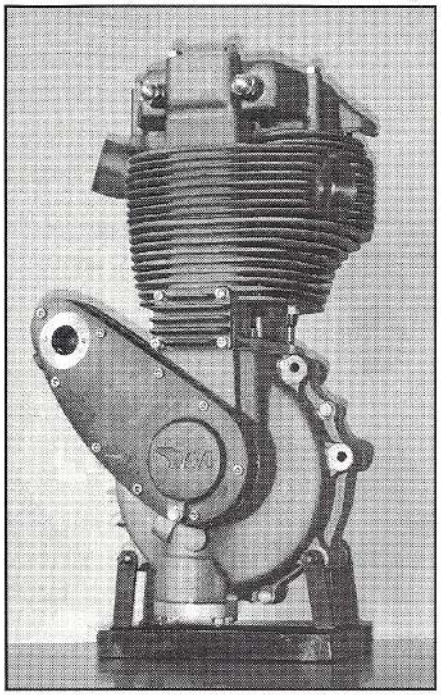
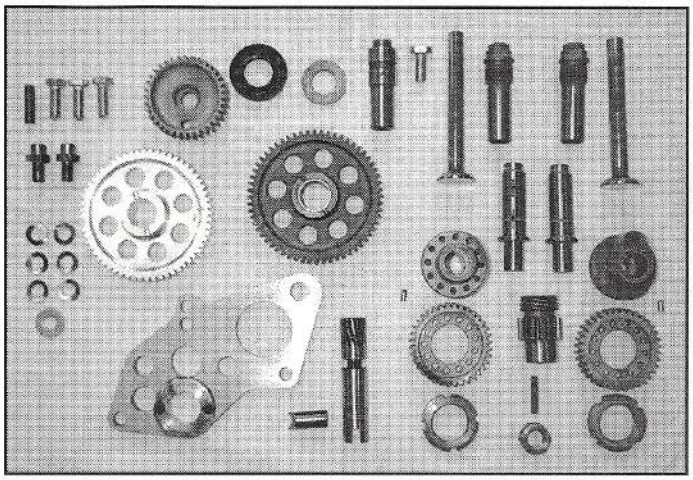
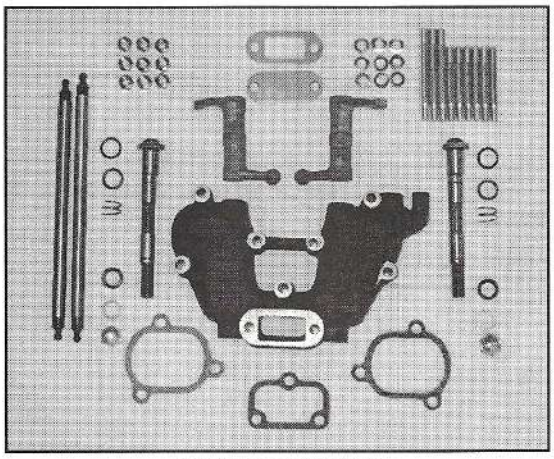


