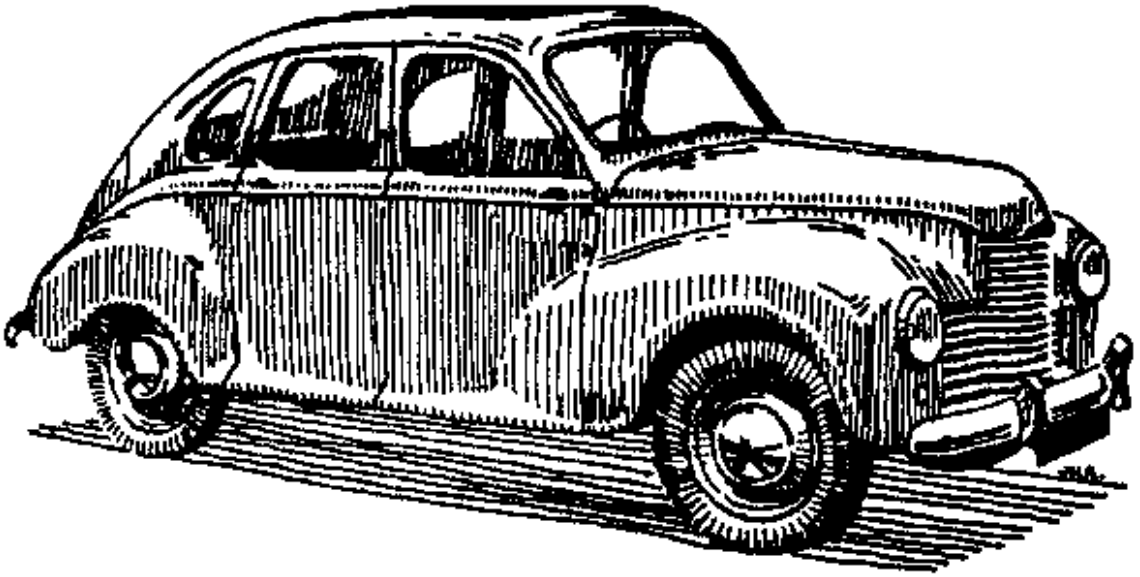
Technical Information for

The Javelin



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COMPLETE SERVICE SCHEDULE

Every 200 miles or weekly

Check level of oil in sump
Check level of water in radiator

Every 500 miles or half monthly

Grease steering nipples including the idler arm (general purpose)
Top up metal-bushed front suspension oil boxes (S.A.E. 140 grade oil)
Check tyre pressures
Check battery connection and acid level

Every 2,500 miles or quarterly

Change engine oil (20W-50 grade is recommended)
Check level of oil in gearbox
Check level of oil in rear axle
Check steering box. Add lubricant to fill if necessary (do not use pressure)
Grease steering column bearings (general purpose)
Grease gear control column (general purpose)
Grease brake and clutch pedals and linkage (general purpose)
Grease handbrake cables and linkage (graphite grease)
Grease water pump bearing (heavy grease) and oil fan spindle
Oil distributor.
Oil throttle and choke linkage
Oil direction indicator arms
Oil gear control linkage
Grease propeller shaft centre bearing (general purpose)
Check condition and tension of fan belt
Check operation of all lights, instruments and direction indicators
Check condition of tyres

Every 5,000 miles or half yearly

Change oil filter element. (Vokes and Tecalemit)
Grease front and rear hubs (heavy grease)
Grease seat adjuster and spare wheel screw (general purpose)
Oil bonnet, boot and door hinges
Check condition of top and bottom radiator hoses
Check condition of core plugs
Check and reset sparking plugs and contact breaker points
Check ignition timing
Check condition of brake pipelines and flexible hoses
Check for wear and smooth operation of front wheel bearings
Check condition of suspension and steering joints

Check condition of sparking plug covers
Adjust brakes
Adjust clutch pedal
Remove and replace or clean the tappet cover air vent filter felts

Every 10,000 miles or yearly

Change oil gearbox (as engine oil)
Change oil in rear axle (hypoid 90 grade)
Grease dynamo rear bearing (heavy grease)
Remove sump and clean sump and oil filter
Change air filter oil clean filter (as engine oil)
Change sparking plugs and contact breaker points
Flush out radiator and check condition of drain taps
Check tightness of all engine transmission, suspension and chassis belts
Check rocker clearances
Clean fuel pump filter petrol filter bowl and carburettor float bowls
Check condition of brake linings and clean out drums

IMPORTANT NOTE

All items should receive attention more frequently if operating under adverse conditions. All recommended lubricants are for British conditions.

SCHEDULE OF LABOUR TIMES

The following labour times are those recommended by Jowett Cars Ltd, for experienced trained Jowett mechanics. When work is done by inexperienced mechanics extra time must be allowed. No allowance has been made for the ageing of components, which can cause considerable delays, in strip-down and additional costs due to breakage of decayed components.

	Man Hrs.	Remarks
Engine		
Rep1ace new engine	6	
Replace reconditioned engine	8	This includes transfer of components.
Tune engine	2	
Re-set ignition	½	
Replace engine mountings	1½	Both sides
Tappets and Camshaft		
Replace n/s tappets	2¼	1 hr. extra where oil cooler is fitted
Replace o/s tappets	2	
Replace rocker assembly or exhaust	1	

Replace rocker arm, inlet	1½	
Replace all push rods n/s	2	l hr. extra where oil cooler is fitted.
Replace one push rod, or all push rods one side	2	l hr. extra where oil cooler is fitted.
Replace camshaft (complete operation)	6	
Replace timing chain	3	
Replace oil pump drive gear	3¼	
Re-time camshaft	4	
Adjust tappets both sides	1½	
Replace camshaft gear	3	
Cylinder Heads		
Re1ace cylinder head n/s	2½	o/s 2 hours
Decarbonise and grind in valves	12	o/s 2¼hours
Fit new valve or valve spring n/s	3	
Fit new valve guide n/s	3½	o/s 3 hours
Carburettors		
Replace carburettors o/s	¾	N/s ¼hour
Clean carburettors and re-set slow running and mixture	1	
Fit new carburettor flange gasket n/s	½	O/s ¾hour
Reset choke control	½	
Fit new accelerator cable inner	¼	
Fit new choke cable assembly	¾	
Remove, clean and refit air cleaner	1	
Crankcase and Camshaft		
Fit new crankcase	30	
Fit new crankshaft	30	
Fit new big end shells Remove and replace sump	3½ 1¼	
Fit new con rod/pistons/small ends	12	
Fit one con rod or piston n/s	5	O/s 5¼ hours
Fit new gasket to rear timing case cover	1	
Fit new gasket to front timing case cover	2	
Fit new timing case cover oil seal	½	Timing case cover not removed
Fit new starter dog	¼	
Fit new liners and pistons	12	
Fit new liner seals	12	
Fit new oil pump	4	
Fit new chain sprocket	3	
Fit new oil delivery pipe	3	
Check balance pipe with JCL test rig	5	Complete operation including removal of cylinder heads.

Clutch and Flywheel		
Fit new clutch assembly	8	
Fit new flywheel assembly	8	
Fit new housing (clutch and flywheel)	9	Includes removing pump
Replace clutch shaft cover	7	
Replace clutch thrust race or fork	7	
Replace flywheel ring gear	8½	
Adjust clutch fingers	8	
Transfer flywheel T.D.C. and B.D.C. markings	½	
Gearbox		
Replace gearbox	7	(Includes remove and replace engine)
Overhaul gearbox complete operation	13½	
Check and reset gear change linkage	1	
Overhaul gear change column including removal and refitting	4	
Replace gear change column, and re-set linkage	2½	
Replace extension bearing or seal	7¾	
Replace speedometer gears	7½	
Replace selectors	1½	Include starter removal
Replace gearbox side cover assembly	1½	Does not include resetting of linkage
Replace reverse gear and bush Replace thrust washer	9 10	 Any one of three
Transmission		
Replace prop shaft centre bearing	2½	
Replace universal layrub couplings	1	Each
Replace prop shaft	2	Either front or rear
Replace midship support rubbers	¾	
Replace gearbox companion flange	1½	
Radiator. Oil & Water		
Fit new water pump assy.	1½	When oil radiator fitted increase ¼hr.
Replace fan	¼	When oil radiator fitted increase 2 hr.
Replace fan belt	¼	
Replace fan belt pulley	¼	
Replace radiator	2	When oil radiator fitted increase ¼hr.
Fit new fan struts left or right hand	¼	When oil radiator fitted increase ¼hr.
Overhaul water pump	2¼	When oil radiator fitted increase ¼hr.
Replace all water hoses	1¼	
Fit new oil radiator and pipes, unions, etc.	1	
Fit new oil radiator pipes	½	

Steering		
Replace steering rod	2½	
Adjust steering rod	¾	
Replace steering column complete assembly	1½	Not including Steering box
Correct end float in steering column	1½	
Remove steering column and fit new horn slip ring assembly	2	
Fit new spring to intermediate Steering arm	¾	
Replace steering top bearing	1	
Replace steering wheel	½	
Adjust steering cones	¾	
Replace steering link	2	
Replace steering box	3	
Electrical		
Replace clock	1	
Replace wiper motor boxes	3	
Replace wiper motor drive cable	½	
Adjust voltage regulator	1	
Replace battery	½	
Top up and clean battery	¼	
Replace battery cable (Positive or Negative)	1	
Replace distributor assembly (complete operation)	1	
Replace dynamo (complete operation)	1	
Clean dynamo commutator and adjust charging rate	2	Includes dismantle dynamo
Replace dynamo pulley	½	
Replace voltage control and cut out (complete operation)	1½	
Replace starter motor	1	
Replace starter switch	1	
Replace and bed starter brushes	1½	
Replace horn assembly and re-wire (complete operation)	1½	
Re-focus head lamps	¾	
Replace stop light switch	1	
Replace dipper switch	1	
Replace H.T. wires and carrier	1½	
Replace horn button only	½	
Replace instrument panel (switchboard)	2	

Replace ammeter and/or oil gauge	½	
Replace petrol tank	½	
Replace speedometer head	½	
Replace speedometer cable	½	
Replace head lamp (each)	1	
Replace side lamp (each)	¾	
Replace tail and/or reverse lamp	1	
Replace trafficator	1	
Replace windscreen wiper motor	½	
Replace coil or condenser	½	
Exhaust Assembly		
Replace exhaust manifold	¾	
Replace rear silencer assembly and tail pipe	2	
Replace exhaust pipe packing (front)	½	Any one of three.
Petrol Supply		
Replace petrol pump	½	
Replace petrol tank	1½	
Replace petrol gauge	½	
Replace petrol tank unit	¾	
Clean out petrol feed system	2½	Removal of units
Fit new A.C. petrol filter	¼	
Rear Axle and Rear Suspension		
Replace rear axle assembly	5	Including transfer of components
Replace pinion oil seal	1½	
Bleed rear brakes	¾	
Replace rear hub oil seal	¾	
Dismantle, clean and re-assemble both rear hubs	1½	
Replace rear back brake assy.	1½	Hrs. each side
Replace rear torsion bar	1½	
Replace rear shock absorber	½	
Replace rear spring arm - one side Replace link and silent bloc bush - one side	1¼ 1	
Replace transverse stay	1	
Replace rear axle buffer	½	
Replace races - one hub	1½	
Remove end float hubs	1½	
Dismantle clean and reassemble both. rear hubs	1½	
Replace brake drums (each)	½	

Independent Front Suspension		
Check and re-set steering track and individual ball heights and	2	
Check camber	2	
Re-set camber	1	Each side
Replace ball joints	2½	Complete operation
Replace front torsion rod	1½	Allow ½hr extra n/s
Replace front back plate assembly	1½	Includes bleeding brakes
Replace front brake drums	½	Complete operation
Replace front hub oil seal	¾	
Replace front shock absorber	¾	
Fit new shock absorber top bush or pin	1	
Fit new swivel pin yoke or pin	1	
Fit new upper link trunnion seal	1¼	
Replace upper link bracket, etc.	2½	
Replace swivel Pin and re-bush stub axle	2½	
Replace hub bearing	1	
Check and adjust front and height	½	
Replace upper link bracket from dash side and adjust shims	2½	Includes camber check
Replace front spring arm - one side	2½	
Brakes		
Replace brake shoes (four wheels and completely overhaul braking system set linkage, rods etc).	9	Includes bleed system
Replace brake cable (each)	1	
Replace master cylinder - bleed brakes	2	PC - PD - PE Models 2¼hrs.
Replace hose - junction piece to brake drum front	¾	
Replace hose-tank to master cylinder to hose	¾	
Replace hose-master cylinder to junction Replace hose-T. Piece to rear axle PC - PD - PE	¾	
Replace handbrake assembly	1½	Includes refitting of linkage
Fit new handbrake pawl and ratchet	1½	
Overhaul master cylinder	1	
Body		
Replace front bumper	½	
Replace rear bumper	¾	
Replace front wing	7	
Replace rear wing	5	
Replace floorboards front, rear, boot	10	

Replace windscreen (complete operation)	3	
Replace body chrome mouldings	6	
Replace windscreen moulding	2	
Replace rear window	2	
Replace bonnet motif	1	
Replace door locus and handles	4	Break down
Replace front grille	½	
Fit new rubber weather strip to boot	1	
Fit new facia panel assembly	6	

ENGINEERING CHANGES - JAVELIN

Modification	Approximate Introduction Points
Flywheel and clutch assembly balanced as unit	D8/PA. 100
Exhaust manifold flanges increased in diameter.	D8/PA. 164
Redesigned Air Silencer	D8/PA. 185
Hydraulic tappet fitted with end cover.	D8/PA. 781
Expansion chamber fitted to exhaust system.	D8/PA. 997
Carburettors changes from 30VM4 to 30VM5 (type 'M')	D9/PA. 1753
Flywheel bolts diameter increased from 5/16" to 7/16".	D9/PA. 2200
Dynamo changed from C.45 to C.39	DS/PA. 2259
Connecting rod bolts diameter increased from 5/16" to 3/8"	D9/PA. 2373
Spring Arm Trunnion bushes pressed on and retaining bolts deleted.	D9/PA. 2554
Steering box eccentric bush incorporated.	D9/PA. 2871
Exhaust system - single rear silencer.	D9/PA .3138
12-volt single battery fitted.	D9/PA. 3696
Copper-lead connecting rod bearings fitted.	D9/PA.3794
Starter solenoid fitted and electrical harness altered (Right hand drive).	D9/PA.4243
Copper-lead front and centre main bearings fitted.	D9/PA.4322
Oil bath air filter fitted (Export only)	D9/PA.4431
Oil bath air filter fitted (All models)	D9/PA .5374
Vacrome piston rings fitted. Water pump modified	D9/PA.5756 D9/PA. 5857
Front suspension lubrication revised.	D9/PB.5979
Adjustable steering balls fitted.	D9/PB.6572
Redesigned rear timing case cover introduced.	EO/PB. 7676
Detachable exhaust tail pipe fitted.	EO/PB. 82 76
Trico windscreen wiper blades fitted.	EO/PB. 8276
New type steering link fitted ('H' section stamping).	EO/PB. 8313
Oil cup added to water pump housing.	EO/PB .8472
Small end bearing changed from 'Glacier' to 'Clevite'.	EO/PB. 8737
Strengthened cylinder liners and 'barrel ground' pistons fitted.	EO/PB. 8825
Hardened crankshaft fitted (R.H.D.)	EO/PB. 8902
Air filter mounting screws modified.	EO/PB. 89 50
Horn relay fitted to horn circuit.	EO/PB. 9293
Oil filter outer casing strengthened	EO/PB. 9423
Main bearing dowel drilled.	EO/PB. 9540
Oil delivery pipe union wired.	EO/PB. 9860
New lower fixing for front shock absorbers fitted.	EO/PB .9877
Sump tray made 'of steel.	EO/PB. 9878
Front engine mountings reinforced and vertical stay deleted.	EO/PB.10450

Introduction of serrated connecting rods.	EO/PB. 10506
Introduction of four wheel hydraulic braking System.	EO/PB. 10594
Steering ball joints redesigned.	EO/PB. 10789
Steering rod cover deleted.	EO/PB. 10789
Close ratio gearbox introduced.	EO/PC. 11270
1951 model Javelin commenced.	EO/PC.11326
Solid tappets fitted.	EO/PC .11907
Adjustable selector and gear change link fitted (R.H.D.)	EO/PC. 12340
Clear vision' steering wheel fitted (de-luxe).	EO/PC. 13111D
Maximum oil pressure increased	El/PC. 15098
Rubber bonded exhaust mounting fitted.	E1/PC. 15432
Radiator grille redesigned.	El/PC. 15631
Front shock absorber strength increased.	El/PC. 16500
Tecalemit oil filter introduced.	El/PC. 16603
Oil groove added to crankcase main bearing bore.	El/PC. 16744
Sludge release hole' drilled in connecting rod cap.	El/PC. 17402
Water pump and fan improved.	El/PC. 18140
Gearbox extension bearing washer strengthened	El/PC. 18141
Throttle rod modified.	El/PC. 18550
Hole deleted from rod half of connecting rod bearing.	El/PC. 18646
Return pipe from oil pressure relief valve added.	El/PC. 18985
Camshaft and chain wheel modified.	El/PD. 19295
Waterproof plug lead connections fitted.	E1/PD. 19760
Gear change stay fitted.	E1/PD. 20135
Gear change stay modified.	E2/PD. 20144
Non-stick taper introduced on water pump spindle.	E2/PD. 20379
Positive locking for first gear introduced.	E2/PD. 20641
Splined steering wheel fitted.	E2/PD. 20881 D
Sludge release hole deleted.	E2/PD. 20977
DM 2 distributor fitted.	E2/PD. 21016
Main beam warning light fitted.	E2/PD. 21035
AC petrol filter introduced.	E2/PD. 21147
Splined steering wheel fitted.	E2/PD. 21838
Armstrong shock absorbers fitted.	E2/PD. 2l868
Rubber bushed' front suspension introduced.	E2/PD. 21868
Crankcase oil flow increased.	E2/PD. 21937
Increased-flow oil cooler fitted.	E2/PD. 21937
Redesigned crankcase fitted. Series III engine introduced.	E2/PD. 22190 E2/PD. 22221
Woodhead-Monroe shock absorbers fitted.	E2/PE. 22346
Narrow lock-notch connecting rods fitted.	E2/PE. 22451
Top water hose fitted	E2/PE. 22560

Main beam warning light fitted.	E2/PE. 22739 D
Crankshaft tolerances revised.	E2/PE. 22873
Loading on synchromesh springs increased.	E2/PE. 23106
Submerged oil pump fitted.	E2/PE. 23122
One-piece gasket support and liner retaining flange fitted.	E2/PE. 23184
Battery mounting improved.	E2/PE. 23257
Air silencer box modified.	E2/PE. 23320
Adjustable camshaft thrust peg fitted.	E2/PE. 23643
Sparking plug covers improved.	E2/PE. 24036
Wide ratio gearbox re-introduced.	E3/PE. 24179

Oil cooler first fitted to Javelins delivered after 7th. January 1952.
Cylinder head studs modified and oil gallery seals improved from Crankcase No. 26496.

NOTE: ENGINEERING CHANGES TO THE JUPITER WILL BE FOUND IN THE JUPITER SECTION.

The Jowett Car Club wishes to acknowledge and thank the 'Motor Sport' magazine for the permission given to print this article in the Jowett Owners Handbook. This article appeared in the March 1953 edition.

TECHNICAL DEVELOPMENT OF THE JAVELIN AND JUPITER FLAT FOUR ENGINES

An account of the modifications adopted by the Jowett Engineers since the Javelin went into production six years ago,

(Criticism is sometimes leveled at British manufacturers on the grounds that they lack initiative and fail to. develop their designs adequately. Consequently, we are glad to be able to show, in this article, that the old established concern of Jowett Cars Ltd. of Bradford is exempt from this charge. Their advanced Javelin saloon of 1945 has had its share of "teething-troubles" and it may not be generally known that much research has gone into curing early shortcomings. Today, in the words of a Jowett spokesman, the present Series III Javelin and Jupiter engines possess a tremendously increased reliability factor and incorporate many modifications resulting from experience in racing which may not be strictly essential under touring conditions. Motor Sport readers will be particularly gratified to learn that, according to Mr. Grandfield, Jowett's Engineering Manager, who generously provided the data on which this article is based, 95 per cent of the new features incorporated in the Series III Jowett engine are directly related to Jowett's participation in racing - ED).

The old established Jowett Company commenced car manufacture as long ago as 1905. Some time ago, under the auspices of John Baldwin, the present Publicity and London Manager a fascinating little book was published which outlined the history of this sturdy Yorkshire concern. Consequently we can dismiss the earlier years after remarking that the firm's specialty was the water cooled, horizontally-opposed twin-cylinder light car, for many years of 7 h.p. Rating afterwards increased to 8 h.p. A very impressive number of these two cylinder Jowetts are still in service, visual testimony of their good quality and design, which resulted in long wearing qualities.

Some years before the Second World War it was decided to add a four-cylinder model to the Jowett range and experimental cars embodied in line engines. It was' felt inadvisable, however to break from the long horizontally opposed tradition and when the new car, known as the "Jason" went into production in 1936 it had a side valve flat four engine. An attempt to offer good visibility by using a sloping radiator met with a mixed response from the motoring public, but it can be said that the flat four engine was adopted for sentimental rather than engineering reasons.

It was not until after the war, when an entirely new post-Armistice Jowett was designed that the horizontally opposed four-cylinder engine was fully exploited. When Gerald Palmer introduced his brilliant Javelin six seater saloon inspired to some degree by the popularity in England of the Italian Lancia Aprilia, he retained the flat four engine and achieved comfortable spacious seating within the wheelbase by reason of the compact dimensions of this engine layout. In addition,

freedom from vibration, a low centre of gravity, and good visibility by reason of the modest height of the power unit were other flat four, advantages.

The new engine had overhead valves and was first prepared in two forms a 1,200 c.c. Unit of 69.5 by 78 m.m. bore and stroke and a 1,500 c.c. version of 72.5 by 90 m.m. bore and stroke. The former engine was intended for the home market, the bigger unit for export, both had a compression ratio of 7.25 to 1.

Subsequently a change of policy caused Palmer to concentrate on the larger engine, of 1.496 c.c. In its early form this engine had a two bearing crankshaft running in white metal bushes carried on the crankcase, a circular spigotted cover at one end obviated the need for a split crankcase. The crankcase was of aluminium alloy to D.T.D. 424 specification, and wet liners sat on a joint washer at the base and were clamped down by the detachable cylinder heads. The cylinder heads were of cast iron with a vertical inlet port leading to Siamese valve ports to provide for one down draught carburettor per pair of cylinders. The exhaust ports were at the bottom of the heads, the gases being led away by an integral manifold under each head. A metal duct directed cooling water to each valve seat. The combustion chambers were of stepped type, the inlet platform providing a 'squish' area to promote charge turbulence over the exhaust valves, from which the mixture was ignited.

The push rod overhead valve mechanism incorporated hydraulic tappet's to compensate for dimensional changes in the alloy crankcase. These tappets were lubricated from one of the main oil galleries, with lubricant filtered by the full flow method.

The new engines, in both sizes, were extensively tested on the bench and on the road, in this country. The prototypes had 10 m.m. sparking plugs, but subsequently, 14 m.m. plugs were used. The 1496 c.c. version developed 40 b.h.p. soon increased to 50 b.h.p. by improved aspiration.

During early testing, when, incidentally, a Bradford back axle was used on the prototype Javelin - later American axle components were tried before the final adoption of Salisbury units possessing a very high margin of safety - the engines proved mechanically noisy in a harsh resonating manner. This decided shortcoming in what was destined to be a luxury small family car was a major problem calling for a cure. Two forms of crankcase had been prepared, one in cast iron, the other, in aluminium. Experimental work on these early designs made it quite clear that there was considerable whirl of the crankshaft and a certain amount of flexing of the crankshaft, as was evident from edge markings on the bearings and deflection tests.

The next development was to prepare a cast iron crankcase and a three bearing crankshaft, the bearing cap joint faces being horizontal, so that the crankshaft and f1ywheel assembly could be dropped out of the bottom of the engine. The first experimental engine of this type was of l, 200 c.c. and when experiments were carried out with larger diameter cylinder liners, increasing capacity to 1500 c.c. considerable crankcase thump was experienced, and to experimentally overcome this, boilerplate was bolted across the bottom of the bearing caps, overcoming this problem and pointing out the inherent weakness of this crankcase design. Subsequent

development was the adoption of the light alloy crankcase split vertically permitting the use of tie bolts, making a very much stiffer job.

Previous experience had determined the fact that the cast iron crankcase did produce a quieter engine, but it was decided that the alloy crankcase should be proceeded with, it having been designed for die-casting. The cast iron version was approximately l0 percent quieter than the alloy one, but was naturally heavier. In view of this and the difficulty at that time of obtaining iron castings, the split alloy crankcase was decided on. It was at this stage that the 1200 c.c. project was dropped, as there was such a pronounced performance difference between it and the l l¼litre engine.

When the revised engine was tested for output, a considerable drop in power was seen to occur above 4,250 r.p.m. Observation showed inadequate freedom of breathing and poor turbulence in the stepped head. The valve lift was increased from 0.275 in. to 0.315 in. and the ports cleaned up. Westlake was called in to inspect the combustion chamber formation and he evolved a semi pancake head with 14 m.m. plugs, easier to produce and increasing top end power output by 15 per. cent, while providing smoother running. The exhaust system was changed from streamlined exhaust ports brought out to the bottom face of the head to a manifold bolted to the underside of the head, the off-side manifold feeding into a pipe running round the front of the engine to enter the near-side manifold and take benefit thereby of extractor action. The main exhaust pipe led from the back of the nearside manifold. It had a 1 3/8" inside diameter and the power drop with silencers was only 3 b.h.p. compared with an open pipe. This new exhaust arrangement, gave a power increase of l½per. cent, and no longer were the cylinder heads handed, a production and service advantage.

Snatchy running below 20 m.p.h. led to an increase of flywheel diameter to the limits of the bell housing. Another outcome of initial testing was the need to alter main bearing clearances due to rapid crankcase expansion. A steel housing giving 0.0003 in. to 0.0018 in. clearance at assembly temperature was finally adopted.

The Javelin now emerged as the first really new British post-war car, a comfortable, brisk 5/6-seater saloon, giving 75/80 m.p.h. and 28/32 m.p.g. with the advanced aspects of a flat four engine, torsion bar suspension and wind defeating body form.

The prototype engine, developing 40-45 b.h.p. had been satisfactory in respect of bearings, but long-distance driving on the Continent with the early production versions showed up a tendency to run big end and main bearings.

With the aforesaid improved breathing 50-52 b.h.p. was developed at 4,500 r.p.m. and it was decided that white-metal bearings must be replaced by copper lead bearings, if possible in conjunction with the existing E.N. 12 steel crankshaft. The flat four engine layout led to higher oil temperatures than are experienced in in-line designs, which contributed to the bearing failures.

The first step was to employ sintered copper-lead consisting of 24 per cent lead, 2 per cent tin 74. percent, copper, with a 0.00125 in white-metal flash in view of the unhardened crankshaft. These bearings showed no sign of fatigue but were extremely sensitive to dirt and scuffing on the crankshaft. A hardened crankshaft was consequently adopted and special care was devoted to assembly and initial running in. It was also found that the stepped location of the big-end led to distortion on tightening, so a new con-rod was devised the big-end having an offset-serrated face and clamp bolts increased to 0.375 in. and 400 lb/in, tightening torque. Maximum distortion was now within 0.00025 in. A dirt-trap hole of 1/16 in diameter had a negligible effect on oil pressure and consumption. The crankshaft was now induction-hardened on the journals and pins to a hardness figure of 512-530 Brinell and the bearing surfaces lapped to a finish of 8-12 micro-inches against the former 12-24 micro-inches. A softer bearing material of 30 per cent, lead 1.2 percent tin and 68.8 per cent Copper, with a 0.00025 in. plated white-metal layer for running in was used with the new rods and crankshaft and the bearings now stood up to 50 b.h.p. and 4,750 r.p.m. in spite of the higher oil temperatures and compact bearings of the flat-four layout.

The lubrication system was thoroughly tested in the initial stages of development, an engine being rigged for measurement of oil spillage from bearings, relief valve, ancillary services, etc. As a result the feed to the main bearings was increased and the size of the oil ways increased to 7/16" dia. to obviate a possible danger of bearing starvation under cold-start conditions with the full-flow filter system adopted to ensure clean oil for the hydraulic tappets. The relief valve exhausted below sump oil level to avoid aeration and later the discharge was by-passed to the pump suction side within the cover.

When the three-bearing crankcase was used, difficulty was experienced with oil swirl caused by air transferring from one side of the case to the other. To stop this, a surface baffle was introduced, much experimentation being necessary to position it so that it was above oil level yet allowed free passage of air only. Originally the oil pump has been carried on a bearing cap but the vertically split crankcase obviated this location, so it was moved to the timing case wall and driven by spiral gears from the crankshaft. The ignition distributor, which was originally disposed horizontally and driven directly off the camshaft, was now positioned nearly vertically, with a common drive shaft to the oil-pump, driven from spiral-bevel gears from the crankshaft. The increase of oil pump capacity represented an increase of oil pressure from 50 lb/sq.in. to 65 lb/sq.in. After its use on competition cars, an oil cooler, built by specialists to Jowett specifications, was incorporated on production engines in 1952. At first this was placed rearwards for accessibility of engine, but later was, moved to a location between fan and radiator. With the oil-cooler in circuit, pressure pulsations occurred at audible frequencies until the aforementioned dirt-trap-holes in the big end caps were deleted.

(** Direct quote factually incorrect)

Some interesting experiments were made in respect of airflow away from the behind-engine radiator. Louvres in the bonnet top were found to become ineffective above 50 m.p.h. so pressure areas were checked and it was found possible to extract air from behind the radiator via apertures in the front wheel arches, ugly louvres thus being obviated.

Another difficulty experienced with early production engines concerned noisy valve gear, in spite of the incorporation of Zero Lash hydraulic tappets. Better manufacturing standards were immediately adopted, but a fairly heavy patter persisted. A special rig was built to investigate suspected deflection of the valve gear, which was substantiated. The attempted cure was to change from the somewhat "Fierce" cam form of 0.002" opening ramp and 0.006" closing ramp to a cam form providing an 0.003" opening ramp of constant velocity and an 0.012" closing ramp with a combination or variable acceleration and constant velocity, the cam period being slightly reduced to avoid increased valve overlap. When operation showed no improvement, a cam with a 0 .006" opening ramp with constant acceleration and a closing ramp of .0.015" with variable acceleration gave slightly quieter running. By connecting the noise-meter to an oscilloscope and watching recordings of the valve movement on a cathode ray tube it was discovered the noise occurred at both opening and closing.

The next step was to design a cam form with an opening ramp of 0.004" and a closing ramp of 0.020" modified to give correct lift. Noise was now considerably less on the closing side but it was deduced that an opening ramp in excess of 0.006" would be required. A mathematical investigation was made to ascertain the theoretical seating of the valve for various valve gear deflections. The final cam gave a 0.008" opening ramp and 0.020" closing ramp. This with stiffer rockers and rocker mountings, maximum possible cleanliness of oil supply, freedom from oil aeration, good manufacturing standards of mating parts and stiffer push rods, effected the desired improvement.

Unfortunately hydraulic tappets became unobtainable during 1950 and the noise level rose somewhat with the enforced use of ordinary tappets.

Experiments at this stage were made in respect of camshaft and tappet materials. A high duty 1% chromium cast iron camshaft with a tip hardness of 40-45 Rockwell C. and chilled iron tappets of similar hardness and a finish of 7-10 micro. inches, gave excellent results up to a cam loading of 120,000 lbs. per sq. in. A phosphate process on cam and tappet faces to retain oil during running were found beneficial, but not really necessary but trouble intervened if the tappet head finish fell below 20 micro. inches and the chill lower than 36 Rockwell C.

Five different forms of liner/piston combination were used in the course of development. Vacrit high duty manganese chromium iron liners with a 270-280 Brunell surface hardness were originally used in conjunction with split skirt pistons in LO-EX or LM.13 alloys with 2 D/26 radial thickness pressure rings and a slotted oil control ring.

The liners were first located by a setscrew through the block into the liner skirt, but slight piston scuff resulted from the retention of dirt particles and the liner skirt tended to distort. Oil-consumption varied from 1,000-7,000 m.p.g. on production cars. Lapped side rings and barrel ground pistons were tried and assembly and service techniques were developed to obviate oil leak throughout the engine.

A taper-faced Vacrom chromium plated top piston ring was adopted to cut oil consumption without entire success. Liner distortion, was suspected and investigations showed that while 0.008-0.0l0" gasket nip at 38/40 lbs/ft. cylinder head tightening torque was satisfactory to retain gas and water seals this was highly critical, any degree of higher torque loading or excessive nip caused local liner collapse and consequent distortion. To counteract this the liner section was stiffened and an internally stepped second ring fitted to facilitate quick bedding in of the chromium-plated piston ring. After this a Javelin ran 80.000 miles in the course of testing, by the Avon India Rubber Co. Ltd. gave an average 3,700 m.p.g. of oil at 37-39 m.p.h. average speed and maximum bore wear averaged 0.002" equal to 40,000 miles per thou.The firing order is 1-4-2-3

This was incorrect in the original Bill Boddy/MotorSport Technical Development article.

