THE RACING

MODEL G50

496 c.c. O.H.C.

Technical Data and Running Instructions

MATCHLESS MOTOR CYCLES · LONDON · S.E.18

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ASSOCIATED MOTOR CYCLES LIMITED

1962 MATCHLESS MODEL G50

ENGINE

Single cylinder chain driven O.H.C.

Bore 90 m.m. (3.543") Stroke 78 m.m. (3.070")

Capacity 496cc. (30.25 cu.in.)

Compression ratio 10.7 : 1 10.5 : 1

Fuel Petrol 100 octane (RM)

Oil Castor base racing oil

Carburettor Amal 1½" type 3 G.P. (see notes on carburation)
Remote mounted top feed float chamber.

Magneto Lucas racing type 2 M.T.T.

Sparking Plu K.L.G. type E.258/2.

Ducati
Bore 86mm Strock 75m
Capacity 435cc
Comp ratio 9.3.1

FRAME

Welded duplex cradle frame

Front Forks Patented Teledraulic
Oil capacity 200cc (0.352 pt.) in each leg use Oil SAE5.

Rear suspension units - Sealed Racing Girling.

Gear Box Matchless racing type 4-speed. 4 plate clutch.
Lubrication 1 pint. SAE 50 mineral oil
Internal ratios: 1.00 : 1, 1.10 : 1., 1.33 : 1, 1.78 : 1.
Overall gear ratios (suitable for I.o.M.)
Top 4.09 : 1, third 4.50 : 1, second 5.46 : 1, bottom 7.28 : 1

Standard Sprockets
Engine 25T, Clutch 42T, Gear Box 23T, Rear wheel 55T

Transmission chains
Primary ½" x .305" Secondary 5/8"x .305"

Chain lubrication
Oil contained in frame top tube. Filled through nozzle on L.H. side of steering head. Tap situated above twin feed block. This must be turned OFF when machine is stopped.
Jet size 20 suitable for SAE 30 mineral oil is fitted as standard but this may require altering to suit varying temperature conditions.

Racing Seat
Constructed of glass-fibre padded with sponge rubber and covered with leather cloth.

Fuel tank	Light alloy	4¾ gallons	21¼ litres
Oil tank	Light alloy	1 gallon	5 litres

Brakes Front brake - Double leading shoe type
Rear brake - Conventional single cam.

NOTE: The front brake link rods must not be adjusted except when relining. After relining and turning the front brake linings, subsequent adjustments must be made only on the cable.

Total dry weight of machine as delivered 290 lbs.

1962 MATCHLESS MODEL G50 - continued:

NOTES ON CARBURATION

Carburettor Amal 1½" type 3 G.P.

Throttle Valve

No.5 throttle valve is fitted as standard but as the optimum one depends partly on the driving technique of the individual rider, it is possible that either No.4 (less cutaway) or No.6(more cutaway) might give better results in certain cases. Generally however, No.5 will provide the cleanest 'opening up' with minimum 'megaphone effect'.

Needle

The standard fitting is 5 G.P/6.

It should be realized that the needle position influences the selection of the throttle valve to some extent. The standard position for the needle is in the middle notch (or third notch from top) but if for example, the needle is raised to the fourth notch from the top, although the mixture strength will be increased mainly in the speed range corresponding to about 2/3 full throttle, a small enrichment will be noticeable also in the first third of throttle opening. In this case a No.6 throttle valve could provide a compensating effect. It is unlikely that it should be necessary to lower the needle below the third notch in any circumstances and generally a 5 G.P/6 needle in the third notch should give best results.

Pilot Jet

It is important that the pilot jet should be carefully adjusted. The slowest possible, regular 'tickover' should be obtained, then slightly enrichened by one or two notches on the finger adjuster.

Screw IN to weaken : Screw OUT to richen

When once set satisfactorily, do not readjust unnecessarily. It is desirable to realize that each adjustable point viz: pilot jet, throttle valve and needle, have some (though small) effect on the other settings.