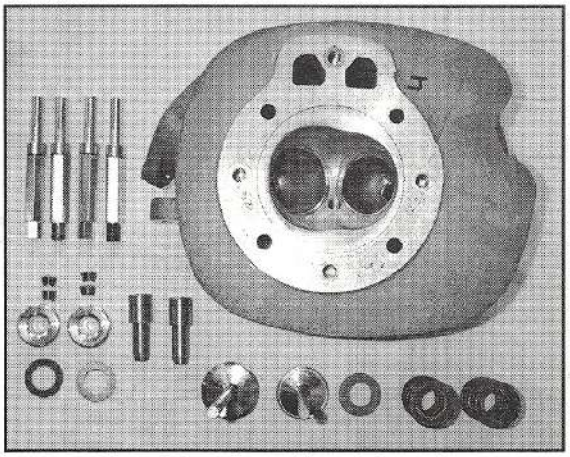
B.S.A. DBD34 Gold Star Engine



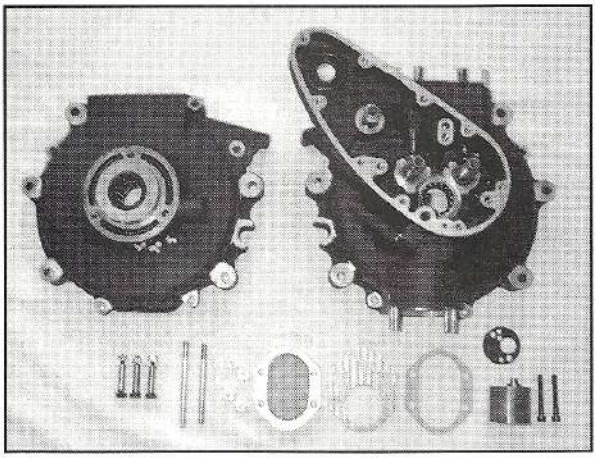
Components from the timing side (DBD34)
including vernier camshafts



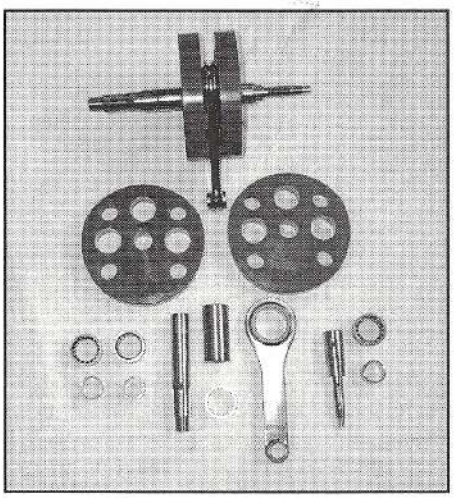
DBD34 rocker box



Special reinforced barrel for racing
Gold Star engines using through bolts.
Standard barrels in nicasil also available.



DBD34 magnesium crankcases
showing high volume oil pump



DBD34 crankshaft

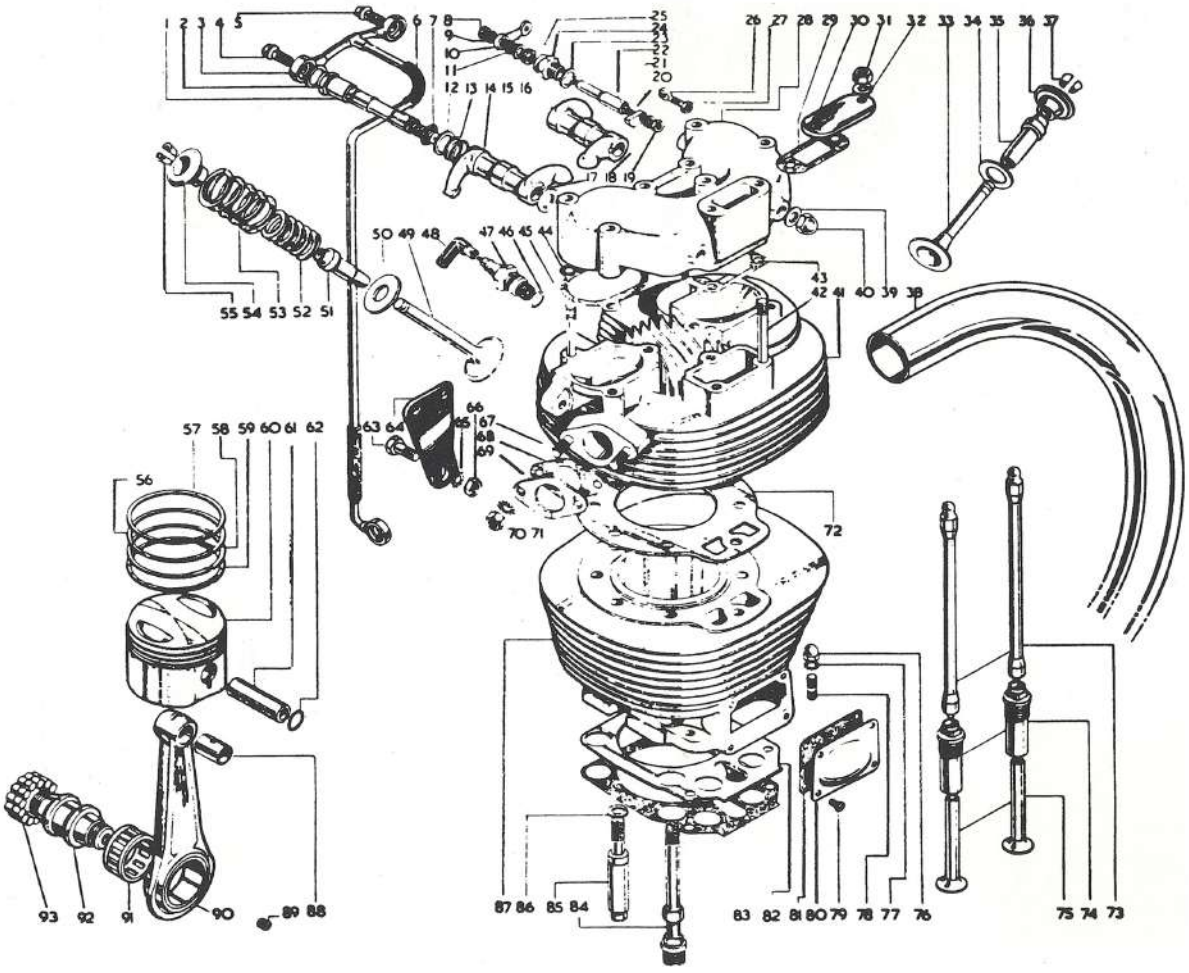
The Illustrated Spare Parts List for the

