TUNING & PREPARATION

of

"E" TYPE CARS

for

COMPETITION USE

JAGUAR CARS LTD., COVENTRY, ENGLAND

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INTRODUCTION

This booklet is intended as a guide for owners of Jaguar "E" Type models who, in addition to normal road use, may wish to use their cars on occasions for racing, it being understood that this model has not been designed as a competition car. The information provided covers essential items which should receive attention prior to participation in competition work and also gives details of a number of minor modifications which will result in improved performance without making the car unsuitable for road use, although naturally some slight sacrifices must be expected in this direction. The contents are not intended to be comprehensive but will serve as guide for intending competitors.

ENGINE

If the car has been run on the road for some time it is necessary to ensure that the compression pressures are correct and a test should be made with the engine hot, plugs removed and with the throttles fully open, using a compression gauge. The figures obtained when the engine is motored by the starter should be approximately:

155 psi 8: 1 C.R. engines.

180 psi 9: 1 C.R. engines.

It is equally important that there should not be more than approximately 7 lb. variation in the pressures between individual cylinders. If there should be considerable variation in pressures, or the pressures

are all more than 7 lb. below that quoted above for the compression ratio, the engine should be decarbonised and the valves ground in.

The tappet clearances, with the engine cold, should be re-set at .008" inlet and .010" exhaust. (The normal production clearances are .004" inlet and .006" exhaust).

Champion N3 plugs, or an alternative make of a similar heat range, must be fitted for racing purposes.

The air cleaner equipment should be completely removed and open trumpet intakes, Part No. XK.4520, fitted. The carburetter needles should be replaced with type UO needles. Ensure that the throttle linkage is correctly adjusted at each carburetter and that full throttle is obtainable.

The ignition static setting should be set at 10° B.T.D.C., with a contact breaker gap of .014" - .016". The vacuum advance / retard mechanism should be disconnected and the pipe blanked off at the manifold.

Remove the thermostat and blank off the by-pass hose using a suitable bung, preferably made from brass, which should be positioned approximately midway in the hose and secured externally by an additional Jubilee clip. A 3/16" diameter hole should be drilled through the centre of the bung before assembly.

In order to save weight the heater unit can be completely removed and the connecting pipes blanked off, using suitable brass blanks, at the header rail and water pump. An aluminium plate should be secured to the scuttle in order to blank off the heater outlet duct. The controls can be disconnected but the tap and dash control levers left in place.

It is recommended that the cylinder block drain tap is replaced with a brass blanking plug.

In order to ensure 100% reliability of the electrical connections under racing conditions, the "Lucar" push-on connectors, which are normally fitted (for ease of servicing) to the coil, distributor and dynamo, should be replaced by soldered eyelets.

Before racing the engine oil should be drained, the filter element changed, and an oil of SAE.40 should be used for refilling. It is essential that the engine should not be over-filled, otherwise loss of power and high oil temperature will result, due to the crankshaft coming continually into contact with the sump oil.

With the engine hot, but having been switched off for approximately one minute, the level should be not more than 1/4" above the lower mark, where the serrated portion commences. The level must, of course, be checked only when the car is standing on level ground. It is equally important that the level is not too low, otherwise surge may occur. With the engine completely cold, and before starting, the correct oil level is at the top of the serrated portion.

COOLING SYSTEM

Apart from the removal of the thermostat and blanking the by-pass, as described in the "Engine" section, it is recommended that a 7 lb. radiator cap is fitted, Part No. C.18484.

The fibre glass fan cowling should be taken off and, as a precaution, the radiator drain tap should be replaced by a brass blanking plug, and wire locked.

CLUTCH

For serious competition work the clutch unit should be replaced with Part No. C.16175, cover assembly, and C.16215, driven plate. It is important that the maximum amount of free play at the slave cylinder should be given and 2" of free movement on the clutch pedal is the minimum requirement.

