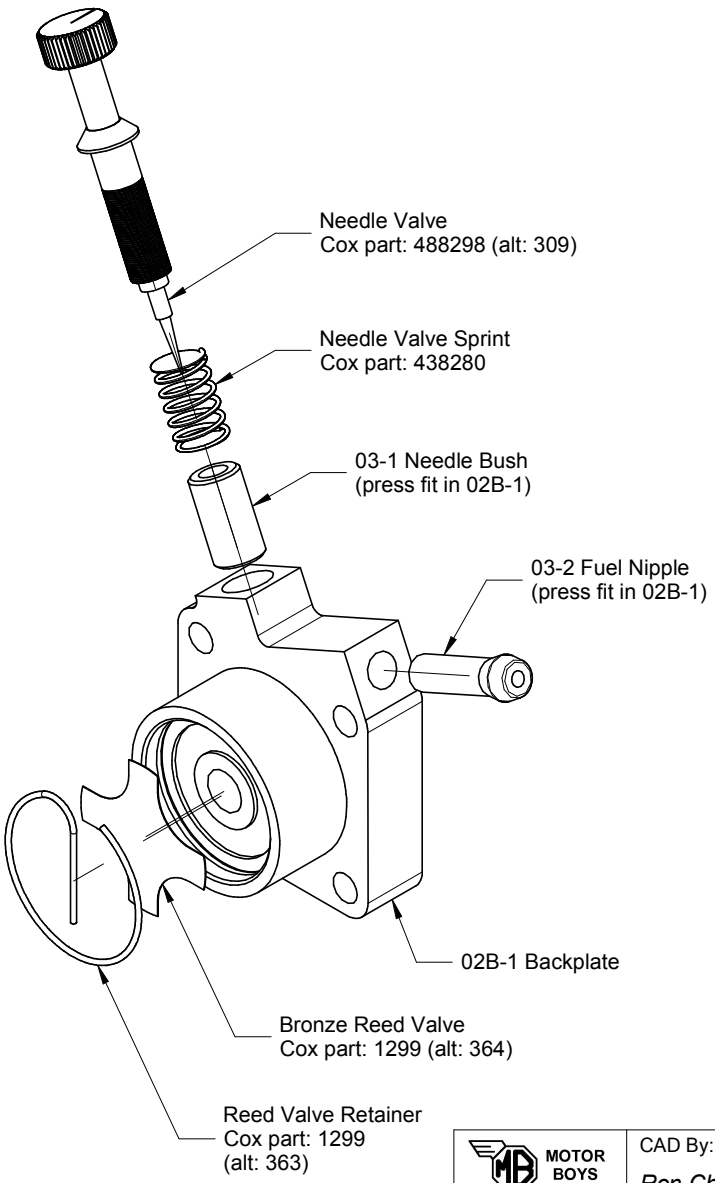


-2 Fuel Nipple

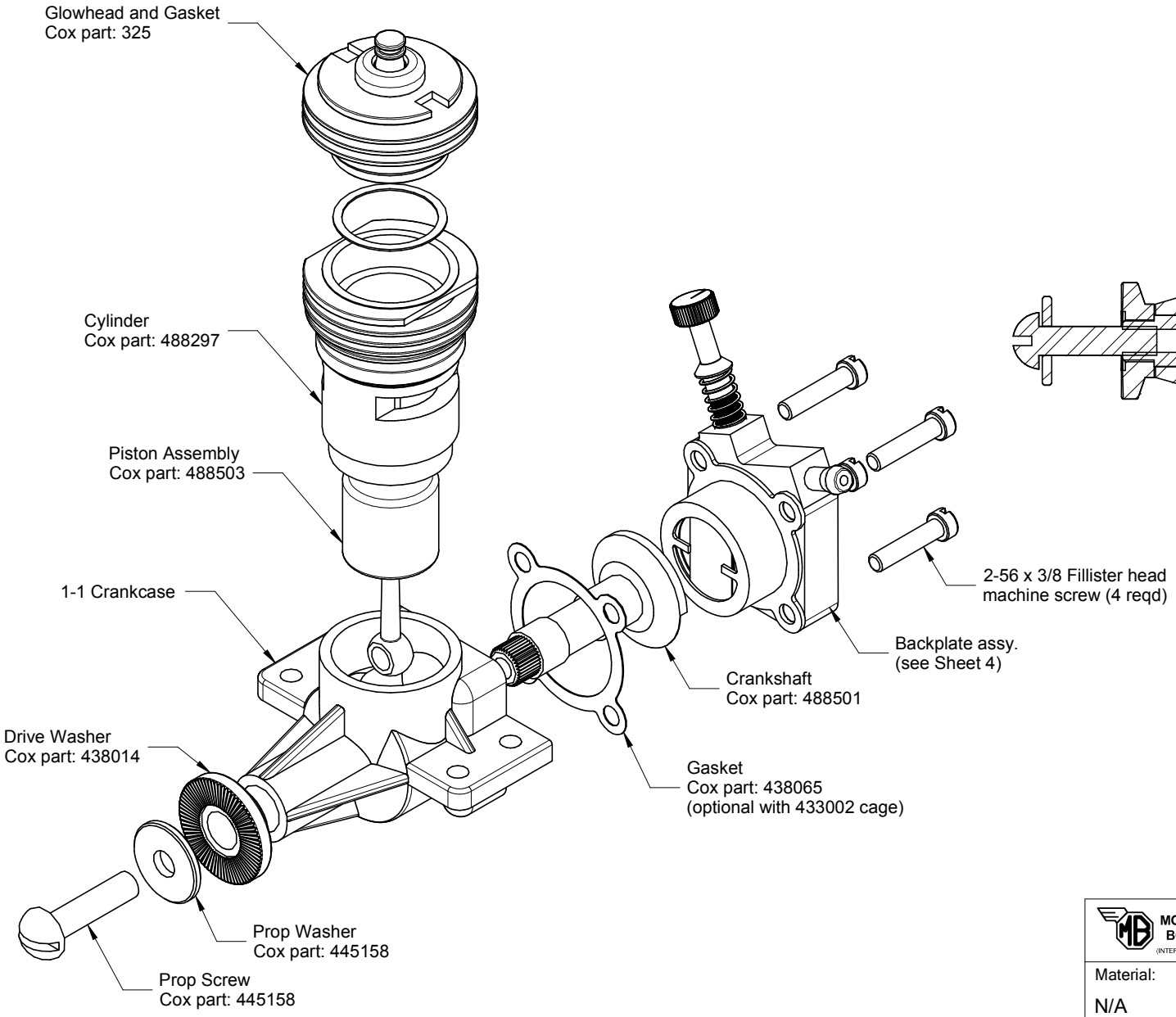
Brass

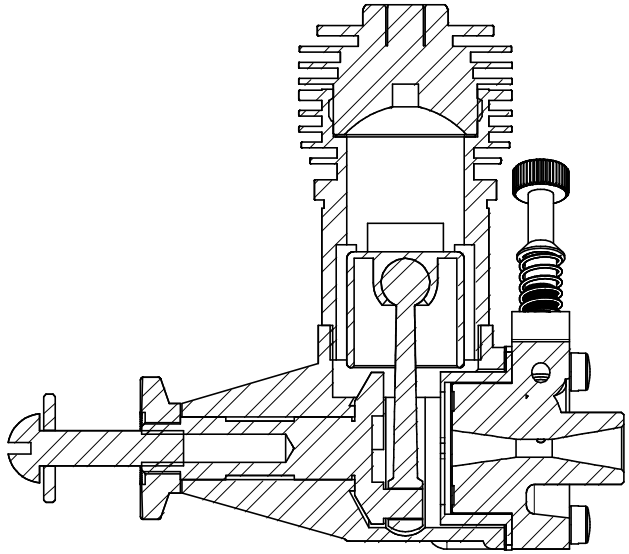
MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-06-20	Scale: 5 : 1
Material: As noted.		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Fuel System			Sheet: 03





MOTOR BOYS (INTERNATIONAL)	CAD By: *Ron Chernich*	Date: 2008-06-20	Scale: 2 : 1
Material: N/A		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Backplate Assy			Sheet: 04



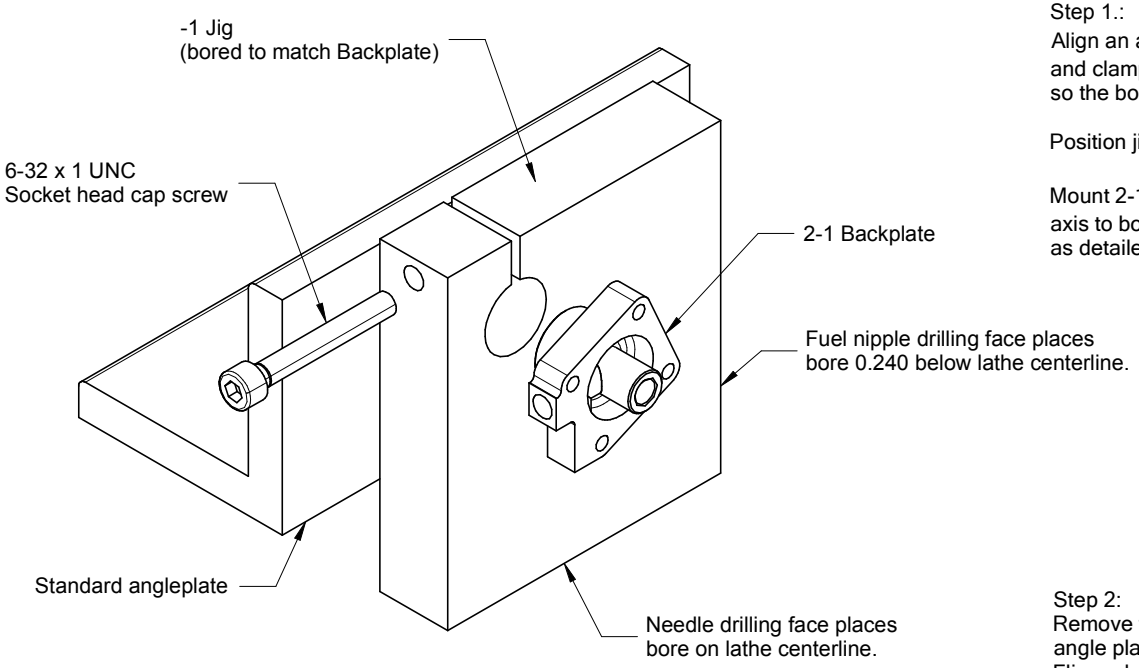


Black Mamba 049

(modelled after the KK Cobra)

Bore:	0.406 (10.31mm)
Stroke:	0.386 (9.8mm)
Displacement:	0.04997 (0.819cc)

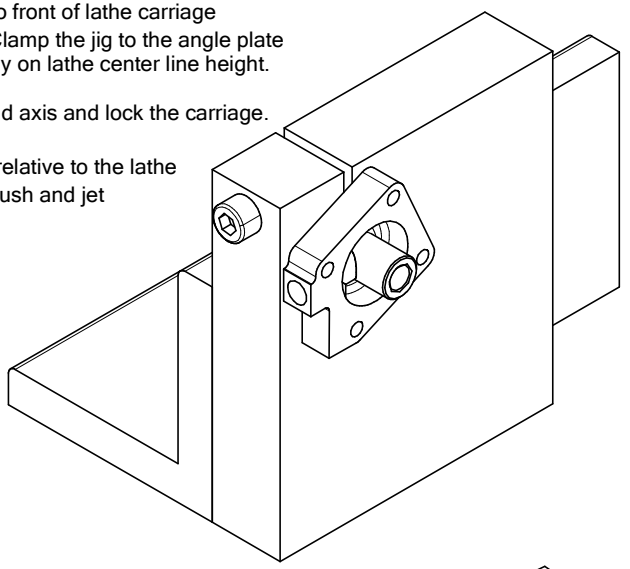
MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2005-06-21	Scale: 2:3
Material: N/A		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Assembly and GA			Sheet: 05



Step 1.:
Align an angle plate at 90° to front of lathe carriage and clamp to the carriage. Clamp the jig to the angle plate so the bored hole is precisely on lathe center line height.

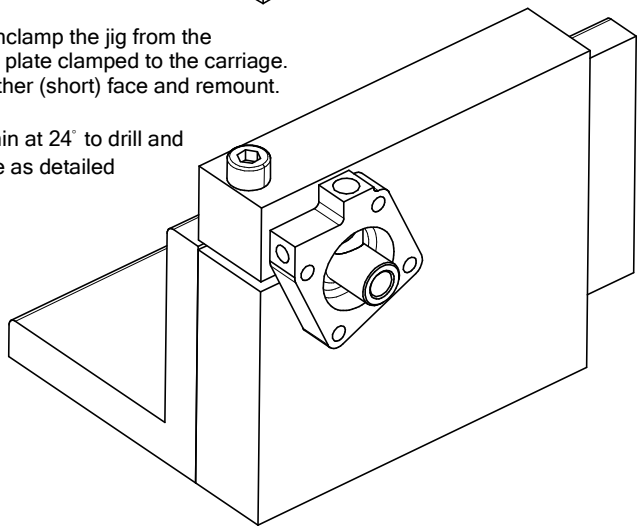
Position jig face 0.100 behind axis and lock the carriage.

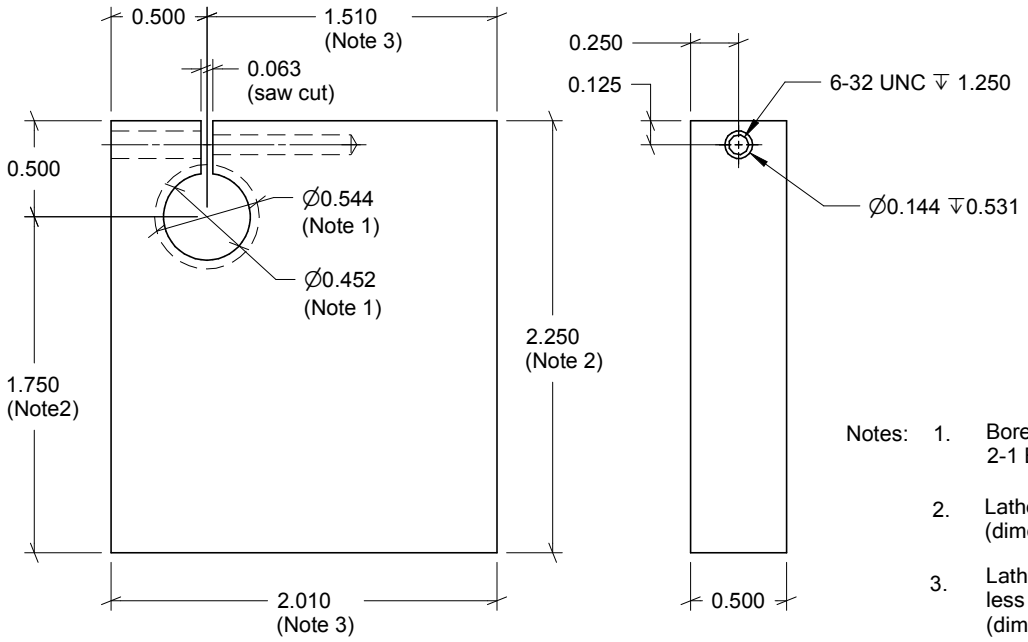
Mount 2-1 Backplate at 24° relative to the lathe axis to bore for the needle bush and jet as detailed on Sheet 2.



Step 2:
Remove the Backplate and unclamp the jig from the angle plate, leaving the angle plate clamped to the carriage. Flip and rotate the jig to the other (short) face and remount.

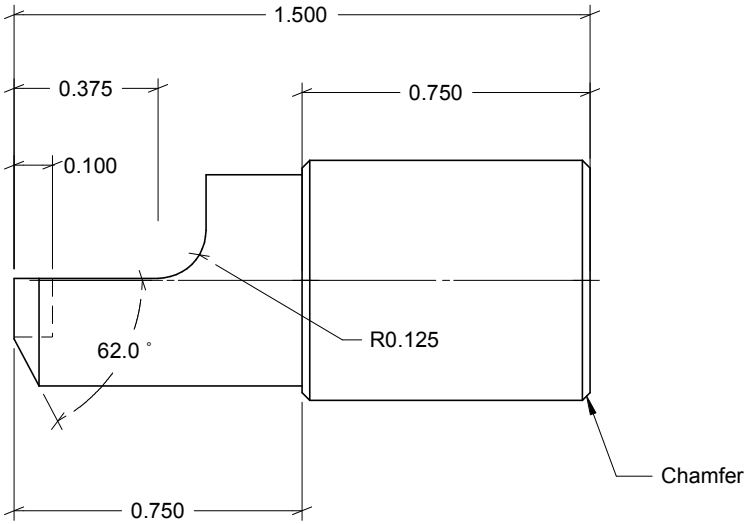
Clamp the 2-1 Backplate, again at 24° to drill and counterbore for the fuel nipple as detailed on Sheet 2.

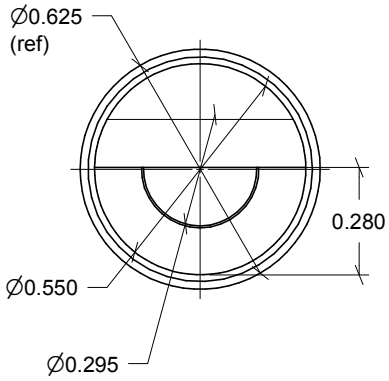


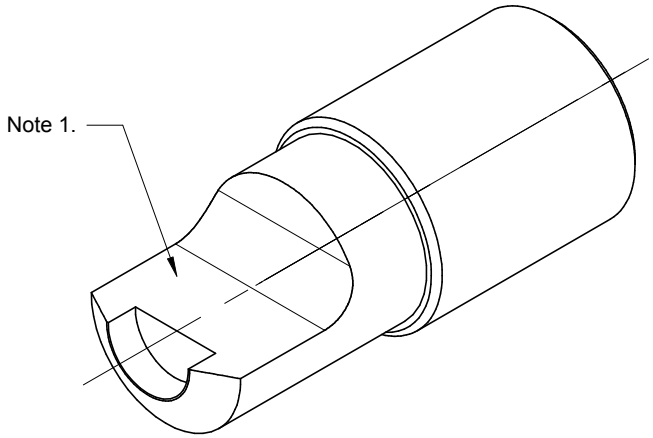


Notes:
1. Bore to close sliding fit on 2-1 Backplate diameter used.
2. Lathe center height above carriage. (dimension shown is for Sherline)
3. Lathe center height above carriage, less 0.240. (dimension shown is for Sherline)

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-06-22	Scale: 1 : 1
Material: Aluminum		*All dimensions are inches unless otherwise stated.*	
Title: Black Mamba - Jig 1			Sheet: 06

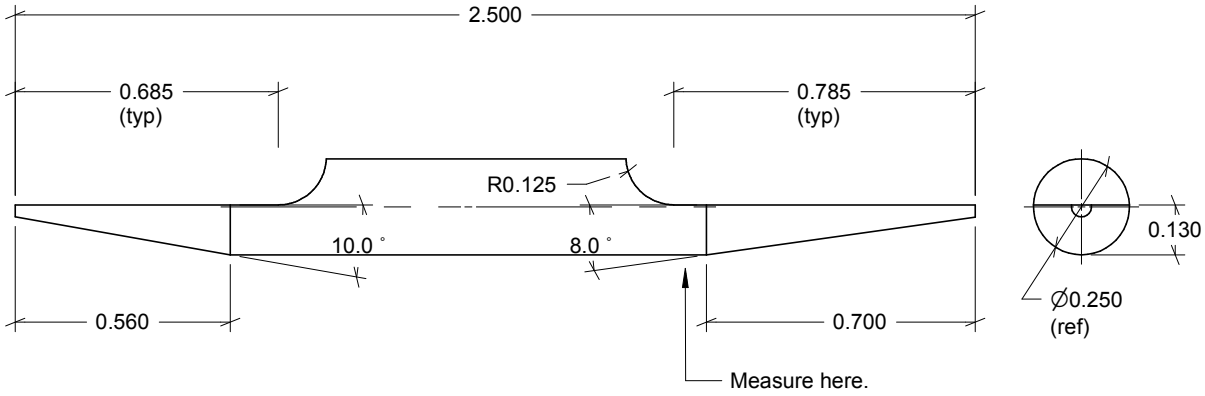


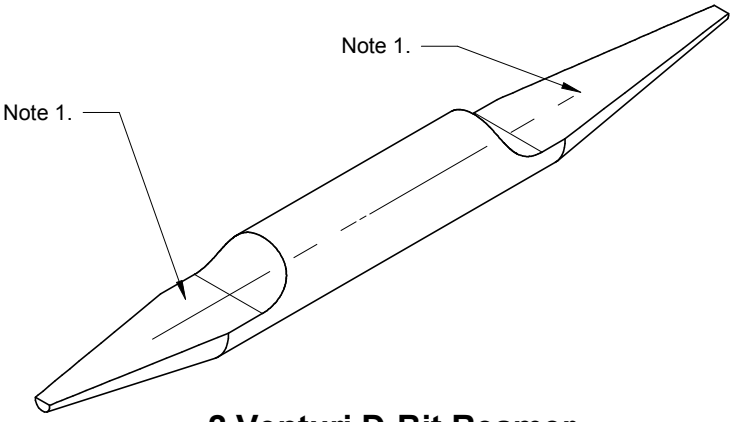




-1 Crankcase D-Bit Reamer

∅ 0.625 Drill Rod (H&T)





-2 Venturi D-Bit Reamer

∅ 0.250 Drill Rod (H&T)

Notes: 1. Mill or file flat to half the measured diameter plus 0.005. Stone flat to create sharp edges after hardening and tempering.

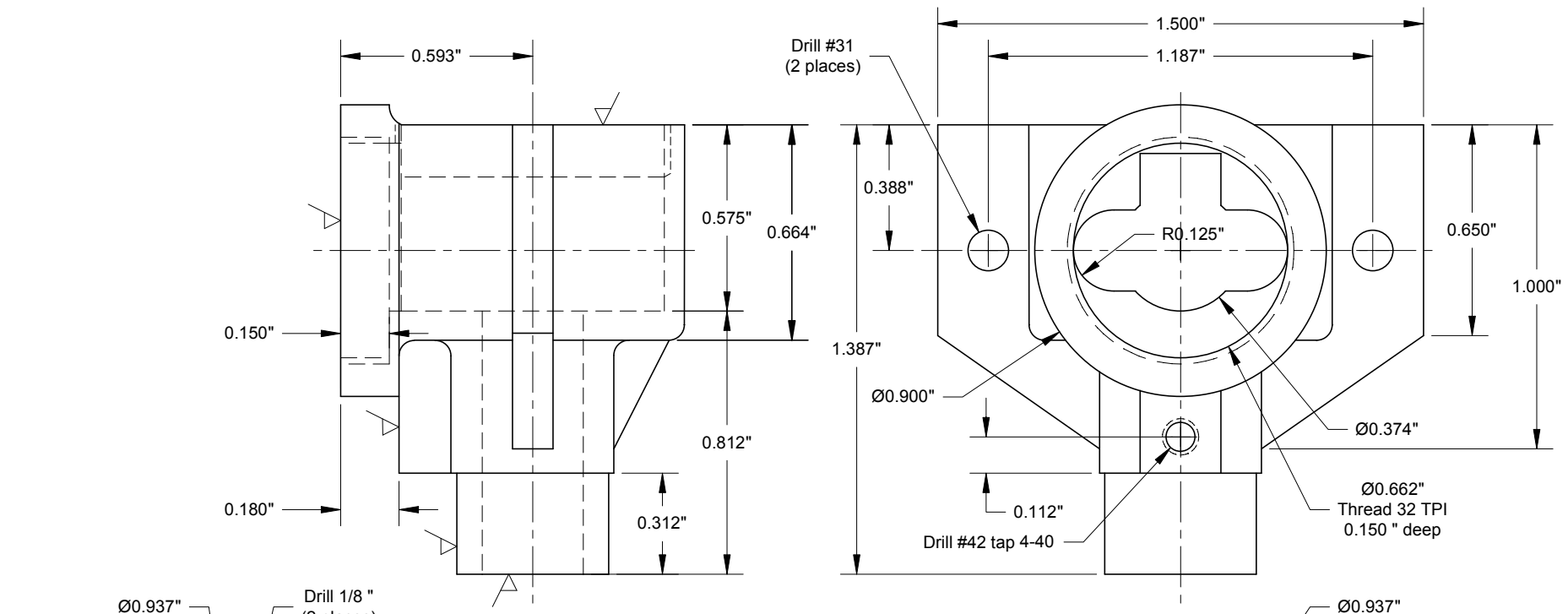
Rotate chuck by hand with raw cutting oil when reaming.

MOTOR BOYS (INTERNATIONAL)	CAD By: Ron Chernich	Date: 2008-06-27	Scale: 1 : 1
Material: Drill Rod			*All dimensions are inches unless otherwise stated.*
Title: Black Mamba - D Bits			Sheet: 07

CHUNN “CHUM” 0.16 ci ignition engine

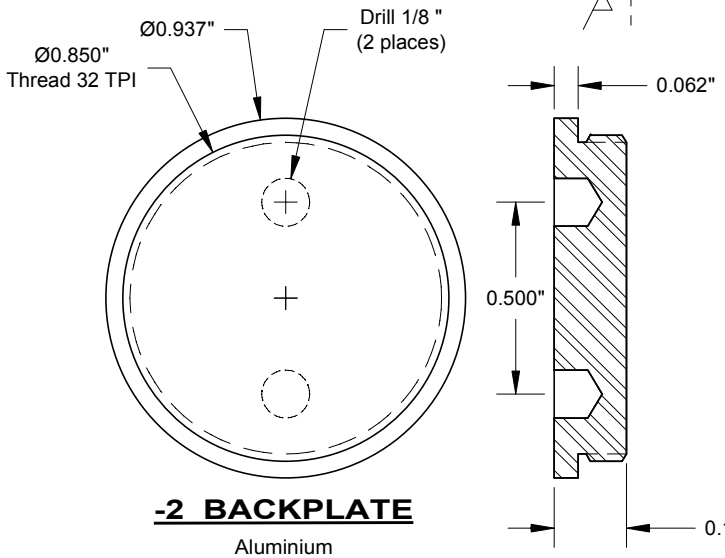
The Chunn “Chum” was designed by Bob Chunn and sold in 1937 by Southern Model Engineers of Nashville Tennessee. There were 2 versions of this design, differing in the way the timer points operated. It is believed that only around 150 engines in total were built. In recent times reproductions have been made both by amateurs and commercially. There also exists another Chunn-designed single cylinder engine of the same capacity known sometimes as the “Kaydet” or confusingly also as the “Chum” but which bears no similarity except for the capacity.

Bob Chunn was a barber by trade, but also a talented modeller with a love of machines. In 1937, believing that a market existed for small engines, Bob had started *Chunn Model Motors Incorporated* with capital invested by a member of one of Nashville's 'first families', Henry "Boots" Tyne. Located over the barbershop, Chunn Motors produced the "Chunn", and the "Chum". Economic circumstances forced a stockholders takeover of the company in 1938.



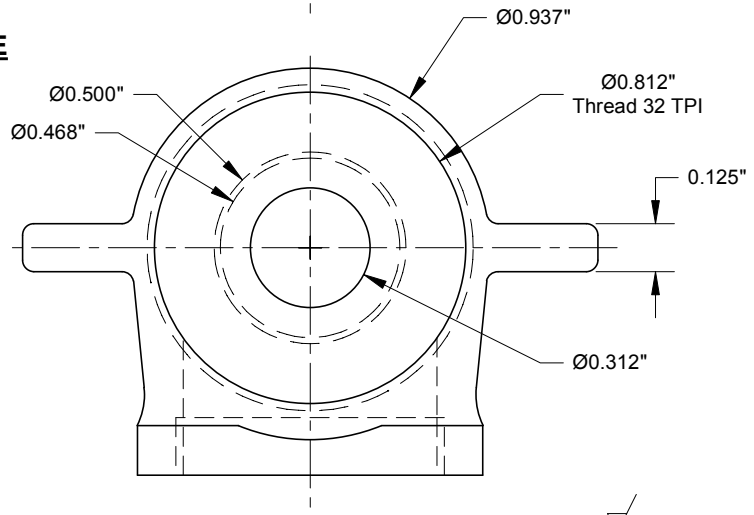
-1 CRANKCASE

Aluminium (sand cast)



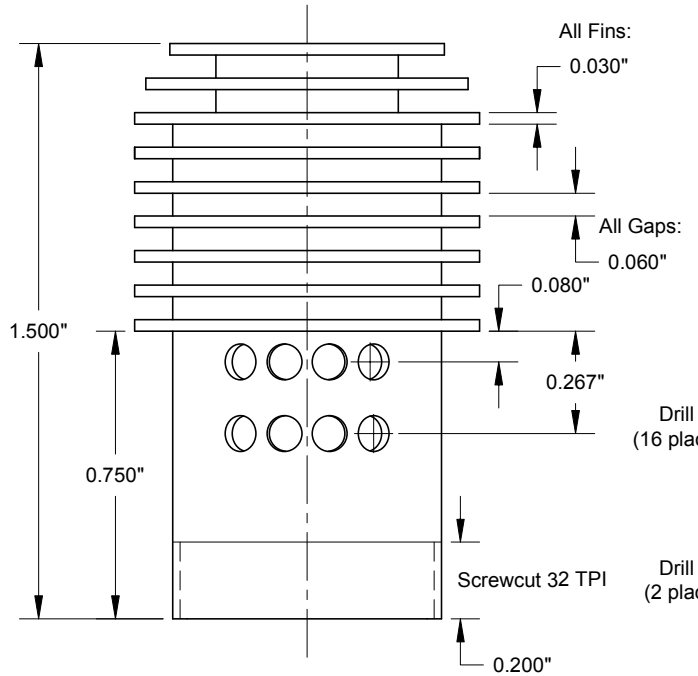
-2 BACKPLATE

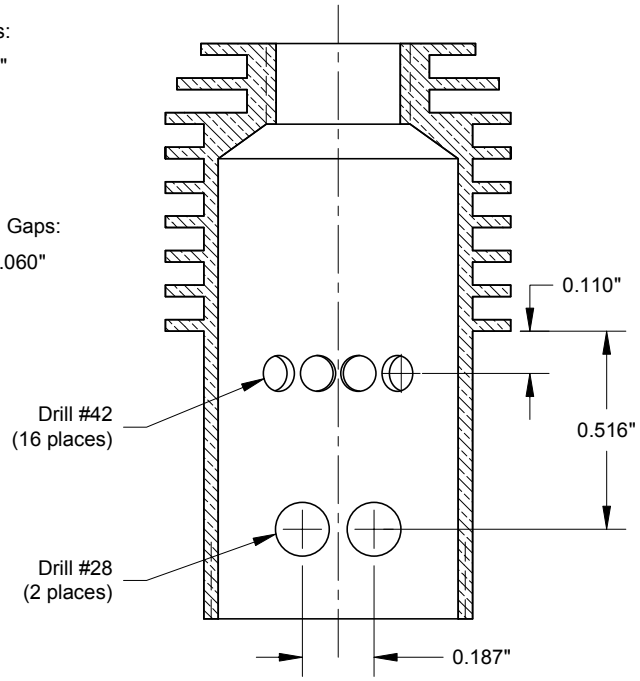
Aluminium



Machine

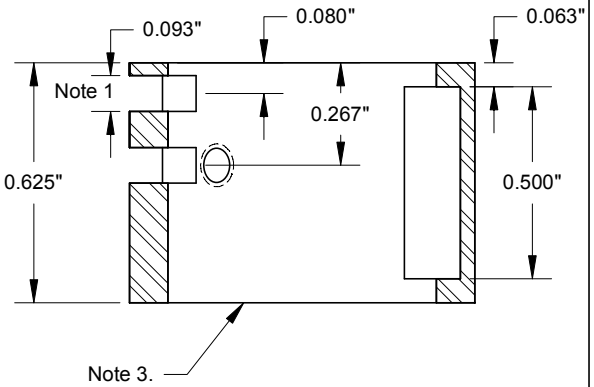
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME CHUNN .16 CHUM (1937)
			SCALE	2 X SIZE			
			DRAWN	Gossman 1975-11-18			NUMBER Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI 2004-02-27			

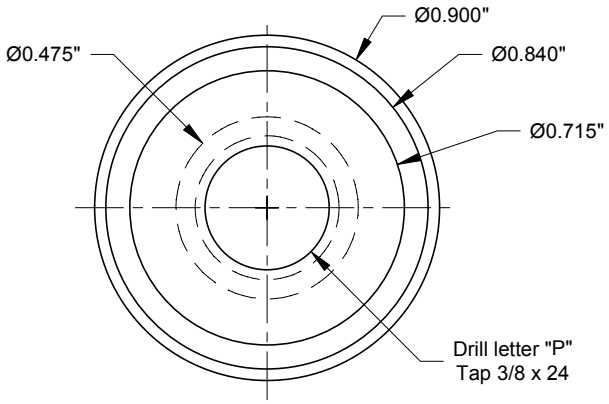


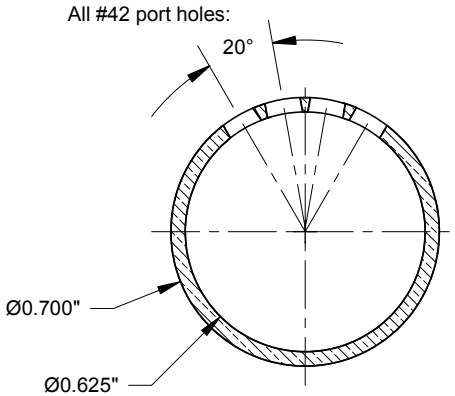


Notes:

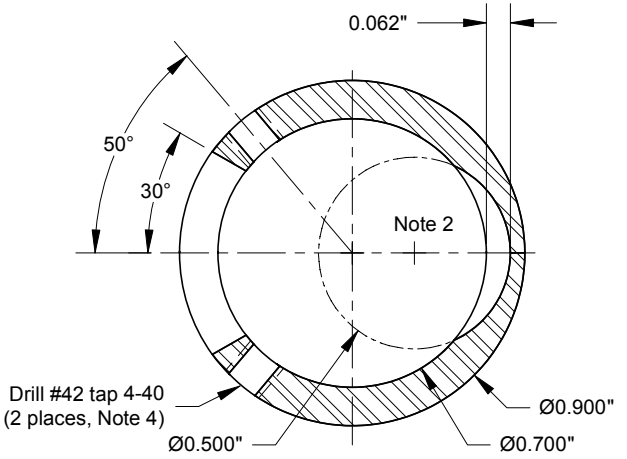
1. Cut slot with 3/32" thick Woodruf cutter, or 3/32 " Ø slot-drill.
2. Mill passage with 1/2" Ø Woodruff cutter.
3. Lap surface to obtain correct orientation of -1 Cylinder in 1-1 crankcase when tight.
4. Spot position from 4-2 Strap holes.







Section through ports
(typical)



Section inlet ports

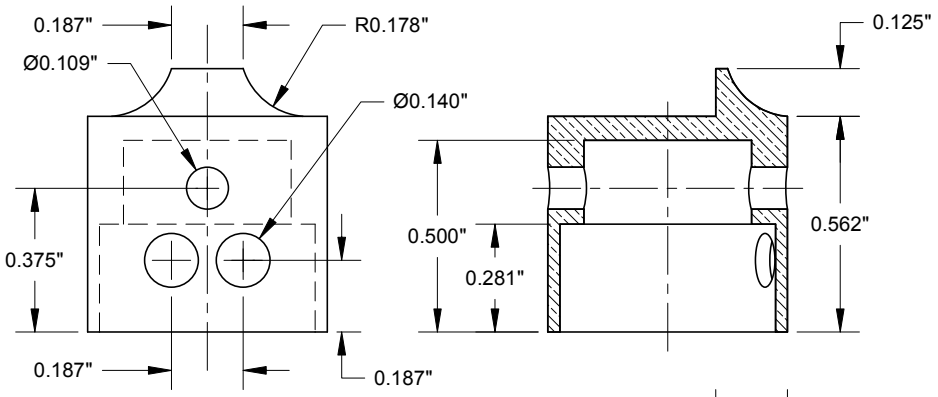
-1 CYLINDER

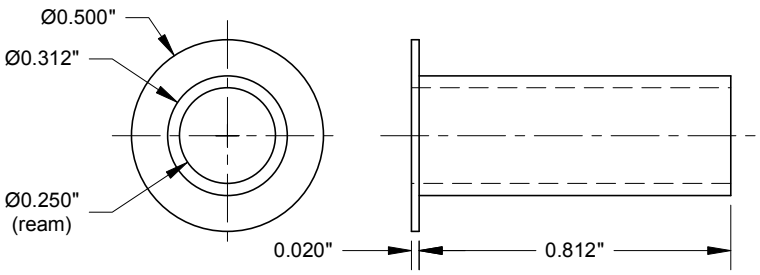
Cast Iron bar

-2 TRANSFER SLEEVE

Aluminium

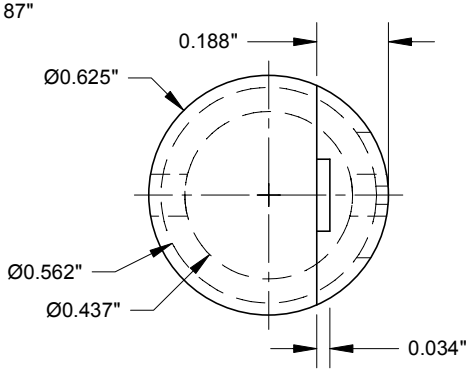
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME CHUNN .16 CHUM (1937)
			SCALE	2 X SIZE			
			DRAWN	Gossman 1975-11-18			NUMBER Sheet 2 - Cylinder
DATE	CHANGE	BY	CAD	BMBI 2004-02-27			





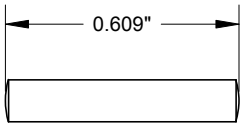
-1 BUSHING

Bronze



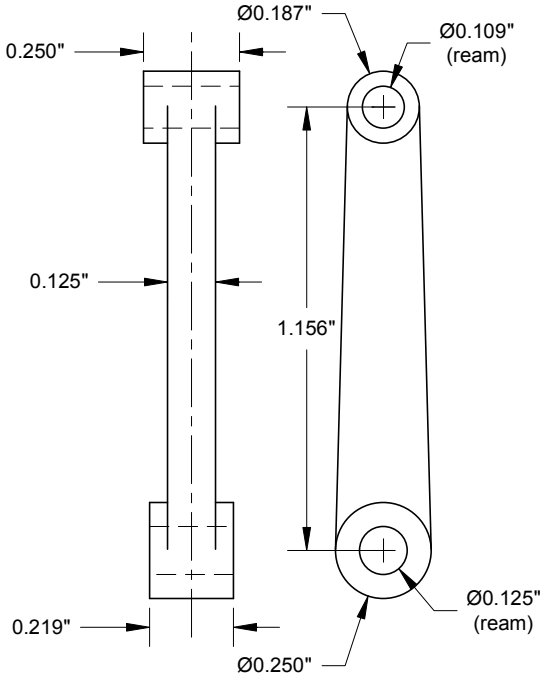
-4 PISTON

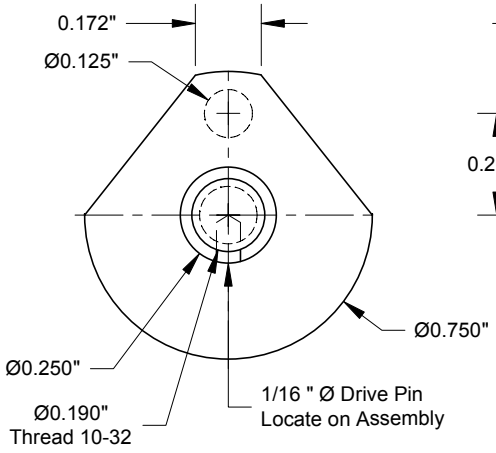
Cast Iron

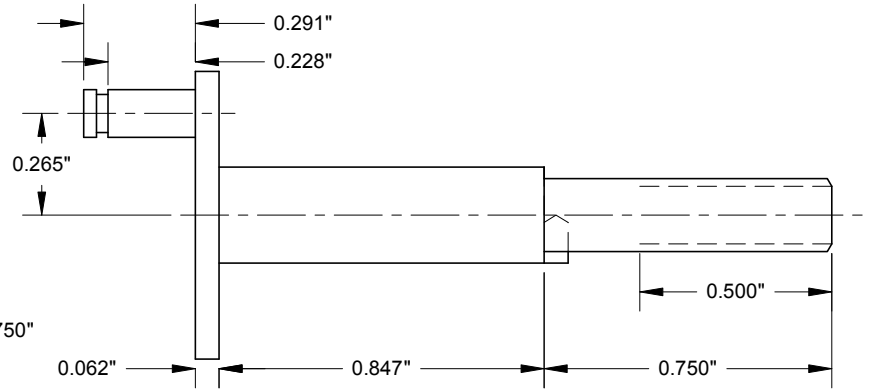


-5 WRIST PIN

7/64 " Ø Drill Rod







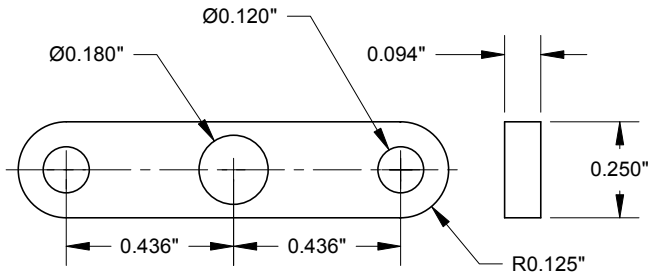
-2 CRANKSHAFT

Steel

-3 CONROD

Bronze

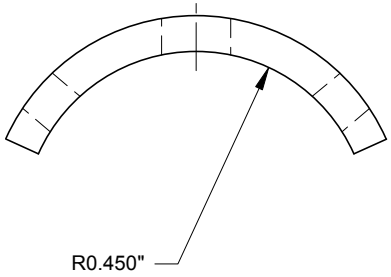
			MAT'L	As Noted	**DO NOT SCALE DRAWING** WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	**MOTOR BOYS** (INTERNATIONAL)	NAME **CHUNN .16 CHUM (1937)**
			SCALE	**2 X SIZE**			
			DRAWN	**Gossman** 1975-11-18			NUMBER **Sheet 3 - Shaft and Piston**
DATE	CHANGE	BY	CAD	**BMBI** 2004-02-27			

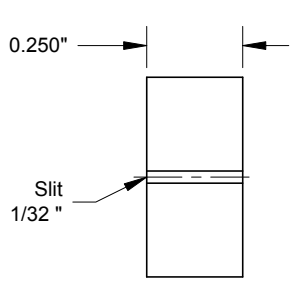


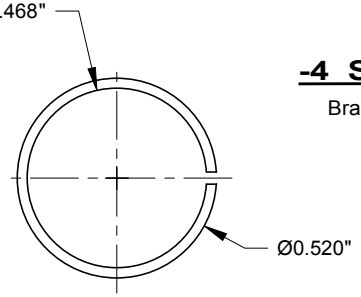
Strap Development

-2 VENTURI STRAP

Brass

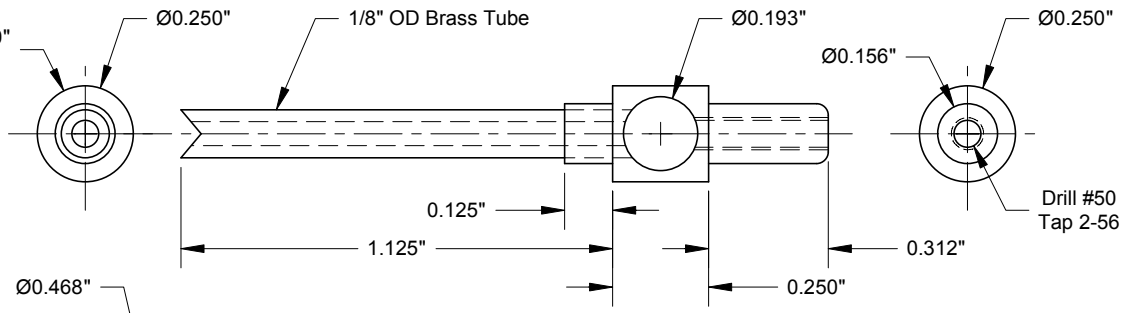






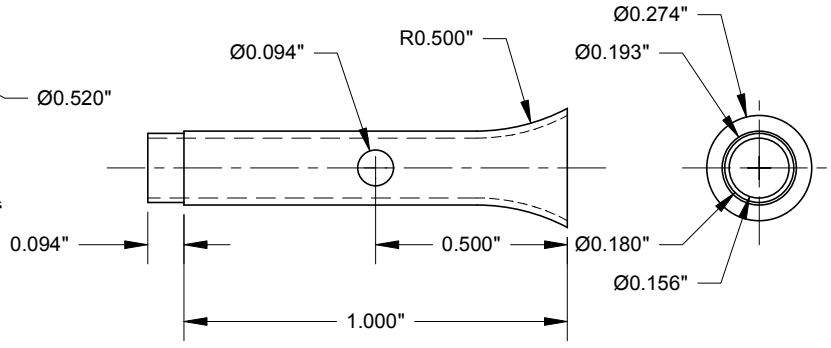
-6 FIXED POINT INSULATOR

Phenolic



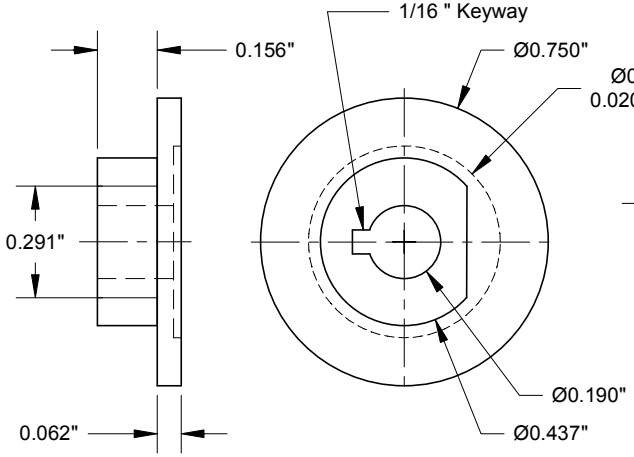
-4 SPRAY BAR

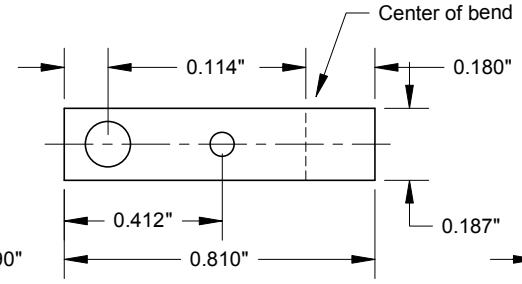
Brass tube and steel

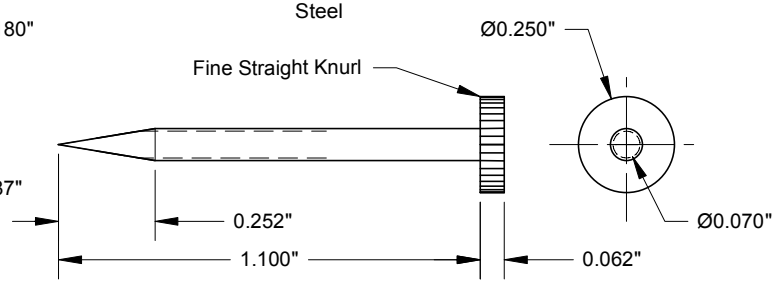


-3 VENTURI

Steel







-1 PROP DRIVER CAM

Steel (case harden)