# LATE-TYPE GOLD STARS

Plate 1

## ENGINE

**Gold Star 500 c.c. Clubmans and Scrambles**



# ENGINE PARTS GOLD STAR 500cc
# CLUBMANS

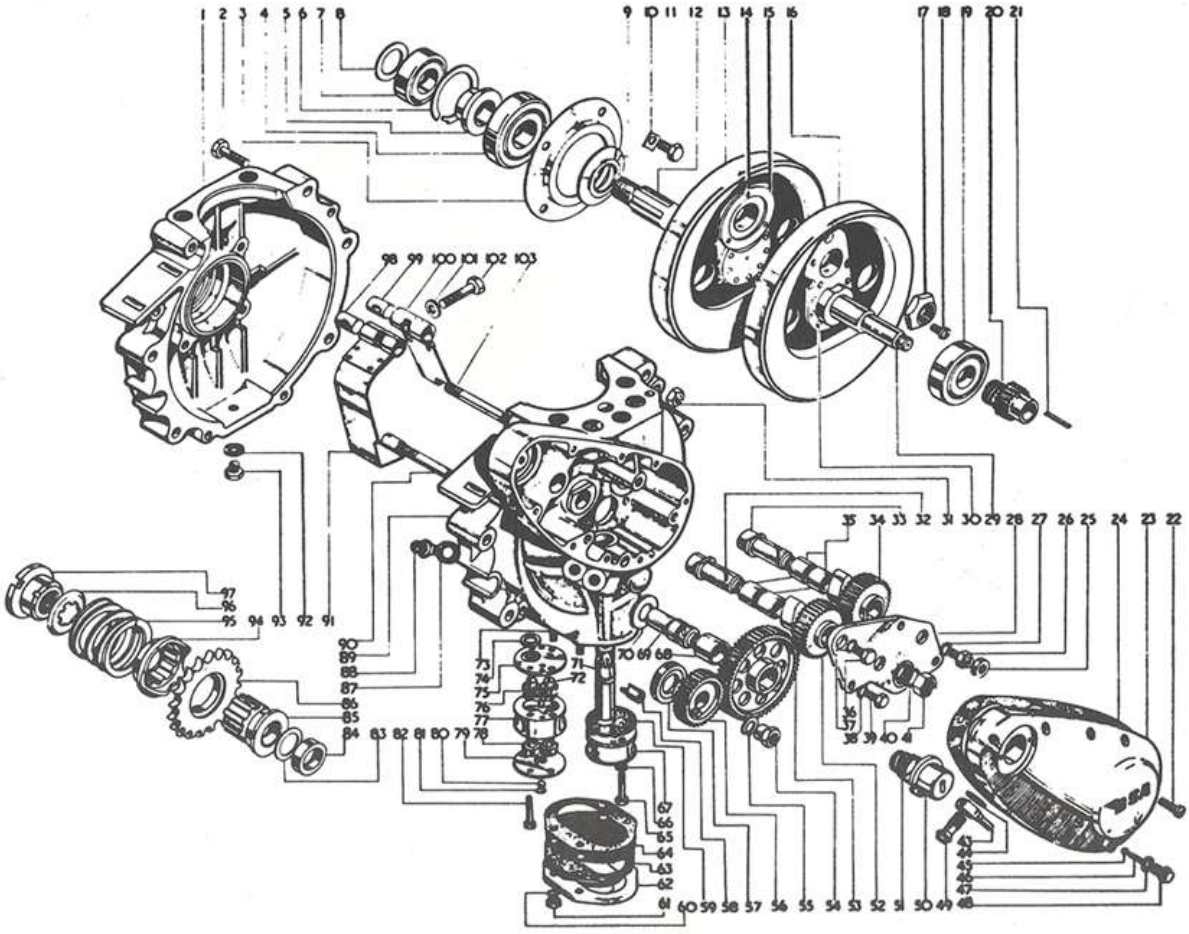
**Plate 1**

| Plate Ref. No. | Part No. | DESCRIPTION | Number Per Set |
|---|---|---|---|
| 1 | 65-1854 | Valve rocker fulcrum pin | 2 |
| 2 | 31-8430 | Rocker oil feed pipe banjo washer (copper | 2 |
| 4 | 65-317 | Rocker oil feed pipe banjo screw (inlet) | 1 |
| 5 | 65-318 | Rocker oil feed pipe banjo screw (exhaust) | 1 |
| 7 | 65-1855 | Valve rocker fulcrum pin cord ring | 2 |
| 12 | 65-1118 | Valve rocker fulcrum pin washer | 2 |
| 13 | 65-1117 | Valve rocker fulcrum pin spring | 2 |
| 14 | 65-1852 | Valve rocker (inlet) | 1 |
| 16 | 65-1853 | Valve rocker (exhaust) | 1 |
| 17 | 65-1857 | Valve rocker fulcrum thrust washer | 2 |
| 28 | 65-1839 | Rocker box | 1 |
| 31 | 2 49 | Rocker box stud nut | 9 |
| 33 | 65-2512 | Valve (exhaust) | 1 |
| 34 | 65-2493 | Valve spring insulating washer | 1 |
| 35 | 65-646 | Valve guide (exhaust) | 1 |
| 36 | 65-2490 | Valve spring collar (exhaust) | 1 |
| 37 | 65-2459 | Valve spring split cotter (exhaust) (halves) | 2 |
| 39 | 15 39 | Valve rocker fulcrum pin washer (copper) | 2 |
| 40 | 65-1856 | Valve rocker fulcrum pin nut | 2 |
| 41 | 65-640 | Cylinder head with fixed fittings | 1 |