A competition clutch is fierce in operation and must not be slipped in order to give a smooth take up when the car is driven slowly in traffic. When moving off slowly from rest the clutch should be operated with the minimum of throttle opening, just enough to prevent the engine stalling.

Although high temperature hydraulic fluid is not required for the clutch system, it is desirable to pump out the existing fluid and refill with Dunlop Racing Fluid (Wakefield H282/58) so that the same fluid is used in both the clutch and brake systems. (See "Brake" section). Bleed the system thoroughly after refilling.

GEARBOX

The oil should be drained and the unit refilled using an SAE. 40 oil. It is most important that the level should be checked with the oil warm, i.e. after a short run, to ensure that it is not over full. The level plug should be left out for some minutes during this check so that any surplus oil can drain.

In order to maintain adequate breathing under extreme racing conditions, the existing breather should be dispensed with and an adaptor, Part No. C.7116, plus lock nut, C.7125, screwed into the gearbox lid to which should be attached a length of oil-resistant rubber hose, Part No. C.7117, so that a remote breather can be attached as high up as possible on the engine bulkhead using a top hat section, Part No. C.10552, for this purpose.

The blanking plugs on the gearbox lid should be wire locked and likewise the level and drain plugs should be similarly locked to prevent any loosening due to vibration. The speedometer drive retaining collar should be checked for tightness before the gearbox top cowl is replaced.

REAR AXLE UNIT

In order to prevent any possibility of oil being thrown out of the existing breather and finding its way onto the rear brakes when the car is subjected to extreme conditions, it is advantageous to remove the breather and unscrew the small top cap. A piece of 5/16" O.D. copper tube should be silver soldered into the breather tube so that a length of oil-resistant rubber hose, Part No. C.7117, can be secured onto the extension tube and retained by a Jubilee clip.

With the breather elbow replaced in the differential cover plate the flexible tubing should be led, via a hole which must be drilled through the access plate in the boot floor, to the forward bulkhead of the boot. A top hat baffle, Part No. C.10552, should be attached to the tube and secured onto the boot bulkhead panel.

Mobil Motrex 314, or similar special oil for Powr-Lok differentials, should be used in the axle unit.

A 1/16" diameter hole should be drilled in each grease filler blank of the hub carriers to allow breathing.

BRAKES

The standard pads should be replaced with Ferodo DS.11 or Mintex 875 racing pads. Owing to the high brake temperatures experienced under racing conditions, Special High Temperature Brake Fluid must be used. Drain off the standard fluid and refill and bleed using Dunlop Racing Fluid (Wakefield H282/58). It is also desirable to use this fluid in the clutch system.

The handbrake pads should be given additional clearance, at least twice the normal .004" between the pads and rear discs with the handbrake released.

FRONT SUSPENSION

Strip the front hubs and repack with a high melting point grease such as Mobil No. 5 H.M.P. Ensure that no more than .003" to .005" end float exists on the front hubs when reassembled.

EXHAUST SYSTEM

So that back pressure is reduced to a minimum the main silencers can be removed and replaced by suitable lengths of normal piping (internal diameter 1¾") which can be secured to the down pipes and tail pipes with the existing clamps.

The rear mufflers should be left in place as the silencing medium for the satisfaction of legal requirements.

Ensure that all the manifold and down pipe flange nuts are checked for tightness prior to each race, particularly bearing in mind that the down pipe sealing rings "settle down" to some extent due to heat and vibration.

BODY

For other than short "club" events the fitting of cooling scoops is desirable for the front and rear brakes, especially when the car is to be raced on circuits where a large number of brake applications are to be made without a fairly long straight to allow adequate normal cooling.

The sketches attached to the booklet indicate the dimensions of the ducts to the front and rear brakes. As far as the rear brakes are concerned, four ducts are indicated, two attached to the lower wishbone levers and two to the body underside, all of which direct air to the discs. The scoops for the front brakes are, of course, cut through the bonnet section below the bumper bars on each side.

The radiator intake motif strip can be removed to allow maximum air entry to the radiator in high ambient temperatures.

