Supplementary Instruction Book for Competition Models

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Introduction

Sports twins, scrambles and trials models, are fitted with engine sprockets which are considered to be best suited for competitions.

Owners, who intend to use a machine of this type for normal road work, should fit a standard type engine sprocket, for reasons that are obvious.

Where prolonged full throttle driving is desired, the use of sparking plugs with a reasonably high heat factor, also with a good oil factor are recommended. (See *Technical Data.*)

Machines of the above type are usually acquired by experienced motor-cyclists and with this in mind elementary details are not included in this supplement.

For those without previous experience, elementary details for decarbonisation, etc., are detailed in the normal Instruction Book, which is issued with each new machine.

TECHNICAL DATA.

SPORTS TWINS.

Engine capacity	592 cc.
Bore and Stroke	72×72.8 mm.
Compression ratio	8.5
Carburettor AMAL Monobloc	Type 376/78
Carburettor bore size	1 1/16 ins.
Main jet size	280
Main jet size with Air Filter	240
Throttle slide	376/3½
Pilot jet	30
Needle position	Third position
Needle jet	.106
Petrol Tank capacity	2 gallons
Oil Tank capacity	4 pints
Front chain	66 links ½ in.×.305 in.
Rear chain	97 links ⅝ in.×.380 in.
Engine sprocket normal. (Competition)	19 teeth
Engine sprocket standard. (Touring)	22 teeth
Gear ratios	See page 12
Sparking plugs	K.L.G. FE. 80
Sparking plugs. Competition type	FE. 220

SUPPLEMENTARY INSTRUCTIONS FOR TRIALS AND SCRAMBLES MODELS.
(To be used in conjunction with normal Instruction Book).

TECHNICAL DATA.

TRIALS MODELS.

Capacity	347 cc.
Bore	69 mm. (2.7187 ins.)
Stroke	93 mm.
Compression Ratio	6.5
Carburettor Type	376/59T Monobloc
Carburettor Bore	1 1/16 ins.
" Main Jet	210
" Slide	3
" Needle Jet	107/1
" Pilot Jet	30
Ignition Setting	Maximum advance ½ in. (free wire control)
Magneto Type	NR—1 (Lucas 42179E)
Sparking Plug	K.L.G. FE. 80
Petrol Tank capacity	2 gallons
Oil Tank capacity	4 pints
Ground clearance	10 ins.
Tyre Sizes	Rear 4.00×19 } Trials Universal
Tyre Sizes	Front 2.75×21 } Trials Universal
Contact Breaker Gap	.012 ins.
Chain Sizes and Length: Primary Chain	½×.305 66 links
Rear Chain	⅝×.380 97 links
Brakes	7 ins.×⅝ ins.

TECHNICAL DATA.

SCRAMBLES MODELS.

	Model 350	Model 500
Engine capacity	348 cc.	497 cc
Bore and Stroke	72×85.5 mm.	86×85.5 mm.
Compression Ratio ...	9.9	8.7
Carburettor AMAL Monobloc	389/18	389/12
Choke Diameter	1⅛ in.	1 3/16 in.
Main Jet No.	270	440
Pilot Jet No.	30	30
Slide No.	3	3
Needle Position	Centre Notch	Centre Notch
Needle Jet	.106	.106
Petrol Tank capacity ...	2 gallons	2 gallons
Oil Tank capacity	4 pints	4 pints
Brakes	7 ins.×⅞ ins.	7 ins.×⅞ ins.
Rear Chain ...	⅝ ins.×0.380 ins.—97 links	97 links
Primary Chain ...	½ in.×0.305 in.—66 links	67 links
Sparking Plug. (For Running-in)	FE. 80	F.E 80
Sparking Plug. (For Racing)	FE. 220	FE. 220

ENGINE SERVICE.

Instructions in this supplement apply only to parts that are dissimilar to the Touring Models.

TRIALS MODELS.

This model closely resembles the standard type engine, with the exception of the alloy cylinder barrel and the method of retaining the cylinder and head to the crankcase. A ground joint is used for the cylinder head and cylinder barrel, jointing compound is not to be used as a seal.

To remake the joint, apply a little fine grinding paste on to the wide face of the cylinder barrel, put the head on to the cylinder. Using both hands, move the head in an oscillating motion through an arc of about 90 degrees, with a slight downwards pressure. Raise the head from time to time to get a fresh "bite" on the grinding paste. Continue this process until (after wiping both joint faces) a continuous matt surface is obtained.

Note: The head joint is made on the wide face only and not on the spigot of the cylinder.

SCRAMBLER MODELS.

