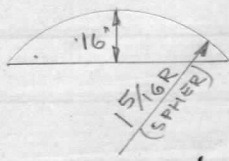


$$V = 3.1416 \times 1^2 \left(\frac{15}{16} - \frac{1}{3} \right) = 3.1416 \times .9792$$

Cylinder Head

= 3.0763 cu ins. +



$$V = 3.1416 \times .16^2 \left(\frac{15}{16} - \frac{.16}{3} \right)$$

= .1012 cu ins.

$1 \frac{3}{32}$ " dia $\times \frac{1}{32}$ " deep.

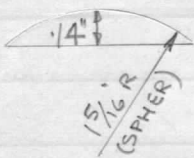
$V = 1.2893 \times .0312 = .0402$ cu ins.

$1 \frac{5}{16}$ " dia $\times \frac{1}{32}$ " deep.

$V = 1.353 \times .0312 = .0422$ cu ins.

Inlet Valve.

= .1836 cu ins. -



$$V = 3.1416 \times .14^2 \left(\frac{15}{16} - \frac{.14}{3} \right)$$

= .0779 cu ins.

$1 \frac{7}{32}$ " dia $\times \frac{1}{32}$ " deep

$V = 1.1666 \times .0312 = .0364$ cu ins.

$1 \frac{1}{4}$ " dia $\times \frac{1}{32}$ " deep.

$V = 1.2272 \times .0312 = .0383$ cu ins.

1" dia $\times \frac{1}{16}$ " deep.

$V = .7854 \times .0625 = .0491$ cu ins.

Exhaust Valve.

= .2017 cu ins. -

Volume of recess in Inlet Valve Head = $3.1416 \times .2^2 \left(\frac{5}{16} - \frac{.2}{3} \right) = .0308$ cu ins. +

" " " " Exhaust " " = $.2618 \times \frac{7}{8}^2 \times \frac{1}{4} = .0501$ cu ins. +

3.0763

.1836

.0308

.2017

-.0501

.3853

3.1572

3.1572

.3853

2.7719

cu ins.

= 45.42 cu. cms. Volume of Combustion Chamber

C. R. = $248 + 45 : 45 = 293 : 45$

Model C.O. Valve Timing.

28-12-45.

Inlet .004" clearance.

Opens. 15° before T.D.C.

Closes. 60° after B.D.C.

Exhaust .008" clearance.

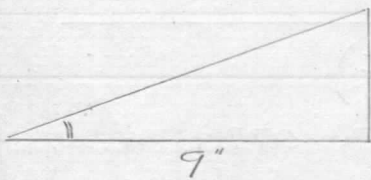
Opens 70° before B.D.C.

Closes 25° after T.D.C.

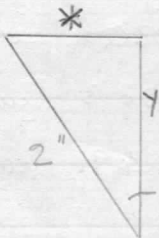
Chaincase. (Back Half) Drg. N^o 1275A. Model G-46.

Dimensions for Jig-Boring.

.0098
.0238
.589

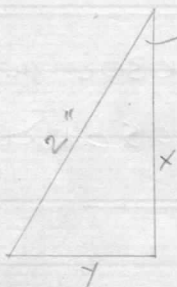


Cot. = $\frac{9}{1}$ $L = 6^\circ 20' 25''$



$\sin L = \frac{x}{2}$ $x = 2 \sin L = 2 \times .50994 = 1.01988$

$\cos L = \frac{y}{2}$ $y = 2 \cos L = 2 \times .86021 = 1.72042$

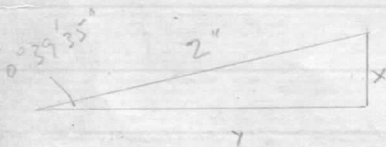


$\sin L = \frac{y}{2}$ $y = 2 \sin L = 2 \times .48999 = .97998$

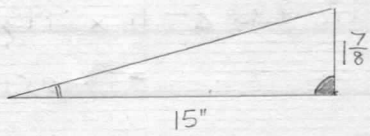
$\cos L = \frac{x}{2}$ $x = 2 \cos L = 2 \times .87172 = 1.74344$