If desired all the superfluous trim and felting can be removed from the pedal box, passenger's foot well, tunnel and floors, etc. Carpets of rexine material may be glued to the floors when the standard carpeting is removed.

WHEELS AND TYRES

Dunlop R5 racing tyres should be used, 6.00 x 15 front and 6.50 x 15 rear. It will be necessary, when the 6.50 tyres are fitted to the rear, to use the special offset rear wheels, Part No. C.18922

Tyre pressures need to be varied according to circuits and individual requirements but 45 psi front and rear

is a good starting point, an increase of between 5 and 10 psi can then be tried according to the prevailing conditions.

On all matters relating to tyre equipment for racing the advice of the Racing Division of The Dunlop Rubber Company should be taken.

Their address is :-

Racing Division,
The Dunlop Rubber Co.Ltd.,
Fort Dunlop,
Erdington,
Birmingham, 24.

Telephone No: Erdington 2121.

MISCELLANEOUS NOTES ON FINAL PREPARATION AND RACING

A maximum engine speed of 5800 R.P.M. must always be observed.

When making a racing start the engine speed should be built up to approximately 2500 R.P.M. just prior to the flag being dropped and as the flag falls the clutch should be fully engaged before full throttle is given. This procedure must be adopted since any attempt to "slip" the clutch and build up the engine speed at the same time will result in severe damage to the clutch linings.

The oil pressure should not run below 40 psi with an engine speed of 3500 R.P.M. minimum when hot.

Particular emphasis is laid on the importance of ensuring that the engine oil level is correct prior to a race and the information given in the "Engine" section of the booklet on this subject should be carefully followed.

The water temperature should, ideally, run at 70^{o}C when racing and the radiator intake must not be blanked in any way. As mentioned in the "Body" section of these notes, the motif bar may be removed for competition work.

Care should be taken to ensure that the cooling system is completely full and it is necessary, following the refilling of the system, to run the engine at idling speed for some five minutes after reaching a temperature of 70^{o}C with the header tank cap removed and gradually top up. In this way any possibility of air pockets remaining in the system will be eliminated.

In high ambient temperatures it is not necessary, or desirable, to "Warm up" the car for more than five minutes prior to starting in a race.

All the modifications suggested in this booklet lie within the terms of Appendix J Group 3 of the F.I.A. Regulations. Before owners decide to make further changes they would be well advised to study the contents of the Group 3 regulations, copies of which can be obtained from the Competitions Department of the Royal Automobile Club, Pall Mall, London. S.W.1. These regulations apply to all events run on a National Open or International permit.

Copies of the Form of Recognition for the "E" type models are available on request from the Service Division of Jaguar Cars Limited, Coventry.

Included in this booklet are charts showing engine R.P.M. related to road speed for each of the alternative axle ratios, i.e.

3.77 : 1, 3.54 : 1, 3.31 : 1, 3.07 : 1 and 2.93 : 1

LIST OF PARTS MENTIONED IN THE BOOKLET

Part No.	Description	Quantity
-	Champion N3 plug.	6
XK.4520	Intake trumpet.	3
-	UO carburetter needle.	3
C.18484	7 lb. radiator cap.	1
C.16175	Clutch cover assembly.	1
C.16215	Driven plate.	1
C.7116	Adaptor elbow.	1
C.7125	Lock nut.	1
C.7117	Breather hose.	2 lengths
C.10552	Breather dust cover.	2
C.18922	Rear wheel.	2

The above parts are obtainable through Jaguar distributors and dealers.

ITEMS SUPPLIED THROUGH JAGUAR DISTRIBUTORS AND DEALERS OR THE RESPECTIVE SUPPLIERS OR THEIR AGENTS

	Suppliers
Dunlop Racing Fluid. (Wakefield H282/58). (½ gallon required).	Dunlop Rubber Co.Ltd., Disc Brake Sales, Holbrook Lane, Foleshill, Coventry.
or:-	Castrol Limited, Castrol House, Marylebone Road, London, N.W.1.
Ferodo DS.11 Brake Pads (8 per set).	Ferodo Limited, Competitions Dept., Chapel-en-le-Frith, Derbyshire.