Carburation was the subject of special attention in view of the Javelin unusual firing order of l, 3,2,4. Cylinders 1 and 3 fed from one carburettor. To combat weak mixture in the front cylinders of each bank caused by inlet tract surge a 0.550" diameter balancer pipe was introduced between the two carburettors. Difficulty of working in the conventional exhaust hot-spot resulted in flat spots between idling and main jets, but adjustment of the level of the Progression hole to the edge of the throttle blade in the Zenith carburettor cured this. A further induction system peculiarity was a very harsh staccato noise at the intakes, unacceptable in what was not a sports engine. Experiments proceeded with many makes of air cleaners and silencer but it became evident that & very large silencer would e required to attain a reasonable noise level and this would about cover the engine and render it inaccessible. Consequently Jowett evolved their own baffle box, accommodated in the alligator bonnet, tuned to length to suit the induction system, and connected to a resonance chamber, which was coupled to the air intakes by vertical pipes having squash rubber connections, which broke as the bonnet, was lifted. A non-spill oil bath air filter was incorporated. Reverting to the carburettor balance pipe, when this was fitted it was adapted to ventilate the engine in conjunction with an A.C. vacuum valve in the oil filler tube.

A minor development feature was a change from flat pressings to tubular stays as supporting legs for the cooling fan shaft, as the flat section caused noise as air flowed over them.

To early bearing failures and excessive oil consumption of some Javelins has been added gasket blowing, but it should be remarked that this was due to too small an asbestos content at the fold of the gasket and it was only with increased output for competition purposes that contributory causes came in.

So far we have dealt with the production engine only, and the painstaking research and development devoted to perfecting this advanced design of flat-four power unit with rear placed radiator is truly a credit to the Jowett Company - even if the public are well advised in respect of all new models, to wait until the initial snags have been eradicated before purchasing.

In 1949 the Javelin engine was developed for competition motoring and class victories were obtained in events as diverse as the Rheineck-Walzenhausen Hill Climb and the Spa 24 Hour Race. The Spa Javelin saloon gave about 57 b.h.p. and had the oil cooler and copper lead bearings etc. Flywheel weight was halved, being reduced from 28 lb. to 14 lb. These Javelins

also ran at Silverstone.

Meanwhile, the Jowett Company had decided to put into production the two-seater sports Jupiter the chassis of which was based on a tubular frame design evolved by Leslie Johnson in association with the German engineer Eberan van Eberhorst.

The Javelin engine was required to be developed to give 60 b.h.p. at 4,750 r.p.m. for use in the new car. The compression ratio was raised from 7.25 to 1, to 8 to 1 by reducing the volume of the combustion space by a change in shape of the piston crown. Javelin port sizes, bearings and camshaft' were used unaltered, but heads and ports were polished. A Delaney Galloy oil cooler was installed, located behind the fan, a Bowman block cooler was mounted on the front of the offside cylinder block later. Instead of 23 m.m. carburetors, 26 m.m. Zenith 30 V.1.G. carbuettors were used, later replaced by the easier to tune Zenith 30 VM. The oil sump capacity was retained at nine pints. As there was more room under the car, the off side exhaust pipe joined the main pipe in rear of the near side manifold and not at the manifold as on the Javelin. The shape of the Jupiter body called for air extractor louvres, not used on the Javelin, and when overheating was experienced in Continental driving and Alpine work the radiator size was increased after louvres had been added in the bonnet top. As noise was now of less moment no air silencers were used for the carburettors and eventually the Vokes air filters were discarded, A.C. filters are now used. The fan shaft was mounted in a rubber ring to offer some freedom of movement and the base of the supporting legs modified to obviate breakage and release of the fan from its axle. (Alas in the recent Monte Carlo Rally the fan of Becquart's Jupiter broke away and punctured the radiator during the regularity test).

It is significant that about this time the Jowett Company issued its "Competition Tuning Notes" to those Javelin owners who sought an increase in performance. The usual port polishing and relieving was covered in respect of this particular engine, stronger outer valve springs were recommended and special pistons we're declared available for increasing the compression ratio from 7.2 to 1, to 7.6 and 8.0 to 1, a reduction in combustion chamber space of 2 c.c. and a further 3 c.c. respectively. The standard Zenith VM 4 or 5 carburettors could be replaced by 30 VM Zeniths and it was assumed that the hardened crankshaft, copper lead bearings, larger water and oil pumps, later oil filter assembly and the oil cooler would be employed.

Subsequently similar "hotting up" of the Jupiter was permitted, with increase of compression ratio from 8.0 to 1 up to 8.5 to 1 for 80 octane fuels, this being obtained by using thin gaskets. Stronger inner valve springs were recommended and the flywheel could be lightened. It was assumed that correct fitting and assembly would be ensured and that the modified high tensile cylinder head studs, Lucas DVX4A distributor and the later cooling arrangements used and Champion L 11S or LA 11 sparking plugs fitted

Charles Grandfield and Horace Grimley who later developed the Jupiter for racing, had tested a prototype sports version over 3000 miles from John 0'Groats and across France, at a running average speed of 54 m.p.h. and an overall average of 46 m.p.h. fuel consumption working out at 31 m.p.g.

The next step was to prepare the Jupiter for participation in racing. For Le Mans in 1950 a compression ratio of 8.5 to 1 was obtained by the employment of thin head gaskets and with stronger inner valve springs, high duty ignition distributor and lightened flywheel, the output was 64 b.h.p. To obviate gasket trouble the strength of the cylinder head studs was increased from 45 to 60-65 tons tensile, but the number and position of the studs were unchanged. The plugs were stepped up from Champion L 11S to Champion LA 11. The l litre class was won at 75.84 m.p.h.

For 1951 the porting, valve timing etc., were improved, and after experiments with compression ratios of 8 to 1, 8.5 to l, 9 to I and 9.25 to 1, the last named ratio was employed. Just over 100 m.p.h. was obtained from the Rl Jupiter, but after six hours at Le Mans the C.A. gaskets collapsed. A composite copper, asbestos and steel gasket was found satisfactory, after experiments with solid copper, laminated aluminium, and corrugated cupro nickel gaskets etc. This gasket is now used on all production engines but eventually, for racing, a gas filled metallic sealing ring at 600 lb/sq.in. pressure in a circumferential recess on the liner top flange stood up to the highest compression ratios. A Plexseal gasket was used as a water joint. The gasket failures were finally traced to sinking of the cylinder liners and this was cured by redesign of the liner bottom seal, a rubber ring trapped between the liner bottom flange and the crankcase permitting a metal-to-metal contact between liner and crankcase, obviating liner sinking and enabling the initial liner interference on the gasket to be maintained. The 1¼litre class was won at Le Mans.

For last year's Le Mans Rl's retained the 9.25 to 1 compression ratio with flat top pistons. The serrated face big ends were used and the top piston ring lands were increased from 3/32" to 1/8" and to reduce a tendency to piston ring flutter and increased oil fling, pressure loading of the scraper ring was put up to 70 lb/sq.in. 2 b.h.p. was gained by using the solid skirt piston, due to less friction. Trailing oil way drillings were used on the crankpins to feed oil at a point of minimum pressure.

The pistons were now solid skirted and of die cast silicon alloy, with the top gas ring chromium plated. Stronger valve springs met the engine speed of 5,500 r.p.m. KE 965 (EN 54) exhaust valves combated a neck temperature of 700-800 C., which had caused an XB valve to break during the 1951 Silverstone Production Car Race. The stems were chromium plated, 0.001 inch extra clearance given at the guides and the valve tip at the rocker end stellited. With 0.5 milli-litre per litre of lead in the fuel, valve life was approximately 200 hours at 4,500 - 5,500 r.p.m. An external carburettor balance pipe of 5/8" internal dia. was now required. A Lucas high duty DVX4A distributor was used, with Lodge plugs in waterproof covers. The crankcase was stiffened by ribs radiating from the main bearing regions and walls were also stiffened. The Marston Excelsior oil cooler radiator and reserve fuel tanks were fabricated in aluminium alloy with a weight reduction of 45 lb. An axle ratio of 4.1 to 1 was employed instead of the former 4.56 to 1. The engine now had a fuel consumption of 0.51 to 0.57 pint/b.h.p. /hour, equal to a race fuel consumption of 18 m.p.g. and the third consecutive l¼litre class win at Le Mans.

The standard crankshaft broke on test after only 50 hours bench running at 4,200 r.p.m. with

compression ratios above 8 to 1. A crankshaft which had run some 200 hours broke during the 1950 T.T. race when a compression ratio of 8.75 1 was in use. This led to a mathematical investigation of crankshaft dynamics and the most probable cause of the crank-web bending fatigue failure was thought to be combined axial and torsional vibrations of the crankshaft system in conjunction with the presence of an adverse residual stress system in the crankpin fillet adjacent to the fracture; this residual stress was due to induction hardening of the bearing-surfaces especially if followed by a cold straightening operation allied with stress risers in the form of a sharp fillet radii and tool marks on the webs. A new crankshaft was developed incorporating fillet radii on all bearings of not less than 0.100". The crankpins were also drilled so as to reduce off centre weight and the magnitude of the bending loads. Great care was also necessary when induction hardening the crankpins so as to ensure that the hard zone does not extend into the webs, also that the fillet radii and journal surfaces were free from quenching cracks.

Experiment showed that Shot peening the fillets could considerably increase the fatigue resistance using 1/32" dia. chilled shot at 25 to 30 lb/sq.in. the crank being rotated during the peening operation, also the practice of rolling the fillet by steel balls was effective.

A load diagram on a polar basis was drawn up for big end bearing loads above 4,750 r.pm. and the serious inertia loading was found to be sufficiently important to warrant drilling the racing crankshaft.

Besides the 1½litre class victories at Le Mans, first and second places were taken in the 1½litre class of the 1951 T.T. race and a win at Watkins Glen.

It is particularly satisfactory to learn that almost all the modifications evolved through racing are found in the current Jowett Series III engine now found in all Javelin and Jupiter cars. These may be summarised as follows: -

1. Crankshaft - The crankshaft has been redesigned in detail so as to increase its fatigue strength. The modifications in this direction consist of the crankpins and main bearing fillets being increased from 0.050" radius, to 0.10" radius, also the hardening technique has been altered so as to ensure that the hardness does not run into the crank webs where it may introduce, stress concentrations. The weight of the crankpins has been reduced by drilling a 7/8" dia. hole through them with the object of reducing the bending load on the shaft.

2. Oil ways - The oil ways both in the crankshaft and in the crankcase have been modified; in the case of the crankshaft these have been repositioned so that they emerge on the crankpins in an area of minimum load, which allows the oil to build up a more stable film. In the case of the crankcase, the oil ways have been increased in area so as to avoid any possibility of restriction, especially under cold starting conditions.

3. Bearings - These are now with the exception of the rear main bearings of Vandervell

manufacture and are of the tri-metal type, which consists of a steel backing strip on which is cast a layer of copper lead alloy; this layer of copper lead is then plated with an approximately 0.003" thick coating of lead indium alloy which actually acts as a bearing medium.

4. Crankcase - This has been stiffened by the addition of radial webs on the front, centre and rear panels, the object of this is to increase the rigidity of the structure which to some extent will assist in minimising noise.

5. Cylinder heads - The combustion chambers and the ports are polished and the ports are lined up with the manifold ports. This will improve the gas flow characteristics and will reduce any tendency towards "run-on"'.

6. Camshaft - An adjustable end location is now provided for this so that individual adjustment can be carried out to reduce any noise resulting from excessive end float.

7 Cylinder liner bottom seal - This has been redesigned and now consists of an oil and heat resisting rubber ring trapped between the liner bottom flange and the crankcase. There is thus a metal to metal contact between the liner bottom flange and the crankcase, which obviated any tendency to liner shrinkage due to collapse of the bottom joint. This ensures that the initial liner interference on the gasket is maintained and will result in greater gasket reliability.

8. Oil Pump - This is now of a submerged pattern, which ensures instant priming under all starting conditions and the relief is by passed to the suction side of the pump to reduce oil churning and frothing in the Sump.

9. Pistons - The proportion of the piston ring lands has been increased so as to improve the fatigue resistance at this point.

10. Sparking plug covers - The original design of bakelite cover with the bayonet fixing has been deleted and this has been replaced by a moulded rubber cover designed by Messrs. Lodge for racing motor cycles. This cover is very simple and improved the accessibility of the sparking plug.

All this development work has been done in the last five years or so and our account covers only that applied to the engine, this being of such unusual layout as to occasion much interest in how its teething troubles were overcome. The reader must by now be impressed with the very thorough testing and research, undertaken by the Jowett engineers and be particularly pleased to learn how much they owe to racing and competition Work.

The Jowetts with the Series III engine are still well in advance of conventional practice and have gained in performance and reliability since the brave introduction of the Javelin eight years ago. Once again, I cannot refrain from observing that at Idle they are anything but idle! - W.B.

TECHNICAL DATA - Javelin, Jupiter & R4.

The fo1lowing data is taken from various sources of reliable information and every attempt has been made to ensure its accuracy by cross-referencing all information available. Wherever possible data has been given for both early and late model Javelins and unless otherwise specified the data is applicab1e to the 1951 Model. Where Jupiter data is listed, it is applicable to a 1952 SA MODEL and R4 Jupiter to the 1953 specification. The data in single brackets gives the equivalent for the Jupiter and in double brackets the Jupiter R.4.

ENGINE

Dimensions & Data

Bore 2.5 m.m. Stroke 90 mm. Capacity 1485 cc's – 90.6 cu.in. Stroke/Bore Ratio 1.24:1. Con Rod/Crank Throw Ratio 3.4:1. Compression Ratio 7.2:l, (7.6:l or 8:1 depending on fuel available), ((7.5:l or 8.5:1)) Firing Order 1,4,2,3**.** Piston Area 6.345 sq.ins. Piston Speed at 1,000 r.p.m. 590 ft/min & at maximum b.h.p. 2,660 ft/min. Maximum b.h.p. 52.5 at 4,500 r.p.m. (60.5 at 4,500 r.p.m.) ((65 at 5000 r.p.m.)). Max. torque 76 ft. lbs. at 2,600 r.p.m. (84 ft. lbs. at 3,000 r.p.m.). ((81 ft.lbs. at 3,400 r.p.m.)). Max. b.m.e.p. 126 lbs/sq.in. at 2,600 r.p.m. (128 lb/sq. in**.** at 1,900 r.p.m.)

Performance –

Javelin	Jupiter	R4
12.5 b.h.p. at 1,00 r.p.m.	13.25	29.3
28 b.h.p. at 2,000 r.p.m.	30.75	29.3
42 b.h.p. at 3,000 r.p.m.	48	46.5
51 b.h.p. at 4,000 r.p.m.	60	60
52.5 b.h.p. at 4,500 r.p.m. (max)	62.5 (max)	64 at 5,100 (max)
Min. fuel consumption, .555 pts/b.h.p./hr.	.5	.54
B.h.p. per litre 35.2	-	-
B.h.p. per sq. in. Piston area 2.05	2.35	-

Crankshaft - 4 throw with 2 main bearings. Material EN 12 steel unhardened up to E0/PB. 8902. EN 12 steel hardened to depth of 0.04-0.05" from E0/PB. 8902 early crankshafts were 0.4 carbon EN 8 steel unhardened, ((EN 110 steel probably nitrided)). Weight 25¼ lbs. Overall length 15 1/16". Thrust taken at rear main bearing. Main bearing journals Dia. 2.2505-2.2500". Wear limit 0.002", Radius of fillet 0.10-0.1". Crankshaft end float 0.003-

0.004". Crank pin bearing journals length 1.003", Dia. 2.000-1.9995" Wear limit 0.002". Radius of throw. 1.7716". Radius of fillet 0.10-0.1". Method of sealing oil Front and shaft oil seal. Rear end shaft oil seal. Distance between each pair of cylinders 5 1/16". 0ffset between Nos. 1 & 2. Cylinders 1 11/16". Webs ½ thick between main journals and crankpins 5/8" between adjacent crankpins.

Main Bearings - Type; Steel backed shell - front and centre white metal up to D9/PA.4322, copper lead after D9/PA.4322, rear white metal. No. of main bearings 3. Length; front 1.126" centre 1.126" rear 1.388". Clearance on crankshaft 0.0015-0.0020" Wear limit; 0.002". End float 0.003-0.004". Inside dia. 2.2518-2.2503. Housing dia. 2.394-2.393.

Flywheel - Weight 28 lbs. Cast iron. Ring gear in 4% carbon steel shrunk on. No. of teeth 111.

Connecting Rod - 'H' section forged in EN 8 steel. Serrated joint faces split at 47°. Two 3/8" dia. bolts. Length centre to centre 6¼". Steel backed. Lead bronze small end bushes. Bore size 0.8125. Wear limit 0.003-0.004". Width 1". Lubrication by splash feed through hole in con rod and bearing. Rods and caps stamped for correct fitting.

Big End Bearings - Type; Steel backed shell - white metal up to D9/PA.3793 Copper lead from D9/PA.3793. Internal Dia. of bearing 2.002-2.001". Width 0.875" Wear limit 0.01" Bearing wall thickness 0.0715-0.07175". Radial clearance 0.0005-0.0015". End float on crankpin - nominal 0.01". Wear limit 0.010". Big end bore size of forging 2.1445-2.1450". Length of big end bolts 1 11/16" under head. Dia. 0.371-0.372 tapped 3/8" b.s.f. Locking device - tab washers, Method of locking bearings in position - notch on bearing shells locating in grooves in con rod and cap.

Gudgeon Pin - Floating in piston and con rod. Material S14 steel. Secured by circlips. Inside dia. 0 5626-0.5615". Outside dia. 0.8125-0.8105". Wear limit 0.003-0.004". Length 2.63125- 2.52625". Fit in piston tight push. Fit in con. rod easy push.

Pistons - Material. - HG 4l3~ Aluminium silicon die casting. Surface finish - tin plated. Split skirt. Pistons are removed from top. Skirt clearance in bore 0.0015". Gudgeon pin hole dia. 0.8377-0.8375". Weight of piston including rings and gudgeon pin 13 ozs 3 drains. Compression height 39.5 mm. Nominal dim. measured at Gudgeon pin centre line 2.8542-2.8534". Max weight variation between pistons 2 drains. Length of piston 3.1299". Diametrical clearances -bottom of skirt; 0.0015". Top of skirt 0.0020". Bottom land 0.0035-0.0016". Intermediate land 0.0128-

010098'. Top of land 0.0125" Ovality 0.001-0.002". at gudgeon pin. 0.006-0.007" at top of skirt, Ring grooves width - Top & 2nd, 0.09625-0.09525". Bottom 0.1772". Ring grooves depth - Top & 2nd. 0.1484-0.1.429". Bottom 0.1701-0.1878". Piston top dished, (Flat top piston).

Piston Rings - 2 Compression and 1 oil control. Material - cast iron. Surface finish - No.1 Chromium plated. Dimensions: -

Piston Rings	Top	2nd	3rd
Width	3/32"	3/32"	5/32"
Wear limit (width)	0.005	0.005	0.005
Groove clearance	0.0035-0.0015	0.0035-0.0015	0.0035-0.0015
Thickness (depth)	0.133-0.123	0.133-0.123	0.133-0.123
Ring gap fitted min	0.007	0.007	0.007
Ring gap fitted max	0.012	0.012	0.012
Wear limit	0.030	0.030	0.030

Cylinder liners - Material 'Vacrit' cast iron.

Camshaft - Material EN 32B Steel or 'Monikrom' cast iron. Method of taking thrust - spring loaded plunger. Amount of lift 0.224". No. of bearing journals 3. Cam heel to toe dimension 1.266". Length of bearing journals 1 3/32". Dia of bearing journals 1½. Wear limit on journals 0.002-0.002". Bearing surfaces in block -length front l 1/8" centre 13/16" rear l¼". Bearing housing internal dia. 1.502-1.501". Bearing clearance 0 001-0.003".

Timing Chain - 3/8" pitch 56 links. No. of teeth on crankshaft chain-wheel 21 & camshaft chainwheel 42. Dimension between wheel centres 4.413-4.418". Crankshaft chain wheel .6% carbon steel. Camshaft chain wheel cast iron.

Cylinder block - Die cast in DTD 133 B Aluminium alloy. Cylinder head studs 3/8" dia. in EN 16 Steel. Bore for liners 3.1895-3.1880". Bore for tappets 0.8130-0.8135". Bore for camshaft 1.502-1.501".

Cylinder Head - Cast iron. Inlet port 1¼" dia. Combustion space volume 41-43 ccs. Volume variation between chambers 1cc. Valve guide bore dia. Inlet & exhaust 0.5630-0.56225". Valve seat angle inlet 30°. Exhaust 45°. Valve seat width inlet 1/32". Exhaust 3/64". Valve throat Dia. Inlet 1¼" Exhaust 1 3/32". 14 m.m. sparking plug holes.

Valves - Material inlet silicon chrome steel. Exhaust XB Austenitic steel. Overall length inlet 4 1/8". Exhaust 4.1406". Lift inlet & exhaust 0.315". Stem dia. Inlet & Exhaust 5/16". Valve head dia. inlet 1 7/16". Exhaust 1

7/32". Inlet 30° seat. Exhaust 45° seat. Stem clearance in guide 0.0035-0.0020" Wear limit 0003". Valve timing - Inlet opens 12° BTDC ((8°)). Inlet closes 53° ATDC ((57°)) Exhaust opens 50° BBDC ((46°)). Exhaust closes 15° ATDC ((19°)). Exhaust guides are counter-bored at inner end. Valve rocker ratio 1.5:1. Push rod 5/16" dia. x 15 S.W.G. steel tube.

Valve Guides - Pressed into head Material - close grain cast iron. Dimensions inlet and exhaust - overall length 2½". Outside dia. 0.564-0.5635. Inside dia. 0.3135-0.3125. Length of lead-in chamfer ¼". Interference fit in head 00005-0.00175". Wear limit 0.007". Length of counter-bore in exhaust guide ¼". Dia. of counter-bore 0.3594".

Valve Springs

	Inlet Inner	Exhaust Inner	Inlet Outer	Exhaust Outer
Free length	1.935	1.935	2.022	2.022
Min. working length	1.4556	1.4556	1.468	1.468
External dia.	0.997	0.997	1.378	1.378
Internal dia.	0.753	0.753	1.0588	1.0588
Pressure when compressed to full lift load.	58 lbs. ((70.4))	58 lbs. ((70.4))	71 lbs. ((101.5))	71 lbs. ((101.5))
Pressure at fitted load.	35 lbs. ((42.5))	35 lbs. ((42.5))	45.4 lbs. ((65))	45.4 lbs. ((65))
Active coil	6½	6½	4½	4½
Dia. of wire.	10½SWG	10½SWG	8 SWG	8 SWG

Tappets - Solid with bronze insert from EO/PC.11709. Material cast iron outside dia. of body 0.8125-0.8120. Length of body 2 1/8". Clearance between tappet and guide - 0.0005-0.0015". Tappet clearance cold - Inlet 0.002". Exhaust 0.006". Zero lash hydraulic self-adjusting tappets up to EO/PC.11709.

Lubrication System - -Spur gear oil pump driven by skew gear from crankshaft at crankshaft speed. Normal pressure 60-70 p.s.i. after El/PC.15098. Capacity 3 galls /Min at 2,000 r.p.m. of pump at 72° inlet temperature. 10 teeth on internal gears on 1.079" P.C.D. Idler gear bore dia. 0.5002"-0.4997". Outside dia. 1.278-1.279". Overall length 1 3/16". Driving gear outside dia. 1.278-1.279". Overall length 1 3/16" Clearance between gear and cover not to exceed 0.004" (including packing). Pressure lubrication to main, big end, camshaft and rocker bearings. Leak lubrication to valve guides and springs. Splash feed to little ends and gudgeon pins. No. of free coils of oil pressure relief spring 18. Rate per inch 19 lbs. Pressure at fitted length 10 lbs. Fitted length 1 3/16". Free length 1¾". Dia. of wire 0.048. Internal dia. 0.233". External dia. 0.329". Relief valve opens at 70 p.s.i. Full flow

filter blow off spring set at 15 p.s.i. (20 lbs.) ((20 lbs.)). Filter - tecalemit element on rear timing cover Capacity 1 pint.

Oil Sump - Capacity 9 pints. ¼" on dipstick equals 1 pint ((capacity 14 pints)).

Cooling System - Thermo syphon pump assisted system. Radiator type 4 row fin and tube. Radiator dimensions 17.13/16" wide x 18¾" deep. Centrifugal water pump driven by fan belt from crankshaft. One ball bearing at front and two plain oilite bushes at rear. No. of fan blades 4. Fan belt type B.44. Driven at engine speed by fan belt 21/32" wide 46" circumfrencial length (44") ((40")). Pump capacity 7.5 galls. /min. at 2100 r.p.m. Thermostat opens at 75^0C 2 x 3/16" leak holes. Thermostat type AC TC-9. Capacity of system 2 gallons. Heater 1 pint (12 pints) ((12½pints)).

Carburettors -

Javelin 30 VM 4		Jupiter 30 VIG 5		R4 30 VM	
Fixed choke	23	Choke	26	Choke	27
Main jet	90	Main jet	105	Main jet	115
Compensator jet	55	Compensator jet	60	Compensator jet	60
Slow running jet	50	Slow running jet	45	Slow running jet	45
		Pump jet	90	Progression	120
		No vent open casting		Vent	2.0
		Leak	70	Used with AC air cleaners.	
		Capacity tube - closed to atmosphere.			

Javelin 30 VM 5		Jupiter 30 WA (from E2/SA.657)	
Fixed choke	23	Choke	27
Main jet	90	Main jet	120
Compensator jet	50	Compensator jet	65
Slow running jet	45	Slow running jet	45
Progression jet	110	A.C. dry air cleaner type 1579035	
Outlet hole in barrel	200		
No.2 cast capacity well			
Screw over cap well		2.6	
Needle seat		1.5	
Seat washer		1mm.	
Compensator vent		1.2 mm.	
Deep slow running feed in bowl			
Long taper air screw			
No. of fuel filters		2	

Location of fuel filters - inlet to float chambers.
Air cleaner type - Vokes oil bath.

Balance pipe internal dia. 7/16" between induction ports.

Fuel system - Mechanical A.C. diaphragm 'U' type pump No.1524577 U (up to El/SA.439 S.U. electric type L. From El/SA.439 S.U. electric type PP 36L). Static pressure 1½- 2¼lbs./sq.in. (early ¾l lbs./sq.in. late 2 lbs./sq.in.) Fuel pump push rod length 1.21/32". Wear limit 0.010". ((as Javelin)). Fuel tank capacity 8 galls. (10 galls) ((15 galls.))

Distributor - Lucas DKYH4A service no. 40ll5H model A.J. 35. Clockwise rotation. Contact breaker gap 0.010-0.012". Condenser capacity 0.2 MFD. Engine induction and counter weight auto advance. Advance 18 - 22° on crankshaft begins at 660 r.p.m. Cam angles 41°± 4° open 49°± 4° closed. Contact spring tension 20-24 ozs. Ignition timing TDC to 3/8" ATDC on flywheel. Lucas DM 2 Service no. 40317A. Clockwise rotation. Contact breaker gap 0.014-0016". Condenser capacity 0.2 MFD. Cam angles 60°± 3° closed. Contact spring tension 20-24 ozs. Ignition timing TDC to 3/8" ATDC.

Sparking Plugs - Champion LI0 (L10S) ((XLl0 suppressed)) 14 mm. 9/16" reach. Gap set at 0.020-0.025".

Dynamo - Lucas type 045 XV. Service No. 22413A up to D9/PA.2259. Type C39 PV. Service No.22250F from D9/PA.2259 to D9/PA.3696. Service No. 22258D from D9/PA.3696. (C45 PV4) ((as Javelin)). Data for 039 Type: - 12 volt. Max output 17 amps, at 2.000 r.p.m. at 13.5 volts out in speed 1050- 1200 r.p.m. at 13 volts. Field resistance 6.1 ohms. Brush spring tension 22-25 ozs. Direction of rotation clockwise (commutator end). Driven at 1.54 of engine speed. Dynamo speed 2,000 r.p.m. at 20 m.p.h.

Starter Motor - Lucas M35G type A.J.33. Service No. 25012A (25025). Direction of rotation (commutator end) Clockwise. Lock torque 9.3 ft.lbs. Lock voltage 7.9. Lock current draw 335 amps. Brush spring tension 32-40 ozs. No. of pinion teeth 9. Cranking ratio 12:3. 10/12 DP remote solenoid switch. Model ST 900. Service No. 760205 (ST 950 Service No. 764111).

Battery - From D9/PA.3696 Lucas GTW 9A. Positive earth. No of plates per cell 9. Capacity 51 ampere hrs. at 10 hour rate. Height 8" Width 6¾" Length 12½". Up to D9/PA.3696 two Lucas 6v model SLIW11E 60 ampere hours. ((43 ampere hrs. at 20 hr. rate)).

Horn - 2 Lucas wind tone model 690798/8 Type WT29. Current consumption 12-15 amps. Service No.69011F low tone, 69012F high tone. Horn relay Service No.33116B.

Windscreen Wipers - Lucas CR4 electric. Current consumption 2-3 amps Service No. 072594.

Other Electrical Equipment - Standard model. Lighting and ignition switch Lucas 34038A Later models 31270A (Mk. l.34067Mk.lA.31270). Deluxe model 1950 34016A. Ignition switch 1952-54 31287A. Lighting switch 31303A. Trafficators 1948-50 54014D. 1951-54 540141A.

Clutch - Borg & Beck 7¼" A6 single dry plate with moulded facing (Woven yarn) ((Woven yarn)). Lining dimensions:- Outside Diameter 7¼" Inside Diameter 5" thickness 1/8**".** Pressure springs RHD 3 Red 135 lbs. and 3 Yellow 120 lbs. (6 light blue 145/155 lbs) ((6 light blue 145/155 lbs)). LHD 3 Red 135 lbs and 3 Maroon 105 lbs. Total spring load RHD 765 lbs. LHD 675 lbs. Spring free length - Red 1.96" Yellow 2.255", Maroon 2.150" (Light blue 1.93"). Spring dia. 1.047. Centre plate cushion springs - 3 Blue drive, 3 Green over run ((4 Buff drive, 2 Buff over run)). Belleville washer type centre plate. Ball type throw out bearing SKF 400869. Throw out load 180 lbs. ((Hydraulically operated 8.26:1 pedal ratio)).

Clutch Housing – Material DTD 428 Aluminium silicon alloy

Gearbox - Selective sliding gear type with 4 forward speeds and reverse. Constant load synchromesh on 2nd 3rd. and top gears. Aluminium silicon alloy DTD 428 die cast case and cover. Layshaft centre distance 2.600". Ratios as given in handbook. 1st. speed gears straight 10 CDP. Other gears helical 10 CDP. All teeth 5/8" wide, machine cut and lapped or burnished after hardening. All gears in 4.25% Ni, Cr CH E**.** N. 39A Steel. Mainshaft 1¼" dia. Splined E.N. 36 steel. Synchromesh cones 2¼" dia. x 15° included angle. Steel on steel. Speedo drive gear ratio 8/20 24 NDP ((7/24 30 NDP)). Bearings - clutch shaft & mainshaft Hoffman LS 12K ball. Mainshaft spigot and layshaft gears Hoffman H 786 roller.

Propeller Shaft - Divided shaft 2" dia. with 3 layrub 55 x l 1/8" joints (Divided shaft 2" dia. with rubber mounted centre bearing I layrub 55 x l 1/8" coupling at gearbox. 2 Hardy Spicer series 1110 needle roller bearing U.J.s and sliding joint) ((Single open shaft with layrub type 55 x 1 1/8" at gearbox and axle)). Max. longitudinal travel 9/16" approx.

Rear Axle - Before EO/PB.10594 Salisbury type HA24 Hypoid bevel. Differential side bearings R & LH. Timken 14138A Cone 14203 Cup. Front pinion bearing Timken 02474 Cone 02420 Cup. Rear pinion bearing Timken 3188S Cone 3120 Cup. Outer axle shaft bearing Timken 14123T Cone 14276 Cup. l¼" vertical offset between pinion shaft and axle center-line.

From EO/PB.10594 Salisbury type 3HA hypoid bevel. Differential side bearings Timken 24780 Cone 24821 Cup. Front pinion bearing Timken 02872 Cone 02820 Cup. Rear pinion bearing, Timken 31593 Cone 31520 Cup. Outer Axle shaft bearing Timken 14130 Cone 14276 Cup. Pinion 8 teeth (9) ((9)). Crown Wheel 39 (41) ((40)). Axle ratio 4.875:1 (4.56:1) ((4.44:1)). Differential housing in malleable cast iron. Drive shaft tubes 2¼" dia. ((2")). Drive shaft max. dia. 1¼" ((1k")).

Brakes

Up to EO/PB.10594 Girling hydro-mechanical. Hydraulically operated front brakes. Mechanically operated rear brakes & handbrake. Front brakes 9" dia. x l½ HNS 1. Lining 7 5/16" long. 1½ wide. 3/16" thick. Lined shoes leading L/RH GBB38167/8. Trailing Shoes L/RH GBB 35678. Rear brakes 9" dia. x 1¼" GNS. Lining 7 5/16" long. 1¼" wide. 3/16" thick. Lined shoes GAGB 2240. Total friction lining area 88 sq.in. Brake lining area per ton 71.5 sq. ins. (80.5 sq.ins). Master cylinder 7/8" T.Type 3122440. Service kit No.SP1208. Wheel cylinders 1" dia. 390010-1. High pressure hose 3703934W. Wheel cylinder service kit SP1215.

From EO/PB.10594 Girling full hydraulic. Mechanically operated handbrake. Front brakes 9" dia. x 1¾ HLS. Lining 8¾ long. 1¾ wide. 3/16" thick. Lined shoes L/RH leading and trailing GB41332. Rear brakes 9" dia. x l¾ HW. Lining: size as front. Lined shoes, leading L/RH GB41324, Trailing L/RH GB41325. Total friction lining area 122.8 sq.in. Brake lining area per ton 121.8 sq.in. (145 sq.in) ((164 sq.in.)) Master cylinder 1" T.Type 3122581. (¾ dia. CB Type). ((¾ dia. CV Type)). Service kit No. SP1209. Pedal ratio 6:1, (3.75:1) ((unknown)). Braking effort -Front 65% Rear 35%. Wheel cylinders Front 7/8" dia. 390320-lW. Rear 7/8" dia. 390120-1W. High pressure hoses front 370053lW. Rear 3700625W. Wheel cylinder service kit front SP2049. Rear SP2057. No. of rivets per shoe 10.