$\sin L = \frac{x}{2}$ $x = 2 \sin L = 2 \times .01151 = .02302$

$\cos L = \frac{y}{2}$ $y = 2 \cos L = 2 \times .99993 = 1.99986$

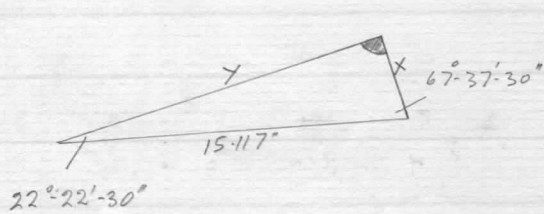


496 cc. O.H.V. TWIN. FRAME.



$$\tan L = \frac{1\frac{7}{8}}{15} = .125$$

$$L = 7^{\circ}-7'-30''$$

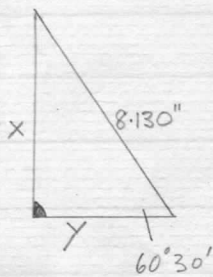


$$\text{Sine } 22^{\circ}-22'-30'' = \frac{x}{15.117}$$

$$\therefore x = 15.117 \times .380665 = \underline{5.755''}$$

$$\text{Cosine } 22^{\circ}-22'-30'' = \frac{y}{15.117}$$

$$\therefore y = 15.117 \times .924715 = \underline{13.979''}$$



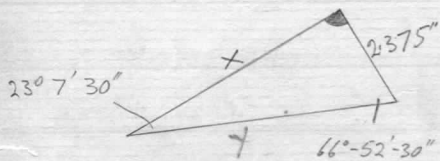
$$\frac{5.755}{2.375} = \frac{x}{8.130}$$

$$\text{Sine } L = \frac{x}{8.13}$$

$$\therefore x = 8.13 \times .87035 = \underline{7.076''}$$

$$\text{Cosine } L = \frac{y}{8.13}$$

$$\therefore y = 8.13 \times .49242 = \underline{4.003''}$$

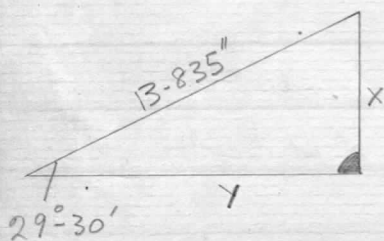


$$\tan 66^{\circ}-52'-30'' = \frac{x}{2.375}$$

$$\therefore x = 2.375 \times 2.34165 = \underline{5.561''}$$

$$\text{Secant } 66^{\circ}-52'-30'' = \frac{y}{2.375}$$

$$\therefore y = 2.375 \times 2.5462 = \underline{6.047''}$$

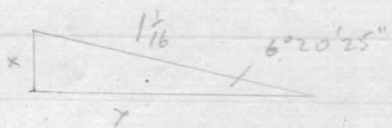


$$\text{Sine } L = \frac{x}{13.835}$$

$$\therefore x = 13.835 \times .49242 = \underline{6.813''}$$

$$\text{Cosine } L = \frac{y}{13.835}$$

$$\therefore y = 13.835 \times .87035 = \underline{12.041''}$$



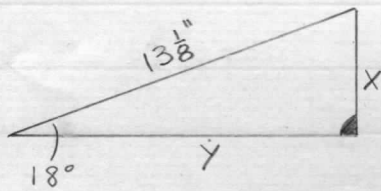
$$\sin C = \frac{x}{1\frac{1}{16}} \quad x = 1\frac{1}{16} \sin C = 1\frac{1}{16} \times .11045 = .11735$$

$$\cos C = \frac{y}{1\frac{1}{16}} \quad y = 1\frac{1}{16} \cos C = 1\frac{1}{16} \times .99388 = 1.05599$$

1285. A

$$\begin{array}{r} 180 \\ 75 \\ \hline 2 \overline{) 105} \\ 2 \overline{) 52 \frac{1}{2}} \\ 26 \frac{1}{4} \end{array}$$

$$\begin{array}{r} 180 \\ 95 \\ \hline 2 \overline{) 95} \\ 2 \overline{) 47 \frac{1}{2}} \\ 23 \frac{3}{4} \end{array}$$

