248 cc

Crankcases.	Pattern-making.	Dowler.
Cylinder Head	" "	Mr Foster.
Cylinder Barrel	" "	Sample Casting inspected.
Crankshaft	" "	?
Kickstarter Cover	" "	Dowler.
Chaincase	" "	Dowler.
Cam Housing Cover	Pattern Made.	Sample Casting inspected.
Rocker Box Cover.	Pattern making here.	
Contact Breaker Cover.	" "	"
Timing Chain Tensioner Pad.	?	
Driving " " "	?	

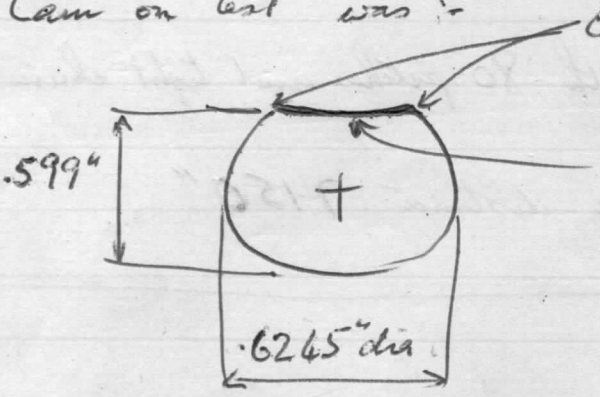
Notes on Arrangement re. the following:-

Thrust Washers on O.H.V. Rockers towards the front on both Rockers.
Adjustment of Foot Change.
Load at which release valves work.
Valve Timing.

---

125 cc Model "RE2" 24-10-50

Alternator Cam on test was :-



Clutch Worm Return Spring "RE-2" Wire gauge = 22 s.w.g. (.028")

Cylinder Head " " Mr Foster.
Cylinder Barrel " " Sample Casting inspected.
Crankshaft " " ?
Distributor Cover " " Dowler.
Magneto " " Dowler.
Cam Housing Cover Pattern Made. Sample Casting inspected.
Rocker Box Cover. Pattern making here.
Contact Breaker Cover " " "
Timing Chain Tensioner Pad ?
Driving " " " ?

Notes on Arrangement re. the following:-

Thrust Washers on O+IV Rockers towards the front on both Rockers.
Adjustment of Foot Change.
Load at which release valves work.
Valve Timing.

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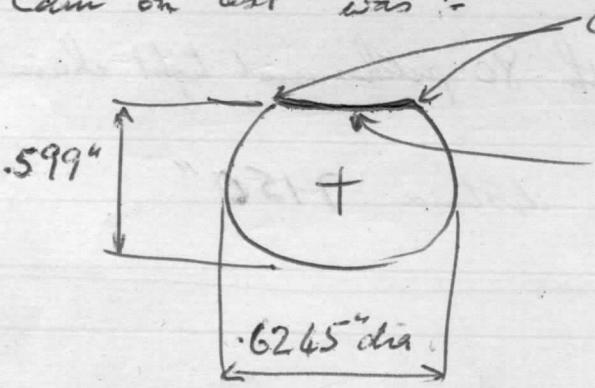
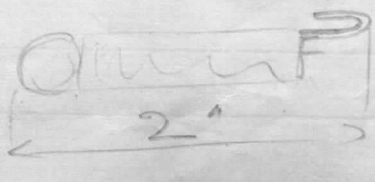
125 cc Model "RE2" 24-10-50

Alternator Cam on test was:-



Clutch Worm Return Spring "RE-2" Wire gauge = 22 swg (·028")
2" overall length Piano Wire
O/Dia = ·325"
Double Eye 5/16" ht. Dia.
Hook 1/16 internal 3/16 long



20-11-50 **248 cc OHV. MODEL**

Engine-Gearbox centres increased from 6·876" to 6·920"
6·874" horizontally to 6·918"

As Gear-change Cam Centre is not moved horizontally with Gear-box centre but the Cam remains ~~in the same position~~ centrally between the two gear-shafts the effective length of the foot-change internal lever is reduced slightly and the gear-change arm could be lengthened to give a more central position of the pads in relation to the sliding gears.

---

500 cc. OHV. Single. 13-12-50

Cylinder Head (Single Port) 26808 (918A)
Faster Head than later Single Port.
1" distance piece reqd. on inlet flange to enable carburetter to connect with Air Cleaner.