Front Suspension -

Unequal arm. Transverse link type. Length top link 7¾. Length bottom link 14 15/16". King pin inclination 10° King pin offset 13/16". Total wheel movement 6 3/8", (4½) ((4½)). Normal load to rebound 1 7/8", (1 5/8"), ((1 5/8")). Normal load to bump 4½. (2 7/8"), ((2 7/8")). Normal wheel camber - 0°. Castor angle 1¼°. Torsion bar spring 0.880" dia. x 36" long ((0.852" dia. x 36")). Working load 846 lbs. Effective length 36¼" Material silico manganese spring steel. Normal load on spring arm 652 lbs. (525 lbs). ((Not known)). Stress in torsion bar at this load 30.96 tons p.s.i. (25.97) ((Not known)). Stress at full bump 52.24 tons p.s.i. (33.70) ((Not known)). Wheel deflection at normal load. 7". Spring periodicity at normal load 69 cycles/min. (77). ((Not known)).

Effective rate of spring 116 lb/in. (96 lb/in.) ((70 lb/in.)). Mainframe members inclined in plane 8° to the CL of car. Swivel pin link pivot centres l0¾".

Rear Suspension - Type parallel arms of equal length. Axle located by transverse stay. Spring arm length.13 5/8". Torsion bars as front. Total wheel movement 7¼". Normal load to rebound 3". Normal load to bump 4¼". Normal spring arm load. 528 lb. (434). Stress in torsion bar at this load 22.8 tons p.s.i. (18.47). Stress at full bump 51-98 tons p.s.i. (45.27). Wheel deflection at normal load 6½". Spring periodicity at normal load 84 c/min. (92). Effective rate of spring 116 lb/min. ((half elliptic leaf spring. The springs are shackled at the rear and supported throughout by Metalastik rubber bushes. Rubber spacer pads are fitted at the ends of the spring leaves to eliminate friction. Total wheel movement 7". Normal load to rebound 4". Normal load to bump, 3". Effective spring rate 110 lb/in)).

Shock Absorbers - -See Service Bulletin Item No. 158 for details of all shock absorber changes and Part Nos. Up to E2/PD.21867, Woodhead Monroe 1" dia. From E2/PD.21867 to E2/PE/22345, Armstrong l" dia. With internal rubber bump stops. From E2/PE/22345 Woodhead Monroe 1" dia. with interna1 rubber bump stops. Front closed length 10 5/32" extended 15 9/16". Rear closed length 11¾" extended 19".

Transverse Stay - (Panhard Rod) Fitted to rear chassis side member and rear axle casing. Stay for full hydraulic axle 4½" longer than hydro-mech. stay. Material – medium carbon steel tube.

Steering Gear - Javelin - internal gear and pinion type with 3-piece track rod. Pinion teeth 6. 0.D. 0.918". 9.9345 DP. 20° PA, l5° helix angle. Material EN 36 CH steel. Gear Teeth 72 on complete ring. Material EN 32A CH steel. Steering gear ratio 12:1. Toe-out 0-1/8". No. of turns lock to lock - 3. Steering wheel 16¾" dia. Jupiter - straight rack and pinion. Rack: No. of teeth 20. Addendum 0.035". Dedendum 0.178". Normal arc tooth thickness 0.1875". Normal DP 11. Normal PA 17½°. Helix angle straight. Material EN 22 (3½% Ni). Pinion - No.of teeth 6. OD 0.918". Addendum 0.144". Dedendum 0.060". Normal arc tooth thickness 0.1875". Normal DP 11. Normal PA 17½° . Helix angle 30°, LH. Material EN 22 or 16. rack and pinion to gear at 0.870 centres. No. of turns lock to lock 2¾". R4 - Bishop Type 'T'. Ratio 13:1 (constant). No. of turns lock to lock 2½3-piece track rod.

Wheels and Tyres - Steel disc wheels (ventilated disc) ((ventilated disc)). Rims 3.00" x 16". L 3/8" inset. ((4"J x 15" rims l 3/8" inset)). 5 studs 3/8" dia, on 7 3/8"

PCD. ((6" PCD)) 5.25 x 16 Goodyear tyres) ((550 x 16 Goodyear tyres (5.90 x 15 Super cushion tyres)).

General Dimensions - Javelin Wheelbase 8'6". Front track 4'3". Rear track 4'l". Overall length 14'0". Front overhang 26½. Rear overhang 39½. Maximum width 5'l". Height unladen 5' 2½'. Front overhang angle 27°. Rear overhang angle 18°. Ground clearance under axle 8½. Sump laden 7½. Frame laden 9". Front seat width (elbow height) 4'3". Rear seat (elbow height) 4'0½. Front seat adjustment 4¾. Height front seat to roof 35½. Height rear seat to roof 34". Height floor to roof 47". Luggage compartment capacity 9¾cu.ft. Turning circle - left hand lock 33', right hand lock 34'.

Jupiter Wheelbase 7'9". Front track 4'4". Rear track 4'2½. Overall length l4'0". Maximum width 5'2". Height unladen 4'8". Ground clearance under axle 8". Turning circle 31'0". Width of front seat 44½. Height from front seat to hood 36".

R4. Wheelbase 7'0". Front track 4'4". Rear track 4'l". Overall length 13'3". Maximum width 5'2½. Height unladen 4'6". Ground clearance 7½under chassis, Turning circle 31'0".

Weights Javelin. Weight of car dry per c.c. engine capacity 1.45 lbs. Weight of car per BHP of engine. 41.3 lbs. Engine r.p.m. per 10 m.p.h. 630 r.p.m. Engine piston speed per 10 m.p.h. 371.1 ft/min. Litres per ton mile dry weight 3,000. Tractive efforts lb. per ton at max torque top gear 280. 3rd.gear 385, 2nd. gear 609 lst. gear 1,000. 15.4 m.p.h. in top at 1,000 r.p.m. 65.5 m.p.h. at 2,500 ft/min. piston speed. Piston area sq.in. per ton 20.5.

Jupiter. Weight of car dry per c.c. of engine capacity 1.28 lbs. Weight of car per BHP of engine 30.3 lb. Engine r.p.m. per 10 m.p.h. 589 r.p.m. Engine piston speed per 10 m.p.h. 347.5 ft/min. Litres per ton mile dry weight 2,500. Tractive effort lb. per ton at max. torque top gear 290, 3rd. gear 397, 2nd. gear 658, 1st. gear 1031. Piston area sq.ins. per ton 23.4. Gearing 16.9 m.p.h. in top a. l,000 r.p.m. 71.5 m.p.h. at 2,500 ft/min. piston speed.

R4. No performance figures issued. Optional extra equipment for R4 Laycock De Normanville overdrive. Detachable plastic coupe top. Aero screens. Turbo disc nave plates. Under shield radio divided tonneau cover. Heater, white walled tyres, bumper over riders, spare wheel cover, fish tail.

Jupiter Chassis Semi space frame of tubular welded construction using 3" dia. x 16 SWG

Construction	chrome molybdenum steel tubes for main side member's and 2" dia. x 18 SWG. Tubes, for struts and torsional stiffness members.

TO SYNCHRONISE THE CARBURETTORS - Ref. PA, PB maintenance manual P.13 and PC, PD and PE maintenance manual P.12

It is impossible to achieve an even tick-over with the Javelin, and Jupiter engines unless the following conditions are achieved.

a) Good compression on all four cylinders
b) There are no air leaks into the induction system
c) The valve stems and guides must have no excessive wear
d) The valves are seating correctly
e) The tappet clearances are adjusted correctly
f) The ignition timing is adjusted correctly
g) The distributor contact breaker points and the sparking plugs are in good order and gapped correctly
h) The carburettor throttle spindles are not excessively worn
i) The air vent filter felts are clean

If slow running is not satisfactory the carburettors are not the only components to be suspected.

Before attempting to synchronise the carburettors it is advisable to check the following items in the carburettor linkage.

i) the carburettor throttle spindles must be free moving and the butterflies must completely close in the choke tubes
ii) the throttle arm balls must be smooth and spherical without any deep indentations.
iii) the springs and plungers in the ends of the throttle rod must be free and well lubricated
iv) when the throttle rod is being adjusted for length the rod must be free to slide smoothly in its clamping device
v) the throttle cable and outer case must be in good condition and should preferably be of the nylon anti-friction type
vi) no part of the throttle rod assembly should touch the tappet cover plates securing bolts or the top of the cylinder blocks, as this will interfere with its free movement

The instructions in the PC, PD and PE maintenance manual for synchronising the carburettors can now be carried out. For those members with a PA or PB manual they are as follows.

1. Remove the throttle rod and return spring.
2. Release the locknut or bolt which secures the throttle cable in the throttle rod centre stud and withdraw the cable.
3. Release the throttle rod nut allowing the rod to be lengthened or shortened as required.
4. Turn out the throttle stop screws until the throttle arms are in the fully closed position.
5. Now holding the throttle arms securely in the closed position turn the

throttle stop screws until they just contact the arms and then turn a further full turn. This ensures that both throttle plates (butterflies) are open exactly the same amount.

6. Again ensuring that the throttle arms are resting on the stop screws (use a couple of strong elastic bands) carefully retighten the throttle rod nut thereby securing the throttle rod at its correct length.
7. Connect the throttle cable and throttle rod return spring and make sure that whilst no excessive slack exists in the cable it does allow the throttle arms to rest against the stop screws.
8. Screw in fully the air regulating screws without forcing, and loosen out two turns, which is the approximate slow running position.

9. Start the engine and allow to warm. If the engine speed is too slow turn the stop screws equally, in a clockwise direction until the desired speed is obtained. If the engine refuses to run for any length of time and gradually dies it indicates that the mixture is too weak. To enrich turn the air regulating screws inwards equally. If the engine tends to "hunt" (alternatively speeding up and slowing) the mixture is too rich, and the air regulator screws should be turned outwards equally.

The air regulating screws have no effect on the petrol-air mixture once the speed of the engine has risen to approximately l, 500 r.p.m. The design of the Zenith carburettor ensures that the correct mixture reaches the combustion chamber whilst the car is 'on the move'.

A fairly accurate but time consuming method of checking the fuel mixture at tick-over is to remove and thoroughly clean both front sparking plugs and then replace. Run the engine when it is thoroughly warmed up at tick-over speed for 5-10 minutes. Remove and inspect the two sparking plugs. They should be slightly blackened. If very black and sooty the mixture is too rich and if white or light brown the mixture is too weak. Adjust the air regulator screws as required, clean the plugs, screw them back into the cylinder heads and run the engine at tick-over for a further 5-10 minutes and recheck the appearance of the plug ends.

One of the most common causes of 'flat spots' on accelerating is the absence or cracking of the rubber ferrules between the air filter and the carburettor down pipes. These ferrules and the rubber bellows must be in good condition. If not, replace as the carburettors are designed to run with the air cleaner in operation.

Service Bulletin Item No.9 March 1950 - Air vent filter felt

If the tappet cover air vent filter felts are not cleaned or replaced at approximately l0.000 miles or more frequently if necessary there is a danger of them becoming blocked causing excessive crankcase depression.

With the air vents blocked this depression is likely to be so great that the operation of the petrol pump diaphragm is neutralised causing engine "fade out".

Maximum depression occurs at approximately 2,500 r.p.m. (40 m.p.h. - 64 k.p.h.) at which speed it should not exceed approximately ¾" (19 mm) lift using a mercury gauge or 10" (20.5 cm) using a water gauge.

A copper pipe sweated into a spare oil filler cap can conveniently be used when coupling the depression gauge to the crankcase.

Service Bulletin Item No.21 September 1950 - Air vent filter felt

Further to Item No. 9

Attention is again drawn to the possibility of engine "fade out" if the tappet cover air vent filter felts become blocked. It is most important that the filter vents are renewed at the recommended periods. In many cases of engine failure from reports being received it would appear that extensive tests are being carried out to the fuel and ignition systems without satisfactory and conclusive results.

It will be readily appreciated that the air vents control the entry of the air into the crankcase to replace that which is withdrawn through the breather valve, therefore if the felt vents are blocked the crankcase depression will increase and subsequently neutralise the operation of the petrol pump diaphragm. Maximum depression occurs at approximately 2,500 r.p.m. (40 m.p.h. - 64 k.p.h.) and when testing for this particular fault the car should be driven at LIGHT throttle openings at approximately the above speeds and not at high speeds as for other complaints, such as normal "Drying up' and "Pre-ignition".

Replacements are inexpensive and quickly fitted and it is therefore, suggested that the felts are replaced at all times when there is the slightest suspicion of restriction. It will be understood that cleaning the tappet covers or the complete engine unit will in most cases allow these felts to become blocked with dirt they should therefore, be replaced after cleaning operations.

For test purposes or in an emergency the engine may be run without the felts for a limited period.

Service Bulletin Item No. 51 May 1951 Engine fade out

Owing to the extreme climatic conditions experienced this winter we have discovered that certain complaints of misfiring and suspected ignition faults have, in actual fact been due to the carburettors freezing especially when operating under climatic conditions.

We therefore, strongly recommend the fitting of a radiator muff on all cars, which operate under these conditions, and would be grateful if you would advise Javelin owners accordingly.

Service Bulletin Item No. *72* October 1251 - Throttle rod assembly

From Javelin Engine No. El/PC.18550 and Jupiter Engine No. El/SA.270 a modified type of Throttle Rod Assembly has been introduced consisting of throttle rod long, throttle rod short and clamp bolt.

The throttle rod long, Part No.54421 and throttle rod short Part No.J54422 will fit all Javelin and Jupiter models, but the clamp bolt differs in design for the Right Hand Drive Jupiter. The clamp bolt part numbers are as follows: -
Clamp bolt - RHD & LHD Javelin & LHD Jupiter (Part No.J54419)
Clamp bolt - RHD Jupiter only (Part No. 1.53409)

The complete assemblies are fully interchangeable with the previous type throttle linkage on their respective models.

Service Bulletin Item No. 91 May 1952 - Petrol Pipe Assembly - Javelin only

From Engine No. E2/PD.21147 the petrol feed pipe from the petrol pump to the carburettors was modified to accommodate a petrol filter Part No. J54436 A.C. SPHINX for improved filtering of the petrol. The petrol filter is connected to the "T" piece connection on the petrol feed pipe between the carburettors and the intermediate petrol feed pipe from the petrol pump. With this modification the fuel strainer in the petrol tank was deleted. The new petrol pipe assembly is fully interchangeable with the previous type.

It is inadvisable to attempt to fit any other Zenith carburettor than that specified, as Zenith's have performed extensive tests and the carburettor giving the best overall economy and performance has been fitted. The correct numbers for the 30 VM 5 series of carburettors as fitted to the Javelin are C1334 and C1164. The only difference between these carburettors is that the C1334 has two screw holes at the back just under the choke butterfly for a choke cable-securing bracket. Check that the screws are in position otherwise the choke will not operate at its correct efficiency.

Further references - Jowetteer November 1968 P.108 Carbs. and coolers
March 1969 P.31 S.U. your Javelin.

THE AIR FILTER - (Javelin only) - Ref .PA and PB maintenance manual P.13 and PC, PD and PE maintenance manual P.16.

Air cleaning on the Javelin is achieved in two stages: large dust particles sire impinged on the surface of the oil and settle on the bottom of the bath while smaller particles are trapped in wire mesh which is constantly kept oiled by an oil mist which is drawn up from the surface of the oil bath.

Early Javelins had no oil bath but a felt filter. This should be periodically blown out with a compressed air line.

Service Bulletin Item No. 47 May 1951 - Air filter PA PB models

With effect from Engine NoEO/Pfl13950 the woodscrews that secure the air filter brackets to the air silencer base have been replaced by threaded screws and rivet nuts.

On cars prior to the above Engine Number where difficulty is experienced with the original filter mounting modified securing brackets may be fitted. This type of bracket (Part No.54237) is held firmly in position by four woodscrews set at right angles to each other as shown in Fig. 1

Service Bulletin Item No. 119 December 1952 - Air silencer box

From Javelin No. E2/PE.23320 a cut away has been added to the Air silencer box and the oil bath has been given a greater recess in order to give improved clearance for the Top Water Hose. Both the modified Air Silencer Box and the Oil Bath are interchangeable with the previous type.

DISTRIBUTOR - Ref. PA and PE maintenance manual P. 81 and PC, PD and PE maintenance manual P.17.

Removing the distributor and turning the rotor arm in an anti-clockwise direction can quickly check the operation of the centrifugal advance weights. Resistance from the weight springs should be felt and when released the shaft and rotor arm should quickly return to their original position.

The operation of the vacuum unit on the DM2 type distributor can be checked by turning the contact breaker top plate assembly in a clockwise direction and then releasing whilst you put your ear over the top end of the offside carburettor to air cleaner tube, A sharp hiss of air should be heard each time the top plate is turned. A more accurate method is to disconnect the vacuum pipe from the vacuum unit and perform the following check. Turn the contact breaker top plate assembly in a clockwise direction and press your finger over the hole in the end of the vacuum unit. Release the top plate and count to ten. It should not move. If the top plate returns even with your finger over the vacuum unit hole then the vacuum unit is faulty and should be replaced.

The early DKY/H4A distributor has a vacuum advance system that can be seen to move the whole distributor as the speed of the engine rises.

On the DM2 distributor, if you have ignition problems due to water entering the distributor cap, a Mini rubber waterproof cap cover should be used. This type of cover completely encloses the cap and distributor body.

After many years of service it may be found that the rotor arm is a loose fit on the shaft. If so it should be replaced.

Service Bulletin Item No. 89 March 1952 - Distributor type DM2

From approximately Javelin Engine No. PD 21016 and Jupiter Engine No. SA 717 the Distributor, type DKY H4A Part No. 50773 is replaced by the DM2 type Part No. J54516, which embodies a micrometer adjustment unit. The mounting flange on the timing cover is modified to suit the new type distributor securing plate and the timing cover part number changed to 54662. The DM2 Distributor may be fitted to the old type timing cover by increasing the width of the elongated hole in the securing plate as shown in Fig.2.a, and the old type distributor (DKY H4A) to the new type timing cover by removing the forward lug of the timing cover mounting flange and fitting a distributor locating bracket Part No.54661 to the rear lug of the timing cover mounting flange as shown in Fig.2.

NOTE: The point gap setting for the DM2 is .014" to .016". (.3556 - .4064 mm) and not .010" - .012" (.254 - .3048 mm) as for the DKY H4A. When timing the ignition it should be set at T.D.C. with the micrometer adjustment setting in a central position so that final adjustment may be carried out on road test. The distributor body is stamped to indicate the direction in which the micrometer adjustment should be turned when advancing or retarding.

Service Bulletin Item No. l7 November 1953 - DM2 Distributor

When the DM2 type distributor is fitted to an engine it is pointed out that the off set keyway in the oil pump drive spindle should be in the position shown in Fig. 33, with No.1 piston on T.D.C. firing stroke.

The position of the off set keyway with No.1 piston on T.D.C. firing stroke shown Fig. 31 Page 30 of the Javelin and Jupiter Maintenance Manual shows the position when the *DKY* H4A type Distributor only is to be fitted.

Further References - Jowetteer Jan.1970 P.10 extract from letter by Col.A.Hicks:-

It may help other members to know that Lucas can provide a 'B90 exchange" Distributor of the latest "25D4" type (instead of the old DM2) to fit the Javelin. The Lucas Part No. is 40795.

SPARKING PLUGS - Ref. PA. and PB maintenance manual P.43 and PC_9 PD and PE maintenance manual P.20.

If "water on the plugs" is a problem with your Javelin and Jupiter, A cure is to fit Lodge

or Champion rubber waterproof sparking plug covers. After a period of use, which can be three months or one year dependent on each engine, the rubber begins to crack due to the rapid changes in the operating temperature. These covers should therefore be inspected regularly and replaced immediately that cracking appears.

Top plates with the special plug caps and neoprene sealing rings have proved to be very reliable on some engines and unreliable on others. The problem with the top plates is that if the seal is broken under the plate it is difficult to remove the top plates to reseal them as they are secured in position by drive screws, which are extremely difficult to remove. When a decoke becomes necessary the opportunity may be taken if required to tap and screw the top plates into position with 6 B.A. brass screws. It is then possible to remove the top plates as necessary to reseal them.

The addition of large rubber flaps hanging inside the wing over the tappet covers has proved to be successful in preventing water being splashed up by the front wheels into the spark plug cavities.

Service Bulletin Item No. 55 July 1951 - Fitting of sparking plug shroud PC models

To eliminate any risk of water entering between the cylinder head face and the cylinder head top cover, an additional top cover drive screws Part No. 52140 has been incorporated at the front and rear of the top cover. It is not necessary to carry out this modification on cylinder heads, which do not embody the additional rivet holes, but in the cases where the cylinder head top cover has been removed a liberal coating of gasket cement should be applied between the shroud and cylinder head face when refitting.

Service Bulletin Item No. 81 March l952 - Waterproof plug lead connections

From Javelin Engine No. El/PD.19760 and Jupiter Engine No. El/SA.520 a rubber cover part No. J54431 and five plug lead grommets part No.J54432 were fitted to the distributor and a rubber sleeve part No.J54424 was fitted to each spark plug cover to prevent the ingress of water at the plug lead locations in the distributor cap and spark plug covers. The above items may be fitted to all models prior to the above engine numbers if required.

Service Bulletin Item No. 126 March 1953 - Improved sparking plug cover

From Javelin Engine No. E2/PE.24036 with the addition of the following engine numbers, E2/PE. 24025 and 24026 and the exception of engine No. E2/PE.24097 an improved type of sparking plug cover has been introduced. The cylinder head top cover has been deleted and the plastic sparking plug cover is replaced by a Lodge type rubber cover, together with a synthetic rubber sealing disc. The Lodge type rubber plug cover is a push pull fit on the sparking plug and the sealing disc is pushed down into the plug cavity by the pressure of the plug cover.

Existing plug protection arrangements may be converted to this new type by removing the cylinder head top covers and fitting the new type sparking plug covers to the H.T. leads.

Service Bulletin Item No.132 March 1953 - Sparking Plug threads

Where cases of "running on" are encountered and all standard methods of eliminating this fault are ineffective, the cause is probably due to uncovered sparking plug cavity threads becoming red-hot. These threads have now been modified to the condition shown in Fig.3 to eliminate any exposed threads.

When this point is encountered on existing heads the following action should be taken. Screw in an old Sparking Plug of the correct type, that is Champion L10 for Javelin and Ll0S for Jupiter then using a small grindstone on a flexible drive, remove the threads which remain exposed to view. The aim should be to get as near to the dimensions shown in Fig. 3 as possible.

Further References – Jowetteer October 1968 Water on the plugs
February 1971 Plugging up the trouble.

IGNITION TIMING - Ref PA and PA maintenance manual P. 39 and PC, PD and PE Maintenance Manual P.20.

After re-setting the ignition timing or replacing the contact breaker points it is advisable to run the engine for 5 minutes and then recheck, and readjust if necessary, the ignition timing.

ENGINE REMOVAL - Ref. PA and PB maintenance manual P.13.

If the PA PB maintenance manual is referred to when removing the engine from Javelins after El/PD.20135, the gear change stay must also be disconnected. This stay was not fitted to early models and it is therefore, omitted from the early manual. The stay runs from the base of the gear change column to the top of the bell housing from where it can best be disconnected through the toe board inspection cover. The earthing lead from the chassis to one of the starter motor bolts must also be detached at the starter and to avoid disturbance of the spring arm bolt, which must remain dead tight.

On some early PA and PB models the rear mounting housing may foul the hydraulic brake cross pipe just in front of the chassis cross member. It may be sufficient to disconnect the 'T' piece from its mounting bracket without interfering with the pipe lines which will allow the pipe to be eased over the rear mounting housing as the engine is withdrawn. The next stage is to dismantle the four housing bolts carefully checking the numbers of spacing washers removed with each. This avoids the need to bleed the brakes, but refer to section on

engine vibrations for correct reassembly of the rear mounting.

CYLINDER HEADS AND VALVES - Ref. PA and PB maintenance manual P.14 and 38 and PC, PD and PE maintenance manual P.22

When removing cylinder heads, which are reluctant to move, check the following: -

1. Stud No.4 is sealed with a rubber seal under the washer, which is countersunk into the head, this seal can seize around the stud and should be cut out before attempting to remove the head.

2 The lead string or solder strip used to seal the 4 top head studs can cause the head to stick - cut this lead off with a knife. If this does not allow the head to be removed, easily, the head should be hit smartly from the front and rear using a heavy hammer and a block of wood to prevent damage to the casting. This may help to break the rust, which is holding the studs tight to the head. If this still does not allow the studs to be removed the only way is to very carefully use a screwdriver - long bladed - at each top corner where the head meets the block and gently tap these in to break the seal between studs and head. Once the head has moved use the exhaust manifold and carburettor studs to "rock" the head off the studs.

For details of a new method of sealing the cylinder liners in position see 'to refit cylinder liners'.

It has been found in the past that water sometimes seeps along the cylinder head studs and into the rocker covers. This water then drains down into the sump where it has a harmful effect on the engine bearings. To prevent this happening it is necessary to coil approximately 2" of thin solder strip around each cylinder head stud under the cylinder head nut washers. When the nuts are tightened down the solder is compressed tightly between the stud, head and washer preventing any loss of water.

Before refitting a cylinder head it is advisable to check very carefully for any cracking, which may become worse and cause the engine to fail. A common fault on Javelin and Jupiter heads is for them to crack between the inlet and exhaust ports. It is very difficult to detect these cracks unless the area between the parts is carefully polished. A slightly cracked head will give continued use for a time but a small loss of water may be evident as the extremely high combustion temperatures can cause the cracks to open up.

It is better to replace the head if a good one is available. Particular attention should be paid to exhaust valve seats when overhauling cylinder heads. Normally, inlet valves and seats do not wear or burn and can be 'dressed up" and reground. Unfortunately, this is not true of the exhaust valves and seats and after re-cutting, it is not unusual for a new valve to grind in below the level of the general head metal. This will cause poor exhaust "breathing" unless the metal exhaust seat is radiused making sure that the seat is not marked in the process. A 30° (inlet) valve seat cutter can be used for this. The edges being smoothed out

by hand with fine emery.

The opportunity to replace core plugs at each decoke should be taken.

It is a fairly frequent occurrence to the sparking plug recesses to fill with oil. To eliminate this it is necessary to seal both ends of the push rod tubes in the cylinder head by applying sealing compound. This is best performed when a decoking operation is being performed.

Some members do not appear to realise that the small rubber washers which are part of the decoke gasket set are to be inserted in the recess around stud hole No.4. When the steel washer and nut are tightened down the rubber washer is compressed tightly around the No 4 stud preventing any loss of water.

Due to wear on the valve ends of the rockers it is difficult to obtain correct rocker clearances. The valve ends of all the rockers should be round to the original radius and polished with fine emery.

Brass nuts should always be used on the manifolds, as they will not corrode in position.

Service Bulletin Item No. 75 October 1951 - Support tube

From Engine No. Javelin El/PC.17900 and Engine No. Jupiter EI/SA.270, the cylinder block distance tube Part No.52143 has been replaced by a cylinder head gasket centre support tube Part No.J54395 and cylinder block distance washer, Part No.J5436. Care must he taken when fitting the new type support tube that its top face is perfectly level with the top face of the cylinder liners, thereby giving additional support to the cylinder head gasket and cylinder head when in position. The height of the support face can be adjusted by fitting brass shim washers below the support tube, or by filing the cylinder block distance washer fitted below the liner locating plate.

Service Bulletin Item No. 90 May 1952 - Engine internal water leaks and gasket failure.

From reports we have received it would appear that the information as detailed in the maintenance manual is not receiving sufficient attention. We therefore, cannot over emphasize that when a vehicle is in your Service Department for repair which necessitates cylinder head removal, the following action is taken:

1. Clamp the cylinder liners firmly in position with the use of a tube or a number of flat washers over the locating plate tube, Part No. 52143 and tightening down with a cylinder head nut to avo id liner movement when the engine is turned.

2. The Cylinder liner top flange must at all times project from the face of the crankcase between .008” (.2032 mm) and .010” (.254 mm) to ensure that a satisfactory seal is obtained between the cylinder head gasket the cylinder head and the cylinder liner.

This distance must at all times be checked and where necessary the liner height adjusted with the use of copper shim inserted between the cylinder liner and the cylinder liner sealing washer Part no.50643. New sealing washers should at all times be fitted when the seal has been disturbed.

3. The cylinder head gasket centre support tube should be fitted as detailed in Item No. 75.

4. We would also draw your attention to the fact that Javelin and Jupiter cylinder head gaskets are NOT interchangeable, and emphasize the importance of using the correct type of replacement detailed below:

Jupiter

Cylinder Head Gaskets		Part No. 1.53691
Cylinder Head Studs	Long	EN 16 Steel. Part No. 50637
Cylinder Head Studs	Centre	EN 16 Steel. Part No. 52110
Cylinder Head Studs	Short	EN 16 Steel. Part No. 50636

Javelin

Cylinder Head Gaskets		Part No. 50738
Cylinder Head Studs	Long	EN 16 Steel. Part No. 50637
Cylinder Head Studs	Centre	EN 16 Steel. Part No. 52110
Cylinder Head Studs	Short	EN 16 Steel. Part No. 50636

The torque wrench setting on both cars is 500. in/lbs. (42 ft. lbs).

Service Bulletin Item No: 113 December 1952 - Cylinder head gasket support

From Javelin Engine No E2/PD.23184 and Jupiter Engine No.E2/SC.948 an improved Cylinder Head Gasket support has been fitted. This support is of cast aluminium and a pre-determined length. No adjustment is necessary to ensure the correct protrusion above the Crankcase Face, i.e. .008" to .012" (.203 - .304 mm). When fitting the modified support it is necessary to remove the centre Cylinder Head Stud to allow the support to clear the Cylinder Liner Flange.

Service Bulletin Item No. 131 March 1953 - Tappet adjustment - solid type

To clarify the instructions on tappet adjustment the following notes are issued. It is extremely important in view of the fine adjustment required that:

1. With the engine COLD the inlet clearance is set to .003" (.076 mm) and the exhaust to .006" (.152 mm) these dimensions being measured between the end of the valve stem and the rocker.

2. Ensure that the tappet being adjusted is riding on the base circle of the cam and NOT

on the initial portion of the cam-quietening ramp.

These are two methods of obtaining the above conditions:

a) Adjustment should be made to tappets according to the table shown below:

Setting Position of Engine		Valve to be adjusted
No.1. Exhaust	valve fully open	No.2. Exhaust
No.1. Inlet		No.2. Inlet.
No.3. Inlet		No.4. Inlet
No.3. Exhaust		No.4. Exhaust
No.2. Exhaust		No.1. Exhaust
No.2. Inlet		No.1. Inlet
No.4. Inlet		No.3. Inlet
No.4. Exhaust		No.3. Exhaust

See chassis number plate on bulkhead to identify cylinder numbers.

b) The alternative is to deal with each valve individually. Obtain the fully open position of the valve, and then turn the engine through one complete revolution; this will bring the valve in question to the fully closed position with the tappet on the base circles direct opposite the peak of the cam.

Service Bulletin Item No. 137 May 1953 - Cylinder head studs

In order to reduce the possibility of the crankcase being damaged when cylinder head studs are being fitted the following modification was introduced at the under mentioned engine or crankcase numbers: - Engine Nos.E3/PE.24111 - 24113 to 24128 incl. 24136 - 24137.

Crankcase Nos. 25475-25479-25486-25579-25624-25632-25749-25888-25894-25898-25904-25911-25916-25918-25955-25982-25989-25998-26004-26007-26011-26017-26039-26049-26060-26063-26072-26087-26088-26120-26129-26436-26496 and onwards.

The modified crankcases may be identified by the small holes drilled in the underside of the block at each corner; these run into the cylinder head stud holes and act as release holes,

The crankcase also incorporated a deeper counter bore for the long cylinder head studs. In consequence these studs have been increased in lengthy the previous stud, Part No.0637 being 4 9/16" (115.89 mm) long and the modified stud, Part No.54768 being 4" (120.65 mm) long.

Service Bulletin Item No. 156 August 1953 - Introduction of Jupiter cylinder head on Javelin engines.

From engine crankcase number 26526 the Jupiter cylinder head was introduced as standard

on the Javelin engine.

Previous Javelin engines maybe fitted with this cylinder head provided the water transfer and push rods are changed to the Jupiter type.

Service Bulletin Item No. 163 November 1953 - Engine overheating and pinking

Cases have occurred where engine overheating and pinking has been caused by a restriction between the outer wall of the cylinder head and the cylinder head stud hole casting shown in Fig. 36.

In cases of this nature an adequate water flow between these two points can be insured by inserting a Woodruff cutter as shown in Fig.36 through cylinder head water port Fig.36 and milling a ¼" (6.330 mm) passage between the cylinder head out wall and stud hole casting.

Further references - Extract from Ben Shaw's article 'Getting the best from your heads' which appears in the July 1966 Jowetteer P.54.

After cleaning, shaping and polishing it is necessary to measure the head capacities. Apply a slight smear of grease to the valve seats and the cylinder head face A glass plate is then pressed firmly down over the combustion chambers and thin oil is then poured in via a small hole drilled in the plate to completely fill the chamber. I use a 50 cc burette and measurements can be made (and repeated) to one-drop accuracy.