| 41 | 65-640S | Cylinder head with fixed fittings, special | 1 |
| 42 | 65-1591 | Cylinder head and rocker box stud (long) | 3 |
| 45 | 65-1592 | Cylinder head and rocker box stud (short) | 6 |
| 49 | 65-647 | Valve (inlet) | 1 |
| 50 | 65-2498 | Valve spring seat | 2 |
| 51 | 65-645 | Valve guide (inlet) | 1 |
| 52 | 65-2495 | Valve spring (inner) | 2 |
| 53 | 65-2494 | Valve spring (outer) | 2 |
| 54 | 65-2490 | Valve spring collar (inlet) | 1 |
| 55 | 65-1848 | Valve spring split cotter (inlet) (halves) | 2 |
| 60 | 65-907 | Piston complete (c.r. 10.25 to 1, Omega forged) | 1 |
| 72 | 65-1818 | Cylinder head gasket | 1 |
| 73 | 65-1858 | Push rod complete | 2 |
| 74 | 65-1875 | Tappet guide (inlet and exhaust) | 2 |
| 75 | 65-2487 | Tappet (inlet and exhaust) | 2 |
| 76 | 65-930 | Cylinder barrel stud nut | 2 |
| 78 | 24-4227 | Cylinder barrel stud | 2 |
| 80 | 66-1936 | Push rod tappet recess cover, alloy, finned | 1 |
| 83 | 65-1650 | Cylinder base shim (0.010") | |
| 83 | 65-1651 | Cylinder base shim (0.020") | |
| 83 | 65-1652 | Cylinder base shim (0.030") | |
| 83 | 65-1653 | Cylinder base shim (0.064") | |
| 84 | 65-1840 | Cylinder holding down bolt | 4 |
| 85 | 65-1822 | Cylinder head bolt (short) | 4 |
| 87 | 65-1825 | Cylinder barrel, Nikasil | 1 |

