

Norton Twin
Oil from Timing Case returned to middle ✓
of sump instead of running down timing side
of c/case avoiding lubrication bias on T/side.

Piston type oil release valve protected by gauge
filter.

No ball valve necessary to prevent oil draining
from tank into c/case.

B.S.A. A.T. Twin

Feed

^ Pump capacity 126.6 pints/hr at 5000 r.p.m.

Return Pump 177 pints/hr at 5,000.

Velocette 500 Scavenge Pump $2\frac{1}{2}$ times feed pump
capacity.

Non return valve in bottom of oil tank.

Rockers lubricated from pressure pump with
metering holes .046" diameter at rocker bearings.
Large bore pipes to rockers ($5/16$ " ID)

Matchless Twin

oil feed 24 galls/hr at max revs

Pressure Pump release valve to discharge on to Timing Gears.
Overflow from Timing Case to go to center of c/case

Feed (Front half)

From oil tank, through gauge filter, ✓
to pump.

From pump through felt filter to big end.
(Release valve between filter & big end)
releasing into timing case.

Feed (Back Half)

From oil tank, through gauge filter,
to pump.

From pump to rockers with release
valve into timing case.

From Rockers down push rod tunnels
into camshaft housings

Drain hole from front tappet guide
hole $1\frac{53}{64}$ " above center of camshaft
into timing case.

Drain hole from rear camshaft
housing $\frac{3}{8}$ " below center of camshaft
into timing case.

Spray jet of
oil or to
Timing Gears.
Feed to roller
gear spindle

Return (Front Half)

From sump to pump

From pump to tank.

Return (Back Half)

From timing case to pump

From pump to tank.

Breathers

700 cc Twin Monobloc Engine

18-8-59

Primary Drive

Engine Sprocket 30 Teeth

Clutch Sprocket 58 teeth

Chain $3/8$ " duplex 94 pitches

Centre distance 9.2211"

(92 pitches would give 8.8394 centre distance)

Clutch M.I. Drum.

Gear box "M" type internals.

Mainshaft raised $1/8$ " in relation to Engine (Engine & Bellon footrests dropped $1/8$ ")

Ring will be necessary to hold alternator stator because of larger engine sprocket.

Gear drive camshafts. 20 D.P.

Engine shaft 29T } 2.250" centres

Koller gear 61T } 2.975" centres

Camshaft gear 58T }

Camshaft centres must be on E of existing tappet guides

Measurements of Machines in Comp. Dept 30-10-59

	Constitution with 17" Wheels Steel FT Fork, Girling Rear Springs	Steel M/M minor (Crossbar Fork Ends)
Length of Rear Spring Box	11 1/8"	10 3/4"
Length of Front Fork from bottom of Casquette	21 5/16"	21 7/8"
Head Angle	63° 23'	61° 27'
Engine Centre to Front Wheel Centre	24 1/2"	24 1/4"
Rim Sizes { Front Rear	WM 2-17 WM 2-17	WM 2-17 WM 2-17
Tyre Sizes { Front Rear	17" x 3.25 17" x 3.50	17" x 3.25 17" x 3.25
Wheelbase	54 1/2"	54 1/2"

Sinfield Constitution Engine in Norton Dominator Frame

Wheelbase 55 1/2"

Engine centre to front wheel Centre 22 3/4"

Ground Clearance 5"

Seat Height 31"

Head Angle 65° 30'

Fork offset at parallel to Head Lug = 2 5/16" - Wheel spindle on fork C.

Trail 3 1/8"

Front Tyre 3.00 x 19 Ribbed on WM 2 Rim.