It is quite common to find the variation between the chambers on the same head and in order to compensate for this the face must be tapered off.

This is determined on the basis of a .022" taper per 1cc difference and would decrease the chambers by .5cc and 1.5cc and this must be remembered when calculating the total cut. Let us take an example: - Two cylinder heads were measured – No 1 cylinder = 47.5 c.c. - No. 3 = 46.5 c.c. - No. 2 & 4 = 46.5 c.c. The N/S head was ground on a taper .077" front .055" rear. The 0/S head had a flat .008" removed.

The measured capacities were each 41cc within readable limits.

It is interesting to note these heads were from a so-called 'Jupitorised" engine, the owner being under the impression that the CR was 8:1. In point of fact it was 7.35:1 and he could have obtained the same increase in C/R by grinding the heads to a standard 41 c.c. - a much cheaper proposition than a set of Jupiter pistons - so a nod to the wise - check your combustion chamber capacities before you hanker after H.C. pistons.

The capacity of the piston crown is Javelin l0.5 c.c. Jupiter 5.2 c.c.
The capacity of a standard gasket is 7.5 c.c. Jupiter gasket 4.8 c.c.

VALVE TIMING - Ref. PA, PB Maintenance manual P.15 and PC. PD and PE Maintenance manual P.23.

Service Bulletin Item No. 34 November 1950 - Valve timing

For setting the valve timing, arrowheads will continue to be marked on both the crankshaft and the camshaft sprockets and are set facing each other as on previous models of the Javelin engine.

The method of checking the valve timing varies only in detail from that outlined in the Manual on pages 39-40. Reference to this section and the illustration will be helpful. For your further information amended details are outlined overleaf: -

1. Rotate the engine until the inlet valve on No.2 Cylinder is at the top of its lift.
2. Adjust the valve clearance of No.1 inlet valve to zero.
3. Locate accurately T.D.C. on cylinders 1 and 2 and mark the crankshaft pulley in this position using a pointer attached to a suitable bolt on the timing cover (see Manua1 Fig.27).
4. Rotate the engine in the direction of rotation until the crankshaft is within 30 to 40 degrees before T.D.C. on cylinders 1 and 2 and approaching the firing point on cylinder 2.
5. Mount a dial indicator on the rocker assembly operating on the inlet valve of No.1 cylinder as described in the Manual and then rotate the engine until a push rod lift of .014" (.385 mm) -.016" (.406 mm) is indicated.
6. Now measure the distance around the periphery of the pulley from the pointer to the T.D.C. mark on the pulley. If the valve timing is correctly set at 12° before T.D.C. this dimension will be ½ (12.7 mm) but up to 1/8" (3.l75 mm) tolerance either early or late, can be allowed. This tolerance represents a maximum variation in valve timing of plus or minus 3°.
7. Remove the dial indicator before rotating the engine further to re-adjust the valves.

NOTE: The keyway in the crankshaft sprocket is slightly offset in relation to the teeth and some adjustment to the valve timing is possible by reversing it on the crankshaft.

CONNECTING ROD AND BIG END BEARINGS - Ref. PA and PB Maintenance manual P.15 and P.35. PC, PD and PD. Maintenance manual P.25.

Reference to the service bulletins below will show that a sludge release hole was made through the big end bearing shell and into the connecting rod cap. This hole was deleted shortly afterward as oil pressure 'hammer' developed. Connecting rod bearing shells without the bole may be fitted to con rod caps with the cavity. Bearing shells with the hole may be used on both types of con rod cops but slight 'hammer' may result.

Again reference to the service bulletins below will show that from Javelin E2/PD.22451 and Jupiter E2/SA.938 the big end bearing shells and con rod cap had 1/8" wide lock notches. Previously they were ¼" wide. When big end bearings are ordered the size of lock notch must be stated. Engine numbers cannot be relied on because the con rods are sometimes changed during an engine rebuild and a later or earlier set of con rods may be fitted.

Big end bearing are available in undersizes down to -0.060" The suffix after the part number on the rear of the bearing shells indicates the size. No suffix indicates a standard size.

New 'Unbrako' cap head Allen bolts and star washers should be used to secure the con rod caps if possible. The continuous strain exerted on the existing bolts can cause them to fail with disastrous results.

Due to extremely high mileages, bad assembly etc. the big end eye may be distorted and the dimensions should be checked. If excessive ovality is found, say more than 0.002" the con rods should be discarded. This check is to be carried out with the con rod bolts torqued to 42 lbs/ft.

Early con rods were stepped across the mating faces and later ones were serrated across the faces. This modification was carried out to reduce distortion under running loads. Serrated face con rods should be used provided the dimensions are correct.

It is not unusual to find that late factory re-conditioned engines were fitted with early rods - probably to use up old stocks.

Service Bulletin No.28 September 1950 Connecting rods - PB models

From Engine No. EO/PB.l0506 a new type connecting rod (Part Mo. 54024) has been incorporated in the Javelin engine.

It should be noted that the mating faces of the connecting rod cap are serrated to ensure a more accurate reassembly of these parts after dismantling.

When fitting the new type connecting rod to engines previous to No. E0/PB.l0506 or when replacing cylinder liners in engines fitted with the new type connecting rods it is most IMPORTANT to check the clearance between the connecting rod and the skirt of the cylinder liner. The liner cut out may be modified, if necessary as detailed in Fig.4.

Service Bulletin Item No.36 February 1951 LH. Crankcase – con rod clearance

Further to Item No.28

With the introduction of the new type connecting rod (Part No. 54024) which is slightly larger in outside diameter then the type previously used (Part No.50650) a flat has been machined on the crankcase boss situated at the rear of number 3 cylinder base inside the left head crankcase. This is to ensure that there is sufficient clearance between the crankcase boss and number 4 connecting rod bolts.
When fitting the new type connecting rods (Part. No.54024) to vehicles prior to engine No.E1/PB.l0506 it is MOST IMPORTANT to ensure that there is adequate clearance between the crankcase boss and number 4 connecting rod bolt. Should any doubt exist, a flat may be filed on the crankcase boss to provide clearance. After carrying out this modification great care should be taken to remove all traces of filings etc., from inside the crankcase.

Service Bulletin Item No.53 July 1951 - Sludge release hole - PC models

THIS MODIFICATION IS FOR REFERENCE ONLY AND IS NOT RECOMMENDED – SEE ITEMS 92 and 105 BELOW.

From investigations we have recently carried out, we consider it desirable to incorporate a Sludge Release Hole in the connecting rod cap and bearing. This modification has been incorporated from Engine No.El/PC.17402 and takes the form of a 1/16" (1.5873 mm.) hole drilled 30° off centre of the connecting rod cap.

The connecting rod bearing (Part No.52574) has also been drilled ¼" Dia. (0.350 mm.) to correspond with the connecting rod drilling.

Arrangements are being made for all service replacement connecting rods, (Part No.54024) and connecting rod bearing shells (Part No.52574) supplied from our Spares Department to incorporate the Sludge Release Hole.

Service Bulletin Item No.92 May 1952 -Sludge release hole

Further to item No.53

From further investigations recently carried out, it has been decided to delete the 1/16" (1.5873mm) hole from the connecting rod cap to prevent pressure "HAMMER" in the oil system. The drillings in the connecting rod bearing shells (Part No.52574) are retained as previously stated and the corresponding countersunk recess in the inner side of the connecting rod cap is incorporated to receive any foreign matter which may have reached the connecting rod bearing. This modification was introduced from Javelin Engine No. E2/PD.20977 and Jupiter Engine No.E2/SA.692.

Service Bulletin Item No.105 September 1952 - Connecting rods and bearings

At Javelin Engine No.E2/PE.22451 and Jupiter Engine No.E2/SA.938 with the following

additions:-

Javelin E2/PE.22444, 22447, 22449,
Jupiter E2/SA 820, 821, 822, 824, 825, 826, 829, 830, 832, 834, 835, 836, 837,

the connecting rod bearings (Part No.J54588) drilled and (Part No.J54589) plain, have been replaced by two plain Vandervell bearing shells Part No. J54710 which incorporate a 1/8" (3.175 m.m.) lock notch. The lock notches in the connecting rod have been reduced in width accordingly and the drilled recess in the connecting rod cap has been discontinued. This modification obviates any tendency of the lock notch to run in line with the oil feed holes in the crankshaft, which may result in a "FLUTTER" in the oil System. The late type connecting rod (Part No.54727) and bearings together, are fully interchangeable with the previous type connecting rod (Part No. J54591) and bearings.

Further references - Jowetteer November 1966 P119 "Bearings" by T.I.O

Bearings, main, and bearings, big end, are both of special interest to the Jowetteer. Aluminium white metal and indium plated lead bronze are used. The Javelin was introduced with white metal bearings all through but after the first 4,000 cars had been put on the road they introduced lead bronze big ends and front and centre main bearings. The rear main stayed white metal to the end. Cars like the XK 150 had white metal mains so why all the fuss?

The answer lies in the factors that govern bearing wear and endurance. The limiting conditions of a bearing are expressed as a bearing load factor, which is the product of the pressure on the bearing and the rubbing velocity. Note that the diameter of a bearing does not increase the safety limit of the bearing as it increases the rubbing velocity, the only way to do this is by widening the bearing but crankshaft design will not allow too much of this. The bearing load factor of lead bronze is some 30° higher than white metal.

White metal is a most traditional mixture formerly called Babbitt metal and consists of roughly 85% tin, 10% antimony and 5% copper. I can just about recall the days when the amateur mechanic could re-metal his own connecting rods - often unsuccessfully - by casting a roughish white metal lining on the connecting rod and carefully scraping it to size with an engineers scraper. The modern engines including the Javelin, uses steel backed shells stamped out of bi-metal sheets with something up to 0.020" of white metal for a bearing surface. These are simply made to fit and cannot be scraped of course.

The most important overall characteristic of a bearing metal is that it is formed from an alloy, which has a coarse crystal structure of hard crystals in a bed of soft crystals. This gives the metal resistance to wear as this is carried on the high spots of harder crystals and it also allows the bearing to retain oil in the worn-out recesses of the softer metal.

Hard driving conditions alone could have called for lead bronze bearings on the Javelin

but there are other factors affecting wear. Oil cooling is one since it is oil, which mainly gets away the considerable heat generated by bearings. Crankshaft and crankcase stiffness are also stray factors in influencing wear. Only experience can tell just what the practical limits are. However the lead bronze bearings (also steel backed shells) are made from a 2 to 1 copper/lead mixture, plus other small quantities of metal. These bearings are more difficult to manufacture since lead and copper do not alloy and have to be mechanically mixed - rather like an oil/water suspension. In this bearing the lead wears away to form the oil pockets of course.

Unlike Babbitt metal, lead bronze has two snags for most of us. Firstly it is a rather hard metal and tends to wear away the crankshaft. Hence it is necessary to harden the crankshaft journals. Secondly, lead bronze is attacked by oxidation products in the oil, so oil changes are to be stepped up (and keep your eyes off sales blurb about long life). This is tackled by plating the bearing with 0.001" of indium. But if you are going to keep your indium, watch your breather felts, air filter, oil filter and do not fill up the sump with a dusty bin. It is hard to keep in mind the direct importance of the air filter to the condition of your mains but that's what it is for.

Quite wrongly in my opinion many oval web shafts have been reground not to say put onto the market new without hardening. Under these circumstances the lead bronze bearings do appear to play havoc and in many cases 8000 miles has been the life of the shaft. Under these circumstances there may be a good deal to be said of trying white metal bearings and especially with an oil cooler to cope with the long distance runs.

PISTONS AND RINGS - Ref. PA and PB maintenance manual P35 and PC PD and PE maintenance manual P25.

Oil control rings fitted should have a 1/32" chamfer which is fitted nearest to the top of the piston. Early oil control rings did not have this chamfer; this modification was introduced to reduce oil consumption and rings, which are not chamfered, should be modified before fitting.

Pistons were produced in over sizes up to 0.060".

Service Bulletin No.15 April 1930 - cylinder liners and pistons

From Engine No.EO/PB.8345 a new type cylinder liner (Part No.54019) has been fitted. This liner can be identified by the fact that the flange, which locates with the crankcase, is larger than the original type. A new type piston (Part No.50656 BG) and second compression ring (Part No. 54021) have also been introduced for use with this liner. The piston has the letters B.G. stamped on the crown and the second compression ring has an internal step, which should be fitted as shown in Fig.5.

As a result of these changes the length of the locating plate distance tube, which fits on

the centre cylinder head stud, has been reduced by 1/16" (1.587 mm.) to 2 7/32" (56.355 mm). Should the shorter distance tube be used with the old type cylinder liners, a 1/16" (1.587 mm) washer should be fitted between the tube and the locating plate to ensure the tube is nipped by the cylinder head. Liners and pistons are fully interchangeable.

Further references - Jowetteer October 1968 P93 Converting to V.W. pistons by E.S. Wolf of the Australian J.C.C.
Jowetteer January 1970 P8 Converting to.V.W.pistons by 'Nobby' Saggers.

CYLINDER BLOCK - Ref. PA, PB Maintenance manual P.34 and PC, PD and PE maintenance manual P.26.

For details of modifications to cylinder blocks to improve lubrication see service bulletin No.103 in the lubrication section.

Before rebuilding an engine it is essential to check very carefully for any cracks. The following areas should be carefully checked:

1. Along the underside of the block near to the sump stud rim (about 1" out).
2. Inside the push rod chamber over No.4 cylinder.
3. Under the water inlets running downward at the rear of the block.
4. Along the top front edges of the block between the water transfers and timing housing.
5. Vertically from the sump between the petrol pump flange and front of No. 2 cylinder (right angle caused by machining the p. pump. flange)
6. Internally round the top four stud housings for the cylinder head studs on each block.
7. Corrosion along the bottom of the blocks under the liners inside water jacket. This is sometimes very severe when the incorrect anti-freeze has been used.

Anti-freezes for aluminium only are not suitable in the Javelin and Jupiter engines as the cylinder heads are cast iron and there is a detrimental chemical action, which occurs. An anti-freeze, which states clearly that it, is for use in a cast iron and aluminium engine is suitable. Various anti-corrosive additives are available which appear to prevent severe inner corrosion. These should be used if you wish to prolong the life of your cylinder blocks.

Later crankcases starting at crankcase No. 21,000 approximately had grooves machined in the main bearing housings to allow oil to feed the bearing from two points instead of one. Some earlier crankcases were modified in this way and this type of crankcase is preferable to the earlier type due to better oil feed and better heat dissipation from the bearings. Stiffening webs also added to the later crankcases and can be clearly dismantled.

Service Bulletin Item No.138 May 1953 - Method of identifying series III crankcases

On the earlier Series III engines the crankcase was identified by the letters "PE" stamped on the front left hand portion of the crankcase, between the crankcase number and the engine number, as described in Bulletin Item No.107. Later this method was changed to the stamping or casting of a "3" on the crankcase adjacent to the front timing case rear cover as illustrated in Fig.6.

Further references - Jowetteer September 1968 P.86 Points about Javelin crankcases by Harry Brierley.

There are three basic crankcase castings, which appear, and these are as follows: -

1. A very early crankcase similar in detail to the drawings in the various parts lists. It is a definitely heavier casting and the most noticeable difference is a flange formed above the sump rim.
2. The most common die cast crankcase.
3. The series 3 crankcase which has radial webs around the mains and is stamped 3 on the shoulder above the petrol pump and PE above the engine number.

There are other differences too which arise in all forms of crankcase since many reconditioned engines had crankcases modified to bring them up to series 3 standards, These modifications included machining an oil way in the main bearing seatings and opening up the oil duct from the oil pump delivery pipe to the later type of oil filter housing. Moreover some Phase I and II engines had their crankcases replaced by new crankcases of series 3 types but without any outward marks of 3 or PE but simply the copy of the previous engine numbers.

The crankcases were always made in pairs particularly as far as the machining of the main bearing housings are concerned. Curiously enough the drilling of the main bearing housings was not absolutely identical in all crankcases and in fact the centre line of the crankshaft can move from side to side and up and down with reference to the crankcase. Naturally this means that the likelihood of two random crankcases matching is remote and they will probably differ to a degree, which makes it impossible to put them together. The error in drilling the main bearing housings slightly to the left or right of centre is decidedly worrying when it is encountered since it is obvious that one bearing protrudes above the face of the crankcase in which it is located and, of course the matching half looks to be too small for the housing.

A more obscure difficulty is related to this problem of one off boring of crankcases. Whilst it is often assumed that any bell housing will fit any crankcase, this is not exactly so. The recess on the bell housing which takes the gearbox clutch shaft cover is also machined to match the crankcase - at least it should be according to the original Jowett Cars manufacture. That is to say it was centered on the position of the main bearing housings in the crankcase with which it should have been used. Thus it is just possible

that the wrong bell housing would put the clutch plate far enough out of centre and alignment to cause trouble with excessive wear, judder etc. Fortunately I have never heard of trouble being traced to this point but it is certainly a possibility.
Another difference less commonly observed in crankcases is that of the oil feed holes to the tappets. 0n the original hydraulic tappet crankcases the oil galleries were drilled so as to break into the tappet bores and thus there would be large oil supply holes, which varied quite an amount in size. Usually they are between ¼" and 3/8" diameter. When solid tappets were introduced these large oil feed holes became an obvious source of oil pressure loss and of course, the solid tappets required only a relatively small feed of oil for lubrication. Therefore, on series 3 crankcases and some other later crankcases, the oil galleries were drilled above the tappet bores and do not intersect them. The oil feed is by a hole about 1/16" diameter drilled obliquely into the gallery, drilling from the inside of the crankcase through the mouth of the tappet bore. This means that the oil feed hole is insufficiently large to operate hydraulic tappets properly and in any case is not correctly situated. It also means that low oil pressure at tick over with solid tappets on an otherwise good engine can be related to the oil loss from hydraulic type oil feed holes in the tappet bore. A further complication worthy of mention is that some series 3 crankcases are certainly made for hydraulic tappets and the only way to find out is to take out a tappet and feel with your little finger.

Jowetteer April 1971 P.54 Engine rebuilding by Ian Dearie.

First requirement is a crankcase, which has grooves, machined in the centre of main bearing housings. This gives a better oil feed to the bearings and therefore, longer life. The later type crankcase with re-enforcing ribs to the bearings is normally thus machined - crankcase numbers from about 21, 000 or crankcases with numbers starting with G.... check for cracks on the underside and look for dodgy threads in the top of the block which take the rear timing cover holding down bolts. Check also for cracks running down from the cylinder head studs on the topside of the blocks as the metal is very thin around this point. Cracks here will possibly result in the stud pulling out just, as you are finally tightening the head down. Look for damage on the centre joint faces of the two -crankcase halves. Indiscriminate use of the screwdrivers when splitting the crankcase particularly in this area of the rear cams haft bearing will give you a very annoying oil leak in this area which will be almost impossible to cure. If everything is it should be, then the crankcase halves can be thoroughly cleaned, oil ways washed through with petrol not forgetting that some of the oil ways go across the crankcase bolts and grit etc. can be left there.

Jowetteer February 1971 P. *37* Positive crankcase ventilation.
Jowetteer March l966 P. 13 Fitting a semi external balance pipe
Jowetteer May 1973 P.57 Crankcases by T.I.O.

TO REMOVE CYLINDER LINERS - Ref PA, PB Maintenance manual P.15 and PC, PD and PE Maintenance manual P. 26.

As stated in the maintenance manual cylinder, liners should be drawn out of the cylinder blocks using a suitable puller. When the two-piece gasket support tube is fitted, one liner can be pulled out but when the single piece support tube is fitted both liners must be drawn out. If the cylinder liners are punched out they can be seriously damaged, as they are cast steel. For details of introduction points of both types of support see service bulletin Item No.113 in the cylinder head section.

TO REFIT CYLINDER LINERS - Ref. PA, PB maintenance manual P.1.9 and PC, PD and PE maintenance manual P.26

The latest method of sealing the cylinder liners is to use solid copper shims between the liner and cylinder block. These copper liner seals are at present only available from G.M.Mitchell. It has been found that if 0.004 - 0.006" of the liner protrudes above the cylinder block face a very reliable and non-sinking seal is provided. If necessary copper shims should be positioned below the copper sealing rings to achieve this interference fit. A greater interference fit is not recommended as the copper sealing rings do not 'give' as much as the old asbestos seals, and cylinder head stud breakage is possible.

The cylinder liner and block should be thoroughly cleaned to ensure a smooth sliding fit of each liner otherwise distortion can take place when heated up causing piston seizure.

The Jowett Car Club does not recommend soldering copper gasket rings onto the standard head gasket to increase the compression pressure on the gasket when cylinder liners have sunk.

Service Bulletin Item No. 149 August 1953 - Liner bottom seal

A synthetic rubber cylinder liner seal was fitted to certain engines. Their number or crankcase number is listed below.

Engine Nos. E3/PE.24111, 24113 to 24139 (inclusive).

Crankcase Nos 25394 25475 25479 26039
26049 26053 26055 26060 26070 26072 26087 26088 26111
26120 26129 26157 26436 26500 to 26509 (inclusive) 26520 26521
26526 26541 26545 26546 26547 26549 26550 26551 26573.

This seal consisted of a synthetic rubber sealing ring trapped in a chamfer machined in the crankcase the cylinder liner thus making metal to metal contact with the crankcase, eliminating the necessity of fitting copper shims as used with the standard type to obtain the correct liner protrusion above the face of the cylinder block. On the engines with the rubber type bottom seal the following parts are different and not individually inter-changeable with the standard arrangement.

J54708/9	Cylinder block 1 R.H. 1 L.H.
J54706	Cylinder liner 4 off
J54707	Cylinder liner sealing ring 4 off

Further references - Jowetteer May 1970 P.59 Comment on solution of liner sinkage.

CRANKSHAFT AND MAIN BEARINGS - Ref PA PB maintenance manual P.15 and 33. PC PB and PE maintenance manual P.26

The original crankshaft was square webbed machined all over and unhardened. The big end journals were solid. The main bearings were white metal, front centre and rear. After EO/PB.8902 the big end and main bearings were induction hardened and the bearings changed to lead indium except for the rear main, which remained white metal steel, backed. This cured the short life of the crankshaft journals and bearings but lead to fractures of the crank itself between the limits of the heat treatment on the webs.

After engine No.E2/PE 22873 and Jupiter engine No.E2/SC 942 a modified crankshaft was fitted which had revised bearing tolerances and had the fillet radii of the journals increased to 0.10" from 0.005". This was to relieve stresses between the journals and webs. The big end journals were bored out 15/16" to reduce weight and the crankshaft was left un-machined. This shaft was called the black sided shaft and proved to be much more reliable. Not all shafts fitted to engines after the above were fitted with machined shafts with bored out big end journals and 0.10" fillet radii.

After car production ceased the oval web shaft was produced; this almost completely eliminated the breakage problem but these shafts tended to be soft and bearing and journal life was short. Finally, around 1958, the Laystall oval web shaft was produced which was nitrided and which is undoubtedly the best crankshaft produced.
It is necessary to maintain, the fillet radii at 0.10" when the shaft is reground. Too many good shafts have been ruined by slipshod regrinding where the radius is wrong or in the worst cases, is removed completely in which case the journal will break off from the shaft.

A word regarding regrinding and journal wear. While the lead indium coating remains on the bearing and oil pressure is at, or near, the recommended pressure, little wear occurs to the crankshaft journals. Once the lead indium wears through and the copper is exposed on the shell, the wear on the shaft increases rapidly. For maximum life of crankshaft therefore, main bearings should be replaced when the oil pressure drops to less than 50 p.s.i. hot over 2,000 r.p.m. Wear on the main bearing journals of the crankshaft of up to .002" (not less than 2.2485" dia.) does not warrant regrinding. A new set of bearings will restore oil pressure and eliminate the "rumble" in most cases.

The centre main bearing journal seems to suffer most wear due to the lack of rigidity in the crankcase and particular care must be taken to bolt up the crankcase halves evenly to

the correct torque to ensure maximum bearing life.

When rebuilding the crankcase take particular care over the inspection of the mating faces of the two halves. The two surfaces must be absolutely flat with no burrs etc. present. Remove these burrs by lightly tapping with light hammer or be very gentle with a file. Pay particular attention to the bearing housings and the backs of the bearings themselves so that nothing will prevent them from bedding in. Wash both halves in clean petrol and allow to air dry, use a brush not rag before final assembly. If this job has been done correctly, and the crankcase is not distorted the crankshaft should turn quite freely when the two halves are torqued up.

Some tightness in the shaft is caused by high spots in the rear bearing shell thrust faces, particularly when the shaft has been reground and the thrust faces have had to be reduced in width because the rear bearing has not been widened as per manual. Ideally, the two bearing shells should be marked with paint and kept in the same position throughout the reduction operation by using a jubilee clip, not over tightened, and fitted into the crankcase in the same relationship to each other. Make sure the end float is correct.

One of the most awkward jobs encountered when assembling the two crankcase halves together is the fitting in of the balance pipe while trying to balance one half on the bench. This can be simplified by either blocking up one half with wood so that the head studs are clear of the bench, or much better, use the old gasket as a pattern to drill holes for head studs through the top of the bench making sure that the sump opening is facing you when you are working. This makes for a very solid base and the balance pipe can be eased into position much more easily.

It is not uncommon to find that the rear main bearing shells are too wide to fit the rear main journal on the crankshaft. If so, the ends of both bearing shells should be carefully scraped allowing end float of up to 0.004".

Reconditioned crankshafts and bearings are available from G.M.Mitchell, which have a copper lead rear main bearing, and rear main thrust washers. In this case it is necessary to modify the crankcase halves to accommodate the thrust washers.

Service Bulletin Item No.2 March 1950 - Crankshaft reconditioning scheme

Our Spares Department is now in a position to supply reconditioned Crankshafts complete with bearings, which will be taped in position. Crankshaft journals will be ground to the following undersizes: -

Connecting. Rod Journals.

Minus .010" (.25mm) - .020" (.51 mm) - .030" (.76 mm) - .040" (1.02 mm).

In cases where it is necessary to regrind the side faces of the journal the width will be increased to nominal + .025" (.52 mm) and oversize connecting rods provided. (See section on Connecting Rods).

Main bearing journals.

Minus .003" (.13 mm) - .010" (.25 mm) - .020" (.51 mm) with no increase in journal width.

Identification.

A series of numbers will be stamped on the crank web giving details of the undersizes of the journals, together with the full part number e.g. a crankshaft with a .010" (.25 mm) undersize connecting rod journal and a .020" (.51 mm) undersize main bearing journal will be designated: - R50647/10/20.

With a .030"(.76 mm) undersize connecting rod journal and .010" (.25 mm) undersize main bearing journal will be designated: -
R50647/30/10 and similarly for any other combination of undersizes.

In addition to the above if the connecting rod journal width has been increased the identification key will be followed by "/0".

The following undersize bearings are available from our Spares Dept. The part number will be retained as for the standard size bearings with a suffix dependant on the bearing undersize.

Connecting Rod bearings.

Undersize	.010"	(.25 mm)	Part No. 52574/10/-
	.020"	(.51 mm)	" " 52574/20/-
	.030"	(.76 mm)	" " 52574/30/-
	.040"	(1.02 mm)	" " 52574/40/-

Main Bearing (Front and Centre)

Undersize	.005"	(.13 mm)	Part No.52573/5/-
	.010"	(.25mm)	" " 52573/10/
	.020"	(.51 mm)	" " 52573/20/-

Main Bearing (Rear)

Undersize	.005"	(.13 mm)	Part No. 50646/5/-
	.010"	(.25 mm)	" " 50646/10/-
	.020'	(.53 mm)	" " 50646/20/-

Connecting Rods.

Oversize connecting rods are available for fitting to crankshafts where the connecting rod journal width has been increased by .025" (.52 mm) and will normally be supplied complete with the crankshaft.

Oversize connecting rods will be identified by part number 50651/0, stamped on the connecting rod and will be painted RED with oil resisting enamel.

Service Bulletin Item No. 18 June 1950 - Crankshaft - PB models

Crankshafts with hardened main and connecting rod bearing journals and modified oil drillings have been fitted to all Javelin cars with effect from Engine No. E0/PB.8937 (Left Hand Drive). and No.E0/PB.8902 (Right Hand Drive).

Copper lead main bearing shells (Part No.52573 and 50646) and connecting rod shells (Part No.52574) will be fitted with this crankshaft.

Service Bulletin Item No.95 May 1952 - Crankshaft and rear main bearing identification

Further to Item No.2.

Undersize crankshaft sizes and increase in the width of the rear main bearing journal and rear main bearing shells can be identified as follows: -The amount of undersize of the front and centre main bearing journals, and the amount of undersize and increase in width on the crankpin journals will be stamped on the outside of the crank web at the rear of No.1 connecting rod journal as follows: -
The part number of the reconditioned crankshaft, which is R50647, is followed by the crank pin undersize, followed by the front and centre main bearing journal undersize. In cases where the crank pins have been increased in width by .025" (2.635 mm) the above numbers will be followed by the letter "O". E.G. a crank shaft with .010" (.254 mm) undersize connecting rod journals and .005" (.127 mm) undersize front and centre main bearing journals and with an increase of .025" (.635 mm) in crankpin journal width would be stamped as follows:

R5064/10/5/0

In the case of the rear main bearing journal where the width may be increased the identification numbers will be stamped on the outside of the crankshaft web at the rear of the number 4 connecting rod bearing journal. In this case the reconditioned crankshaft part number will be followed by the rear main hearing journal undersize number and the increase in width number i.e. if the rear main bearing journal had been reground to .010" (.254 mm) undersize with a .005" (.127 mm) increase in width, the stamping would read as follows:

R50647/10/5

The rear main bearing journal will be increased in width in comparison with the undersize as follows: -

Standard and .005" (.127 mm) undersize - No increase in journal width
.010" (.254 mm) undersize - .005" (.127 mm) increase in width
.020" (.506 mm) undersize - .010" (.254 mm) increase in width.

The rear main bearing shell width will be increased in comparison to the undersizes as follows: -

Standard and .005" (.127 mm) undersize - No increase in width .010" (.254 mm) undersize bearing - .005" (.127 mm) increase in width .020" (.508 mm) undersize bearing - .010" (.254 mm) increase in width.

For identification purposes, the part number followed by the undersize number followed by the width increase number will be stamped on the outside face of the bearing as follows:

50646/5
50646/10/5
50646/20/10

Service Bulletin Item No.104 September 1952 - Crankshaft - improved design

At Javelin Engine No.E2/PD.22190 and Jupiter Engine No. E2/SA.882 with the addition CL the following Javelins: - E2/PD.2216, 22162, 22163, 22l70 22173, 22175, 22 176, 22170, 22179, 22l80 22l81 22183, 22 l84 22l85 2.l86, 22187, 22188, a modified Crankshaft Assembly (Part No.J54593) was introduced. The radii of the Crankshaft journals and crankpins have been increased .100" (2.54 mm). The Crankshaft has been lightened by a 15/16" (.9375mm) hole drilled horizontally through the Crankpins and the Oil Feed Holes have been drilled offset to avoid the lightening holes. The lock notch in the big end bore of the modified Connecting Rod and Cap Assembly, which now bears the Part No. J54591 has been machined .040" (1.016 mm) nearer the centre of the bore face to accommodate the modified Connecting Rod Bearing (Plain) (Part No.J54589) and Connecting Rod Bearings (Drilled)(Part No.J54588), which have been decreased in width. The Front and Centre Main bearings (Part No 52573) have been decreased in width to allow for the larger radii of the Crankshaft. The Rear Main Bearing (Part No.50646) has not been altered in width, but the corner profiles have been modified to allow for the 1arger radius on the Crankshaft although the part numbers for the Main Bearings have not altered, only bearings of Vandervell manufacture stamped: - LTD should be fitted to the modified type Crankshaft. The early type Main Bearings. Connecting Rods and Connecting Rod Bearings cannot be fitted to the modified Crankshaft. Late type Main and Connecting Rod Bearings and Connecting Pods, can be fitted to the early type crankshaft. Reconditioned Crankshaft, Connecting Rod Assemblies, and undersized Bearings of new type, will be stamped with the new part numbers, followed by the undersizes as detailed in the Service Bulletin Javelin Sections

Items No. 2 and 95.

NOTE: From the introduction of this modification a number of Crankshafts have been fitted which do not incorporate the lightening holes. The modified Crankshaft can be identified by the offset position of the Oil Feed Holes and the increased radii on the Crankpins and Journals.

Service Bulletin Item No. 112. December 1952 - Crankshaft - Improved Design

Further to Item 104. From Javelin Engine No.E2/PE.22873 and Jupiter Engine No.E2/SC.942 with the addition of the following Javelins E2/PE/22850. 22852, 22855-22864 inclusive and 22866-22871 inclusive, the tolerance of the Main Bearing Journals has been revised from 2.249" - 2.250" (57.025 - 57.150 mm) to 2.250" - 2.2505" (57.15 - 57.163 mm) and the tolerance of' the Crankpins from 1.999" - 2.000" (50.775 - 50.800 mm) to 1.9995" - 2.000" (50.775 - 50.800 mm) in order to give improved running clearance. A new Rear Main Bearing Part No. J54739 has been introduced with this revised tolerance. There has been no alteration to the front Main, Centre Main and Connecting Rod Bearings.

NOTE: The new type Rear Main Bearings must be used only in conjunction with "high limit" Crankshaft.

Further references - Jowetteer November 1966 P.119 Bearings TIO Column See connecting rod and big end bearing section.

TO REPLACE THE CRANKSHAFT - Ref. PA, PB Maintenance manual p.34 and PC PD and PE Maintenance manual P.28

On assembly of the two blocks it is often found that the dowels are such an accurate fit in the dowel holes that the crankcases cannot be brought together. In these circumstances a small flat along the entire length of the dowel will relieve any pressure that builds up at the bottom of the dowel holes.
In addition to smearing gasket cement to the upper edge of the cylinder blocks it is best to also seal around each crankcase bolt as oil sometimes seeps into the bolt galleries. It then seeps past the outer washer and nut or bolt and can cause considerable oil loss.

