

# **BSA**

## **SPEED & SPORTS PARTS**



from **BSA** Incorporated Service Dept.

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### HOW TO OBTAIN MAXIMUM PERFORMANCE FROM THE 650cc LIGHTNING AND HORNET ENGINE

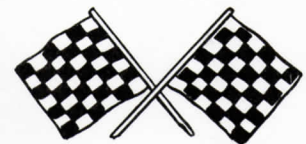
#### PERFORM A SYSTEMATIC SERVICE CHECK & TUNE-UP

1. TAPPETS: .008" Inlet  
.010" Exhaust
2. CONTACT POINTS: Contact Breaker .015" Gap.  
Check Spark Advance - .376" (38°) B.T.D.C.
3. SPARK PLUGS: .025" Gap - Use Champion N4 for "running-in".  
Change to KLG-FE100 for fast riding.
4. CARBURETORS - WITH AIR CLEANERS:  
#220 Main Jets  
#3 Needle Positions  
#3½ Throttle Valves
5. CARBURETORS-WITHOUT AIR CLEANERS:  
#280 Main Jets  
#3 Needle Positions  
#3½ Throttle Valves

NOTE: There is a restriction in most all air cleaners that are supplied on motorcycles sold for General Riding. Therefore, in order to obtain maximum performance, it will be necessary to remove the air cleaner. Then the carburetor will have to be re-calibrated.

6. CARBURETORS - WHEN SILENCERS ARE REMOVED:  
#210 Main Jets  
#2 Needle Positions  
#3½ Throttle Slide
7. CARBURETORS - WITHOUT AIR CLEANERS AND WITH SILENCERS REMOVED:  
#280 Main Jets  
#2 Needle Positions  
#3½ Throttle Valves

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NOTE: The carburetor specs shown are for general all around running. We recommend that you re-calibrate the carburetors for the particular engine you are concerned with and to the exact conditions under which the motorcycle will be running. See the Instruction Manual and Amal Carburetor Sheets for complete carburetor tuning procedures.

8. IGNITION TIMING ON ADVANCE: .376" (38°) B.T.D.C.

TIMING: Accurate ignition timing is an important requirement in the operation of the energy transfer system. The contact breaker is arranged to open only at the moment of peak value in the alternating current cycle in order that maximum electromagnetic energy is transferred from the alternator to the ignition coil and a good spark obtained at the plug. Refer to Instruction Manual for details on Timing Engine on pages 24 and 25.

9. VALVES-PORTS-VALVE SPRINGS: Make sure the valve faces and valve seats are true and have a perfect seal. Test for a perfect seal by filling the valve ports with gasoline. It will be necessary to re-grind the valves if there is a leak. Install S & W valve springs spaced to 1-5/16" with 185 pound spring tension.

10. CYLINDER HEAD: Remove the valve guides and turn the end that extends into the valve port to a taper. Increase the inside diameter of the valve seats and valve ports and polish the ports, manifold, and combustion chamber to a mirror-finish.

11. SILENCERS: The high performance Lightning engine could be classified as a racing engine and when silencers are installed, the top speed is affected. In other words, maximum performance is obtained when straight-through pipes or megaphones are installed.

The silencers are standard equipment on Lightnings to abide by the Motor Vehicle regulations. However, when the machine is going to be run where the Motor Vehicle regulations are not in effect they may be replaced with extension pipes or megaphones.

12. GEARING-SPROCKETS; The early Lightnings are "geared" 4.36 to 1 and this gearing is on the "high" side in order to obtain highest possible top speed on long stretches where the engine will be run mile after mile at full throttle. (late shipments are geared 4.58 to 1 in top gear).

When the machine is going to be run in areas where the stretches are less than a mile and the rider seldom runs at full throttle for any great length of time, a lower gearing is recommended.

To obtain quicker acceleration on the early Lightnings and to reach peak R.P.M. and high speed sooner, assemble a 19 tooth sprocket on the engine. The overall gearing in top speed will be 4.58 to 1, 3rd-5.24 to 1, 2nd-7.31 to 1, 1st-11.50 to 1.

13. In order to obtain maximum top speed from an engine, it is necessary to take advantage of the four speeds in the gearbox and run the speeds up gradually as per example shown below:

Run in 1st speed up to 6000 RPM or 40 MPH then shift into 2nd.  
Run in 2nd speed up to 7000 RPM or 75 MPH then shift into 3rd.  
Run in 3rd speed up to 7000 RPM or 100 MPH then shift into 4th.  
Run in 4th speed up to 7000 RPM or 120 MPH on up.

14. OTHER FACTORS THAT AFFECT TOP SPEED PERFORMANCE:

Tire Pressure  
Chain Adjustment  
Brake Adjustment  
Wheel Bearings

CHECK OR ADJUST THESE THINGS ACCORDING TO THE INSTRUCTION  
AND MAINTENANCE MANUALS.

WB/jc

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