Plate 2

# ENGINE

Gold Star 500 c.c. Clubmans and Scrambles



# ENGINE PARTS GOLD STAR 500cc
# CLUBMANS

**Plate 2**

| Plate Ref. No. | Part No. | DESCRIPTION | Number Per Set |
|---|---|---|---|
| 1 | 66-1681 | Crankcase with fixed fittings (drive & timing side) | 1 |
| 4 | 65-1388 | Roller bearing (drive side) | 1 |
| 5 | 65-1396 | Engine shaft distance collar | 1 |
| 7 | 65-2045 | Roller bearing (drive side) | 1 |
| 19 | 24-722 | Roller bearing (gear side) | 1 |
| 20 | 65-692 | Engine shaft driving pinion | 1 |
| 21 | 65-693 | Engine shaft driving pinion key | 1 |
| 22 | 65-2157 | Timing cover screw | 9 |
| 23 | 65-2503 | Timing cover | 1 |
| 24 | 65-1920 | Timing cover washer | 1 |
| 25 | 66-1923 | Oil feed washer (rubber) | 2 |
| 26 | 66-2007 | Cam pinion spindle bolt | 2 |
| 28 | 66-2008 | Timing gear plate complete | 1 |
| 31 | 2-49 | Crankcase connecting bolt nut | 5 |
| 32 | 65-2509 | Cam pinion spindle (inlet) | 1 |
| 33 | 65-2426 | Cam pinion spindle (exhaust) | 1 |
| 34 | 65-2446 | Exhaust cam pinion complete | 1 |
| 34 | 65-2446v | Exhaust cam pionion complete, Vernier adjustable | 1 |
| 36 | 1-5069 | Timing gear plate bolt | 1 |
| 39 | 21-2902 | Timing gear plate bolt (Whit.) | 1 |
| 41 | 29-905 | Engine shaft timing pinion nut | 1 |
| – | 65-2505 | Engine shaft oil seal | 1 |
| 45 | 1-4675 | Oil valve spring ball | 1 |
| 46 | 66-1684 | Oil valve spring | 1 |
| 47 | 66-1683 | Oil valve spring retaining screw washer (fibre) | 1 |
| 48 | 65-2188 | Oil valve spring retaining screw | 1 |
| 50 | 65-1882 | Engine breather valve | 1 |
| 51 | 65-1883 | Engine breather valve spring | 1 |
| 52 | 65-2442 | Inlet cam pinion complete | 1 |
| 52 | 65-2442v | Inlet cam pinion complete, Vernier adjustable | 1 |
| 53 | 65-1174 | Magdyno drive idler pinion complete | 1 |
| 56 | 65-1879 | Magdyno driving pinion | 1 |
| 57 | 65-2316 | Magdyno driving pinion oil seal | 1 |
| 58 | 65-2580 | Oil pump driving spindle retaining pin | 1 |
| 59 | 65-2618 | Oil pump and crankcase joint washer | 1 |
| 64 | 65-2623 | Oil pump filter | 1 |
| 67 | 65-2589 | Oil pump set complete (special high volume) | 1 |
| 69 | 65-2335 | Magdyno drive idler pinion spindle | 1 |
| 70 | 36-3528 | Magdyno drive idler pinion thrust washer | 1 |
| 71 | 66-2620 | Oil pump driving spindle | 1 |
| 77 | 65-2596 | Oil pump body (cast iron) | 1 |
| 90 | 2'-949 | Crankcase stud (rear) | 1 |
| 103 | 31-212 | Crankcase stud (top) (rear) | 1 |