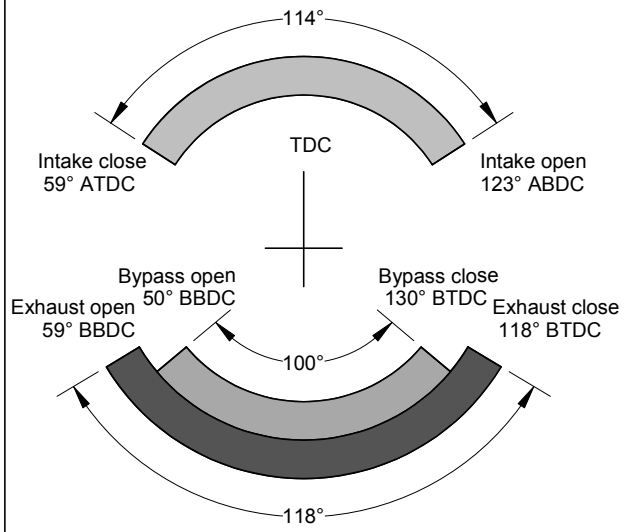
-7 MOVING POINT

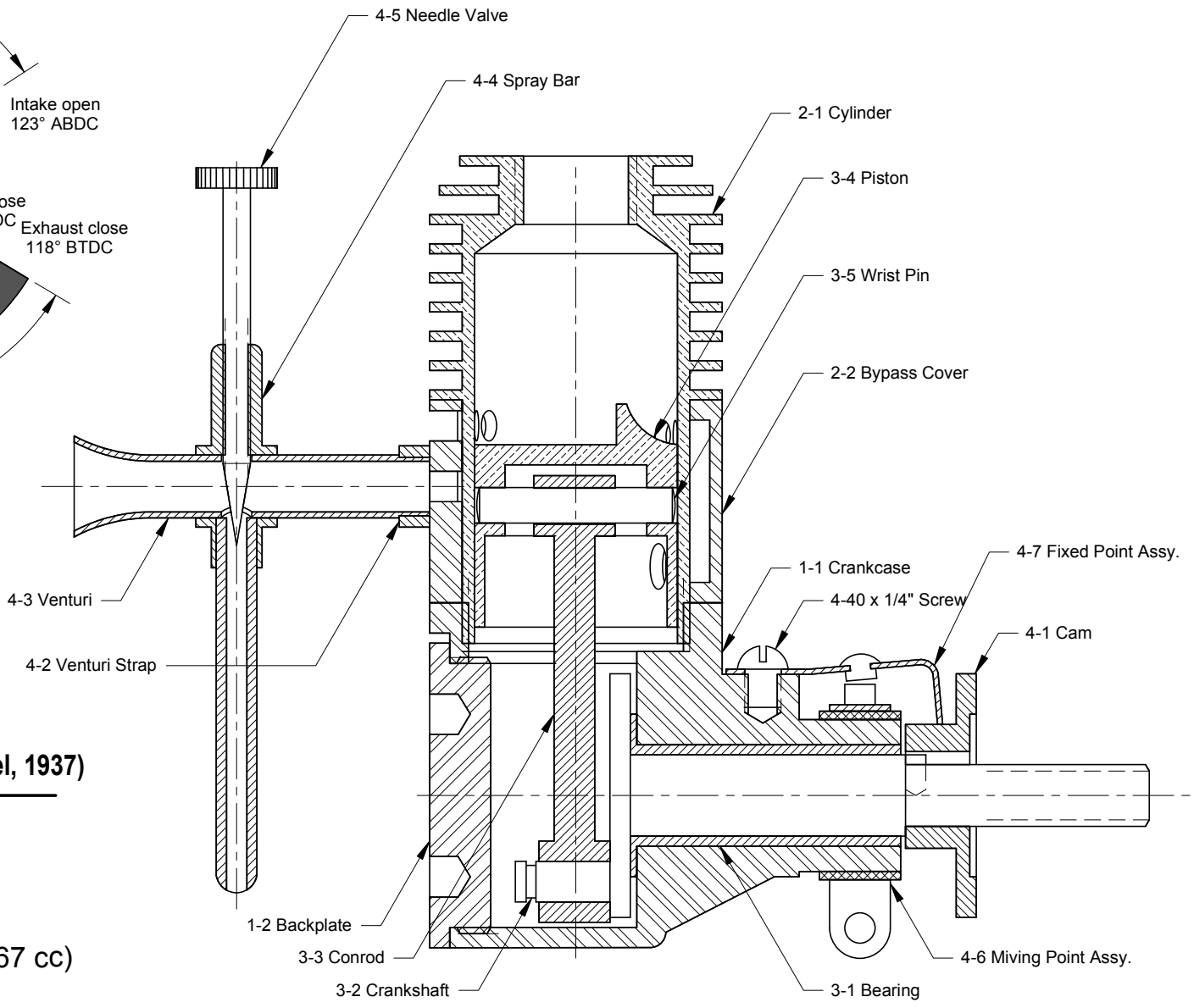
0.016" Spring Steel

-5 NEEDLE VALVE

2-56 Threaded Rod and Brass

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME CHUNN .16 CHUM (1937)
			SCALE	2 X SIZE			
			DRAWN	Gossman 1975-11-18			NUMBER Sheet 4 - Fuel and Ignition
DATE	CHANGE	BY	CAD	BMBI 2004-02-27			





CHUNN .16 CHUM (second model, 1937)

Bore: 0.625 "

Stroke: 0.530 "

Capacity: 0.163 cu in (2.67 cc)

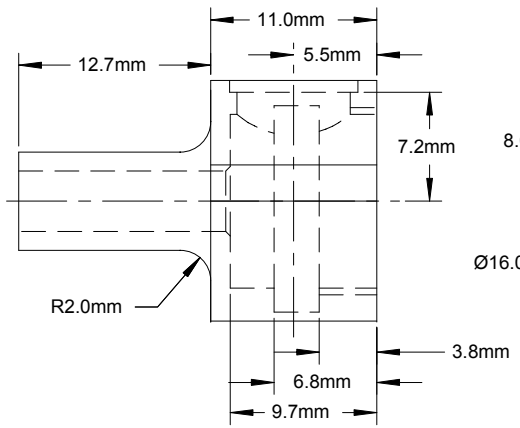
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME CHUNN .16 CHUM (1937)
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Gossman 1975-11-18			NUMBER Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2004-02-27			

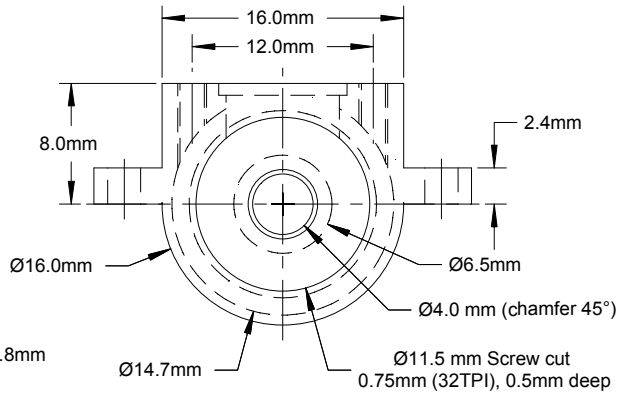
CLANFORD “CLAN” 0.24 cc

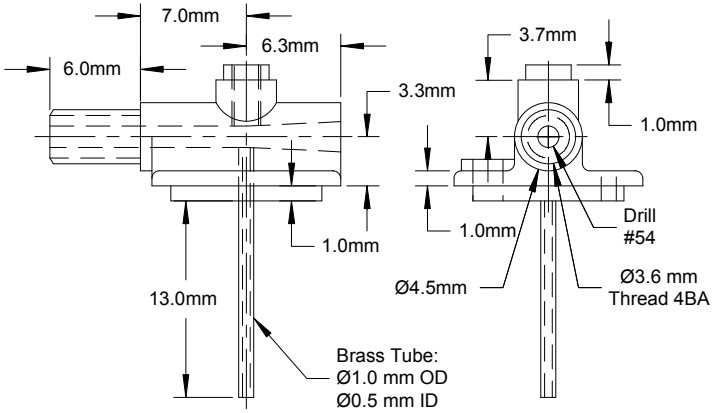


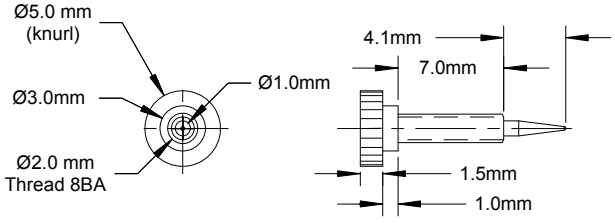
The *Clanford Clan* was a sub-miniature compression ignition engine manufactured briefly in England, circa 1976, under the direction of Mike Clanford, he of "A-Z" fame. It was a tiny side-port design featuring a barstock crankcase with a plastic injection moulded tanktop/venturi assembly, and came in a variety of colours. Tiny diesels are tricky beasts, both to make and to operate. With the Clan, this latter aspect was compounded by an occasional manufacturing defect which prevented transfer, so if you had one and could not get it to run, it may not have been your fault!

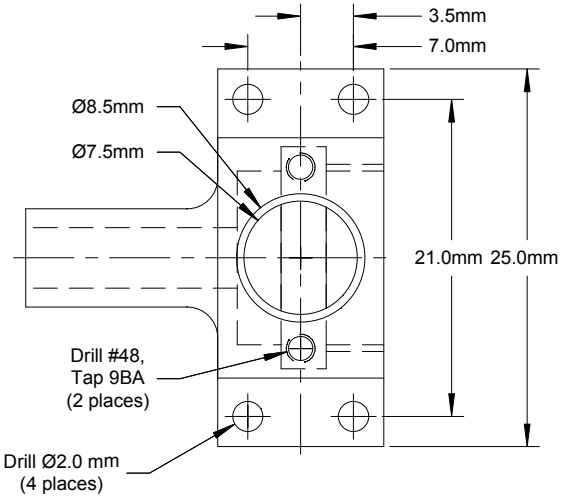
However, as it appeared to possess an elegant if deceptive simplicity, we drew a set of Motor Boys Plans for it way back in the dying days of the last century. What with one thing and another, none of The Boys ever got around to building one from the plan.





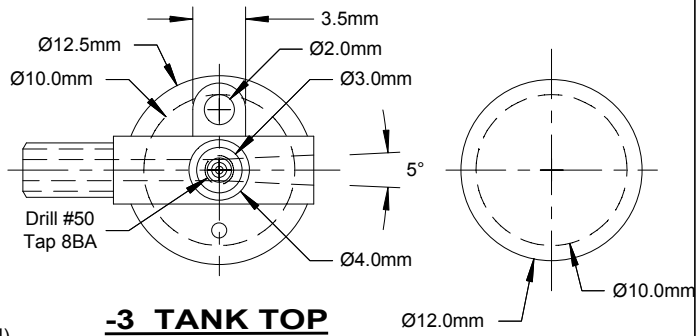






-4 NEEDLE VALVE

Brass



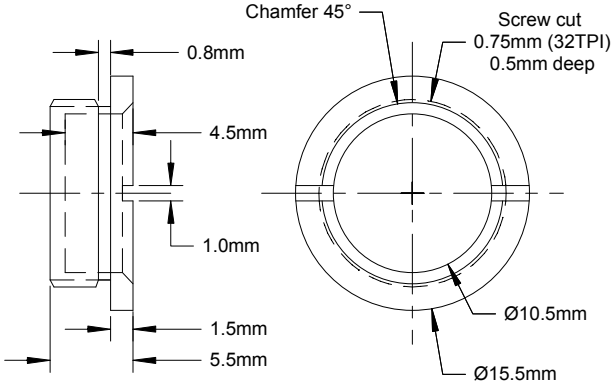
-3 TANK TOP

Black plastic moulding

Crankcase made from solid aluminium bar, turned, sawn and milled. The lower radius was probably "shaped" in the lathe.

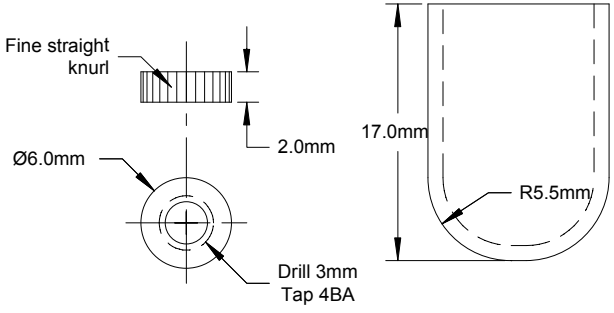
-1 CRANKCASE

6061-T6 Aluminum
(clear anodize)



-2 BACKPLATE

Aluminum



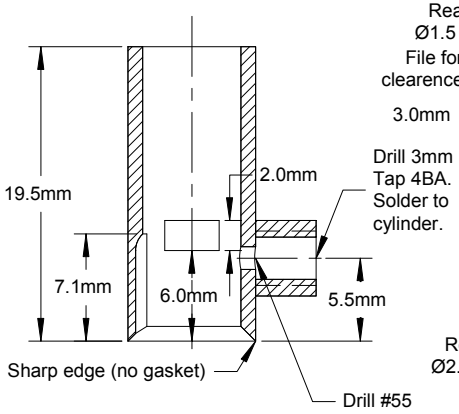
-6 LOCK NUT

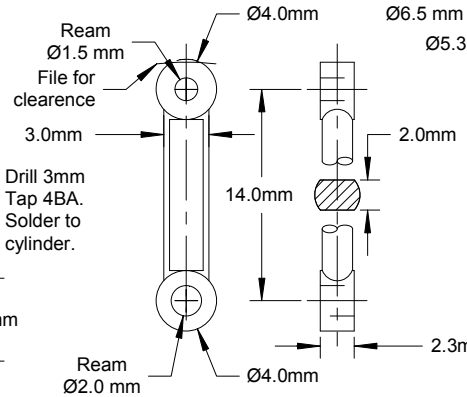
Brass

-5 FUEL TANK

Translucent plastic moulding

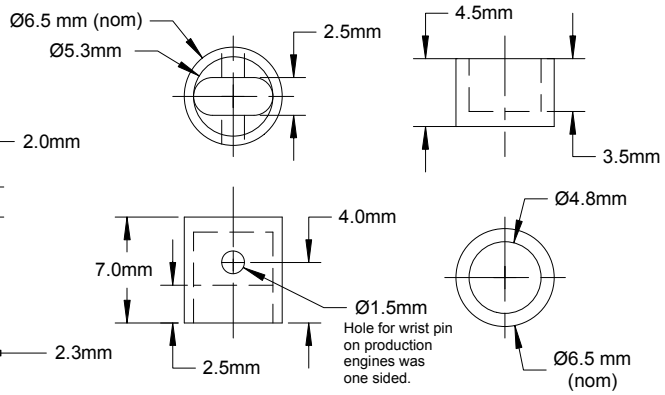
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME CLANFORD CLAN
			SCALE	2 X SIZE			
			DRAWN	RMBI 2000-5-7	NEXT ASSEMBLY		NUMBER Sheet 1 - Crankcase/Tank
DATE	CHANGE	BY	CAD	BMBI 2000-5-24			





-4 CON ROD

2024 T3 Alluminium

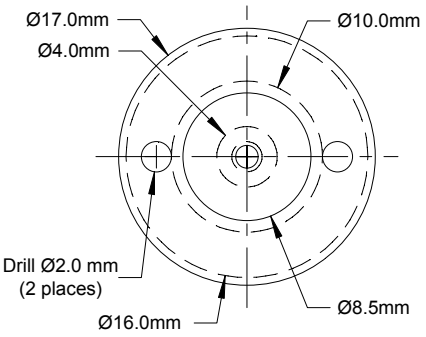


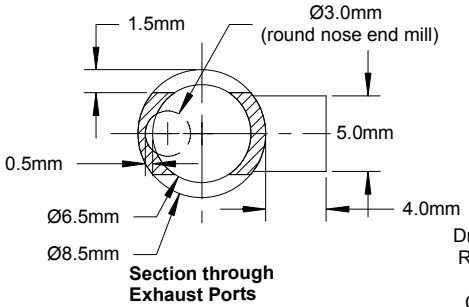
-2 PISTON

Cast Iron

-3 CONTRA PISTON

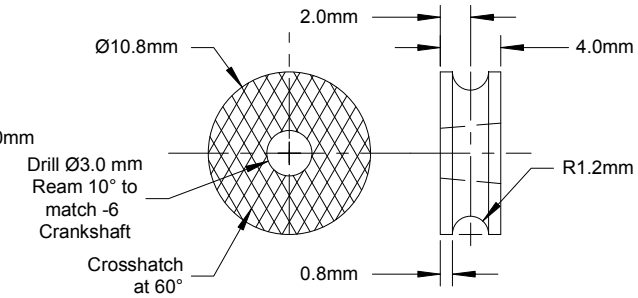
Cast Iron





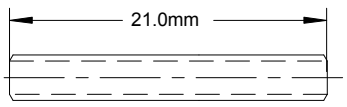
-1 CYLINDER

Leaded Steel



-7 PROP DRIVER

Aluminium

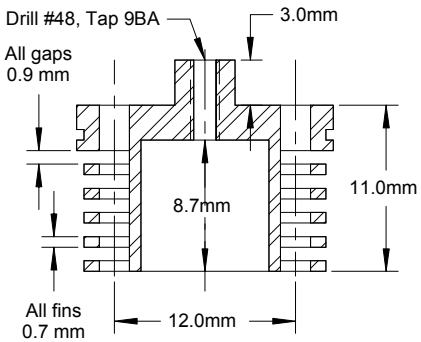


-8 STUD

6BA Threaded Steel Rod

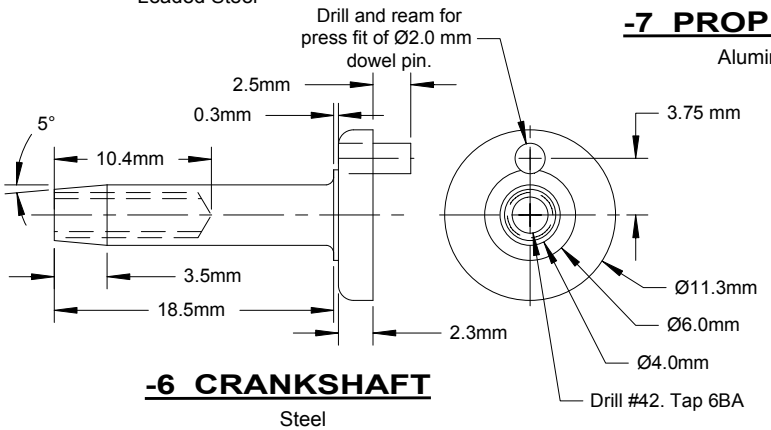
Note:

-11 Wrist Pin (not shown)
from Ø1.5mm Drill Rod.



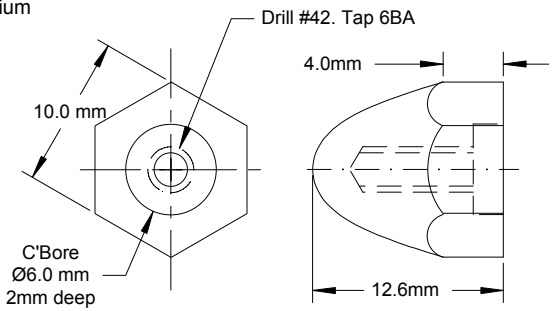
-5 CYLINDER HEAD

Aluminium (red or blue anodize)



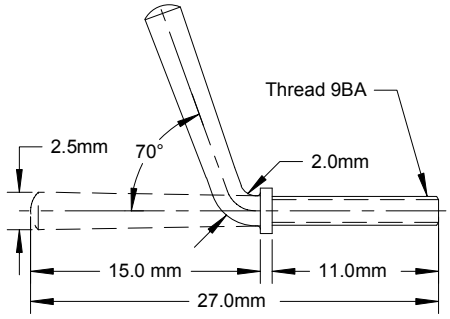
-6 CRANKSHAFT

Steel



-9 SPINNER NUT

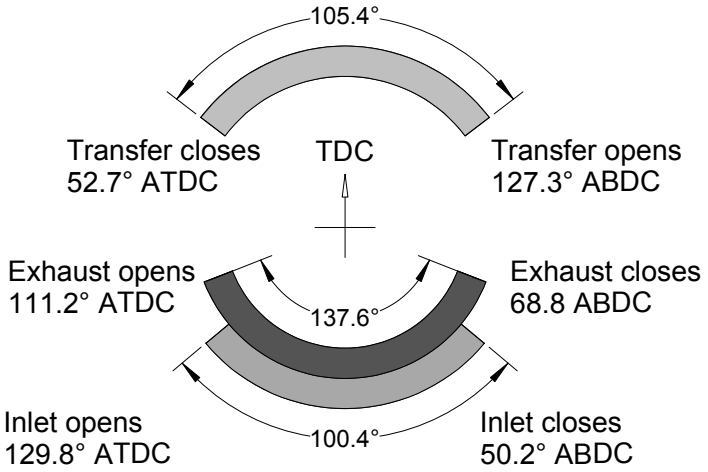
Aluminium (red or blue anodize)



-10 COMPRESSION SCREW

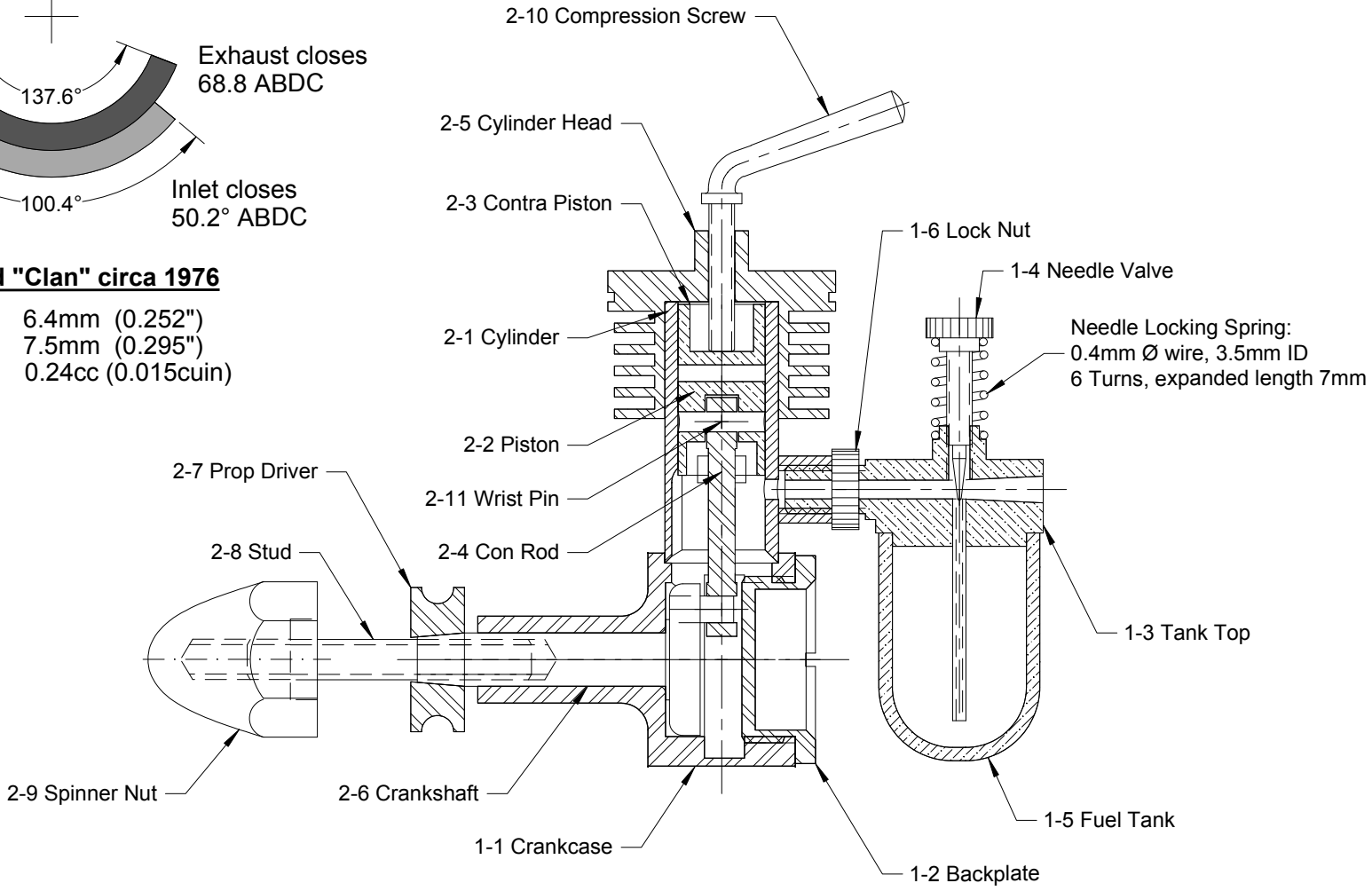
Steel

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME CLANFORD CLAN
			SCALE	2 X SIZE			
			DRAWN	RMBI 2000-5-7	NEXT ASSEMBLY		NUMBER Sheet 2 - Cylinder/Shaft
DATE	CHANGE	BY	CAD	BMBI 2000-5-24			



Clanford "Clan" circa 1976

Bore: 6.4mm (0.252")
Stroke: 7.5mm (0.295")
Capacity: 0.24cc (0.015cuin)



2007-08-14	Amend and standardize timing diagram	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: CLANFORD CLAN
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	RMBI 2000-05-07	NEXT ASSEMBLY		NUMBER: Sheet 3 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2000-05-24			

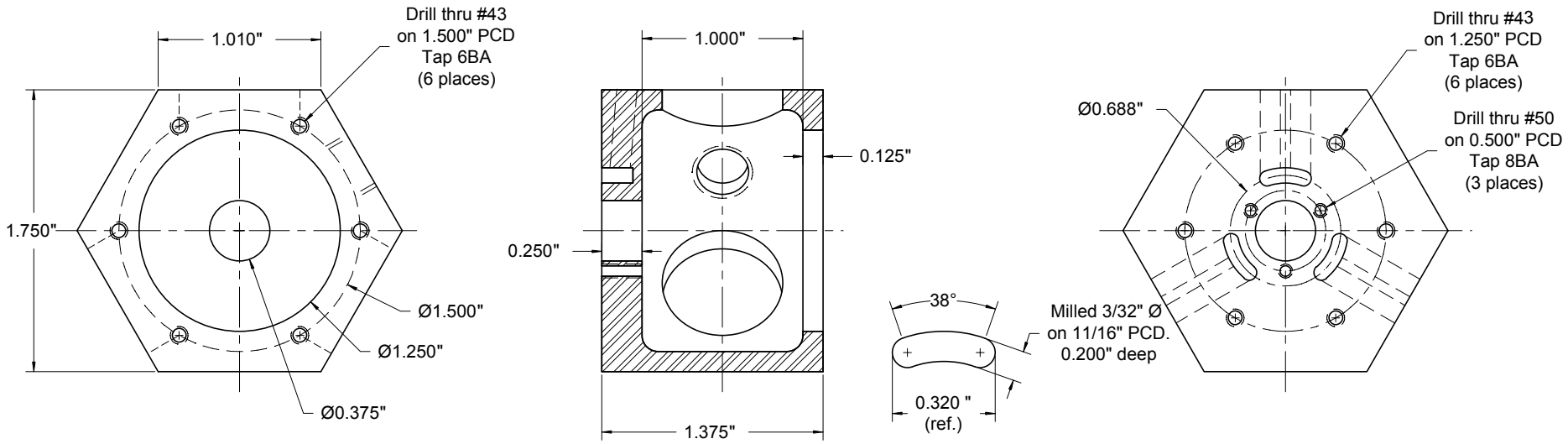
ETW CYGNET ROYAL steam engine

There can be no doubt that Edgar T Westbury (1896-1970) was a true, but unassuming, giant of the model engineering fraternity. Designing and building over 60 unique IC and steam engines, one wonders how he also found time to edit bi-weekly issues of the Model Engineer magazine for almost 20 years!

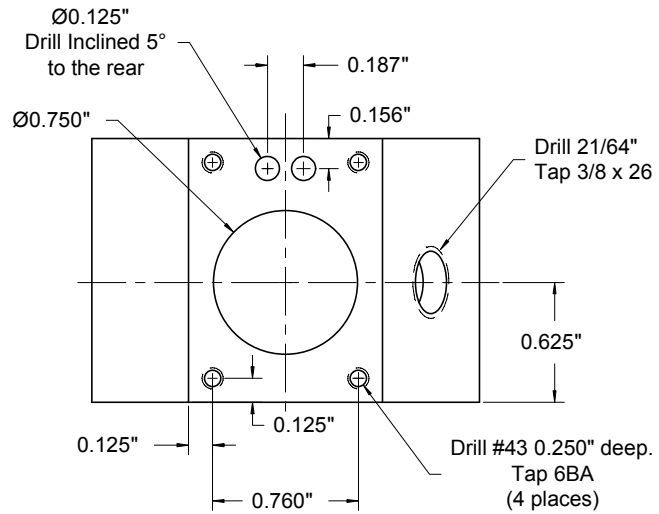
Westbury's Cygnet Royal, a 3 cylinder radial steam engine was conceived in 1962 as an experimental crossover between steam and IC build techniques. It was designed as a marine engine for use behind a flash steam generator, withstanding high pressure (80psi and upwards) and running at high speed (typically 3,000rpm +). In many ways, with its in-line orbital distribution valve, it behaves as a 2 stroke IC engine but running much more smoothly. The single throw crankshaft runs on ball bearings within an oil filled crankcase.

As well as being a elegant curiosity, the Cygnet Royal is a good deal lighter and more compact than conventional steam engines of a similar output. Measuring around 4" x 4" x 4", the engine has a bore x stroke of 5/8" dia x ½". Having 3 cylinders, the Cygnet Royal is also a self-starting engine - just add steam (or compressed air) and off it goes!

Castings are available from *Hemingway Kits* in the UK, from whom all of this text was plagiarised.

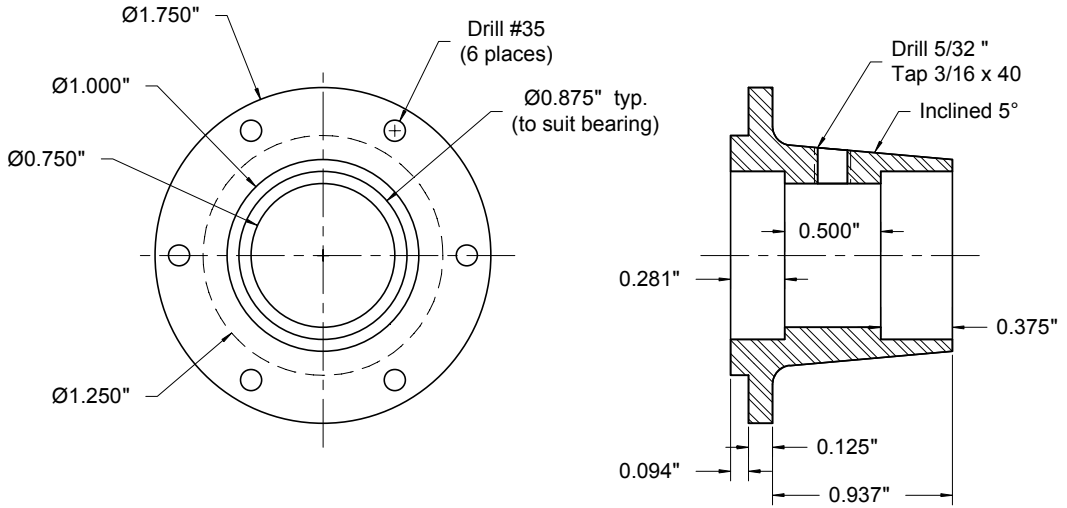


Port Detail (Twice Size)



-1 CRANKCASE

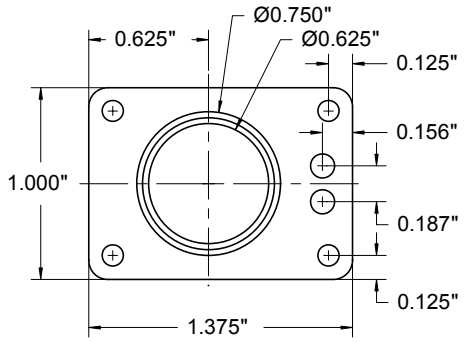
Hex Aluminum

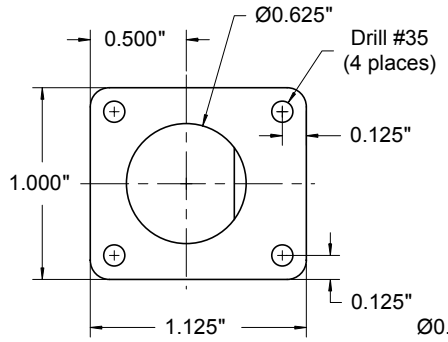


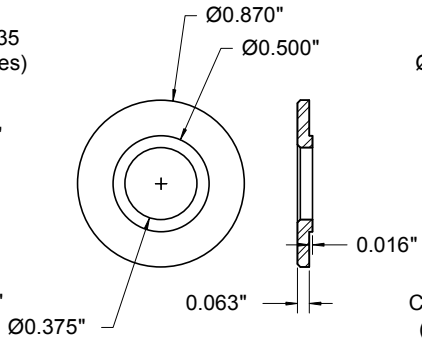
-2 MAIN BEARING HOUSING

Aluminum

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ETW CYGNET ROYAL
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	ET Westbury 1962	NEXT ASSEMBLY		NUMBER: Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	RC 2006-10-01			

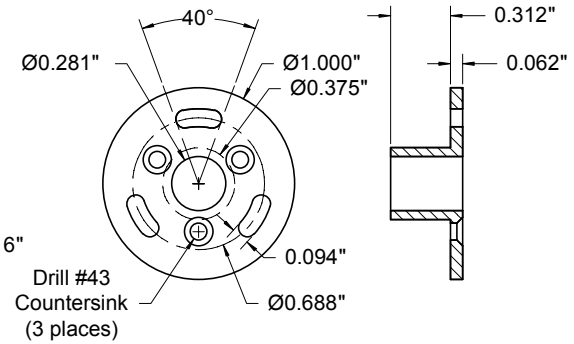






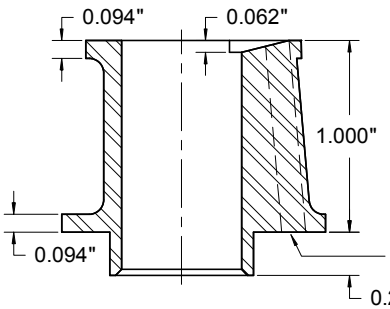
-8 SEAL RING

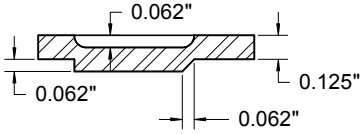
Aluminium



-7 PORT FLANGE

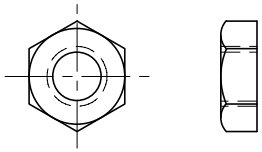
Bronze

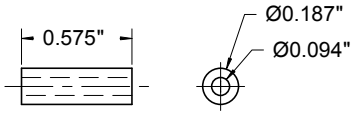




-5 CYLINDER COVER

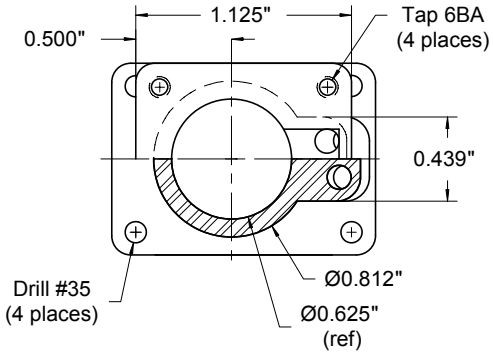
Aluminum (3 off reqd)

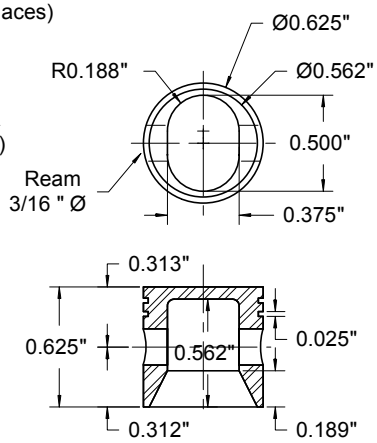


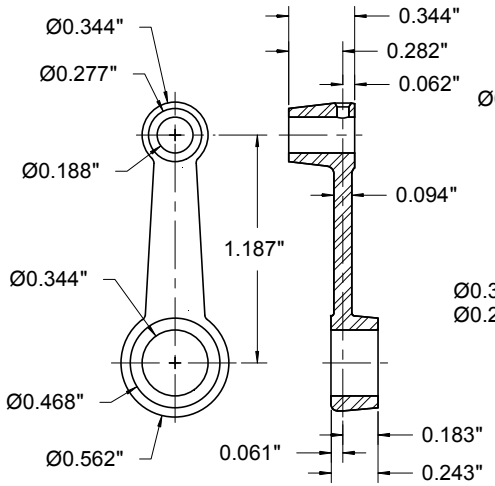


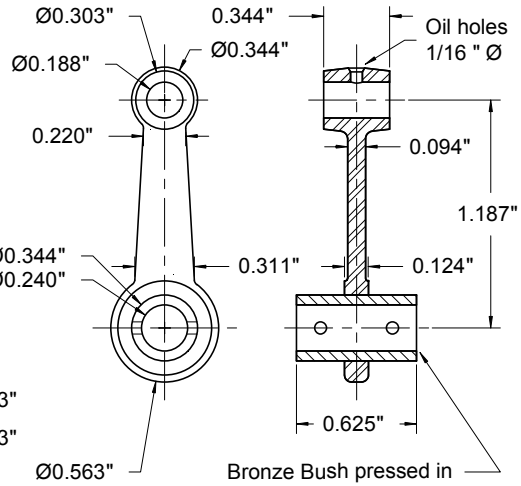
-6 GUDGEON PIN

Silver Steel H&T (3 off reqd)









-1 CYLINDER

Cast Iron (3 off reqd)

-4 PISTON

Aluminum (3 off reqd)

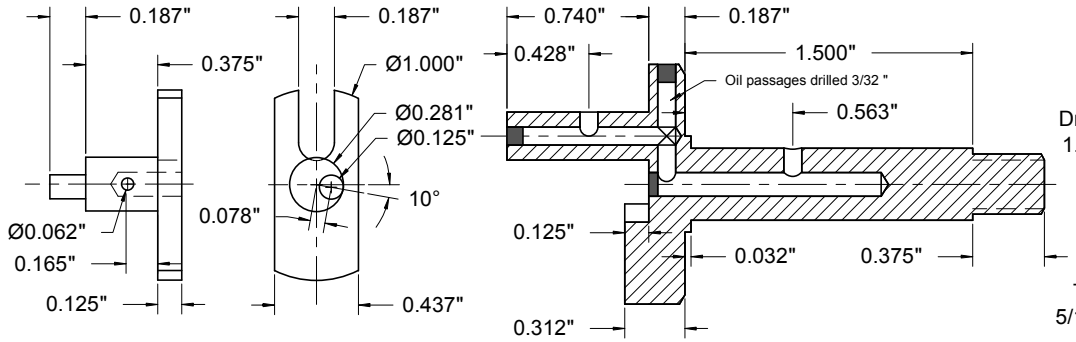
-3 SLAVE ROD

Aluminum (2 off reqd)

-2 MASTER ROD

Aluminum + Bronze

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ETW CYGNET ROYAL
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	ET Westbury 1962	NEXT ASSEMBLY		NUMBER: Sheet 2 - Cylinders
DATE	CHANGE	BY	CAD	RC 2006-10-01			

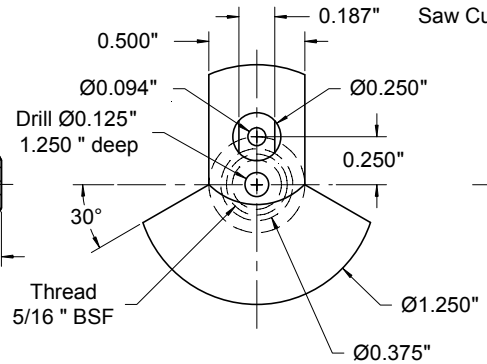


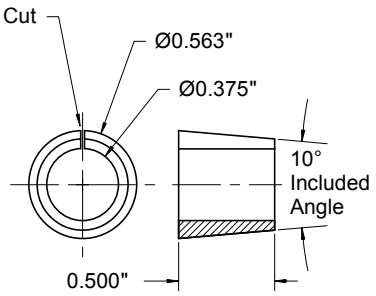
-2 RETURN CRANK

Steel (CH)

-1 CRANKSHAFT

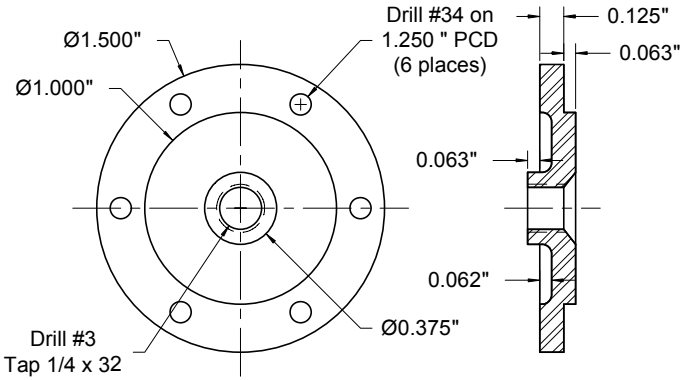
Steel

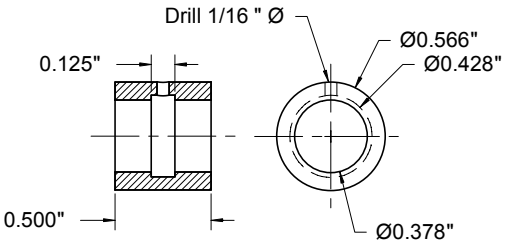




-3 COLLET

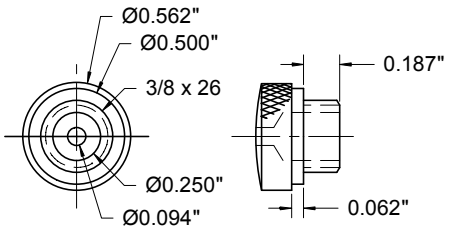
Aluminum





-4 SPACER

Aluminum

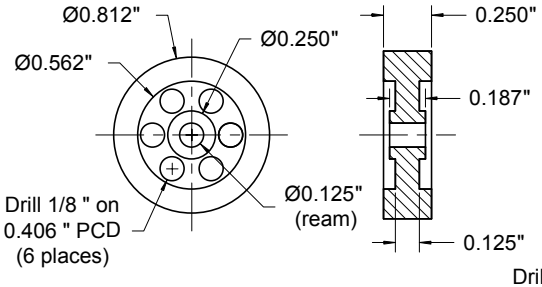


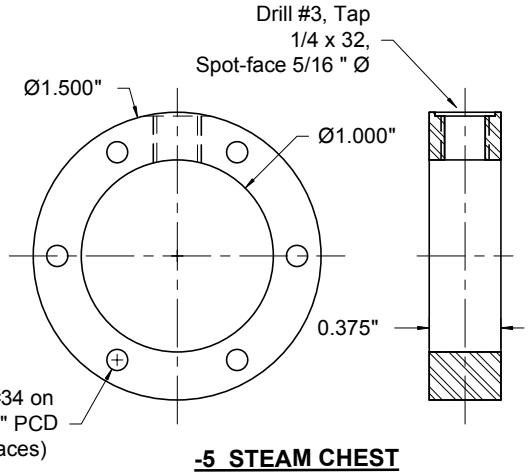
-9 BREATHER CAP

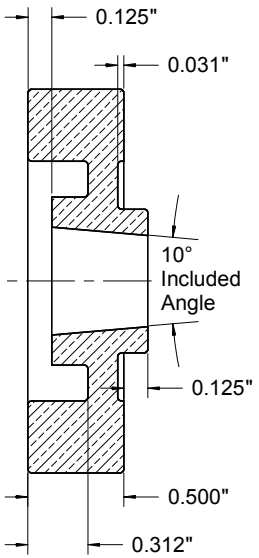
Aluminum

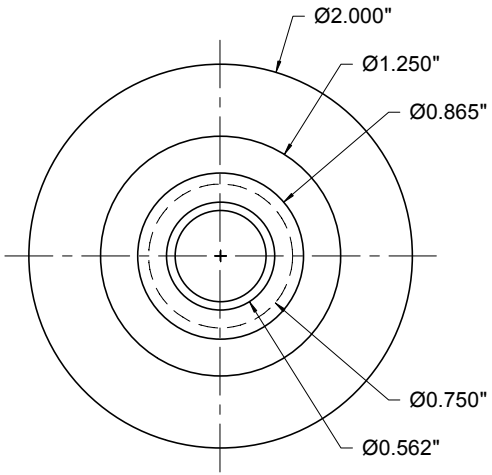
-6 STEAM CHEST COVER

Aluminum









-7 ORBITAL VALVE

Cast Iron

-5 STEAM CHEST

Aluminum

-8 FLYWHEEL

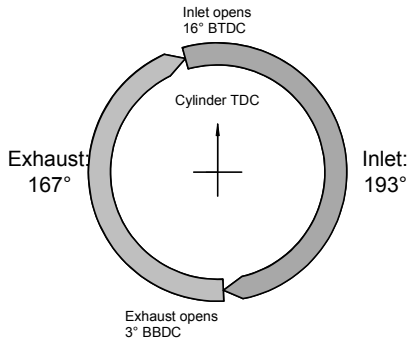
Cast Iron

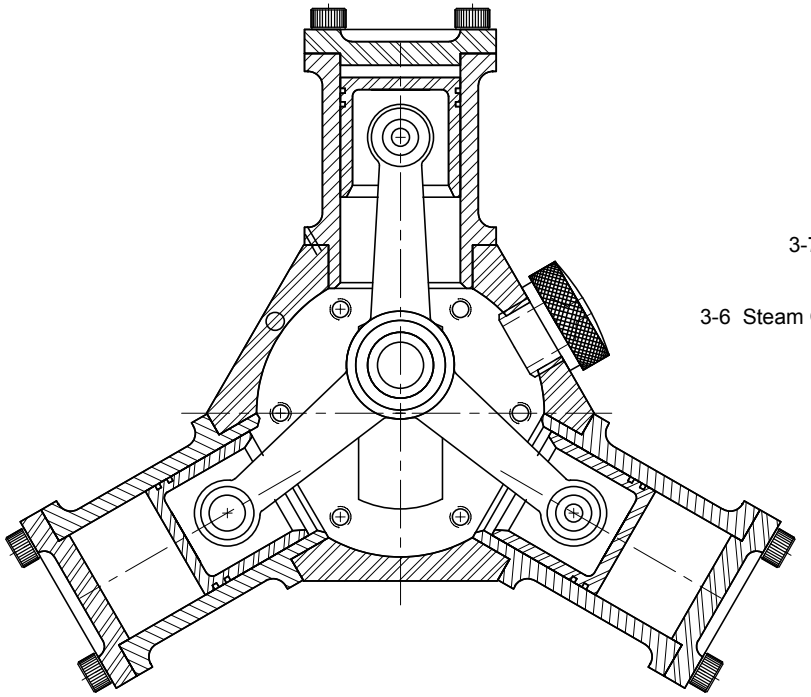
			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ETW CYGNET ROYAL
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	ET Westbury 1962	NEXT ASSEMBLY		NUMBER: Sheet 3 - Crankshaft
DATE	CHANGE	BY	CAD	RC 2006-10-01			

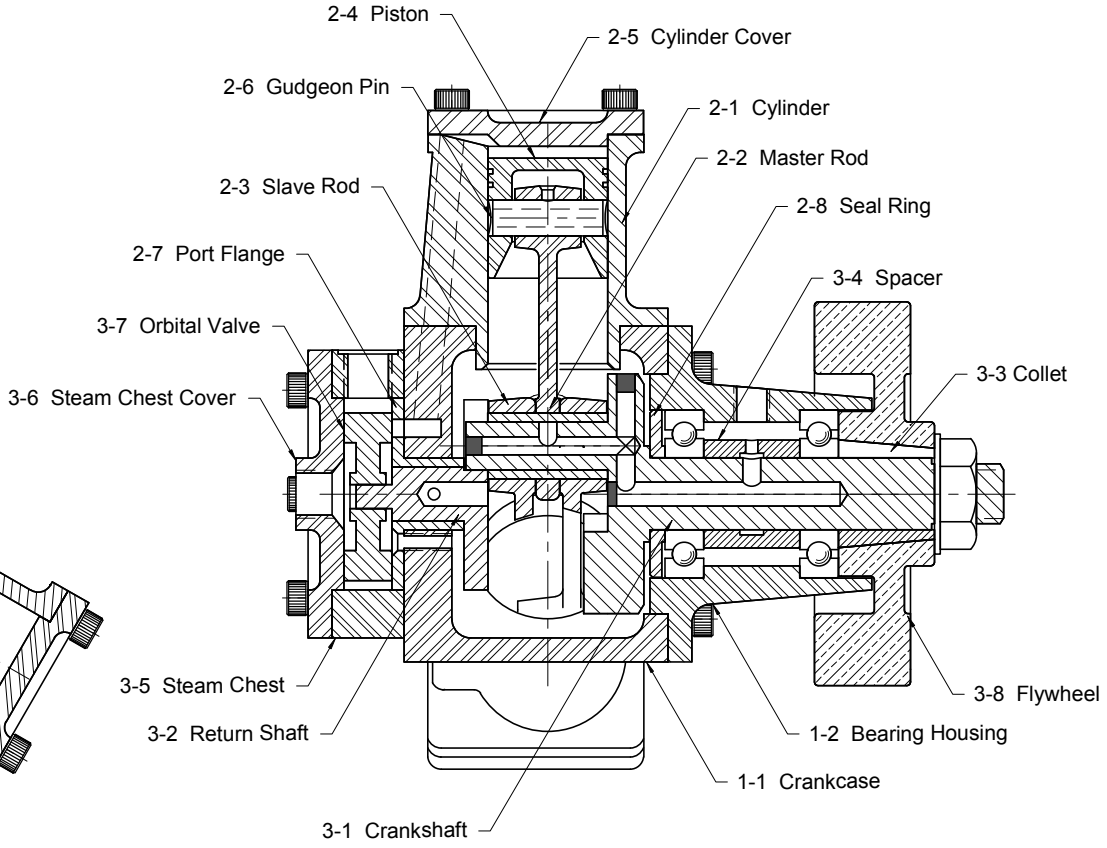
ETW CYGNET ROYAL

Bore: 0.625 " (15.88 mm)

Stroke: 0.500 " (12.7 mm)







			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ETW CYGNET ROYAL
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	ET Westbury 1962	NEXT ASSEMBLY		NUMBER: Sheet 4 - Genreal Arrangement
DATE	CHANGE	BY	CAD	RC 2006-10-01			

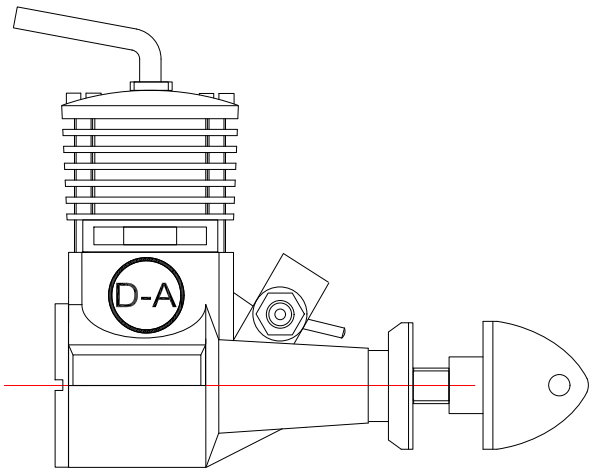
David Anderson SATELLITT 1cc

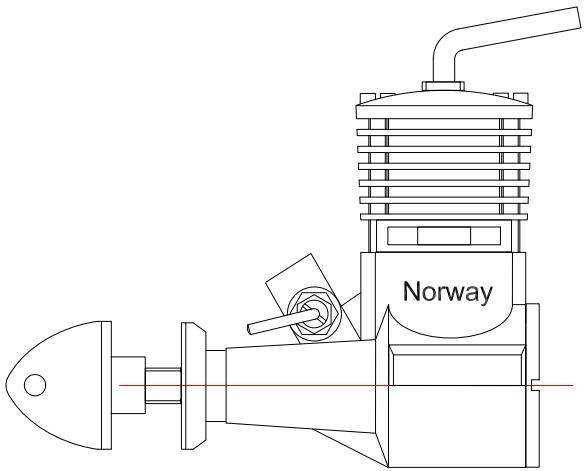
Jan David-Andersen was making model aircraft engines from 1950 to 1964.

