

# **“GOLD STARLETS”**

## ***Hints on Tuning and Assembly of the B.S.A. ‘Gold Star’***

*Compiled by Eddie Dow*

**T**HE first B.S.A. Gold Star model was introduced for the 1938 season and was the result of experience gained in numerous competitive events, with the sports version of the 500 c.c. Silver Star, culminating in the winning of a Brooklands Gold Star by W. Handley on the 30th June 1937.

The machine on which this honour was gained had a cast iron cylinder barrel and head, but the new model, designated the M24 Gold Star, had an aluminium cylinder barrel and head with a cast-in push-rod tunnel and this has been a feature of all subsequent models. The bore and stroke of 82mm x 94mm were the same as for its predecessor, but the internals of the engine were strengthened and polished to enable the increased power to be sustained.

The M24 Gold Star was continued for 1939, but the outbreak of war prevented any further development, and it was not until 1949 that it became possible to reintroduce the model! In that year the 350 c.c. B32 Gold Star was produced and achieved an instant success by winning the Junior Clubman's T.T. Race.

The new Gold Star had a bore and stroke of 71mm x 88mm and in 1950 a 500 c.c. B34 Gold Star model was produced with a bore and stroke of 85mm x 88mm these basic dimensions being continued until the present day.

The post war Gold Star engine had rocker boxes cast integrally with the cylinder head, but for 1952 the engine was redesigned and a reversion made to pre-war practice, in that a separate rocker box is employed.

In 1953 an all-welded, duplex frame with swinging arm type rear suspension was fitted for the first time, together with a new type of gearbox which provides a very wide range of ratios suitable for all types of events.

The basic engine and frame specifications have been continued up to the present day, but a number of detail design changes have been carried out which have resulted in the constant improvement in all round performances so ably demonstrated by Gold Star models in competitive events all over the world.

## ENGINE DATA

**Engine Capacity:** 499cc or 348cc.

**Cylinder bore:** (nominal) 85mm (500) 78mm (350).

**Cylinder bore:** (actual) 3.345-3.344 in.

**Stroke:** 88mm.

**Valve timing** (at .018 in valve clearance):

| Inlet Cam   | Opens before<br>B.D.C. | Closes after<br>B.D.C. | Cam lifting<br>including valve<br>clearance |
|-------------|------------------------|------------------------|---|
| 65-2442     | 65°                    | 85°                    | .442 in.                                    |
| 65-2446     | 63°                    | 72°                    | .400 in.                                    |
| 65-2454     | 50°                    | 80°                    | .415 in.                                    |
| Exhaust Cam | Opens before<br>T.D.C. | Closes after<br>T.D.C. | Cam lifting<br>including valve<br>clearance |
| 65-1891     | 85°                    | 60°                    | .428 in.                                    |
| 65-2446     | 80°                    | 55°                    | .400 in.                                    |
| 65-2450     | 70°                    | 45°                    | .385 in.                                    |
| 65-2491     | 95°                    | 50°                    | .428 in.                                    |

Engine shaft pinion 65-696 advances the timing by 10° 350cc only.

**Connecting rod centres:** 6 $\frac{1}{2}$  in. Mang. Molybdenum steel.

**Connecting rod internal diameter:** (small end) .7506-7503 in.

**Connecting rod internal diameter:** (big end) 1.7704-1.7702 in.

**Gudgeon pin diameter:** .7502-.7500 in.

**Rocker spindle diameter:** .561-.560 in.

**Cam spindle diameter:** .6235-.6230 in.

**Piston rings:** (compression) .0625 x .120 in.

**Piston rings:** (oil control) .125 x .104 in.

**Valve stem diameter:** (inlet) .310-.309 in. En. 54.

**Valve stem diameter:** (exhaust) .3485-.3474 in. Nimonic.

**Valve spring (outer):** free length 1.670 in.

**Valve spring (outer):** fitted length 1.312 in.

**Valve spring (inner):** free length 1.500 in.

**Valve spring (inner):** fitted length 1.218 in.

**Sprockets:**—Engine 16, 17, 18, 19, 20, 21, 22 or 23 teeth.

Gearbox 19 teeth (Scrambles—16 teeth).

Clutch 43 teeth.