# ROAD RACE KIT
# TO SUIT G50/GOLD STAR

| DESCRIPTION |
| --- |
| Special Magnesium 35mm Ceriani Forks complete with Yokes |
| Seeley MK2 Special Lightweight Frame Gold Star |
| Set of Engine Plates |
| Footrest Kit |
| Rear Brake Pedal |
| Petrol Tank |
| Oil Tank |
| Carbon Fiber Seat |
| Fairing Brackets |
| Special Oil and Petrol Caps |
| Rear Sprockets (8) |
| Alloy Handlebars |
| Head Bearings |
| Rear Wheel Hub Special Magnesium |
| Spokes and Nipples for Rear Wheel |
| Wheel Rim (2.15) |
| Rear Wheel Build |
| Swinging Arm Bearings |
| Rear Wheel Axle and Adjusters |
| Lightweight 6-Speed Gearbox (Low First Gear) |
| Gearbox Nuts |
| Gearbox Sprockets |
| Special Lightweight Belt Drive System |
| Rubbers for Frame |
| Filter for Oil Tank (Alloy) |
| Pushrod Clutch |
| Gearbox Adjuster |
| Gear Leaver (Alloy) |
| 210mm Fontana Front Hub (Magnesium) |
| Amal 38mm Smooth Bore Carburettor |
| All the Above Items are excluding V.A.T. and shipping |

# USEFUL TECHNICAL & ENGINEERING FORMULAE

The following formulae can be used to great advantage by the aspiring engine builder. In studying these espressions you will have a better understanding of the relationship of many factors contributing to the development of horsepower in an internal combustion engine ... *to understand is to know, and to know is where it's at.*

### TO CALCULATE PISTON DISPLACEMENT IN CC's

Displacement =

3.1416 x Cylinder Radious$^2$ x Piston Stroke (mm) x No. of Cyl.

### COMPRESSION RATIO

$$\text{Ratio} = \frac{\text{Piston Displacement + Combustion Chamber Volume}}{\text{Combustion Chamber Volume}}$$

(Chamber volume can be arrived at by measuring with a graduated beaker and a SAE10 weight oil)

### SUPERCHARGED OR TURBOCHARGED COMPRESSION RATIO

$$\text{Measured Compression Ratio} \times \frac{\text{Boost Pressure} \times 2}{14.69}$$

Figure one pound less atmospheric pressure per 2000 ft. above sea level.

### BRAKE HORSEPOWER (BHP)

$$\text{BHP} = \frac{\text{RPM} \times \text{Torque (foot-pounds)}}{5252} \quad \text{or}$$

$$\text{BHP} = \frac{\text{CCs} \times \text{Mean Effective Pressure (MEP)} \times \text{RPM}}{792{,}000}$$

$$\text{SAE HP} = \frac{\text{Number of Cyliders} \times \text{Piston Diameter}^2}{2.5}$$

**TORQUE (Ft.-Lbs.)** The effort devoted to twisting or turning.

$$\text{Torque in foot-pounds} = \frac{\text{BHP} \times 5250}{\text{RPM}}$$

**PISTON SPEED** (Feet per minute; Ft./min.)

$$\text{Feet per minute} = \frac{\text{Stroke (in.)} \times \text{RPM}}{6}$$

$$\text{or} \quad \frac{\text{Stroke (mm)} \times \text{RPM}}{152.4}$$

### BRAKE MEAN EFFECTIVE PRESSURE (BMEP)

See other formula also.