F.28 Unit-construction 5-4-51

25 T Engine Sprocket } 3/8" Pitch.
56 T Clutch Sprocket }
Centre distance with 80 pitches and tight chain = 7·163"

Make centre distance 7·150"

13-7-51 "R.E.-2"

CHECK ON ENGAGEMENT & DISENGAGEMENT OF K'START RATCHETS

C'case D/Side. From ℄ to inside Bearing = 1.7555" / 1.7495"
C'case T/Side. From ℄ to inside Bearing = .989" / .983"
From ℄ to outside of fixed ratchet - 2.760" / 2.735"

With mainshaft and clearance this becomes 2.782" / 2.735"

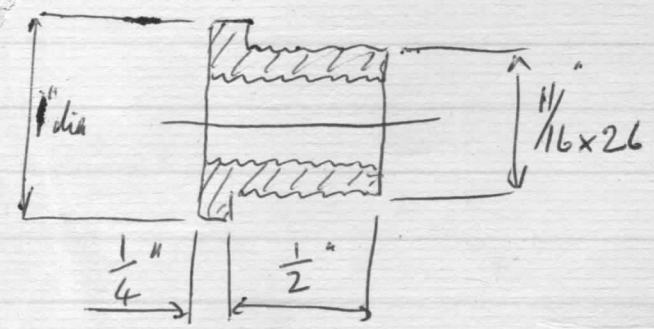
From ℄ to inside of moving ratchet in engaged position = 2.707" / 2.667"
with k'starter quadrant pushed outwards against inner face of cover.

∴ minimum engagement = 2.735" - 2.707" = .028"

and maximum movement for disengaging = 2.782" - 2.667"
= .115" + end clearance of k'start spindle.

28-8-51 500cc Twin Cylinder Heads — International Models

Bush screwed in to take Sparking Plug.



Head Spotfaced & drilled & Tapped. 3/64" off-centre to miss valve seating.

Matchless 500cc OHV TWIN 11-9-51

Outer Valve Spring. 1 5/16" o/dia x 1 3/16" long in position.
Valves 9/32" dia Stem?
1 3/8" dia Inlet } Head dia of valves
1 5/16" dia Exhaust }

V

12-9-51 — 248 cc OHV model.

Primary Drive. Chain No 110036 · 375" pitch x · 25" Roller x · 225" x 70 pitches.

Engine Sprocket 23T.
Clutch Sprocket 49T.
Centre Distance without a tensioner = 6·177"

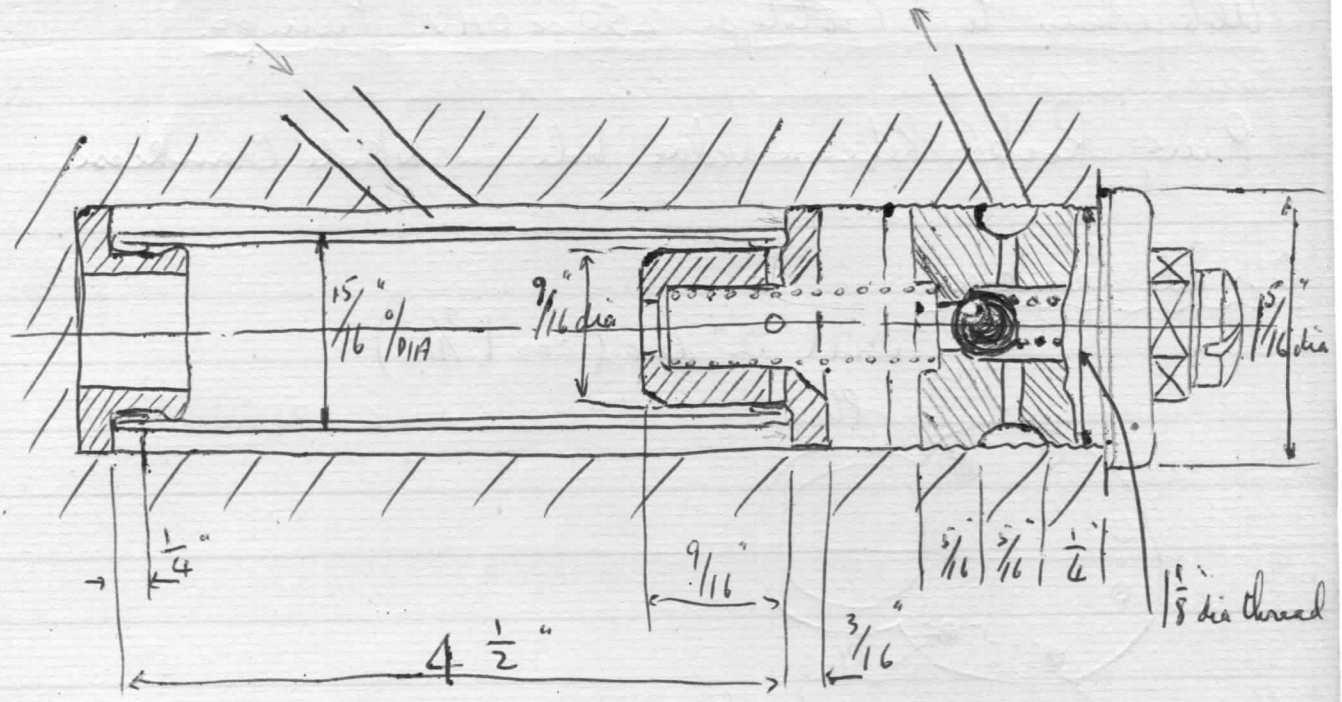
Gear type oil pump
24 D.P. 15T. · 625 pitch dias & centres.