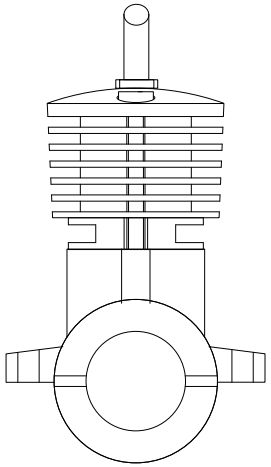
DA 1 cc was the second type of engine developed by David-Andersen. It came in 1954 and was a typical engine of its time. The cylinder with cooling fins and no separate cylinder head, was screwed into the crankcase, keeping the cylinder and the crankcase together. The construction was not entirely successful. The workshop did not have good quality equipment to make the threads. The users of the engines were often brutal when removing the cylinder. Many engines were damaged during disassembly.
To cure the problems with version 1, the engine was modified. It was constructed with new cooling fins which were fastened with two screws. The crankcase was modified with lugs for the screws. The cylinder was also modified. In some manuals a drawing of this engine is mention as “Satellitt” and this is the version presented in the image above and in the plans that follow.

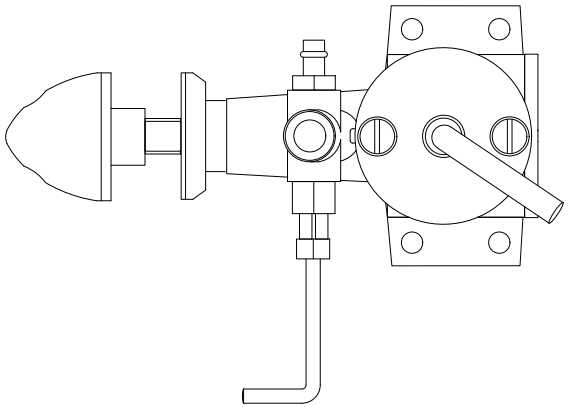
David Andersen Satelitt 1cc

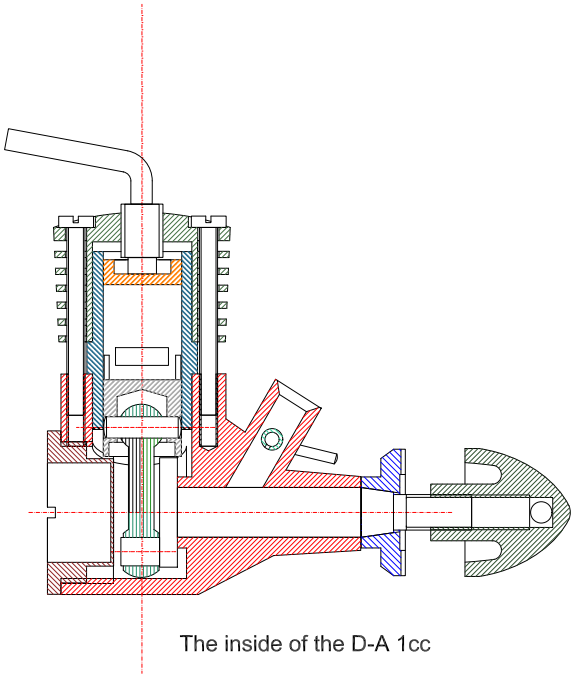
Measured and drawned by Jens Eirik Skogstad, Bergen, Norway.











The inside of the D-A 1cc

The engine was drawned
and measured of the old
D-A Satelitt 1cc.
I won the used engine in
auction, the engine was
without contrapiston
and worned piston and sleeve.
Hence i maked the plan of
the engine when i maked new
engine parts.

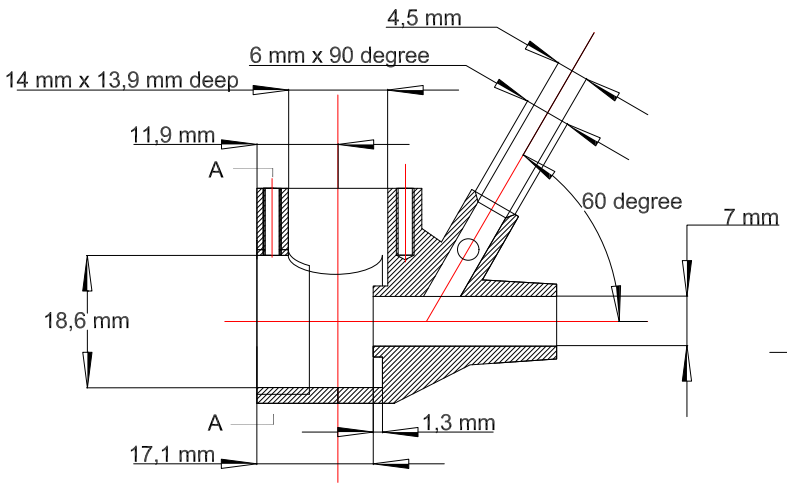
Regards Jens Eirik Skogstad
Bergen, Norway

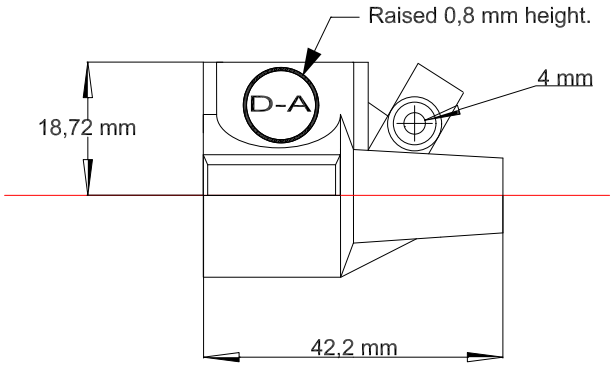
TITLE

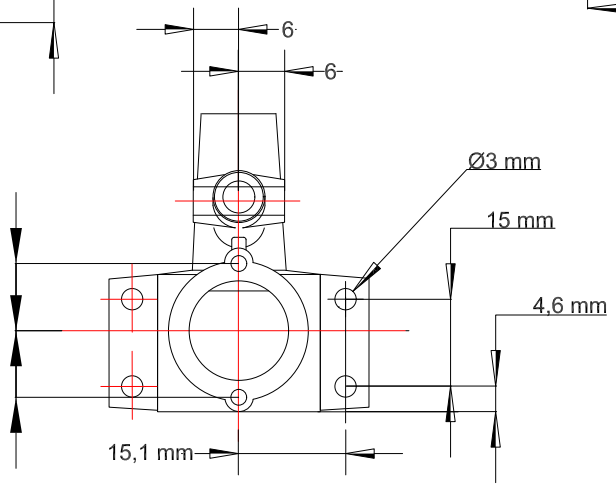
David-Andersen Satelitt 1cc

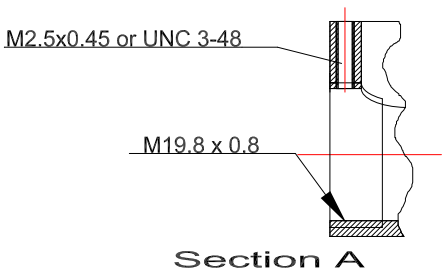
SIZE	CAGE CODE	DWG NO	REV
A4		1:9	

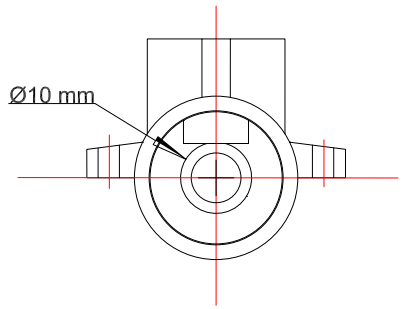
SCALE		SHEET
1:1		











Note: The crankcase are casted in aluminium

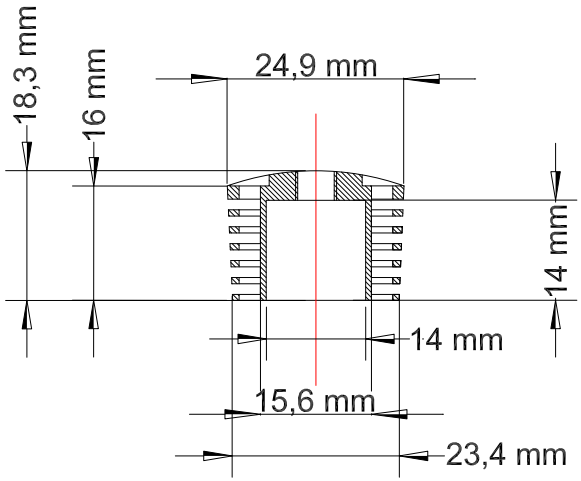
Crankcase

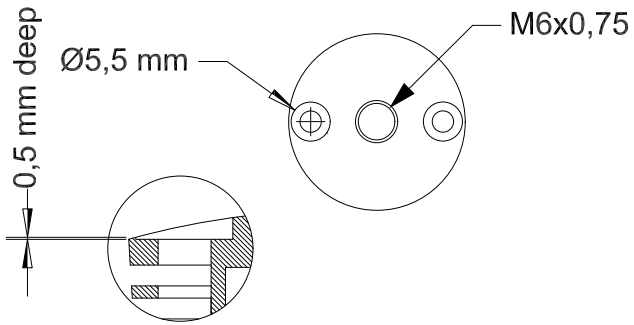
TITLE

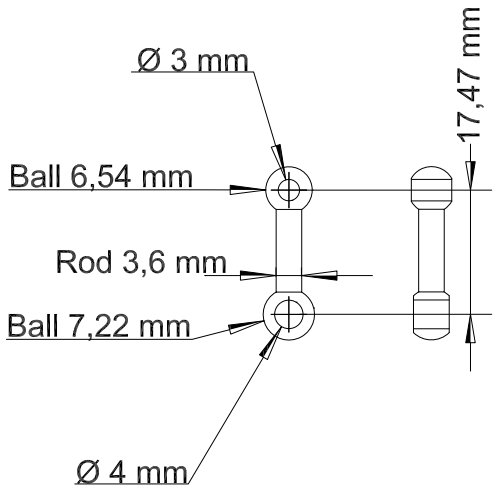
D-A 1cc Model Dieselengine

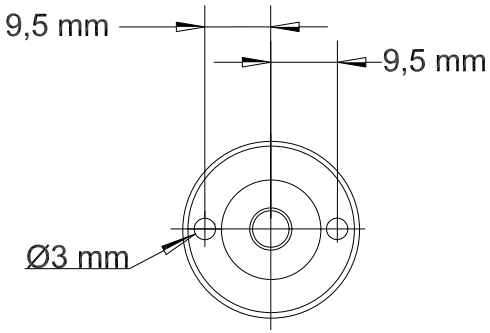
SIZE	CAGE CODE	DWG NO	REV
A4		2:9	

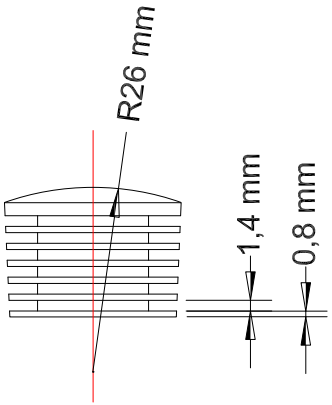
SCALE	Material: Aluminium	SHEET
1:1		







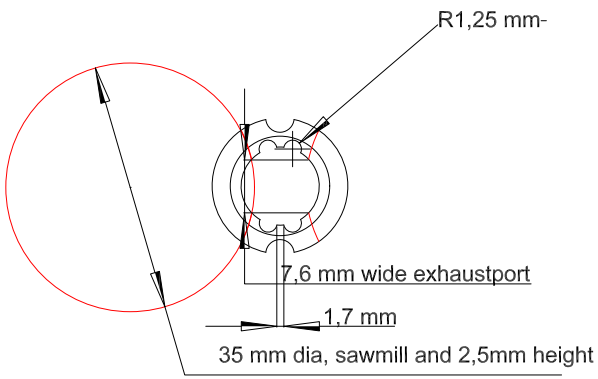


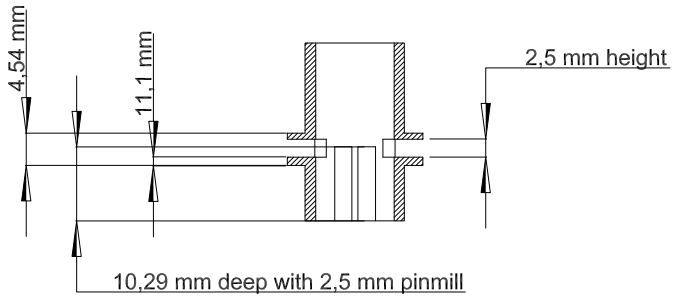


	Cylinderhead con. rod			
	TITLE D-A 1cc Model Dieselengine			
	SIZE A4	CAGE CODE	DWG NO 6:9	REV
	SCALE 1:1	Material: Duraluminium	SHEET	

Cylinder

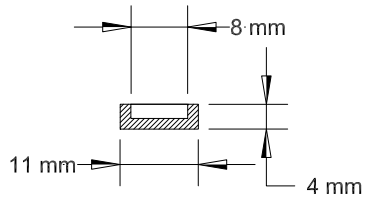
Material: High tensile steel or cast iron (original: Cast iron)





Contrapiston

Material: Cast iron

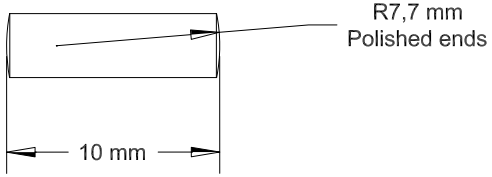


Note: The contrapiston was lost in my used engine and maked own contrapiston.
Original design and measure of the contrapiston unknown.

Wristpin

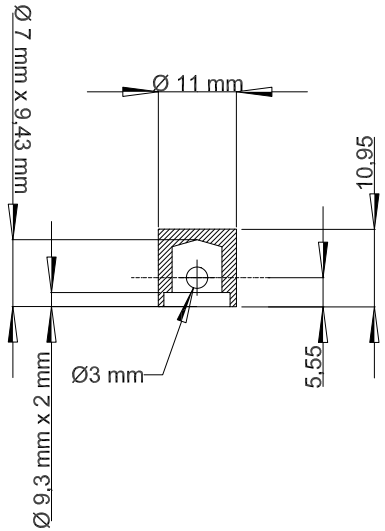
Material: 3 mm dia. Silver steel

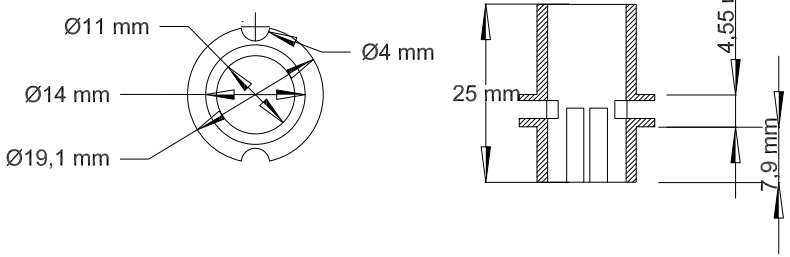
Scale: 3:1



Piston

Material: Cast iron





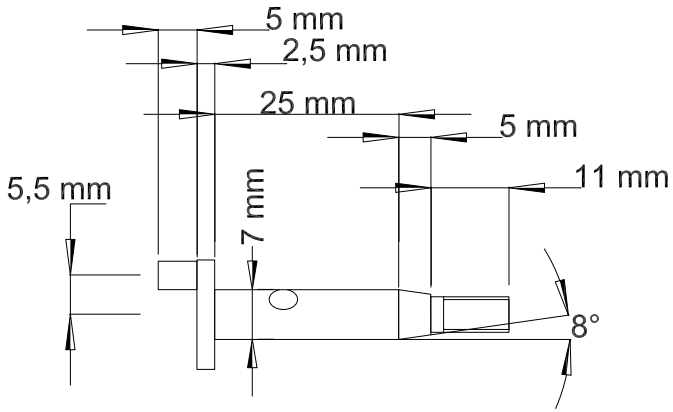
Cylinder and piston

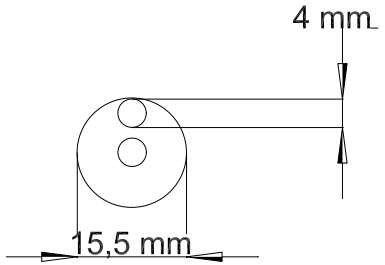
TITLE

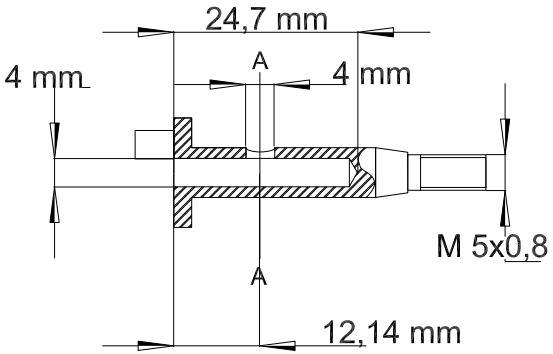
D-A 1cc Model Dieselengine

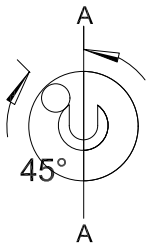
SIZE	CAGE CODE	DWG NO	REV
A4		4:9	

SCALE		SHEET
1:1/3:1		









Crankshaft

Material: High tensile steel

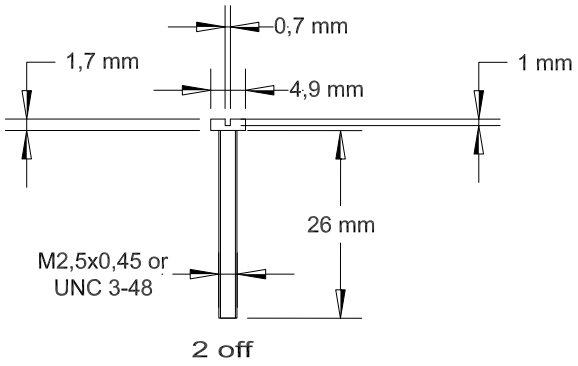
TITLE

D-A 1cc Model Dieselengine

SIZE	CAGE CODE	DWG NO	REV
A4		3:9	

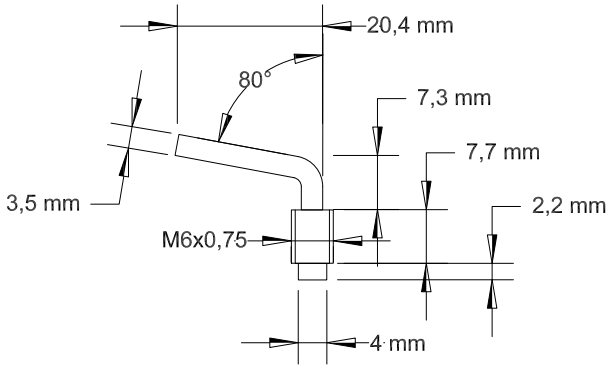
SCALE		SHEET
1:1		

Screws for cylinderhead. Material: Steel

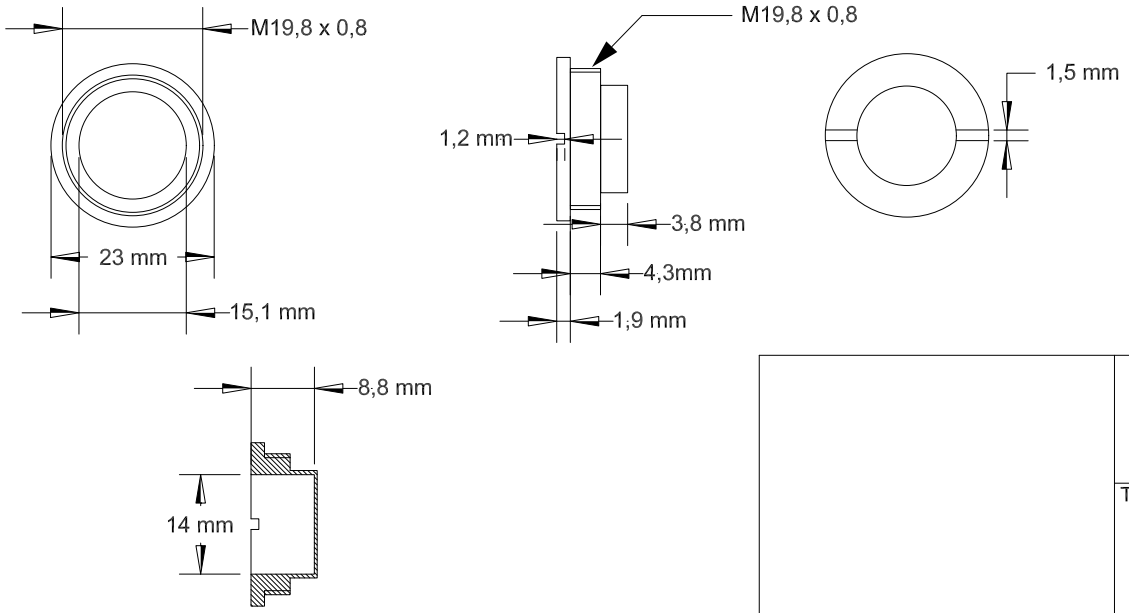


2 off

Compressionscrew. Material: Steel



Backcover. Material: Duraluminium



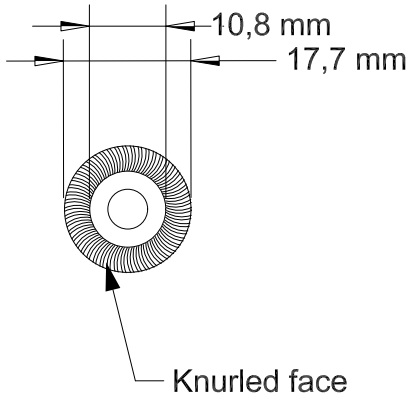
Backcover and screws

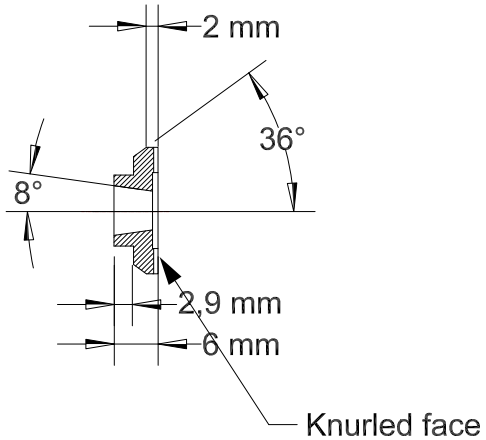
TITLE

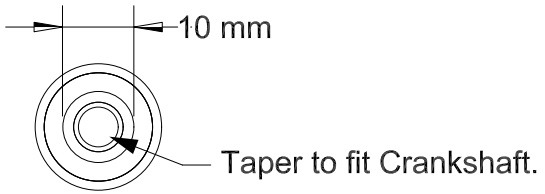
D-A 1cc Model Dieselengine

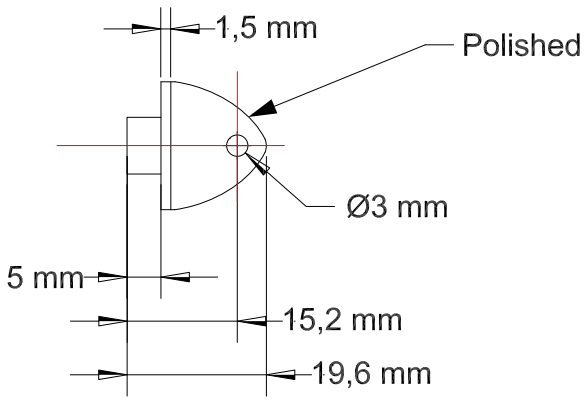
SIZE	CAGE CODE	DWG NO	REV
A4		5:9	

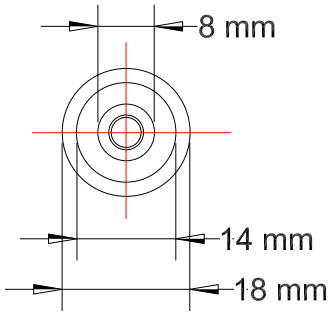
SCALE		SHEET
1:1		

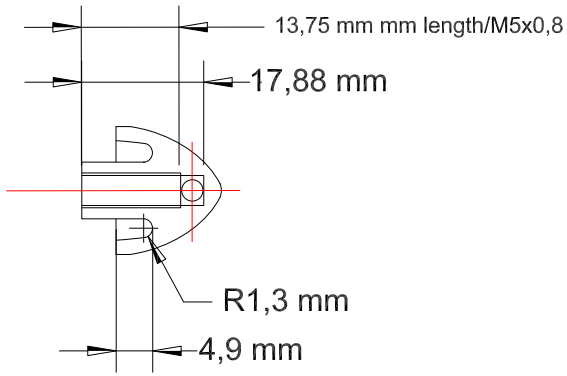


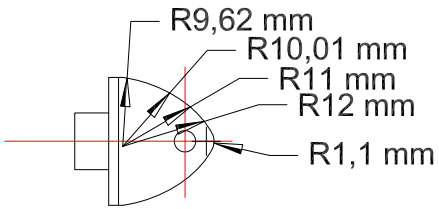












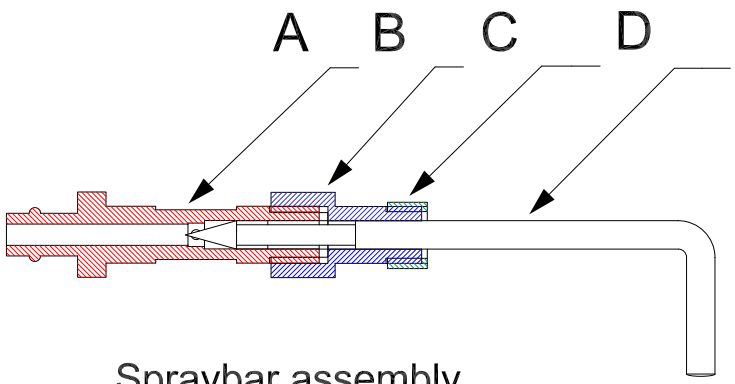
Aluminium parts

TITLE

D-A 1cc Model Dieselengine

SIZE	CAGE CODE	DWG NO	REV
A4		7:9	

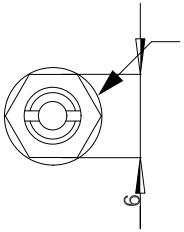
SCALE	Material: Duraluminium	SHEET
1:1		



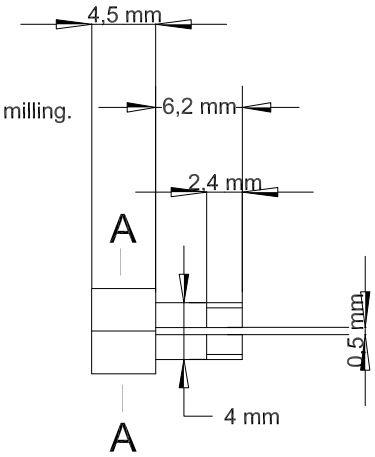
Spraybar assembly

B Nut with lock

Material: Brass

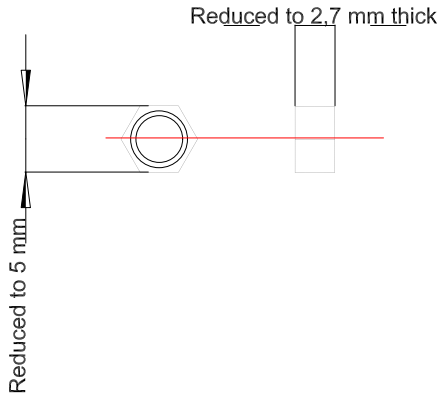


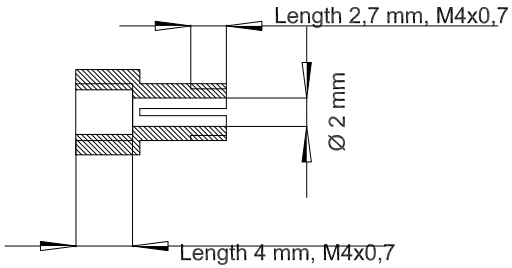
Section A



C Locknut

Material: Nut M4x0,7, steel





Nutlock and nut with lock.

TITLE

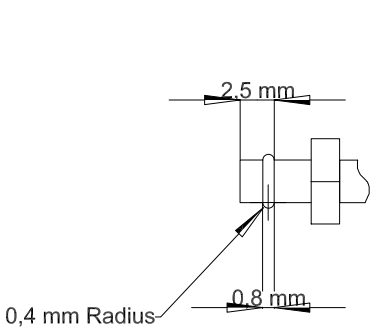
D-A 1cc Model Dieselengine

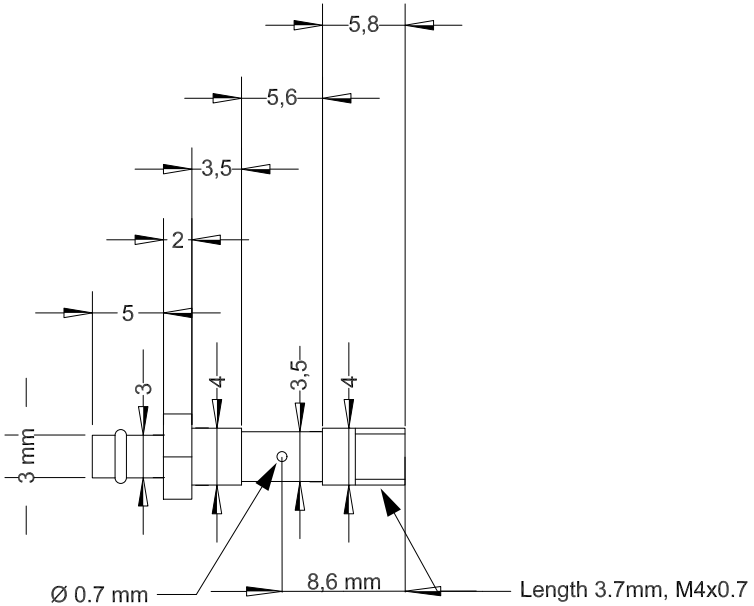
SIZE	CAGE CODE	DWG NO	REV
A4		8:9	

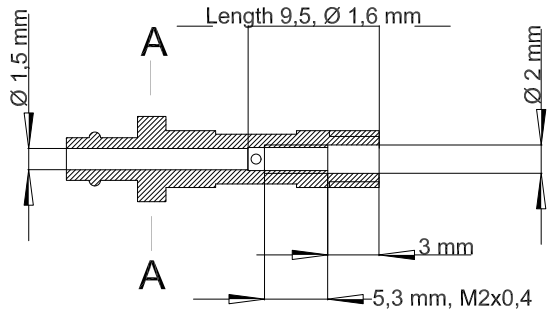
SCALE		SHEET
2:1		

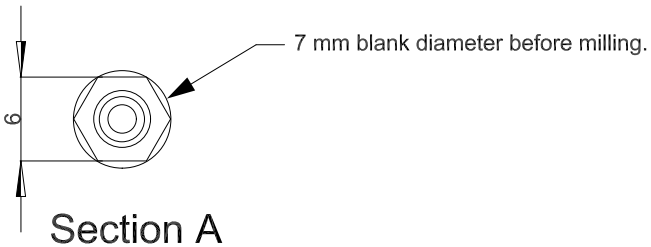
A Spraybar

Material: Brass





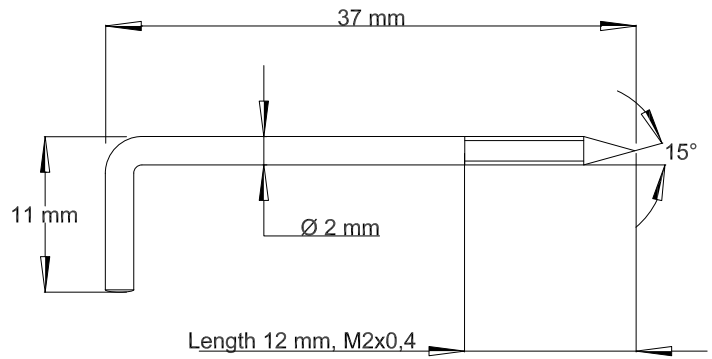




Section A

D Needle

Material: 2 mm steelwire



Spraybar and needle.

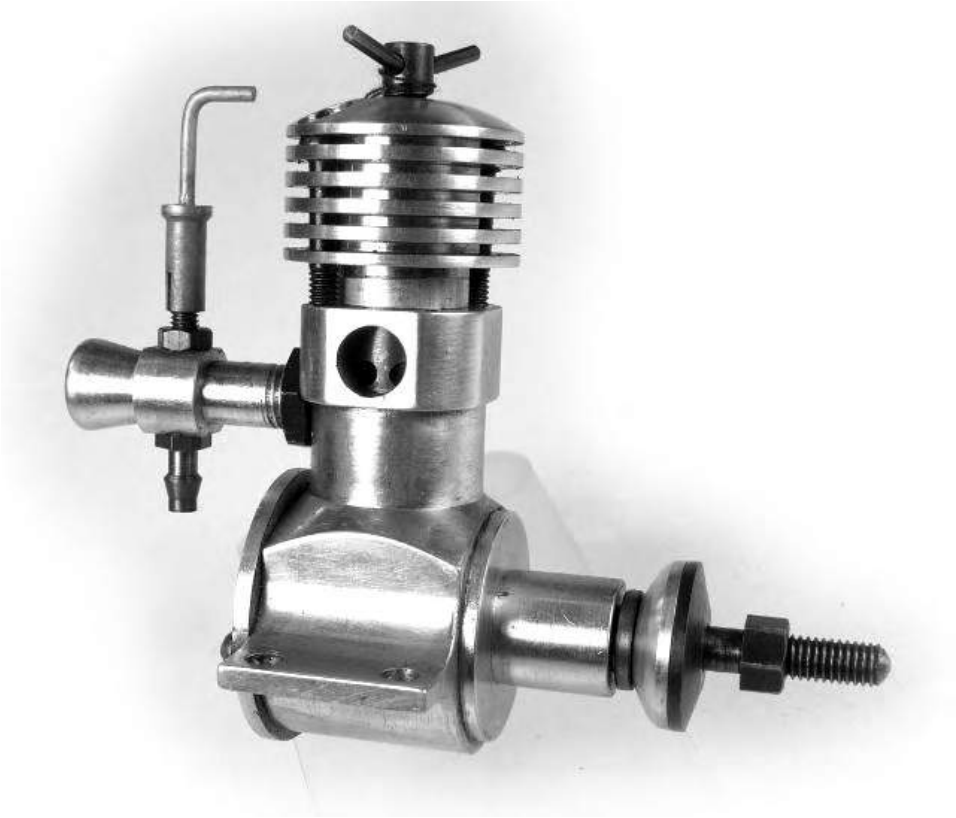
TITLE

D-A 1cc Model Dieselengine

SIZE	CAGE CODE	DWG NO	REV
A4		9:9	

SCALE		SHEET
2:1		

EMBEE 0.75cc diesel



The EMBEE was made in Leicester by Moore and Bailey. It is a bar-stock engine, and quite nicely made and finished, inside and out. Sadly in the hand, in my view, it is an ugly lump.

The "EmBee 75" (the maker's initials) was a nicely made little engine. The crankcase was machined from barstock with the front shaft housing glued into the main case section with Araldite (a well known English two part epoxy). The finish was excellent and the engines were well-behaved and easy to start. Peter Chinn suggested that it *"[would] fill a long felt want for a Mills .75 replacement engine"*. I am unable to locate any advertising for the EmBee, but *Clanford's A-Z*, not always the most reliable reference, indicates that production spanned the period 1968 through 1970.

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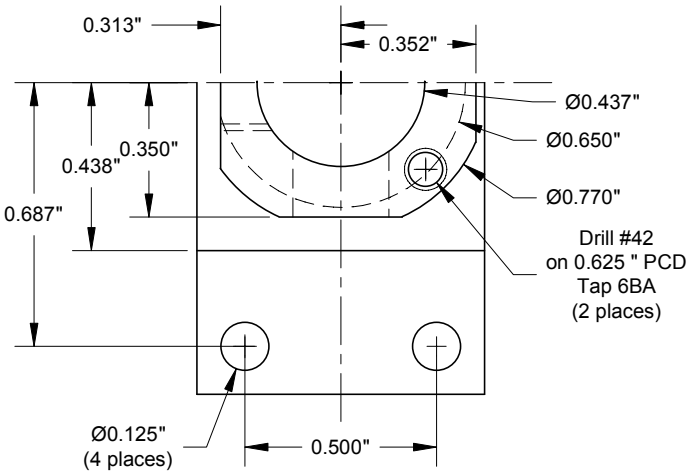
Notes:1. On original engines, the front bushing was glued in place with "Areldite" (tm). We recommend screwing the bushing in place with a 40 TPI thread, fixed with Locktite (tm).

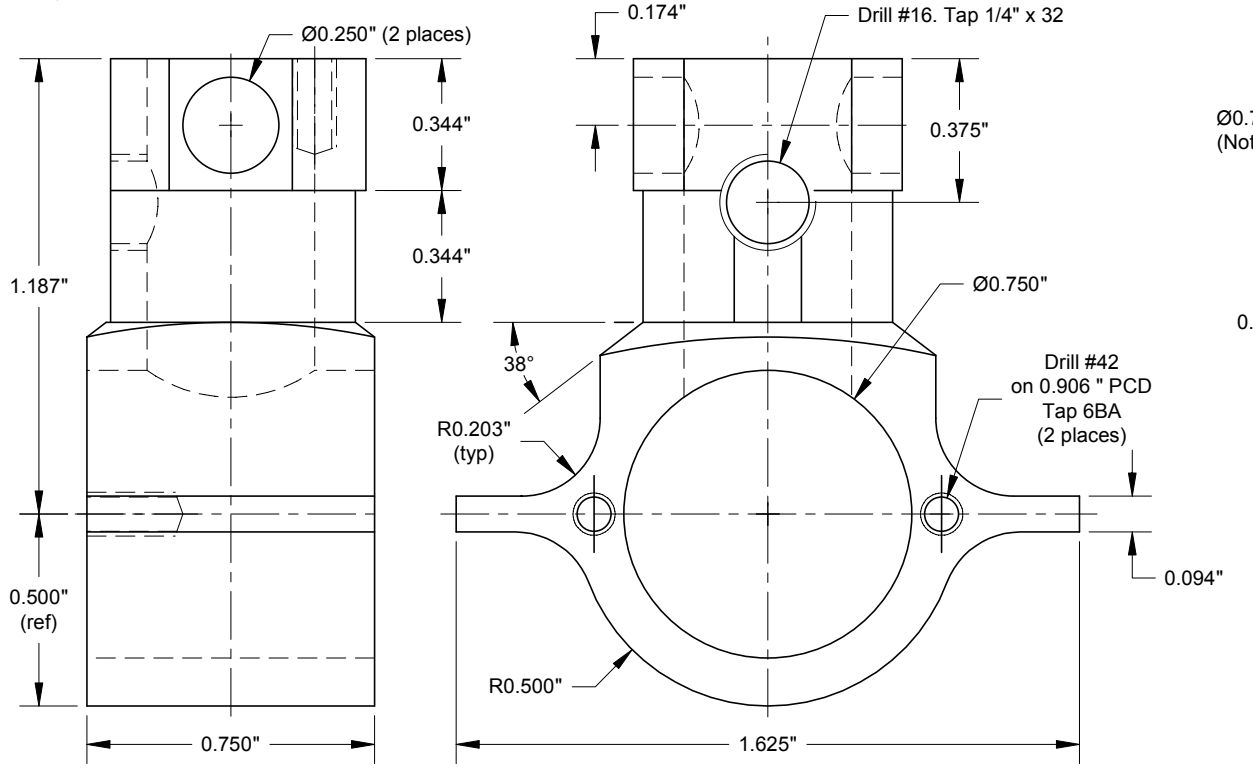
2. There was no thrust face machined onto the front bearing of production engines. The one shown is a strongly suggested modification.

3. The front bushing projection of production engines was 0.437 " long allowing excessive endplay of the crankshaft. It has been extended on this drawing to prevent the crankpin contacting the backplate.

