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HANDLING AND MAINTENANCE NOTES

FOR THE RACING VERSION OF THE LOTUS ELAN S.2

LOTUS COMPONENTS RACING DIVISION, DELAMARE ROAD, CHESHUNT, HERTS.

TELEPHONE: WALTHAM CROSS 26181

APRIL 1965.

NA

GENERAL DIMENSIONS

Wheel base	84"
Track, front	45 $\frac{1}{4}$ "
Track, rear	49 $\frac{1}{4}$ "
Length overall	145"
Width overall	56"
Height overall	46"
Fuel tank	10 $\frac{1}{2}$ gallons
Extra tank	12 $\frac{1}{2}$ gallons
Spring rate, front	128 lbs./in
Spring rate, rear	100 lbs./in
Anti roll bar, front	13/16"
Anti roll bar, rear	$\frac{1}{2}$ "
Ground clearance to bottom of chassis.	5"

REAR AXLE

The car should be driven gently, initially, for as far as practical in order to run in the rear axle; if the axle is not run in it will rapidly become noisy and wear out prematurely. Recommended oil - Esso AL.1763.

Inspect the limited slip diff. regularly - by its very function it cannot be expected to last forever.

ENGINE

BRM Type 84 (see separate schedule)

CLUTCH

Borg and Beck 8" diaphragm type

GEARBOX

Ford with aluminium alloy bell housing and tailshaft housing. Special rear engine mounting to suit.

<u>Ratios</u>	<u>Standard</u>	<u>Alternative</u>
1st	2.509	3.543
2nd	1.64	2.396 or 2.04
3rd	1.230	1.412
Top	1.0	1.0
Reverse	2.807	3.96

Recommended oil: Esso GP.80 or equivalent.

FINAL DRIVE

Aluminium alloy differential carrier in magnesium housing fitted with limited slip differential.

Alternative ratios:	4.43	4.12	3.90 standard
Speed at 7000 rpm in top:	117 mph.	126 mph.	133 mph.
Recommended oil:	Esso AL.1763		

Calculated when fitted with 600 x 13 tyre (807 revs.per mile)

If the unit is stripped, care should be taken to see that the correct thickness of gasket is used.

DRIVE SHAFTS.

The frictionless roller splines which make up the driveshafts on this car are manufactured to very fine tolerances and the dust seals should be kept in perfect condition and the shafts checked for grease at least twice a season. Care should be taken when dismantling to avoid loss of any of the rollers.

NB. If the car is raced in wet conditions the drive shafts should be dismantled immediately afterwards, repacked with grease and the felt seal replaced.

SUSPENSION

The suspension should be set at the running ground clearance of 5".

Camber	front	1° negative
	rear	2° negative
Toe-in	front	1/8" total
	rear	3/8" total
Dampers	front	18 clicks from soft
	rear	non adjustable
Tyre pressure	front	32 lbs./sq. in cold
	rear	32 lbs./sq. in cold
Castor	front	3°

The toe-in at the front should also be checked with the car in the full bump and full rebound positions. It is permissible to have up to 1/8" more toe-in on rebound than bump. Variations greater than above can be corrected by adjusting the spacers under the steering rack clamps.

Raising the rack by 1/16" on one side will produce about 3/32" more toe-in on rebound than bump on that side.

NOTE: DISTANCE FROM LOWER WISHBONE PIN TO TOP OF
RACK MOUNT SURFACE 2.19" STOCK ± .005"

Wheel alignment may be carried out as follows:



Set two bars at hub height, one at each side of the car, so that C and D are equal and A equals A and B equals B, then set front and rear wheels as follows:

Front: 1/16" toe in on each wheel measured on the rim at the side wall with the steering wheel central.

Rear: 3/16" on each wheel measured as above.

ROSE BEARINGS

These should be cleaned, checked and regreased at regular intervals as they are inclined to pick up grit and subsequently seize.

WHEELS.

Magnesium knock-on wheels of 6" rim width.

The left hand threaded hubs should be fitted on the right hand side of the car. To ensure that the wheel does not loosen, the friction between the nut and the hub should be greater than the friction between the nut and wheel. The threads, therefore, should be kept dry and the core on the nut lightly coated with molybdenum disulphide.

Tyres: 5.50 x 13 R6 front

6.00 x 13 R6 rear

BRAKES

The master cylinders are $\frac{5}{8}$ " bore, the front calipers are Girling Type AR and the rear calipers are Girling Type 10/12 HP.

Care should be taken to see that the flexible brake pipes have a free run (particularly near the rear wheel). The run of the pipe can be altered by rotating the inboard end of the flexible pipe before tightening.

The pad material used ~~is~~ Ferodo DS.11

The braking system is fitted with twin master cylinders, both cylinders being $\frac{5}{8}$ " bore. The two master cylinder push rods are connected by an adjustable balance bar to enable adjustment of ratio between front and rear to be obtained.

To adjust balance bar:

NOTE: Do not carry out adjustment to braking ratio until pads have become properly bedded.

- (a) Slacken both nuts at ends of balance bar.
- (b) Screw the balance bar in or out as needed half or one turn.