Spiral gear drive from camshaft to pump: Normal D.P. = 24. 14T.
· 825" pitch dias & centres.

Worm Gear drive from mainshaft.
1⅛" Gear centres. 3 start worm. 14T wheel. 24 D.P.
2 5/8" from joint face of crankcase.

Camshaft Drive.

40 pitches	12T	24T	3/8 pitches	- 4·061" centres
40 pitches	13T	26T	3/8 pitch	- 3·762" centres
42 pitches	14T	28T	3/8 pitch	- 3·845" centres.



Matchless 500 twin felt oil cleaner

Rough Valve Timing on Prototype 250

I opens 1/4" BTDC (30°)	Ex Opens 5/8" B.B.D.C (60°)
I closes 1" ABDC (77°)	Ex Closes 3/8 A.T.D.C. (38°)

Advance 8½° on engine shaft.

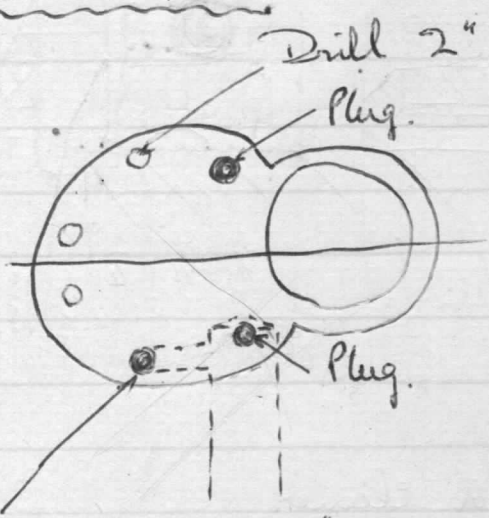
Valve Timing on Prototype 250 with revised cams.

I opens 13/64" BTDC (26½°)	Ex opens 25/32" B.B.D.C. (68½°)
I closes 7/16" A.B.D.C. (51°)	Ex closes 25/64" A.T.D.C (37°)
In correct	Ex 5° late

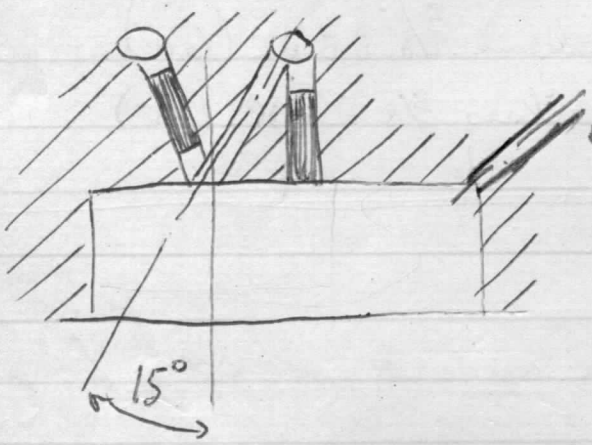
Alterations to Prototype 250 cc OHV. Pumps.

Plug Rocker Release Valve hole in N/Side Crankcase.

Off Side Crankcase.



Plug & Redrill 15/16" deep at 15° to break into hole from Pump.



↑ Vent back half of Pump into crankcase.

Oil Return hole to tank – Spotface ½" dia & Tap 5/16 BSF x ½" deep.

Fill in Groove on Pump Disc face.
Open out top plunger hole to .251 / .250 dia to take plunger W.13906 (Std G-2 feed)

Remove two extra pieces on Disc.
Re-lap in disc and assemble without extra washer and nip.

248cc OHV MODEL 9-4-52

Primary Chain 110036 x 72 pitches
23T - 52T Centre distance = 6.224"

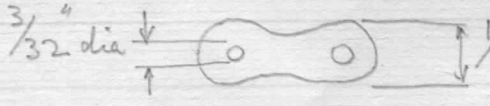
Secondary Chain 110046 x pitches
16T - 44T

} 6.2 Top Gear.

Camshaft Chain 114500 x 54 pitches
19T - 38T Centre Distance = 3.900"
114500 x 56 pitches = 4.225" Centre Distance.
114500 x 58 pitches = 4.548" " "
114500 x 50 pitches = 3.246" " "
114500 x 52 pitches = 3.574" " "
14T-28T 114500 x 38 pitches = 2.582" " "
" " " x 40 pitches = 2.908" " "

9/32

8 m/m Chain (duplex) 15/32" over plates 17/32" over rivets + 1/32" side movement



3/8" pitch Chain. Simple 13/32" over plates 1/2" over rivets + 1/32" side movement.
Duplex 13/16" over plates 7/8" over rivets + 1/32" side movement.