Rear wheel 46 teeth.

**Capacities:**—Fuel tank 2, 4 or 5 imp. gals.

Oil tank 5 $\frac{1}{2}$  pts.

Gearbox 14 fl. oz. (400cc).

Front forks 7 $\frac{1}{2}$  fl. oz. (213cc) each leg.

Primary chaincase 8 fl. oz. (225cc).

## GENERAL DETAILS

**Front brake size:** Scrambles 7 in. diameter,  $1\frac{1}{2}$  in. wide.

**Front brake size:** Racing Clubman's 8 in. diameter,  $1\frac{1}{2}$  in. wide, or  $7\frac{1}{2}$  in. diameter,  $1\frac{1}{2}$  in. wide.

**Rear brake size:** 7 in. diameter,  $1\frac{1}{2}$  in. wide.

**Front chain size:**  $\frac{1}{2}$  in. x .305 in.

**Pitch—Scrambles:** 67; Racing Clubman's 70.

**Rear chain size:**  $\frac{5}{8}$  in. x  $\frac{1}{2}$  in. Pitch, 99 (Scrambles 98).

**Front suspension movement:**  $5\frac{1}{4}$  in.

**Rear suspension movement:**  $3\frac{1}{2}$  in.

**Dynamo output:** 60 watts. **Battery capacity:** 13 ampere hours.

**Overall length:** 85 in. **Wheel base:** 56 in.

**Ground clearance:** 5 in. ( $6\frac{1}{2}$  in. Scrambles).

**Steering head angle:**  $61^\circ$ ; steering lock  $45^\circ$ .

**Steering trail:** 3.46 in. (19 in. wheel) 3.73 in. (21 in. wheel).

## ENGINE

The connecting rod and big end assembly should be changed after 50 racing hours, or during your winter overhaul. No exchange service available for complete flywheel assemblies.

Whilst stripped carefully inspect flywheels for cracks or damage, security of big end bearing thrust washers. Tightness of shafts and rivets, and tightness of bearings on shafts. Loose or worn shafts can be replaced, oversize shaft being available.

### VALVE GEAR

An alternative timing pinion which advances the overall valve timing to 10 degrees is available for 350 DB engines. This timing pinion should be used in conjunction with Inlet cam 65-2442, and Exhaust cam 65-1891 for racing. This pinion can be identified by the fact that it does not have a tooth over the key-way. Part No. 65-696.

The rotary breather in the timing cover is driven by the peg on the timing pinion. When the piston is at TDC on the firing stroke, the peg should be at the 2 o'clock position, opposite a tappet cover screw hole, for correct breather timing this means that when the ignition is retimed, the breather timing must also be checked. Breather opens 20° BBDC and closes 40° ABDC.

### MAGNETO

When fitting magneto, check that the peg on the magneto pinion does not protrude above the face of the timing case. If the peg protrudes it will foul the timing cover causing damage and seizure of the breather.

When fitting magneto, check backlash of half-speed pinion to magneto pinion. Adjust with brass shims on magneto platform. Timing gear whine is usually caused by insufficient backlash. Magneto Base shim Part No. 66-2347.

The idler gear driving the magneto pinion must be fitted with the widest flange towards the crankcase. Viewed endwise, it will be seen that the central flange is slightly wider on one side than the other. Incorrect fitting results in only half the width of the gear being engaged with the magneto pinion and inlet cam wheel. A special dural lightweight idler gear is now available.

The oil valve spring retaining screw in the timing cover should be drilled and secured with locking wire. Serious damage can result from loss of this screw.

### OIL PUMP

During overhaul or following failure of any engine component, the oil pump should always be changed. Efficiency is easily affected by metal particles.

The length of the engine push rods should be checked every time the cylinder head is lifted, or if the minimum tappet clearance cannot be obtained. The standard length, excluding the spigot is 9.0625in. Replace if more than .025in shorter than standard length. Part No. CB, DB and DBD models 65-18581.

### VALVES AND GUIDES

Loss of power is often caused by worn Valve Guides. The guides should be changed when any perceptible wear occurs. Valve seats should always be recut after new guides are fitted. Oversize Valve Guides are available. Part No. DB and DBD models 350 c.c. Inlet 65-2497. 500 c.c. Inlet 65-645 Exhaust 65-646 Valve Guide removal tools No. inlet 61-3263. Exhaust 61-2267.