-1 CRANKCASE

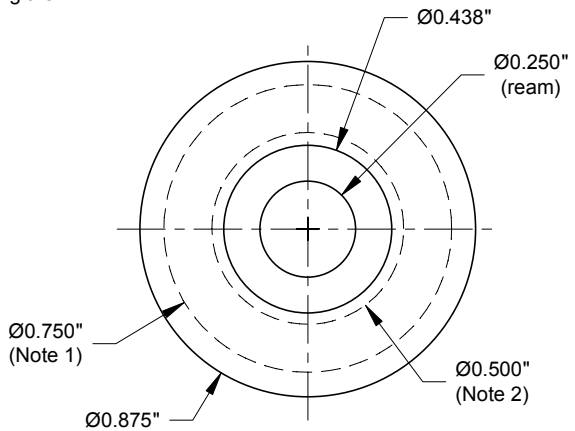
Aluminum
(2024 or 6061 for preference)

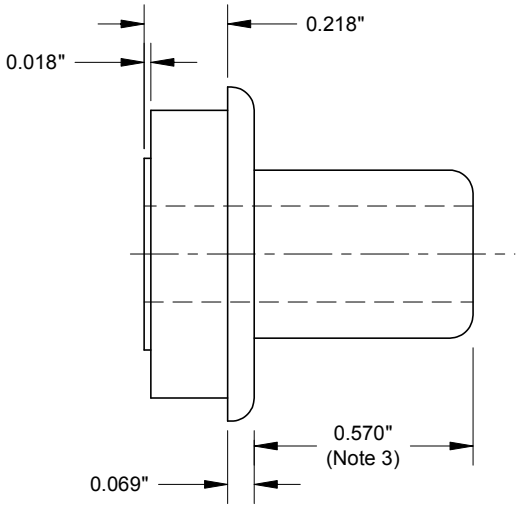




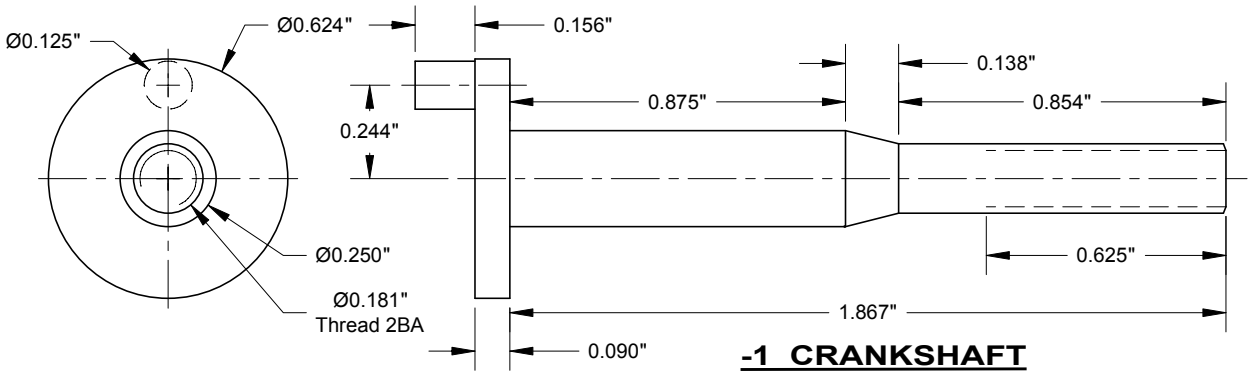
-2 FRONT BEARING

Aluminum
(2024 or 6061 for preference)



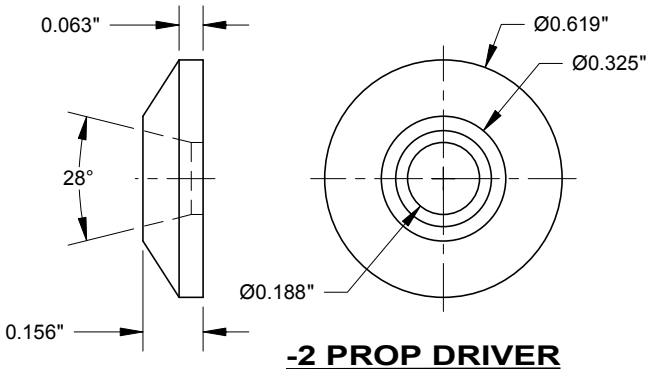


			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **EMBEE**
			SCALE	**2 X SIZE**			
			DRAWN	RMBI 2005-12			NUMBER **Sheet 1 - Crankcase**
DATE	CHANGE	BY	CAD	BMBI 2005-12-13			



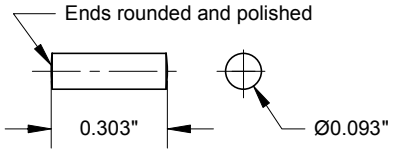
-1 CRANKSHAFT

Steel



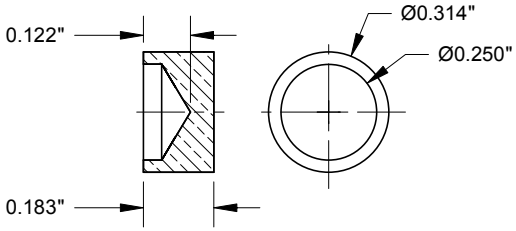
-2 PROP DRIVER

Aluminium



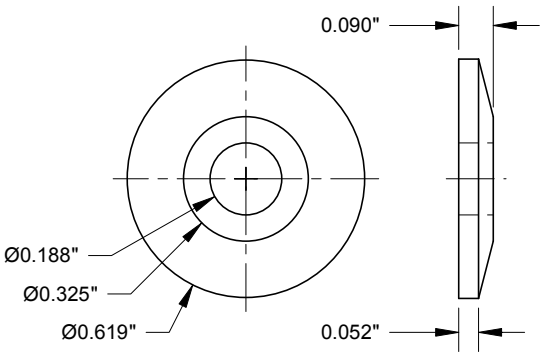
-6 GUDGEON PIN

Ø 3/32 " Silver Steel



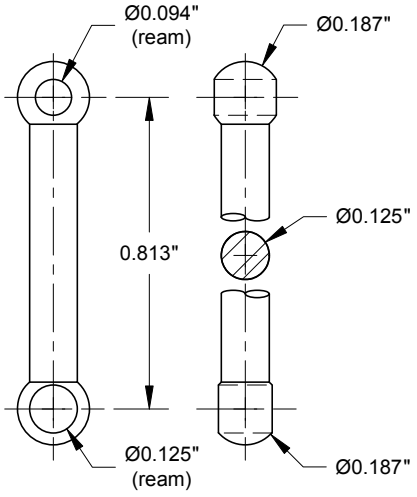
-7 CONTRA PISTON

Cast Iron



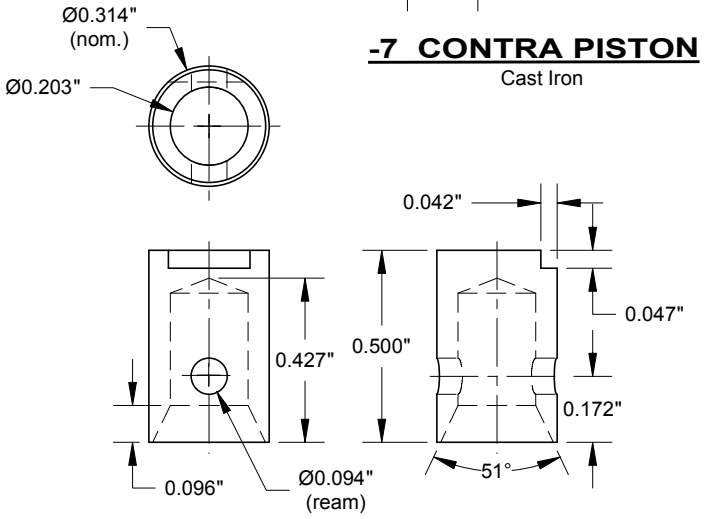
-3 PROP WASHER

Steel



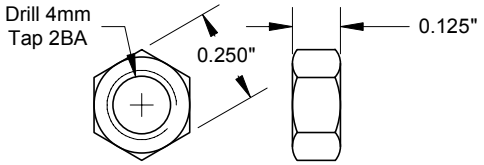
-4 CONROD

2024 T3 Aluminium



-5 PISTON

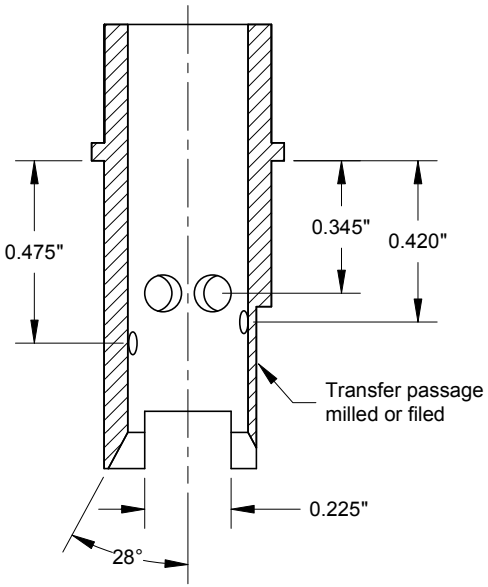
Cast Iron

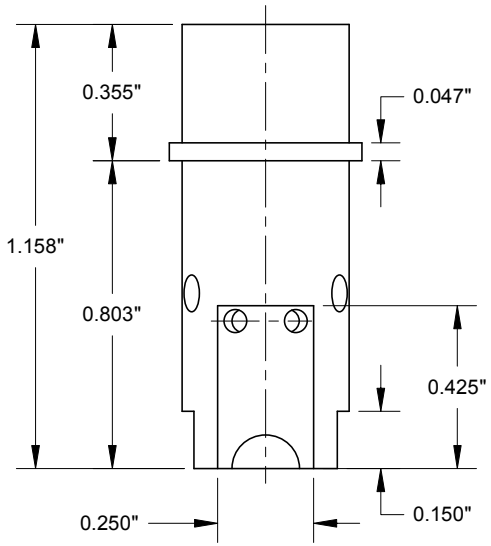


-8 PROP NUT

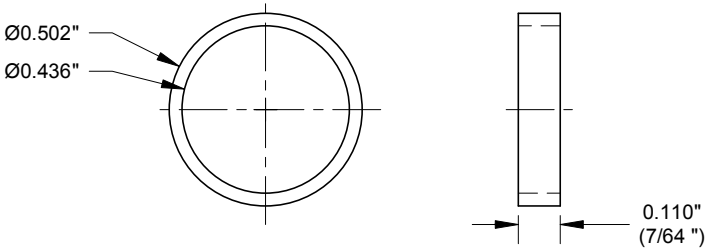
1/4" AF Hex Steel

2005-12-10	Include revised piston detail and note.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **EMBEE**
			SCALE	**2 X SIZE**			
			DRAWN	RMBI 2005-12			NUMBER **Sheet 2 - Moving Bits**
DATE	CHANGE	BY	CAD	BMBI 2005-12-13			





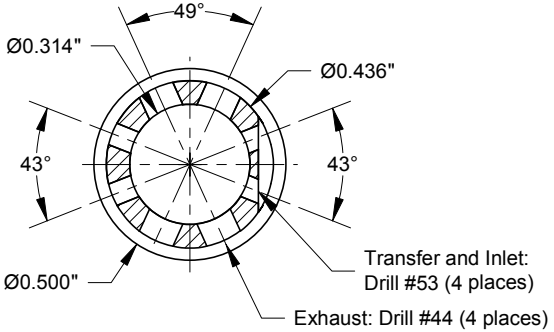
Note: Aeromodeller review engine was supplied with 3 rings: 7, 8, and 9/64 ".



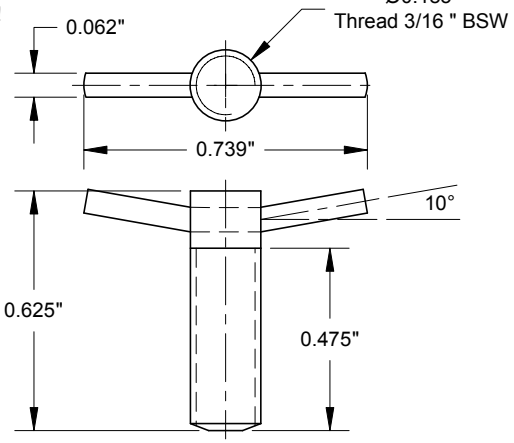
-4 CYLINDER SPACER RING

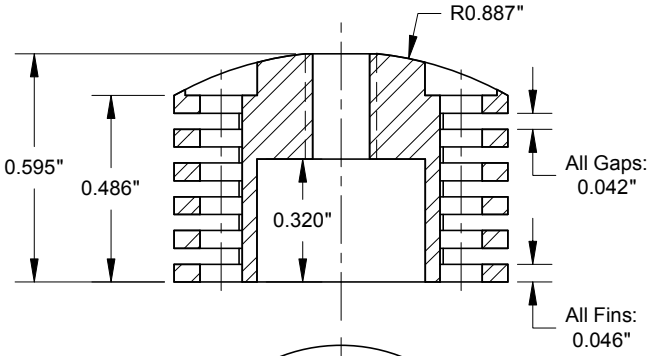
Aluminium

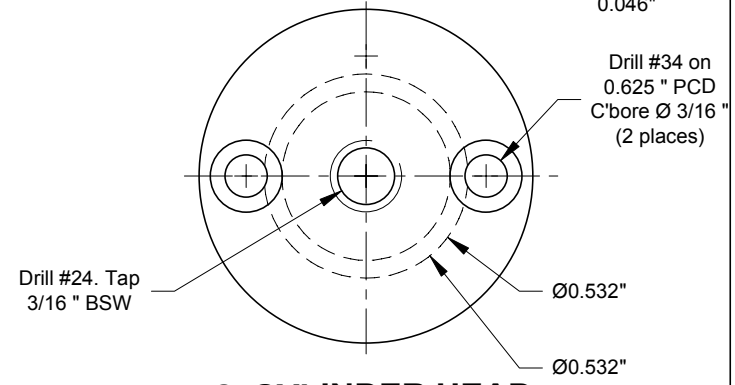
Note: All ports on original cylinders were drilled vertically. They have been redrawn for radial drilling to minimize drill wandering and breakage!



Imaginary section through the center of all ports







-1 Cylinder

Steel

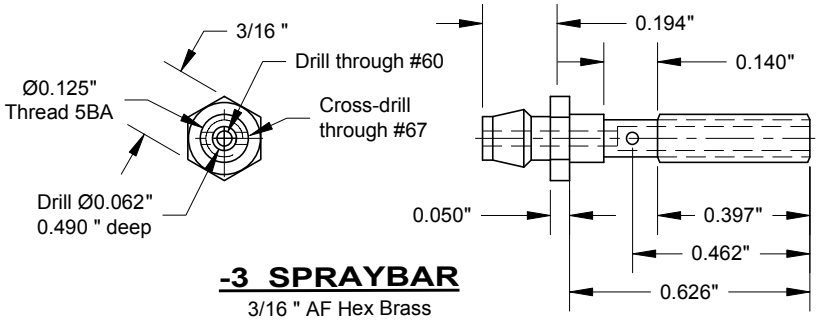
-3 Comp Screw

Steel and Piano Wire

-2 CYLINDER HEAD

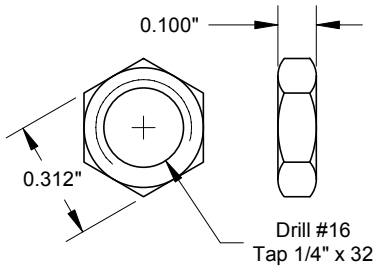
Aluminium

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME EMBEE
			SCALE	2 X SIZE			
			DRAWN	RMBI 2005-12			NUMBER Sheet 3 - Cylinder
DATE	CHANGE	BY	CAD	BMBI 2005-12-13			



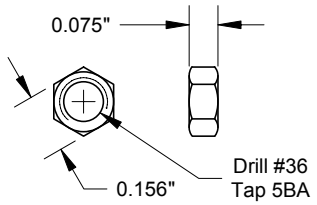
-3 SPRAYBAR

3/16 " AF Hex Brass



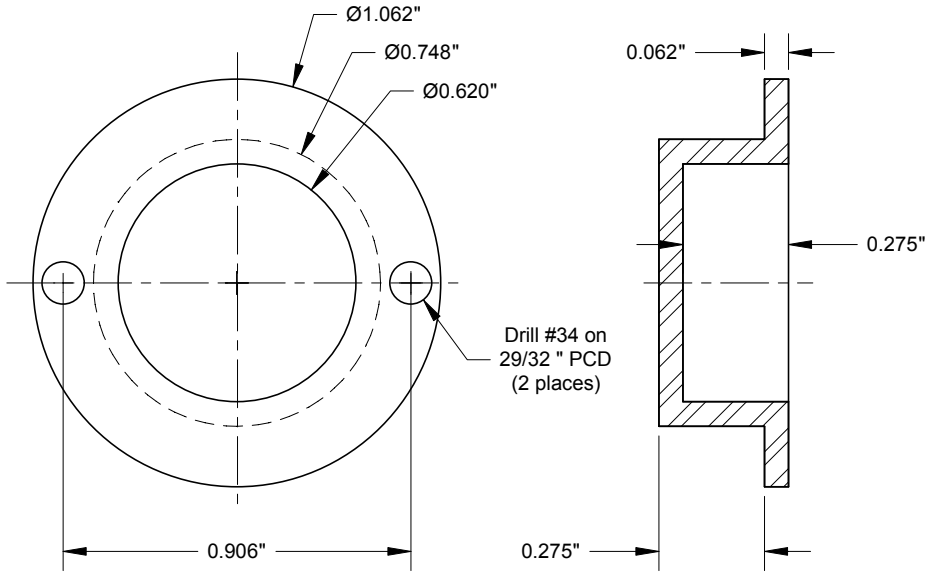
-4 VENTURI JAM-NUT

5/16 " AF Steel (black finish)



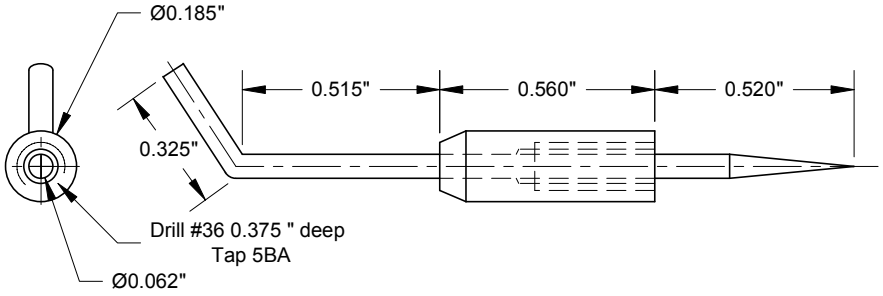
-6 SPRAYBAR JAM-NUT

5/32 " AF Brass



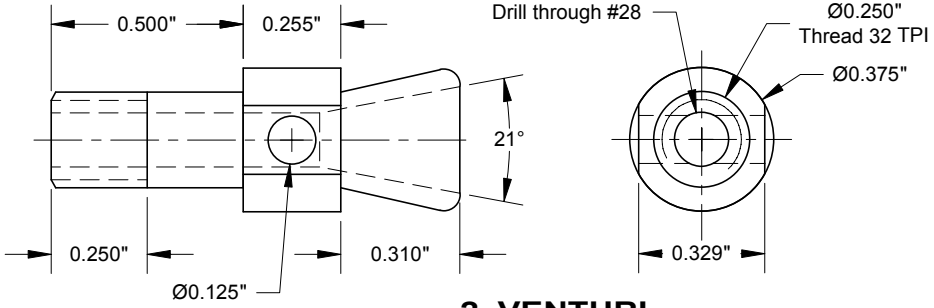
-1 BACKPLATE

2024 T3 Aluminium



-5 NEEDLE VALVE

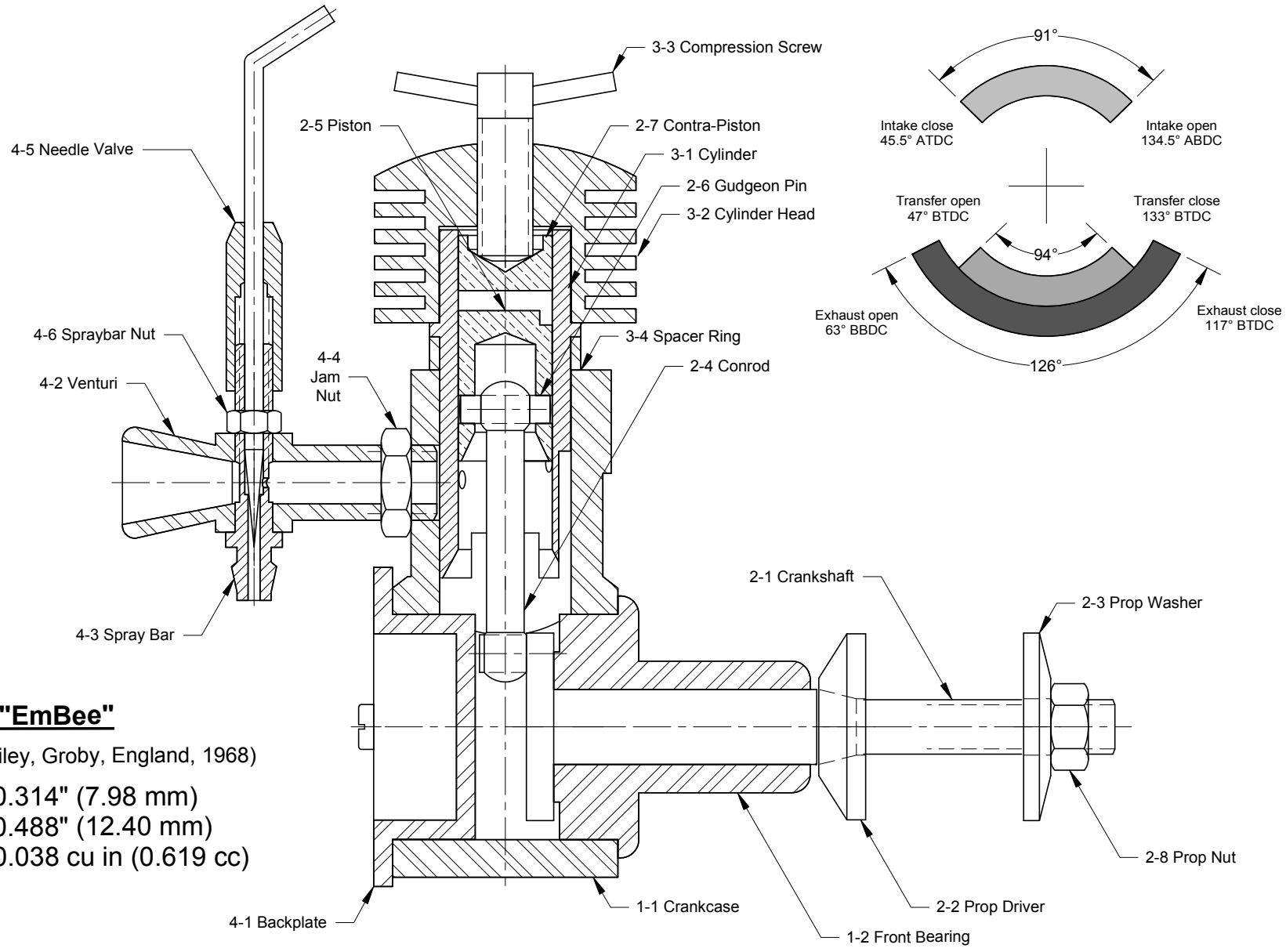
Aluminium and Ø 1/16 " Music Wire



-2 VENTURI

Aluminium

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME: EMBEE
			SCALE	2 X SIZE			
			DRAWN	RMBI 2005-12			NUMBER: Sheet 4 - Other Bits
DATE	CHANGE	BY	CAD	BMBI 2005-12-13			



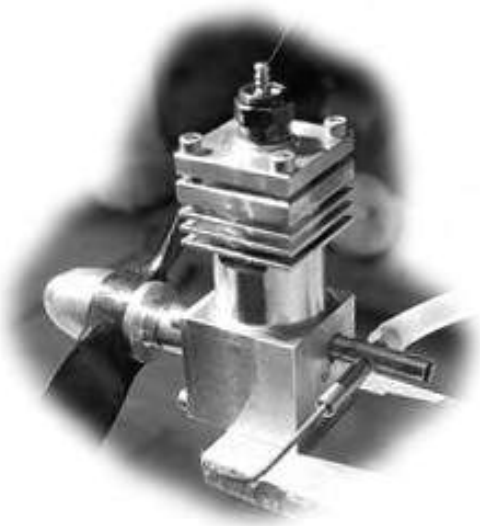
"EmBee"

(Moore and Bailey, Groby, England, 1968)

Bore: 0.314" (7.98 mm)
Stroke: 0.488" (12.40 mm)
Capacity: 0.038 cu in (0.619 cc)

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **EMBEE**
			SCALE	**2 X SIZE**			
			DRAWN	RMBI 2005-12			NUMBER **Sheet 5 - General Arrangement**
DATE	CHANGE	BY	CAD	BMBI 2005-12-13			

M A N LITTLE DRAGON glow plug engine



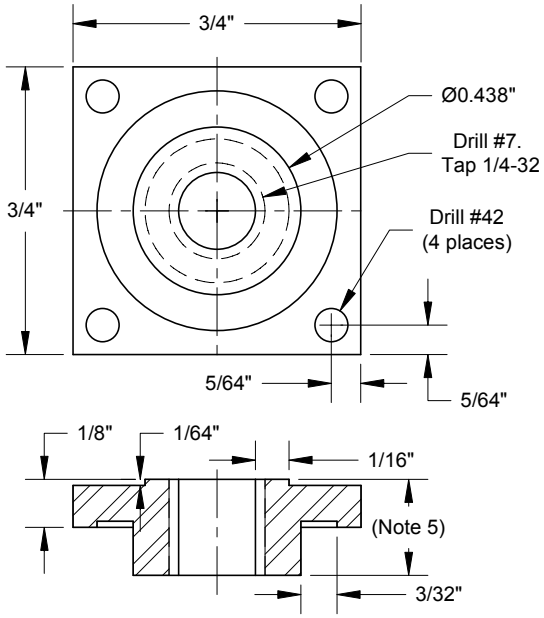
In 1950, the magazine **Model Airplane News** published a two part article describing a simple 0.06 cu in engine for home construction called the *Little Dragon*. The designer and author was Roy Clough Jr. Roy appears to have been the man called on when something out of the ordinary was required; engines, free-flight helicopters and ducted-fan designs, Roy did them all. His concept for the project was that it should be:

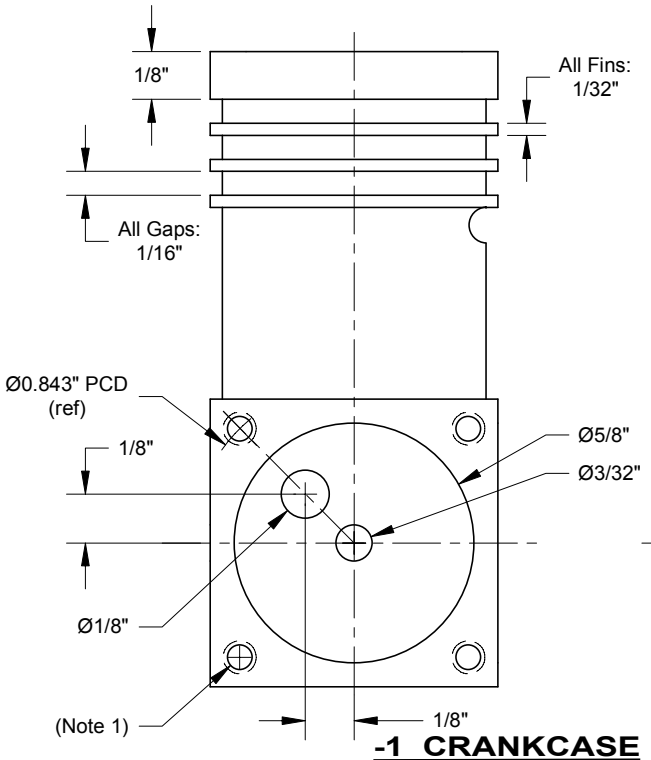
"..a project any amateur machinist can tackle with full confidence of good results. It does not require any special tools, special talents, or extreme precision. A large part of the total time spent in developing the design was devoted to eliminating awkward machining jobs, delicate operations, and tricky assemblies. If the reader owns a small lathe and can centre a piece of stock with 1/64", he need have no qualms about being able to turn out the job."

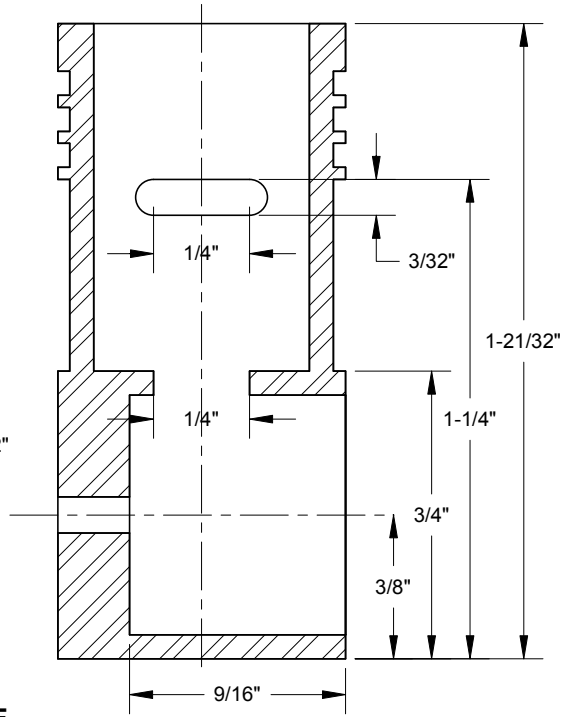
[Apologies for poor photographs. These are the best I could find as despite it's simplicity the engine does not seem to have had many builders.]

-3 CYLINDER HEAD

Aluminum
(2024 or 6061 for preference)

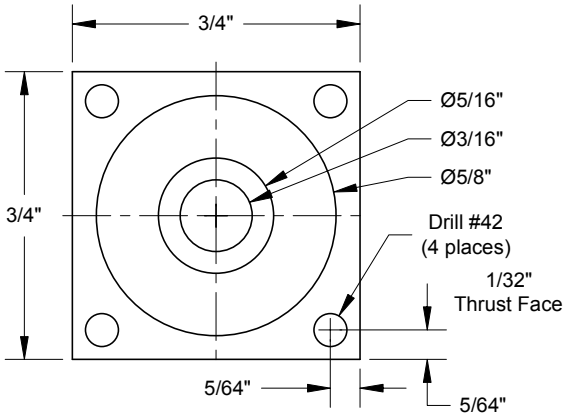


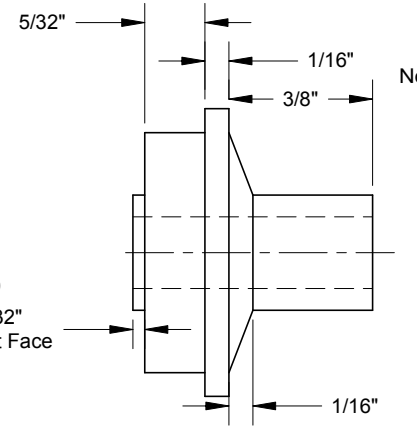




-2 BUSHING

Aluminum
(2024 or 6061 for preference)

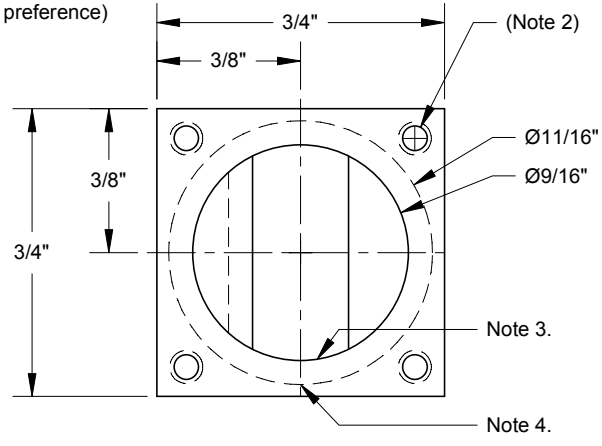




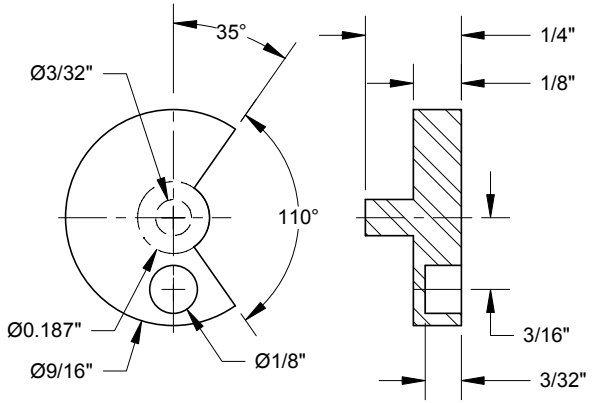
-1 CRANKCASE

Aluminum
(2024 or 6061 for preference)

Note:
1. Spot from -2 Bushing
   Drill #50, 3/16" deep
   Tap 2-56 (4 places)
2. Spot from -3 Head
   Drill #50 thru' top fin
   Tap 2-56 (4 places)
3. File or grind to provide
   clearance for
   2-6 Con Rod.
4. Drill #46, 3/16" deep
   Tap 3-48 (2 places)
   for mounting studs.
5. Vary to give 1/32"
   piston clearance.

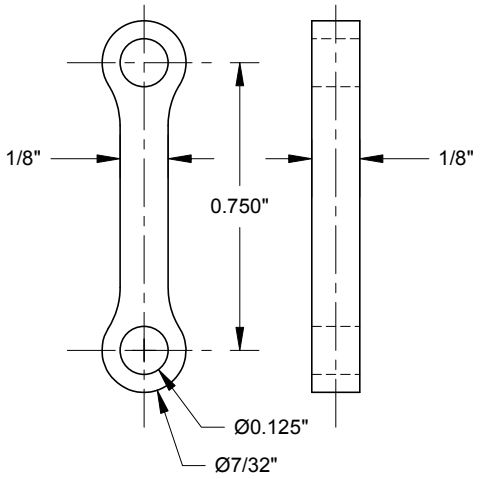


2006-03-06	Widen conrod slot and fix bad thread spec.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: M.A.N. LITTLE DRAGON
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Roy L Clough Jr, 1950			NUMBER: Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI 2002-12-31			



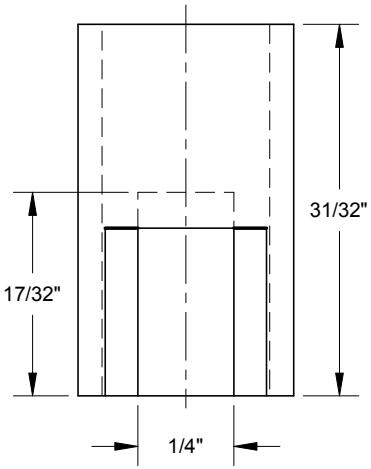
-5 ROTARY VALVE

2024 T-3 Aluminum



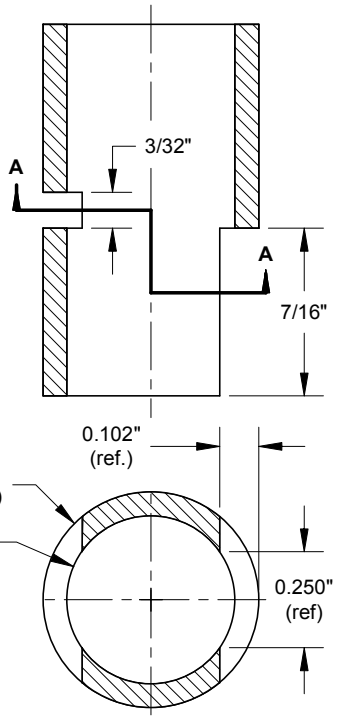
-3 CON ROD

2024 T-3 Aluminum

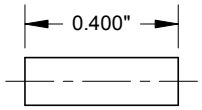


-2 CYLINDER LINER

Steel
(4130 seamless tube suitable)

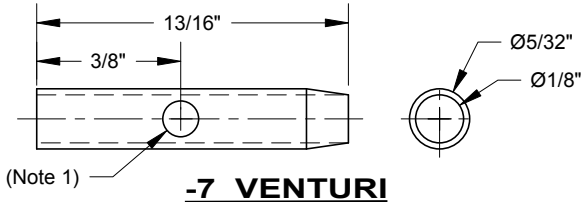


Section A-A (through ports)



-6 WRIST PIN

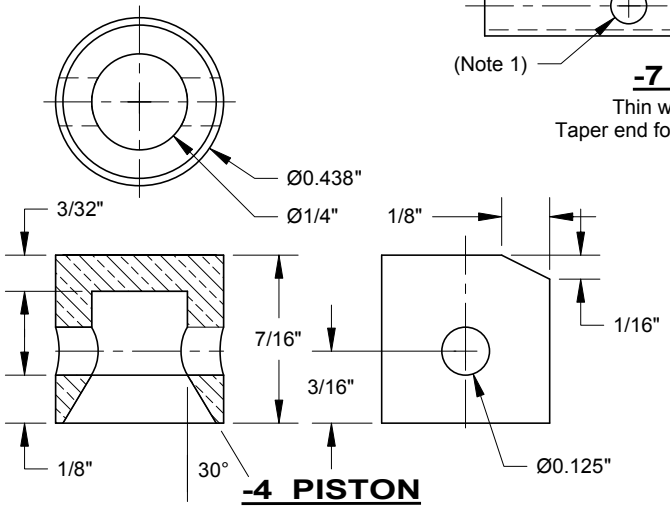
Thick wall 1/8" Brass Tube



-7 VENTURI

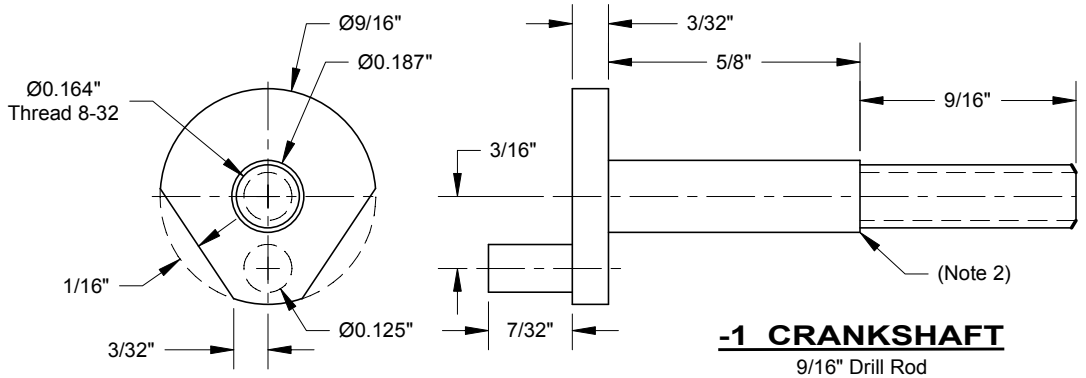
Thin wall 5/32" Brass Tube
Taper end for press fit in 1-1 Crankcase

Note:
1. Needle valve position for Baby Spitfile assembly.
2. Tap flat washer as thrust plate. #29 drill and 8-32 tap
3. Liner should be a close, sliding fit in 1-1 Crankcase (ie, removable with effort!)



-4 PISTON

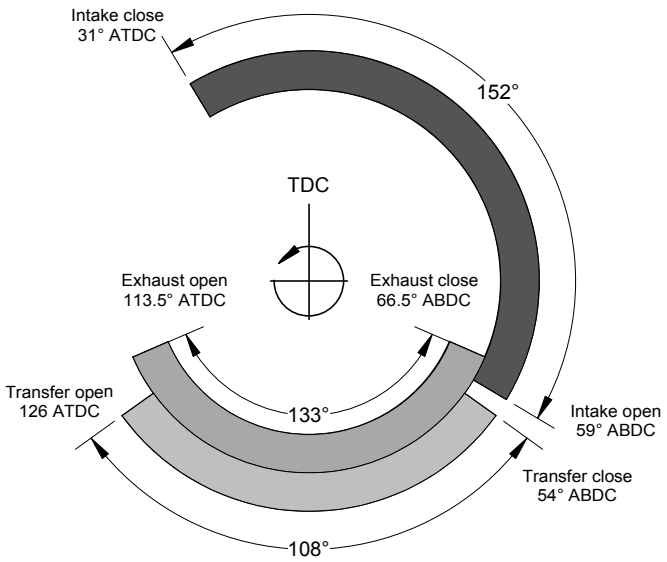
Cast Iron

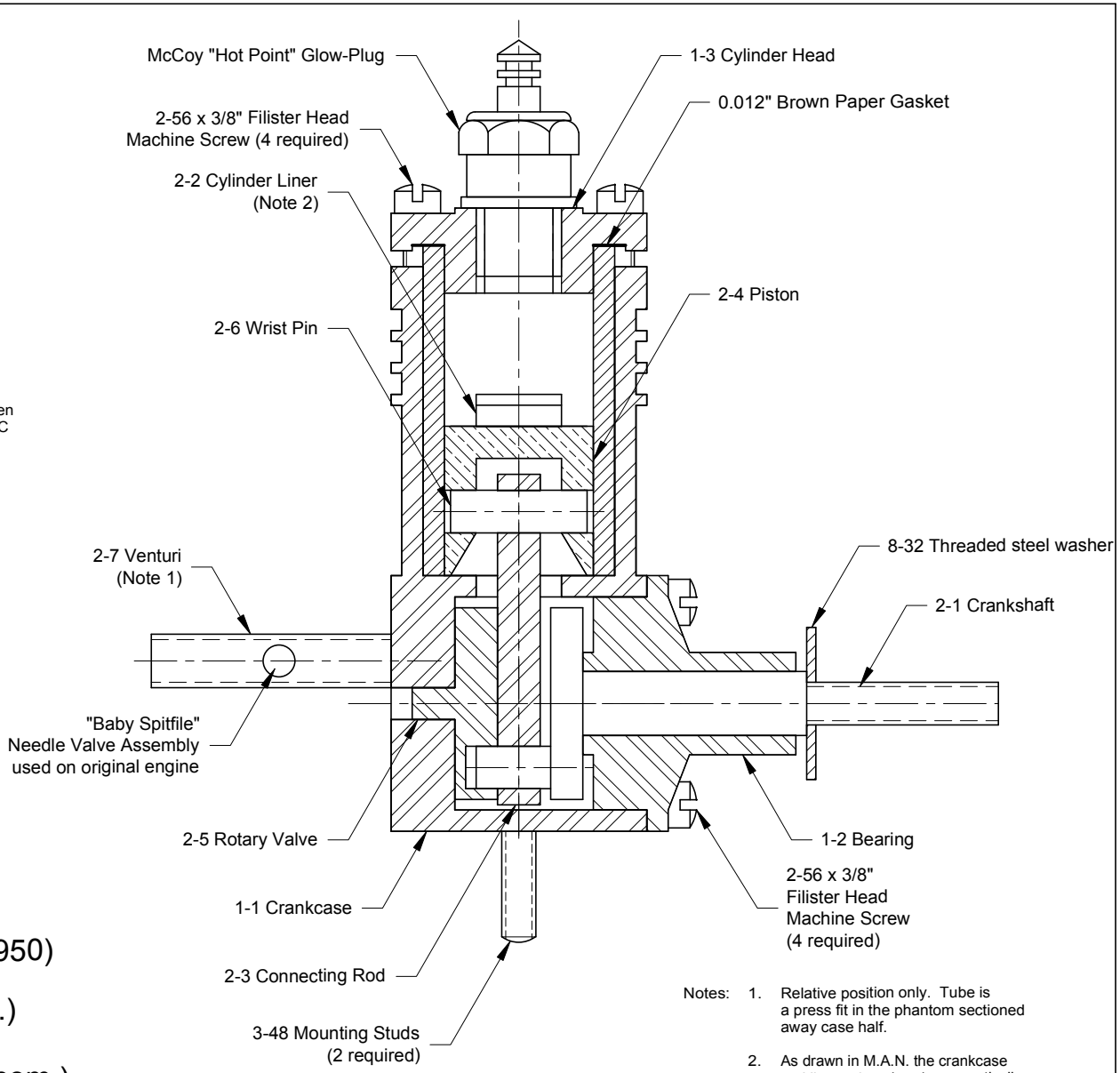


-1 CRANKSHAFT

9/16" Drill Rod

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME M.A.N. LITTLE DRAGON
			SCALE	2 X SIZE			
			DRAWN	Roy L Clough Jr, 1950			NUMBER Sheet 2 - Moving Bits
DATE	CHANGE	BY	CAD	BMBI 2002-12-31			





"LITTLE DRAGON"

Designer: Roy L Clough Jr
(See Model Airplane News: Oct & Nov, 1950)

Bore:	7/16" (nom.)
Stroke:	3/8"
Displacement:	0.06 cuin (nom.)

Notes:
1. Relative position only. Tube is a press fit in the phantom sectioned away case half.
2. As drawn in M.A.N. the crankcase and liner exhaust ports are vertically out of allignment by 1/32".

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME M.A.N. LITTLE DRAGON
			SCALE	2 X SIZE			
			DRAWN	Roy L Clough Jr, 1950			NUMBER Sheet 3 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2002-12-31			

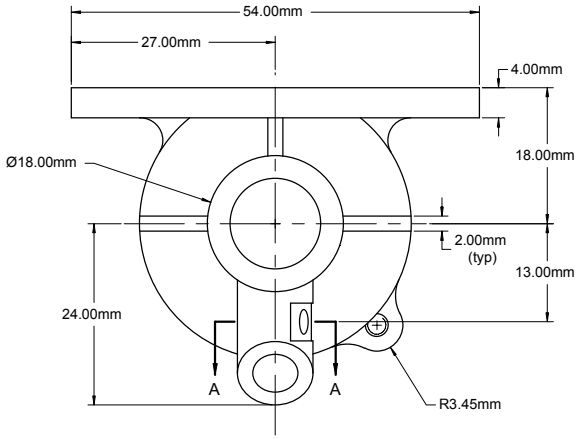
MICRON 5CC fixed compression diesel

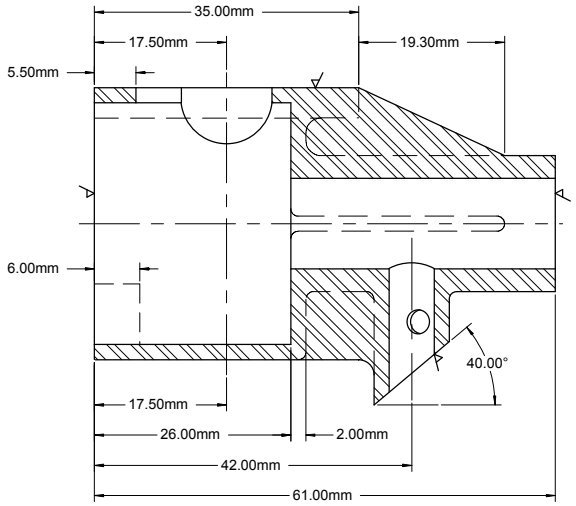
This is the big, classic, French manufactured Micron 5cc introduced in 1946. It was a highly successful contest engine in that year.