V

Clutch

Narrower ~~engine~~ sprocket. to allow for movement of clutch

350 cc. G-47. ✓

Cylinder Base Washer - Manilla "A" Paper .010" thick.

Push Rod Tube Washer Hallite

Inlet Value & Exhaust Value EN54 Head 1½" dia. $\frac{1}{16}$" dome. $\frac{1}{32}$" parallel $\frac{1}{16}$ chamfer at 45°. ¾" rad to .341" $^{+0}_{-\frac{1}{2}}$ stem dia. 18° incl taper for split collar.

Value Spring (Outer) 1⅛" inside dia $^{+\frac{1}{64}}_{-0}$. 1¾" long. 85-90 lbs compressed to $1\frac{33}{32}$" 5½ coils

" " (Inner) 13/16" inside dia. 1¾" long 35-40 lbs " " ⅞" 6½ coils point to point. Bend & Grind ends square.

Value Collar Top Hecla 68. Split Collar M.S. Stem Cap K.E. Cone Steel Harden & Temper.

Value Guide MK. 3. Nickel Chrome Alloy Iron Rod. Quench in oil at 875°C. for C.I. Heads. Harden & G.

.3447" / .3437" Bore .624" / .623" O/DIA.

Value Spring Collar (Bottom) Ann M.S.

Value Rockers. 2% Nickel steel Stmpg. C.H." & "G"

Rocks Bearing & Caps C.I.

Push Rods "A" Qual. Tube. Hard Drawn. ⅜" O/DIA x 19 S.W.G.

Push Rod End (Top) K.E. Cone Steel. Harden & Temper.

" " " (Bottom) M.S.

" " Cups V.B.A.S. C.H. Cup.

Tappets. V.B.A.S. C.H. & G. .375" / .374" dia stem. 1" dia x .104" / .094" head with 23° angle per side & $\frac{1}{16}$" rad. 5/32" Rad Spher. End.

Tappet Guides (Inlet & Short) MK. 3. Nickel Chrome Alloy Iron Rod. ground to 1" dia $^{+.005"}$ Quench in oil at 875°C.

(Exhaust-Long) .875" / .874" O/Dia .376" / .375" dia bore. 2⅛ & 2½" overall lengths

Cams V.B.A.S. C.H. & G. 1" dia bar Circle. 5/16" lift. .750" / .749" bore.

Gears - 2" pitch dia. 40 T. 20 D.P.

Cam Bushes Casebronze Tube .760" / .764" Dia x .616" / .620" Bore

Bore? O/DIA?

Cam Spindles Phoenix Steel "CH & G" .6245" / .6235" dia for Cams.

Dia of bore in C/case = .624" / .623" dia. for cam spindles. .626" / .625" dia into crankcase.

holes for idler pinion spindles = .498" / .497" dia. Tappet Guides .875" / .874" dia

hole for filler collar = 1¼" dia x 20 T.P.I. R.H. Whit.

248 cc OHV Model SHORT STROKE 70 mm Bore x 64.5 mm Stroke

Camshaft Drive

19 T — 38 T 114500 x 52 pitches.

Centre Distance = 3.574"

Combustion Chamber 1½" rad .905" (23 mm) high.

Primary Drive 3/8" pitch 21 T — 52 T 70 pitches.

Centre Distance = 5.991"