Mintex 875 Brake Pads. (8 per set).	Mintex Limited, Competitions Dept., 41/42, Thorpe Street, Birmingham, 5.

PERFORMANCE DATA - 'E' TYPE MODELS

Tables show road speed related to R.P.M. in the various alternative axle ratios.

Tyre size Dunlop 6.50 x 15 R5., rolling radius 13.45" at 30 M.P.H.

R.P.M. figures are shown to the nearest 25 R.P.M.

NB. A maximum limit of 5,800 R.P.M. must be observed.

AXLE RATIO. 2.93 : 1 (Alternative)

M.P.H.	K.P.H.	1st. 9.89:1	2nd. 5.45:1	3rd. 3.76:1	Top 2.93:1
10	16	1200	675	450	350
20	32	2450	1350	925	710
30	48	3750	2050	1400	1080
40	64	5000	2700	1870	1425
50	80		3400	2325	1800
60	96		4050	2800	2175
70	112		4700	3250	2500
80	128		5350	3700	2875
90	144		6000	4150	3225
100	160			4600	3575
110	176			5050	3925
120	192			5500	4275
130	208			5900	4600
140	224				4950
150	240				5300
160	256				5600
170	272				5900

AXLE RATIO. 3.07 : 1 (Alternative)

M.P.H.	K.P.H.	1st 10.35:1	2nd. 5.71:1	3rd. 3.94:1	Top. 3.07:1
10	16	1300	700	475	375
20	32	2550	1400	975	750
30	48	3850	2150	1450	1150
40	64	5150	2825	1950	1500
50	80		3525	2425	1900
60	96		4250	2900	2275
70	112		4925	3400	2650
80	128		5600	3900	3000
90	144			4375	3375
100	160			4830	3750
110	176			5300	4125
120	192			5775	4500
130	208				4850
140	224				5200
150	240				5550
160	256				5900

AXLE RATIO. 3.31 : 1 (Standard)

M.P.H.	K.P.H.	1st. 11.18:1	2nd 6.16:1	3rd. 4.25:1	Top. 3.31:1
10	16	1350	775	500	400
20	32	2750	1550	1025	825
30	48	4175	2300	1575	1250
40	64	5600	3075	2100	1650
50	80		3850	2600	2050
60	96		4600	3150	2475
70	112		5350	3675	2875
80	128		6075	4200	3275
90	144			4700	3675

AXLE RATIO. 3.31 : 1 (Standard) Cont'd.