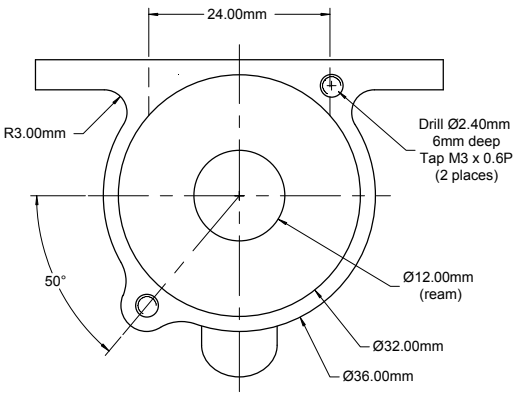
This fixed compression 5cc engine was available in two variants for upright or inverted operation.

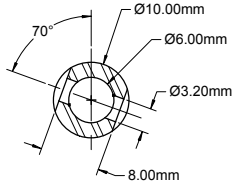
A feature worthy of note is the spring thing on the tank. This is a fuel cut-out. It is resting against an internally spring loaded plunger that will seal off the fuel supply from the tank. The plunger is pulled up until the external spring clicks into a detent, thus keeping the fuel supply open. A tug on the spring arm from a timer releases the plunger, cutting off the supply.

Note that there exists a British engine of the same period, the 5cc fixed compression *Owat* that looks exactly like a carbon copy of this Micron, with which it is easily confused. The Owat externally is said to be more poorly finished that the Micron. So buyer beware!

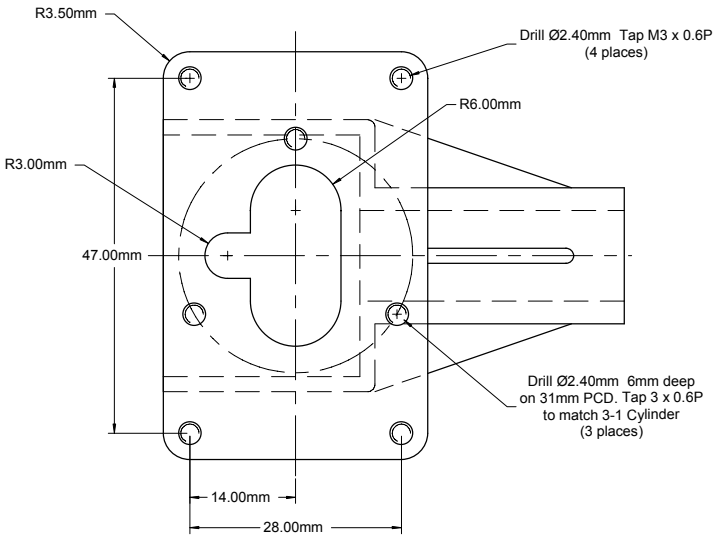








Section "A - A"

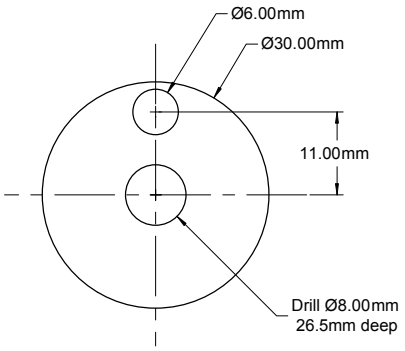


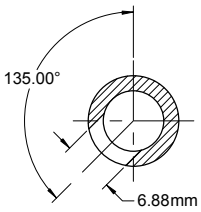
-1 CRANKCASE

Aluminum sand casting

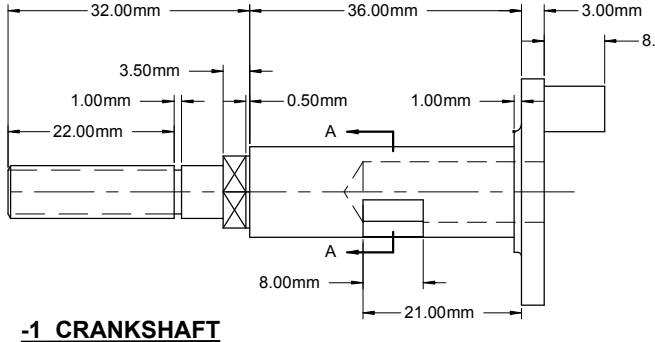
√ Machine

2007-08-08	Add half section view, missing dimensions, and Notes.	BMBI	MAT'L	As Noted	**DO NOT SCALE DRAWING** WORK TO DIMENSIONS ALL DIMENSIONS ARE METRIC	**MOTOR BOYS** (INTERNATIONAL)	NAME **Micron 5cc Fixed Compression Diesel**
			SCALE	**Full Size**			NUMBER **Sheet 1m - Crankcase**
			DRAWN				
DATE	CHANGE	BY	CAD	**BMBI** 2007-05-02			



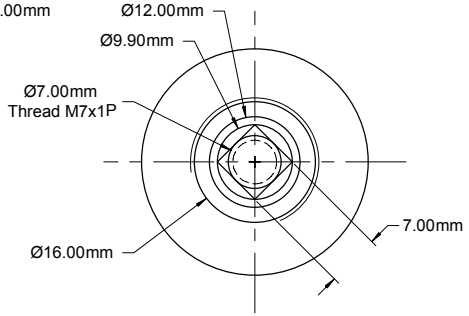


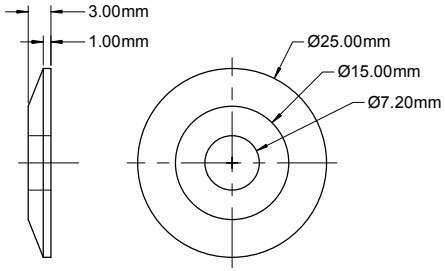
Section "A - A"



-1 CRANKSHAFT

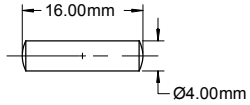
Steel (4140)





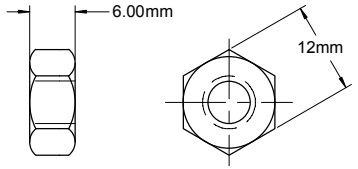
-5 PROP WASHER

Aluminum



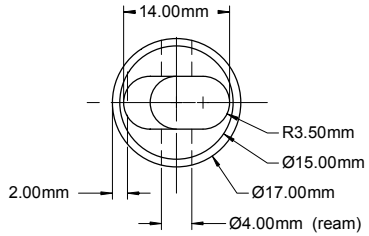
-7 WRIST PIN

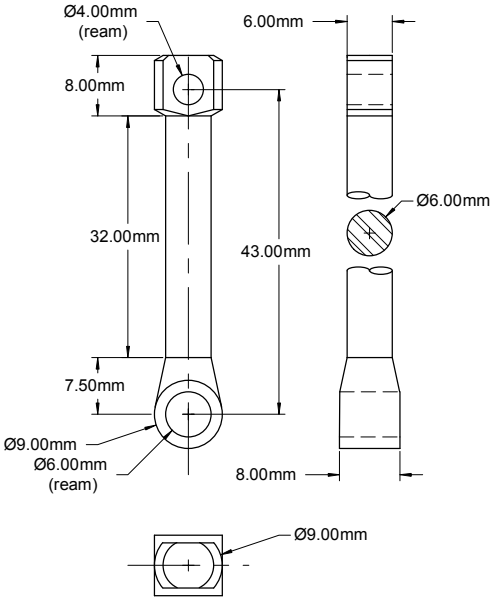
Ø3mm DrillRod with brass end caps

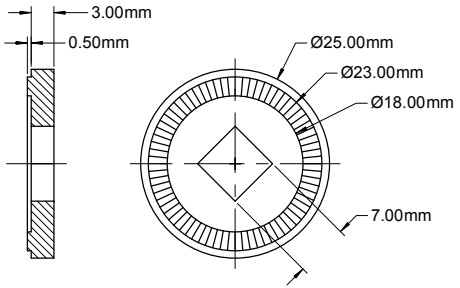


-6 PROP NUT

12mm AF Hex Steel

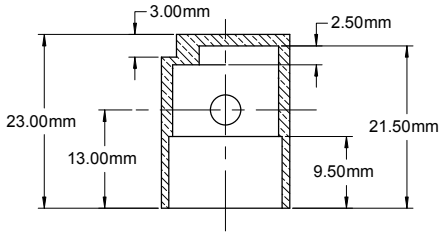






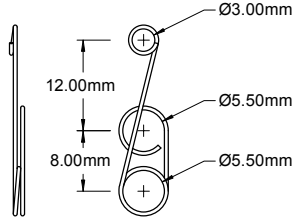
-4 PROP DRIVE WASHER

Steel (case harden)



-3 PISTON

Cast Iron



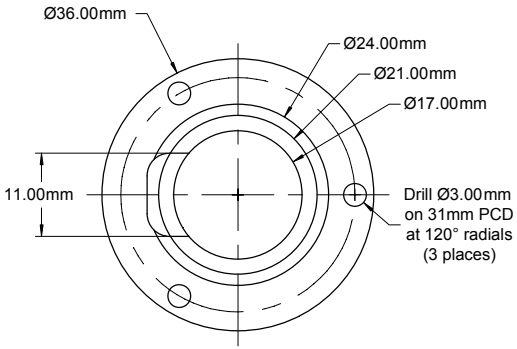
-7 CUT-OFF LATCH

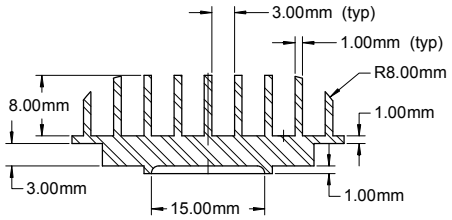
Ø 0.8mm Piano Wire
(dimensions not critical)

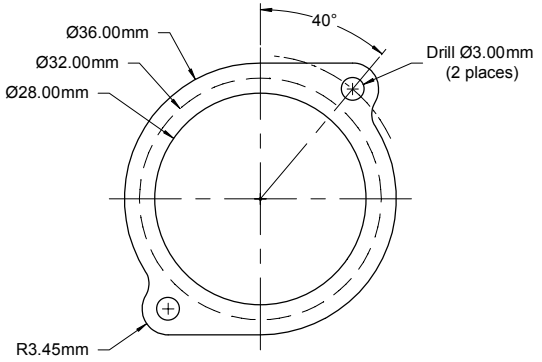
-2 CONROD

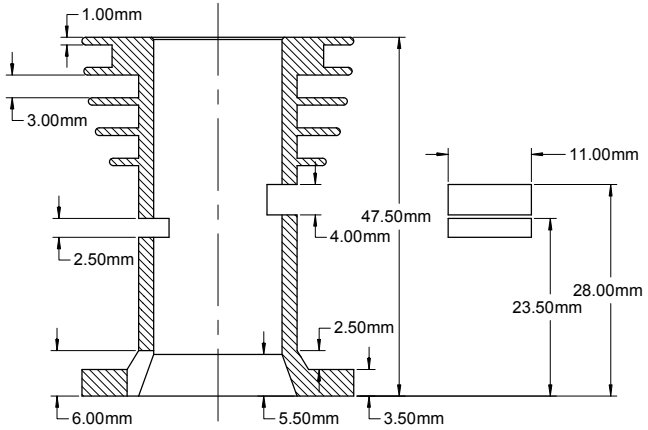
Aluminum (2024-T3)

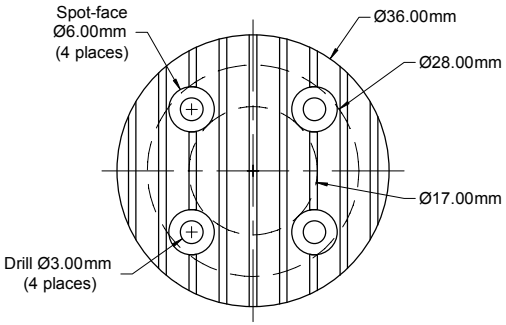
2007-08-08	Add half section view, missing dimensions, and Notes.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE METRIC	MOTOR BOYS (INTERNATIONAL)	NAME **Micron 5cc Fixed Compression Diesel**
			SCALE	**Full Size**			
			DRAWN				NUMBER **Sheet 2 - PiECES MOTION**
DATE	CHANGE	BY	CAD	**BMBI** 2007-10-04			





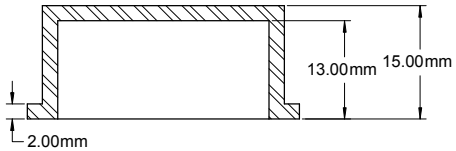






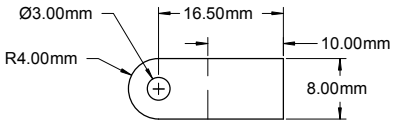
-6 CYLINDER HEAD

Aluminium



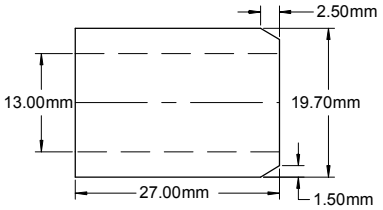
-3 BACKPLATE

Aluminium



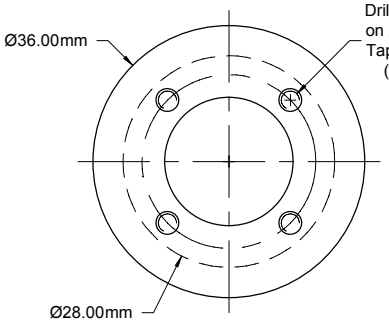
-6 FUEL TANK STRAP

0.8mm steel (2 reqd)



-2 BYPASS COVER

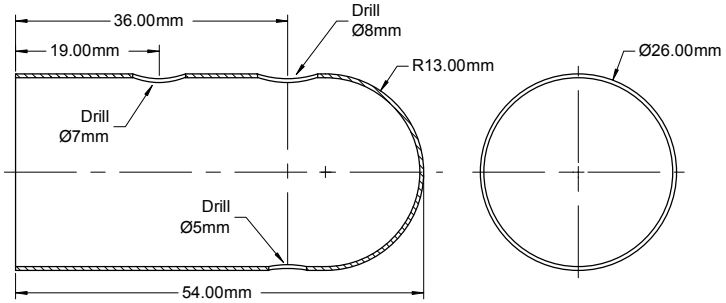
0.5mm Steel shim (soft solder to -1)



Fin	Diameter
1	36.0mm
2	35.5mm
3	34.3mm
4	32.4mm
5	28.7mm

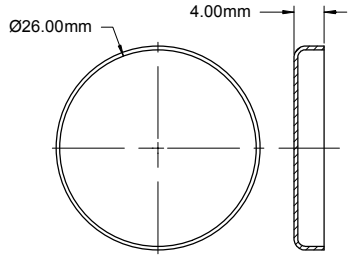
-1 CYLINDER

Steel



-4 FUEL TANK

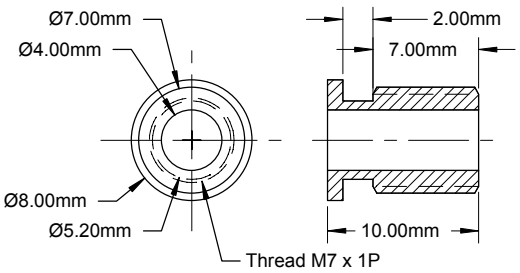
0.5mm drawn brass (nickle plated)



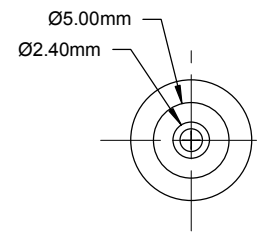
-5 FUEL TANK END CAP

Pressed 0.5mm brass (solder to -4)

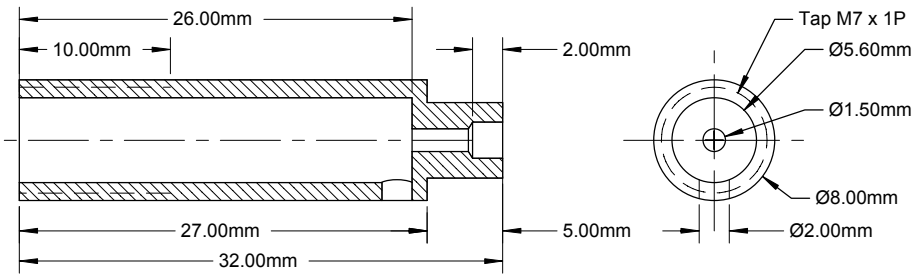
2007-08-08	Add half section view, missing dimensions, and Notes.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE METRIC	MOTOR BOYS (INTERNATIONAL)	NAME **Micron 5cc Fixed Compression Diesel**
			SCALE	**Full Size**			NUMBER **Sheet 1m - Crankcase**
			DRAWN				
DATE	CHANGE	BY	CAD	**BMBI** 2007-05-02			



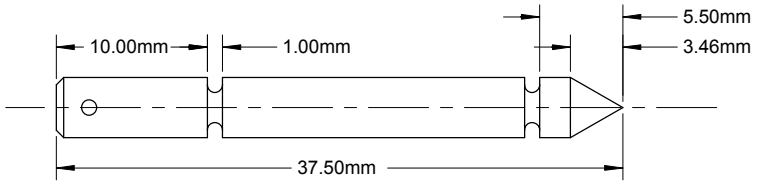
-8 SHUT OFF BUSH
Steel

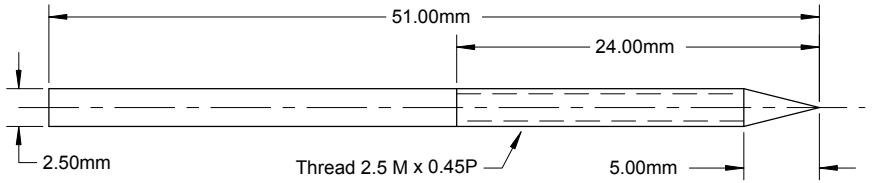


-6 SHUT OFF PLUNGER
Steel

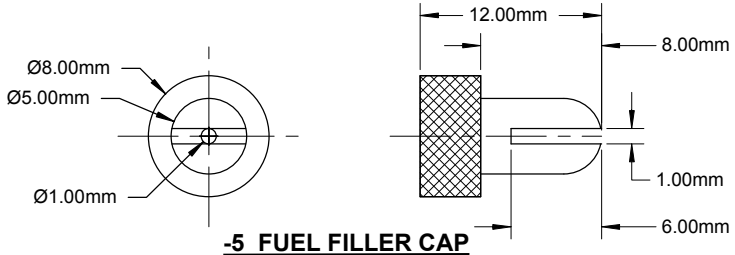


-7 FUEL TANK FEED
Steel

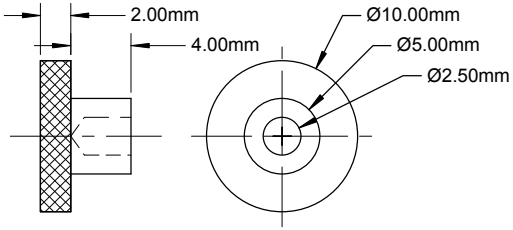




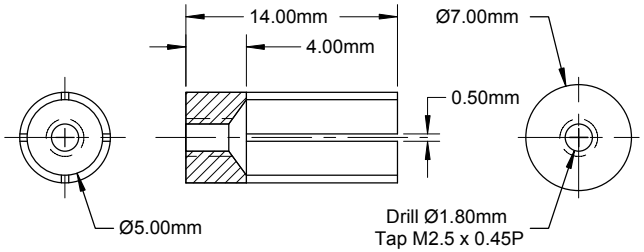
-3 NEEDLE VALVE
Steel



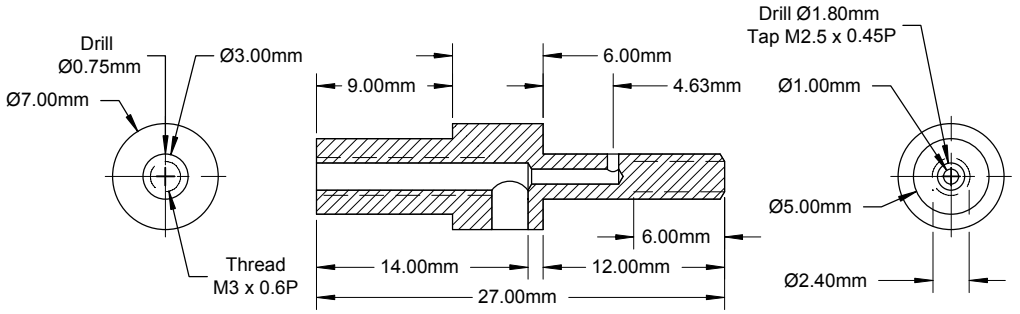
-5 FUEL FILLER CAP
Brass



-4 NEEDLE KNOB
Brass

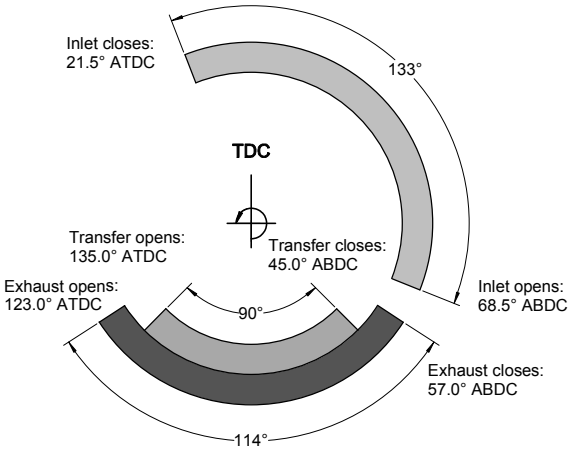


-2 NEEDLE THIMBLE
Brass



-1 SPRAY BAR
Brass

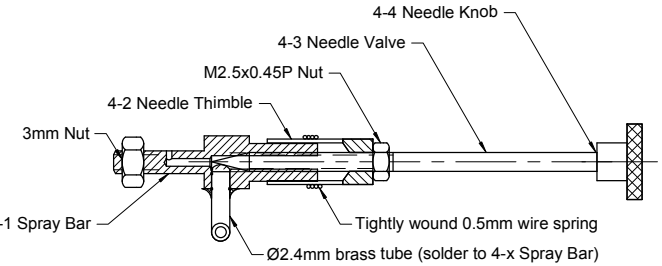
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME **MONSUN**
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE METRIC		
			DRAWN				NUMBER **Sheet 5 - PiECES DU CARBURAETUR**
DATE	CHANGE	BY	CAD	BMBI 2007-10-03			

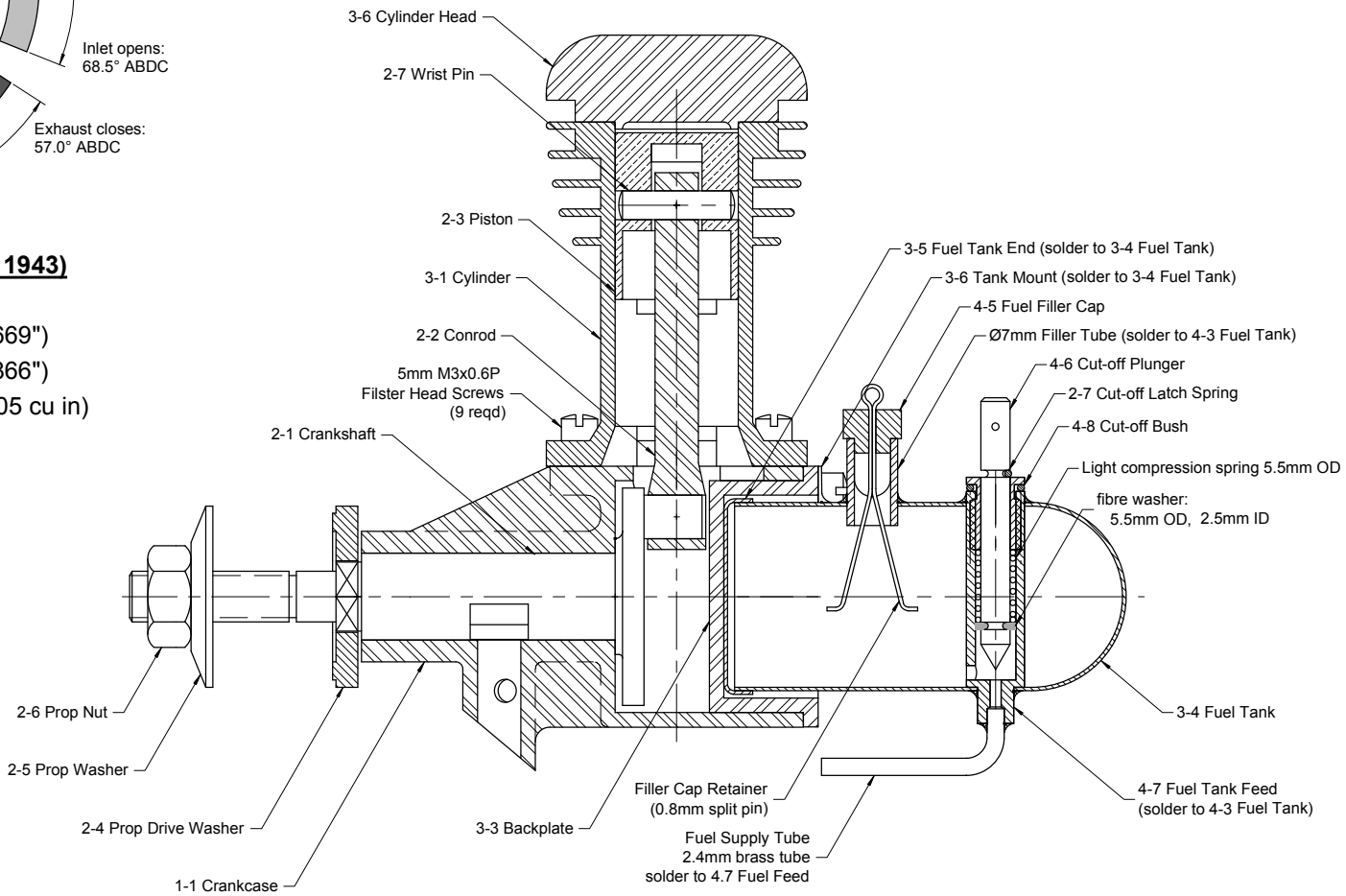


MICRON 5cc (France circa 1943)

Compression Ratio, Fixed: 19.62:1

Bore:	17.0mm	(0.669")
Stroke:	22.0mm	(0.866")
Capacity:	4.99cc	(0.305 cu in)





			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE METRIC	MOTOR BOYS (INTERNATIONAL)	NAME **Micron 5cc Fixed Compression Diesel**
			SCALE	**Full Size**			
			DRAWN				NUMBER **Sheet 5 - General Arrangement**
DATE	CHANGE	BY	CAD	**BMBI** 2007-10-03			

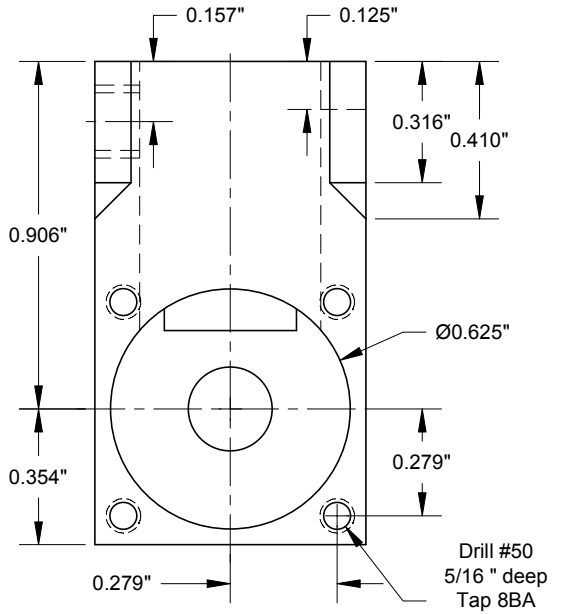
M L MIDGE side-port diesel 0.5cc or 0.8cc

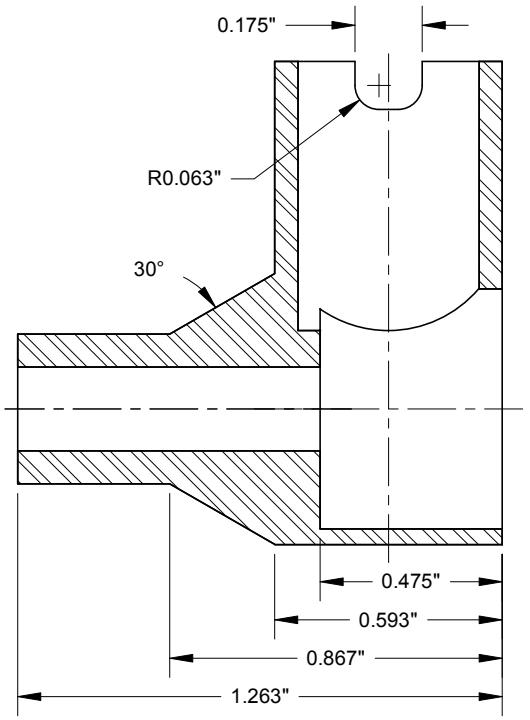
The scheme that uses the piston to control timing for inlet, exhaust and transfer is, for some reason, called "side-port", even though most all examples place the inlet at the back.

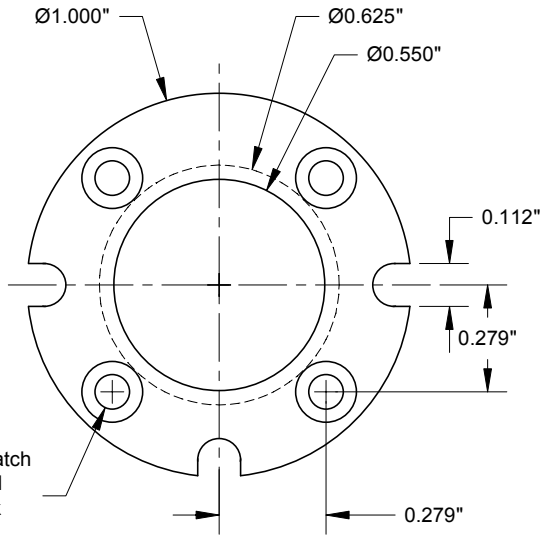
ML Midge is, as the designer asserts, a genuine side-port! The design was serialized in Aviation Modeller International, issues April and June of 1997. It is a little square looking engine. You may not like it until you have built it and run it then you will love it. There are two sizes, you can build either 0.8cc or 0.5cc. The designer was a young chap called Mark Lubbock. It was his first ever design, and his first ever home build. It is a winner, and very simple to make.

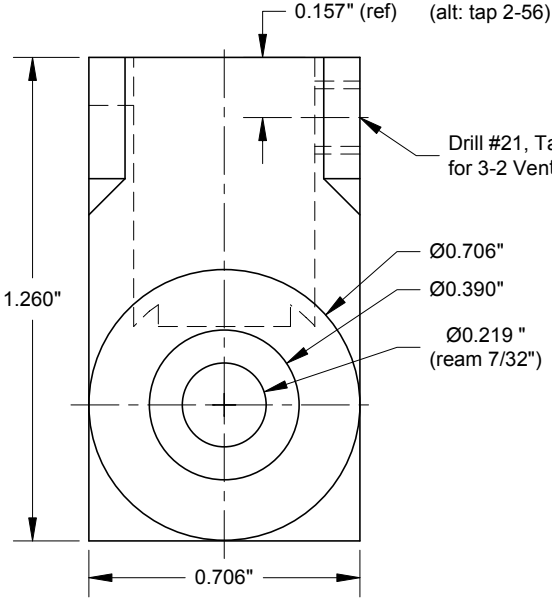
Do not be tempted make any of the ports any bigger, they make for a sweet running and very flexible engine. And when end-milling the transfer ports, don't go too deep or the thin bit of cylinder wall that is left will collapse inwards.

Note that in the photograph above, the two engines have the carb on the opposite side to that detailed on the plan and as per the original design. This is because they were built by an Australian to his own preference!

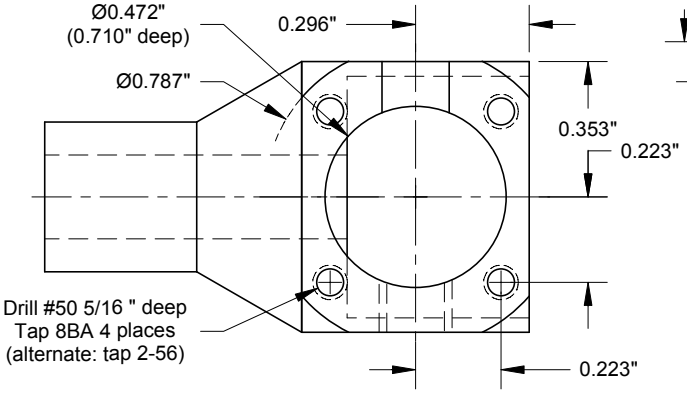


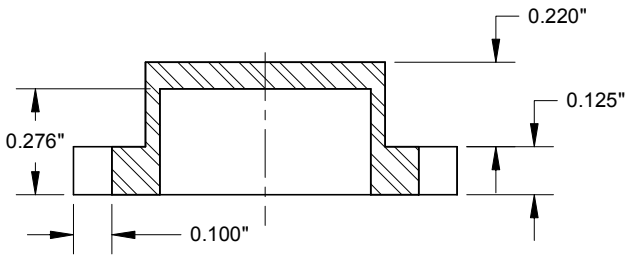






-1 CRANKCASE
Aluminum

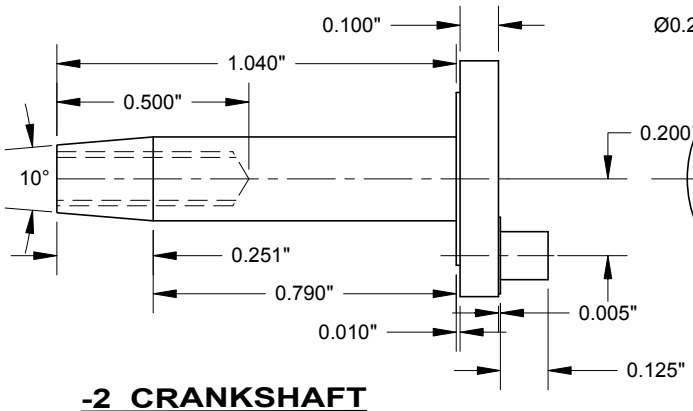




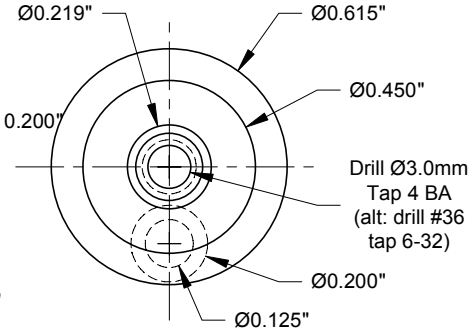
-2 BACKPLATE
Aluminum

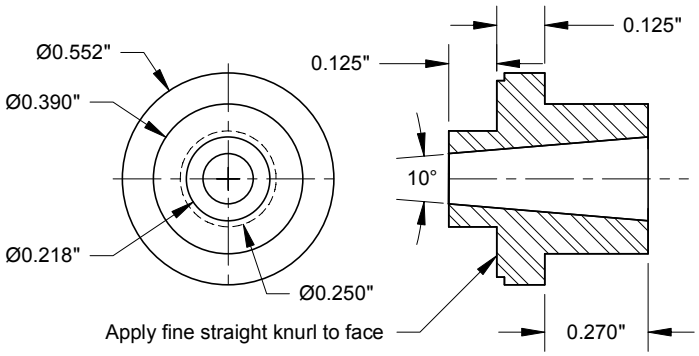
Note 1:
The venturi can be positioned on either side as desired and the cylinder liner rotated to suit. Right-handed owners may prefer to place the venturi on the left side (viewed from the front) allowing the model to be held with the right while the engine is adjusted with the left.

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ML MIDGE
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Mark Lubbock, 1997	NEXT ASSEMBLY		NUMBER: Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	BMBI 2002.5.3			

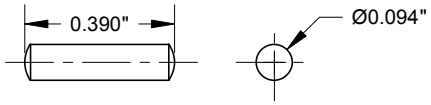


-2 CRANKSHAFT
Steel

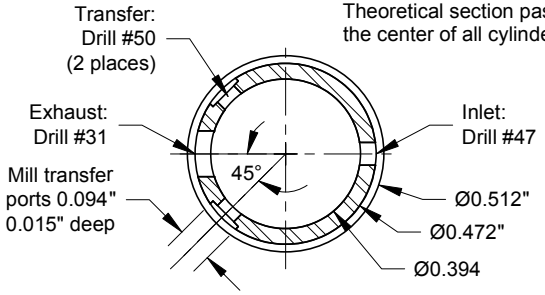


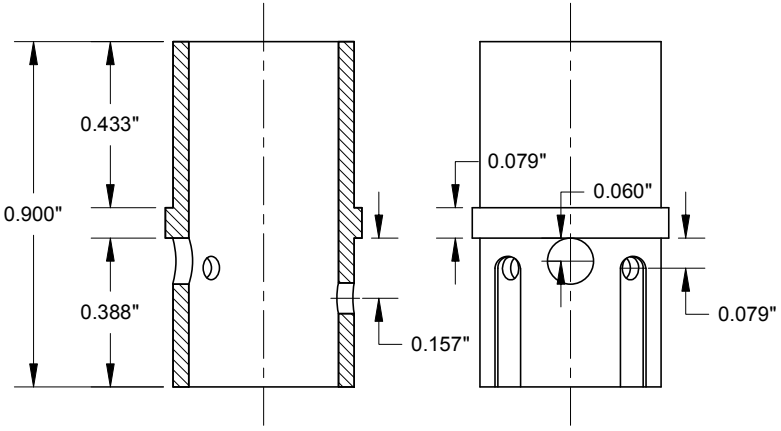


-3 PROP DRIVER
Aluminum

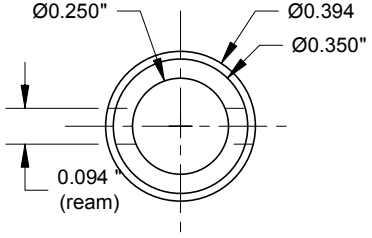


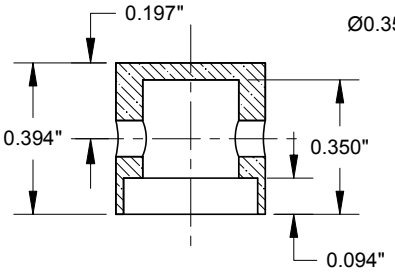
-7 WRIST PIN
Drill Rod



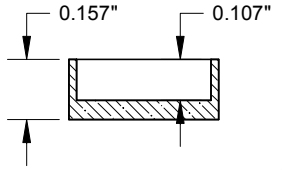


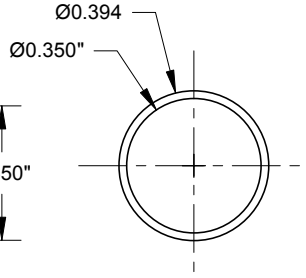
-1 CYLINDER
Steel



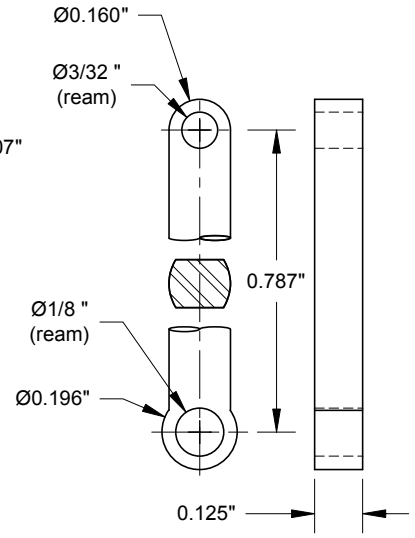


-4 PISTON
Cast Iron



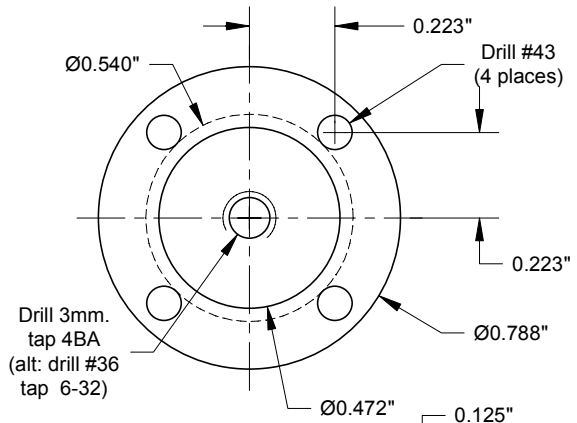


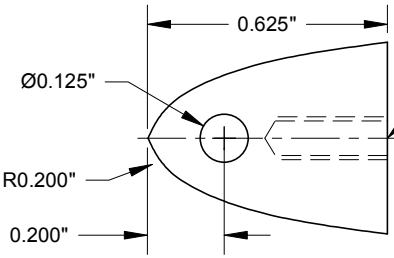
-5 CONTRA PISTON
Cast Iron

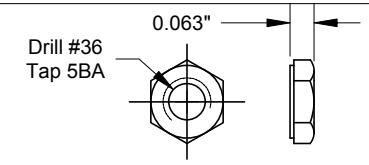


-6 CONROD
Aluminum

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ML MIDGE
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Mark Lubbock, 1997	NEXT ASSEMBLY		NUMBER: Sheet 2 - Power Train
DATE	CHANGE	BY	CAD	BMBI 2002.5.3			

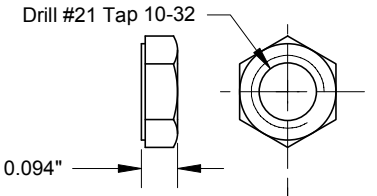


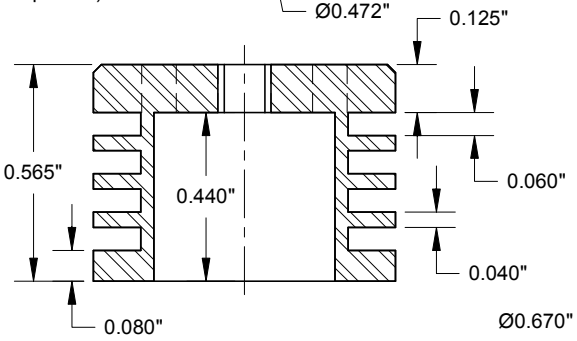


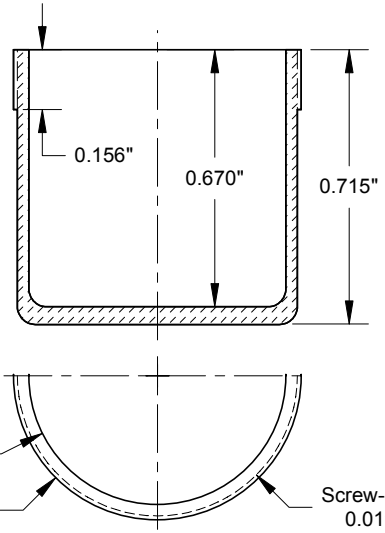


-9, 10 JAM NUTS

3/16", 1/4" AF Hex Brass

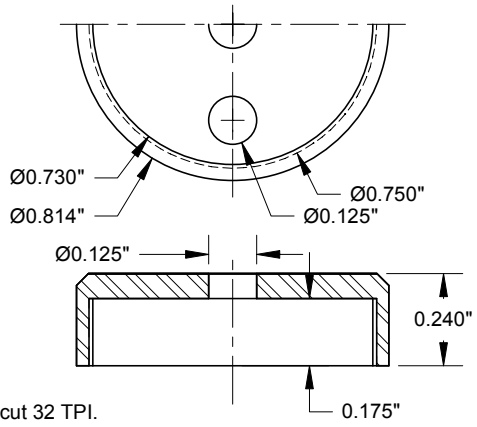


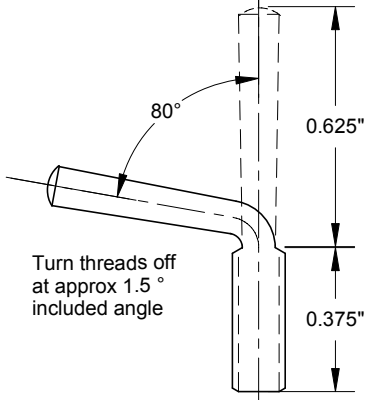




-6 SPINNER NUT

Aluminum





-1 CYLINDER HEAD

Aluminum

-4 FUEL TANK

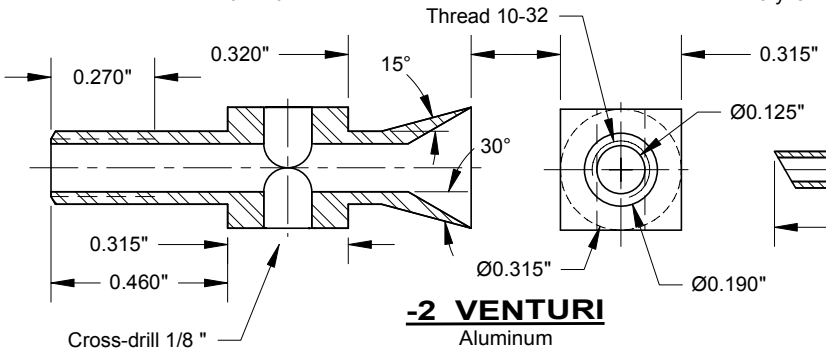
Acrylic

-3 TANK TOP

Aluminum

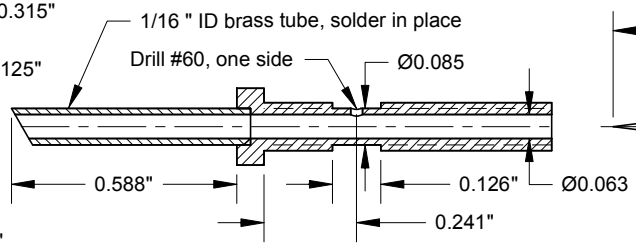
-8 COMPRESSION SCREW

4BA Threaded steel rod
(alt: 6-32 threaded steel rod)