Main Jet

The standard main jet "400". However, engines are accepted for rated power and specific fuel consumption having main jets varying between 380-410. This is invariably due to changes in ambient temperature and air density, e.g. when the barometer is "high" and the air intake temperature is "low" a 380 main jet gives the best power output: conversely, a 410 jet might be necessary to restore maximum performance.

Fuel level

The fuel level should frequently be checked to ensure that the standard setting has not inadvertently been disturbed. When the machine is standing on level ground and upright, the level should be in line with the bottom of the circle inscribed on the air jet cover plug. This is conveniently achieved with the aid of a length of transparent tubing attached to the float chamber outlet. An alternative but less accurate method is to remove the air jet plug and lean the machine over at about 10^{o} from the vertical. At this angle petrol should just "weep" through the air jet.

Air Jet

This jet has the effect of providing some compensation for the varying air and fuel characteristics as the gas velocity increases with the engine speed.

The standard air jet fitted is a .125, i.e. the diameter of the orifice of the jet is .125". Any change will adversely effect other settings, so that no alteration in this respect is recommended.

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NOTES ON IGNITION SETTING AND VALVE TIMING

The ignition point is critical. The optimum setting is 32° b.t.d.c. when the contact breaker points are set at .012". If the contact breaker gap varies, the ignition point varies. If it is suspected that the ignition angle is not precisely 32° it should be checked and if necessary reset after ensuring that the contact breaker points gap is set at .012". Ensure that precise t.d.c. has been obtained before resetting. This can be found by means of a special tool screwed into the sparking plug hole. The tool can easily be made up since it merely consists of an old sparking plug body into which a length of rod is attached. When the tool is screwed into the sparking plug hole, the length of the rod is such that the end touches the piston about ¼" before t.d.c. Thus, in finding true t.d.c. the degree plate is adjusted until 0° is opposite a pointer attached to the crankcase at exactly half the total crank angle permitted by the protruding rod. When intending to remove the cylinder head, it is important before doing so, to ensure that the original valve timing can easily be re-obtained. The best procedure is as follows:

1). After removing the timing case lid, undo the two nuts on the end of the camshaft.

2). Before removing the vernier peg, mark the hole that it occupies on both the sprocket and the hub. The mark on the hardened sprocket is most conveniently made with indelible pencil, but the mark on the hub can be centre-popped.

3). Make sure that the sprocket cannot get out of position relative to the chain. This is best done by wiring the sprocket firmly to the chain.

4). The chain will deflect laterally sufficiently (without straining it) to enable the sprocket (in position on the chain) to be taken off the end of the camshaft.

5). The 12 screws holding the rocker box and the four long bolts are now removed, giving access to the cylinder bolts.

6). If original timing has been lost, fix a Dial Test Indicator by means of a bracket to the cam box and align the indicator stalk truly in line with the valve.

7). Mount a degree plate on the crankshaft, together with a pointer to a convenient attachment point.

8). Obtain precise T.D.C. (Use tool made from an old sparking plug).

9). Set tappets to normal running clearances (Inlet .008" Exhaust .012") then, with the vernier peg removed, turn degree plate two or three rotations in normal running direction. This is to enable friction of sprocket hub to carry the camshaft round until it is resisted by the exhaust rocker. (This is the approximate point at which exhaust valve lift will commence). Now continue to turn in the same direction until the pointer indicates that the piston is approximately 79° b.b.d.c. (1959 and later engines).
Insert the vernier hole peg in the appropriate hole and lock up both camshaft nuts and check. (Take reading when indicator shows .0005" 'nip'). If not correct, an adjustment of 2.3° (crankshaft angle) either way can be obtained on the vernier incorporated in the sprocket hub assembly.

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Notes on ignition setting and valve timing continued.

10). If the 2.3° provided by the vernier is too much, proceed as follows: Since the sprocket has 18 vernier holes and 17 chain teeth, a small change occurs in the angular position of the sprocket relative to the hub when the sprocket is moved in relation to the chain. Therefore, in order to obtain the timing required, move the sprocket relative to the chain by one or two links and then re-check. This will indicate the extent and direction required and one or two trial adjustments will result in achieving the precise timing required.