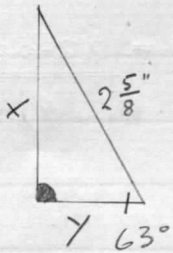


$$\text{Sine } L = \frac{x}{13\frac{1}{8}}$$

$$\therefore x = 13\frac{1}{8} \times .30902 = \underline{\underline{4.056''}}$$

$$\text{Cosine } L = \frac{y}{13\frac{1}{8}}$$

$$\therefore y = 13\frac{1}{8} \times .95106 = \underline{\underline{12.483''}}$$



$$\text{Sine } L = \frac{x}{2\frac{5}{8}}$$

$$\therefore x = 2\frac{5}{8} \times .89101 = \underline{\underline{2.339''}}$$

$$\text{Cosine } L = \frac{y}{2\frac{5}{8}}$$

$$\therefore y = 2\frac{5}{8} \times .45399 = \underline{\underline{1.192''}}$$

12.041"

9.500"

4.625"

12.483"

4.003"
13.503"

7.076"

1.192"

6.813"

25.716"

4.056"

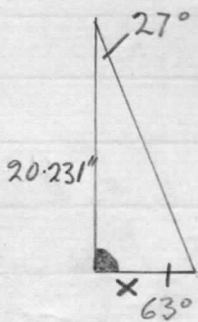
13.503"

22.570"

12.213"

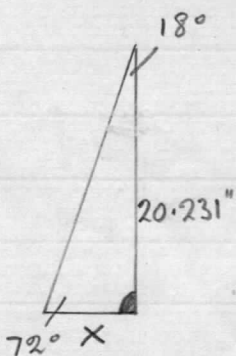
2.339"

20.231"



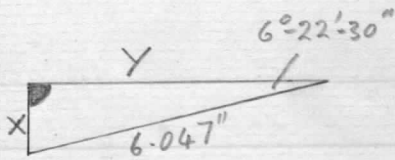
$$\text{Tan } 27^\circ = \frac{x}{20.231}$$

$$\therefore x = 20.231 \times .50952 = \underline{\underline{10.308''}}$$



$$\text{Tan } 18^\circ = \frac{x}{20.231}$$

$$\therefore x = 20.231 \times .32492 = \underline{\underline{6.573''}}$$

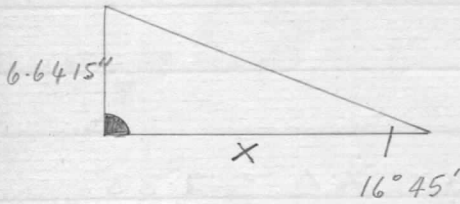


$$\text{Cosine } L = \frac{y}{6.047}$$

$$\therefore y = 6.047 \times .993815 = \underline{\underline{6.01''}}$$

$$\text{Sine } L = \frac{x}{6.047}$$

$$\therefore x = 6.047 \times .111035 = \underline{\underline{.671''}}$$



$$\text{Cotan } L = \frac{x}{6.6415}$$

$$\therefore x = 6.6415 \times 3.3226 = \underline{\underline{22.067''}}$$

$$\begin{array}{r} 1.5157 \\ \underline{\quad 2} \\ 3.0314 \\ \quad .795 \\ \underline{\quad 2} \\ 2.2364'' \end{array}$$

$$\begin{array}{r} 50.8001 \\ 5.080 \\ .762 \\ .152 \\ \hline 56.794 \end{array}$$

$$\begin{array}{r} 2.54 \\ 1.778 \\ 127 \\ \hline 4.445 \end{array}$$

$$\begin{array}{r} 19\frac{3}{4} \\ 139\frac{1}{2} \\ \underline{\quad 2} \\ 79 \\ \underline{\quad 2} \\ 58 \end{array}$$

$$\begin{array}{r} 90-0-0 \\ 54-16-55\frac{1}{2} \\ \underline{\quad 2} \\ 35-43-4\frac{1}{2} \\ \underline{\quad 2} \\ 70-26-9 \end{array}$$

Twin

Ex O 120-33-51 before B.D.C.

Ex C 83-26-9 after T.D.C.

In O. 70-51-35 before T.D.C.

In C. 109-8-25 after B.D.C.