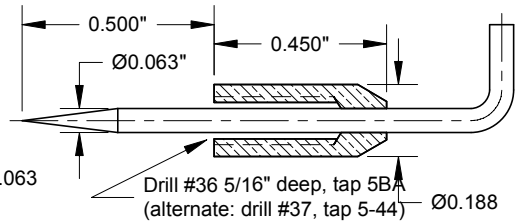
-2 VENTURI

Aluminum



-5 SPRAY BAR

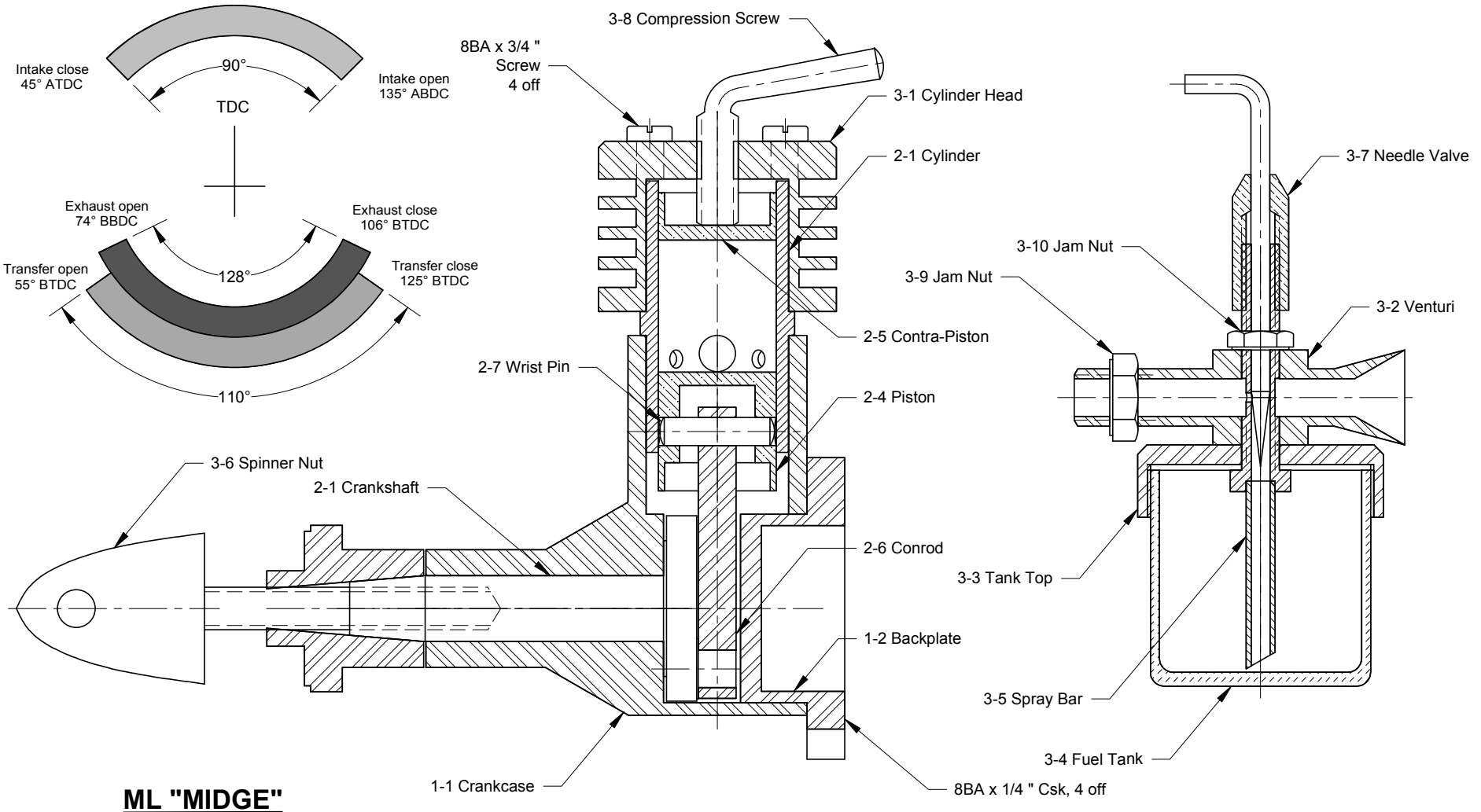
5BA 3/4" brass screw
(alt: 5-44 3/4" brass screw)



-7 NEEDLE VALVE

Brass and 1/16 " Ø Music Wire

2007-10-02	Spinner nut profile revised	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ML MIDGE
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Mark Lubbock, 1997	NEXT ASSEMBLY		NUMBER: Sheet 3 - Other Bits
DATE	CHANGE	BY	CAD	BMBI 2002.5.3			



ML "MIDGE"

Bore: 0.394" (10mm)
Stroke: 0.400" (10.16mm)
Capacity: 0.049 cu in (0.798 cc)

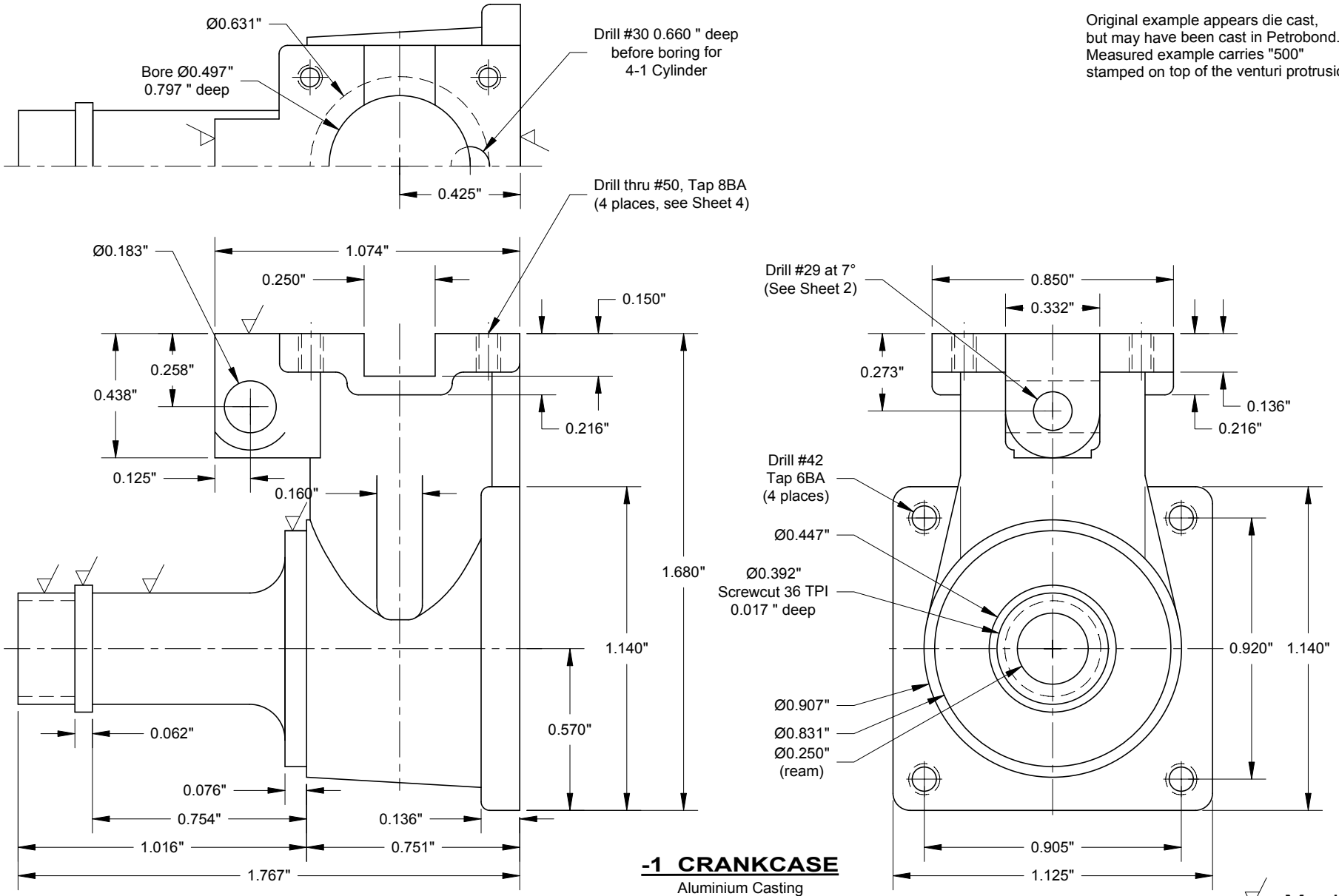
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: ML MIDGE
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Mark Lubbock, 1997	NEXT ASSEMBLY		NUMBER: Sheet 4 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 2002.5.3			

M S 1.24 cc diesel

The MS diesels were made by one of the earliest if not *the* earliest model shop in England, the Model Shop Newcastle. They made a small diesel which is about 1.24cc and a larger one at about 2.4cc. Both engines are rarer than hens' teeth, or rocking horse droppings; even the shop that made them in the late 40's, still trading, does not have an example of them.

The 1.2cc engine is a sort-of conventional sideport, except the carb is at the front, and the tank is around the front housing. The cylinder fins are square. The bigger one, 2.4cc I think, has an eccentric crankshaft bush to vary the compression, and also has square fins.

Both engines were made by the proprietor of the shop, Charlie Lutman, at a factory in the Team Valley, near Newcastle upon Tyne. They also made fuel tanks, pilots, and a whole range of goodies. The factory is long gone, as is Charlie, but the shop is still going on in Newcastle, run by Charlie Lutman's daughter-in-law and his grandson [I think]. Real historians will know some more than this, but not a lot more.



Original example appears die cast, but may have been cast in Petrobond. Measured example carries "500" stamped on top of the venturi protrusion.

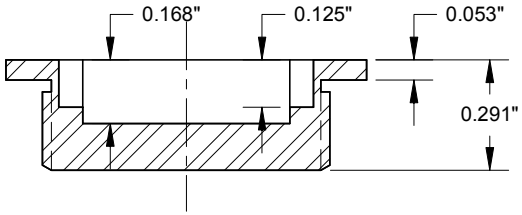
-1 CRANKCASE

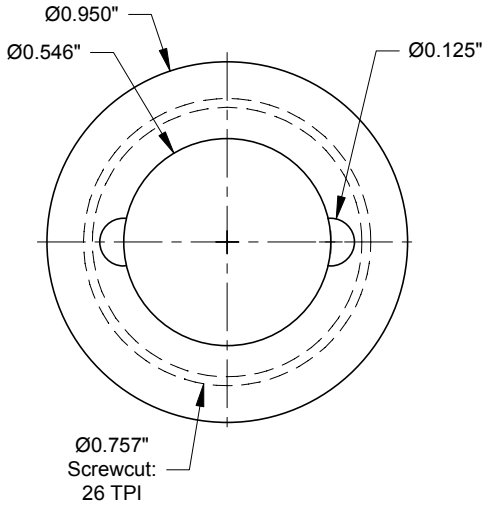
Aluminium Casting

Machine

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME MS 1.24
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	EMBI 2003			NUMBER Sheet 1 - Crankcase (external)
DATE	CHANGE	BY	CAD	BMBI 2004-01-28			

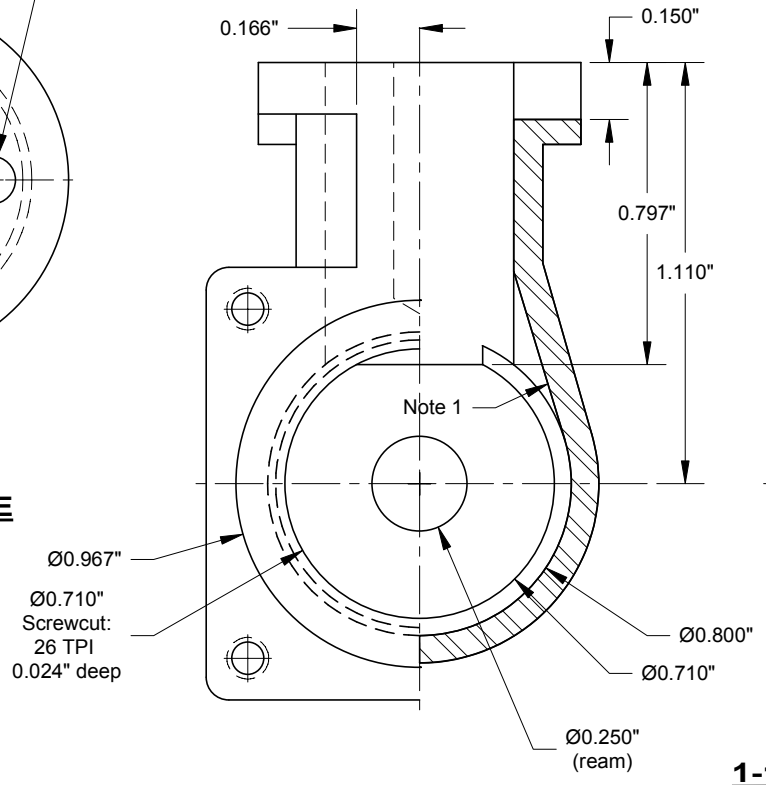
Notes: 1. Incline case 17° from the vertical. Touch inner face with a 3/16 " long series enf-mill on cylinder bore diameter. Mill radially for 0.072 ".

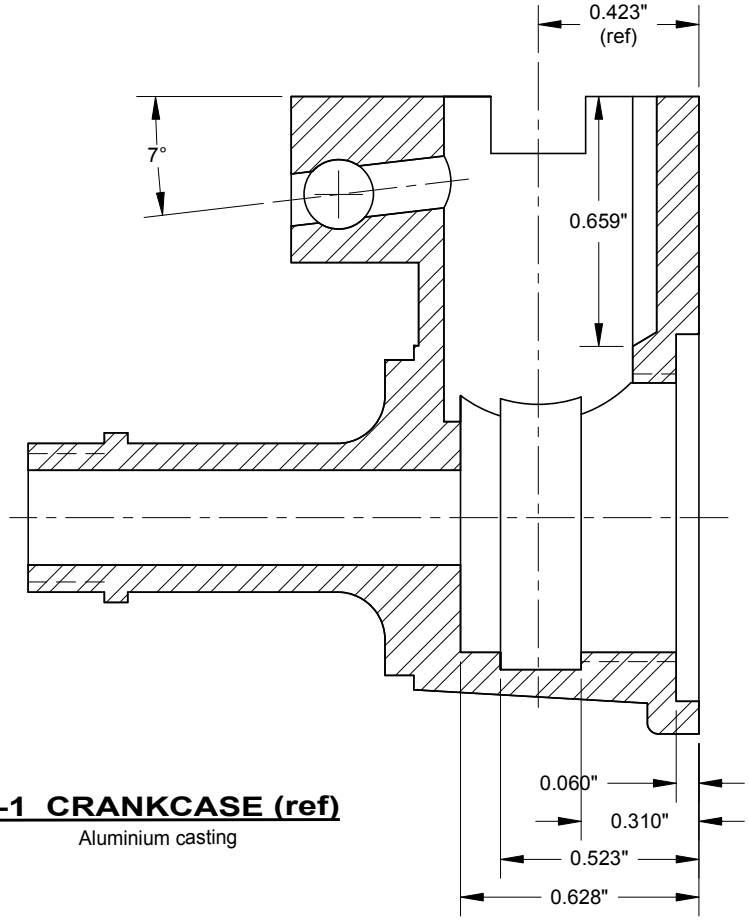




-2 BACKPLATE

Aluminium

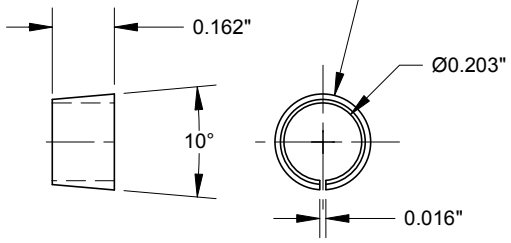




1-1 CRANKCASE (ref)

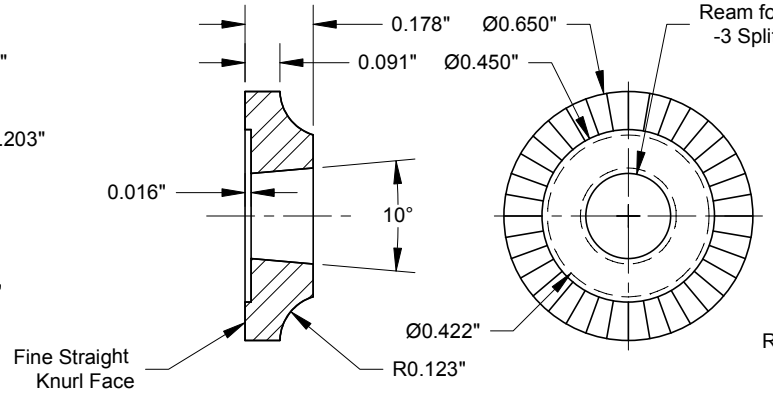
Aluminium casting

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **MS 1.24**
			SCALE	**2 X SIZE**			
			DRAWN	EMBI 2003			NUMBER **Sheet 2 - Crankcase (Internal)**
DATE	CHANGE	BY	CAD	BMBI 2004-01-28			



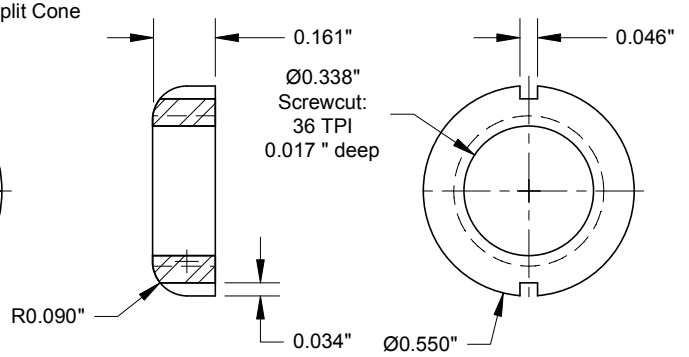
-3 SPLIT CONE

Brass



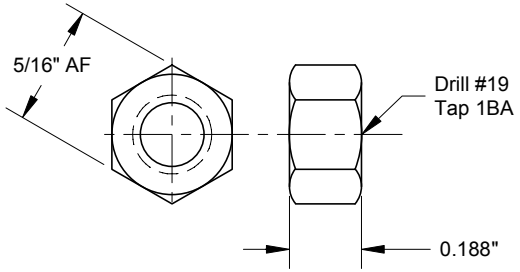
-4 PROP DRIVER

Aluminium



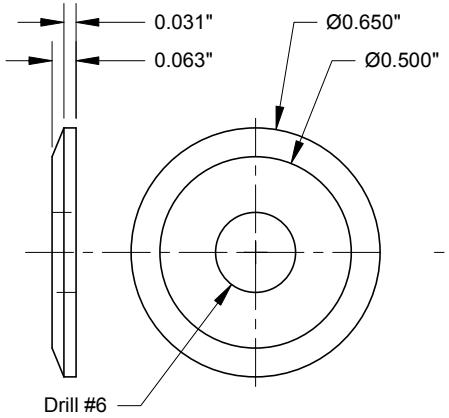
-2 TANK NUT

Aluminium



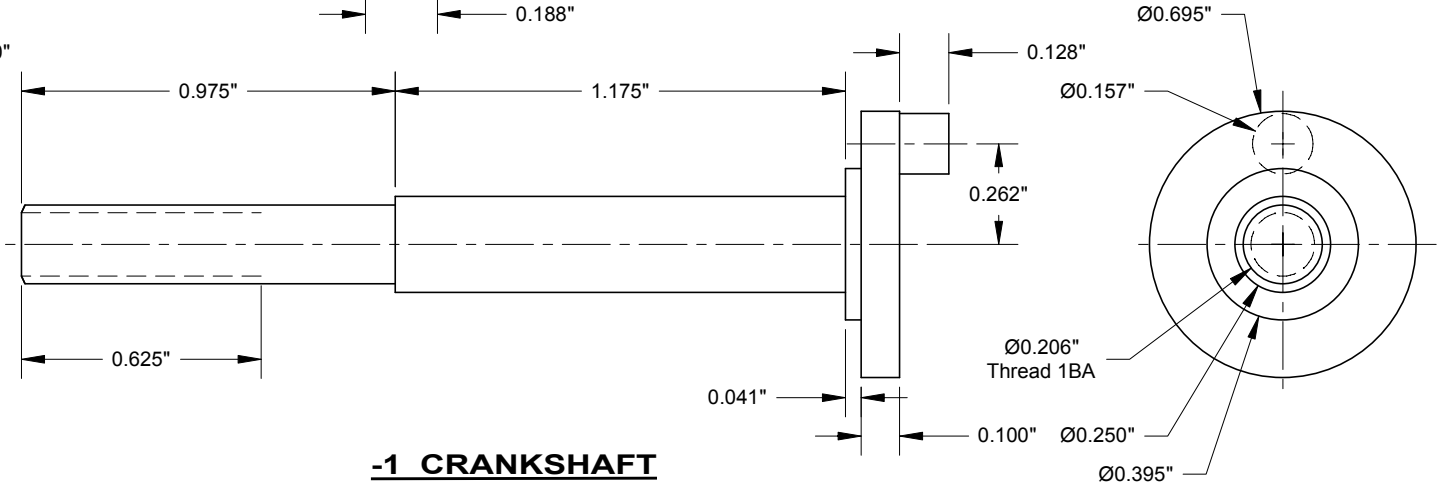
-6 PROP NUT

5/16" AF Hex Steel



-5 PROP WASHER

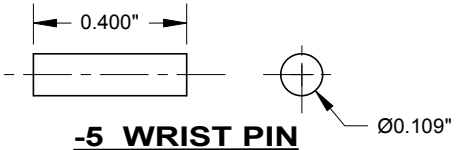
Aluminium



-1 CRANKSHAFT

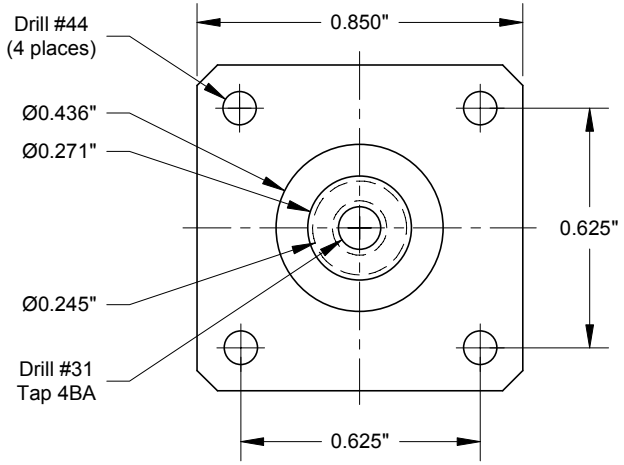
Steel

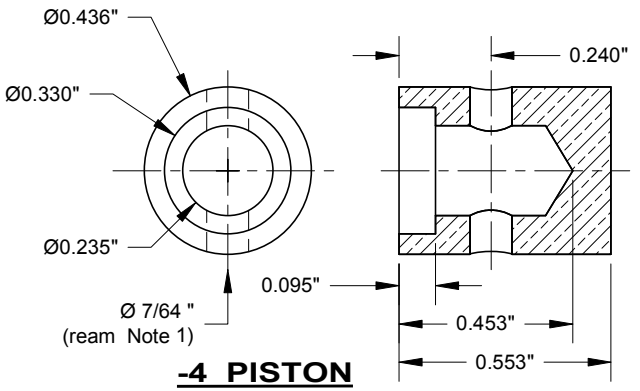
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME MS 1.24
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN				NUMBER Sheet 3 - Crankshaft
DATE	CHANGE	BY	CAD	BMBI 2003-10-20			



-5 WRIST PIN

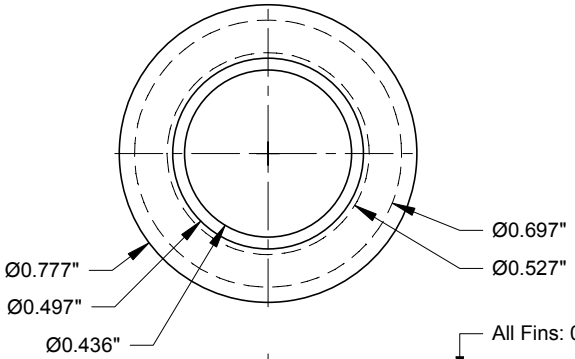
Ø 7/64 " Silver Steel

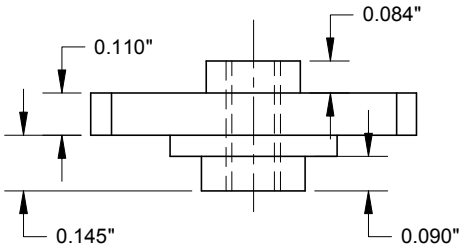




-4 PISTON

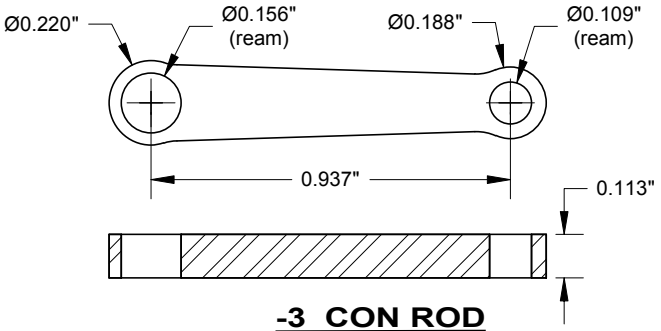
Cast Iron





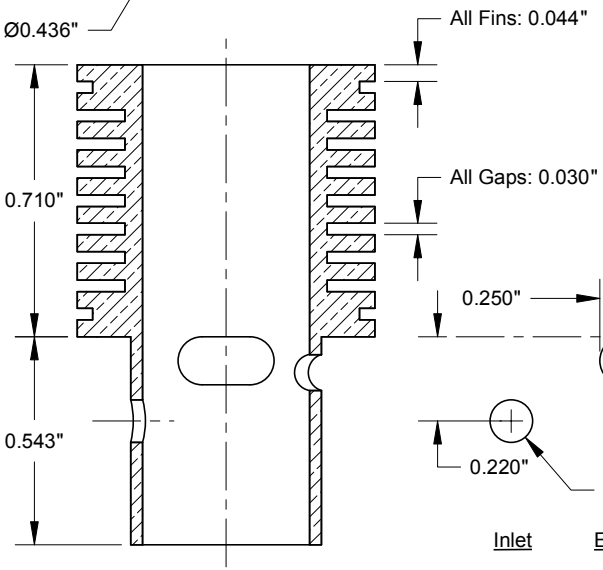
-5 CYLINDER HEAD

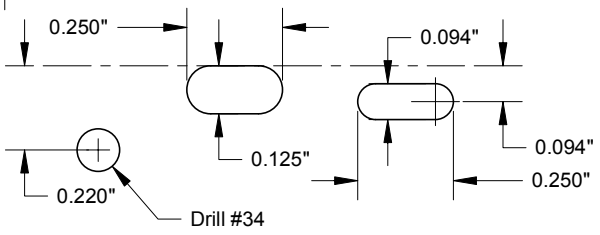
Aluminium



-3 CON ROD

Aluminium (2024 T3)

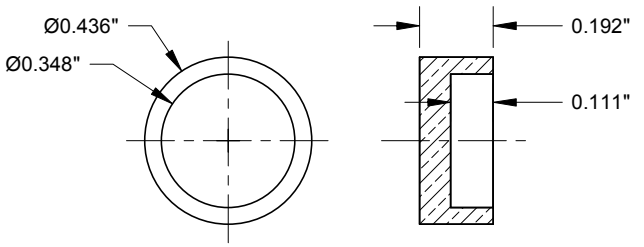




Inlet Exhaust (2) Transfer

-1 CYLINDER

Cast Iron



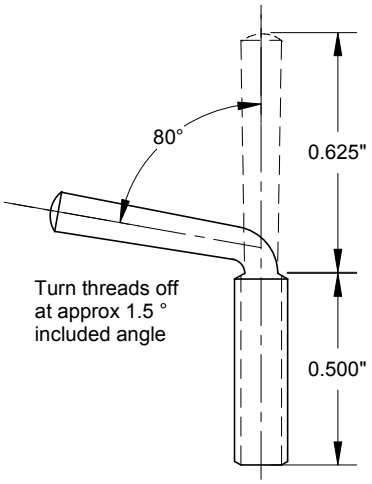
-2 CONTRA-PISTON

Cast Iron

Notes: 1. Use a taper reamer and leave the hole undersize on the inlet side for a press fit of the -5 Wrist Pin.

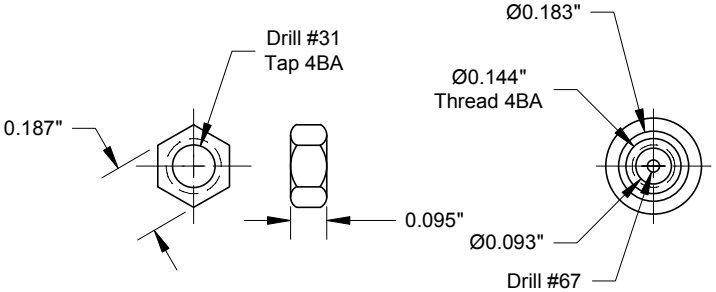
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME MS 1.24
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	EMBI 2003			NUMBER Sheet 4 - Cylinder and Piston
DATE	CHANGE	BY	CAD	BMBI 2004-01-28			

Notes: 1. Slit this section after tapping and fit a tight would spring to lightly compress for needle friction.



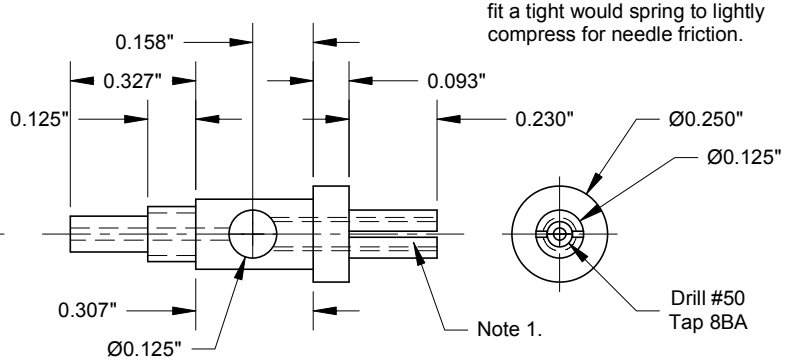
-6 COMPRESSION SCREW

4BA Threaded steel rod



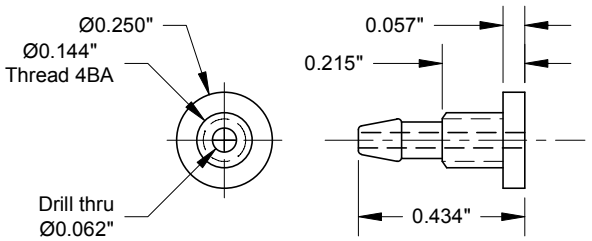
-2 NIPPLE NUT

3/16 " AF Hex Brass (2 required)



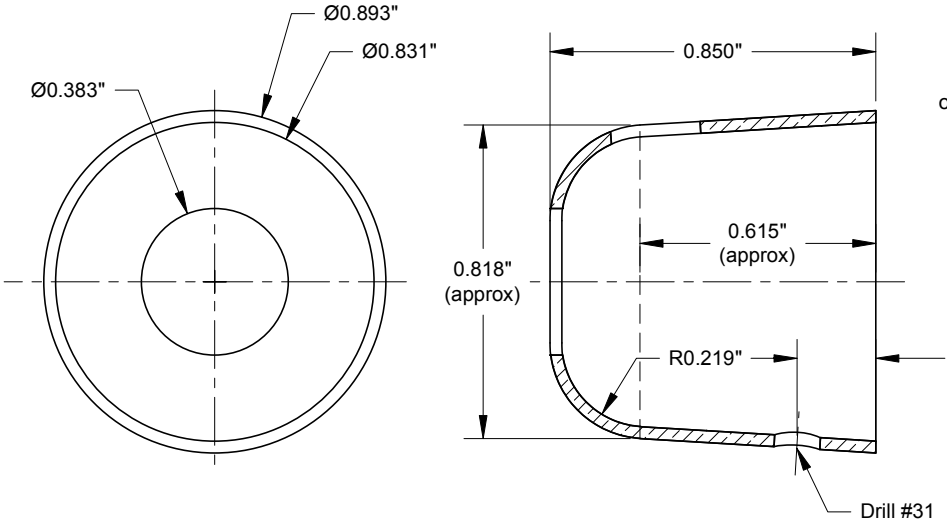
-1 SPRAY BAR

Brass



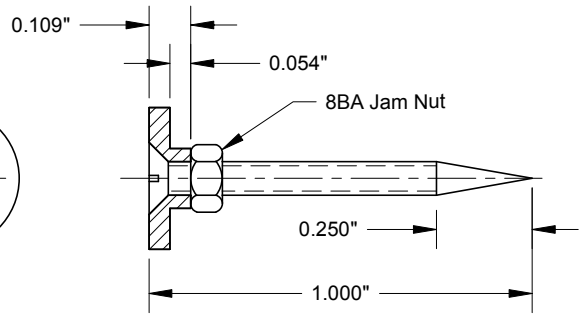
-4 FUEL NIPPLE

Brass



-5 FUEL TANK

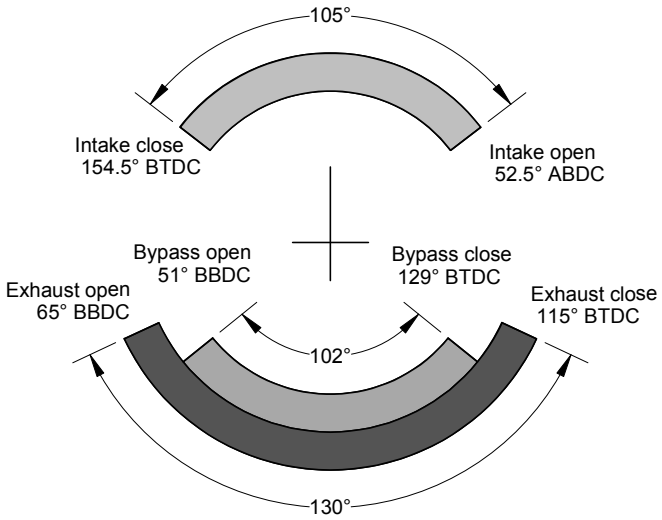
Perspex Sheet



-3 NEEDLE VALVE

Assy: 8BA Steel Screw and Brass

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME MS 1.24
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	EMBI 2003			NUMBER Sheet 5 - Fuel System
DATE	CHANGE	BY	CAD	BMBI 2004-01-28			

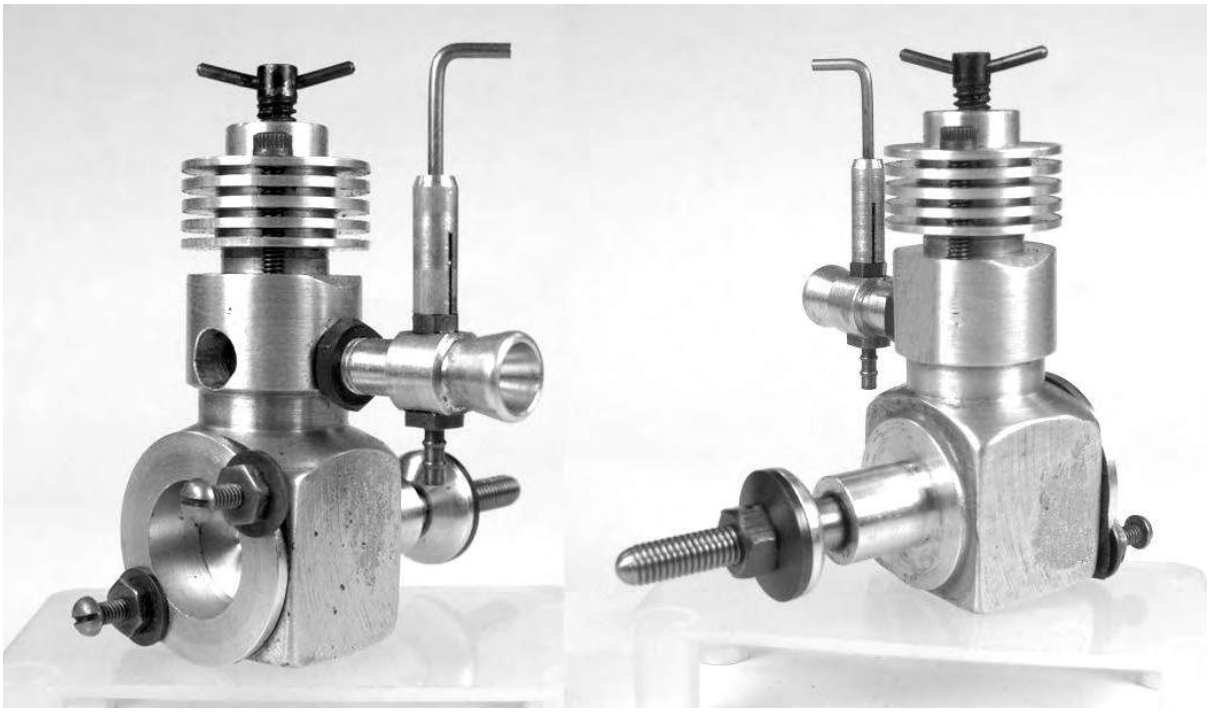


Model Shop Newcastle MS 1.24

Bore:	0.436"
Stroke:	0.524"
Capacity:	1.28 cc (0.078 cuin)

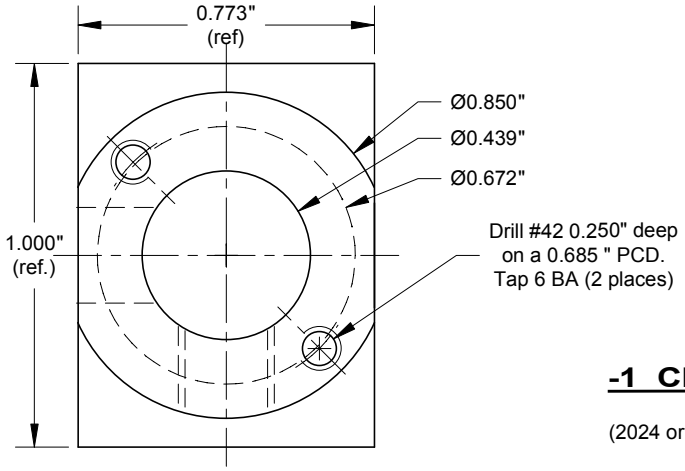
			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME MS 1.24
			SCALE	2 X SIZE			
			DRAWN	EMBI 2003			NUMBER Sheet 6 - General Arangement
DATE	CHANGE	BY	CAD	BMBI 2004-01-28			

PMC IMP



The Aeromodeller of March, 1968 announced the release of the first new English diesel for some appreciable time. The makers were given as Messrs. Moore & Baily of Groby, Leicestershire; Peter Chinn observed that entirely new British engines were *"...somewhat rare these days"*. The following month, he followed up with more detail, highlighting an unusual feature of the engine which was supplied with three spacing rings of different depth (7/64, 1/8, and 9/64"). These permitted the user to vary the position of the cylinder ports in relation to the crankcase axis, effectively altering the timing of the engine—a unique and curious feature. This engine was the EmBee 75.

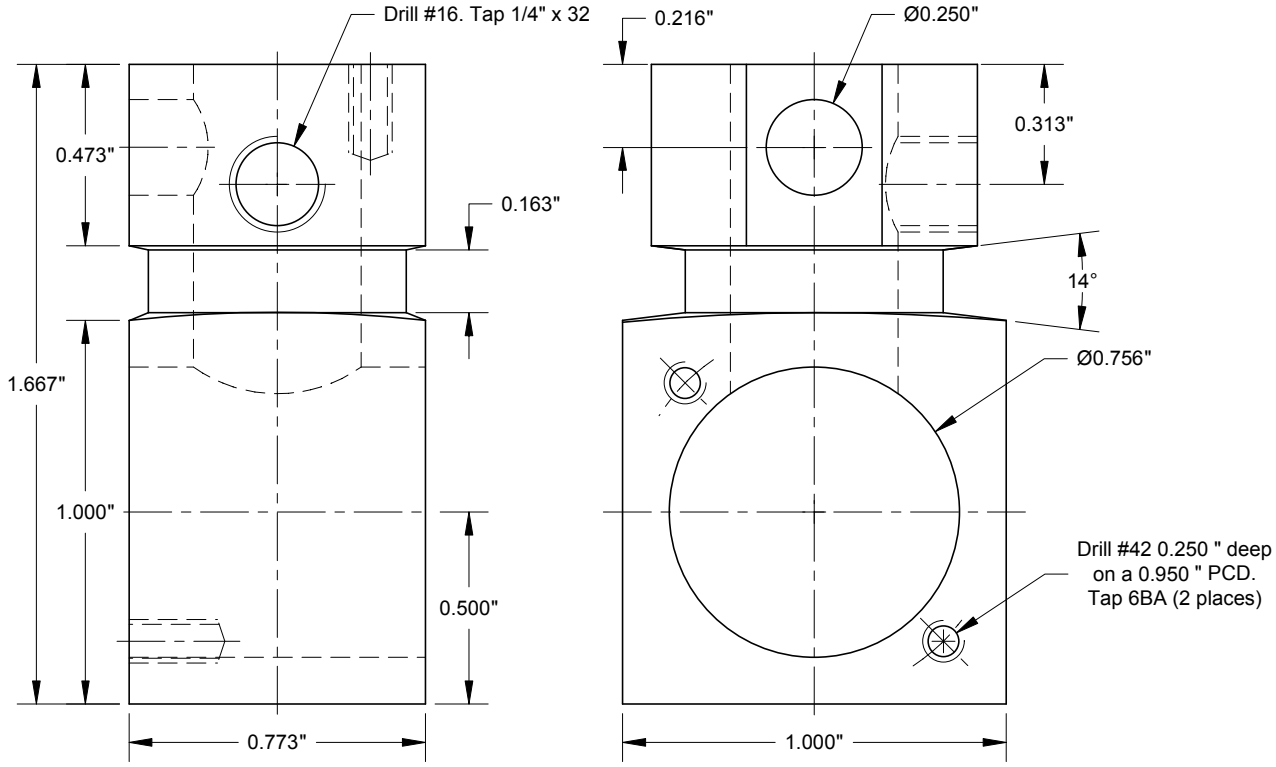
A variation on the engine re-surfaced in a single advertisement appearing in the October 1980 issue of the *Aeromodeller*. The ancestry is obvious; the most significant change being the transposition of the inlet and the exhaust. And proving that it always pays to read the fine print, note that the add states *Prototype engine photo only*. Now called the "PMC IMP", the capacity was unchanged and although no manufacturer was stated, we now know it was being produced by Peter Moore on the Isle of Mann.



Notes:
1. On original engines, the front bushing was glued in place with "Areldite" (tm). We recommend screwing the bushing in place with a 40 TPI thread, fixed with Locktite (tm).
2. There was no thrust face machined onto the front bearing of production engines. The one shown is a strongly suggested modification.
3. The front bushing projection of production engines was 0.267 " long allowing alarming endplay of the crankshaft. It has been extended on this drawing to prevent the crankpin contacting the backplate.

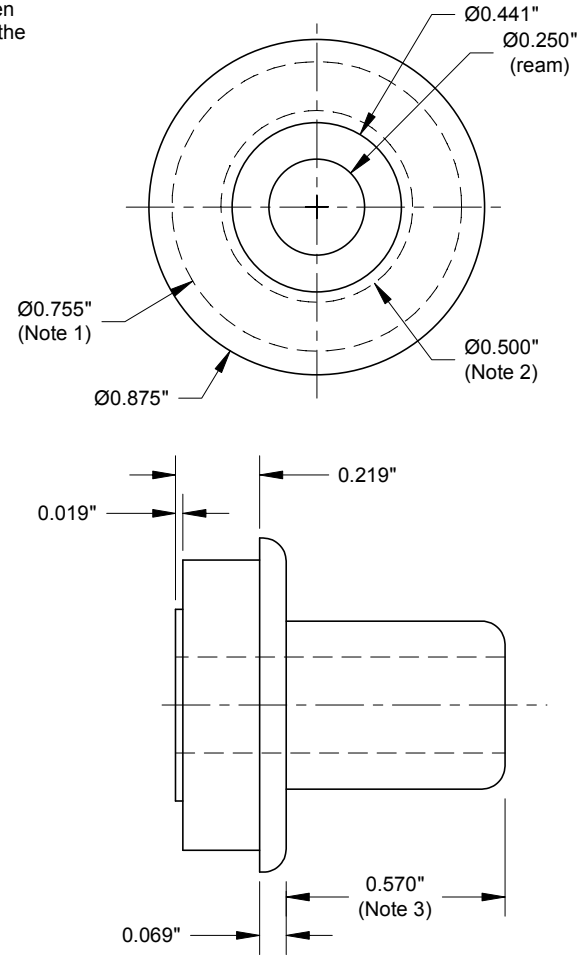
-1 CRANKCASE

Aluminum
(2024 or 6061 for preference)

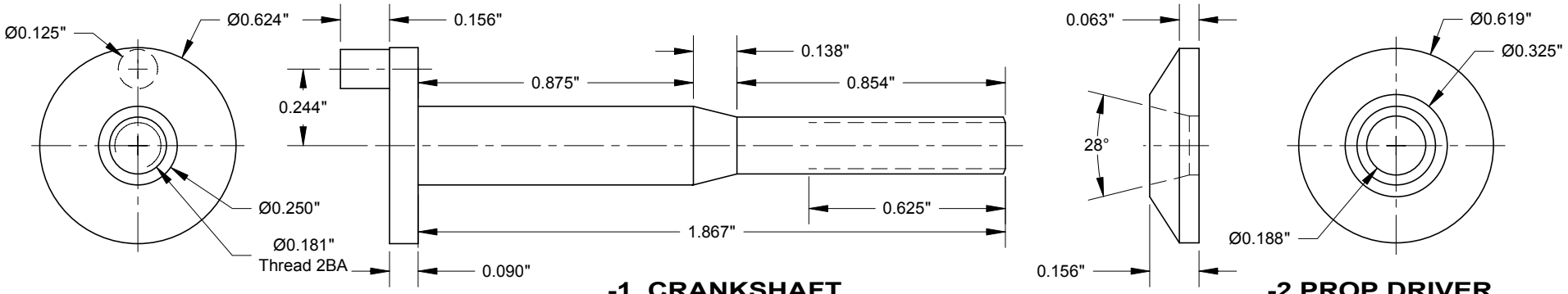


-2 FRONT BEARING

Aluminum
(2024 or 6061 for preference)



2005-12-10	Increase dia of upper section; add omitted dim	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: PMC "Imp"
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	EMB 2005-11-24			NUMBER: Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	EMB/BMBI 2005-11-25			

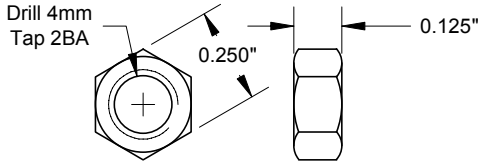


-1 CRANKSHAFT

Steel

-2 PROP DRIVER

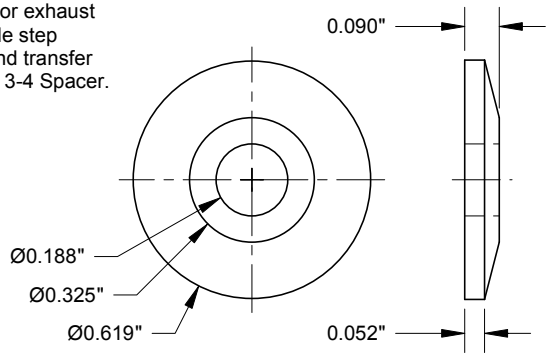
Aluminium



-8 PROP NUT

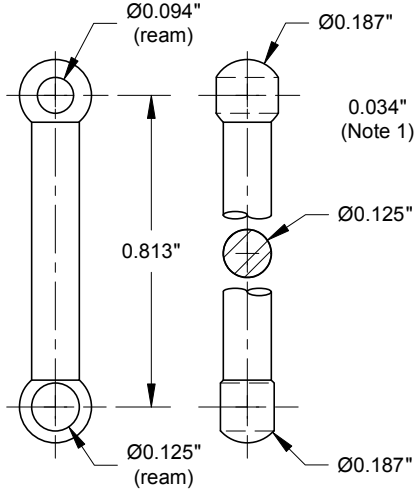
1/4" AF Hex Steel

Notes: 1. The step and bevel of production engines, as dimensioned, results in poor exhaust and transfer timing as detailed on Sheet 5 (GA). We recommend a single step transfer deflector as dimensioned in Detail A. This separates exhaust and transfer by 20° . Actual openings can be fine tuned by adjusting the height of the 3-4 Spacer.