Inlet should open	55° x 57°
Inlet should close	76° x 78°
Exhaust should open	76° x 78°
Exhaust should close	42° x 44°

Inlet opening and exhaust closing points should be obtained as accurately as possible.

Cylinder Head/Piston - clearance dimensions

In the original build one or more shims may have been fitted in order to obtain the correct clearance. It is important to note that shims (if any) must be replaced.

VALVE SPRING LOAD ADJUSTMENT

Valve seated load (1962 G50 Engines)

The valve seated load should be approximately 104 lb. using Springs Part No. 020328 and 020329. This load value is obtained with springs (i.e. one pair of hairpin springs per valve) having a specific load of 180 lb. per inch deflection. When the initial deflection of a spring of this rating is 0.580" the load will be 104 lb. ± 2 lb.

These conditions may be checked by measuring the distance between the spring prongs and the loop. This is conveniently achieved by making up a simple ".010 tolerance" gauge from a piece of ¼" steel plate. The width of the gauge should be .570" at one end and .580" at the other end. One end or the other of this gauge should be capable of sliding just freely between the upper sides of the spring prongs and the lower sides of the spring loop. If necessary, adjust by means of the shims under the spring seat block to provide the required "gap".

If new springs are to be fitted, it is precaution to ensure that the prongs do not "butt" when installed. A clearance of approximately .020" between the prong ends is necessary. Also, the spring prongs must not have any tendency to "bind" or "lock" in their respective holes in the spring seat blocks. This is to ensure that, by allowing the springs to take up unconstrained and natural alignment, stress concentration and risk of premature failure is avoided.

CAMSHAFT CHAIN ADJUSTMENT

The camshaft chain is adjusted by means of shims between the rocker box faces. If more than .060" total shim thickness is required it is an indication that the timing chain is worn and should be renewed. Shims in excess of 0.060" are liable to adversely effect the valve and rocker operation geometry.

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Camshaft Chain Adjustment continued

The chain should be set so that the spring tensioner (aided by finger pressure) deflects the chain from a straight or taut line by between 5/16" and $\frac{3}{8}$" measured approximately at mid-distance between the sprocket centres. This slack is necessary to take care of variation of sprocket centres due to thermal effects.

Cylinder Head Nuts and Rocker Box Bolts
Torque loading spanner settings

Cylinder head nuts	(012780)	30 lb.ft.
Rocker box bolts	(012871)	18 lb.ft.

GEAR BOX	Top	Third	Second	Bottom
Internal Ratios G50	1.0 : 1	1.099 : 1	1.331 : 1	1.782 : 1
GEARS	23	22	20	17
Number of teeth	19	20	22	25

A lower bottom gear ratio of 1.892: 1 may be obtained by using a specially formed 16T mainshaft pinion (Part No. 040605) which meshes with the standard 25T layshaft pinion (Part No. 040510)

REAR CHAIN ADJUSTMENT

The rear chain should be adjusted with just perceptible slack when the rear suspensions are at their fully compressed position. This operation is not easy to achieve unless a tool is available for holding the suspension units in their fully compressed position. The tool may be easily made up since it consists merely of two pieces of $\frac{1}{4}$"wide mild steel plate with suitable slots for engaging above and below the suspension unit spring abutments. Three, $\frac{1}{4}$" steel rods are welded on to position the plates at the appropriate distance apart.

The procedure is to depress the rear of the machine and slip the claws of the tool over the spring abutments of one suspension unit thus holding the position required while adjusting the chain.

POWER RANGE AND GEAR RATIOS

The top gear ratio should be selected which will allow the engine to run, generally, between 6600 and 7200 rpm, and 7400 rpm. must be considered as the upper limit for a very short time. Inertia loading in the piston and con. rod becomes excessively high beyond 7200 rpm, also the power output tends to fall off above this speed. The 'mean' rpm. to aim for when selecting the top gear ratio should be 6900 rpm, this giving a margin of 300 rpm above 6900 rpm for downhill and following wind conditions, while 300 rpm below 6900 rpm provides nearly maximum power and increased torque for uphill and head wind work in top gear.