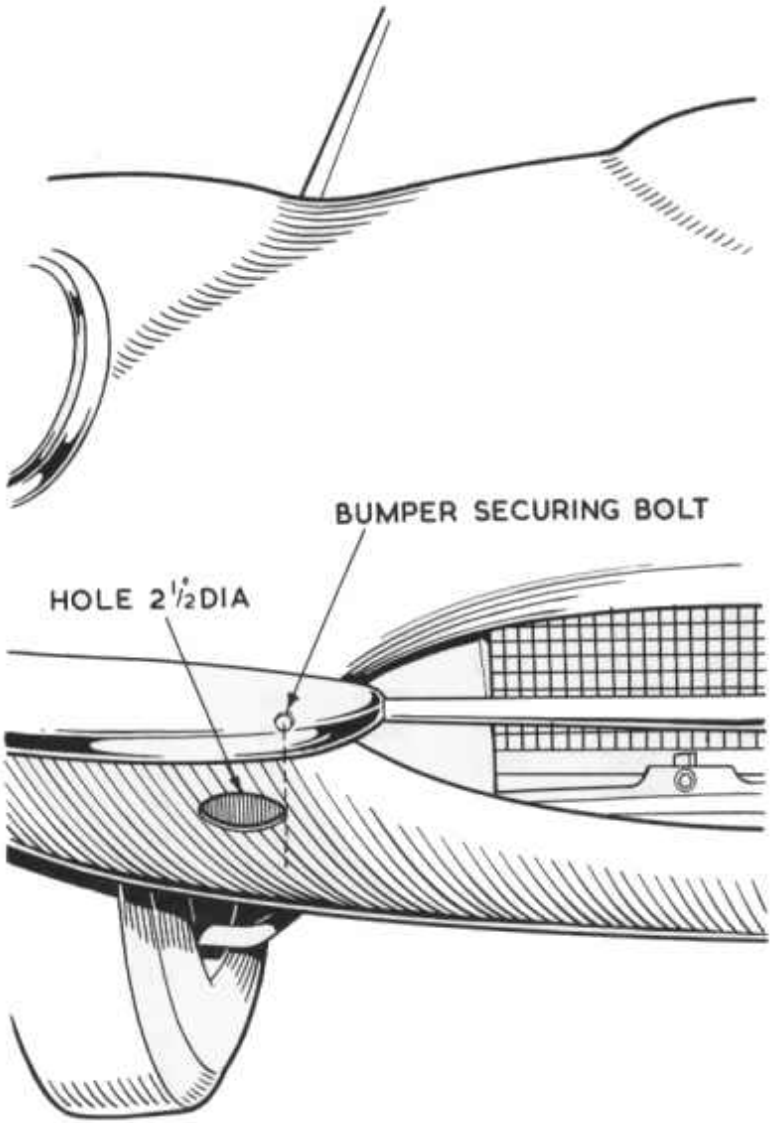
M.P.H.	K.P.H.	1st. 11.18:1	2nd. 6.16:1	3rd. 4.25:1	Top 3.31:1
100	160			5200	4050
110	176			5700	4450
120	192				4850
130	208				5200
140	224				5600
150	240				5975

AXLE RATIO. 3.54 : 1 (Alternative)

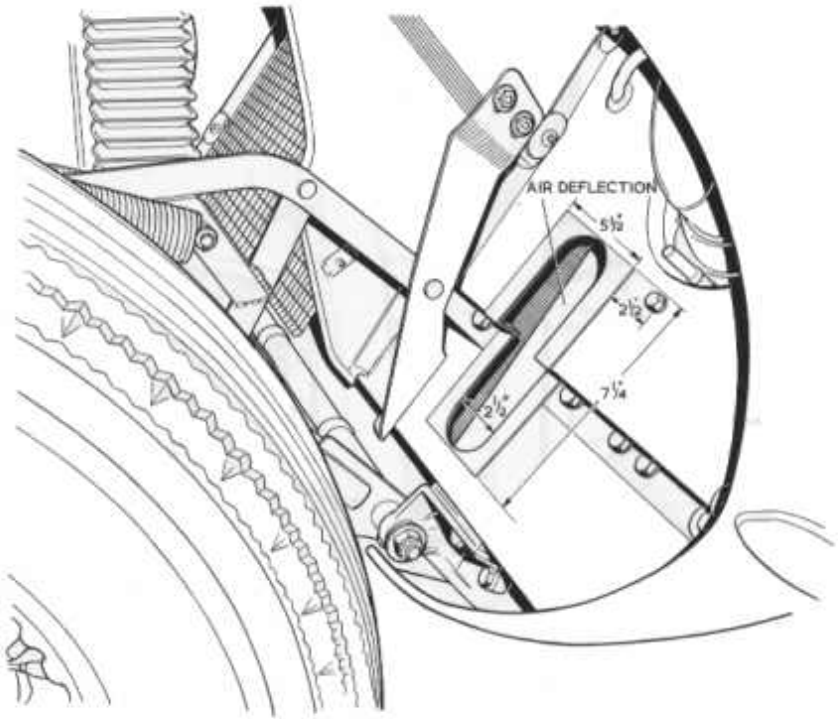
M.P.H.	K.P.H.	1st. 11.95:1	2nd. 6.58:1	3rd. 4.54:1	Top. 3.54:1
10	16	1475	825	550	450
20	32	2950	1650	1100	900
30	48	4475	2500	1700	1350
40	64	5900	3300	2250	1775
50	80		4100	2800	2200
60	96		4900	3350	2650
70	112		5700	3900	3100
80	128			4475	3500
90	144			5025	3950
100	160			5550	4350
110	176			6100	4775
120	192				5175
130	208				5600
140	224				5975