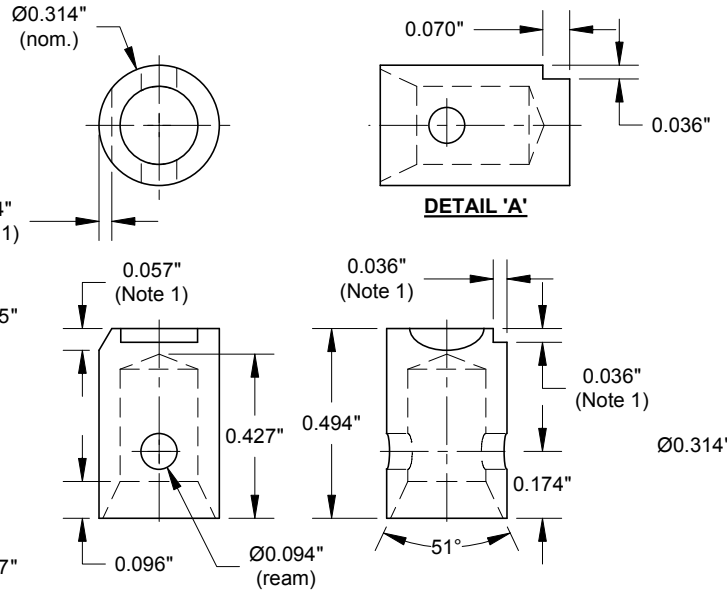
-3 PROP WASHER

Steel



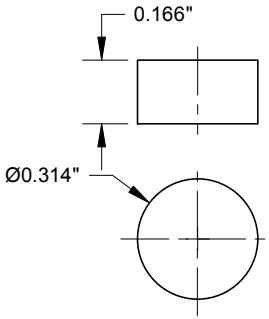
-4 CONROD

2024 T3 Aluminium



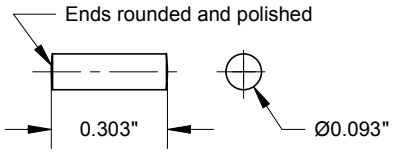
-5 PISTON

Cast Iron



-7 CONTRA PISTON

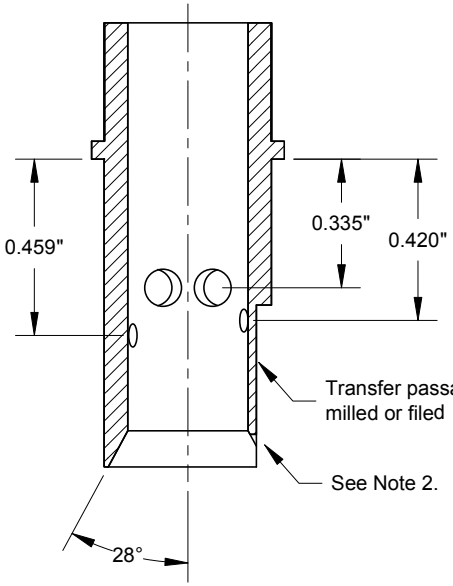
2024 T3 Aluminium (another bad idea)

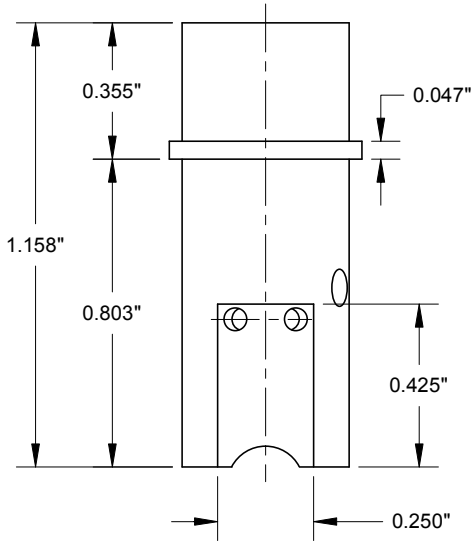


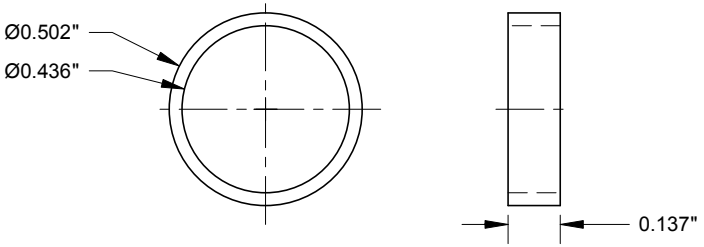
-6 GUDGEON PIN

Ø 3/32 " Silver Steel

2005-12-10	Include revised piston detail and note.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: PMC "Imp"
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	EMB 2005-11-24			NUMBER: Sheet 2 - Moving Bits
DATE	CHANGE	BY	CAD	EMB/BMBI 2005-11-25			

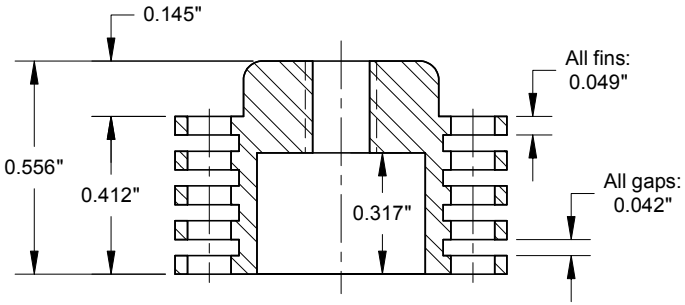


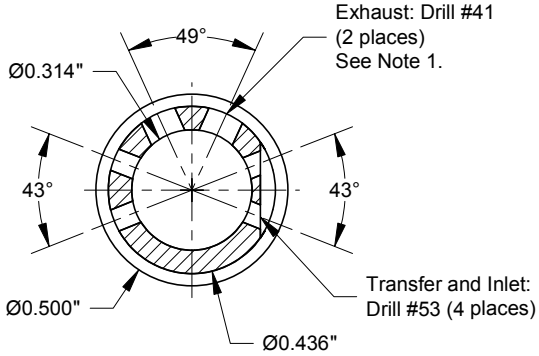




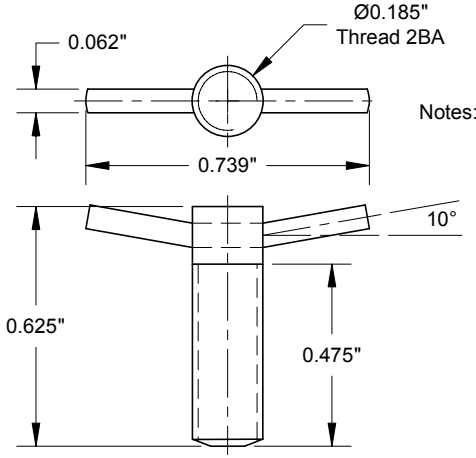
-4 CYLINDER SPACER RING

Aluminium

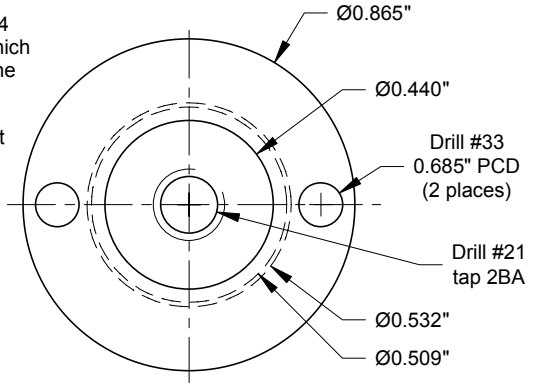




Imaginary section through the center of all ports



Notes:
1. Original engines had 4 exhaust ports, 2 of which were blanked off by the crankcase.
2. This cut-out is a result of the lower cylinder chamfer and the bypass flat.



-1 Cylinder

Steel

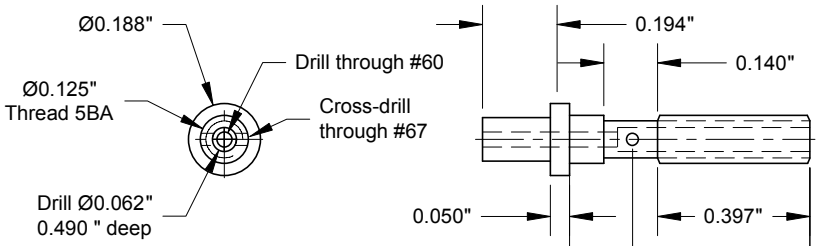
-3 Comp Screw

Steel and Piano Wire

-2 CYLINDER HEAD

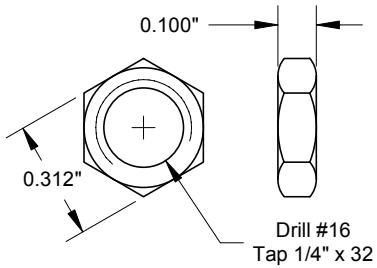
Aluminium

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **PMC "Imp"**
			SCALE	**2 X SIZE**			
			DRAWN	EMB 2005-11-24			NUMBER **Sheet 3 - Cylinder**
DATE	CHANGE	BY	CAD	EMB/BMBI 2005-11-25			



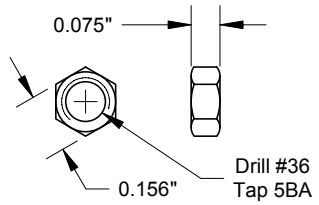
-3 SPRAYBAR

Ø 3/16 " Brass



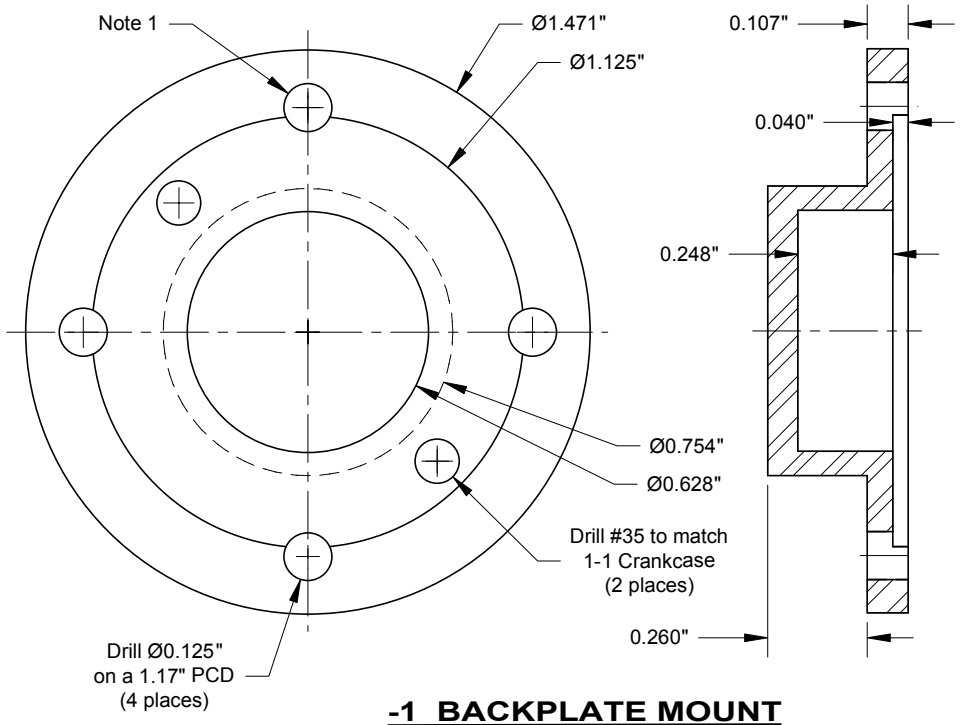
-4 VENTURI JAM-NUT

5/16 " AF Steel (black finish)



-6 SPRAYBAR JAM-NUT

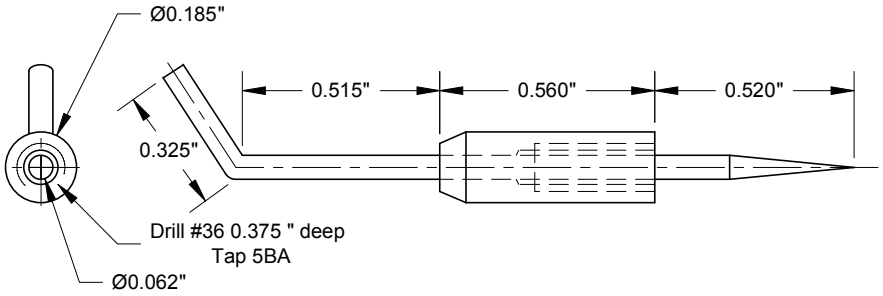
5/32 " AF Brass



-1 BACKPLATE MOUNT

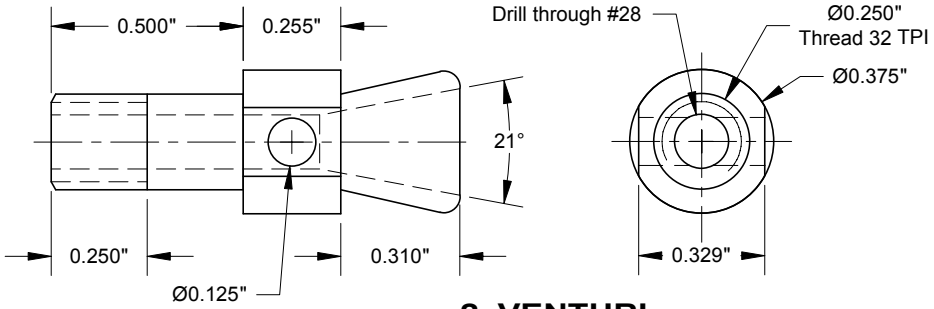
2024 T3 Aluminium

Notes: 1. Although drilled in "production" engines, there is no way to insert a screw into this hole!



-5 NEEDLE VALVE

Aluminium and Ø 1/16 " Music Wire



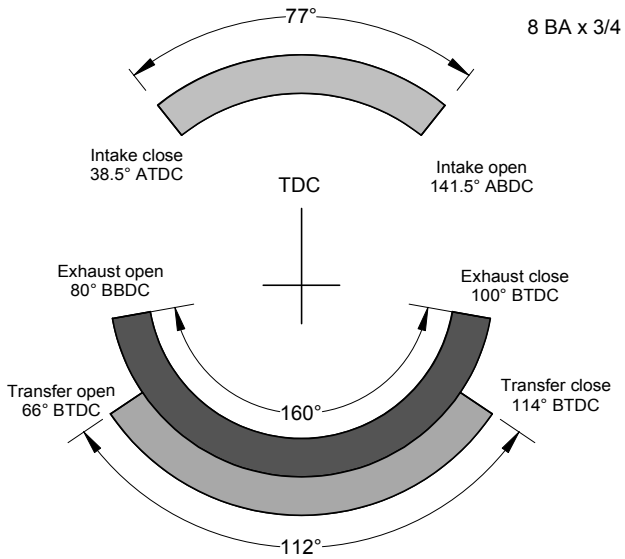
-2 VENTURI

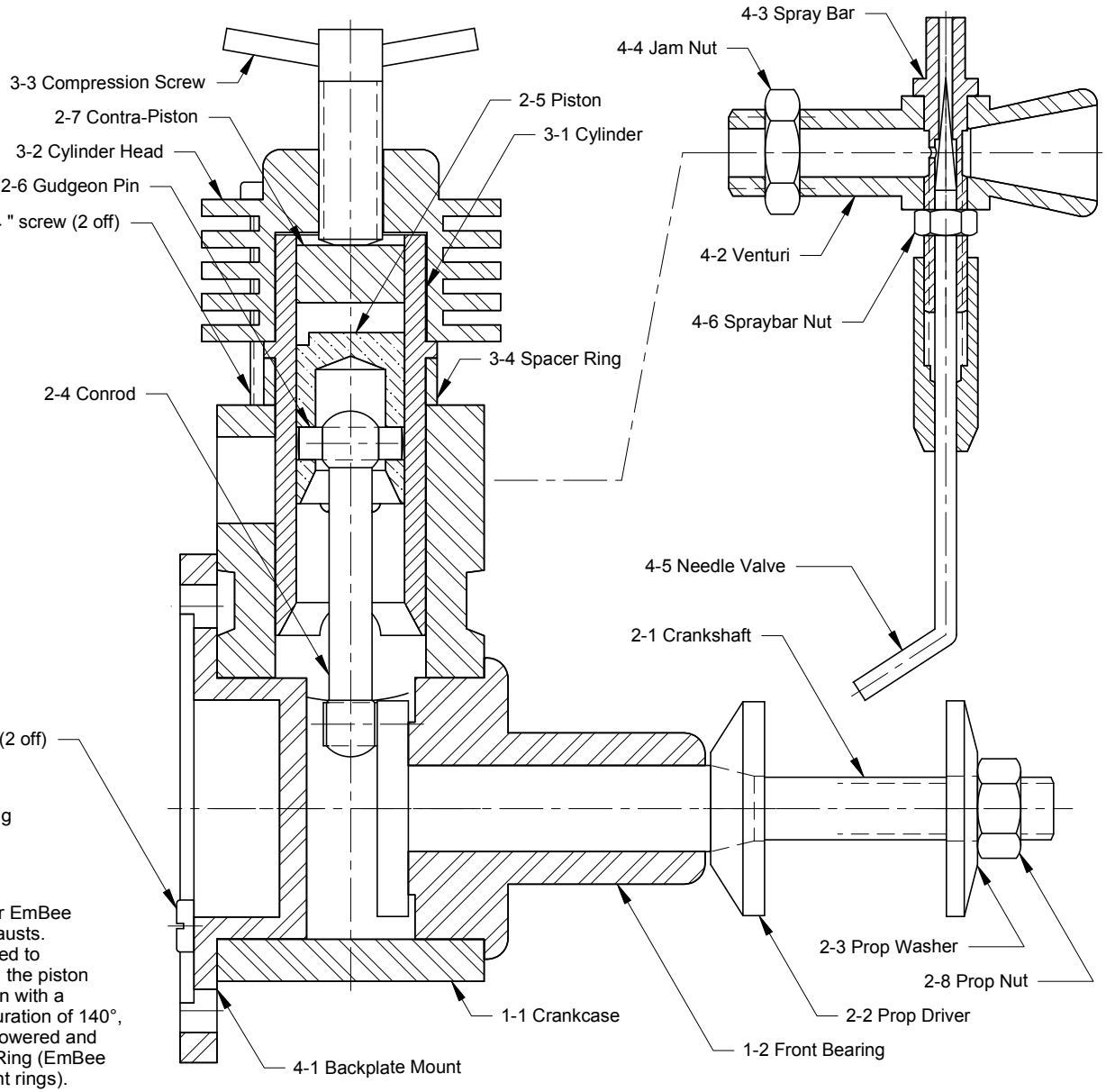
Aluminium

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME **PMC "Imp"**
			SCALE	**2 X SIZE**			
			DRAWN	EMB 2005-11-24			NUMBER **Sheet 4 - Other Bits**
DATE	CHANGE	BY	CAD	EMB/BMBI 2005-11-25			

PMC "IMP"

Bore: 0.314" (7.98 mm)
Stroke: 0.488" (12.40 mm)
Capacity: 0.038 cu in (0.619 cc)



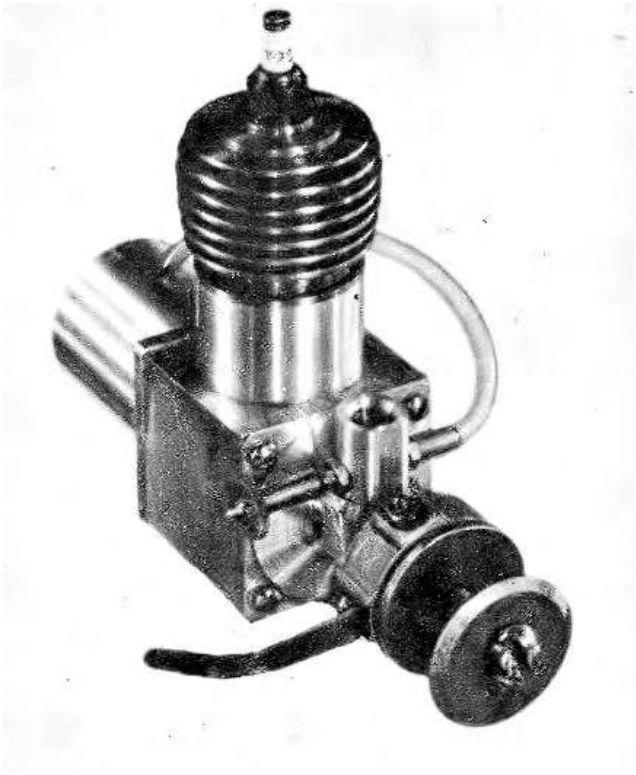


Note: The Exhaust duration of 160° is extreme, to say the least, being more typical of that used with a tuned pipe! Omitting the milled step on the exhaust side of the piston would reduce exhaust duration to 140° which, while still high, is not excessive.

We suspect that PMC IMPs were assembled from leftover EmBee parts. The Embee had the inlet at the rear, with side exhausts. In this orientation, the piston step would have been oriented to the front as a transfer deflector. We assume the bevel on the piston was a PMC affectation. Sheet 2 shows an alternate piston with a single transfer deflector step. This will give an exhaust duration of 140°, with a transfer of 120°. This is still high, but both can be lowered and kept in relation by adjusting the height of the 3-4 Spacer Ring (EmBee produced engines were supplied with three different height rings).

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME PMC "Imp"
			SCALE	2 X SIZE			
			DRAWN	EMB 2005-11-24			NUMBER Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	EMB/BMBI 2005-11-25			

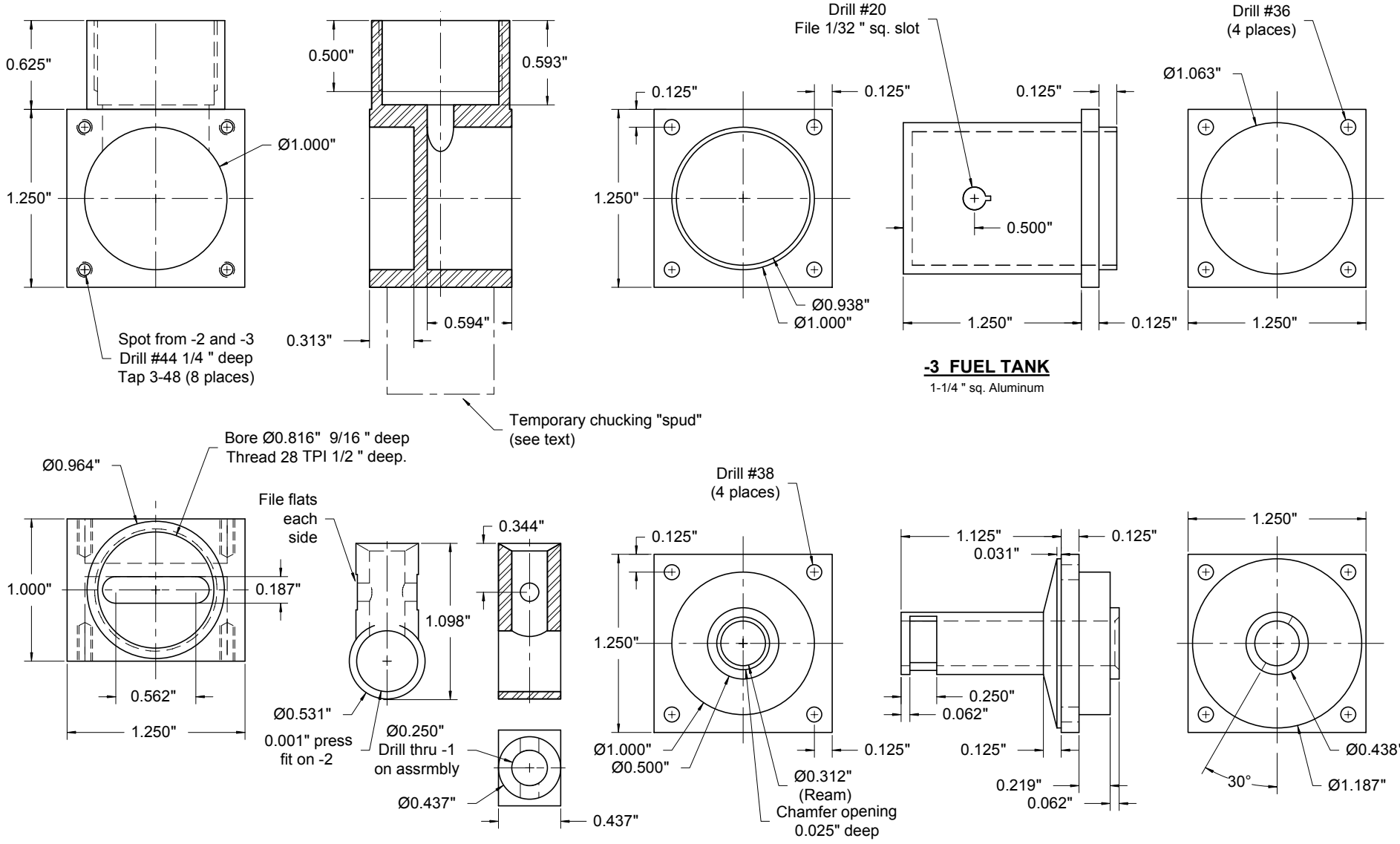
M.A.N. SIMPLEX 25



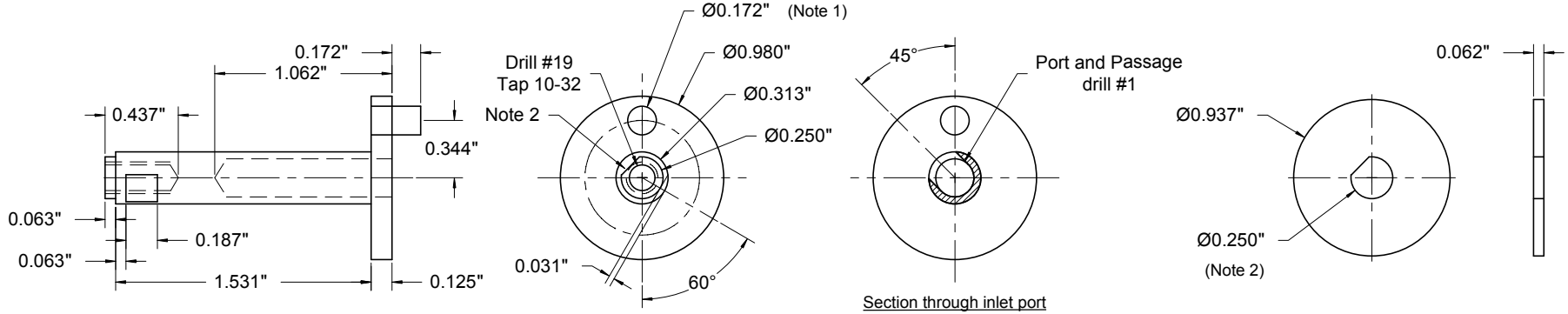
The SIMPLEX 25 was serialized over the March and April issues of Model Airplane News for 1947. The design and articles are credited to Louis Garami. The SIMPLEX is a 0.25 cu in (4.2cc) spark ignition engine designed to be built from readily available materials on minimal equipment. In the words of the designer, *"...the simplest design consistent with good results."*

The text went on to say that it was assumed that the reader/builder had reasonable knowledge of lathe operations. This was not an unreasonable assumption for the America of 1947.

The SIMPLEX design briefly re-surfaced in 1978 as a limited edition production from John Morrill. Billed as the Mk II, the Morrill SIMPLEX is rather attractive in an angular sort of way. The obvious design changes are a screw-in head (no blind-bore to hone), a different timer that appears to be based on a commercial points assembly, and the case has conventional mounting lugs. About 50 (or 115) engines were built.



			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: MAN SIMPLEX 25
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Luis Garami 1947	NEXT ASSEMBLY		NUMBER: Sheet 1 - Crankcase
DATE	CHANGE	BY	CAD	RC 2007-02-03			

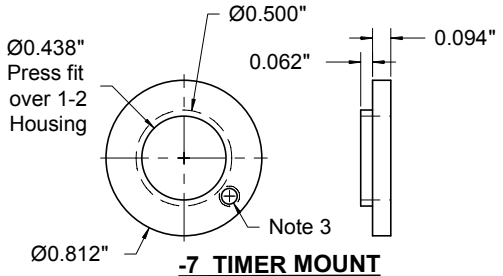


-1 CRANKSHAFT

Steel

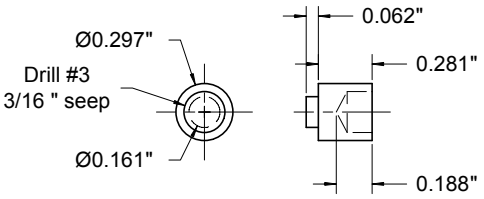
-2 PROP DRIVER

Steel



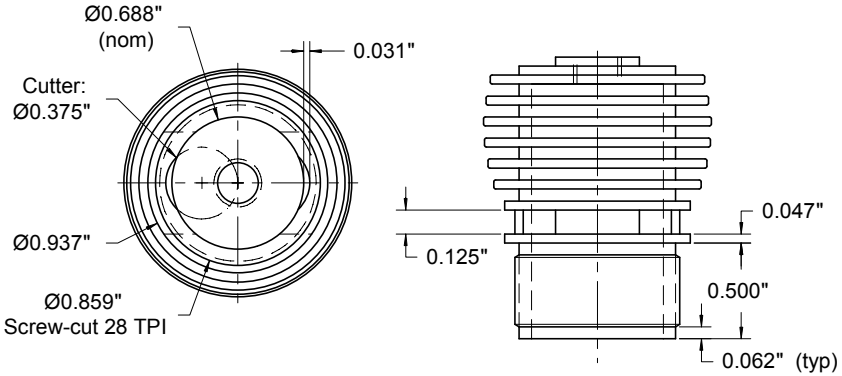
-7 TIMER MOUNT

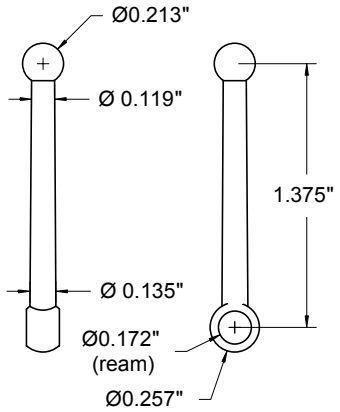
Aluminum



-5 PISTON BALL SOCKET

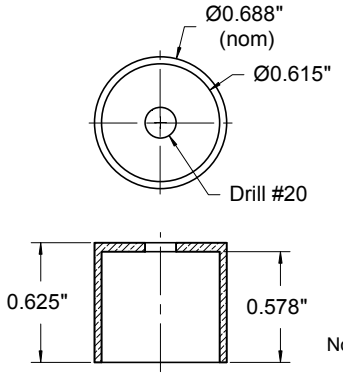
Aluminum





-6 CONROD

Steel (case harden)

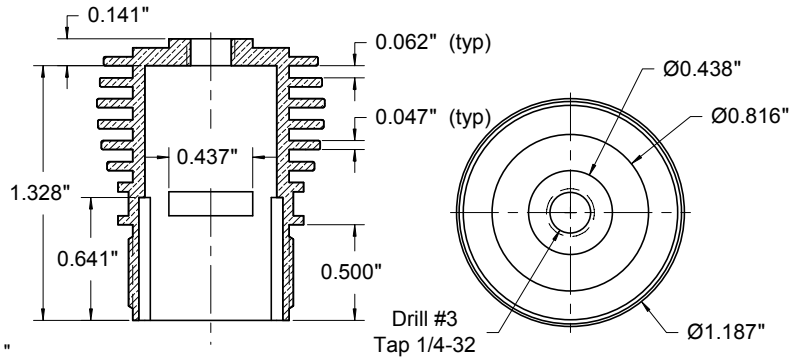


-4 PISTON SHELL

Cast Iron (SG or "Meenhite")

Fin Diameter Table	
Top	1.118 "
5th	1.160 "
4th	1.187 "
3rd	1.177 "
2nd	1.142 "
1st	1.080 "
Ex.	0.937 "

Notes:
1. Drill for press-fit of Ø 11/64 " drill rod crankpin
2. File 1/32 " deep flat on Ø 1/4 " -1 Crankshaft nose. Drill and file keyed hole in -2 Prop Driver to suit.
3. Drill #44, tap 3-48 on assembly with Timer.

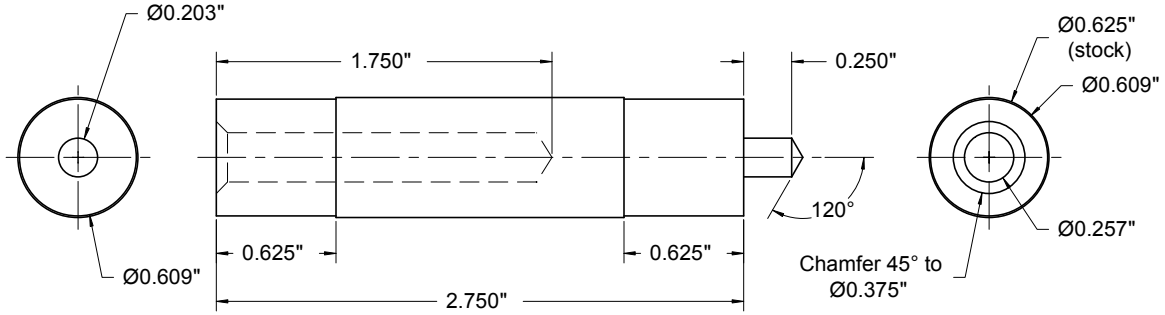


-3 CYLINDER

Cast Iron (SG or "Meenhite")

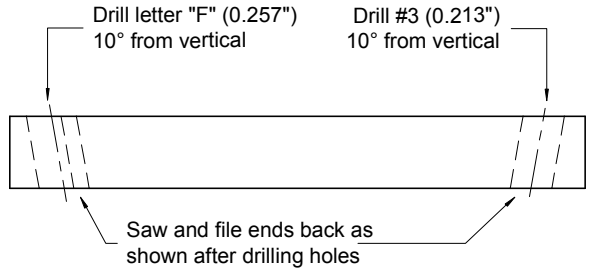
			MAT'L		DO NOT SCALE DRAWING	NAME
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MAN SIMPLEX 25
			DRAWN	Luis Garami 1947		NUMBER
DATE	CHANGE	BY	CAD	RC 2007-02-03		Sheet 2 - Shaft and Cylinder

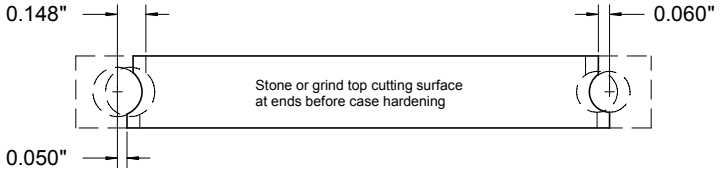
MOTOR BOYS (INTERNATIONAL)



-1 SOCKET SETTING TOOL

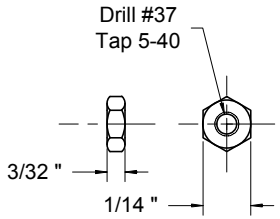
Steel





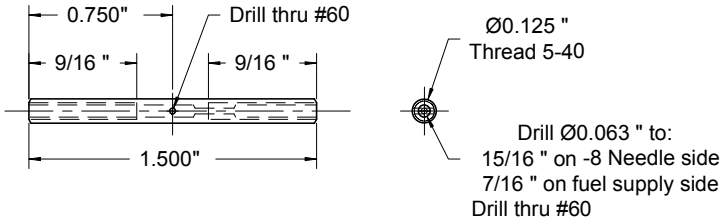
-2 CONROD FORM TOOL

3/8 " sq. Steel - case harden ends



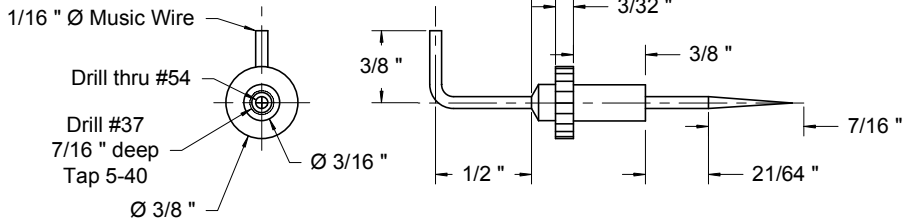
-4 SPRAYBAR NUT

1/4 " AF Hex Brass (2 required)



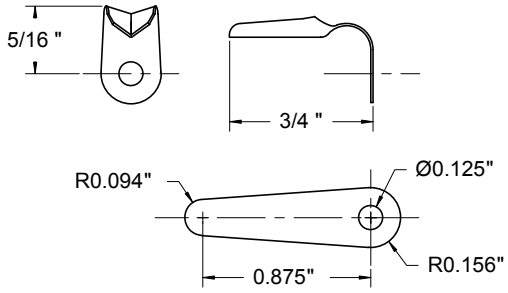
-3 SPRAYBAR

1/8 " Ø Brass Rod



-5 NEEDLE VALVE

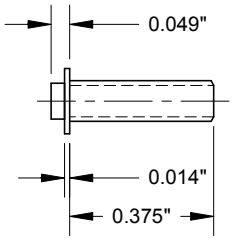
Body: Brass
Needle: 1/16 " Ø Music Wire



-6 NEEDLE RATCHET

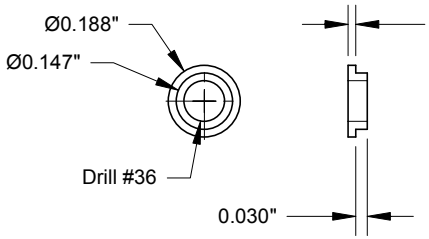
0.010" Hard Brass Shim

			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: MAN SIMPLEX 25
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Luis Garami 1947			NUMBER: Sheet 3 - Tooling and COTS substitutes
DATE	CHANGE	BY	CAD	RC 2007-02-03			



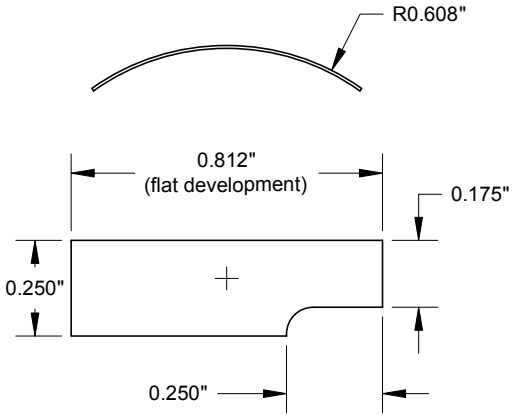
-4 FIXED CONTACT

Tungsten tipped 3-48 screw (Note 1)



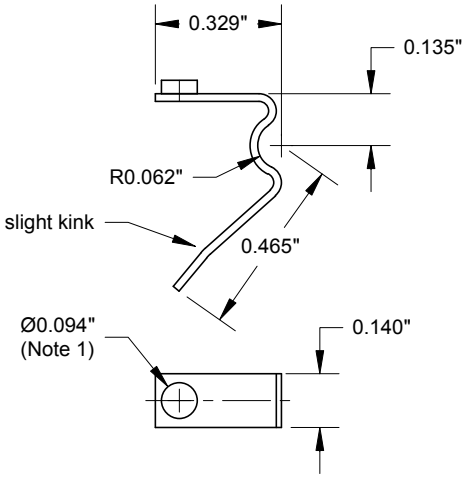
-5 INSULATOR

Ebonite (2 reqd)



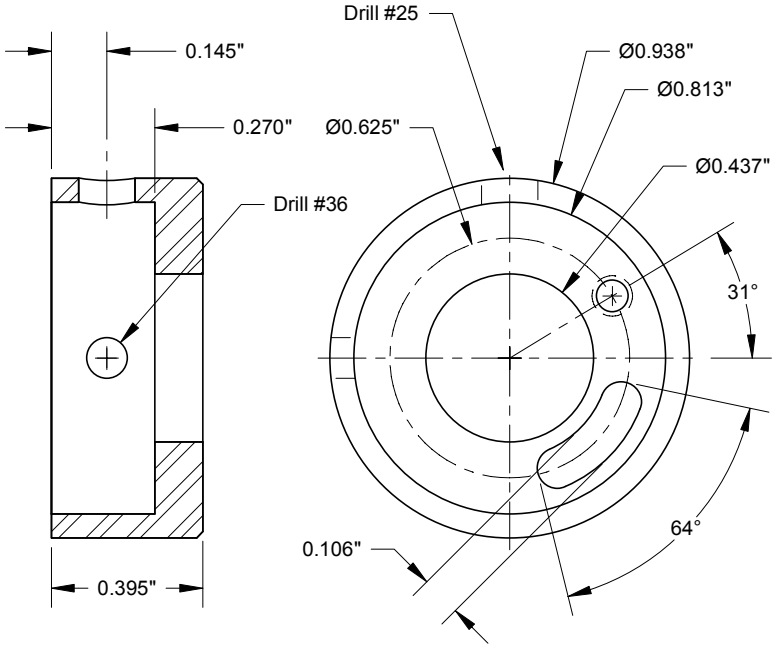
6 Spring

0.008" clock spring steel



-7 MOVING CONTACT

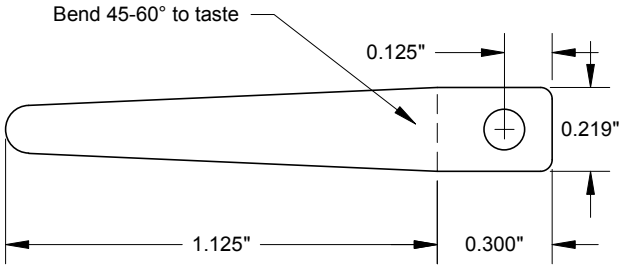
0.030 " hard brass



-1 TIMER SHELL

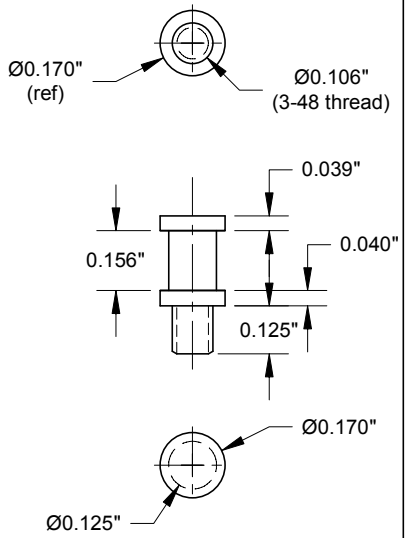
Aluminum

Notes: 1. Tungsten rivet points, once plentiful, are now almost extinct. Use them if you've got them. Otherwise, you can turn them from tungsten welding rod. Failing that, drill rod will work, although the use of a transistor switch on the coil is recommended to reduce the current and so reduce pitting, making "soft" points practical.