Tightening the crankcases to 75 lbs./ft. is very critical as if this as increased it is unlikely the crankshaft will turn and if it is insufficiently tightened, 'play' may be present in the bearing surfaces. Use of a torque wrench is essential. Short bearing or crankshaft life is probable if the tightness is guessed.

FLYWHEEL - Ref. PA PB maintenance manual P.36 and PC / PD and PB maintenance manual P.28.

In the past, flywheel ring gears have occasionally been forced off the flywheel by the action of the starter motor Bendix. When a new ring gear is fitted it is advisable to hold it in position by putting 2 or 3 countersunk screws into the flywheel so that the edge of the screw holds the ring gear firmly in position as shown in fig.7 (e). To ensure the screws do not shake loose, centre punch the flywheel over the edge of the screw. Obviously the flywheel and clutch assembly may require balancing after this operation.

Service Bulletin Item No.86 March 1952 - Flywheel ring gear.

An increased tooth chamfer, which runs parallel with the pressure side of the ring gear tooth, is now incorporated on all flywheel ring gears fitted to Javelin and Jupiter cars. This modification gives an improved 'lead in' for the starter Bendix gear thereby cutting down to a minimum any tendency for the flywheel ring gear teeth to become burred or damaged due to initial contact between the two gears. If starter jamming is experienced on vehicles with the previous type ring gear fitted, due to burrs or damage at the edges of the ring gear teeth, the chamfer should be increased to the dimensions shown in fig.7 (a) by grinding the flywheel ring gear as shown in fig.8 (c and d). This operation may be carried out on Javelin and Jupiter models with the engine in position using a grinding wheel of the dimensions shown in fig.8 (b). The new type ring gear is fully interchangeable with the previous type and the fitting instructions remain the same.

CAMSHAFT. TAPPETS AND PUSH RODS - Ref ,PA, PB maintenance manual P. 15, 30-33, 37, PC, PD and PD maintenance manual P.28.

Camshafts were produced in two materials cast iron and cast steel. Three basic types were produced. The first was for use with hydraulic tappets up to EO/PC.11709 when solid tappets were introduced. The solid tappets required a different tappet form so a new camshaft was introduced. From Javelin EI/PD.19295 and Jupiter El/SA.481 a very accurate set of holes was drilled in the leading boss of the camshaft so that the later chainwheel with 6 dowel holes could be fitted. This gave very accurate valve timing.

It is extremely difficult by eye to distinguish the difference between the first two types. When changing camshafts it is therefore, essential to measure the base diameter of the cam. The hydraulic tappet camshaft should be 1.070". The solid tappet camshaft should be 1.0418". If the camshaft has 6 dowel holes in the boss at the front it is only for solid tappets.

Up to Javelin E2/PE.23643 and Jupiter E2/SC.957 camshaft and float was controlled by a plunger and spring. After these numbers an adjustable thrust peg was incorporated in the front timing case cover. This front timing case cover can be used on earlier Javelins if the camshaft is changed or modified as detailed in service bulletin No.139 below. NEVER adjust the end float with the engine running.
When solid tappets were introduced a redesigned push rod was introduced with a larger spherical end, which locates in the new tappet.

Camshafts with 0.025" oversize main bearings were produced and care should be taken when changing camshafts to ensure that the correct size of camshaft is fitted.

Service Bulletin Item No.23 September 1950 - Camshaft

To avoid the possibility of the operating cams of the camshaft fouling adjacent tappet assemblies the width of the operating cams has been reduced from ½ (12.70 mm.) to 7/16" (11.11 mm.) with effect from Javelin Engine No.EO/PB.9332,

Service Bul1etin Item No. 34 November 1950 - Revised tappet assy. - solid type

From engine No.EO/PC.11907 the fitting of the hydraulic tappet has been discontinued and a solid tappet introduced (see. fig.8).

With the introduction of the new units the engine components detailed below have been redesigned and are not individually interchangeable with equivalent components on cars prior to engine No.EO/PC.11907 No alterations have been made, however to the crankcases and the redesigned items may be fitted to existing cars in sets.

54151 CAMSHAFT

The camshaft has been modified to obtain satisfactory operation with solid type tappets. The diameter of the base circle is reduced. Other dimensions are as previous.

54161 TAPPET

The new unit consists of a cast iron body widely grooved for lubrication, with a bronze insert fitted to the push rod end of the tappet. The insert is shaped to conform to the spherical end of the push rod.

54162 PUSH ROD

The spherical end of the push rod has been increased to minimise wear on the bronze insert of the tappet and the length of the push rod has been increased by 17/32" (13.493 mm.)

TAPPET CLEARANCE (engine cold)

Inlet tappet	0.002" 0.050 mm.)
Exhaust tappet	0.006" (0.152 mm.)

Service Bulletin Item No.38 - Revised tappet assembly - solid type (Feb.1951)

The following vehicles built at a later date than EO/PC.11907 but with lower figured engine numbers also have solid tappets fitted: - 11753, 11788-9, 11791-94, 11805-09 11819, 11822-24, 11826-11836, 11841-11860, 11862-11870, 11876-11881, 11888, 11891-11906.

The following exceptions have the Hydraulic Tappet fitted: -

11912	11937	11949	11959
11913	11933	11951	11960
11914	11939	11952	11971
11921	11947	11957	11972
11922	11948		

Service Bulletin Item No.49 May 1951 - Hydraulic tappet extractor

In cases where difficulty is experienced in removing a hydraulic tappet from the crankcase tappet bore an extractor may be used as described below.

Directions for use of Extractor:

a. Remove tappet plunger.
b. Place the extractor in position through the push rod tube bores with the flared collet end inside the tappet bore.
c. Tighten the extractor barrel nut until the collared collet end of the extractor is expanded and grips firmly in the tappet bore.
d. Hold the extractor central in the push rod tube bore and strike the extractor head smartly with the ram until the tappet is drawn clear.

For manufacturing details please refer to Fig.9.

In cases where difficulty is experienced in withdrawing the solid type tappet from the tappet bore a firm hold can be obtained on the conical end of the tappet insert, A special puller is therefore not necessary in this case.

Service Bulletin Item No.64 October 1951 - Camshaft knock

Instances of heavy intermittent engine knock particularly at slow running speeds have been traced to camshaft end float.

Investigation has indicated, that this is due to oil pressure building up between the camshaft boss and the crankcase thereby causing a “hydraulicing” action.

We have recently introduced a modification in the form of a groove in the crankcase-bearing boss to relieve excess pressure at the point as illustrated in Fig.l0.

Camshaft end float is normally controlled by the thrust spring, Part No. 50681, but when any knocking of the nature referred to is experienced the following action should be taken: -

1. Increase the tension of the thrust spring. A simple check may be effected by tapping the camshaft thrust peg, Part No.54002 into the timing case, which will increase the spring loading. If the knock is eliminated the front timing case must be removed and washers of suitable thickness inserted between the thrust pad end and the timing case to re-position the thrust pad.

   SPECIAL NOTE: Care must be taken when affecting this repair as maximum adjustment on the thrust peg is 3/64" (1.1906 mm.) If this tolerance is exceeded the thrust pad will contact the camshaft chain wheel with subsequent wear.

2. In the event of the check detailed in (1) proving unsatisfactory:

   a) Remove the camshaft and complete tappet assemblies.
   b) Examine the tappet heads and the camshaft operating cams for damage or excessive wear, and where damage is discovered the part should be replaced.

3. The opportunity may be taken whilst the camshaft is removed to incorporate the modification (Para. 3) to the crankcase camshaft front bearing boss as detailed in the illustration (Fig 10).

4. Refit the camshaft and tappets and make sure when replacing the tappet assemblies, that the units are free to rotate in the crankcase.

5. Re-check the valve timing and complete the re-assembly of the engine.

Service Bulletin Item No.76 March 1952 - Camshaft and chain wheel

A modified camshaft and chain wheel, which gives a finer degree of accuracy when carrying out valve timing adjustment, was introduced at Javelin Engine No.E1/PD/19295 and Jupiter E1/SA.481.

Six offset dowel holes are incorporated in the chain wheel and in the forward boss of the camshaft, which allows the chain wheel to be set in any desired position in relation to the camshaft when carrying out the valve timing operation. To assist further, a 12° mark is also stamped on the flywheel.

To carry out valve timing adjustment with the above type camshaft and chain wheel proceed as follows:

1. Rotate the engine until No.1 piston is at its TDC position.

2. Turn the flywheel anti-clockwise (looking from the front of the engine) until the 12° mark is in the T.D.C. position opposite the centre line of the crankcase.
3. Turn the camshaft until the base of the No.1 cylinder inlet tappet is resting on the heel of the cam.
4. Fit a dial indicator gauge with the operating rod resting lightly on the top of the tappet and turn the indicator face until a zero reading is registered.
5. Turn the camshaft clockwise until a .013" (.3302 mm) lift of the tappet is registered on the dial indicator gauge.
6. Fit the chain wheels into the timing chain and fit them to the crankshaft and camshafts, ensuring that the boltholes in the camshaft chain wheel (slightly elongated) are opposite the boltholes in the camshaft.
7. Locate the chain wheel in this position by examining the relative positions of the dowel holes in the chain wheel and the dowel holes in the camshaft boss and inserting the dowel (reduced end towards the camshaft) into the two camshaft and chain wheel dowel holes which are dead opposite each other.

8. Check the position of the 12° mark on the flywheel and the 0.13" (.3302 mm) tappet lift on the dial indicator gauge to ensure that no movement has taken place and with the setting correct, fit the chain wheel bolt locking plate and securing bolts and locking the securing bolts by folding over the locking plate tabs.

The full assembly which includes camshaft, chain wheel, locking plate and dowel is fully interchangeable with the previous camshaft and chain wheel assembly as a complete assembly but the parts are not interchangeable as individual items.

Service Bulletin Item No.115 December 1952 - Camshaft end float

From Javelin Engine No.E2/PE.23643 and Jupiter engine No.E2/SC.957, with the exceptions of the following Javelins E2/PE.23805, 23811, 23813, 23816, 23817, 23829, 23837, 23842 and 23825, a modified timing case cover camshaft and thrust peg assembly has been introduced in order to regulate camshaft end float (see fig.1l). The front timing case cover has been modified to incorporate a threaded thrust peg, which is locked in position by a locknut.

The camshaft now incorporates an integral extension to provide a bearing surface for the adjustable thrust peg. Oil is fed to grooves on this surface via a drilling in the camshaft front journal.
To eliminate camshaft end float on cars fitted with the foregoing adjustment release the locknut Part No. FN 207/K on the thrust peg and screw in the thrust peg Part No.J54644 to make light contact with the camshaft, and turn back not more than 1/8" of a turn and tighten the locknut.

NOTE: It is most essential that the adjustment is NOT carried out with the engine running.

The bearing surface of the camshaft and thrust peg must be lubricated prior to assembly.

Service Bulletin Item No.139 May 1953 - Camshaft conversion

In order to convert the pre-series III type camshaft to the series III type detailed in Bulletin Item No.115 the following action should be taken (see fig.12): -

1. Remove the camshaft and drill a 3/32" (2.38 mm.) dia. hole in the front camshaft journal to break into the existing hole at right angles.

2. Press the camshaft end plug, Part No. J54824 into the 0.440"-0.439" (11.18 - 11.15 mm) diameter hole already in existence in the camshaft end.

3. Tap the timing case cover with a 7/16" B.S.F. thread as shown in fig.12. The hole in the timing case cover at present should be suitable size for tapping out.

4. Fit the thrust peg J54644 and locknut FN 207/K to the timing case cover. Reassemble pre-oiling the thrust peg end plug.

5. With the engine STOPPED adjust the camshaft end float by screwing the thrust peg into light contact with the camshaft end plug and slacken back not more than 1/8" of a turn, then tighten the locknut.

LUBRICATION Ref. PA, PB maintenance manual P.12, 15 and 29. PC, PD and PE maintenance manual P. 30

Lubrication of the early Javelin engine can only be called adequate for the needs of the average motorist. Main bearing wear has always been problem with the engine and during the years of production, changes were made to the lubrication system frequently in attempts to lengthen the life of the main bearings, especially the rear main, which tended to melt.

Originally all main and big end bearings were white metal. The big end bearings, followed quickly by the centre and front main bearings, were changed to copper-lead very soon after production commenced. The rear main bearing remained in white metal. Continuous running at temperatures above 75°C can cause rapid wear to the rear main bearing. It is essential therefore that any overheating problems are quickly rectified, otherwise wear will definitely increase rapidly. An alternative is to fit an oil cooler, which Jowett intended to do on all their cars from January 1952. In a further attempt to increase bearing life, a groove was machined in the crankcase behind each main bearing shell, which acted as a small reservoir and later the crankcase and rear timing case cover were redesigned. All the oil ways serving the bearing surfaces were increased in size to allow more oil to get to the vital surfaces. For continuous fast running there is no doubt

that this latter crankcase is superior to the early type and should be used wherever possible. The last modification to the lubrication system was to increase the depth of the oil pump body so that the pump is primed with oil before starting.

When the series III engine was introduced with increased bore oil ways, the three oil holes in the main timing cover gasket were increased in size. When using a gasket on series III engines ensure that the holes in the gasket are as large as the holes in the block.

Service Bulletin Item No. 50 May 1951 – Oil pump release valve spring.

From engine No. E1/PC. 15098 a modified release valve assembly has been fitted to the oil pump. This will have the effect of increasing the maximum oil pressure from 60 to 70 lbs/sq. in. The assembly consists of the following parts: -

Release valve spring	(Part No. 54388)
Release valve piston	(Part No. 50680)
Spring retainer	(Part No. 50864)

The part numbers for the piston and retainer remain the same. The release valve piston and spring retainer are interchangeable with the type used prior to the above engine number but the new release valve spring has been increased in diameter and cannot be fitted with the old type release valve piston or spring retainer. It will be necessary, therefore, when fitting the new type spring to engines prior to EI/PC.l5098 to fit the complete modified assembly consisting of spring, piston and retainer. It should also be noted that due to the diametral increase, the new type spring is not interchangeable with the camshaft thrust spring, as was the previous type.

Service Bulletin Item No. 59 July 1951 - Oil pump filter level

A lip has now been added to the rear of the oil pump filter housing to ensure that the oil entering the oil pump filter is not restricted due to the filter face being set too close to the sump base. When initially setting the level of this type filter in relation to the sump a distance of 1/16" (1.5873 mm) should be allowed between the lower edge of the lip and the sump base. When setting the level of the oil pump filters which do not embody the above filter housing lip, an overall distance of 5/16" (1.937 mm.) should be allowed between the filter gauze and the sump base. A suitable check may be made with the use of a gauge conforming to the sump dimensions, and before the sump is refitted the distance between the filter base and the gauge should be checked in accordance with the above.

Service Bulletin Item No.60 July 1951 - Centre main bearing housing PC model

From engine No.El/PC.16744 an oil groove has been machined in the centre of the crankcase centre main bearing bore.

This allows additional lubrication to the centre main bearing insomuch as in addition to the oil entering the bearing through the bearing shell lubrication hole which opposite the main crankcase oil feed gallery, the oil can also travel around the groove in the crankcase and enter the bearing at the oil feed hole in the opposite bearing shell.

This modification will be incorporated in all crankcases of factory-reconditioned -engines.

Service Bulletin Item No. 63 October 1951 - Oil return pipe from release valve

From Javelin Engine No. El/PC.l8985 and Jupiter EngineNo.El/SA.480 an oil return tube will be incorporated in the oil pump cover assembly, Part No. 50674. The outlet tube will return the oil passing through the release valve in excess of normal pressure directly back into the oil in the sump, thus eliminating any risk of it becoming aerated. The Part No. for the new type oil pump cover remains the same and it is fully inter-changeable with the previous assembly.

Service Bulletin Item No. 79 March 1952 - Lubrication grooves

Further to Item No.60. An oil groove is now machined in the centre of the front and rear crankcase main bearing bores in addition to the existing groove in the centre crankcase main bearing hole. The main bearing dowel hole in the crankcase has been counter bored to allow oil to pass around the dowel but the dowel and dowel locating hole dimensions remain the same. The above modification will be incorporated in the crankcases of all factory-reconditioned engines.

Service Bulletin Item No. 103 September 1952 - Crankcase - increased oil flow

At Javelin Engine No.E2/PD.21937, the dimensions of the Oil Feed Holes from the Oil Pump Body, Oil Delivery Pipe and Timing Case Rear Cover, were increased in diameter to increase the oil flow of lubricating oil to the Crankshaft and Connecting Rod Bearings.

At Javelin Engine No. E2/PD.22160 with the exception of the following numbers: - E2/PD.22175, 22178, 22182 and 22186, the Oil Feed hole through the Crankcase from the Oil Delivery Pipe to the Timing Case Rear Cover was increased in diameter for further improvement to the oil flow.

The tappet oil feed gallery in the crankcase has been repositioned and lubrication of the tappets is by a 3/32" (2.381 mm) diameter hole drilled through the wall of the tappet housings into the oil gallery, thereby allowing sufficient lubrication to the tappets thus eliminating the possibility of excessive oil leak.

The drilling in the crankcase locating the overhead valve rocker gear oil feed pipe has been increased in diameter to bring into line with the repositioned oil gallery and incorporates an adaptor. The existing valve rocker oil pipes and olives are connected to the adaptors by union nuts.

At Jupiter Engine No. E2/SA. 882 all the above modifications were incorporated. The following modified, parts are not individually interchangeable with the previous parts and it is now strongly recommended that they should only be fitted to the modified Crankcase, which retains its original part numbers.

Part No.	Quantity	Description
J54555	1	Oil Pump Body
J54554	1	Oil Delivery Pipe
J54552	1	Oil Pipe Elbow Washer
J54548	3	Oil Delivery Pipe Union Bolt
J54549	6	Oil Pipe Union Fibre Washer
J54547	1	Timing Case Rear Cover
J54573	2	Oil Pipe Adaptors
J54474	*2*	Union Nuts
J54688	1	Timing Case Rear Cover Gasket

Service Bulletin Item No. 116 - December 1952 - Oil Pump

From Javelin Engine No. E2/PE.23122 and Jupiter Engine No. E2/SC.945 a new type submerged oil pump has been introduced. This modification has been carried out to ensure that the pump is immediately self-priming under all conditions. An adjustable release valve is now incorporated and is pre-set to the correct oil pressure of 65-70 lbs. per sq.in. and should not be disturbed under any circumstances without first consulting the factory.

The excess oil from the release valve is now returned to the feed side of the pump by an internal drilling. The new type submerged oil pump may be fitted to all engines incorporating the Increased Flow Crankcase.

Service Bulletin Item No. 144 May 1953 - Improved method of sealing oil gallery

Drilling At the following engine and crankcase numbers -
Engine Nos 24111-24113 to 24128 incl. 24131-24136-24137-24142-24159-24165-24178.
Crankcase Nos. 25475-25479-25486-25597-25624-25632-25749-25888-25894-25898-25804-25911-25916-25918-25955-25982-25989-25998-26004-26007-26011-26017-26039-26049-26060-26063-26072-26087-26088-26120-26167-26436-26496 and onwards.

A counterbore has been added to the oil galleries and a new type oil gallery plug has been fitted. The plug cannot be fitted to the unmodified crankcases.

Further references – Jowetteer November 1968 P.108 Carbs and coolers,

OIL FILTER - Ref. PA, PB maintenance manual P.13, PC, PD and PE maintenance manual P.32.

Service Bulletin Item No. 4 March1950: - Rear timing case cover

A redesigned rear timing case cover Part No.50690. Item No.19 has been fitted to all Javelin cars from Engine number E0/PB.7676.

The new type cover, which is interchangeable with the original cover, has been redesigned to retain oil in the oil filter and accessories when the engine is stationary.

Agents will, of course be aware that with a pressurised cooling system it is essential that the radiator cap is removed when draining, in order to ensure that the system is completely empty.
Some owners may not however, be aware of this and we would, therefore strongly recommend that you emphasise to such owners the importance of carrying out the following drill when draining.

1. Remove Radiator Cap.
2. Open Drain taps under Cylinder heads and check that water is flowing freely.
3. As soon as all water is drained from the cooling system run the engine for NOT more than 10 seconds.

Service Bulletin Item No.57 July 1951 - Full flow oil filter (Tecalemit) PC model

From Javelin Engine No. El/PC.16603, the Vokes Full Flow Oil Filter Assembly, Part No.50872 has been replaced by a Tecalemit Full Flow Oil Filter, Part No.53422.

With the introduction of this filter, the Rear Timing Case cover, Part No.53030 has been redesigned to incorporate a balance valve designed to act as a by-pass in the event of a choked filter occurring.

Service Bulletin Item No. 73 October 1951 - Timing Cover oil leak

To eliminate the possible causes of oil leaks from the rear timing case cover. Part No.53038 and oil filter assembly Part No.53422, it is necessary to carry out inspection and fitting instructions detailed in the following paragraphs: -

1. Clean off all oil accumulated on the top area of the crankcase.

2. Run the engine and examine joint faces and attachment points for leaks, the use of a mirror will assist in examination of the underside of the assembly. Instances have been noted where oil leaking from the tappet covers have been mistaken for the rear timing cover fault, note or mark the area where the oil leak is suspected.
3. Remove the rear timing cover assembly, examine and rectify the following points:

    a. Damaged face joints, which could prevent a satisfactory seal.
    b. Examine the drain screw and oil pressure unit tapped holes for cracks.
    c. Examine the seat recess where the felt seal, Part No.52171, is fitted for possible burrs. Place the felt into the recess, the felt should be proud to the main face to ensure the felt is pressed into the recess when the cover is tightened down. If the felt is too thick reduce to the correct fitting depth, this is important.
    d. Chamfer the sides of the bolt holes and the edges of the face joints.
    e. Examine the oil filter sealing ring, Part No.55428, for serviceability.
    f. Clean all face joints thoroughly before fitting.

Service Bulletin Item No. 120 December 1952 - Tecalemit Oil Filters

It is recommended that the period of change for the Tecalemit Oil Filter Element be set at 5,000 miles (8000 kilometers).

NOTE: The cleaning of the element is not recommended and is considered to be a dangerous practice. Please make the necessary amendment to all copies of the Javelin and Jupiter Instruction Books in your possession, and kindly notify all owners accordingly.

BALANCE PIPE SEAL TEST - Ref. PA PB maintenance manual P. 35. PC, PD and PE maintenance manual P.32.

Service Bulletin Item No. 141 May 1953 - Balance Pipe seal test

If on carrying out the ba1ance pipe seal test it is found impossible to hold the requisite amount of vacuum, the following action should be taken. Retain the test equipment in position but remove the vacuum gauge and plug the adaptor to which it was fitted. Apply a pressure pump in place of the vacuum pump and put the system under pressure. Whilst the system is under pressure, spray oil on to all joints and pipes in the system. Determine where the leak is occurring by observing the point at which the oil is affected by the escaping air pressure. This point should then receive attention.

Further references - Jowetteer March 1966 P.13 Fitting a semi external ba1ance pipe by Drummond Black.

After completing nearly l, 000 miles with a rebuilt engine, I discovered that the pipe seals had gone. The oil pressure of the engine was good so I did not want to disturb the bearings to repair the seals. I then decided to fit an external balance pipe. (See Fig.38)

The way I decided was to cut the existing pipe inside the tappet covers and fit a length of reinforced plastic pipe (oil & heat resistant) between the two pipe ends. A suitable hole had to be cut in each tappet cover to allow the pipe to protrude through. A suitable nylon bush was cemented in each cover. A smaller take-off pipe, fitted external to the tappet covers is then attached to the breather valve. The plastic pipe is attached to the old balance pipe with Jubilee type clips.

BREATHER VALVE - Ref PC, PD and PE maintenance manual P.32.

On the Javelin and Jupiter engine the crankcase is ventilated by air drawn in through the air vent filter felts, which, after circulating around the crankcase, is extracted by the inlet manifold suction via the balance-pipe and breather valve. The breather valve controls the flow of air by means of a spring, which allows the valve to close under high manifold vacuum except for a limited flow through a permanent bleed. This bleed is necessary to maintain adequate ventilation at low engine speeds.

This valve must be kept clean otherwise carburation will be affected and condensation and sludging will occur if the valve is obstructed. The valve should be dismantled and thoroughly cleaned in petrol. The internal valve seat should be checked and if worn, the assembly replaced. Check the valve for free operation when assembled.

Service Bulletin Item No.2 167 November 1953 Crankcase breather valve

To assist with the many enquiries regarding the crankcase breather valve, the following details are issued.

The crankcases of both the Javelin and the Jupiter are designed to operate at a pressure slightly below atmospheric pressure (14.7 lbs/sq.in.) the normal running pressure in the crankcase being between 14 - 14.6 lbs/sq.in.

To ensure even running of the twin carburettors a balance pipe was fitted from which runs a connecting pipe to the oil filter tube where the breather valve is located. To further assist the circulation of the air, Breather vents are fitted one in each push rod cover, inside, which is, tucked a small felt, to act as an air filter (Refer to Bulletin Item No.9).

It is advisable to note the necessity of keeping the felts clean, as neglect of this point may cause failure of petrol pump and bad engine performance.

When the engine is on tick-over or closed throttle, the pressure in the crankcase is 14 - 14.6 lbs./sq.in. whilst in the balance pipe the pressure is approximately 8 - 10 lbs/sq.in. and in this circumstance the breather valve is closed with the exception of the small airflow, which is consistent through the small toggle valve B.

If the breather valve was not closed and a free passage of air allowed from the crankcase to the balance pipe, the slow running mixture would be varied resulting in rough tick-over, engine hunting, excessive petrol consumption and flat spots on the initial take off.

It is therefore, essential that the breather valve is closed on the tick-over or closed throttle. (See Fig.13).

Further References - Jowetteer October 1969 P.99 Breather valves
Jowetteer January 1970 P.35 Breather valve correspondence by John Evans and Harry Brierley.

WATER PUMP - Ref: PA, PB maintenance manual P.13. 20 and 29. PC, PD and PE maintenance manual P. 33 - 35.

The Javelin and Jupiter water pumps are similar but the Jupiter water pump spindle and tube are longer.

The basic design of the water pump remained unchanged throughout production of the car. A few minor changes were made as shown in the service bulletins below. The most important was the addition of a slip ring to the pump impeller, which increased the volume of water circulated. Wherever possible this later modified impellor should be used.

There were four different fans fitted on Javelins. The first type had pairs of blades mounted offset to each other and mounted on the spindle by means of screwed boss and locknut. The next type also used the screwed boss but the blades were equally spaced and were stronger. The third and fourth types used a taper to locate on the spindle, but two different taper angles were used and the two are not interchangeable. It has been known for the early fan blades to break up causing severe damage to the radiator, so for performance motoring use the later type spindle and blade.

A major problem when overhauling the water pump is the removal of the pump front cover. No attempt should be made to lever off the front cover, as it is easily damaged. The rear end of the shaft should be tapped with a copper head hammer being careful not to damage the thread. To prevent damage to the thread if a sharp knock is necessary one of the following methods usually works.

a) For a screw fitted fan with 0.500" bore rear bearing: -
Screw an elongated nut onto the end of the shaft and in the open end screw an old bolt. Tighten down, and the bolt head can be hit quite hard without damaging the thread.

b) For a taper fitted fan with 0.620" bore rear bearing: -
An old taper fitting fan should be put on the end of the shaft and a socket just larger than the thread on the shaft should be held on the fan centre and hit firmly with a

hammer. The sudden jolt usually frees the front cover without the taper jamming.

When knocking out the front cover and spindle, do not remove the circlip holding the front ball race in position otherwise the impeller will be smashed.

NOTE: There are two types of front cover. The later has a thick 'cap' at the rear, which slides inside the pump housing. This type is more difficult to remove as corrosion occurs between the 'cap' and the housing but a better water flow is created through the pump. Thoroughly grease the 'cap' before reassembly to prevent future corrosion. Before fitting new centre and rear oilite bushes they must be soaked for 24 hours in engine oil or a thinner general purpose oil. When fitting, use the water pump spindle as a guide to ensure correct positioning of the bearings. It is virtually impossible to press the two bushes into position 'in line' without the use of a guide.

On engines, which are liable to overheat, it is advisable to run without a thermostat during the summer months. Ensure that any thermostat fitted has two 3/16" dia. leak holes. N.B. No holes if the bypass is used. See Appendix I.

Oil sludging will occur in engines, which continually run cool, therefore oil changes should be more frequent.

Service Bulletin Item No. 14 April 1950 - Water pump housing

From Engine No.8472 oil cup has been fitted to the rear of the water pump housing extension tube to assist in the lubrication of the fan bearing.

Service Bulletin Item No. 65 October 1951 - Water pump modification - PC model From Engine No. El/PC.18140, an improved type water pump and fan assembly, which embodies the following modifications has been introduced:

a. Single pressing fan with a taper fitting to the water pump spindle.
b. A slip ring fitted to the water pump impellor to increase the circulated volume.
c. The internal diameter of the rear fan spindle bearing Part No.50600 has been increased to give additional bearing surface.
d. Threaded studs on the fan spindle bearing housing for the fitting of the fan support strut with the use of oddie nuts.

NOTE: To allow a certain amount of flexibility on the water pump supporting stays, the Oddie nuts must not be tightened fully down.

The following parts on the new assembly are not individually interchangeable with corresponding parts on water pumps prior to Engine No.E1/PC.18140, and stocks of these parts will be maintained by our Spares Department for servicing requirements: -

I. Water pump housing (Part No. J54505)
2 Water pump spindle (Part No. 54331)
3. Rear fan spindle bearing (Part No. 50600)
4. Fan assembly (Part No. 53058).

The new type pump Part No.J54513, complete with fan assembly, Part No. 53058, is fully interchangeable with the previous type as a complete unit.

Service Bulletin Item No. 85 March 1952 - Water pump and fan

Further to Item No. 65. From Jupiter Engine No. E2/SA.575 and Javelin Engine No. E2/PD.20379 a non-stick taper has been introduced to the water pump spindle to facilitate the removal of the fan. This modification incorporates a sharper taper at the fan location end of the spindle. The new type fan and spindle are fully interchangeable as a pair with the types previously fitted but not as individual items.

Service Bulletin Item No. 93 May 1952 - Lubrication of fan spindle bearing

With the introduction of the Radiator Mounted Oil Cooler the Fan Support Tube Oil Cup Part No. J54011 was inaccessible and therefore removed. A 3/16" (4.7625 mm) hole is now incorporated in the Fan Support Tube for lubrication purposes together with a 1/8" (3.175 mm) spill hole to prevent over lubrication. (See Fig.14)

RADIATOR - Ref. PA PB maintenance manual P.13. PC, PD and PE maintenance manual P. 35.

Two types of water, temperature gauge fittings were produced in the radiator header tank. The early water temperature gauge had a female locknut and the later a male fitting. The correct type of fitting must be ordered when a replacement is purchased.

The efficiency of the radiator will be impaired if the two deflector plates are missing from either side of the radiator. These plates direct more of the airflow through the radiator.

Service Bulletin Item No. 118 December 1952 - Top water hose - Javelin only

From Javelin E2/PD.22560 the fitting of the Rubber Hose (Part No.5075l) has been discontinued, and replaced by two Rubber Hoses joined by an aluminium casting. These parts are fully interchangeable, with the previous type water hose.

Further references - Jowetteer July 1967 P.75 - Fitting a semi-sealed cooling system by J. Harvey.

To make a semi-sealed cooling system on a Javelin arrive at a Halfords Branch with about 8 shillings in your pocket, ask for a Halfords screen washer bottle 1 pint and fixing bracket only and the length of polythene tubing supplied with it. Return, cut the copper overflow

pipe, on the top of the radiator about 4" or 5" away from the filler cap with a hacksaw, dress with a smooth file bend the long piece away, 'bell" the end of the short piece with the blunt end of a suitable drill, insert one end of the polythene tube smeared in red 'Hermetite' for about 1" remove the offside carb intake at the top, hacksaw about ¼" off the tip of the wind-tone horn, remove the top self tapping screw that holds the radiator valance in place, attach screen washer bracket using a longer self tapping screw, tighten, insert bottle and fill about a third. Using the small self-tapping screw smeared with Hermetite, plug the breather hole in the top of the bottle, replace cap. Push open end of tubing onto connector on cap, replace air cleaner connection result NO topping up with anti-freeze, No topping up in summer either, this has worked with 100% success on my Javelin for two years now.

HEATER - Ref PA PB maintenance manual P. 22. PC, PD and PE maintenance manual P.35.

The efficiency of the heater is fully dependent on running the engine at its correct temperature i.e. 75°C. During the winter months it is necessary to use a front grille muff to regulate the amount of cold air passing through the radiator. The engine is slow in warming up due to the necessity for bleed holes in the thermostat, but once up to temperature, a reasonable amount of heat is given off. Efficient door seals are definitely required to eliminate all cold draughts. The efficiency of an old heater can be increased slightly by 'back flushing' the heater to remove old scale.

A quicker warm up of the engine can be assured by modifying the water circulation as detailed in 'Modification to Water Circulation' in the appendices.

More heat would be given off if the larger 'Jupiter' heater were fitted to the Javelin.

Further references - Jowetteer March 1970 P. 34 - Improving the heating and demisting.

ENGINE MOUNTINGS

Service Bulletin Item No. 25 September 1950 - Front engine mountings – PB models.

A re-enforced front engine mounting, which may be identified by a central re-enforcing plate bonded through the centre of the rubber portion of the mounting, has been fitted to all Javelin cars with effect from Engine No.E0/PB. 10450.

With the introduction of this mounting, the timing case to frame vertical stay, Item No.322. (Part No.50930) is no longer fitted.