Without any clearances.

125 cc. Model R-E-48.

17/1/47

Primary chain:- $\cdot 375$ " Pitch $\times \cdot 25$ " dia. roller $\times \cdot 225$ " wide. (46 pitches) (chain track max $\cdot 65$ "
 Centre distance = $4\cdot 506$ " ($2\frac{5}{8}$ from Φ)

Engine Sprocket = 14T. Primary driven sprocket = 29T.

Secondary chain:- $\cdot 500$ " Pitch $\times \cdot 335$ " dia. roller $\times \cdot 205$ " wide (chain track max $\cdot 75$ "

Final Drive Sprocket = 14T. Rear Wheel Sprocket = 51T.

Top Gear ratio = $7\cdot 55$ ($2\frac{1}{16}$ from Φ)

Kick Starter Gears.

Normal diametral pitch = 14. Spiral angle = 30° . Centre distance = $1\cdot 6084$ "

Pinion = 12T L.H.

Gear = 27T

R.H.

Pitch Dia = $\cdot 9898$ "

Pitch Dia = $2\cdot 2269$ "

Outside Dia = $1\cdot 1327$ "

Outside Dia = $2\cdot 3698$ "

Lead of Spiral = $5\cdot 387$ "

Lead of Spiral = $12\cdot 117$ "

Bottom Dia = $\cdot 8245$ "

Bottom Dia = $2\cdot 0616$ "

496 cc TWIN OHV Vertical

13/3/47

Flywheels. Balance weights extends 60° each side of Vertical Φ from $1\frac{3}{4}$ " rad inside. (without locating hole)

If taken right into centre boss will extend 46° each side of Vertical Φ . (without locating hole)

Moment of inertia of balance weight estimated from flywheels machined for first 2 machines = $1\cdot 311$ in/lbs.

If taken right into centre boss (with locating hole) will extend 50° each side of Vertical Φ .

B.S.A Vertical TwinValve Timing.

I.O. 24° Before T.D.C.

I.C. 65° after B.D.C.

E.O. 60° before B.D.C.

E.C. $21\frac{1}{2}^{\circ}$ after T.D.C.

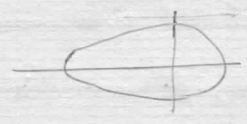
Inlet T.D.C. $39^{\circ} 54'$

$$\begin{array}{r}
 72 - 48 - 31 \\
 40 - 10 - 16\frac{1}{2} \\
 \hline
 112 - 58 - 47\frac{1}{2} \\
 180 \\
 \hline
 292 - 58 - 47\frac{1}{2} \\
 7 \cdot 30 - 0 \\
 \hline
 285 - 28 - 47\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 360 - 0 - 0 \\
 285 - 28 - 47\frac{1}{2} \\
 \hline
 74^{\circ} - 31' - 12\frac{1}{2}'' \\
 \hline
 140^{\circ} - 6' - 0'' \\
 214 - 37 - 12\frac{1}{2} \\
 \hline
 360 - 0 - 0 \\
 214 - 37 - 12\frac{1}{2} \\
 \hline
 145 - 22 - 27\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 74^{\circ} - 31' - 12\frac{1}{2}'' \\
 2 \\
 \hline
 149 - 2 - 25'' \\
 140 - 6 - 0 \\
 \hline
 289 - 8 - 25''
 \end{array}$$

$$\begin{array}{r}
 360 - 0 - 0 \\
 289 - 8 - 25 \\
 \hline
 70^{\circ} - 51' - 35'' \text{ Before T.D.C.}
 \end{array}$$



without clearance.

$$\begin{array}{r}
 70 \cdot 51 \cdot 35 \\
 43 \cdot 0 \cdot 0 \\
 \hline
 27^{\circ} - 51' - 35'' \text{ with } .004'' \text{ clearance.}
 \end{array}$$

= .175" B.T.D.C. or $4\frac{1}{2}$ mm.