-2 TIMER ARM

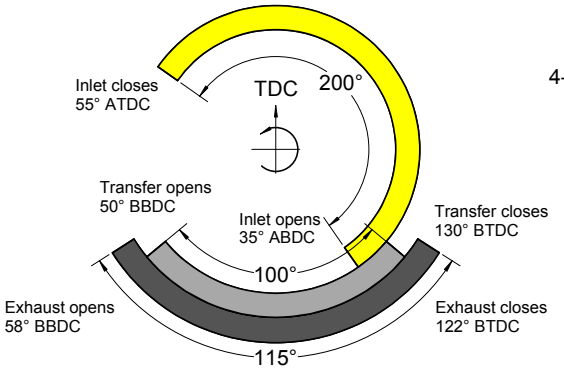
0.050" Steel

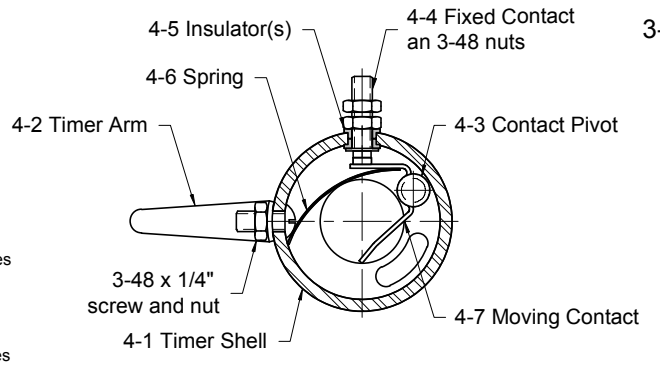


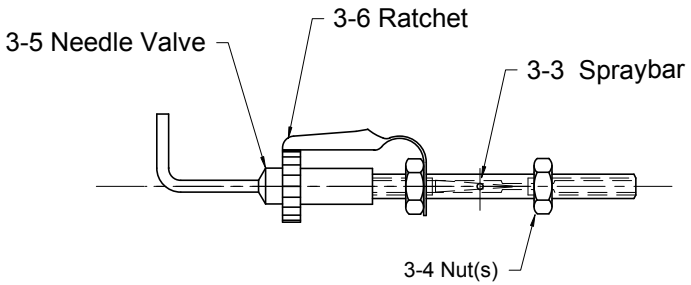
-3 CONTACT PIVOT

Steel

			MAT'L	As Noted	DO NOT SCALE DRAWING WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES	MOTOR BOYS (INTERNATIONAL)	NAME MAN SIMPLEX 25
			SCALE	2 X SIZE			
			DRAWN	Les Stone			NUMBER Sheet 4 - TIMER (O&R 29)
DATE	CHANGE	BY	CAD	RC 2007-01-05			



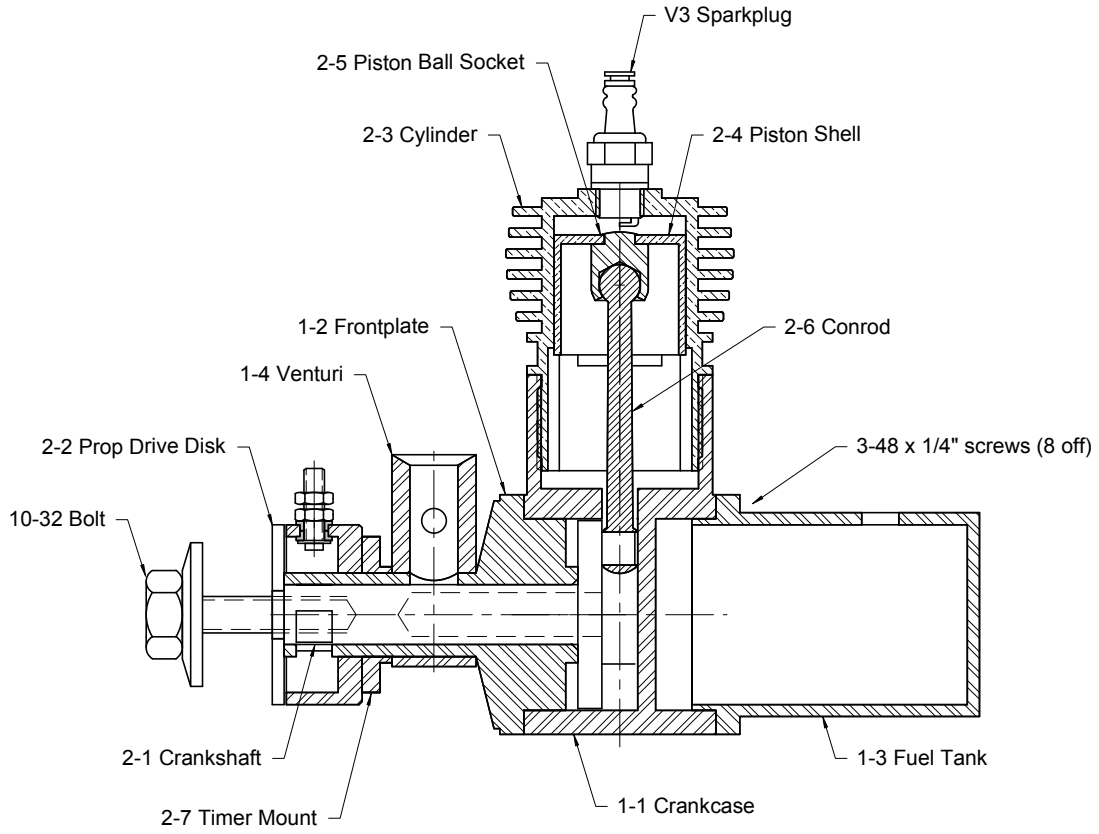




Model Airplane News SIMPLEX 25

Designed by Louis Garami.
Published in Model Airplane News (MAN) issues of March, 1947 and April, 1947.

Bore: 0.688 " (17.48 mm)
Stroke: 0.688 " (17.48 mm)
Capacity: 0.256 cu in (4.19 cc)
Compression Ratio: 8:1



			MAT'L		DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: MAN SIMPLEX 25
			SCALE	FULL SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	Luis Garami 1947			NUMBER: Sheet 5 - General Arrangement
DATE	CHANGE	BY	CAD	RC 2007-02-03			

SPAREY TWIN 2cc

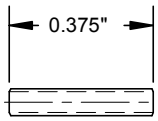
We Motor Boys often got up to some crazy ideas, and in the year 2000 Ron Chernich and myself decided that we would each make an engine to celebrate what everyone called “the Millennium”. The little engine known as the Sparey 0.8 [actually 0.64cc] had long been one of my favourite flying engines, and since I fancied the challenge of a twin, then a twin based upon two little Spareys, making just 1.28cc, was my choice. Ron had already built a few little Spareys in 2000 but he had up-sized his to 1cc. Consequently he fell in line with my plans to build a twin, but his was to be 2 x 1cc based on his success with the single.

The big problem with alternate firing in-line twins is the sealing of the two separate crankcase chambers. This was achieved by the use of a split bobbin closely fitted into the case and sealed with twin “O” rings. The bobbin is shown as an inset in the heading composite image.

My engine was completed and ran nicely though it was a little heavy at 190 gm [6.75 oz] to be a flying engine of just 1.28cc. So it sits on a shelf.

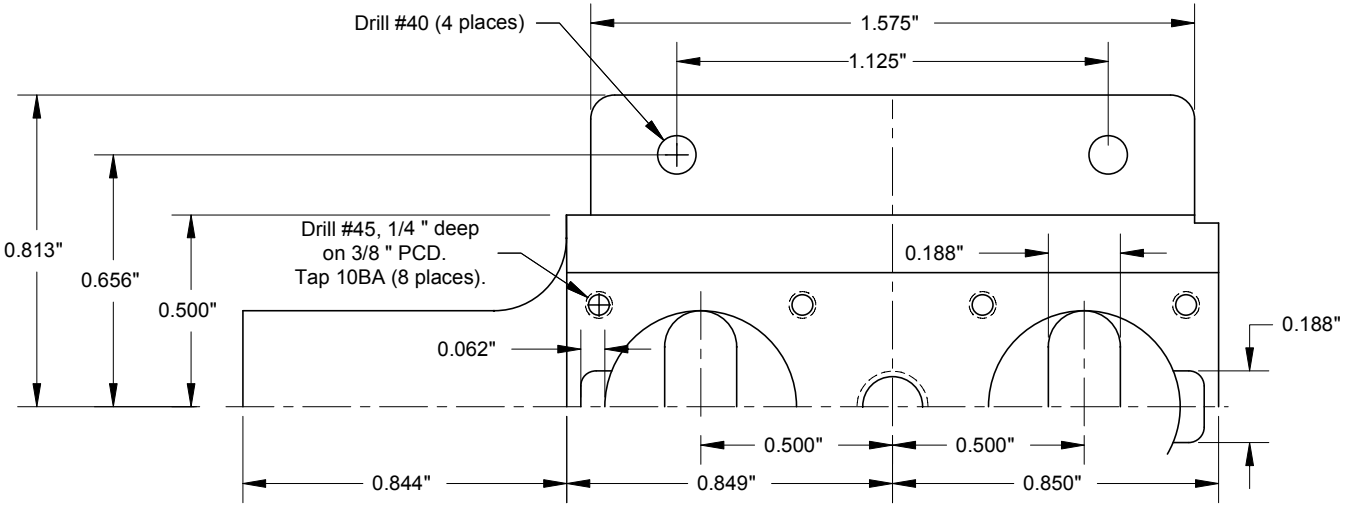
I know not the reason, but although construction of Ron’s engine got to an advanced build, it never seems to have been completed. No photographs exist other than of some of the parts.

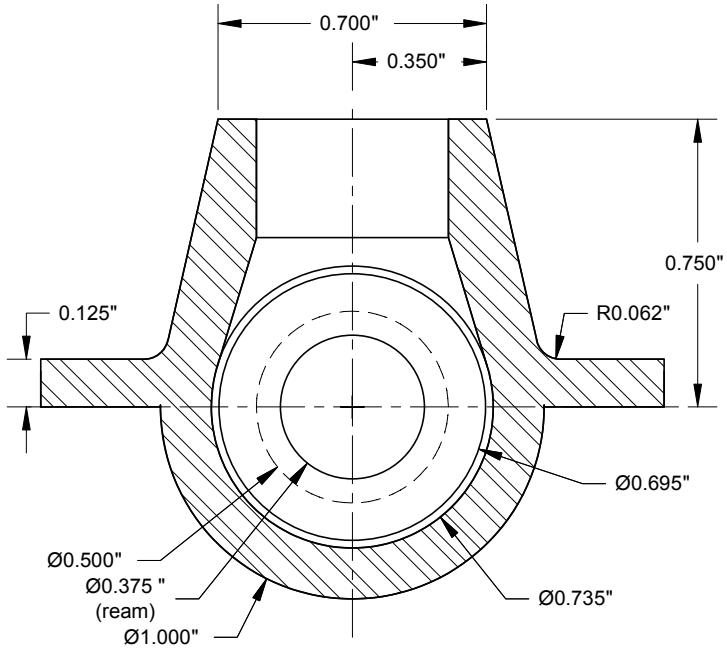
Ron’s 2cc version is the one presented in the plans, but the images here are of my own 1.28cc version. The differences are only in the dimensions, all details being the same.



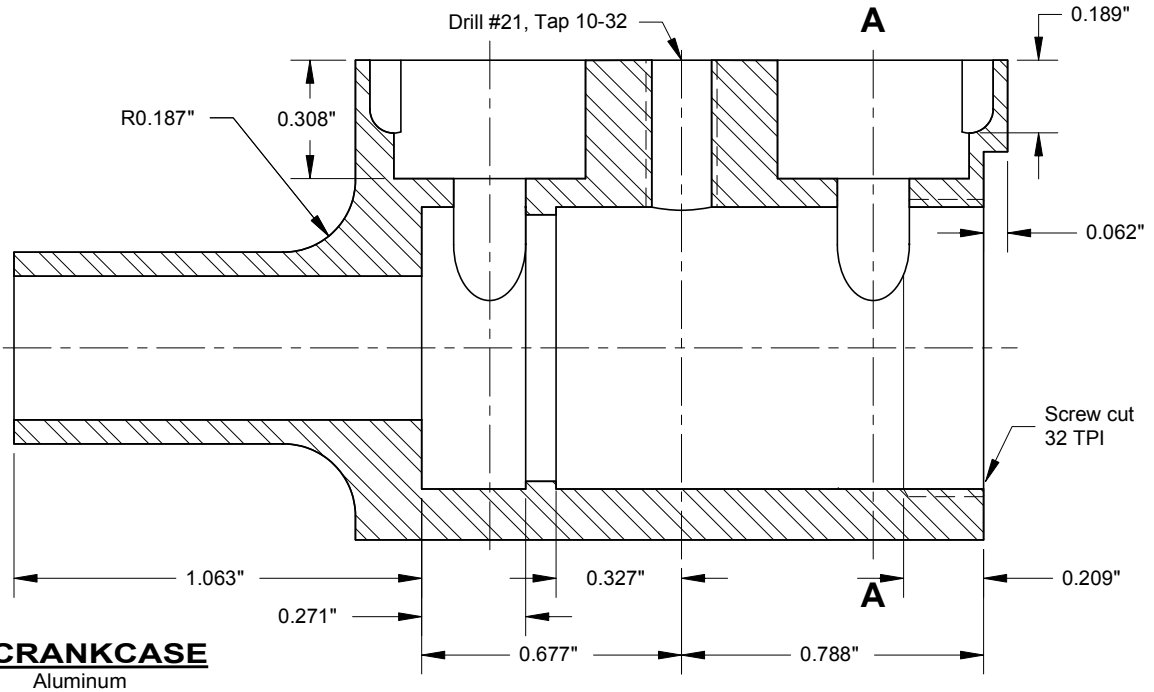
-2 CYLINDER STUD

Cut from 10 BA steel screw
(8 required)





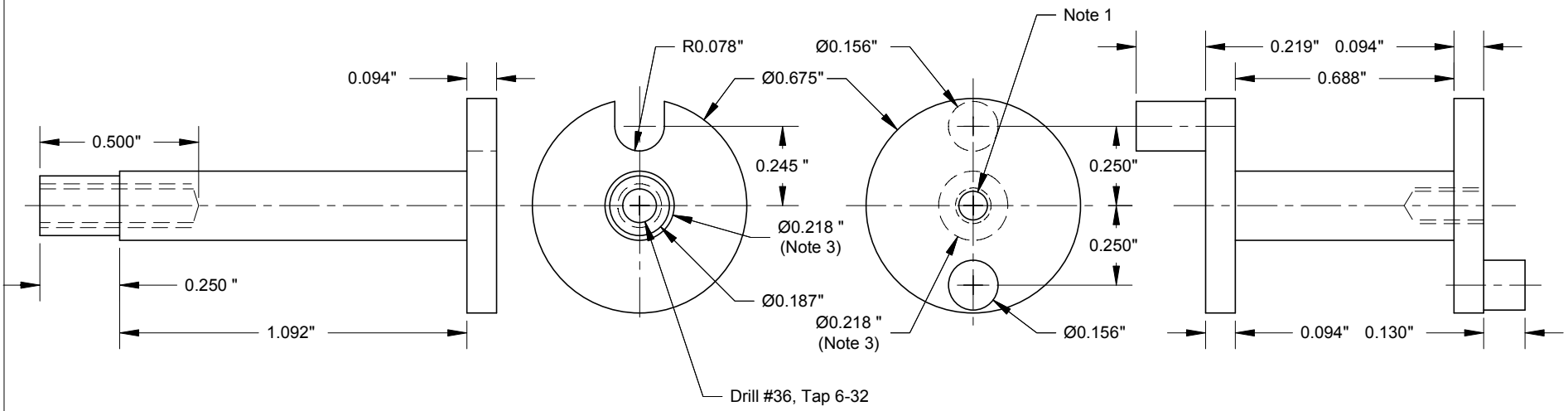
Section A-A
(looking forward)



-1 CRANKCASE

Aluminum

2001.01.24	Intercylinder spacing reduced 1/16" to 1.000"	BMBI	MAT'L	As Noted	**DO NOT SCALE DRAWING**	MOTOR BOYS (INTERNATIONAL)	NAME: **Sparey Twin**
			SCALE	**2 X SIZE**	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	**BMBI** 28 Dec 2000	NEXT ASSEMBLY		NUMBER: **Sheet 1 - Crankcase**
DATE	CHANGE	BY	CAD	**BMBI** 28 Dec 2000			



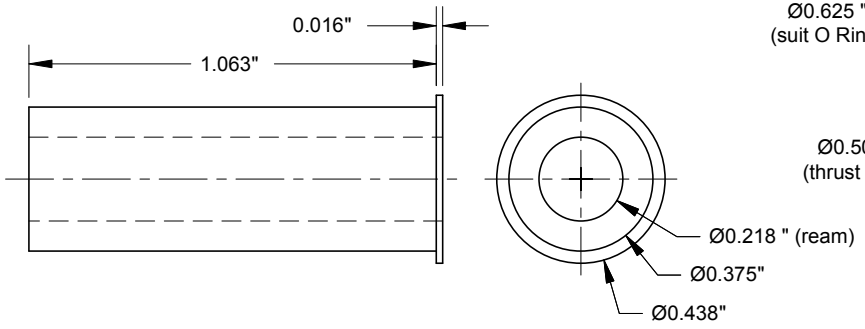
-1 FRONT CRANKSHAFT

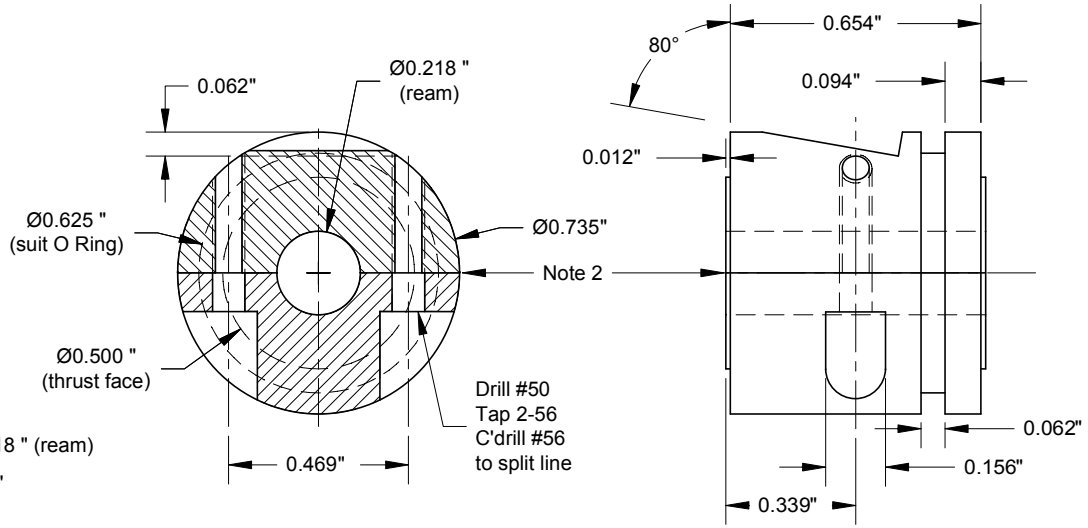
Steel

-2 REAR CRANKSHAFT

Steel

Notes:
1. Drill #43 1/4" deep, tap 4-40 in rear web for assembly extraction tool.
2. Soft solder segments together and center accurately on seam before machining.
3. Adjust for running fit in bushing.





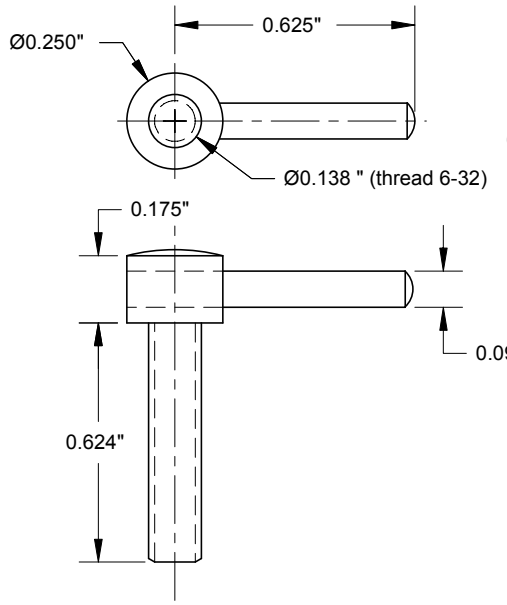
-3 FRONT BEARING

Bronze

-4 SPLIT BEARING

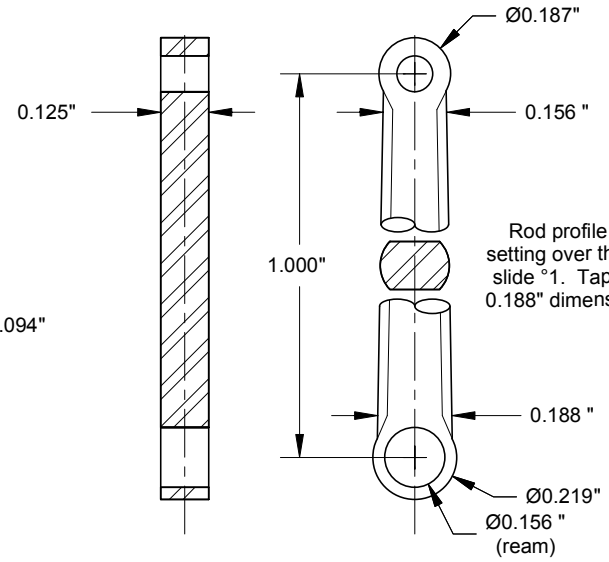
Bronze

2001.01.24	Reduced length of -2 Shaft and -4 Bearing	BMBI	MAT'L	As Noted	**DO NOT SCALE DRAWING**	MOTOR BOYS (INTERNATIONAL)	NAME **Sparey Twin**
			SCALE	**2 X SIZE**	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	**BMBI** 28 Dec.2000	NEXT ASSEMBLY		NUMBER **Sheet 2 - Crankshaft**
DATE	CHANGE	BY	CAD	**BMBI** 28 Dec.2000			



-3 COMP SCREW

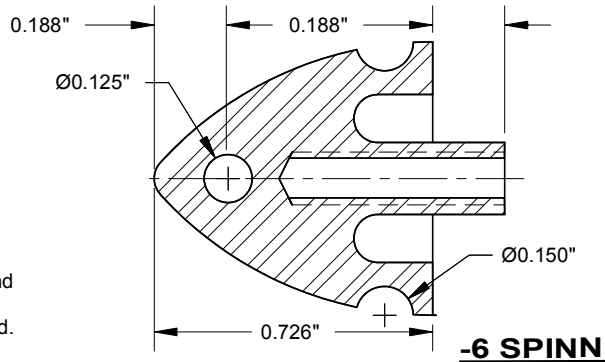
Steel and Piano Wire



Rod profile formed by setting over the compound slide °1. Taper turn until 0.188" dimension reached.

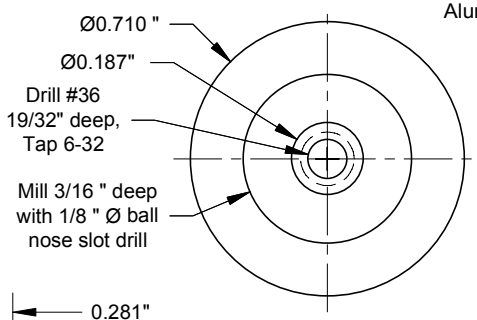
-5A CON ROD

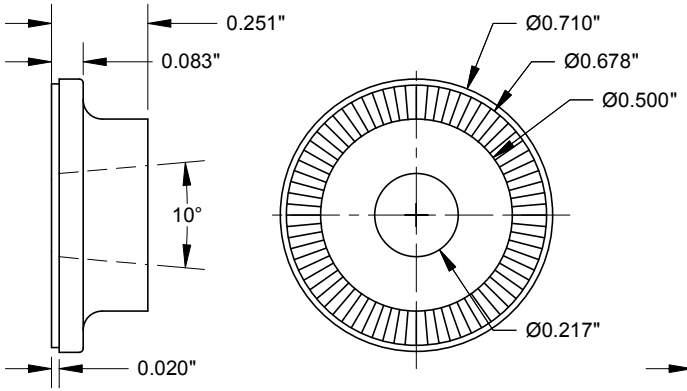
Aluminum (2024 T3 preferred)



-6 SPINNER

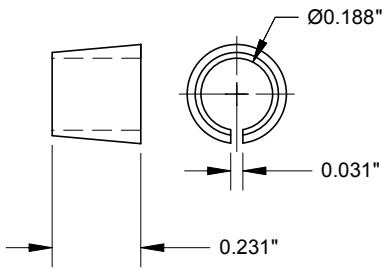
Aluminum





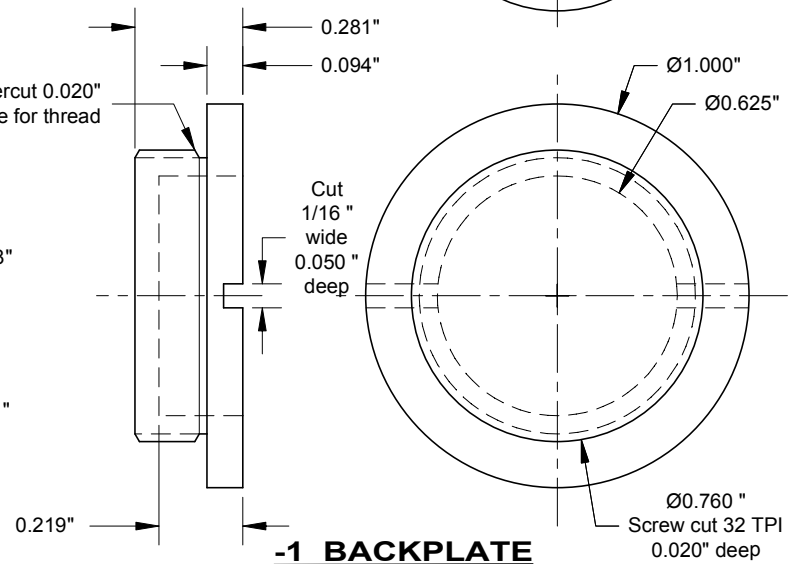
-4 PROP DRIVER

Aluminum



-2 SPLIT CONE

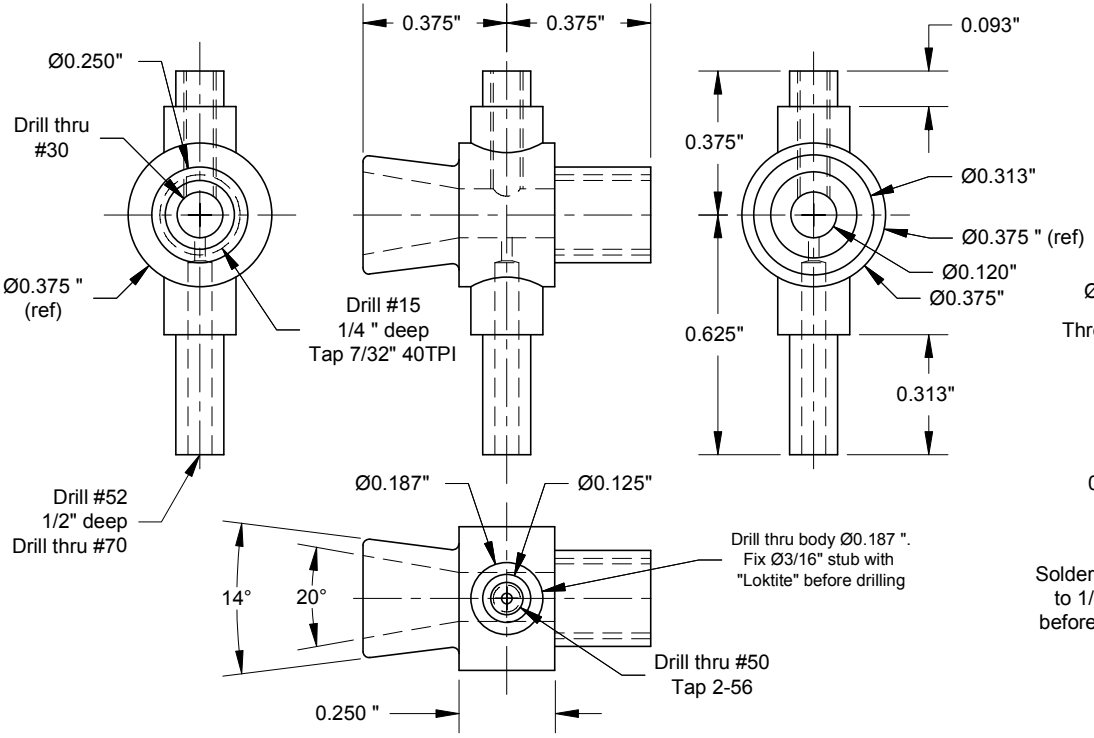
Brass



-1 BACKPLATE

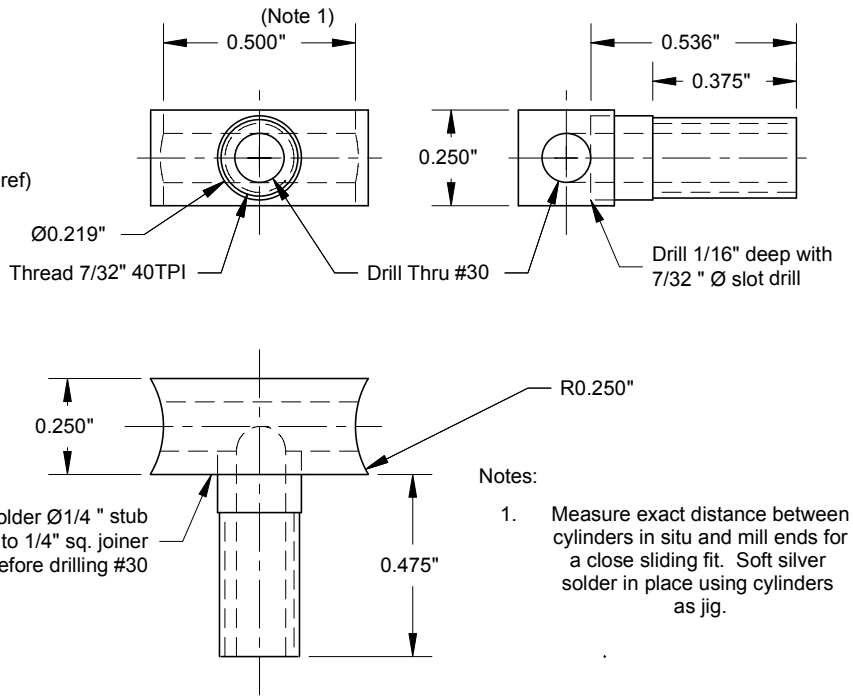
Aluminum

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Sparey Twin
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	BMBI 28 Dec 2000	NEXT ASSEMBLY		NUMBER: Sheet 3 - Odds 'n Sods
DATE	CHANGE	BY	CAD	BMBI 28 Dec 2000			



-2 VENTURI

3/8 " and 3/16 " Ø Aluminum

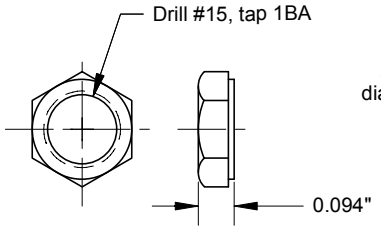


Notes:

1. Measure exact distance between cylinders in situ and mill ends for a close sliding fit. Soft silver solder in place using cylinders as jig.

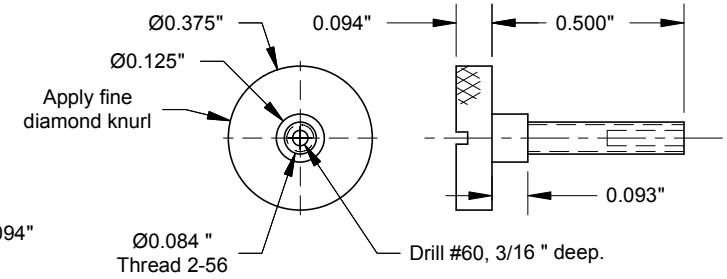
-1 CYLINDER JOINER

1/4" sq brass; 1/4" Ø brass



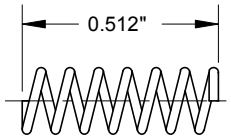
-3 JAM NUT

1/4 " AF Hex brass



-4 NEEDLE CARRIER

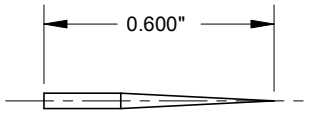
Brass (fabricate)



ID 1/8", close ends, 5 free turns.

-6 NEEDLE SPRING

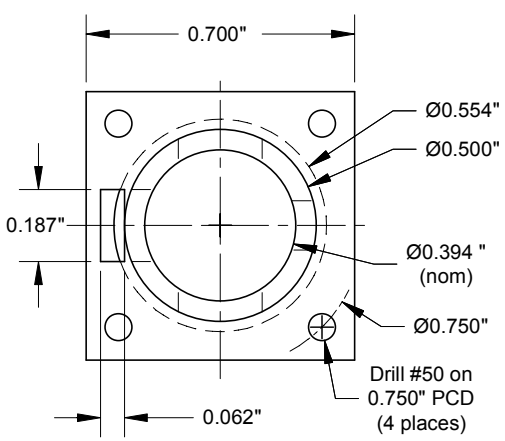
0.024" Music Wire



-5 NEEDLE VALVE

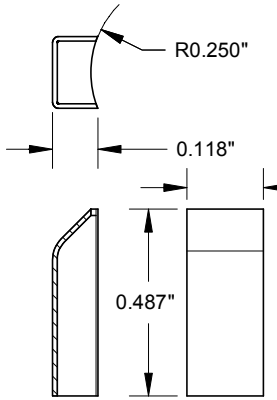
1mm Darning Needle

2001.01.24	Revise length of -1 Joiner	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Sparey Twin
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	BMBI 28 Dec 2000	NEXT ASSEMBLY		NUMBER: Sheet 4 - Fuel System
DATE	CHANGE	BY	CAD	BMBI 28 Dec 2000			

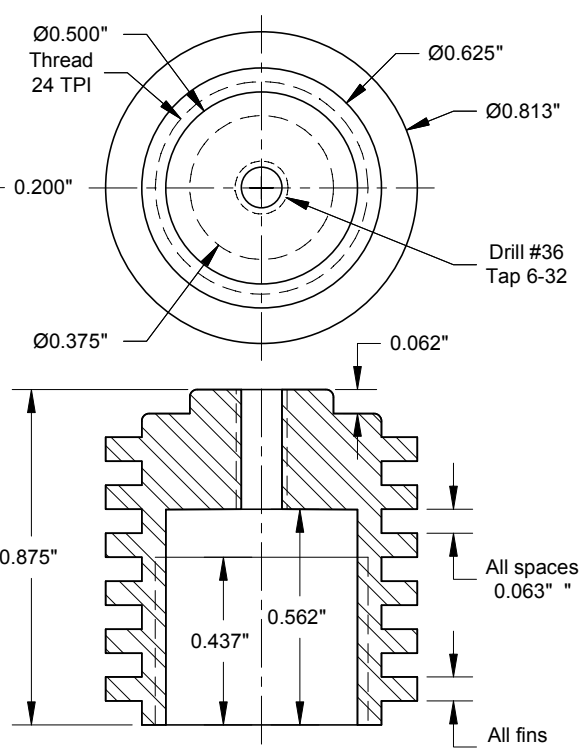


-1F CYLINDER

1.0 " Ø Steel

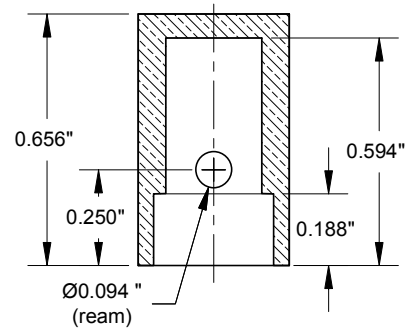


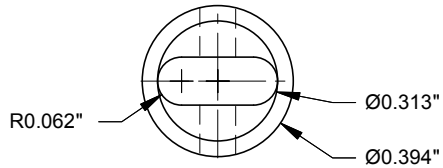
Fabricate bypass cover from 0.012" steel shim. Silver braze corners on the inside, then soft solver solder to cylinder.



-2F CYLINDER HEAD

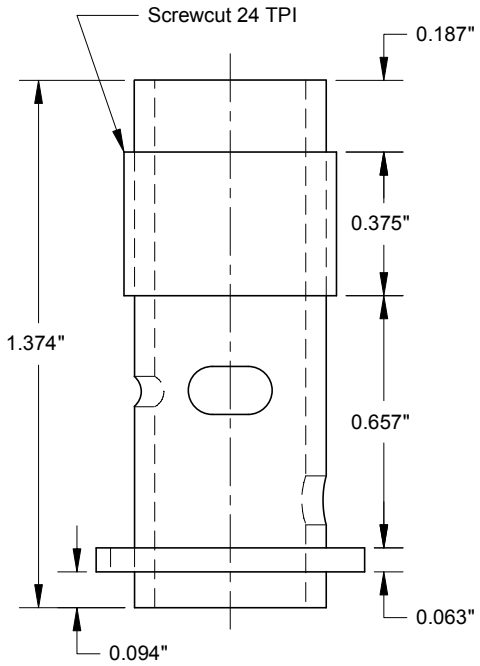
Aluminum

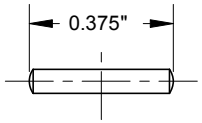




-3F PISTON

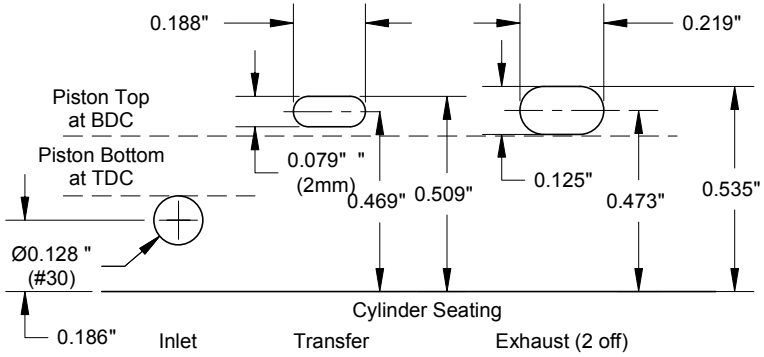
Cast Iron

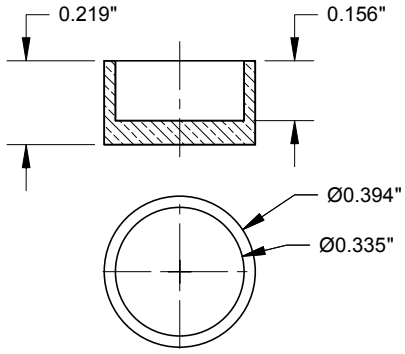




-5A Gudgeon Pin

1/16 "Ø Drill Rod





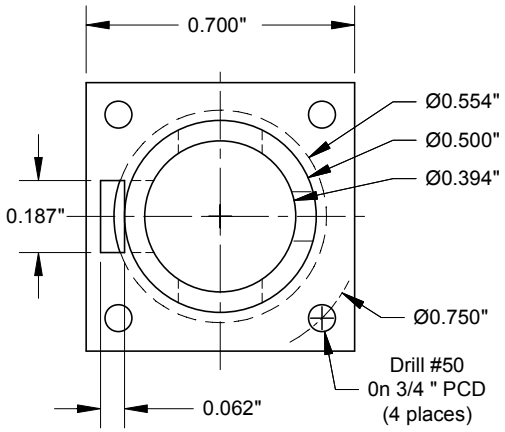
-4F CONTRA PISTON

Cast Iron

Note:

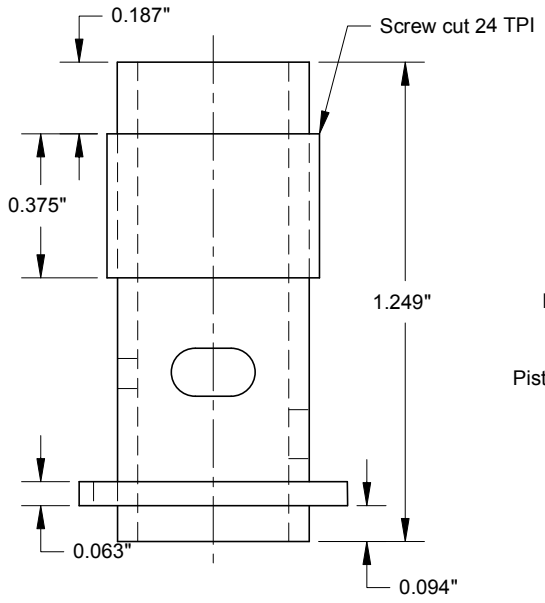
-xF (Forward) parts shown;
-xA (Aft) parts are identical

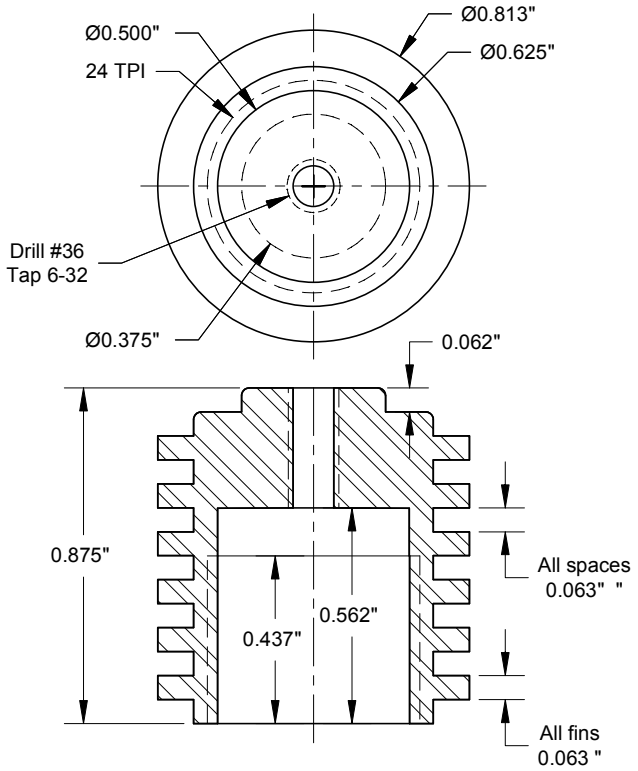
			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Sparey Twin
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	BMBI 27 Dec 2000	NEXT ASSEMBLY		NUMBER: Sheet 5 - Cylinder Assys
DATE	CHANGE	BY	CAD	BMBI 29 Dec 2000			



-1F CYLINDER

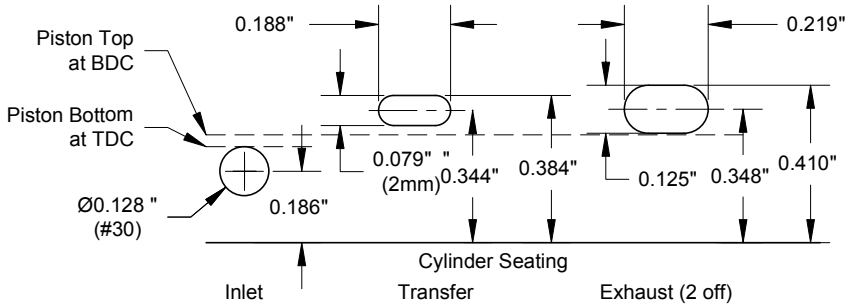
1.0 " Ø Steel

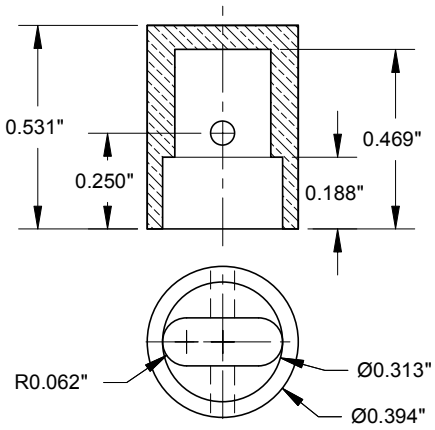




-2F CYLINDER HEAD

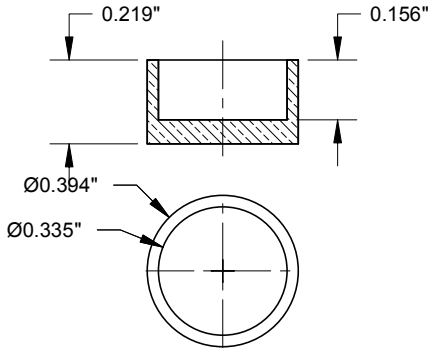
Aluminum





-3F PISTON

Cast Iron

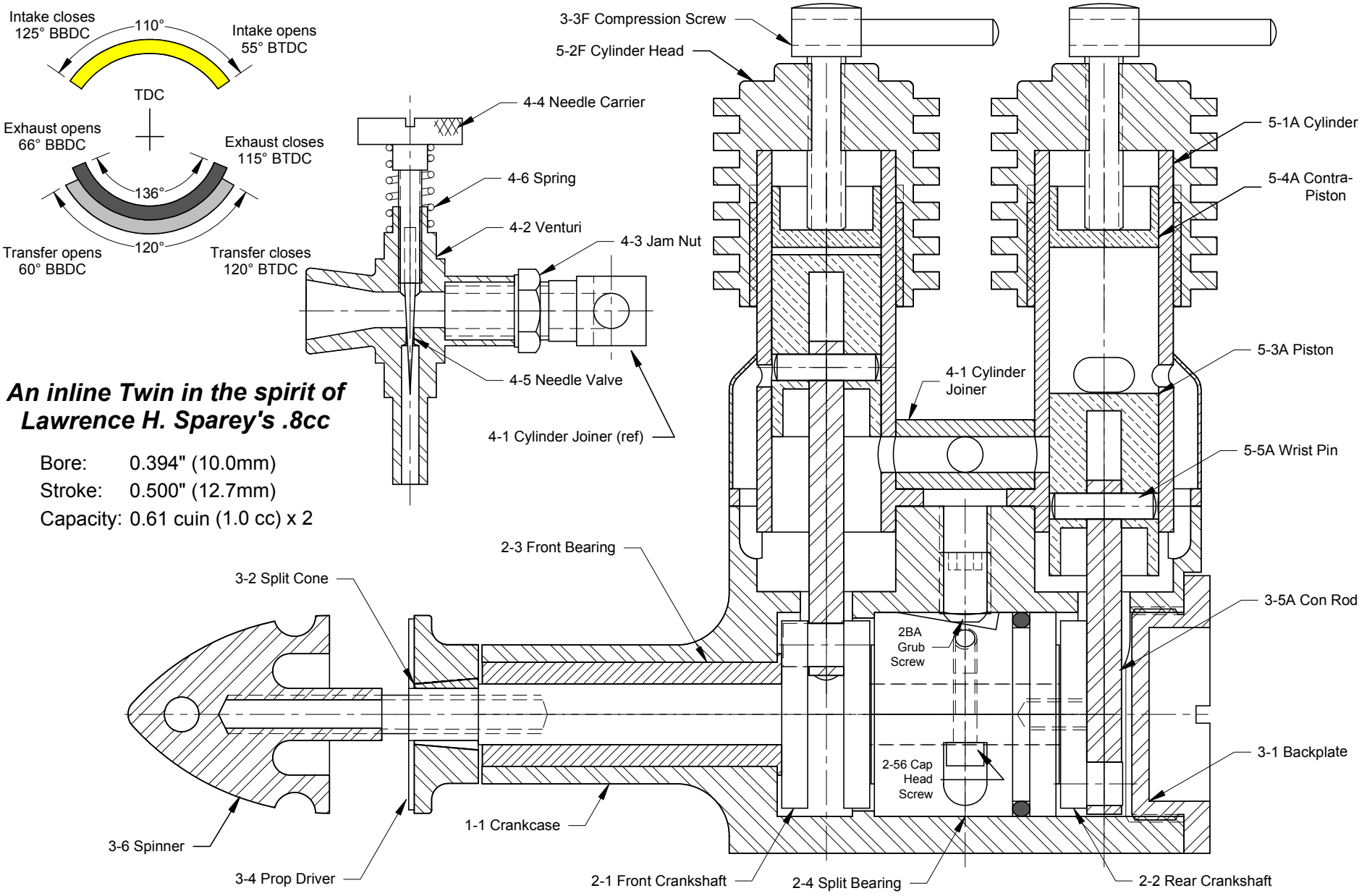


-4F CONTRA PISTON

Cast Iron

Note: -xF (Forward) parts shown;
-xA (Aft) parts are identical

			MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Sparey Twin
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	BMBI 27 Dec 2000	NEXT ASSEMBLY		NUMBER: Sheet 5a - Alternate Cylinder Assys
DATE	CHANGE	BY	CAD	BMBI 27 Dec 2000			



2001.01.24	Revise with changed parts.	BMBI	MAT'L	As Noted	DO NOT SCALE DRAWING	MOTOR BOYS (INTERNATIONAL)	NAME: Sparey Twin
			SCALE	2 X SIZE	WORK TO DIMENSIONS ALL DIMENSIONS ARE IN INCHES		
			DRAWN	BMBI 28 Dec 2000	NEXT ASSEMBLY		NUMBER: Sheet 6 - General Arrangement
DATE	CHANGE	BY	CAD	BMBI 28 Dec 2000			