The recommended safe life of the NI 80 Exhaust valve is 20 racing hours. Part No. DB and DBD models 350 c.c. 65-2485. 500 c.c. 65-2512.

Standard B.S.A. Valve Springs should be replaced whenever the free length of the spring is less than Outer 1.675in. Inner 1.550in. Part No. DB and DBD models Inner 65-2495. Outer 65-2494.

Withams Valve springs imported by Eddie Dow are the world's Finest Valve Springs. Allowing increased R.P.M. with reduced valve seat wear, fitted length  $1\frac{3}{4}$ in. Seat Poundage (115) 96. Full lift

(190) 230lbs. (Standard figures shown in brackets). Suitable only for DB and DBD engines.

Springs must be fitted with the closed coil end of the spring to the base washer.

#### VALVE COLLETS

Due to difference in valve stem diameter, the valve collets are not interchangeable. A careful check should always be made when re-fitting valves. Replace if hemispherical locking ridges are worn.

#### TAPPET ADJUSTMENT

Tappet adjustment CB, DB and DBD models. To ensure that the rocker arm is correctly aligned to the valve stem, tappet adjustment should be made with the eccentric adjustment in the correct rotational setting. This is anti-clockwise for the Inlet, and clockwise for the Exhaust valve when viewed from the spark plug side of the engine. See page 12 of the Manual.

#### ENGINE SHAFT SHOCK ABSORBER

The standard length of the shock absorber spring is 1.675in. This should be frequently checked and the spring replaced if below standard length. This is important to avoid wear on the mainshaft spacing collar and possible loosening of the main bearing on the mainshaft. Part No. 67-1136.

A full range of engine sprockets are available 16-22T. The BB and CB sprockets have four lobes and the DB and DBD two lobes—always state type required when ordering by post.

#### ROCKER OIL FEED

To cure oil leaks replace the long rocker oil feed pipe and rubber connection with polythene tubing. The oil feed banjo bolts are drilled transversely. The bolt with the large hole must be fitted to the exhaust rocker spindle.

## GEARBOX AND CLUTCH

Gearbox specification is indicated by the letter stamped on the gearbox casing. Always quote when ordering spares the letter "T" indicates needle roller layshaft.

|             |                         |
|-------------|-------------------------|
| Extra Close | RRT2                    |
| Extra Close | RR (Lower bottom gear.) |
| Scrambles   | SC                      |
| Standard    | STD                     |
| Trials      | TRI                     |

Jamming of the kickstarter is due to wear on the kickstart ratchet pinion. Rapid wear will occur if persistent back firing is permitted. The ignition should be retarded before attempting to kickstart. Part No. of ratchet pinion 67-3376.

Jumping out of gear is usually due to incorrect adjustment of the camplate plunger. This should be screwed into the casing until one thread only shows above the locknut.

Lighter operation of the clutch lever can be achieved by adjusting the operation arm so that it is parallel to the gearbox inner cover, before the clutch lever is withdrawn. The operation lever is offset internally thus ensuring the optimum leverage without side thrust when the clutch is withdrawn.

Do not overfill gearbox with oil, allow surplus to drain from level screw. Overfilling results in oil passing clutch push-rod into clutch. For racing a gearbox breather is advised.

Plain and not slotted clutch plates should be used with the latest type friction plates.

The clutch chainwheel and inserted plates are no longer exchangeable. Nyloc nuts should be fitted to the clutch spring studs to replace the locknuts used previously.

**For correct gear selection on re-assembly of gearbox, it is important that the centre casing is fitted as follows:—**

1. Rotate camplate by removing spring plunger until bottom gear is engaged. Count the notches on the rim of the camplate, noting the neutral between first and second.

2. Slide centre cover home, ensuring that the swinging fork is raised almost to the top of its slot.

3. When the selector engages with the pinion on the camplate, note its position. If it is tight at the top of the slot in the centre casing, it is one tooth too high. If there is a gap of more than  $\frac{1}{4}$ in. then the engagement is one tooth too low. Ignore all markings on case and selector fork.