$$\begin{array}{r}
 67^{\circ} 0' 12'' \\
 40^{\circ} 10' 16\frac{1}{2}'' \\
 26^{\circ} 49' 55\frac{1}{2}'' \\
 7 \cdot 30 \\
 \hline
 34^{\circ} 19' - 55\frac{1}{2}'' \\
 2 \\
 \hline
 68^{\circ} 39' - 51''
 \end{array}$$

$$\begin{array}{r}
 140^{\circ} - 6' - 0'' \\
 68^{\circ} - 39' - 51'' \\
 \hline
 71^{\circ} - 26' - 9''
 \end{array}$$

$$\begin{array}{r}
 180 - 0 - 0 \\
 71 - 26 - 9 \\
 \hline
 108^{\circ} - 33' - 51'' \text{ Before B.D.C. without clearance}
 \end{array}$$

$$\begin{array}{r}
 108^{\circ} - 33' - 51'' \\
 39^{\circ} - 30' - 0'' \\
 \hline
 69^{\circ} - 3' - 51'' \text{ with } .008'' \text{ clearance.} = .795'' \text{ B. BDC}
 \end{array}$$

= 2.236" aft. T.D.C. or $56\frac{3}{4}$ mm.

Inlet opens $27^{\circ} - 51' - 35''$ or .22" or $5\frac{1}{2}$ mm. Before T.D.C. (with .004" clearance)
($70^{\circ} - 51' - 35''$ without clearance)

Exhaust opens $69^{\circ} - 3' - 51''$ Before B.D.C. (with .008" clearance) = .80" or $20\frac{1}{2}$ mm.
Before B.D.C.
($108^{\circ} - 33' - 51''$ Before B.D.C. without clearance)

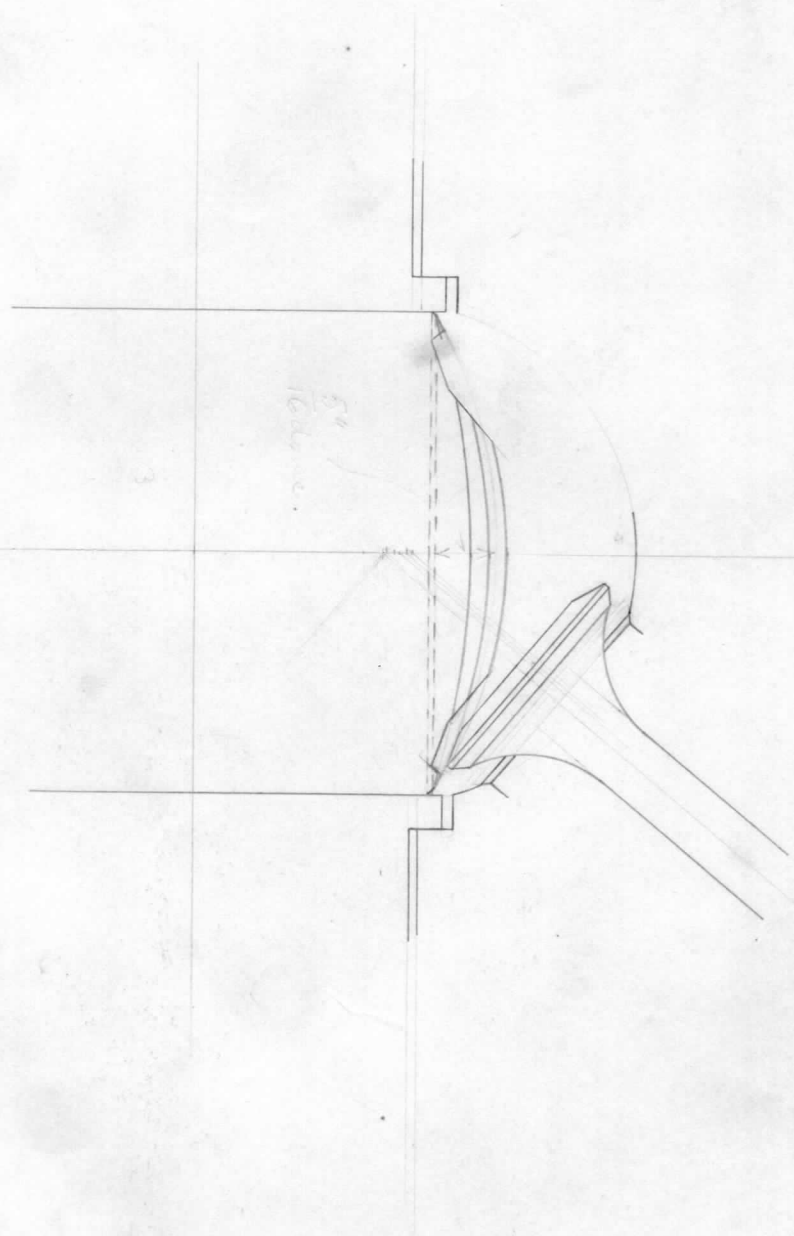
" " 2-5095 " 2-5125 " Bottom ✓
Y alloy 2-5090 " Top of skirt. 2-5120 " of skirt.