21 T - 50 T 70 pitches = 6.224" c/distance

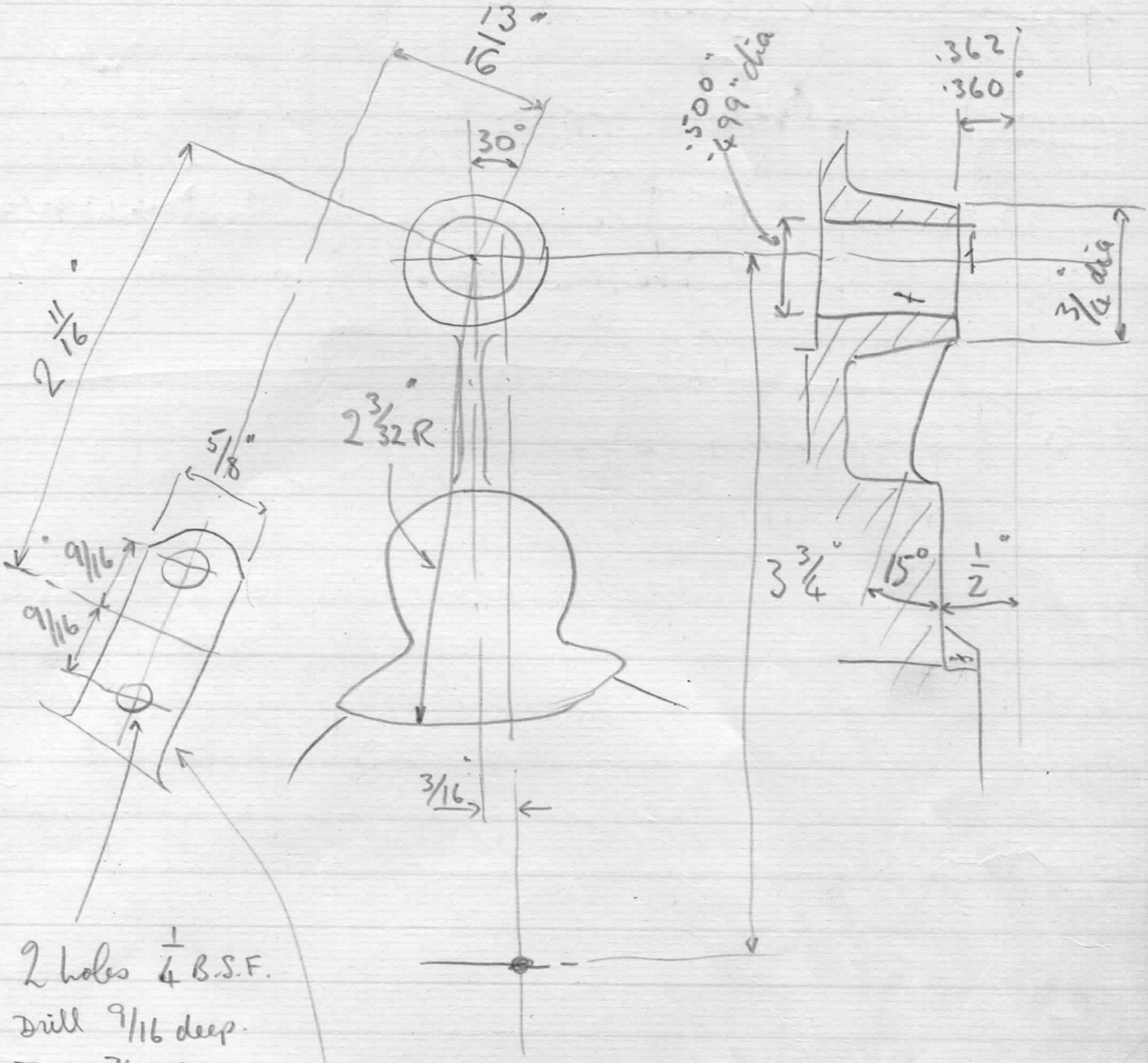
MODEL J-S. ROLLER BEARING BIG-END.

Conn Rod. .693" 1-9325"
.688" wide. 1-9315" dia bore.

Flywheels. .9995"
.9990" dia for crankpin. Chamfer $\frac{1}{16}$" × 45°
.703" wide 1.000" .997" from manifold face.
.121" instead of .106" dimension
Peg hole N° 43 drill (.089") 5/16" deep 7/8" from centre.
Recess for Thrust Washer 2.132" dia.
2.128"

Oil hole in T/Side 22° and 9/32" back from big end thrust washer face.

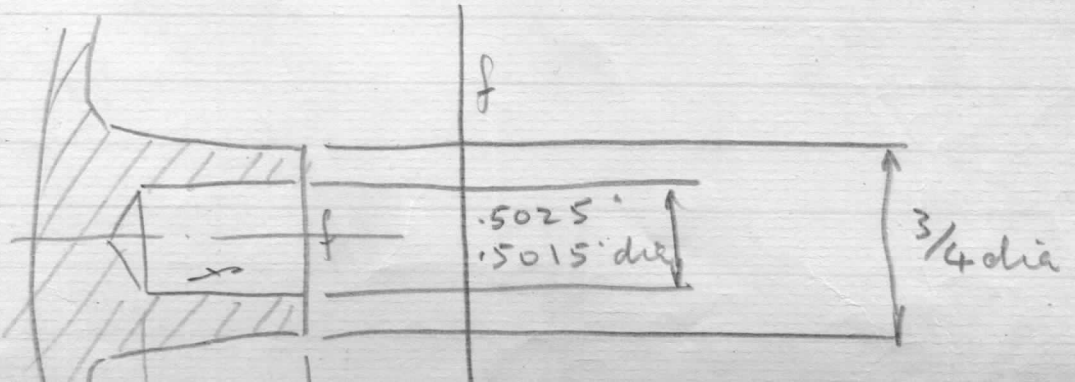
Modification to Crankcase 36503



2 holes 1/4 B.S.F.
Drill 9/16 deep.
Tap 7/16 deep.

This face 1/4" back from joint face.