Total Weight ~~448~~ 448 lbs

Weight on Front Wheel 184 lbs

Weight on Rear Wheel 234 lbs

VISIT TO REYNOLDS TUBES LTD

12-7-60 ✓

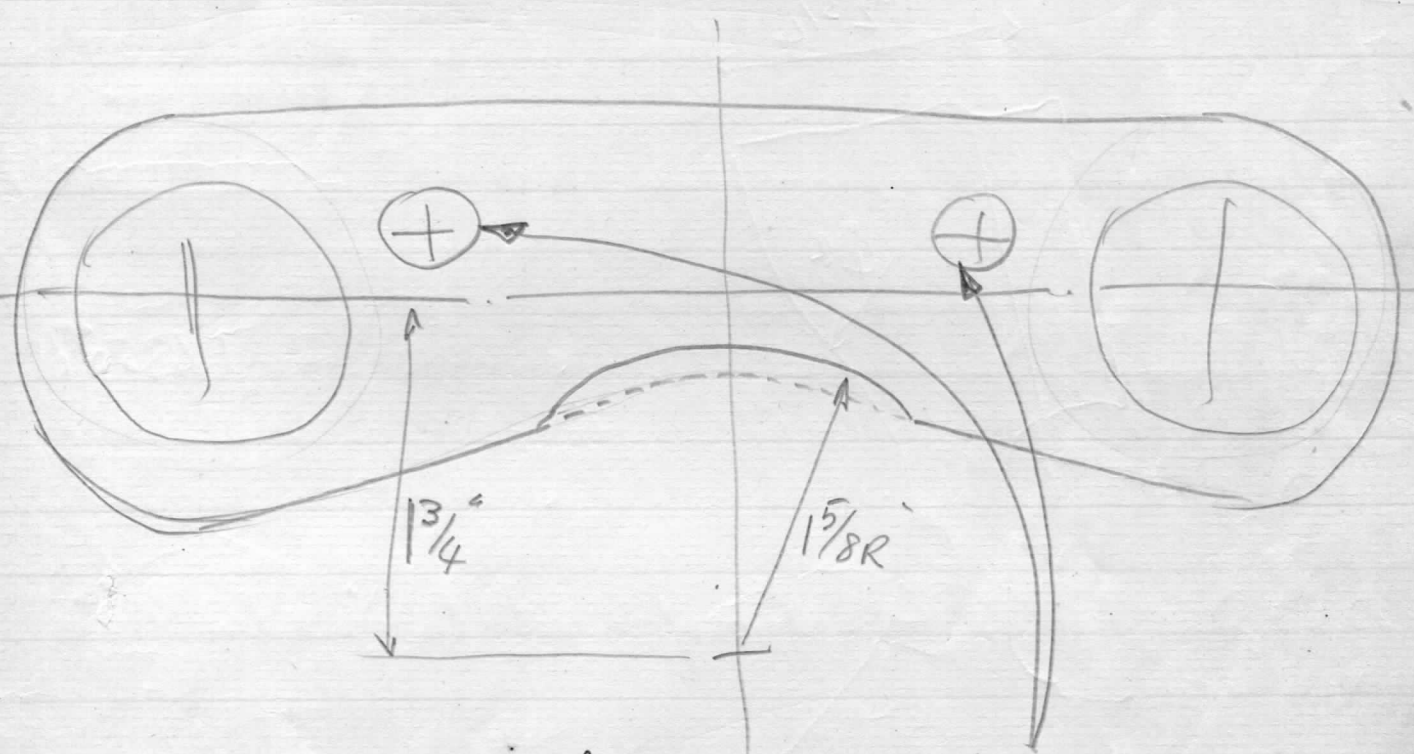
248cc FRAME IN "B" QUAL TUBE

FRONT DOWN TUBE	1 3/8" DIA	10 SWG	(was 12/8B CR. MO.)
TOP TUBE	1 3/8" DIA	14 SWG	(" 15G CR. MO.)
SIDE TUBES	1" DIA	12 SWG	(" 14G CR. MO.)
PILLION FOOTREST TUBES	3/4" DIA	16 SWG	(was 5/8" DIA 16G "B" QUAL WITH LINERS) (WITHOUT LINERS)

MODIFY STEERING STOP TO WELD ON NEUTRAL AXIS

Proposed casting alteration to P. 5082 (1479A)