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ATTENTION TO TRANSMISSION PARTS

Adequately lubricated chains and sprockets in good condition and in perfect alignment and adjustment have a very high mechanical efficiency, but a rapidly increasing loss in efficiency and a corresponding reduction of effort at the rear wheel takes place when quite small defects in lubrication, alignment and adjustment appear. This point is made in order to emphasize a recommendation that as much care should be given to ensuring a minimum loss of power in transmission as is usually given to obtaining maximum engine power output.

Tyre pressure has an effect on tractive resistance which is not generally appreciated - it is relevant therefore to consider this aspect under the heading of 'transmission parts'. The highest pressure consistent with riding comfort on wet or dry surfaces should always be employed. The tyre manufacturers recommendations should be followed as closely as practicable.

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Gear ratios and corresponding r.p.m. at speeds shown when rear wheel is fitted with 3.50" x 19" racing tyre. Clutch sprocket 42T. Gearbox sprocket 23T.

Engine Sprocket	Rear wheel Sprocket	Top gear ratio	R.P.M. at M.P.H. 105	110	115	120	125	130	135
25	54	3.95	5460	5720	5990	6250	6500	6760	7020
25	55	4.01	5550	5820	6090	6350	6610	6880	7150
25	56	4.09	5650	5940	6200	6470	6740	7000	-
25	57	4.16	5750	6040	6300	6590	6850	7140	-
25	58	4.24	5850	6150	6420	6700	6990	-	-
24	54	4.10	5680	5950	6220	6490	6760	7040	-
24	55	4.18	5790	6060	6350	6610	6890	7170	-
24	56	4.26	5900	6180	6450	6745	7100	-	-
24	57	4.34	5990	6270	6555	6840	7130	-	-
24	58	4.41	6110	6400	6700	7000	-	-	-
23	54	4.29	5940	6210	6500	6790	7060	-	-
23	55	4.36	6040	6325	6610	6900	7200	-	-
23	56	4.45	6160	6460	6750	7050	-	-	-
23	57	4.52	6270	6560	6850	7160	-	-	-
23	58	4.60	6370	6680	6980	-	-	-	-
22	54	4.48	6210	6500	6800	7100	-	-	-
22	55	4.56	6310	6610	6920	7200	-	-	-
22	56	4.65	6440	6750	7050	-	-	-	-
22	57	4.74	6520	6850	7150	-	-	-	-
22	58	4.81	6650	6960	-	-	-	-	-
21	54	4.70	6500	6800	7120	-	-	-	-
21	55	4.79	6600	6930	-	-	-	-	-
21	56	4.88	6770	7100	-	-	-	-	-
21	57	4.96	6880	-	-	-	-	-	-
21	58	5.05	7000	-	-	-	-	-	-

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25	56	4.09	5650	5940	6200	6470	6740	7000	-
25	57	4.16	5750	6040	6300	6590	6850	7140	-
25	58	4.24	5850	6150	6420	6700	6990	-	-
24	54	4.10	5680	5950	6220	6490	6760	7040	-
24	55	4.18	5790	6060	6350	6610	6890	7170	-
24	56	4.26	5900	6180	6450	6745	7100	-	-
24	57	4.34	5990	6276	6555	6840	7130	-	-
24	58	4.41	6110	6400	6700	7000	-	-	-
23	54	4.29	5940	6210	6500	6790	7060	-	-
23	55	4.36	6040	6325	6610	6900	7200	-	-
23	56	4.45	6160	6460	6750	7050	-	-	-
23	57	4.52	6270	6560	6850	7160	-	-	-
23	58	4.60	6370	6680	6980	-	-	-	-
22	54	4.48	6210	6500	6800	7100	-	-	-
22	55	4.56	6310	6610	6920	7200	-	-	-
22	56	4.65	6440	6750	7050	-	-	-	-
22	57	4.74	6520	6850	7150	-	-	-	-
22	58	4.81	6650	6960	-	-	-	-	-
21	54	4.70	6500	6800	7120	-	-	-	-
21	55	4.79	6600	6930	-	-	-	-	-
21	56	4.88	6770	7100	-	-	-	-	-
21	57	4.96	6880	-	-	-	-	-	-
21	58	5.05	7000	-	-	-	-	-	-