$$\text{BMEP (lbs./sq. in.)} = \frac{\text{BHP} \times 33{,}000}{\text{Stroke (ft.)} \times \text{Piston Area (sq. in.)} \times \text{RPM}}$$

### MEAN PORT GAS VELOCITY (Ft./sec.)

$$\text{Feet per second} = \frac{\text{Piston speed}}{60} \times \frac{\text{Piston Diameter (ft.)}^2}{\text{Port Diameter (ft.)}^2}$$

### MEAN VALVE GAS VELOCITY (Ft./sec.)

$$\text{Feet per second} = \frac{\text{Piston Speed}}{60} \times \frac{\text{Diameter of Piston (ft.)}^2}{\text{Valve throat dia. (ft.) Valve Lift (ft.)} \times 3.14}$$

### BRAKE MEAN EFFECTIVE PRESSURE (Lbs./sq. in.)

Pressure on pistons

$$\text{BMEP} = \frac{\text{BHP} \times C}{\text{RPM}}$$

C= Constant for Total Engine CC's (4 Strk)

250cc = 52460 500cc = 26230

350cc = 37480 1000cc = 13125

### MILES PER HOUR & FEET PER SECOND

$$\text{MPH} = \frac{\text{Distance in miles} \times 3600}{\text{Time in seconds}} \qquad \text{Ft./Sec.} = \frac{\text{MPH} \times 5280 \text{ ft.}}{3600}$$

### AIR RESISTANCE TO RACE VEHICLE (RIDER INCLUDED)

Air Resistance in pounds =

Frontal Area (sq. ft.) x Velocity$^2$ (ft./sec.) x Drag Coefficient

.0008 is Average Drag Coefficient

.0002 is for Fully Streamlined

### ROLLING RESISTANCE

Rolling Resistance (pounds) = Bike & Rider weight x .02

### HORSEPOWER REQUIRED TO RUN A PREDETERMINED MPH

$$\text{Horsepower} = \frac{\text{Air + Rolling Resistance} \times \text{ft./sec.}}{550}$$

### EXHAUST HEADER LENGTH

Using the stock inside diameter pipe this formula will give you the correct header length for one particular RPM. Calculate the Peak RPM at a point about 1000 rpm lower than the absolute peak to allow for reflex action, etc. in shifting, and also for having a *little extra* when needed. The length is measured from the centre of the piston when located at Bottom Dead Centre.

$$\text{Length in inches} = \frac{1700 \times {}^1/_2 \text{ exhaust cam duration}}{\text{RPM}} \quad (\pm \text{ One Inch})$$

Dyno is best means for determining exact length.

### INTAKE MANIFOLD LENGTH FOR RAM-LOG APPLICATION

Using stock valve seat diameter to carburetor throat diameter being used. Length is measured from the centre of the piston at Top Dead Centre to the *beginning of the venturi taper* at the rear of the carburetor (where the air cleaner or velicity stack is clamped on).

$$\text{Length in inches} = \frac{1100 \times {}^1/_2 \text{ intake cam duration} \times 7}{\text{RPM}} \pm \text{One Inch}$$

### GEAR RATIOS

$$\text{Any Gear Ratio} = \frac{\text{Gear Doing the Driving}}{\text{Gear Being Driven}}$$

$$\text{FINAL DRIVE RATIO} = \frac{\text{Rear Wheel Sprocket (teeth)}}{\text{Countershaft Sprocket teeth}}$$

### CUBIC INCHES TO CUBIC CENTIMETRES

$$\frac{\text{Cubic Inches}}{.061} = \text{Cubic Centimetres (cc)}$$

### CUBIC CENTIMETRES TO CUBIC INCHES

CC's x .061 = Cubic Inches

**ONE ATMOSPHERE** = 14.69 lbs./sq. in.; or 29.92 inches of Mercury; or 33.90 ft. of Water

**ONE INCH OF MURCURY** = .491 lbs./sq. in.

# GLOSSARY

**ATDC** – After Top Dead Centre. A point in degrees of the crankshaft after the piston has past the top of the cylinder and is going down.