Section thro' boss on Timing Cover 37449



Albion Gearbox (Excelsior Type)

Portion of Inside Operator Anchor Pin

Distance of Bottom of Bearing Recess from front face = 4.922"
" " Anchor Pin Boss " " " = 2.057"

$\frac{49}{23} \times \frac{49}{98}$

✓

248 cc OHV MODEL SHORT STROKE 70 M/M BORE x 64·5 M/M STROKE

Primary Drive 23 T - 49 T Centre Distance = 6·178"
Chain N° 110038 x 70 pitches.

Camshaft Drive 14 T - 28 T Centre Distance = 2·582"
Chain N° 114500 x 38 pitches.

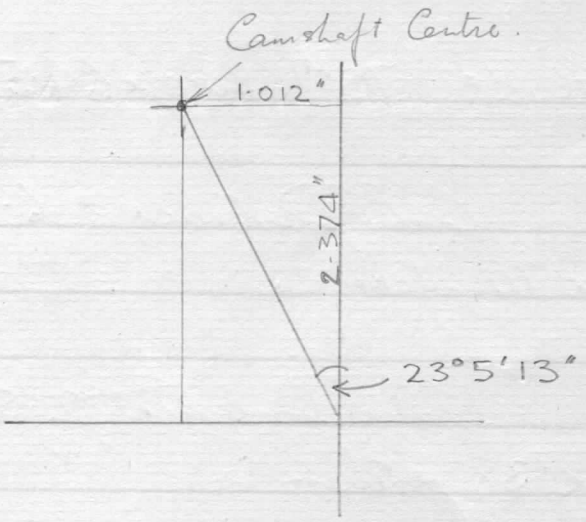
Angle of valves - 65° included.

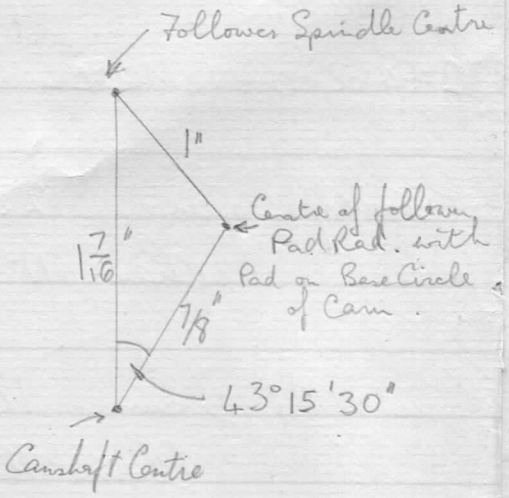
Final Drive 16 T - 49 T Chain N° 110046
= Top Gear Ratio 6·5 with 3·25 x 18 tyre on WM3-18 Rim

Final Drive for 3·25 x 17" tyre = 18 T - 49 T
Chain N° 110046
= Top Gear Ratio 5·8 3rd 7·83 2nd 10·64 1st 16·965

Geardrive to pump 20 D.P.
24 T — 1·200" Pitch dia 1·300" O/Dia 2 OFF
23 T — 1·150" Pitch dia 1·250" O/Dia 1 OFF (IDLER)

Generator (miller) max Taper 15/16 dia 7/8 long.



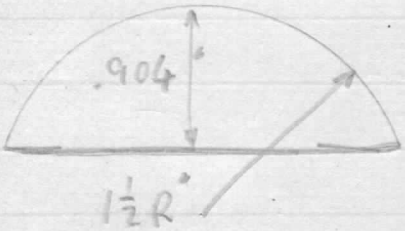


Kickstarter Ratios

	Primary Drive	K'starter	K'starter/Engine Ratio
Meteor	32:56 — 1·75	18:30 — 1·67	1·67 × 1·75 = 2·92
J	21:42 — 2	18:30 — 1·67	1·67 × 2 = 3·34
G	19:42 — 2·2	18:30 — 1·67	1·67 × 2·2 = 3·67
J·S & 500 TWIN	25:56 — 2·24	18:30 — 1·67	1·67 × 2·24 = 3·74
New 250	23:49 — 2·13	15:27 — 1·8	1·8 × 2·13 = 3·83
S	17:42 — 2·47	15:27 — 1·8	1·8 × 2·47 = 4·45

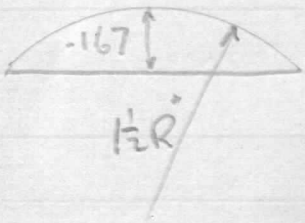
Compression Ratio

9.3.53



$V = 3.1416 \times .904^2 \times \left(1.5 - \frac{.904}{3}\right)$

Cylinder Head = 3.0788 cu ins. +



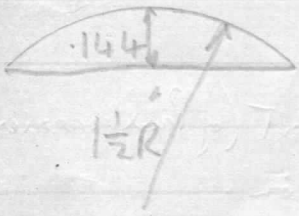
$V = 3.1416 \times .167^2 \times \left(1.5 - \frac{.167}{3}\right)$

$= .1257$ cu ins.