The two assemblies are fully interchangeable and when fitting the new type mounting to cars prior to E0/PB.10450 the frame vertical stay may be removed.

Technical Circular No.3 - Rear engine mounting

After Engine No.D8/PA.150 the compression on the rear engine-mounting rubber was reduced by fitting three 1/16" (1.5 mm) washers between the mounting housing and the bracket.

In cases of engine roughness on cars before Engine No.D8/PAA5O cheek the rear engine mounting to ensure that the rubber is not over-compressed. Where necessary fit up to ¼" (6.35 mm) washers between the housing and the bracket. Should the number of washers fitted be excessive, clutch 'judder' may be experienced? If this occurs the spacing should be reduced until the clutch action is smooth.

CLUTCH - Ref. PA, PB maintenance manual P. 43. PC, PD and PE maintenance manual P.42.

The Javelin and Jupiter clutch is a standard Borg and Beck unit and any standard motor vehicle reference book will give an accurate description.

When a new clutch is being fitted the following points should be checked: -

i) Check for cracks in the clutch housing.
ii) Check for free and smooth running of the clutch release bearing and replace if necessary.
iii) Check the condition of the clutch operating lever fork. If any flats are present on the clutch operating lever pins renew them.
iv) The flywheel face must he smooth and free of grooves.

Both the pressure plate and friction plate should be replaced together, the latter being a heavy duty plate wherever possible. A small amount of PH Castrol grease or equivalent should be smeared on the fork ends, clutch shaft splines and the exterior surface of the brass clutch shaft cover where the clutch release bearing slides.

Before assembly the notes regarding gearbox oil loss should be read in the gearbox section of this manual.

Service Bulletin Item No.19 June 1950 - Clutch assemblies - Borg and Beck.

All replacement clutch cover and pressure plate assemblies (Part Nos. 50844 Right Hand Drive and 52420 left Hand Drive) are now treated with "Lanoline" as a precaution against corrosion.

When replacing clutch assemblies it is most important that every trace of the lanoline is removed before assembly.

GEARBOX - Ref. PA, PB maintenance manual P.45. PC, PD and PE maintenance manual P. 50.
(Originally written for the Jowetteer by Keith Rumsey).

During their period of production Javelin and Jupiter gearboxes underwent many minor modifications and as has been mentioned elsewhere in the Jowett Owners Handbook it is doubtful if anybody now knows of all these modifications.

When dismantling I would suggest that you slide all gears and washers onto a hammer shaft or similar, in the order they come off, and reassemble them in the reverse order,

Description: All boxes have four forward speeds and reverse with constant load syncromesh on 2nd, 3rd and top gears. All teeth in constant mesh are helically cut. They are available in two ratios wide with 34 teeth on the layshaft clusters and 18 teeth on the clutch shaft and close ratio with 33 teeth and 19 teeth respectively. I have seen a 32 teeth and 20 teeth ratio but not assembled in a box. Basically it is a conventional gearbox with nothing particularly unusual, the only differences being in the general layout of components, which is dictated by the general design of the car and the space available below the floor. Fig. 22 illustrates the general layout of the gears and shafts in the casing. Fig.23 illustrates the positions of all gears and bearings etc. in relation to the splines, gaps in the splines and holes for syncromesh springs in the mainshaft. In the following description reference can also be made to the exploded view in the Javelin parts book.

The front end of the clutch shaft revolves in the spigot bearing in the rear end of the crankshaft. The rear end revolves in the large ball bearing in the front of the gearbox casing. The ball bearing is a light press fit on the clutch shaft and is locked in position by a nut and tab washer. The ball bearing has a locating ring in its outer shell, which is accurately located between the gearbox casing and clutch shaft cover thus effectively preventing any clutch shaft end float.

The front of the mainshaft revolves in the clutch shaft spigot bearing which itself revolves in the rear end of the clutch shaft. The rear revolves in a large ball bearing, the same as the front and likewise the mainshaft end float is regulated by a nut, tab washer and bearing locating ring. The rear end of the mainshaft revolves in a roller bearing in the end of the main shaft extension housing.

The layshaft is a light press fit in either end of the gearbox casing and is prevented from revolving by a lug on the rear end of the shaft, which is located in a groove in the rear face of the casing. The layshaft cluster revolves on two layshaft roller bearings which themselves revolve on the layshaft. End float of the cluster is prevented by a thrust washer at the front and a rear washer and pad.

The mainshaft and gears assembly is made up of the following, beginning at the rear, 1st and 2nd gear sliding dog, which is splined onto the main-shaft. A small amount of end float is provided. On most Javelin boxes there is a continuous set of teeth around the perimeter. The Meadows box has 6 banks of 3 teeth with the intermediate land cut away. On this dog slides the 1st and 2nd sliding gear which has a continuous set of teeth on its

inside face various grooves, a missing tooth and a plunger which I shall explain later in the operation of the synchromesh. 2nd gear bush is rigidly located n the mainshaft splines and 2nd gear revolves around this bush although in constant mesh with the layshaft cluster. 2nd gear is located by a thin mainshaft washer at the front and a thick washer at the rear, both of which are located in grooves in the splines and secured by spring loaded pins (see Fig. 24). There is an undercut in the rear end of the bush to clear the rear thick mainshaft washer locating pin. Some bushes have an undercut at both ends and can be used either way round. As in the case of the 2nd gear the 3rd gear bush is rigidly located on the splines and has an undercut on the rear end to clear the 2nd gear thin mainshaft washer locating pin. 3rd gear is free to revolve around this bush but is in constant mesh with the layshaft cluster. 3rd gear is located by a thick mainshaft washer (the same as the rear one), which is located in a groove in the splines by a spring-loaded pin. Note that this pin is in the centre of the groove and not offset as with the previous two. Top and 3rd gear driving dog, which is located by the mainshaft splines, therefore, has no undercut to clear the pin. A small amount of end float is provided for this dog. Top and 3rd sliding gear slides on this dog in the sane way as the 1st and 2nd gear, although on some gearboxes, lock plungers are provided. I cannot comment on their method of operation but are probably similar to the 1st gear lock plunger (ref article by Harry Brierley 'Where will the dimple be' in the March 1969 Jowetteer). Most boxes do not appear to have the Top and 3rd gear lock plungers as none of my six boxes have any.

On the early Meadows box the 2nd and 3rd gears and bushes were located by 3 thin mainshaft washers l ¾" diameter on the 50119 mainshaft. There must obviously have been trouble with the washers breaking up, so the front and rear washers were increased in thickness, which could be done without re designing the gears. The thickness of the centre washer would have necessitated a redesign of the box so it was probably left. A very important point to remember when stripping boxes is NOT to fit the l ¾" diameter thin mainshaft washer between 2nd and 3rd gears. If you use it, it is almost certain to break up at some time. The later 2" diameter washer should be available from the usual dealers.

In the neutral position the sliding outer gear and dog are midway between the clutch shaft (4th gear) cone and the 3rd gear cone. The sliding gear is held in position by 6 spring-loaded balls, which are located in a groove midway along the inner sliding gear teeth. When pressure is exerted in either direction by the Top and 3rd gear selector bar the dog and sliding gear are pushed along the mainshaft splines until the dog cone touches the constantly revolving top and 3rd gear cone. As the pressure is increased the dog gradually picks up speed until it reaches the same speed as the gear. The pressure at this point overcomes the pressure of the six springs behind the balls and they are forced down behind the teeth of the sliding gear and the sliding gear moves across to engage with the narrow set of teeth on the gear Unless the cones effectively speed up the dog and sliding gear it is impossible to engage the gear due to the gears revolving at different speeds. When the synchomesh is worn (i.e. the cones are excessively scarred) by the time the sliding gear is forced across, the speeds of the gears are not quite synchronised hence a crunch as the teeth mesh together. Quiet engagement can only be made in this case if extra

time is allowed for the dog to reach the same speed as the gear.

Syncromesh Operation of 2nd Gear and engagement of 1st gear on Meadows Boxes before E2 .PD 20641 (Fig.26).

The synchromesh operation of 2nd gear is identical to that of Top and 3rd gear previously described except that there is another groove inside the sliding gear in which 5 synchromesh balls engage when 2nd gear is selected. On movement of the sliding gear into non-synchronised engagement with 1st gear it would be possible for the dog to vibrate and slide along to the 2nd gear, thus engaging 2nd gear as well as 1st gear. This would effectively lock the box solid. It was therefore necessary to provide a plunger to lock the dog in position. When 2nd gear is engaged the dog slides towards 2nd gear and the plunger is forced out of its dimple in the mainshaft and up into the groove in the inner teeth of the sliding gear. As the rear portion of the inner teeth is cut away it is possible for the sliding gear to move into engagement with 2nd gear. When 1st gear is engaged the inner tooth of the sliding gear forces the plunger down into its dimple and is held there continuously therefore, preventing the dog from moving into engagement with 2nd gear.

Synchromesh Operation of 2nd Gear and engagement of 1st Gear on Meadows Boxes after E2/PD.20641 and Jowett Boxes (Fig.27)

During production a mere positive 1st gear engagement was provided presumably to correct a fault of slipping out of 1st gear. A further groove was ground in the inner sliding gear teeth, which engaged with the synchromesh balls when 1st gear was fully engaged. The 1st gear lock plunger for securing the dog in position was made more positive by a deeper 'dimple' in the mainshaft and a return spring on the plunger which pushed the plunger out of the deeper hole.

After E2/PE.23106 the synchromesh spring loadings were increased by putting small circular flat shims at the bottom of all the synchromesh spring holes in both 1st and 2nd and 3rd, and top dogs. This modification can be carried out on all gearboxes if they are not already in use. The bottoms of the holes will be perfectly flat if they are fitted. If not fitted the holes have pointed (drilled) bottoms.

Operation: (Jowett box described)

In the neutral position the clutch shaft, layshaft cluster/ 3rd gear and 2nd gear are free to revolve. The mainshaft, 1st and 2nd gear dog and sliding gear, 2nd gear bush, 3rd. gear bush top and 3rd gear dog and sliding gear and all three mainshaft washers remain still.

When the clutch is disengaged all the components are stationary and 1st gear is selected by the selector bar pushing the 1st and 2nd sliding gear into engagement with the straight cut set of teeth on the rear end of the layshaft cluster. In this position the dog is prevented from moving by the lock plunger and the 5 synchromesh balls are engaged in the groove

inside the sliding gear as previously explained. As the clutch is engaged the drive is taken up as shown in Fig. 28 (a).

As the selector bar is returned to neutral the plunger is free to rise out of the dimple and as 2nd gear is selected and the dog and sliding gear move towards the 2nd gear where the synchromesh cones synchronise the gear speeds and the sliding gear moves across onto 2nd gear where the 5 synchromesh balls engage in the groove in the sliding gear. As the clutch is engaged the drive is taken up as shown in Fig. 28 (b). As the selector bar is returned to neutral the sliding gear pushes the lock plunger into the mainshaft dimple. 3rd Gear is selected in a similar manner as 2nd Gear. The top and 3rd sliding gear and dog move towards 3rd gear until the two cones synchronise the gears to the same speed and the sliding gear moves across onto the 3rd gear where the 6 synchro balls engage in the groove in the sliding gear as shown in Fig.28 (c).

4th Gear is selected exactly the same way when the selector bar pushes the sliding gear in the opposite direction as shown in Fig.28 (d).

A reverse gear is provided by engaging an independent straight cut gear between, the small straight cut gear on the end of the cluster gear and the 1st gear teeth on the outside of the 1st and 2nd sliding gear. The sliding gear remains in the neutral position and the reverse gear is of sufficient length to reach across the two sets of teeth. The reverse gear shaft is of sufficient length to allow the gear to be completely withdrawn from both gears where, it is locked in position by the reverse selector lock on the selector housing cover.

Gear Selector Operation

The two gear selectors slide in machined grooves in either end of the selector cover. Each selector bar has a brass selector fork riveted onto it, the top and 3rd gear at the front of the selector bar and the 1st and 2nd gear at the rear. These selector forks lock into the large machine grooves on the outside of the top and 3rd and 2nd and 1st sliding gears.
When the gear selector linkage rods are adjusted correctly vertically, the gear operating shaft and lever move one of the selectors in either direction. Vertical movement of the gear operating shaft and lever is governed by the selector change lever. With the shaft and lever in its lowest position reverse gear can be selected, above this 1st and 2nd gears and in its highest position, 3rd and top gears. When reverse is selected and the shaft and lever is in the lowest position, it engages in the reverse gear selector mechanism on the inside of the selector cover. A reverse selector lock is provided in this linkage.

Dismantling Inspection and faults to look for:

The gearbox should be dismantled as described in the maintenance manual. I would suggest that a gearbox ball race extractor be used to remove both front and rear ball bearings. Cons iderable effort can be saved by doing so and the bearings will not be damaged.

As well as the inspection of parts listed in the 'maintenance manual, I would suggest the following are checked. The layshaft should show no signs of excess wear or scoring. It should be replaced if this is so. If any teeth are missing or badly chipped the gear should be replaced making sure that the new one is exactly the same as the old. All the components in the Meadows boxes had part numbers etched on them. These should be quoted when ordering new parts. The front end of the mainshaft, which revolves in the clutch shaft spigot bearing, often shows signs of wear and this should be replaced if possible. Most boxes which I have stripped, show signs of wear on the mainshaft and gear splines and the gears have quite a lot of free play on the shaft, so I do not think this is a problem unless the free play is really excessive. In these cases just quoted, the gearbox will still operate but considerable noise and gear whine will be heard. On six of the inside teeth of the top and 3rd sliding gear (without lock plungers), very small grooves will be seen where the synchro balls have run. The sliding gear can be turned so that the balls run on an unmarked tooth. This will help the gears to remain engaged. All three mainshaft washers should be carefully checked for cracking and should be replaced if necessary. Failure of the centre thin mainshaft washer is very common. Bronze blanks are available from the dealers, but the splines have to be filed by hand. If a thick mainshaft washer is used as a template and both washers are held in a vice, it is not too difficult to make a copy. In my opinion the best way to cure this fault would be to increase the diameter of the washer making it much stronger. An undercut would have to be put on the outer edges to clear the cluster gear when end float has developed, due to wear. The cut out in one of the inner splines on the mainshaft washers should be sharp and not burred over, as the washer locating pin must hold the washer securely and must not slip out. For the same reason I always replace the locating pins as these always look chewed up. The 1st gear lock plunger should also be replaced if worn. Check that the pintles on the plunger spring seats and the rockers are not broken. The front gearbox casing securing lugs and the rear mounting brackets should be carefully checked for cracking. The gear operating shaft should be checked for free play at either end, replaced if necessary and the top and bottom holes in the casing rebushed if play is still present. Check the selector change lever lock screw. This should be tight and wired to prevent it vibrating out.

To anyone who is going to rebuild a gearbox, the following parts should be replaced: -

a) Both front and rear ball bearings.
b) Clutch shaft and layshaft roller bearings (full-length roller bearings are available from the dealers)
c) All synchromesh balls and springs checking that the springs are of the correct type. Check their tension against the originals.
d) 3 mainshaft washer locating pins.
e) Front bearing oil thrower if damaged.
f) Layshaft if worn.
g) Selector bars if the brass forks are loose (it may be possible to tighten the rivets). selector bars with 5/8" of the fork ends thickened by 0.020", and the mating sliding gears are best used as they were introduced March 1952 to prevent gear

lever vibration.

h) Mainshaft extension bearing and oil seal
i) All gaskets
j) Replace a 1 3/4" dia. mainshaft washer if fitted, with a 2" dia. one.

The synchronising action of the gear cones can be returned if the cones are lapped-in with very fine valve grinding compound and then paint rubbing down compound followed by metal polish. The mainshaft should be used to accurately locate the gears during re-grinding. When finished the two cones must be as smooth as possible with no scoring. Be careful not to grind too much metal away as there must be oil grooves to allow the oil to drain away from the conical surfaces.

A lot has been written in the past in the Jowetteer about loss of oil from the gearbox. During each gearbox rebuild I have given considerable thought to this matter and if the following items are checked, most cases of leakage are cured: -

a) Bolt the gearbox onto the clutch housing without the withdrawal bearing and feel for any end float in the clutch shaft cover. If any is present then the oil is seeping out between the cover and gearbox casing. This can be cured only by replacing the cover or very carefully shimming the leading edge of the cover where it sits in the clutch housing until the cover is just pinched tight.
b) I always put a brown paper gasket with sealing compound on both sides between the clutch housing and gearbox casing. I never cut a hole in the paper for the air vent hole.
c) Renew the extension oil seal.
d) Renew all gaskets.

If your gearbox still loses oil excessively then it must be getting out through the hole in the front of the clutch shaft cover and there is nothing much you can do to stop it. After following the above rules, oil loss in my boxes has always been slight.

Excessive wear on the front locating hole or the layshaft can also cause slight leakage. In these circumstances the only cure is to change the gearbox casing.

Reassembly: Reassembly is carried out in exactly the reverse order to dismantling so it is very important to remember the correct order. The reassembly instructions in the maintenance manual can be used but so many modifications were made that the parts must be reassembled in the order that they were dismantled, rather than the way the manual states.

Service Bulletin Item No.66 October 1951 - Gear ratios PC models

From Engine No. E0/PC.11270 the number of teeth on the clutch constant drive gear was increased from l8 to 19 teeth and decreased on the layshaft cluster constant drive gear

from 34 to 33 teeth.

This alteration rives a higher gearbox and final drive ratio in 1st, 2nd 3rd and reverse gears as detailed below: -

Drive Ratios from Engine No. E0/PC.11270

Gearbox Ratio		Final Drive Ratios	
Top	1 to 1	Top	4.875 to 1
Third	1.37 to 1	Third	6.7 to 1
Second	2.17 to 1	Second.	10.6 to 1
First	3.56 to 1	First	17.4 to 1
Reverse	3.56 to 1	Reverse	17.4 to 1

Drive Ratios prior to Engine No. E0/PC.11270

Gearbox Ratio		Final Drive Ratios	
Top	1 to 1	Top	4.875 to 1
Third	1.5 to 1	Third	7.34 to 1
Second	2.38 to 1	Second.	11.6 to 1
First	3.88 to 1	First	19.0 to 1
Reverse	3.88 to 1	Reverse	19.0 to 1

Service Bulletin Item No. 68 October 1951 - Gearbox extension bearing washer

From Javelin Engine No. E1/PC.18141 and Jupiter Engine No. SA.284 the thickness of the extension bearing locating washers was increased to give additional strength. This necessitated an increase in the depth of the bearing bore in the Speedo Housing Extension tube, Part No.50044. The complete assembly is interchangeable in all Javelin and Jupiter gearboxes, but it is emphasised that the thicker washer must not be fitted to the previous type extension tube. The new type washers and extension tube will retain their original part numbers with the addition of the prefix letter J.

Stocks of the early type bearing locating washer Part No.50121 and speedo housing extension tubes Part No. 50044 will he maintained by our Spares department for service requirements.

Service Bulletin Item No. 83 March 1952 – Gearbox selector fork - 3rd and top

To prevent gear lever vibration the width of the third and top selector fork has been increased for a distance of approximate1y 5/8" (15.875 mm) from the ends of the fork by .020" (.500 mm) as shown in Fig.16. With this modification the 5/8" (15.875 mm) increased width portion of the fork only contacts the sliding sleeve groove when the sliding sleeve is being moved axially on the driving dog, thereby eliminating any

tendency for the sliding sleeve to be incorrectly aligned when in full engagement with the gear dog teeth. The increased width of the selector fork necessitates an increase in the width of the sliding sleeve grooved and the fork and sleeve are only interchangeable with the previous type in pairs.

Service Bulletin Item No.99 July 1958 - Locking of first gear

At Javelin Engine No. E2/PD. 20641 and Jupiter Engine No. E2/SA.657 a modification was introduced to improve the locking of the first gear when in an engaged position. This modification takes the form of a further groove ground on the internal splines of the 1st Sliding Gear (Part No J54577) to mate with the synchro balls when engaged in first gear position. The 1st and 2nd Sliding Dog (Part No. J54670) outside diameter is fully splined and the lock plunger drilling has been counter bored to accommodate an improved type Gear Lock Plunger (Part No.J54648) which is fitted with a Plunger Spring (Part No. J54649).

The countersunk recess on the Mainshaft (Part No.J54671), which locates the gear lock plunger, has been modified to accommodate the shank of the improved type plunger. It is essential to ensure that any rough edges, which may be found on the lock plunger, are cleaned off and that the plunger is an easy sliding fit to the sliding dog and the recess in the mainshaft.

To assemble the gear and plunger the following drill should be carried out: -

1. Fit the plunger spring over the reduced shank of the gear lock plunger, and together insert them into the counter bored drilling in the sliding dog.
2. Fit the synchro springs and balls into their respective drillings and fit the sliding gear to the sliding dog with the reduced internal spline in line with the gear lock plunger.
3. When fitting the gear assembly on to the mainshaft ensure that it is an easy sliding fit. The above items are interchangeable in sets only to vehicles prior to the above engine numbers.

Service Bulletin Item No. 122 December 1952 - Increased loading of synchromesh springs.

From Javelin Engine No. E2/PE.23016 and Jupiter Engine No.E2/SC.945 R packings have been added behind the synchromesh springs to increase the Spring Loading. This is to provide a more positive locking action between the Top and Third Sliding Gear Sleeve and Top and Third Gear driving dog and First Sliding Gear and First and Second Gear Sliding Dog.

These packings may be fitted to cars prior to the above engine no.

Service Bulletin Item No.129 March 1953 - Gearbox ratios

From Javelin Engine No. E3/PE.24179 the teeth on the constant mesh drive gear were decreased from 19 to 18. The teeth on the layshaft cluster constant drive gear were increased from 33 to 34. This alteration gives a lower gearbox and overall gear ratio as detailed below.

Drive Ratios from Engine No. E3/PE.24179

Gearbox Ratio		Final Drive Ratios	
Top	1 to l	Top	4.875 to 1
Third	1.5 to 1	Third	7.34 to 1
Second	2.38 to 1	Second	11.6 to I
First	3.88 to 1	First	19.0 to 1
Reverse	3.88 to 1	Reverse	19.0 to 1

Drive Ratios from E0/PC.11270 to E3/PE.24179

Gearbox Ratio		Final Drive Ratios	
Top	l to l	Top	4.875 to 1
Third	1.37 to 1	Third	6.7 to 1
Second	2.17 to 1	Second	10.6 to 1
First	3.56 to 1	First	17.4 to 1
Reverse	3.56 to 1	Reverse	17.4 to 1

See also Item 143.

Service Bulletin item No. 135 March 1953 - Improvement to reverse lock lever

Cases of the gearbox sticking in first gear usually after reverse gear has been used have been traced to the long arm of the reverse selector lock lover (Part No.J50140) catching on the first gear selector fork.

To eliminate this fault remove approximately 1/16" (2 mm) from the reverse selector lock lever end and back off as shown in Fig. 17.

Service Bulletin Item No. *143* May 1953. - Gearbox ratios

Further to Bulletin Item No. 129 on the introduction of a wider gearbox ratio. This was introduced at gearbox number 8153.

Service Bulletin Item No. 155 August 1953 - Modified reverse lock lever

A reverse lock lever of thicker gauge material and revised dimensions has been designed. As yet only a limited quantity of these have been produced and fitted to gearboxes going into the American market. When this feature becomes general production, the engine or

gearbox number will be issued.

The modified lever J54800 is interchangeable with the previous type (Part io.50140) if the previous type reverse link pin Part No.J50112 is replaced by the modified type J54801.

Further references - Jowetteer March 1969 P.35 'Where will the dimple be'

STEERING COLUMN GEARCHANGE - Ref. PA PB maintenance manual P.46. PC, PD and PE maintenance manual P.52

Service Bulletin Item No.37 February 1951 - Adjustable type selector and gear change links.

From Engine No.E0/PC 12340 new type adjustable selector (Part No.AS.54031) and gear change (Part No.AS.54027) link assemblies have been fitted between the gear change column and gearbox on Right Hand Drive Models only. This modification allows a finer and increased range of adjustment on each rod. See Fig.15.

Adjustment: The adjustment nut on the selector change link and the adjustment sleeve on the gear change link are provided with left and right hand threads which allow the link to be lengthened or shortened by turning, the nut or sleeve after the locknuts have been released. Please refer to the illustration (Fig15). The direction of rotation for adjustment works in opposite directions on each link i.e. to lengthen the selector change link the top of the adjustment nut should be turned away from the operator whereas to lengthen the gear change link the top of the adjustment sleeve should be turned towards the operator.

The new type selector and gear change link assemblies are fully interchangeable with the original assemblies on Right Hand Drive vehicles.

Service Bulletin Item No. 84 March 1952 - Gear change stay

From Engine No.El/PD.20135 an adjustable gear change stay assembly Part Nos.J54497 RHD and J54506 LHD was introduced. This adjustment makes it unnecessary to use force when fitting the stay to its location on the clutch housing. The new stay is fully interchangeable with the previous type as a complete assembly. (See also Item 94).

Service Bulletin Item No. 94 May 1952 - Gear change stay

From Engine No.E2/PD.20144 a modified Gear Change Stay was introduced to all Javelin Cars. This modification gives added strength to the Gear Change Stay and takes the form of a pressed steel stay Part No. J54584 Right Hand Drive and Part No. 54596 Left Hand Drive, which replace the rods incorporated with the previous type Gear Change Stays Part No. J54498 RHD and Part No. J54507 LHD. The revised type Gear Change Stay is interchangeable with the previous type on RHD Models and the modified Change Stay and Stay Rod Eye Part No. J54630 together are interchangeable with those on LHD models.

Further reference - Jowetteer January 1970 P.14 Replacement of a gear change column.

Having had my gear column break 3 times at the gear change pivot I decided to change the column with 1 original, that is one which has not been repaired My estimate was that it would not take as long as an engine removal, 2 hrs at the most. How wrong can one be? I was sickened by the juggling one has to do it is definitely better, quicker to have the engine and gearbox out. It is definitely better to have the change welded and hope it lasts until you are ready for an engine removal: -

1. (With engine in position). I jacked the car up to give working clearance, blocked the chassis, removed driving side road wheel) then followed the Maintenance Manual as follows: -

(1) Remove the draught excluder and metal surround at the base of the column and the gear change rod inspection cover in the toe board.
(2) Disconnect the gear change link and the selector change link at the ball joints from the gear change and selector operating levers on the gearbox.
(3) Disconnect the gear change stay from the gear change by removing the gear change stay securing bolt at the base of the gear change column. This number 3 instruction I altered by removing gear change stay from Clutch Housing Stud first, slackening the setscrew from securing gear change to steering column. This gives a slight movement to enable you to wobble the column in order to turn the nut with a ring or ordinary spanner.

Number 2 instruction as per book but it requires a little wrestling. After nut removal, the bolt will push down and out leaving stay free to put to one side. Now completely remove setscrew from 2 columns. Disconnect the "U" bolt from facia panel steering column support bracket. The column can then be withdrawn guiding the column lever and link through the aperture in the toe board.

On replacing the gearchange column: -

(1) Insert gear change column and connecting links through the board aperture and replace the setscrew connecting the gear change to base of steering column.
(2) Connect gear change stay to gear column bracket and gear change stay pin on Bell Housing.
(3) Connect gear change column to the facia panel at the facia panel bracket.
(4) Connect gear change link and selector operating link to operating levers on gearbox and reset as described in adjustment section. This number 4 instruction is the bugbear, the only way to do it (I think) is to connect selector rod first at operating lever and struggle, you must remember to replace washers and split pin. That was an operation I am hoping not to be repeated if I can possibly help it.

On dismantling the gear change rod I screwed the rod out of the adjustable ball housing

in preference to removing from column level ball. On reassembling the gear rod it was then easy to screw the rod back into the adjustable housing, which passes easily through toe board both removing and refitting.

I hope I have not confused all who try to decipher those lines I have written. Hope you can sort this out. The gear column change is certainly a struggle point as also is the steering box.

PROPELLOR SHAFTS - Ref. PA, PB maintenance manual P.48. PC, PD and PE maintenance manual P. 60.

When changing the Javelin rear prop. Shaft, it is important to remember that the hydro-mechanical-brake rear prop. shaft is 1" larger than the full hydraulic-brake shaft. The correct model rear prop-shaft must be fitted.

REAR AXLE - Ref. PA PB maintenance manual P.49. PC, PD and PE maintenance manual P.65.

Service Bulletin Item No. 17 June 1950 - Rear hub bearing lubrication

Cases have been reported where an over application of grease to the rear hubs has resulted in brake lining contamination and subsequent brake inefficiency.

A 3/16" (4,7625 mm) excess grease relief hole will shortly be incorporated for all rear hub bearings at the rear and outer (hub) end of the axle casing tubes as shown in Fig.18.

When greasing rear hubs on axles embodying this featured hubs should be lubricated until grease just appears from the relief hole.

Service Bulletin Item No. 159 November 1953 - Axle shaft nuts

The threads on the axle shaft and the axle shaft nuts of the Javelin and Jupiter axles have now been changed from B.S.F. to S.A.E. threads (14 T.P.I.)

The corresponding new Part Numbers are: -

Axle shaft	Part No. 3MA-005-21	S.A.E. Threads
Axle shaft nuts	" " 14A-74-11	"

The Axle Shaft Extractor Part No. J14836 will not fit these new thread forms, but steps are being taken to make available a suitable adaptor for fitting the above tool.

FRONT HUBS – Ref. PA, PB maintenance manual P.59. PC, PD and FE maintenance manual P.78.

When reassembling the front wheel bearings inside the front hub it is important to check that the outer bearing casing is a light press fit in the drum, and the inner bearing casing is a light press fit on the hub spigot. If either is loose the bearing casing will revolve and the bearing balls will remain stationery. This will very quickly cause irreparable damage to the hub spigot or brake drum. If the wear has not gone too far it is possible to 'centre pop' the hub or drum about a dozen times. The bearing will then have to be lightly pressed into position and no free movement should be evident. This is only a temporary cure. The worn parts should be replaced.

Wear of the front wheel bearings can be checked in the following way: -
Raise the wheel off the ground and holding the top of the tyre in one hand and the bottom in the other, move to and fro alternately. No free play should be evident. Very slight play is not dangerous but this indicates that the bearings have a very short future life and replacement parts should be procured and fitted as soon as possible. A noisy bearing also indicates limited life and replacement will soon be necessary.

Some members do not appear to know the reason for the 'bolt' or setscrew, which appears to screw into the drum outer flange on Javelins after E0/PB. 10594. This setscrew secures the outer bearing looking ring in position and prevents it from unscrewing. The pin at the end locates in a hole in the locking ring (see Fig.19). When removing the outer bearing from the drum, it is necessary to remove the setscrew before unscrewing the locking ring. If this is not done the pin will be sheared off the end of the setscrew and will jam in the locking ring thread making it very difficult to remove the ring.

To reassemble, press the outer bearing into the drum and screw in tight the bearing locking ring. Check to see if the existing hole in the ring is in line with the setscrew hole. If not, re-drill the ring being very careful not to damage the thread in the drum. The setscrew can then be screwed into position not forgetting to use a spring washer.

When refitting a front brake drum, it is best to renew the split pin in the drum securing nut. Old split pins can be very weak after years of use and a serious accident may occur just for the saving of a few pence. This also applies to the rear brave drum securing nut split pins.

Service Bulletin Item No. 27 September 1950 - Front wheel bearings

With the introduction of the full Hydraulic Braking System the front wheel bearing sizes have been raised as detailed below: -

Front wheel bearings (inner) Part No. 189/S
Type - Skefco RLS/3
Internal Diameter 1" (25.4 mm)

External Diameter 2 1/2" (63. mm)
Width 5/8" (15.88 mm)

Front wheel bearing (outer) Part No. 190/S
Type Skefco RMS/C
Internal Diameter ¾" (19.05 mm)
External Diameter 2" (50.8 mm)
Width 11/16" (17.46 mm)

It will therefore, be readily understood that the stub axles and brake drums etc., are not interchangeable with the assemblies as fitted to cars prior to Engine No. E0/PB.l05494.

Service Bulletin Item No. 164 November 1953 - Front hub bearings service conversion scheme.

It is advised when replacing front hub bearings to use the Service Replacement Scheme now in operation.

This scheme involves the changing of the inner bearing, which is of the ball type, to a roller bearing Part No. J54855 (Skefco CRL 8) and also the distance piece to the new type, Part No. J54854. When fitting the new bearing, attention must be paid to the dimensions required when pressing the roller bearing into position (See Fig.19). The outer ball bearing Skefco RMS/6 remains unchanged.

The roller type bearings and distance piece can be fitted to all hubs after Engine No.E0/PB. 10594, the new type distance piece must be used.

FRONT SUSPENSION - Ref. PA, PB maintenance manual P.56 PC. PD and PE maintenance manual P.82.

The front trunnion bush brackets are secured onto the chassis frame members by a long vertical bolt which passes through the frame with a locknut under and four bolts which screw into the inside of each main frame member. It is most important to make sure that these bolts are kept tight especially the vertical one. Due to the rusting of the mainframe from the inside, the frame is easily cracked due to the sudden shock transmitted through the loose bolts. Once cracking has occurred it is exteme1y difficult to repair. The frame is such a complex construction at this point that normal surface welding is not strong enough to make a permanent weld. Many dozens of Javelins have had to be scrapped because of this, so be warned.

On the early metal-bushed front suspension, everything should be kept well oiled, as wear will quickly take place in the metal bushes. Replacement parts for the early front suspension are expensive and some parts are in very short supply. The king pin bushes should be regularly greased with the weight of the car on a jack. This helps in getting the grease to the vital points. When renewing the king pin, the opportunity may be taken to fit

a new grease nipple to the bottom king pin bush. This is the bearing that gets least, but needs the most grease. If king pin seizure has occurred, try pumping oil into the nipple. Heat applied to the outside of the hub can assist in freeing the joint. If this fails the king pin must be stripped out, cleaned, regreased and reassembled.