2-4885 " "
2-4880 3 lands.

Silicon 2-51325 2-51625 Bottom
2-51275 top of skirt 2-51575 of skirt

2-489 -
2-488 3 lands

496 cc. OH.V. TWIN.



6.5:1 C.R. \approx $\frac{3}{16}$ Dome.

7:1 C.R. \approx $\frac{3}{32}$ Dome.

7.5:1 C.R. \approx $\frac{3}{8}$ Dome.

Volume of Combustion Chamber with flat-topped piston
& Copper/Asbestos gasket as measured by Mr Wilson-Jones
= 46.8 ccs. = 6.3:1 Ratio.

From above figures:- Volume of Combustion Chamber with
domed piston (.145" dome) = 41.3 ccs = 7:1 Ratio.

Original estimate of Volume of Combustion Chamber
without Copper/Asbestos gasket = 45.4 ccs = 6.5:1 Ratio

From above figures:- Volume of Combustion Chamber with Copper/Asbestos
gasket and flat-topped piston = 50.75 ccs. = 5.9:1 Ratio.

And Volume with Copper/Asbestos gasket and domed
piston = 45.2 ccs. = 6.5:1

Volume as measured by Mr Neale = 46.5 ccs (6.3 C.R.) & 47.5 ccs (6.2)

One piston was .015" small on height of crown.

∴ correct figure = 46.5 ccs with .145" dome.

Volume of .145" dome = 5.5 ccs

" " $\frac{9}{32}$ " " = 10.8 ccs.

∴ Volume of Combustion Chamber with $\frac{9}{32}$ " dome = 46.5 + 5.5 - 10.8
= 41.2 ccs. = 7.02 C.R.

Ex. Valve $\frac{1}{8}$ " from seat at T.D.C.

Prints issued to Westwood.

1 off following:- 33918 (1376A); 33940; 33939; 32526 (7278m);
32523 (7278m); 33917 (1374A); 33919 (1375A);
33924 (1377A); 32705 (7310m); 32706 (7310m);
32504 (1308A); 32505 (1307A); 32506 (1307A);
32547 (7279m); 32548 (7279m); 32552 (7285m);
32564 (7562m)

125 cc. Model R-E-48

27/6/47

Engine Sprocket Rollers.

Clearance between rollers same as existing R-E "Big-End".

Crankshaft Dia = .6131" Dia.
.6127" Dia.

Sprocket Bore = .9889"
.9885" Dia.

N^o. of Rollers = 13 - Roller Dia = .1875"
.1874" dia

Pitch Dia. of Rollers = .80062". Clearance between Rollers = .004095"

125 c.c. Stationary Engine.

Induction Pipe Valve Spring with "Amal" Butterfly type Carburettor.

Free length = 5/8" working length approx 3/8" 5 coils. (3/16 pitch)

32 swg. (.0108")

125 cc Model R-E

Primary Drive 14 x 44 } 7.633 Top - Present R.E.

Secondary 14 x 34 }

Primary 15 x 29 } 7.595

Secondary 14 x 55 }

Primary 15 x 29 } 7.585

Secondary 13 x 51 }

Primary 15 x 29 } 7.572

Primary 15 x 30 } 7.666

Secondary 12 x 46 }

Primary 14 x 29 } 7.55

Secondary 14 x 51 }

496 cc. O.H.V. TWIN (Chain-drive Timing) 6-8-47

Camshaft Chain - .375" Pitch .25" Roller Dia. .225" Wide - Simple

Wheel Width $\frac{.210}{.204}$ " Chain Track Max. .65" Chain N^o: 110 036

Engine Sprocket (Timing) (66 pitches)

12 T. Pitch Dia. 1.449". Top Dia 1.62". Bottom Dia 1.199"

Max Shroud Dia .98" (+.05" for absolute with sharp corner) Min. Clearance Rad .95" (-.02" for absolute min. cl. rad.)