**AREA UNDER THE LIFT CURVE** – The actual length of the swept contact area of the cam lobe surface, commonly illustrated using curves that show lift and duration in graph form.

**BASE CIRCLE** – The diameter of the cam lobe from one flank side to the other flank side through the centre of the core usually. Not to be confused with the distance from heel to nose.

**BBDC** – Before Bottom Dead Centre. A point in degrees of the crankshaft before the piston reaches full bottom in the cylinder.

**BDC** – Bottom Dead Centre. When the piston reaches the exact bottom of the cylinder.

**BOOST PRESSURE** – amount of manifold pressure above the atmospheric pressure, as expressed in PSI (pounds per square inch).

**BRAKE HORSEPOWER** – BHP – The actual power developed at the crankshaft, as measured in dyno tests. BRAKE MEAN EFFECTIVE PRESSURE, BMEP, BMP – An imaginary figure calculated from the BHP which indicates average pressure in the cylinders on the power stroke, but allows for the mechanical engine losses.

**CAM JOURNALS** – The concentric bearing surfaces on a camshaft.

**CAMSHAFT** – The shaft in the engine that actuates the cam followers with accentric shapes called lobes. It controls the timing of the valves.

**DECK HEIGHT** – The distance between the outer top edge of the piston and the top of the cylinder. If the piston is higher it is usually called "positive deck height", and if lower it is called "negative deck height".

**DETONATION** – Fuel mixture exploding after its internal heat has built up to the point where it ignites all at once on its own.

**DURATION** – The number of camshaft degrees that the valve is in motion; also the number of cam degrees from one side of the cam to the other, such as used when checking-heights are given.

**FLANK** – The distance from where the lifter begins to rise up to the nose.

**FLOAT** – That point when a tracking follower leaves the cam surface and is literally in the air. Its return to the cam surface will produce a bounce and result in "pulling" material off of either one or both surfaces. In a short while a pronounced wear spot will be produced, and continued wear will result quickly.

**HEEL** – That portion of the cam lobe that is concentric with the centre of the cam core. . . and is used for adjusting the valve clearance.

**HORSEPOWER** – A unit of work; equal to 33,000 ft./lb. per minute; work done in lifting 33,000 lbs. a distance of one foot in one minute.

**INLET VELOCITY** – The speed at which the fuel mixture travels through the inlet tract.

**LIFT** – There are two lifts to consider in engines. . . cam lift and valve lift. Cam lift is determined by measuring follower lift and valve lift is determined by measuring actual valve lift.

**LIFT RATE** – The amount of cam lift per degree of cam rotation.

**LOBE** – The cam lobe is the part of the cam that raises and lowers the follower and is matched to the type of follower used in design; solid, hydraulic, roller, etc.

**LOBE CENTRE** – The angle in camshaft degrees between the centre-line of the intake and exhaust lobes of the same cylinder. Calculated by subtracting the intake opening from the exhaust opening, adding 180° and dividing by two. . . but, only when the durations of both lobes are the same.

**MEAN EFFECTIVE PRESSURE, MEP** – also referred to as Mean Indicated Pressure (MIP). The average pressure produced in the cylinders on the power stroke.

**MECHANICAL EFFICIENCY** – A factor expressed as a percentage, which indicates the amount of power left to do work after all losses take their toll; the percentage difference between MEP and BMEP.

**NOSE** – The point of highest lift on the lobe; the point farthest from the centre of the cam core.

**OVERLAP** – The number of crankshaft degrees from where the intake valve opens to where the exhaust valve closes, during which time both valves are open and crossflow is occurring. . . also called scavenge period.

**PERCENTAGE OF CRANK BALANCE** – The percent of weight used of the actual total weight of the rod and piston assembly to balance the crankshaft. . . i.e., if total weight is 500 grams, then 80% balance is using 400 grams to balance with.