1 13/32 dia × 1/32 deep. $V = 1.553 \times .031 = .0481$ cu ins

1 7/16 dia × 1/32 deep. $V = 1.623 \times .031 = .0503$ cu ins

Inlet Valve = .2241 cu ins. −



$V = 3.1416 \times .144^2 \times \left(1.5 - \frac{.144}{3}\right)$

$= .0942$ cu ins.

1 5/16 dia × 1/32 deep = 1.353 × .031 = .0419 cu ins.

1 11/32 dia × 1/32 deep = 1.418 × .031 = .0440 cu ins.

Exhaust Valve = .1801 cu ins. −

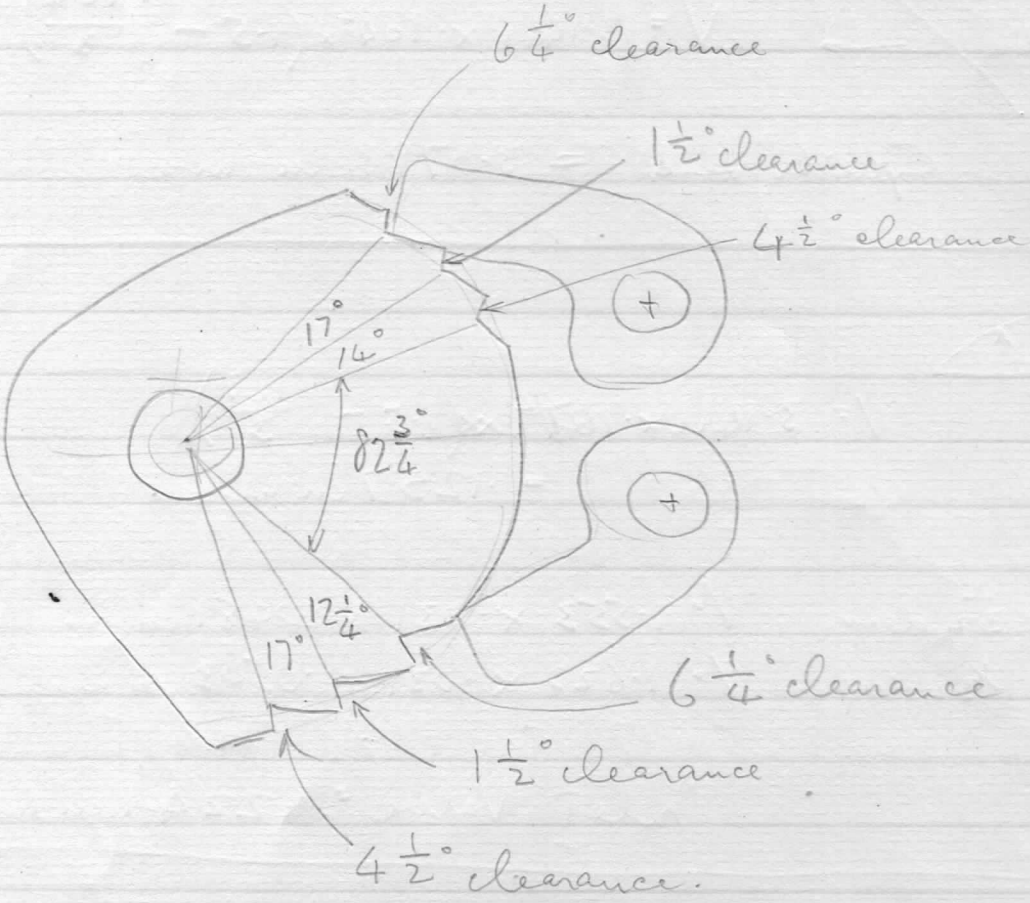
Estimated Volume of Recesses in Valve Heads = .081 cu ins. +

3.0788	.2241	3.1598
.0810	.1801	.4042
3.1598	.4042	3.7556 cu ins = 45.15 cu cms

Volume of Combustion Chamber

9/64 dome on piston (Std "Meteor") = .38 cu ins = 6 cu cms.

248cc Foot Change. 5-6-53



17° + 1½° working clearance = 18½° total movement (of Pawl carrier) in each direction.

EN. 41 Nitriding Steel suitable for cam followers

J-S Compression Ratios.

Volume of Combustion Chamber with Std Piston & Gasket calculated to be 90·73 ccs. (Taking Std CR as 6·5:1)

Difference in volume through not using gasket (allowing .04" thickness) = ·3447 cu ins

Volume of Std Piston "dome" = 1·643 cu ins.

∴ Volume of Combustion Chamber with flat top piston & without gasket would be 90·73 ccs + 1·643 cu ins − ·3447 cu ins

= 90·73 ccs + 1·298 cu ins

= 90·73 ccs + 21·27 ccs = 112 ccs.

Volume required to give 9·5:1 C.R. = 58·7 ccs.