Camshaft Sprocket

24 T. Pitch Dia .2.873". Top Dia 3.08". Bottom Dia 2.623"

Max Shroud Dia 2.43" Min Clearance Rad 1.70"

Tensioner Sprocket

14 T. Pitch Dia 1.685". Top Dia 1.88". Bottom Dia 1.435"

Max Shroud Dia 1.23" Min Clearance Rad 1.08"

Dynamo Chain 8^m/m Pitch 5^m/m Roller Dia. .118" Wide - Simple

Wheel Width $\frac{.106}{.100}$ " Chain Track Max. .45" Chain N^o: 110 500

(~~3.624" crs. - 46 pitches~~) (3.943" crs. - 48 pitches)

Camshaft Sprocket

30 T. Pitch Dia. 3.013". Top Dia 3.19". Bottom Dia 2.816"

Max Shroud Dia. 2.64" Min. Clearance Rad. 1.74"

Dynamo sprocket

15 T. Pitch Dia. 1.515". Top Dia. 1.69". Bottom Dia 1.318"

Max Shroud Dia. 1.15" Min. Clearance Rad. .96"

Magneto Chain.

8^m/m Pitch 5^m/m Roller Dia .118" Wide - Simple

Wheel Width $\frac{.106}{.100}$ " Chain Track Max .45" Chain N^o: 110 500

(~~3.624" crs. - 42 pitches~~) (3⁵/₁₆ crs. - ~~48 pitches~~) 44 pitches

Camshaft & Magneto Sprockets

19 T. ~~23 T.~~ Pitch Dia ~~2.313"~~ Top Dia ~~2.50"~~ Bottom Dia ~~2.116"~~

496 cc. O.H.V. TWIN (Chain-drive Timing) 6-8-47 ✓

Camshaft Chain - .375" Pitch .25" Roller Dia. .225" Wide - Simple

Wheel Width $\frac{.210}{.204}$ " Chain Track Max. .65" Chain N^o: 110 036

Engine Sprocket (Timing) (66 pitches)

12 T. Pitch Dia. 1.449". Top Dia 1.62". Bottom Dia 1.199"

Max Shroud Dia .98" (+.05" for absolute with sharp corner) Min. Clearance Rad .95" (-.02" to absolute min. cl. rad.)

Camshaft Sprocket

24 T. Pitch Dia .2.873". Top Dia 3.08". Bottom Dia 2.623"

Max Shroud Dia 2.43" Min Clearance Rad 1.70"

Tensioner Sprocket

14 T. Pitch Dia 1.685". Top Dia 1.88". Bottom Dia 1.435"

Max Shroud Dia 1.23" Min Clearance Rad 1.08"

Dynamo Chain 8^m/m Pitch 5^m/m Roller Dia. .118" Wide - Simple

Wheel Width $\frac{.106}{.100}$ " Chain Track Max. .45" Chain N^o: 110 500

(~~3.624" crs. - 46 pitches~~) (3.943" crs. - 48 pitches)

Camshaft Sprocket

30 T. Pitch Dia. 3.013". Top Dia 3.19". Bottom Dia 2.816"

Max Shroud Dia. 2.64" Min. Clearance Rad. 1.74"

Dynamo sprocket

15 T. Pitch Dia. 1.515". Top Dia. 1.69". Bottom Dia 1.318"

Max Shroud Dia. 1.15" Min. Clearance Rad. .96"

Magneto Chain.

8^m/m Pitch 5^m/m Roller Dia .118" Wide - Simple

Wheel Width $\frac{.106}{.100}$ " Chain Track Max. .45" Chain N^o: 110 500

(~~3.624" crs. - 42 pitches~~) (3⁵/₁₆ crs - ~~48 pitches~~) 44 pitches

Camshaft & Magneto Sprockets