AXLE RATIO. 3.77 : 1 (Alternative)

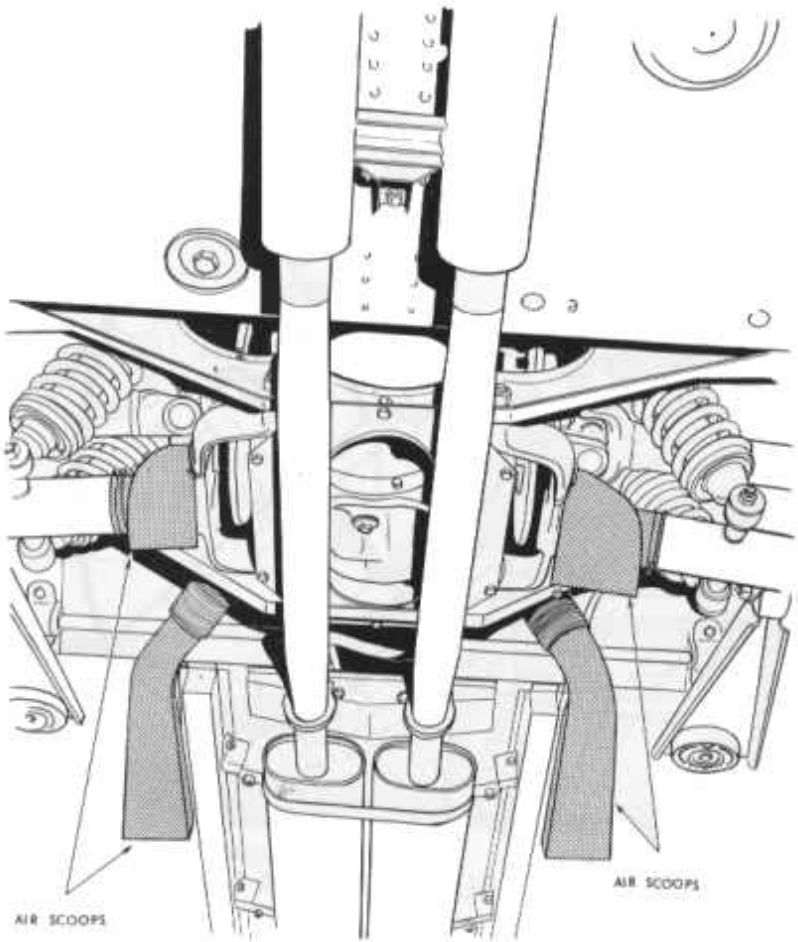
M.P.H.	K.P.H.	1st. 12.73:1	2nd. 7.01:1	3rd. 4.84:1	Top. 3.77:1
10	16	1550	875	600	475
20	32	3200	1750	1200	950
30	48	4800	2650	1800	1400
40	64		3500	2400	1875
50	80		4400	3000	2350
60	96		5250	3600	2800
70	112		6100	4200	3275
80	128			4750	3725
90	144			5325	4200
100	160			5875	4650
110	176				5100
120	192				5550
130	208				5950