When removing the king pin or replacing the bottom spring arm bushes it is usually very difficult to remove the spring arm pin. A method of removal, which usually works, is to screw an elongated nut over the screwed end of the pin, screw a bolt tightly into the nut and tap sharply with a hammer. It is always advisable to purchase a new pin before stripping just in case the pin is damaged.

All metal and rubber bushes should be regularly checked for any serious wear or damage and new bushes fitted where necessary.

When removing the torsion rods it is always advisable to replace the torsion rods on the side from which they have come. Some members have found occasionally that if the rod is subjected to a twisting action in the opposite direction to usual, failure may occur.

The spring arm rebound buffers must be present and in good condition as under severe conditions the spring arm would strike the mainframe. This may cause serious damage after a time.

Service Bulletin Item No. 12 April 1950 - Upper link trunnion pin

The new type upper link pin (Part No.52716), which is reduced in length, is fitted to cars where the upper link is lubricated by a greaser.

The old type pin (Part No.50301) should be used where the lubrication is by oil feed.

Service Bulletin Item No. 44 May 1951 - Fitting of torsion rods

To prevent the octagonal ends of torsion bars corroding and causing difficulty when torsion bar removal is necessary the ends should be treated prior to fitting with an anti-corrosive solution.

Service Bulletin Item No. 96 - July 1952 - Front suspension

Front Javelin Engine No.E2/PD.21868 and Jupiter Engine No.E2/SA.865 the front suspension has been re-designed in accordance with the 1952 specification. The suspension is mounted on conical rubber bushes, and does not require lubrication. The upper link bracket is replaced by a cast aluminium type bracket and the upper link is manufactured in two sections to facilitate the assembly of the rubber bushes.

The new type swivel pin yoke is a screw fit to the swivel pin and thrust between the yoke

and stub axle is taken by a steel thrust washer.

New type shock absorbers of Armstrong manufacture are fitted which incorporate an internal bump stop, the lower spring arm has been modified to accommodate the new rubber mounting for the swivel pin. The new type suspensions and shock absorber assembly together with the existing stub axle and front hub assembly is fully interchangeable with the previous type suspension.

Service Bulletin Item No. 140 May 1953 - Conversion of suspensions to rubber bushed type.

It is possible to convert the old metal-bushed suspension to the new type rubber front suspension by using the following late type parts.

J54466	4 off	Upper Spring arm
J54467	2 off	Upper Spring arm pin
J 54491	4 off	Metalastik bush
FB 107/27	2 off	Bolt - clamping upper spring arm
FN 107/K	4 off	Nut
J54449	1 off	Upper link bracket - LH
J54448	1 off	Upper link bracket - RH
354490	8 off	Metalastik bush
52084	as reqd.	Upper link bracket shim
54023	as reqd.	Upper link bracket 1/2 shim
J54450	2 off	Spindle - upper link bracket
J54474	4 off	Upper link trunnion washer
54082	1 off	Stub axle - LH
54083	1 off	Stub axle - RH
50275	4 off	Stub axle bush
J54475	2 off	Swivel pin
J54 490	4 off	Metalastik bush
J54476	2 off	Swivel pin yoke
J54509	2 off	Swivel pin thrust washer
52591	as reqd.	Shim - swivel pin
50571	4 off	Grease nipple - front hub and swivel pins.
54087	2 off	Locking ring
54088	2 off	Locking ring screw
54091	2 off	Hub joint
W 10	2 off	Washer
FN4 10/K	2 off	Slotted nut
190/S	2 off	Front hub bearing - outer
54085	2 off	Front hub distance tube
189/S	2 off	Front hub bearing - inner
54084	2 off	Front hub oil seal - inner
54086	2 off	Corner spacer

54090	2 off	Grease cap
50697	6 off	Hub grease cover setscrews
FB104/14	2 off	Bolt
J54485	2 off	Lower spring arm pin
J54473	2 off	Spring arm washer
J54468	2 off	Spring arm pin spacer
J 54470	2 off	Front shock absorber
52151	8 off	Shock absorber bush thimble
50469	8 off	Shock absorber bush
FB107/26	2 off	Shock absorber bolt
FNl07/K	4 off	Shock absorber nut
J54472	4 off	Washer - pin support shock absorber
J54494	4 off	Shock absorber bolt spacer
J54495	4 off	Keeper plate
FS/104/4	4 off	Keeper plate setscrews
FBl07/17	2 off	Shock absorber mounting bolt
W7	4 off	Washer

It is essential that if this conversion is carried out on a Javelin before E0/PB.10594 that the stub axle, together with the complete brake and hub assembly are retained, or if they require replacement, they are replaced by the same type (See also Item No. 162).

Service Bulletin Item No. 162 November 1953 - Spring arm conversion.

Further to Service Bulletin Item No 140 a scheme has now been evolved whereby the spring arms fitted to pre rubber bushed suspensions on cars before Engine No. E2/PD 21868, E2/SA.865 may be modified and used with the rubber bushed type suspension. Reference should be made to Figs.20a b and c for conversion instructions Fig. (a) shows the general arrangement, (b) and (c) show the parts required to convert the spring arm.

Further reference - Jowetteer March 1970 Page 40 - Converting early suspension to late using the existing brakes - by Alan Tuppen.

When I say that everything in the article I found out the hard way, with only four freezing cold days to do the job, you will know why I wrote it.

Having spent nearly all of my hard earned Christmas holiday grunting and cursing in the garage, I think it worthwhile to help anyone else to avoid my troubles.

If you own a PA Javelin like mine and are intending to replace the original front suspension with the later rubber bushed type, it isn't as straightforward as you think.

Everyone knows the steering ball joints are of a different type, the later ones having screw fittings in to the steering arms, but if you are intending to retain the original front brakes, then things become complicated.

It is fairly easy to remove the old suspension put jacks under the chassis and the spring arm and undo the relevant nuts and bolts. Undo the bolts at the bottom of the king pin and damper, and the bolts round the upper link bracket. If you can support the rest of the assembly you may not need to take the upper link off its bracket to get at the bolts, but if you can undo the through bolt - the "upper link trunnion pin" it is easier. When you take the upper link bracket off the body, don't lose the packing shims you will need these and probably more when you put the new lot on. Mine even had half shims to pack out the front of the bracket in relation to the rear.

Before you get this far if you are retaining the old brakes you will want to suspend the back plate and brake assembly - a mutilated wire coat hanger is ideal for this purpose, hooked through the ventilators behind the radiator.

Now comes the interesting part. With the old parts all off and the new upper link bracket and king pin yoke assembled, you will need, not only three or four extra packing shims so that the nuts projecting from the front of the new bracket clear the body ride, but considerably longer bolts to attach the assembly with, since the new bracket is cast in what appears to be a rather nasty zinc alloy. I bought fourteen 1 1/2" bolts. They don't really need to be quite so long, but assembly is easier and 1" is not really enough. On the offside, things are complicated by the steering. The original bottom rear bracket fixing bolt cannot be removed without also removing the steering column inside the car, so you will have to decide yourself what to do. I got a larger bolt unthreaded near the head, cut off the threaded part, drilled it up the middle, and tapped it to mate with the bolt still inside the car. On the nearside there are no fixing problems. Incidentally the "Jowcars funnyman" has had a hand in the suspension too. The new upper link bracket marked "LH" naturally goes on the RH and the one marked "RH" goes on the LH.

Now to the stub axles. If you are fitting the old back plates, then you will need to use the old stub axles too. If you have to rebush these yourself you will find it easier to do if you file the slits in the bushes out to about 35 than with a fine vee file. I found that the old bushes in every case were so tight that I had to cut through them with an old hacksaw blade in every case before I could even hammer them out. If you have an adjustable reamer, then use this to make the king pins fit. It must be a joke to suggest burnishing the bushes, but I would like to know what the professionals do. If you are stuck for king pin bushes there is a Morris of 1936-9 sort of vintage that uses identical ones, and you will probably have to buy the whole king pin set, but at 21/- this should not break you.

The stub axle spigot and back plate bolt holes are different so you cannot use the two

different series together. The diameters of the stub axles are also different so that without changing the wheel bearings the different brake drums will not fit either. There may be other differences apart from these but I didn't look any further.

Now all that remains is to satisfactorily attach the bottom of the new king pin to the old spring arm. With the old system there was no problem with freedom of movement and fore and aft clearance taken up by shims if necessary.

If possible one should use later type spring arms but I really couldn't face that too as you need to jack up the engine and use torsion rod pullers to get the old ones out. The differences are small, but important if you have no welding facilities.

On the later one there is a thick washer about ¼" welded to the inside rear of the fork that holds the king pin and a small piece welded to the outside rear to stop the spring arm pin turning. In addition, the hole in the front of the fork has to be enlarged to take a tube to compress the rubber bushes properly. This tube should be a press fit, and as the spring arm fork is somewhat hardened, you will need a good file or whatever you use to open out the leading hole. Anyway, the best thing to do is visually improve the old one and the new if you can so that you have time to work out a way of adapting the old to take the new.

Well after all that, is it worth it?

As far as I am concerned, yes, as suspension movement is taken by rubber bushes instead of elaborate metal bearings, all stiffness is greatly improved so that my car now rolls much less on corners than before. It also pitches and wallows hardly at all now but this will be because the new dampers are good whereas the old ones might just as well not have been there at all. As you may have gathered road holding is now much better, with the result that it seems easier to slide the back now, I suppose because I can safely drive faster. With the elimination of steering play, control is now better than I had thought it could be. Camber of the wheels did not appear to he affected by the extra shims added to the inner link bracket. Beware though the stiffer suspension makes your car rattle more, but at least the car should get through the M.O.T. test this year.

REAR SUSPENSION Ref PA PD, PB maintenance manual P 63. PC, PD and PE maintenance manual. P.86.

As with the front suspension, all rear suspension bushes should be regularly checked and replaced if found faulty. The aluminium rear torsion rod covers should be in sound condition. If badly corroded or cracked they can fail allowing the upper spring arm to slip off the torsion rod.

The upper spring arm is constructed of two strips of thick steel plate spot-welded together

at the ends. Water sometimes gets between these plates and corrosion sets in. When badly corroded the two plates bow apart allowing even more water to enter. If this is the case on your car clean out as much rust as possible, re-weld the plates together, or put a couple of small nuts and bolts through and lubricate freely with old engine oil.

The bottom spring arms are subjected to a lot of splashing from the wheels and again the water gets between the two thin sheets of steel plate causing severe rusting. In the past a few of these arms have been seriously weakened by rust and finally broken causing rear wheel steering, which can result in a serious accident.

The following action should be taken

a) Check that the spring arms are in sound condition replace if necessary.

b) Thoroughly clean and do rust the exterior surfaces, coat with paint and apply a thick covering of under-seal. This is to prevent oil getting out as well as water getting in so put plenty on.

c) Screw a self-tapping screw into the arm at the top on the outside.

d) Remove the self-tapping screw and fill the arm with old engine oil put the screw back and seal over with more under-seal.

e) If oil leaks out, top up about once every two years.

No future corrosion should take place if this procedure is followed.

On early Javelins the rear shock absorber top mounting was very weak and breakage was common. A bracket was introduced which held the unsupported end of the mounting shaft secure, This bracket Part No 54389 should be fitted to both sides if absent. (See the competition notes appendix for further information).

SHOCK ABSORBERS Ref. PA, PB maintenance manual P 64. PC, PD and PE maintenance manual P.86

Service_Bulletin Item No 29 September 1950 - Front shock absorbers - PB models

From Engine No E0/PB 9877 a new type front shock absorber has been fitted to Javelin cars. These units incorporate a redesigned lower fixing arrangement, which reverses the position of the shock absorber buffer as shown in Fig 21. It will be noted that the buffer assembly is cut away to provide clearance for the stub axle in the rebound suspension position.

Service Bulletin Item No 54 July 1951 - Front shock absorbers - PC Models

From Engine No EL/PC.16500 a 25% increased strength shock absorber (Part No 54385) has been fitted to the front suspension. This will obviate any necessity for the fitting of special type shock absorbers to vehicles using oversize tyres or where operating under extreme road conditions. The existing standard rear shock absorber Part No 50467 will still be retained for the rear suspension. A stock of the original type front shock absorbers will be retained for replacement service.

Service Bulletin Item No 97 July 1952 – Shock absorbers – Armstrong type.

With the introduction of the new type front suspension at Javelin Engine No. E2/PD 21868 and Jupiter E2/SA 865, Armstrong type shock absorbers were fitted to the front and rear suspension. The front shock absorbers (Part No. J54470) incorporate an internal rubber bump stop and are only interchangeable on Javelin and Jupiter models incorporating the new type front suspension. The rear shock absorbers (Part No. J54529) are interchangeable on all models, but it is strongly recommended that the Armstrong type is always fitted to models incorporating the new type front suspension and not to previous models.

Service Bulletin Item No. 108 September 1952 – Shock absorbers – Woodhead Munroe type.

Further to item 97. At Javelin Engine No. E2/PE 22346 and Jupiter Engine No. E2/SA 921, the Armstrong shock absorbers were discontinued and replaced by the Woodhead Munroe type. The front shock absorbers incorporate an internal rubber bump stop and are only interchangeable on Javelin and Jupiter models incorporating the new type front suspension. When fitting replacements both shock absorbers should be of the same type. The rear shock absorbers are interchangeable on all models and when fitting replacements both shock absorbers should be of the same type.

Service Bulletin Item No. 158 November 1953 – Changes in shock absorbers.

(The Part Numbers in brackets are the manufacturers assembly numbers).

Engine No.		Part No Front	Part No Rear	Remarks
From	D8/PA 8	(01314)	(0115A)	Original units
To	D9/PA 4381	(50468	50467	
From	D9/PA 4382	(01314)	(0115A)	Rebound buffer modified
To	E0/PB 9876	52584	50467	on front units.
From	E0/PB 9877	(02395)	(0115A)	Redesigned lower
To	E1/PC 16499	54010	50467	attachment on front Units. T/Bulletin No. 29
From	E1/PC 16500	(02748)	(0115A)	25% increased strength

To	E2/PD 21867	54385	50467	of front units. T/Bulletin No. 54
From	E2/PD 21868			
To	E2/PE 22345	Reference Technical Bulletin No. 97		
From	E2/PE 22346	(03025)	(02749)	Competition units front
To		CD 9079	54383	rear stops in front unit. T/Bulletin No. 108

STEERING - Ref. PA PB maintenance manual P -56. PC, PD and PE maintenance manual P.91.

The importance of greasing all steering joints at the correct intervals cannot be overstressed. If left un-greased for long periods the old grease will harden causing the steering to stiffen. The application of grease at this stage has very little effect and all joints have to be stripped and cleaned. See under front suspension for method of freeing dry king pin bushes. Do not forget to grease the idler arm.

The Javelin steering system is basically very safe. The only items that need watching are the track rod ends. If badly worn the track rod will jump off the 'ball' and steering will be lost. Very slight free play is acceptable but preparations should be made to replace them both. When one side is badly worn the other will quickly follow unless there is a fault in the steering assembly.

The Javelin steering box has proved to be of very good design. Very little wear takes place and this can be taken up by adjusting the mesh of the box and steering column teeth with the eccentric pinion bush. Full details of adjustment are in the maintenance manual. Many of the existing steering boxes have oil seals, which no longer can hold oil. In these circumstances the box should be filled with heavy grease. A pressure system of refilling should NOT be used. The steering box mounting bolts must secure the box rigidly with no free play. Any free play will give unwanted steering 'Play'. The steering box securing bolts and the three bolts securing the steering column to the steering box should be checked for tightness periodically.

Service Bulletin Item No. 16 June 1950 - Steering track and camber

Camber angle and track should invariably be checked together as the track cannot be checked effectively before Camber is checked and if necessary re-set.

The following routine is the only satisfactory method of carrying out these checks and we would emphasize the facts that short cuts should be avoided.

1. Check wheel bearings upper links lower links, stub axles and wheel rims for damage wear etc. and rectify as found necessary. In addition when checking track, it is essential that the following points are checked for play and if necessary, adjusted.

A. Steering cone nuts and steering rods should move freely in the steering link assembly without play.
B. The lift between the swivel pin and the stub axle should NOT exceed .008".

2. Slack off the torsion bar adjusters completely.
3. Set the car level. To do this jack up the front of the chassis using a screw type jack under each frame-side member at the gearbox cross member, so that the underside is approximately 10" (25.5 cm) from the ground. This distance will, of course, be governed by the adjustment necessary to level the car transversely. The level gauge as illustrated in Service Aid No.6 is essential for this purpose.

4. With the use of screw type jacks, raise the spring arms until they are clear of the ground.

5. Check the camber angle, which should be zero, with the suspension in this position and the wheels 'straight ahead'. The maximum tolerance permissible is: -

VERTICAL - Minus 1/8" (3.175 mm)
ZERO - Minus 0° - 27`

6. Camber angles may be reset, by adding or removing shims behind the upper link bracket. As a general guide it can be taken that removing or adding 1/8" (3.175 mm) thickness of shims alters the camber angle by 5/32" (0° - 35`)

7. Remove all jacks by lifting with a garage jack under the centre of the gearbox cross member. Lower the chassis until with the wheels on the ground, the spring arms are again horizontal. Set the track dead parallel.

Special note It is essential that the steering rod assemblies are within 3/16" (4.5 mm) of equal length. This length may be measured between the inner-face of the steering ball joints, and the face of the steering ball socket. If this point is not given careful attention the steering assembly will be strained on an extreme lock, also "kick" on the steering wheel may be experienced.

8. Lock the steering box with the wheels straight ahead. It is essential that the straight ahead position is maintained during the whole check, the steering must therefore be locked by some method such as inserting a wooden wedge between the steering box case and the steering box arm. When doing this special care should be taken to avoid damage to the steering box casing.

9. Raise the car until the wheels are clear off the ground, and remove the front road wheels. Fit the independent tracking equipment as detailed in Service Aid No 6 in the following manner. Remove the grease nipple from the bottom of the swivel pin boss, and thoroughly clean the boss. Fit the pointer and secure with an 1/8" gas setscrew, screwed into the greaser drilling. Care should be taken to avoid distorting

the pointer by over tightening the setscrew.

10. Fit the calibrated arm to the brake drum and secure with wheel nuts and tighten the brake adjuster so that the drum is locked and the plate in line with the pointer arm. Set the pointer on the centre mark of the calibrated plate with the spring arm horizontal.

11. Raise the spring arm until the suspension is at maximum bump position (i.e. until the full weight of the car is resting on the front wheel buffer) Check the pointer reading in this position.

12. Lower the spring arm until it is resting hard against the rebound buffer on the frame side and again note the reading. The maximum difference in readings on the calibrated plate must not exceed 1/32". The ideal, of course is to have no track variation at all and this should be achieved wherever possible.

NOTE: 1/32" reading on the plate represents a difference of 1/16" on each wheel, which in turn represents 1/8" difference in track.

Should these limits be exceeded it will be necessary to alter the height of the steering ball, either by replacement if the ball joints are the fixed type, or by screwing as necessary if the balls are adjustable.

For cars with fixed type joints, the following steering balls to correct track variations can be supplied, assembled into steering ball joint assemblies: -

STANDARD	25/32"	SHANK HEIGHT
Plus 5/32"'	30/32"	
Plus ¼"	33/32'	

The following will be found a useful general guide when correcting excessive track variation: -

STEERING BALL TOO SHORT

A. "Toe-in" at rebound.
B. "Toe-out" a' Bump.
C. Combination of conditions A and B.

STEERING BALL TOO HIGH

D. "Toe-out" at rebound.
E. "Toe-in" at Bump.
F. Combination of conditions D and E.

After checking and if necessary correcting on one side, the operation should be repeated on the other side.

13. Finally reset the torsion rods refit the greasers and road wheels, remove the wooden block from the steering box, re-adjust the front brakes, and re-check the overall track The track setting should be parallel to 1/16" toe out.

14. MOST IMPORTANT.

After the chassis height has been reset and with the spring arm resting hard against the rebound buffer on the frame side check the distance between the steering ball, housing and the steering arm which must not under any circumstances be less than 1/16" as shown in Fig.2.

It should be noted that steering arms part Nos 52667 (RH) and 52666 (LH) are fitted to Right Hand drive cars and steering arms. Part Nos. 52678 (LH) and 52679 (RH) fitted to Left Hand drive cars. The difference in Right and Left Hand drive models is in the height of the forward end of the steering arm, in relation to the stub axle, and it will therefore be readily understood that the fitting of the incorrect arm will seriously affect the steering geometry.

Service Bulletin Item No 30. November 1950 - Steering ball joint - PB models

A re-designed steering ball joint assembly, (Part No 54012) has been fitted to all Javelin cars with effect from Engine No.EO/PB.10789, as shown in Fig.30.

The new assembly has been designed for ease of dismantling and is fully interchangeable with the previous type of steering ball joint assembly (Part No.52668).

To adjust the spring tension, release the lock nut (Part No. 54015) and screw the spring retaining nut in a clockwise direction until solid. From this point release the spring retaining nut a quarter of a turn and lock with the lock nut. (Part No.54015).

It is important that there should be a clearance between the neck of the ball and the bore of the socket in all positions throughout the range of suspension movement. When carrying out adjustments to the steering it is necessary to check this Point and also the clearance. between the socket housing and the steering arm.

The new type ball joint assembly allows an increased range of travel for the ball, and the steering socket is positioned in such a manner as to allow increased clearance between the housing and the steering arm.

Where difficulty is experienced in obtaining the correct clearance on cars fitted with the

ball joint assembly. (Part No 52668) the new type steering ball joint assembly (Part No 54012) should be fitted.

The full track and camber check as detailed in Bulletin Item No.16 should be carried out when fitting the new assembly.

Service Bulletin Item No.40 February 1951 - Steering ball housing clearance

It is again emphasised that after carrying out Steering Track and Camber Drill as detailed in Bulletin Item No.16 it is most important to check the following: -

The distance between the Steering Hall Housing and the Steering Arm MUST NOT under any circumstances be less than 1/16" (1.587 mm) with the spring arm in the full rebound position. Please refer to Fig.29 for any clarification of this point.

In addition to the above it is equally important to check that the bottom inner edge of the bore of the steering ball housing does not foul the neck of the steering arm ball with the suspension in the full rebound position.

A satisfactory check may be made with the suspension in the full rebound position and by rotating the steering ball housing which should be free to rotate in a backward and forward direction.

If the housing is free to rotate a clearance is indicated between the inner edge of the steering ball housing and the steering hall neck. Please refer to Fig. 31.

If there is little or no free movement, it is apparent that the inner edge of the steering ball housing and the neck of the steering ball are in contact. In this case, IMMEDIATE ACTION must be taken to fit replacement ball joint assemblies as detailed in Bulletin Item No.30 (See Fig.30)

Service Bulletin Item No. 48 May 1951 - Steering wheel - deluxe models

From Engine Number E0/PC.13111 a new type clear vision steering wheel has been fitted to deluxe models. In order to maintain the correct clearance between the steering wheel rim and the gear change lever when in reverse position the inner and outer steering column has been lengthened by approx. 3/8" (9.525 mm). If the inner steering column is being replaced on vehicles prior to the above engine number by the new type inner column (Part No.50529) an extension sleeve (Part No.54362) will have to be fitted to the top of the outer column to take up the space between the outer column and the steering wheel boss. In cases where the outer column is being replaced by the longer type (Part No. A550533) no modification is required as the inner recess of the steering wheel boss will allow for the outer column increased

length.

The inner and outer columns are fully interchangeable in sets on all models.

Service Bulletin Item No. 62 October 1951 - Steering adjustment

Reports have been received regarding the "stiffening up" of the steering action, especially in both extreme locks after steering adjustment service has been carried out.

Investigations reveal that the stiffness is due to the adjustment of steering internal gear and pinion being carried out with the wheels in a straight ahead position and without allowance being made for the extra wear which takes place on the centre teeth of the internal gear. In view of this, we would again draw your attention to Sections 129, 130 and 131 of the Maintenance Manual which deals fully with steering adjustment and emphasize the necessity for paying special attention to Paragraph 4 of Section 130 which reads as follows: -

"To adjust, remove the three set screws securing the column to the box and turn the lock washer until the best possible meshing is obtained, bearing in mind that if wear has taken place, this will be mainly in the centre of the gear and that the adjustment will be limited by meshing on each extreme lock".

Service Bulletin Item No.107 July 1952 Steering wheel - Splined fitting type PD models.

From Javelin Deluxe Engine No.E2/PD.20881 and Javelin Standard Engine No. E2/PD.21838 a splined fitting type steering wheel was introduced to facilitate the removal, replacement and positioning of the steering wheel so that a clear view of the instrument panel may be obtained between the steering wheel spokes when the road wheels are in a straight ahead position. The fitting of the improved type steering wheel necessitates the tapered end of the steering internal column being replaced by a splined insert. The steering column felt bearing locating collar is integral with the insert and does not allow the removal and replacement of the horn slip ring, which together with the steering internal column are supplied only as an assembly. A distance piece is fitted between the steering wheel and the shoulder at the upper end of the internal column to facilitate the fitting of the felt bearing. The late type Steering Wheel (Part No.J54539) Deluxe (Part No.53338) Standards and Steering Internal Column (Part No.J54528) together with the Distance Piece (Part No.54511) are fully interchangeable with the previous type steering wheel and steering internal column.

Service Bulletin Item No. 123 December 1952 - Swivel pin thrust washers

When assembling the Stub Axles and Swivel Pins on cars incorporating the

Rubberised Suspension the end float between the Swivel Pin Yoke and the Stub Axle must not exceed .010" (.254 mm).

To enable this adjustment to be made, Thrust Washers of varying dimensions are available and may be identified by the following Part Nos.

J.54748 Thrust Washer .1005" - .0995" (2.553 mm – 2.528 mm)
J.54749 Thrust Washer .1085" - .1075" (2.756 mm – 2.731 mm)
J.54750 Thrust Washer .1165" - .1155" (2.959 mm - 2.934 mm)

Service Bulletin Item No. 123 March 1953 - Wheel tracking

The following is recommended when using the Dunlop optical wheel aligning equipment.

1. The aligning fixture should be located on the tyre sidewall.

2. Readings should be taken at two, preferably three, different positions, equally spaced on the tyre sidewall circumference, and an average of these readings taken.

The readings obtained by this method may vary slightly with those obtained using the brake drum face for location purposes but the error should be within the acceptable tolerances of parallel to 1/8" (3.2 mm) toe-out.

Service Bulletin Item No. 166 November 1953 Camber setting

In cases where the frame level gauge, Tool No. J.9127C is not available, steering camber setting should be carried out as follows: -

With the car on level ground adjust torsion bars until frame height from underside of frame to ground is 10" (25.4 cm). A plumb line is then dropped from the tyre as near to centre as possible, care being taken to avoid the tyre bulge and the distance between plumb line and tyre should measure 1/16" (1.59 mm).

To obtain correct dimensions, adjustment can be made by means of shims (J.54731) fitted between the upper link bracket and the frame.

After setting the camber the overall wheel track should be checked.

The following circular was issued by Jowett Cars Ltd. shortly after production commenced on the Javelin. These notes therefore, only apply to a few early production Javelins.

Technical Circular No. 3

We are not satisfied that under certain conditions the steering link cone nuts (50557) will remain tight.

The following action must be taken IMMEDIATELY on all vehicles, which passed through your organisation,

I. Remove Steering Link Lock Nuts and Cone Nuts from each end of the steering link assembly (50553).
2. File a flat on both Steering Link Pins as shown in the Fig.32.
3. Refit the Cone and Lock Nuts using the new type "D' locking washer (52054) - supplies of which are enclosed.
4. The correct adjustment for Cone Nuts is to tighten up fully and then slack back through 1/6th of a turn.
5. The Lock Washer should be folded over on to both the Cone and the Lock Nuts.
6. Every care should be taken to remove any filings, and to prevent these from entering working parts.

BRAKING SYSTEM Ref PA PB maintenance manual P.51. PC, PD and PE maintenance manual P.101

The hydro-mechanical and full hydraulic braking systems are very sound but as with other cars careful checks should be made at regular intervals to ensure that the braking system remains in perfect condition.

The following check list may be used at every 5,000-mile service to maintain braking efficiency:

a) Check condition of brake linings and replace them before they are worn down to the copper rivets. Blow out any dust from the brake drums.
NOTE: This dust mostly comprises asbestos and is harmful when inhaled.
Use an air line or foot pump.
b) Check for brake fluid leaks from wheel cylinders, pipe unions, brake hoses and master cylinder.
c) Check condition of steel brake pines. If rust pitted replace before they corrode through.
d) Check condition of high and low-pressure brake hoses. Replace at the first sign of cracking in the rubber.
e) Check all mechanical linkages for security. Check that split pins are fitted.
f) Check operation and return of handbrake linkage. The rear compensator must be well greased and free to move. Only graphite grease should be used on brake cables. The brake adjuster should be free moving and lightly greased.
g) Check brake fluid level.
h) Check wheel cylinder pistons and handbrake expander units for free operation.

As some members may be aware Ford Consul Mark I brake shoes fit the full hydraulic brake

Javelin and Jupiter. There is however, a difference in the brake lining material. The Javelin is a much heavier vehicle and has a harder lining material. Ford Consul Mark 1 brake shoes are not suitable for 'performance' use as 'brake fade' occurs very quickly.

The rear wheel cylinders on the full hydraulic brake Javelin and Jupiter 15 designed to move slightly allowing the pressure exerted to be equalized between the two brake shoes. On assembly the cylinder inner (sliding) face and the exterior cover plate should be lightly greased with brake grease. The cylinder securing nuts (Simmonds nuts) should be tightened down and turned back one half turn. Do not over tighten. No further maintenance should be required but should uneven wear take place on one pair of shoes the probably cause is restricted movement of the rear wheel cylinder. In these circumstances the cylinder will have to be removed, the sliding surfaces cleaned regreased and reassembled.

A very common handbrake fault is that the handbrake lever being a steel sheet pressing is easily broken. Do not apply excessive force to the handbrake lever. Only light pressure is required to hold the car on the steepest slope. If excessive force is required the handbrake system is faulty and the following items should be checked.

a) Handbrake cables must not stretch excessively.
b) The rear compensator should be well greased and free to move.
c) The rear wheel cylinder draw links must be free moving, well greased and the tapered roller surfaces should be smooth and un-grooved. Light stoning will remove any grooves and indentations.
d) The tappets must be free moving, well greased and the ends un-grooved.
e) The rollers must be rust free and round. If there are any flats on the rollers they must be replaced.
f) The brake adjusters must be correctly adjusted and the brake shoe ends lightly greased with 'brake grease'.

As mentioned, a very careful check should be made on the freeness of all wheel cylinder pistons. The brake drums should be removed followed by the brake shoes. A 'G' clamp should be used to hold one of the pistons inside its cylinder whilst pressure is exerted on the brake pedal forcing the other out. Be careful not to press too far or the piston and seal will be forced completely out of the cylinder. If excessive pressure is required to move the piston, the flexible brake hose should be clamped tight with the special Girling tool and the piston and seal removed for cleaning. No abrasive papers or pastes should be used. The inside of the piston chamber and the piston should be cleaned with brake fluid or a mild liquid polish such as 'Brasso' or Bluebell. A new seal should be inserted, recessed side innermost followed by the piston. Plenty of Girling brake fluid should be used. Do not assemble dry. After reassembly the hose clamp can be released and the appropriate pipe bled.

To assist bleeding 'A.P.V.' brake bleed valves can be inserted in place of the existing. No rubber tube or bottle is required with these.

The existing Javelin brake fluid reservoir tank can if required, be changed to a Jaguar one which incorporates, a float and switch which can be wired to a warning lamp under the instrument panel giving warning of low brake fluid level or complete loss. Others are available, e.g. Smiths.

Service Bulletin Item No. 8 March 1950 - Front brake judder

The following may cause "Grabbing" or "Judder" on the front brakes: -

1. Incorrect adjustment, allowing excessive clearance between the brake lining and drum.
2. Brake linings insecurely or incorrectly rivetted to the shoes.
3. Brake shoe pivot pin loose on the back plate.
4. Irregularities in the surface of the brake drum bore.

It is possible that even with the above points correct grabbing may occur and in this case the existing linings should be replaced with Mintex M14J linings.

Service Bulletin Item No. 26 September 1950 - Four wheel hydraulic braking system.

Introduced with effect from Javelin car engine No.EO/PB.10594.

DESCRIPTION: The brakes fitted are Girling 9" x 1 3/4" (228.6 mm X 44.45 mm) Hydraulic Leading Sliding Shoe on the front and Girling 9" X 1 ¾ (228.6 mm x 44.45 mm) Non Servo Sliding Shoe with internal handbrake mechanism on the rear. Footbrake application is Hydraulic with a separate mechanical operation for the hand or parking brake.

FRONT BRAKES: The Front Brakes are 9" x l 3/4" (228.6 mm x 44.45 mm) H.L.S.S. each shoe is operated by a separate wheel cylinder located on the back plate. It will be seen that each shoe is located on one cylinder and expanded by the piston of the other with the leading edges of both shoes making initial contact with the drum. The rear at the cylinder casting is formed to create a 28° inclined faced abutment with a steel strip which is the locating slot for the trailing edge, thus increased efficiency and more even lining wear is obtained owing to the sliding action of the shoes.

Each brake shoe is held in position by a return spring which passes from the abutment end of the shoe to a hole in the back plate and the springs are not positioned from shoe to shoe.

Adjustment for lining wear is provided by knurled snail cam adjusters, which operate against a peg at the actuating end of the shoes, the adjusters turn clockwise to expand the shoes.

Each wheel cylinder the bodies of which are made from alloy, consist of a seal retaining spring, a Bakelite seal spreader, seal and piston.