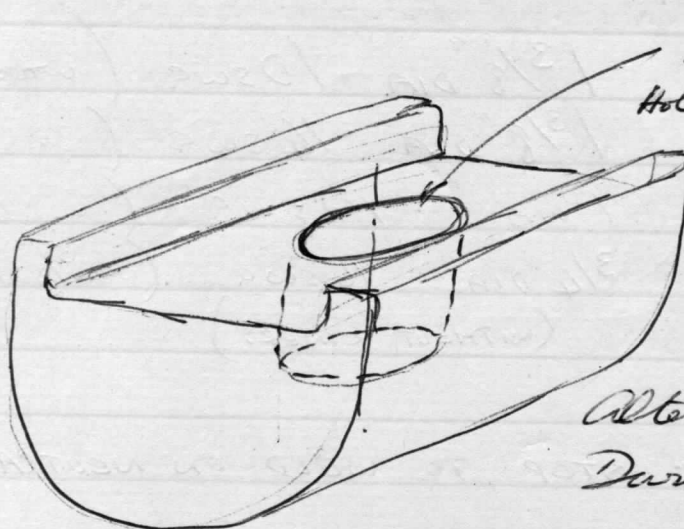
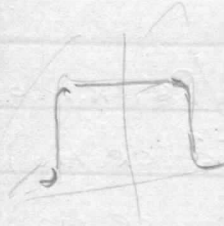
7/9/60



Also increase cable holes from 7/16 dia to 5/8 dia drill

SEPT 30TH 1960

PETROL TANK SUPPORT BLOCK W. 46061 (10086m)

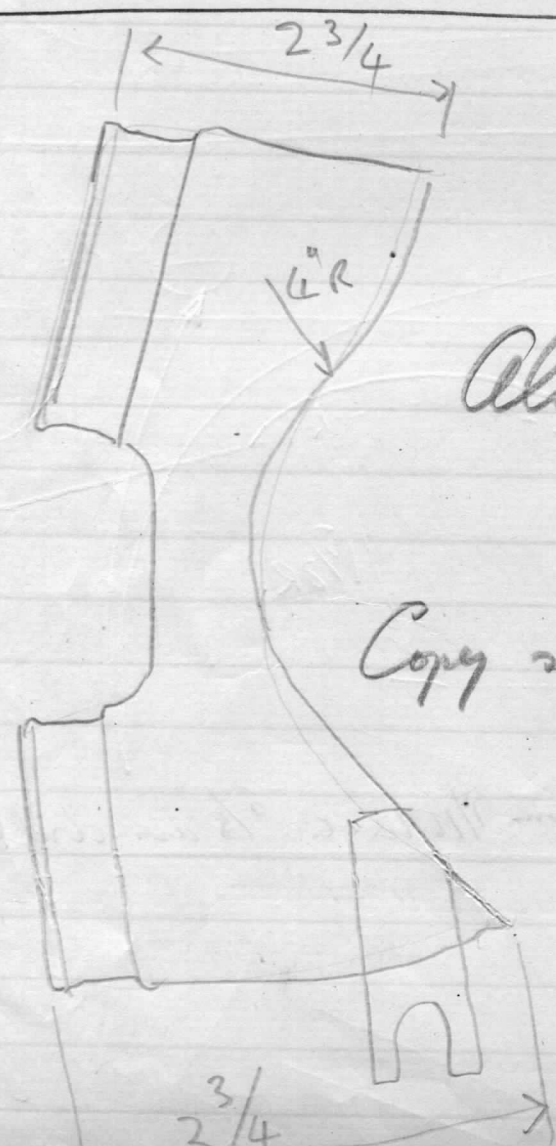


1" DIA X 5/8" DEEP
Hole to be added if possible

Alter Spec to
Durometer Hardness 35

PETROL TANK BUFFER W. 46063 (10086m)

Alter spec to Durometer Hardness 35



22-11-60

Alteration to U. 43507

Copy sent to Speedwell
(Mr. Fletcher)

248cc FRAME IN B QUAL STEEL

SUGGESTED ALTERATIONS TO ~~INCREASE STRENGTH~~ OF PREVENT FRACTURE OF FRONT DOWN TUBE BETWEEN HEADLUG AND TANK TUBE

- ① Increase Tank Tube to $7/8 \times 149$ or 1×169 .
- ② Gusset Plate
- ③ Increase Gauge of Front Down Tube.