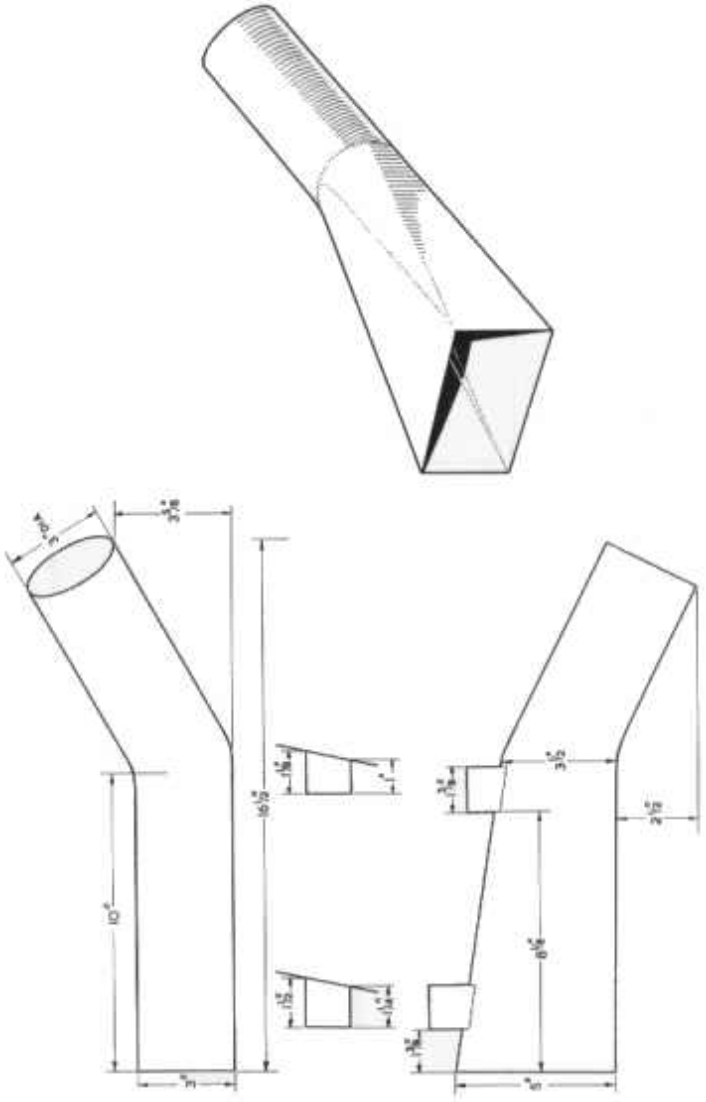
AIR SCOOP HOLE IN BONNET



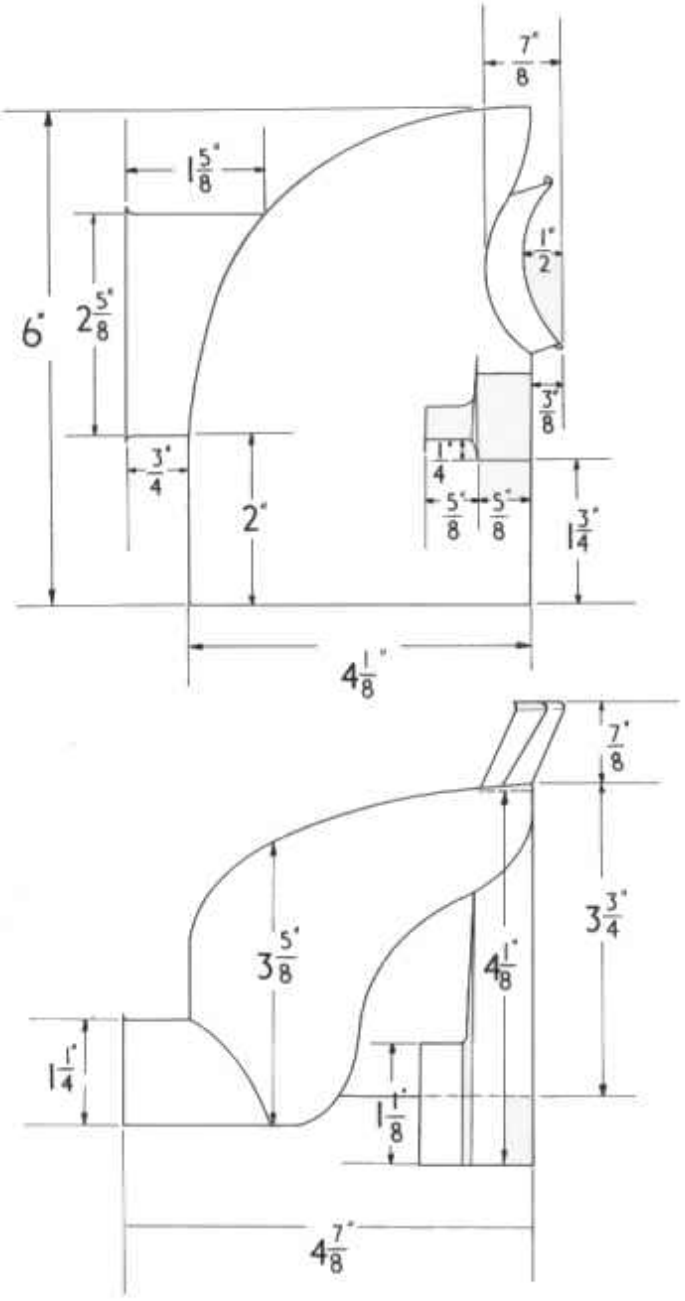
BONNET DUCT (INTERIOR VIEW)