Instructions for cylinder head grinding for Trials Models apply also to the scrambler type engine. The two sealing rubbers surrounding the top of the push rod tunnels must be removed, before grinding takes place.

VALVE GRINDING.

Both valve seats are inserts cast in the cylinder head, and are not replaceable. Unnecessary, or prolonged valve grinding should be avoided, which can only cause the seat to become saucer shaped with an ineffective gas seal.

If the valve seat is pitted it should be recut with a valve seating cutter, the valve angle is 45°.

PORT POLISHING.

If the ports in the cylinder head are ground, or polished, avoid removing metal immediately below the valve seat insert, which will weaken the support of the insert and may cause it to move.

DECARBONISING.

The engine should only be decarbonised when there are definite signs of a loss of power, increased petrol consumption, or difficult starting, assuming the ignition system is in order.

The competition type engine runs at a low temperature, and providing the oil consumption is not excessive, a heavy formation of carbon on the piston crown and sphere of the cylinder head is unlikely to occur.

If the cylinder barrel is removed to examine the piston rings, the rings should not be disturbed unless it is absolutely necessary. Gas leakage past the rings is indicated by brown patches on the ring surface.

PISTON REMOVAL.

Trials models are fitted with a split skirt piston, if the piston is removed it must be replaced with the split in the skirt facing the front wheel indicated by FRONT stamped on the piston crown.

Scrambles models are fitted with a solid skirt piston, and although the recesses for valve clearance on the piston crown are symmetrical, the piston should be suitably marked before removal, so that it can be refitted in its original position.

PUSH ROD ADJUSTMENT. SCRAMBLER ENGINE.

Special racing camshafts (marked SH) are a standard fitment for the Scrambler models, and for engine efficiency correct push rod adjustment is of considerable importance.

Make this adjustment when the engine is cold, with the piston on T.D.C. of the firing stroke. Clearance for the inlet valve is Nil, the push rod should be just free to rotate by finger application with no up and down movement.

The exhaust valve clearance is .005 inches, obtainable by first adjusting the push rod with a Nil clearance, the adjusting screw is screwed down to the extent of one-sixth of a turn, or one flat on the hexagon for the adjusting screw.

PUSH ROD ADJUSTMENT. TRIALS ENGINE.

Follow details given for the Standard models.

To avoid "losing the engine", or spitting back through the carburettor when tuning for "Plonk" the push rod adjustment can be made with the engine cold, or the inlet push rod clearance increased slightly.

TO RETIME THE IGNITION. TRIALS MODELS.

The normal ignition advance is 39° or ½ inch.

First check contact breaker gap, .012 inch; leave off contact breaker cover.

Remove magneto chain case cover, and slacken the nut securing the lower magneto drive sprocket, two or three turns. Lever the sprocket loose on its taper shaft.

Refer to the normal instruction book and follow the dismantling instructions then set the piston ½ inch before T.D.C. as recommended.

Place the ignition control lever in the fully advanced position, rotate the sprocket on magneto, anti-clockwise, until the contact points are just about to separate. The precise point of separation can be found by inserting a piece of tissue paper between the points, when by rotating the magneto sprocket and with a light pull on the paper until it is released, the exact contact separation point will be indicated.

With care that the magneto does not move, tap the lower magneto sprocket back on its shaft and tighten the fixing nut.

Recheck this setting before refitting the parts removed.

Replace contact breaker cover.

TO RETIME THE IGNITION. SCRAMBLER MODELS

The normal ignition advance is between 39 to 41 degrees or ½ inch vertical measurement for both the 350 cc. and 500 cc. model. Follow details given for Trials models.

VALVE TIMING. SCRAMBLER AND TRIALS MODELS.

Both cam wheels, also the small timing pinion are marked for correct assembly. Use No. 2 mark for inlet cam, No. 1 for exhaust cam.

TO REFIT CAM WHEELS.

With both cam wheels removed, turn the engine until the marked tooth on the small pinion is in line with the centre of the cam wheel bush for the inlet cam.

Insert the inlet cam into its bush with the No. 2 tooth gap mark in mesh with the mark on the small pinion.

Turn the engine *forward* until the marked tooth on the small pinion is in line with the centre of the cam wheel bush for the exhaust cam.

Insert the exhaust cam into its bush, with the No. 1 tooth gap mark in mesh with the mark on the small pinion.

Note: The mark on the small pinion is central with the key way and if obscured release the pinion nut which has a LEFTHAND THREAD one or two turns to expose the mark.

AVERAGE VALVE TIMING FIGURES. SCRAMBLES MODELS.