∴ Volume of Piston dome to give this ratio = 112 − 58·7

= 53·3 ccs = 3·25 cu ins.

Allowing ·05 cu ins for valve "cut-aways"

then "dome" should equal 3·3 cu ins

Height of dome = $^{23}/_{32}$"

C.R. with Std Piston & <u>without</u> gasket found to be 7·1:1

∴ Volume of Combustion Chamber = 81·8 ccs. = 4·99 cu ins

Volume of Std Piston "Dome" = 1·643 cu ins.

∴ Volume of Combustion Chamber with flat top piston & without gasket would be 4·99 + 1·643 = 6·633 cu ins.

Volume required to give 9·5:1 CR = 58·7 ccs = 3·581 cu ins.

∴ Volume of piston dome to give this ratio =

6·633 − 3·581 = 3·052 cu ins.

Allowing ·15 cu ins for valve "cutaways"

then "dome" should equal 3·2 cu ins

Height of dome = 45/64" (Rad = 2 $^1/_4$")

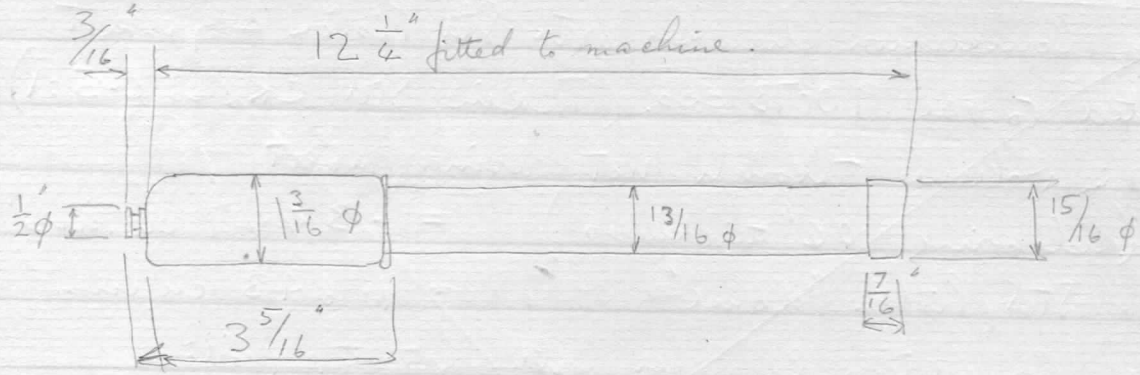
Volume required to give 8:1 CR = 71·3 ccs = 4·349 cu ins

∴ Volume of piston dome to give this ratio = 6·633 − 4·349 = 2·284 cu ins

Allowing ·07 cu ins for valve "cutaways"

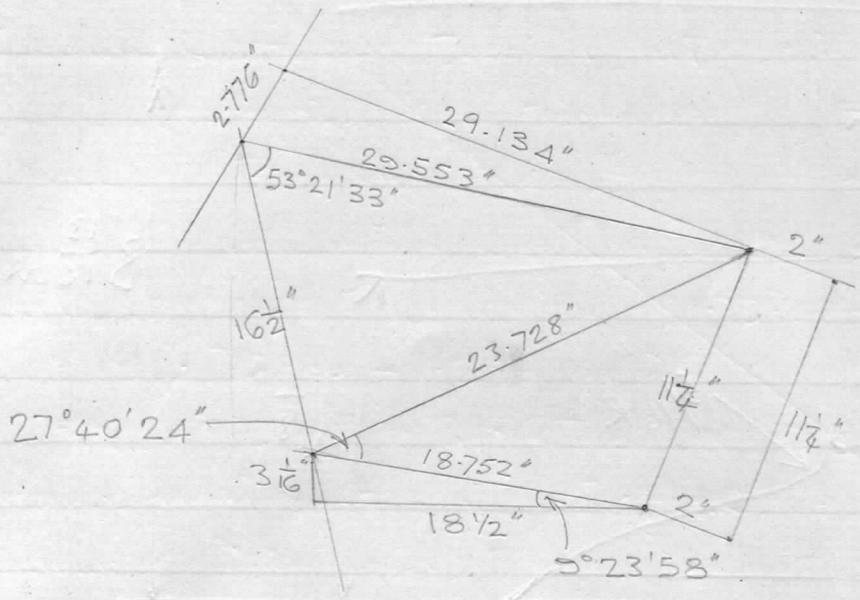
then dome" should equal 2·35 cu ins.

Height of dome = 17/64"



TYRE INFLATOR 21/9/53

248cc OHV MODEL FRAME 7-9-53



250cc machine 9-10-53

O/dia of Rear wheel 17" Rim with 3·25 tyre = 24 3/4"
O/dia of Front " 17" " " " ? " = 24 1/4"

.656
.257
.399

500 Gold Star BSA In Valve Head.