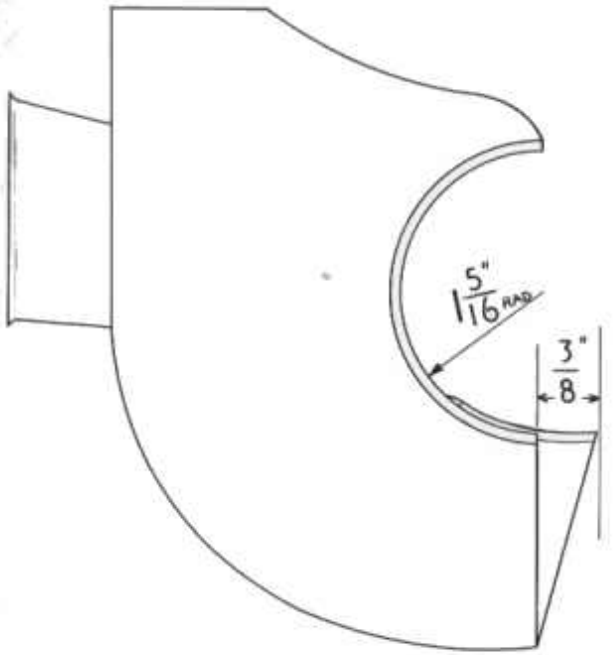


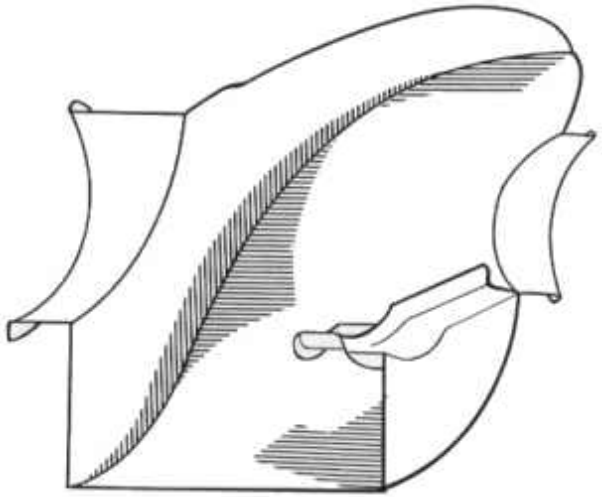
POSITIONS OF REAR BRAKE AIR SCOOPS



REAR AIR SCOOP (MOUNTED ON BODY)







REAR SCOOP-MOUNTED ON LOWER WISHBONE TO DEFLECT AIR ONTO THE DISCS.