Inlet Valve opens:	59° B.T.D.C.	Nil clearance.
Inlet Valve closes:	69° A.B.D.C.	
Exhaust Valve opens:	69° B.B.D.C.	.005 in. clearance.
Exhaust Valve closes:	48° A.T.D.C.	

Taken with valve .001 inches off the valve seat.

TRIALS MODELS.

Inlet Valve opens:	26° B.T.D.C.
Inlet Valve closes:	53° A.B.D.C.
Exhaust Valve opens:	64° B.B.D.C.
Exhaust Valve closes:	25° A.T.D.C.

Readings taken with .016 inches rocker clearance and valve .001 inches off its seat.

SPORTS TWINS.
REMOVING THE TWO-PIECE EXHAUST PIPE.

Slacken the bolt securing the clip, where the short pipe joins the long pipe.

Remove nut and washer on front engine plate.

Pull out the short pipe from the exhaust port and the long pipe simultaneously.

Remove both the nut and washer on the front frame uniting bolt.

Slacken the silencer clip bolt.

Pull out the long pipe from the exhaust port, leaving the silencer attached to the frame.

Refit in reverse order.

Note: Do not unduly rock the exhaust pipes sideways during removal, which tends to distort the exhaust pipe and cause gas leakage.

PETROL TANK REMOVAL. COMPETITION TYPE.

Where a competition type petrol tank is fitted the method of attachment differs from the standard fitting as shown on page 30 in the Instruction Book.

The front attachment for the petrol tank is made by two cylindrical-shaped rubbers attached to the tank support rail and engaged in two tubular steel extensions, the rubbers are expanded, when the two bolts securing the rubbers are tightened.

To remove this type of petrol tank:

Disconnect both petrol pipes.

Remove the bolt passing through the tank and frame tube at the rear end of the tank.

Release the two front attachment bolts and lift up bodily the tank, with care not to misplace the two separating rubbers for the rear attachment.

When refitting do not unduly tighten the front attachment bolts.

REAR WHEEL REMOVAL.

With the machine on its central stand:

Disconnect: Rear chain.
Rear brake rod.
Speedometer drive cable.

Remove the bolt which passes through the rear chain guard, and the rear brake cover plate anchor lug.

To avoid disturbing the wheel spindle distance pieces, leave the spindle in position and remove both spindle nuts only, twist the wheel to the right, until the cover plate is clear of its anchorage and withdraw the wheel.

FRONT CHAIN ADJUSTMENT.

Refer to Illustration 27 in the Instruction Book for location of adjuster.

Scrambler models have two chain adjuster bolts.

Trials and Sports Twin models use one chain adjuster bolt.

For front chain adjustment follow details on page 56 of the Instruction Book.

Where two chain adjusters are used, both bolts must be moved an equal amount, when this adjustment is carried out.

TO REMOVE FRONT CHAINCASE.

To remove outer half of front chaincase:

Place tray under chaincase to catch oil.

Remove screw binding chaincase metal band at its rear.

Remove metal band.

Remove endless rubber band.

Remove nut and washer, in centre of chaincase front.

Take away outer half of chaincase.

Fit outer half of front chaincase by:

Ensure faces of both halves of chaincase are clean.

Ensure the rubber and metal bands are clean and undamaged.

After carefully positioning the outer half so that its exterior edge exactly coincides with that of the inner half, apply the endless rubber band.

Fit the metal band, starting at the front end of the chaincase and drawing together the two free ends with the fingers of one hand while with the other hand insert the binding screw.

Whilst slowly tightening this binding screw apply at the same time light taps all round the band exterior using a small rubber mallet.

These light taps will cause the metal band to creep on the rubber to ensure an even all-round pressure.

Remove the inspection cap from the chaincase and pour in engine oil to the level of the bottom edge of the inspection cap orifice and then replace the cap.

Do not overtighten the clamping screw.

TO REMOVE THE DYNAMO.

Remove the left side footrest arm.

Place a tray under primary chaincase to catch the oil.

Remove chaincase band binding screw and remove metal band and also endless rubber band.

Remove nut and washer in centre of chaincase when outer half can be taken away.

Remove spring circlip, locking plate and nut securing dynamo sprocket and withdraw sprocket with a suitable tool. (Use spanner 017254 to hold sprocket while nut is being slackened, this relieves the dynamo shaft of all bending strain).

Detach dynamo cables and loosen dynamo clamping bolt to fullest extent.

Twist dynamo by hand until the locating strip on its body is in line with the keyway cutaway in the rear engine plate housing the dynamo, in which position same can be withdrawn tilting upwards to clear gear box while doing so.