Design new steering stop plate

J-S 580cc 84 Bore x 90 stroke 1/12/60

Timing Angles

$1/4$ "	B.T.D.C	=	$27\frac{1}{2}^{\circ}$
$5/16$ "	"	=	31°
$3/8$ "	"	=	34°
$7/16$ "	"	=	37°
$1/2$ "	"	=	40°

250 OHV models

7-12-60

Engine Sprocket	23T
Clutch	" 49T
C/shaft	" 17T
Rear	" 49T

Gearbox Ratios

Overall Ratios

B.H.P

Top = 1:1

Top = 6.14:1

Clipper - 13 x 5,750

3rd = 1.275:1

3rd = 7.83:1

Bravado - 13.5 x 5,750

2nd = 1.800:1

2nd = 11.05:1

Sports - 17 x 6,250

1st = 2.925:1

1st = 17.96:1

30-12-60

Lever-type Petrol Tap

Sample tested & approved subject to following criticisms:-

Lever bends too easy.

Size of hole could be increased with advantage.

Price 2/10d each - finish dull chrome.

EWARTS LTD P.O. Box N°5

Dudley S4411 - MR WEBB

12-1-61

	70 in/in Bore x $45\frac{1}{2}$ in Stroke = 175 cc	} Meter Minisport Piston would give 8:1 CR.
74	70 in/in Bore x $51\frac{1}{2}$ in Stroke = 198 cc	
84	64 in/in Bore x 54 in Stroke = 174 cc	
96	64 in/in Bore x $61\frac{1}{2}$ in Stroke = 198 cc	

9-6-61

8 qual Charney Tubes for over 250 cc

$1\frac{1}{4}$ dia x 10g (.128)

350 cc Single on Crusader Crankcases

6-1-61

70 mm Bore x 90 mm Stroke = 346 cc.

Length of Conn Rod to be $6\frac{1}{16}$ ins

(Conn Rod / Stroke ratio = 1.71) (CRU = 2.19. 350 & 500 Built = 1.94)
(M.P.M. = 2.38 METEOR & CONN = 1.76)

Increase in height of engine over Crusader = 1.002"

C.R. with Flat Top Piston = 7.8 + (Based on 9:1 C.R. of Crusader)
C.R. with $9/64$ " dome (w. 37480) = 8.8 + (Spots with 3 lcs at T.D.C.)
C.R. with $9/64$ " ~~CONCAVITY~~ = 7.03 +

2ND PROTOTYPE REYNOLDS 250 cc FRAME

30-1-61

FRONT DOWN TUBE	$1\frac{3}{8}$ DIA X 10 SWG.	(AS 1ST PROTOTYPE)
TOP TUBE	$1\frac{3}{8}$ DIA X 12 SWG	(WAS 14 G)
TANK TUBE	1" DIA X 16 SWG	(WAS $\frac{3}{4}$ X 16 G)

FRAME CRACKED AFTER 120 MILES ON PAVÉ

3RD PROTOTYPE REQUESTED BY US

FT DOWN TUBE	$1\frac{3}{8}$ DIA	BUTTED 8 TO 12 SWG.
TOP TUBE	$1\frac{3}{8}$ DIA	14 G.
TANK TUBE	$\frac{3}{4}$ DIA	16 G
SIDE TUBES	1" DIA	12 G.
PILLION FOREST TUBES	$\frac{3}{4}$ DIA	16 G.

250 cc RACING Model For P. PSALTY

FT. MUDGUARD W. 46843 (NOT DRAWN)

AS W. 44582 BUT 13" R instead of 14 3/4"
11 1/2" R " " 13 1/4"
27" ROUND GUARD instead of 31"
10" from Ft to ϕ of Trapping.
3 3/8" instead of 3 7/8" at front
3 1/2" " " 4" " back.
No holes.