NOTE: Adjustment is very sensitive.

- (c) Re-tighten the nuts at each end.

FUEL SYSTEM:

An aluminium radiator block is used with a remote-header tank. The radiator is of very light construction and great care should be taken when handling it. Particular care should be taken to see that the bottom offtake does not touch the body when the radiator is fixed, otherwise the side tank will squash and leak. The radiator is mounted at a small angle when viewed from the front to give adequate clearance between the inlet and the bonnet lid.

TYPE 84 ENGINE INFORMATION FOR THE RUBERY OWEN
MODIFIED FORD LOTUS CORTINA ENGINES

In standard form the engine gives approximately 105 bhp. but when modified by the BRM Engine Development Division of Rubery Owen & Co. Ltd. gives a minimum of 145 bhp. It is vital that the engine number is quoted when ordering spares.

OVERALL SPECIFICATION.

Capacity 1594 c.c. (97.4 cu.in) bore 83.5 mm. (3.288")
stroke 72.55 mm. (2.864").

Compression ratio	11:1
Maximum bhp	145 minimum at 6,750 r.p.m.
Maximum torque	130 lbs.ft. at 5,000 r.p.m.
Maximum B.M.E.P.	201 p.s.i. at 5,000 r.p.m.
Maximum r.p.m.	7,000 r.p.m.

CYLINDER HEAD

Cast aluminium twin overhead camshaft hemispherical head.
Valves set at included angle of 54° .

CRANKSHAFT/FLYWHEEL CLUTCH

Cast iron crankshaft and flywheel with diaphragm type clutch.
Whole assembly dynamically balanced before assembly.

TIMING COVER ASSEMBLY

Cast aluminium timing case and cover mounted on front of cylinder block enclosing camshaft drive system by Renolts Chain $\frac{3}{8}$ " pitch, chain tension controlled by spring loaded jockey pulley tensioner unit on one side of engine and rubber damper on opposite side. Timing chain also drives jackshaft incorporating skew gear for distributor and oil pumps.

MAIN AND BIG END BEARINGS

Vandervell lead Indium bearings. Steel backed.

PISTONS AND CON RODS.

Die cast piston with Ford steel conn rod (125E) two plain compression rings and one four piece steel oil control. Ring diametral clearance of skirt 0.006" - 0.008". Ring gaps .016/.021.

VALVES

Inlet 1.53" dia. - 5/16" stem 45° seat angle mat: - EN 52

Exhaust 1.32" dia. - 5/16" stem 45° seat angle mat: - EN 59

VALVE SPRINGS

Special BRM racing springs to BRM specification. A.7005 Inner and A.7004 outer. Free lengths 1.426" inner; 1.400" outer.

VALVE TIMING

Inlet valve opens. 54° B.T.D.C.) Based on tappet clearances

Inlet valve closes 82° A.B.D.C.) of 0.009" exhaust

Exhaust valve opens 72° B.B.D.C.) 0.006" inlet and using

Exhaust valve closes 54° A.T.D.C.) .002" shim foil for timing
(See over)

LUBRICATION SYSTEM

Wet sump engine with standard Ford oil pump and filter but fitted with high rate oil pressure relief valve spring.

IGNITION SYSTEM

Coil ignition firing order: 1342

Centrifugal ignition advance, giving 24° (crankshaft) advance

Standard contact breaker points 18-24 oz. spring.

Static ignition setting 14° B.T.D.C.) This may be changed during

Contact breaker gap .012") dynamometer running.

CARBURETTORS

Two 40 DCOE 18 type Weber. Choke size 33 mm. main jets
135. Air corrector jets 175. Slow running jets 45F9. Pump jets
40. Emulsion tubes F.11

N.B. Jets are often changed during dynamometer testing and
may differ from above.

OIL PRESSURE

55 - 65 psi at running speeds.

Maximum oil temperature 110°C

Optimum water temperature 70°C

TAPPET CLEARANCE

0.006" inlet) cold

0.009" exhaust)

SPARKING PLUGS

Champion N57R

RECOMMENDED OILS

Shell SAE 30. or equivalent mineral based oil.

FUEL

100 octane petrol.

CARBURETTOR FLEXIBLE MOUNTINGS

Should not be overtightened. Spring washers should still retain
some movement, even though rubber gaskets do not appear to be markedly
squashed.

BOLT TIGHTENING TORQUES

Cylinder head bolts	50/55 lb.ft.
Main bearing cap bolts	55/60 lb.ft.
Big end bearing cap bolts	45 lb.ft.
Camshaft bearing cap nuts	12 lb.ft.
Flywheel to crankshaft bolts	45/50 lb.ft.
Camshaft sprocket bolts	23/30 lb.ft.

MAXIMUM SAFE REVS.

7,000 r.p.m.

6,500 r.p.m. in first and second

FUEL SYSTEM

Supply drawn from Bendix high pressure type 12 volt pump.

If it is ever necessary to replace the clutch pressure plate assembly, the new one must be balanced on the crankshaft/flywheel assembly and marked to ensure correct refitting thereafter.