4. Reassemble outer casing and test.

5. Refill with oil to level plug.

## CYCLE PARTS

### FOOTRESTS

To give a lower footrest position the nearside footrest can be fitted direct to the brake pedal pivot by removing the stud. The offside

footrest is adjustable to the same height.

#### **REAR BRAKE**

The rear brake rod is often bent due to lack of clearance on the clevis connection with the brake lever. Check for clearance with brake lever fully depressed.

The locknut on the rear brake shoe pivot pin, which also secures the torque arm, should be drilled and wired. A loose pivot pin can cause the rear wheel to lock when the brake is applied.

#### **CHAIN ADJUSTMENT**

For accurate rear chain adjustment remove lower bolt from rear suspension units. Any free undamped movement of the damper rod will adversely affect handling and steering particularly through fast bends. Any loss of fluid will result in loss of damping efficiency.

#### **FRONT FORKS**

The effectiveness of the hydraulic damping of all B.S.A. forks can be improved by fitting T-D Fork damper units. An alloy damper valve provides differential compression and rebound damping, which can be varied by the grade of oil used in the fork legs. Fitted without stripping forks.

Gaiters are practical fittings for both front forks and rear suspension units. Made from P.V.C. and secured with Jubilee clips they serve as dust and mud excluders and overcome the rattle inevitable with the steel sliders.

#### **FRONT BRAKE**

A 'Spongy' front brake is often caused by misalignment of the back plate when torque arm is tightened. A cure can be effected by altering the 'set' of the torque bracket. When tightening the securing nut make absolutely certain that no misalignment of the back plate occurs.

## CARBURATION

It will be noted that the induction tract of DB 350 and DBD 500 Gold Star is slightly smaller than the choke diameter of the carburettor. Modifications should not be made without professional advice.

Road racing exhaust pipe and megaphone combinations for CB, DB and DBD engines.

350 c.c. Exhaust Pipe  $1\frac{1}{4}$  in. Part No. 42-2912.

Megaphone. Part No. 42-2817.

500 c.c. Exhaust Pipe  $1\frac{7}{8}$  in. Part No. 42-2805

Megaphone. Part No. 42-2816

The exhaust pipe used with the silencer cannot be used for road racing with the megaphone. The 350 c.c. road racing exhaust pipe must not be shortened, it is intended to project into the megaphone.

Some 500 c.c. models using the 3 GP carburettor are fitted with a weak needle marked 3 GP 6. If the carburation is unsatisfactory, particularly between 3,500-4,500 R.P.M. the needle should be replaced with a standard needle marked 3 GP.

Flooding is a common cause of poor carburation. Check for wear on the alloy float needle. Mount as rigidly as possible, taping the fuel pipes to the frame for extra support.

Float chamber height relative to the main jet is essential. A line marked  $1\frac{1}{8}$  in. from the top flange of the float chamber should be opposite the base of the circle marked on the air jet plug on the float chamber to give the correct level.

The racing Q.A. Twisgrip has a limit adjusting screw in the open position to avoid strain on the throttle cable. Check adjustments frequently, over adjustment prevents throttle opening fully.

Alloy induction port spacer blocks 1 in. thick can be supplied 65 mm stud centres only. Choke sizes  $1\frac{1}{8}$  in. for 10 GP. 350 c.c. and  $1\frac{1}{4}$  in. for 3 GP 500 c.c. One or more spacers can be fitted to suit individual requirements. Longer studs are also available.

## SPECIAL ITEMS

We make alloy blank plugs to replace auxiliary units removed for road racing.

Blank for—Exhaust lifter assembly.

” ” Speedo drive union.

” ” Kickstart axle.

## CIRCUIT GEARING 500 c.c.

Recommended gearing for 500 c.c. Racing Gold Star. Silverstone G.P., Oulton Park, Castle Combe, Scarborough—46T wheel, 22T engine, or 42T rear wheel, 20T engine.

Cadwell, Silverstone Clubmans, Crystal Palace, Brands GP—46T rear wheel. 21T engine, or 42T rear wheel 19T engine.

Thrupton, Aberdare, Mallory—46T rear wheel, 20T engine or 42T rear wheel 18T engine.

For 350 c.c. Gold Star gearing—1 tooth less on engine sprocket than 500 c.c. sizes recommended.