REAR MUDGUARD W. 46844 (NOT DRAWN)

AS W. 46497 BUT 14" R instead of 15" R
33 1/2" Round guard instead of 36"
No holes

3-5-61

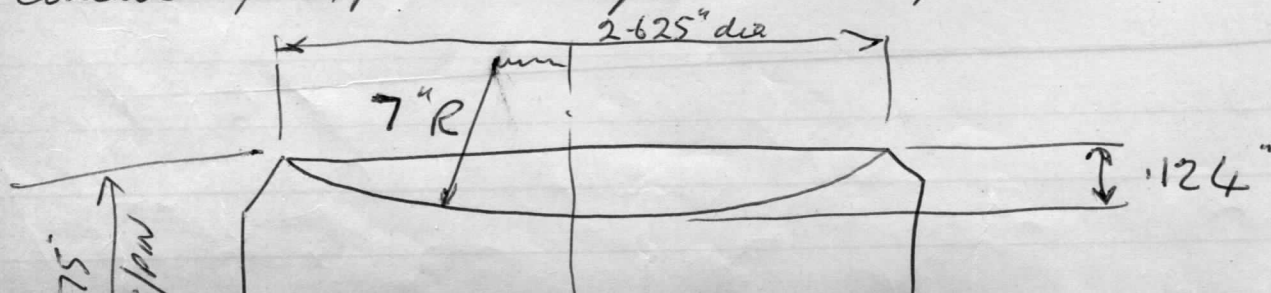
350 cc CRUSADEER

Piston to give approx 7 1/2 CR

Piston with flat top reduced to 1.355" above gudgeon pin
as used in first prototype gave 8.06:1 (49ccs volume)

Raising flat top to 1.375" (std height) = 47cc Volume = 8.36:1

Concave top to piston ~~thus gives~~ as below gives +5.5ccs = 7.6:1 CR.



PRINCE MODEL

10-3-61

Angle of Rear Spring Boxes with rider aboard = 62°
 Length of Centres with 178lb rider aboard = $10\frac{7}{8}$ "
 Weight on Rear Wheel - - - - - 229 lbs
 " " Front " - - - - - 145 lbs
 Angle of Front Forks - - - - - 63°
 Length " " " - - - - - From Bottom Clamp $17\frac{7}{8}$ "
 " " " - - - - - Bolt to Wheel Spindle
 Height of Footrest - - - - - $8\frac{7}{8}$ "
 " " Seat - - - - - 29 "
 " " Bars - - - - - $\left\{ \begin{array}{l} \text{To Centre } 35\frac{1}{4} \\ \text{To Ends } 36\frac{1}{2} \end{array} \right.$

 Distance Between Front of Seat & Centre of Bars $16\frac{1}{2}$ "
 " " " " & Footrests Rest 2 " in front of Seat
 " " Rear Wheel Spindle & Footrests $20\frac{1}{2}$ "

 Wheelbase $47\frac{1}{2}$ "
 Length of Seat 23 "
 Weight of Machine, ~~unladen~~ unladen, 200 lbs
 Weight of Rider 178 lbs

VARIOUS CHAIN WHEEL CENTRES

14T, 28T, 42 PITCHES, $\frac{3}{8}$ PITCH = 3.845"	12T, 35T, 48 pitches, $\frac{3}{8}$ PITCH = 4.3748"
20T, 49T, 70 PITCHES, $\frac{3}{8}$ PITCH = 6.419"	
20T, 49T, 68 " , $\frac{3}{8}$ " = 6.029"	13T, 35T, 48 pitches, $\frac{3}{8}$ PITCH = 4.296"
12T, 24T, 40 " , $\frac{3}{8}$ " = 4.061"	
13T, 26T, 40 " , $\frac{3}{8}$ " = 3.762"	13T, 37T, 50 pitches, $\frac{3}{8}$ pitch = 4.4533"
21T, 50T, 70 " , $\frac{3}{8}$ " = 6.224"	
21T, 52T, 70 " , $\frac{3}{8}$ " = 5.991"	29T, 56T, 86 pitches, $\frac{3}{8}$ pitch = 7.991"
14T, 28T, 40 pitches, 8 in. pitch = 2.908"	
19T, 38T, 58 " , 8 in. " = 4.548"	29T, 56T, 88 pitches, $\frac{3}{8}$ pitch = 8.3736"
19T, 38T, 52 " , 8 in. " = 3.574"	
19T, 38T, 50 " , 8 in. " = 3.246"	
19T, 38T, 56 " , 8 in. " = 4.225"	

198cc

Spring Boxes

Crusader 41568 Girling MDA 18/8½ ee

Clipper 41203 Armstrong AT6/7/1073 16/11 ee

Prince 42629 Armstrong AT6 17/1129 15/5½ ee.