To re-fit the dynamo, reverse the foregoing taking care to accurately locate the dynamo sprocket key when applying the sprocket. See separate instructions for correct dynamo chain adjustments. Ensure that dynamo sprocket securing nut is well tightened before refitting locking plate and retaining circlip.

DYNAMO CHAIN ADJUSTMENT.

The dynamo armature shaft is eccentric to the body of the dynamo.

Therefore, by partially revolving the dynamo in its housing the distance between the two dynamo driving sprockets can be varied, thereby allowing latitude for chain adjustment.

Tighten dynamo chain by:

Remove inspection cap from front chaincase.

Slacken dynamo clamping strap bolt.

With the fingers turn dynamo bodily in an anti-clockwise direction till, by passing a finger through the inspection cap opening, it can be felt the chain tension is correct.

The chain whip should be about $\frac{1}{4}$ inch. Ensure, when feeling tension, the front driving chain is not confused with the dynamo chain which lies behind the front driving chain.

Tighten dynamo clamping strap bolt.

Re-check chain tension.

Replace chaincase inspection cap.

MAGNETO CHAIN ADJUSTMENT.

The magneto platform hinges on one of its fixing bolts. This provides sufficient movement for adjustment to the magneto driving chain.

Tighten magneto chain by:

Remove magneto chain case cover.

Slacken nut on rear bolt supporting magneto platform.

Insert a screwdriver under that end of the magneto platform and lever upwards until the chain tension is correct.

The chain whip should be about $\frac{1}{4}$ inch.

Tighten nut on platform supporting bolt.

Re-check chain tension.

Place a supply of grease on magneto driving chain and using a broad pen knife blade or thin strip of metal work well into the interior of the auto ignition advance unit a generous quantity of either Mobilgrease No. 2 or Esso Fluid Grease.

Replace magneto chain cover.

CARBURETTOR. SCRAMBLES MODELS.

The main jet size in technical data is for an open exhaust pipe system.

The correct exhaust pipe length is most important, namely 42 inches long measured along centre line.

GEAR RATIOS. SCRAMBLES MODELS.

Internal Ratios.

Engine sprocket size	1.1 *First gear*	1.35 *Second gear*	1.77 *Third gear*	2.67 *Fourth gear (top)*
16 teeth ...	18.39 to 1	12.19 to 1	9.30 to 1	6.89 to 1
(*a*) 17 teeth ...	17.30 to 1	1.47 to 1	8.74 to 1	6.48 to 1
18 teeth ...	16.34 to 1	0.83 to 1	8.26 to 1	6.12 to 1
(*b*) 19 teeth ...	15.48 to 1	0.26 to 1	7.83 to 1	5.80 to 1
20 teeth ...	14.71 to 1	9.75 to 1	7.43 to 1	5.51 to 1
21 teeth ...	14.01 to 1	9.29 to 1	7.08 to 1	5.25 to 1
22 teeth ...	13.37 to 1	8.86 to 1	6.76 to 1	5.01 to 1

(*a*) Standard for 350 cc. Scrambles Models.

(*b*) Standard for 500 cc. Scrambles Models.

GEAR RATIOS. TRIALS MODELS.

Internal Ratios.

Engine sprocket size	1.1 First gear	1.47 Second gear	2.39 Third gear	3.28 Fourth gear (top)
16 teeth ...	22.59 to 1	16.46 to 1	10.12 to 1	6.89 to 1
(a) 17 teeth Standard	21.25 to 1	15.48 to 1	9.52 to 1	6.48 to 1
18 teeth ...	20.07 to 1	14.62 to 1	8.99 to 1	6.12 to 1
(b) 19 teeth ...	19.02 to 1	13.86 to 1	8.52 to 1	5.80 to 1
20 teeth ...	18.07 to 1	13.16 to 1	8.10 to 1	5.51 to 1
21 teeth ...	17.22 to 1	12.54 to 1	7.71 to 1	5.25 to 1
22 teeth ...	16.43 to 1	11.97 to 1	7.36 to 1	5.01 to 1

(a) Standard for 350 cc. Trials Models.

(b) Standard for 500 cc. Trials Models.

GEAR RATIOS. SPORTS TWINS.

Internal Ratios.

Engine sprocket size	1.1 First gear	1.35 Second gear	1.77 Third gear	2.67 Fourth gear (top)
(a) 19 teeth ...	15.48	10.26	7.83	5.80
20 teeth ...	14.71	9.75	7.43	5.51
21 teeth ...	14.01	9.29	7.08	5.25
(b) 22 teeth ...	13.37	8.86	6.76	5.01

(a) Competition Sprocket.

(b) Standard 600 cc. Engine Sprocket.

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