20/6/61

Leading Link Forks

Bearing Housing 47005 9-002d each made here

Bearing Sleeve 47004 3-961d " " "

Bearing Rubber 47006 1-800d each (Moulded Rubber Products 15/- per 100)

2/10/61

Fitting of .625" pitch ^{400"} ~~350"~~ dia roller chain to Crusaders (Chain No 110056)

250cc c/shaft 14T Rear 40T Top Ratio 6.08 (std 6.15)

" 15T " 43T " " 6.12

350cc c/shaft 15T Rear 37T Top Ratio 5.25 (Prototype with ½p chain was 5.16)

Additional width of sprockets added on inside face, i.e. chain centreline moves in.

VALVE TIMING AT VALVE ENDS - DEGREES ON CRANKSHAFT

248cc CLIPPER

INLET

<u>Degrees</u>	<u>Thous</u>	<u>Degrees</u>	<u>Thous</u>	<u>Degrees</u>	<u>Thous</u>
290°	0	90°	294	250°	11
300	1/2	100	294	260	8
310	6	110	293	270	5
320	16	120	286	280	3
330	29	130	275	291	1
340	45	140	260	300	0
350	65	150	238		
360°	91	160	217		
10	125	170	189		
20	153	180	160		
30	186	190	132	370	
40	214	200	100		
50	238	210	67		
60	258	220	45		
70	274	230	28		
80	287	240	17		

EXHAUST

<u>Degrees</u>	<u>Thous</u>	<u>Degrees</u>	<u>Thous</u>	<u>Degrees</u>	<u>Thous</u>
80°	0	230	288	20	29
90	2	240	294	30	17
100	9	250	294	40	10
110	19	260	292	50	7
120	36	270	286	60	4
130	47	280	277	70	1
140	67	290	262	80	1/2
150	98	300	244	90	0
160	121	310	221		
170	153	320	194		
180	186	330	165		
190	213	340	136		
200	238	350	104		

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290°	0	90°	294	250°	11
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340	45	140	260	300	0
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200	238	350	104		
210	260	360	73		
220	275	10	47		

Yacks Pre-war 250?

Inlet

Exhaust

300	1	130	274
310	4	140	260
320	8	150	247
330	18	160	230
340	35	170	205
350	60	180	180
0	90	190	150
10	117	200	120
20	148	210	85
30	175	220	54
40	200	230	30
50	220	240	10
60	240	250	2
70	255	260	0
80	267		
90	277		
100	280		
110	281		
120	279		

90	10	280	315
100	2	290	299
110	12	300	278
120	32	310	255
130	61	320	228
140	94	330	197
150	128	340	164
160	165	350	130
170	198	0	95
180	230	10	63
190	255	20	37
200	280	30	20
210	300	40	10
220	315	50	5
230	327	60	2
240	333	70	0
250	335		
260	334		
270	327		

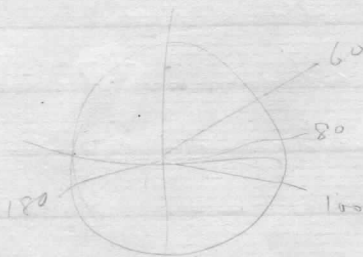
56 1/2

260 2x

95 1/2

165
113

278



Dynastart Drivng Shaft W.47385

1st Prototype was 387 BRINELL
2nd Prototype was ~~323~~ BRINELL 285 BRINELL
(Stone will not go above 610°C)

27-6-62

Armstrong Spring Boxes

The following sizes will be available:

<u>Compressed length</u>	<u>Extended length</u>	<u>Bottom Dia</u>	<u>Top Dia</u>	<u>Springs</u>
8 1/4"	11 1/4"	1 1/4"	2 1/16"	80/110 lb OR 95/115 lb Dual Rates.
9"	12"	"	"	
10"	13"	"	"	

3/4" pre-load

Prime Box

<u>Spring Free length</u>	<u>Fitted length</u>	<u>Rate</u>
5 1/2"	5"	100 lb (130 lb also available)

Ariel Type Rear Box

Amount of movement on Top Stud Fixing = 10° all round
(= 10° per side)

8.1 to 11.36 2 3/8" ID
1 1/2"