The two wheel cylinders are inter-connected by a bridge pipe, which passes from cylinder to cylinder on the reverse side of the back plate, provision being made for a bleed valve on one cylinder only. It will be noted that the flexible feed pipe is now connected to the wheel cylinder at the rear and not as previously at the top.

FRONT BRAKE ADJUSTMENT: -

1. Jack up the car until the front wheels are clear of the around.
2. Rotate the wheels and if necessary operate the adjusting bolts anti-clockwise until the wheels rotate freely, and without drag.
3. Turn one of the adjuster bolts until its brake shoe touches the brake drum and release the adjuster until the shoe is just free.
4. Repeat the procedure for the second adjuster and the other wheel.
5. Apply the footbrake and after a Short pause recheck the wheels for free rotation. It is obviously essential that the shoes should not be in contact with the brake drum when the brake pedal is in the off position.

REAR BRAKES: The Rear Brakes are 9" x l 3/4" (228.6 mm x 44.45 mm) HNS/S/H. The shoes are hydraulically operated by a hydraulic wheel cylinder, which consists of a die cast aluminium housing, two plungers complete with dust covers, two seals, two bakelite seal retainers and a seal retaining spring.

The handbrake expander housing which is part of the wheel cylinder casting, consists of a hardened steel wedge which also acts as the draw link, two hardened steel rollers and two flat inclined faced hardened steel tappets.

The retaining cover, which is secured on the housing by four setscrews has two tabs, these prevent the flat tappets from sliding out of the housing when the brake shoes are removed.

A bleeder valve is also incorporated in the cylinder housing, a rubber cover being fitted to exclude dust etc. The shoes are located at the adjustment end in the slots provided in the adjuster plungers, being held in position by two springs from shoe to shoe, the shorter of the two being fitted at the adjuster end of the shoes.

It will be seen that the shoes are not anchored in any fixed position but are allowed to slide both at the hydraulic pistons and the adjuster links.

Adjustment for lining wear is made by the screwed adjuster wedge as for the previous mechanical rear brake operation.

The adjuster clicks over notches as it is tightened in a clockwise direction: do this as far as it will go without forcing until the shoes are binding on the brake drum. Then slacken off the adjusting screw until the drum revolves without binding on the brake shoes, releasing for two notches is normally sufficient.

HANDBRAKE OPERATION: The handbrake cable is no longer interconnected with the foot brake mechanism, a pull rod is inserted between the hand-brake and rear brake cables which gives a direct connection between the handbrake lever and the rear brake compensator.

Adjustment is provided at each end of the Pull rod and as with the previous system there should be slight play in the linkage before movement of the handbrake lever operates the rear shoes. With the rear brake shoes correctly adjusted the handbrake should be full on at approximately 5 notches.

MASTER CYLINDER: This is the Girling Tension Type Master Cylinder and is operated between a pivot mounted on a bracket fixed to the chassis side member and a short connecting link from the brake pedal. The draw rod is protected from dirt and dust by a rubber boot, which should be packed with Wakefield Rubber Grease No. 3. Unlike the hydraulic- mechanical system previously used, there is no movement of the main body of the cylinder and the flexible hose to the distribution block has been replaced by a short copper pipe.

BLEEDING THE HYDRAULIC SYSTEM: Further to the usual procedure when carrying out this work the following points should receive particular attention: -

1. Before commencing operations adjust the brakes, so that there will be no danger of the brake shoes flexing and thereby allowing air to enter the system.
2. Each wheel should be bled in a definite order beginning at the wheel nearest to the master cylinder. The last of the four wheels to be bled will therefore be the rear near side wheel (left hand) on a right hand drive Javelin (and right hand for a left hand drive car).
3. The type of brake fluid recommended is "Girling Crimson" and when topping up the supply tank during bleeding operations fluid, which has circulated through the system, should NOT be used due to its probable aerated condition. However if the aerated fluid is perfectly clean it may be used after standing 48 hours.

ALTERATIONS TO PARTS AND COMPONENTS: With the introduction of the Four Wheel Hydraulic System the major components detailed below have been revised and are not interchangeable with cars prior to Engine No. E0/PB. 10594.

REAR AXLE - PART NO.54097 (SALISBURY'S 3HA-00l-16)

The new type axle embodies a larger differential casing, the oil capacity being increased to 2 pints (1.284 litres) of HYPOID OIL. The type of oil recommended remains the same.

It should be noted that the transverse stay bracket is now integral with the offside outer tube of the rear axle.

TRANSVERSE STAY - PART NO.54104

Due to the new position of the transverse stay bracket it has been necessary to increase the length of the stay by approximately 4 1/2" (107.95 mm).

REAR PROPELLOR SHAFT - PART NO.54106.

The propeller shaft is approximately 1' (25.4 mm) shorter due to the increased size of the differential casing. The fitting of the layrub Couplings remains the same.

Further references - Club library - Girling maintenance and overhaul of brakes. Jowetteer December 1968 P.118 - Fitting late axles to early cars retaining mechanical brakes, by R. Cope.

When in 1962 I got the chance of a very cheap brand new rear axle for my 1950 Javelin, I naturally wasted no time in accepting. Replacing my old and very noisy unit with the new one seemed easy. Four suspension bolts, Panhard rod and prop shaft, and back plates and since the 1950 Javelin has no hydraulics on the back, no bleeding problems. No bleeding problems? There were several, as I very soon found. To cut a long story short, the new axle was the later one with longer pinion housing, intended for hydraulics and the result being that I had to shorten the rear prop shaft, shift the (old) back plate holes through 90° and find two brake drums and longer Panhard rod to suit the new axle. Fitting the old back plates meant that the old narrow shoes were working in drums intended for wide ones. This set up worked quite well except for a loud squeak when braking other than gently. I need hardly say that my car was often the focus of attention from people waiting to cross the road at traffic lights and these trusting individuals would step blithely onto pedestrian crossings without warning.

A couple of months ago I decided to do something about these brakes. No - didn't convert to hydraulics. A couple of back plates intended for hydraulic operation were obtained and converted to mechanical and at the same time wide shoes were fitted. The result? Better brakes and no squeal.

The actual conversion was quite simple and if any member owning an early Javelin gets the chance of a later axle the following information may be of some help. I feel that it is much cheaper and easier than trying to fit the complete hydraulic system, and has the advantage of being easily converted back to hydraulics at some later date if

you intend, as I do, to fit rubber front suspension and bring your car really up to date.

In the first place, when you get your later axle, make sure you get the rear prop shaft and Panhard rod as well as the rear drums and back plates. You can consider yourself almost home already. Incidentally my axle was brought up to Middlesborough from Wales, that's the beauty of having friends with wide connections. There must be several of these axles lying in storerooms of agents because they never seemed to need changing. However - on with the story.

All you need now is a piece of 3/16" thick mild steel, bright preferably, 4-1" or 1 1/8" by ¼" B.S.F. bolts with self-locking nuts and spring washers, 4 more ¼" castellated nuts and a piece of 3/32" or thereabouts springy wire. You will then need the brake expander housings off your old back plates or better still, buy a couple from a distributor as I did and save yourself some time. The conversion can now be completed and the new axle fitted as a unit apart from one thing - you still need the rubber dust excluders from your old axle but these can wait unless, of course you can get hold of a couple.

The first job in to make 2 plates as in Fig.49 from 3/16" steel plate. One of these is fitted between each expander housing and back plate to make up for the difference in width between the narrow and wide shoes. The expander housing should fit the top 3 holes. A little filing may be necessary. The bottom 2 holes, with the ¼" bolts in replace the studs in the old housings. Since both back plates receive the same treatment I will describe the operations on one. The work needed can be carried out in situ but I would take them off for convenience.

First of all, remove the old hydraulic cylinder. Take the packing plate and with the ¼" BOLTS in the bottom holes, offer it to the backing plate from the shoes side so that the bolts fit in the slots already there. It will be immediately apparent that additional slots are needed for the expander studs. These are best made by drilling 9/32" holes at the slot extremities and cutting to the holes with a fine saw. The next step is to fit the expander housing into the top holes in the packing plate and try the unit on the back plate. You will find that it doesn't fit. Don't worry all that is needed is a small flat filing along the upper side of the expander nose to the depth of the recess which is machined in it. At this point the whole assembly should slide along the slots without force being needed and without excessive up and down play.

At this stage I made a cover plate from this sheet to the same pattern as the packing plate. This fits on the opposite side to the back plate and covers up the hole cut for the original expander. There is now the difficulty of holding the rubber dust excluder in place and this is where the springy wire comes in. Bend it as shown in Fig.50 so that it holds the flange of the excluder onto the back plate and is itself held by the bottom bolts.

Before final assembly a split pin hole was necessary as near the end of each expander stub as possible. I also tack welded the bolt heads to the packing plate but this is not essential.

Having made sure that all sliding surfaces were rust and paint free I fitted the expander housing assembly to the back plate, applying sufficient grease to ensure there would be no sticking. On the other side of the back plate the thin cover plate was fitted first then castellated nuts put on the expander housing studs and tightened down finger tight, that is, so that the split pins could be fitted and the assembly could slide in the slots without any free play. I would have preferred to fit longer studs and spring washers here but any attempt to remove the original studs results in them shearing off. By the way it might be necessary to deepen the castellation slot a little to get the pin in. After fitting the dust excluder the bent spring wire should be fitted followed by a spring washer on each bolt and finally the self-locking nuts. It is absolutely essential that the expander assembly can slide, even if a little force is needed, otherwise the leading shoe will eventually be the only one doing any work. The shoes can now be fitted. I built up the ends, which fitted in the expander to the same shape as the old narrow shoes, but this is probably not necessary.

Fitting the axle and adjusting the brakes is straightforward. After adjustment and with the handbrake on, give the expander a tap with a piece of hardwood to make sure the assembly is centralised. A road trial will now provide the 'proof of the pudding'.

BODY - Ref. PA, PB maintenance manual P.67. PC, PD and PE maintenance manual P.109

Like all steel constructed vehicles of its period, the main body and chassis problems to arise will be duo to the formation of rust causing in some cases severe structural weakness. It is becoming increasingly common for the welds securing the front cross member to be broken causing the whole chassis of the car to flex unduly. In severe cases the front steel floor pan will emit a 'boom' each time the car goes round a corner. It is important to very carefully check for any cracking at the end of the cross member and re-weld if necessary.

As the main frame members end in front of the roar axle the rear body structure is not as strong as the rest of the car. Two steel angles supporting each side of the boot floor run from just behind the rear seat back to the toolbox in the boot. These angles are joined to the mainframes by a complex system of steel panels around and behind the rear sent cushion. It has been found by a few members when towing heavy cars vans or trailers that this can actually pull the panels apart and very serious damage can be caused if the panels are not re-welded. All Javelin owners who tow caravans or trailers should carry out periodical checks for any signs of damage. The maximum recommended towing weight is 15 cwt.

Rust is the real car killer and like all steel cars the Javelin can be seriously damaged by

rust. Figs.34 and 35 show the most common positions for rusting. It is impossible to say which of the positions shown will be affected most on each car. Some cars have serious frame rusting, others doors and sills and others rear wing pillar and inner boot panels. A careful check should, therefore be kept on all the positions shown. Below is a list of the areas likely to be effected on one car or another. Each letter refers to the illustrations Figs. 34 and 35.

A. - Rusting of the gutter at the top of the boot lid is caused by the build up of mud along the seam on the inside of the gutter. The gutter should be regularly cleaned out and a rust preventative applied to the seam.

B. - Rusting between the wing piping, wing and main body structure caused by water being trapped between the three surfaces. Serious rusting can occur which is not obvious from the exterior. When the rear wings are removed the full extent may become obvious. Very little can be done once corrosion has set in unless the wings are removed for cleaning and rust killing. A sealer such as 'Bostick' waterproof sealer can be used to prevent the further ingress of water to the rust in the joint.

C. - Rusting of the top of the enclosed spare wheel carrier caused by the collection of water retaining mud on the upper surface. Rusting also occurs between the fuel tank and the end securing brackets for the same reasons.

D. Rusting between the inner boot panels and the horizontal steel angles is caused by the failure of the boot lid sealing rubber. Water collects in the gap between the boot floor and the inner wing panels. There is no exit for this water and severe corrosion is sure to occur.

E. - Rusting of the steel lower spring-arm tube. This tube is always subjected to a continuous spray of water from the rear wheels and once the surface of the underseal is broken, rusting occurs very rapidly. If rusting is serious then the car is in a dangerous condition. It has been known for the lower spring arm tube to brake away causing rear wheel steering.

F - Rusting of the rear body outrigger caused by the collection of water retaining mud inside the member with no adequate draught to dry it out. There is a drain hole in each member, which should always be kept clear.
A rust preventative must be sprayed inside the member. The rear quarter windows should not allow water to run down to the outrigger.

G - Rusting of the sills caused by water being held behind the rubber sealing strips. These should be periodically removed so that any rust can be removed and a rust preventative painted on. Rusting also occurs around the securing screws on the underside of the sills.

H - Rusting of the jacking points and centre outriggers caused by the collection of water retaining mud in the outrigger and jacking socket. The drain holes should be kept clear all mud periodically removed and a rust killer sprayed in all inaccessible corners. New jacking points are available.

J - Rusting at the bottom of the front pillars caused by tie collection of water retaining mud at the bottom of the pillar and a supply of water from a leaking

windscreen rubber which collects under the carpet and behind the quarter trim panel.

K - Rusting of the top of the frame caused by water being held by the felt, which is on top of the frame under the floorboard. The felt should be soaked with a rust killer, which should periodically be reapplied. This rusting can be serious and DANGEROUS if allowed to go too far. In severe cases the frame can be seriously weakened and may collapse.

L - Rusting of the outer door panel and the door bottom panel caused by the collection of water retaining mud in the bottom of the doors. Water seeps down between the outer and bottom panels where it is trapped with obvious results. The drain holes should be kept clear and the inner trim panels removed periodically so that cleaning and rust killing can be carried out,

M - Rusting of the front wing and inner wing panel caused by the collection of water retaining mud. This area is kept continually wet by the spray from the front wheels and has no opportunity to dry out. Remove all loose mud and apply a rust killer.

N - Rusting of the front outrigger caused by water being trapped between the member and the steel floor. This area should receive periodical treatment with a rust killer in spray form, which reaches the inaccessible areas.

O - Rusting of the top of the inner wing member caused by the collection of water retaining mud. Remove all loose mud and apply a rust killer.

P - Rusting of the inside of the frame at the point where the front suspension spring arm trunnion bush bracket bolts on. Rusting here is not obvious until the frame cracks. Repairs are extremely difficult due to the complex structure at this point. All the five securing brackets should be kept tight especially the vertical one. Severe knocks when the spring arm 'Bottoms' on the frame will put excessive strain on the mainframe if they are loose. Rebound buffers should, therefore be in good condition. When the frame is cracked the car is in a DANGEROUS condition. In severe cases the front of the mainframe will drop and the engine will appear to be 'lopsided'.

Q - Rusting between the inner wing panel and member caused by the collection of water retaining mud. The first sign is for the inner wing panel to rust through behind the carburettor down pipes. At this point rusting of the inside of the member is far more serious. All mud should be removed and a rust killer applied.

R - Rusting of the horizontal section of the inner wing panel caused by the collection of large quantities of water retaining mud and the blockage of the two drain slots either side. Remove all mud, clear the drain slots and apply a rust killer.

S - Rusting of the inner wing panel caused by the collection of water retaining mud. Remove all loose mud and apply a rust killer.

T - Rusting of the inner wing panel caused by the collection of water retaining and the continuous supply of water from the gutter, which seeps down behind the wing. Remove all loose mud and regularly apply a rust killer.

In the above notes the majority of the areas that are prone to rusting build up thick

layers of mud. In these areas the mud never dries off and the rusting action is continuous. The outer layers of mud may look dry but digging out the mud will reveal that the surface of the steel panel is damp and rusting fast. If all mud can be removed and areas, regularly cleaned by spraying with a high pressure water supply rusting will be slowed considerably. Spraying water underneath every week and fast natural drying will cause far less rust damage than the continuous action of mud and water.

When all mud has been removed the rusted areas can be treated. All deep rust can be removed with a sharp screwdriver or old wood chisel and the majority of the remaining rust with a wire brush. It is practically impossible to kill all the remaining rust with a liquid killer as this only penetrates a few thousands of an inch and the rusting action always continues deep down. The only sure, cure is to remove the rusting area and weld in a new sheet of Steel. If welding equipment is not available a rust killer such as 'Jenolite', 'Kurust' or 'Rustroy' should be applied at least three or four times over a period of 24 hours. Wire brushing the area before each new application. A rust proofing primer such as 'Bondaprimer' should be then applied followed by plenty of red lead, zinc chromate or paint. A thick layer of underseal can then be applied if required.

If panels are rusted through and fibreglassing has to be resorted to it is important to keep to the following rule. IT IS BETTER TO FIBREGLASS, A LARGE RUST FREE HOLE THAN A SMALL RUSTY HOLE. If fibreglass is applied to a rusty panel it will definitely fall out as the rust spreads. Remember this important rule. After the fibreglass and resin have dried, one of the sealers previously listed should be applied to both sides if possible. On a panel that shows, obviously only a cellulose primer and top coat can be applied. Final finishing should be left for a week or more in case there is any shrinkage of the patch.

All rust repairs to the frame should be made by welding in new steel panels. Fibreglass will NOT do and can be dangerous.

To remove all rust from under the car is obviously a long and dirty job, which the majority of members will probably not be prepared to do. The simplest and quickest method of stopping rusting is to thoroughly soak the rust with old engine oil. If oil is poured inside both frame members and squirted in quantity around the areas listed above rusting will be almost entirely stopped. Oil has the ability to creep into all inaccessible corners that cannot be seen. For a short period dirty oil will drip onto your garage floor or driveway. Do not let it drip onto the road surface outside your home.

If the floor needs renewing, use 3/8" marine ply. Its well worth the extra cost and will not split and 'lift' like the original. Use 3/8" in the boot as well and not the existing 5/16".

It is recommended that a liquid rust preventor/killer is sprayed once a year inside the

deer pillars, front inner wing panel box members and around the inside of the rear torsion bar mountings and the mainframes are topped up, with engine oil or similar.

Service Bulletin Item No. 11 March 1950 - Spare wheel carrier (standard) PB

Under certain conditions there is a possibility that the spare wheel carrier will foul the rear brake compensator.

From Javelin No.E0/PB.8145 the rear portion of the carrier has been removed and a reinforcing strap has been substituted. Should this condition be experienced on cars before Nc.E0/PB.8145 the carrier may be modified as shown in Fig. 48.

Service Bulletin Item No. 109 September 1952 - Chassis frame height

From investigations recently carried out it has been decided to decrease the setting of the chassis height from l0 ¼" (260.350 mm) to 9 ¾" (247.050 mm) - 10" (254 mm).

The above alteration decreases the load to the torsion bars resulting in a smoother action of the front suspension.

Further references - Jowetteer May 1970 P.52 – "Original Jowett paint colours" by Arthur Wood.

I was in touch with the London Office of Imperial Chemical Industries and they have sent me this list, which can be obtained in 'Delco' 300 Car Finish: -

Jowett Colour	I.C.I. Reference No.
Sage Green	P030 - 25
Connaught Green	P030 - 97
Tampico Beige	P030 - 5057
Maroon	P030 - 2185
British Racing Green	P030 - 8120
Ivory	P030 - 32
Ilation Red	P030 - 37
Golden Sand	P030 - 2002
Bottle Green Metallic	P031 - 2051
Rich Maroon Metallic	P031 - 2194
Tampico Beige Metallic	P031 - 2147
Athena Grey Metallic	P031 - 2111
Copper Metallic	P031 - 2124
British Racing Green Metallic	P03l - 2291
Turquoise Blue Metallic	P031 - 2217

All I.C.I. Refinish materials are supplied to the Trade through their distributors Brown Bros. Ltd., who have branches all over the country. This firm can supply the

above colours in 'Delco' 300 Car Finish Spraying Cellulose but if members are not able to make Trade orders they will have to contact a local garage or refinisher who would be prepared to order the paint for them.

They will also supply if asked for at the time or ordering paint, Refinish Information Sheets: - No.1 Preparation of Surfaces, No.2 'Delco' Car Finish P030 LINE, and No.4 'Delco' Metallichrome P031 LINE.

Jowetteer October 1972 P.141 - "Rust and the Javelin' by Keith Rumsey

Everyone is aware of the effect of rust on the body panels and frames of motor cars and a great deal of effort is spent on repairing rusting panels but very little time is given to preventing corrosion. The Javelin being a quality car, which uses thick steel panels, was very little affected in its early years but there is probably no member of the Club who is not aware of the problem now. I hope the following notes will be of some value to those who hope to prevent the rust bug increasing its domain.

Rusting of the leading edge of the rear wings is the most common occurrence. Obviously the major cause is the dirt and water trap that exists between the rear door pillar and rear wing. This area always remains wet and is therefore an area in which the rust bug thrives. Cure? None other than getting yourself dirty and going under with a wire brush and clearing away all the caked dirt, treating with an anti-corrosive compound and sealing. By sealing I don't mean a coat of paint. Half a dozen is more like it with about a ¼" of under body sealer. Another cause of corrosion in this area not often realised is that water seeps behind the rear quarter window sealer and then down inside of the rear door-pillar causing the rear outriggers to rust. Whenever the rear quarter windows are removed they must be re-sealed. I use bostick black weatherproof sealer.

Running along both sides of the boot floor are two steel angles, which support the boot floor. These steel angles are the main rear structure of the Javelin, the mainframes ending in front of the rear axle. The two inner rear wing panels fold under these angles and usually rot badly at their base. When they are corroded away completely the angles are open to all the water thrown up from the rear wheels, and they finally corrode through causing the boot floor to collapse. Rot in this area is not only caused externally. I have found that when the boot rubber perishes water runs down the inside of the inner wing panels onto the boot floor and down between the angle and panel. Cure? Renew the boot rubber drill a small hole through the boot floor to drain most of the water that may get in and wire brush, kill any existing rust on the outside of the panel and re-seal.

The jacking points are in a very open position receiving all the splashed up water from the front wheels If they are badly corroded away little can be done to replace them. New jacking points will be available shortly from George Mitchell. I would suggest

plenty of paint and underseal and periodical coatings of rust preventative or old engine oil. On the offside I have a rubber flap covering the front hole in the jacking point, which prevents most of the water getting in.

I think many club members would be surprised if they lifted the front carpet. Severe rotting of the leading edge of the front floorboard is very common. Water gets in through the windscreen rubber and through a large hole behind the front wing trim panel. The windscreen rubber can be replaced with the Rover 90 one if it is really bad or some Bostik sealer works sometimes. The holes behind the trim panels I have welded in. This is done by cutting a piece of steel sheet to the shape of the inside of the front door pillar and welding all round and to the existing floor. This also stops a lot of draughts.

I have found that a great many Javelins have gone to the scrap heap because the mainframes break where the front suspension spring arms bolt onto the frame. From conversation I have heard in the past between club members very few seem aware of this point of failure. Any water that gets into the inside of the frames runs down to this point where it corrodes the inside of the frame badly. There is a long bolt, which goes through the spring arm and frame vertically. This bolt is usually loose being in a not easily seen position and each time the front suspension moves violently the shock is transferred, to the bolt and then down the frame where it quickly breaks up the rust weakened frame. Once broken, there is very little that can be done. Because of the complex construction at this point it is extremely difficult to repair. I cannot overstress the importance of keeping the VERTICAL SPRING ARM BOLT TIGHT. If you are driving your car around with this bolt loose you will not be for very much longer. By keeping this bolt done up tight you can extend the life of your car for a long while but rust is still spreading in the insides of the mainframes. The only cure I know of is to put a couple of pints of old engine oil in each frame member, sealing as many holes as possible before doing so. Most of it will run out immediately making a nice mess of your driveway or garage but the oil that remains will creep everywhere inside the frame and neutralise any existing rust.
Most of the hints I have given apply to those members cars that are only lightly affected by rust. If yours is badly rotted the only cure is to have new metal welded in. Although it is quite expensive to have good welding repairs done it is much better to save money up than to spend hours on temporary fibreglass repairs. When I say temporary I mean it because it is very difficult to prevent metal corroding away round the fibreglass. If you have to use it I would give this advice. Cut all the rotten metal away and only bond fibreglass onto completely rust free metal. If there is any rust left that is more than a few thou, thick it will spread and the patch will fall out. It is therefore better to fit a large rust free hole than a small rusty hole. Once filled you must be doubly sure that no water gets behind the top paint coat.

Jowetteer January 1969 P.11 - Welding by Harry Brierley.

With our cars getting older it occurs to many of us that the solution to many of our car preservation problems lies in the acquisition of welding equipment. On the one hand seine people fight shy of the whole business and on the other some barge ahead with too little knowledge of what they are up against.

There are, of course, various forms of welding and in its earliest sense welding was the process of working metals, mostly by hammering the hot metal until a joint was made. Welding is different to soldering and brazing in that the actual metals are fused, rather than made to adhere to a second metal. That is, the brazing rod remains on the surface of the metal rather than fusing with it. Welding normally requires higher temperatures than brazing which can be carried out with gas/compressed-air mixtures.

Two classes of welding are available to the amateur and the costs are about the same. Electric arc welding simply uses a large electrical current, e.g. 40 amp 50 volts for fairly thin steel. The welding rod coated with flux, to prevent oxidation etc. forms one electrode and the metal to be welded forms the other. In oxy-acetylene welding the metal is fused with a flame from a burner consuming the two gases oxygen and acetylene supplied from cylinders.

Of course, every car magazine exhorts the motorist to buy welding equipment of the electrical kind and some miracles are available at very low cost. In fact if you can maintain an electric arc of any kind, as from a car battery, using an electrode with the right sort of flux you can weld something with it, but to be able to weld many different types of material you must be able to vary current (amps) and voltage. This will mean in practice a welding set costing in the region of £40 although you will get a sort of set adequate for welding bars and angle iron at something under £30. The disadvantages of electric are that thin sheet metal and corroded metal cannot be welded adequately, gaps and holes cannot be filled, and the method rather dictates the speed of your welding so that the beginner just is not able to take it easy. A big snag is that you are restricted to welding steel and cast iron etc. non-ferrous metals call for more sophisticated arc welding, although the use of rather clumsy carbon arc electrodes can weld and braze other metals after a fashion. The advantages are that equipment is slightly cheaper electric welds are sometimes preferable and stronger, and electric welds tend not to distort metal so much as gas welds.
It is not generally realised that it is quite possible to rent bottles of welding gas for amateur use without any difficulties. These are not expensive about a pound a bottle for acetylene and half as much for oxygen. However, the supplier charges a rent on his bottles, which will amount to about £10 a year. You also need a blowpipe suitable for light work, pipes and gauges. These are often sold in sets at about £30 but you can certainly get them for less than £20. If you simply aim to fasten metal together without too much attention to neatness etc. you can go slowly and unlike electric welding you do not often make a completely irretrievable mess of a job. Moreover you can weld a number of different metals including aluminium (if you try hard). You can also cut metal and whilst this is also possible with electric it is messy. Both are probably dangerous but

acetylene is the more diabolically dangerous if anything goes wrong. A not inconsiderable value of oxy-acetylene is in its use for heating parts, e.g. for bending pipes or freeing bolts.

So on balance gas is much the more useful, but if you buy electric do not buy anything cheap. Do not either run away with the idea that sticking two bits of metal together is all there is to it. Welding is really a difficult job and the skill lies in getting strength avoiding distortion and in doing the job quickly and neatly.

Jowetteer April 1973 P.44 - Chassis repairs by Harry Brierley.

ELECTRICAL SYSTEM

BATTERY - Ref .PA, PB maintenance manual P.73 PC, PD and PE maintenance manual P.116

The Javelin battery is rated at 51-ampere hours. A battery with a lower rating is fitted to many modern cars and is not recommended as in very cold conditions there will not be a sufficient charge to turn the engine over for a long enough period to start. Battery maintenance should not be ignored. The level of the distilled water and acid mixture should be kept just over the top of the battery plates. Never top up with tap water and never add acid, as it never evaporates away with the water. Keep the top of the battery clean and dry. A slight smear of petroleum jelly on the battery terminals will prevent a rapid build up of corrosion.

DYNAMO - Ref. PA, PB maintenance manual P.74. PC, PD and PE maintenance manual P.117

If the correct operation of the dynamo is suspected, the additional following tests may be carried out.

Test for condition of armature and brushes: - See Fig.51.

Disconnect both dynamo leads. Connect as shown below. Start the engine and increase speed. The voltmeter should not read less than 2 volts. A zero reading indicates -

a) Brushes are sticking in their holders or badly worn.
b) The armature is faulty.
c) The connection from the 'D' terminal to the brushes is broken.

Test for checking the field current of the dynamo: - See Fig.52.

Disconnect the F and D terminals on the dynamo. Connect as shown in Fig. 52. Start the engine and increase speed slightly. When the voltmeter reads 12 volts the ammeter should be reading approx 2 amps. A zero reading indicates: -

a) The field windings may be earthed.
b) An open field circuits possibly caused by field terminal or in the wire joining the two field coils together.

A reading of more than 2 amps indicates: -

a) An internal short circuit, which cuts out the resistance in, the field circuit and therefore increases the current flowing through the remaining winding.
b) A reading of over 4 amps indicates that one field coil earthed.

STARTER MOTOR - Ref. P.A, PB maintenance manual P.76 PC, PD and PE maintenance manual P.120

If the correct operation of the starter motor or circuit is suspect the following tests nay be carried out.

Successive tests should be carried out with a voltmeter in the sequence 1 to 4 (see Fig.53). A sudden drop in voltage indicates a fault between the testing point and the previously tested point.

A low reading at I indicates a faulty or discharged battery.
A low reading at 2 indicates a bad battery connection or broken lead.
A low reading at 3 indicates a faulty solenoid.
A low reading at 4 indicates a faulty starter.

LIGHTING - Ref. PA, PB maintenance manual P. 85. PC, PD and PE maintenance manual p. 121

Sealed Beam headlamp units can be fitted if required. Special connectors will have to be fitted to the ends of the headlamp leads. These are available from most good car accessory shops.

RE-WIRING - Below is a list of automobile cables which may be used as a guide when re-wiring. Unfortunately all the sizes listed are not freely available. Where possible consult the local electrical dealer.

Type	**Strands**	**S.W.G.**	**Capacity (amps)**	**Use**
14/36	14	36	2	Internal lighting, wipers
9/30	9	30	4	Side lights and flashers
14/30	14	30	7	General circuits, fog lamps & field circuits
19/30	19	30	9	Twin pass lights, fog & spot lamps
28/30	28	30	12	Headlamps & horn
35/30	35	30	17	High load circuits, cigar lighter
44/30	44	30	19	Dynamo and ammeter circuits

65/30	65	30	25	Larger dynamo and ammeter circuits
120/30	120	30	36	Heavy duty dynamo and ammeter circuits
61/18	61	18	200	Heavy duty 12v starters

HORNS - Ref. PA PB maintenance manual P. 88. PC, PD and PE maintenance manual P.124

Service Bulletin Item No. 22 September 1950 - Horn relay

A Lucas type S.B.40 relay (Part No.54025) has been incorporated in the Horn Wiring Circuit on all Javelin cars, with effect from Engine No.E0/PB.9293.

The relay may be fitted to previous models as detailed below: - (See Fig.48).

1. Fit the relay to the scuttle dash, immediately below the control box securing with two No.6 x ½ self-tapping screws (Part No.N.D.1578).
2. Disconnect the battery and transfer the horn leads from terminal "A2' on the control box to "C.1." on the relay (Identification colour - purple).
3. Disconnect the two wired (Identification colour - purple with black) from the "push in" connector behind the instrument panel and also free the terminals ins ide the horns.
4. Extend the horn push lead (Identification colour - purple with black) from the connector to the "W" terminal on the relay.
5. Fit a new lead from the main battery lead on the starter solenoid to the C2 terminal on the relay.
6. Fit a short earth lead from each horn terminal (which was originally fitted with a purple and black lead) to one of the horn securing bolts.

Service Bulletin Item No. 154 August 1953 - Modified horn pick up brush.

The horn pick up brush has been modified to the design shown in Fig. 37.

Existing steering column can be modified to incorporate the latest type horn brush by drilling the additional hole shown in Fig.37 and fitting the new pick up brush assembly Part No.J54733/A. and using the existing clip.

Further references - Jowetteer April 1972 P.56 'Horns' by John Evans.

APPENDICES

APPENDIX I

Modification to the Water Circulation

This modification was to have been introduced on Javelins just prior to the close of the factory

and it is strongly recommended that this should be fitted if possible. The engine as originally produced, often did not transmit enough heat to the thermostat to operate it. This resulted in water circulating back up the radiator local overheating and bad running on. To offset this two large bleed holes were made in the thermostat to increase flow. This very much reduced the value of the thermostat and thus the engine tends to warm up very slowly. A by-product of this modification is faster warm up which eliminates overheating, and a heater, which will give heat very quickly. No extra heat can be expected once the engine is up to normal running temperature. Note that he dimensions specified must be adhered to and as this circuit was a result of considerable research, modifications are likely to impair its efficiency.

On to each of the water inlet pipes on the rear of the crankcases braze a ½ pipe. Make up a 'T" piece from ½ pipe and fit it with hose halfway between the inlet pipes. Bore a hole in the heater outlet tap boss on the water pump and braze a length of ½ pipe over this hole. Connect this pipe to the "T" piece between the water inlet pipes. The bleed holes on the thermostat can now be soldered up again and the feed of hot water through the new circuit will operate the thermostat correctly.

See Fig. l for illustrative diagrams of the water circulation before and after.

APPENDIX II

Excessive Oil Consumption

The Javelin engine normally uses what might be considered an appreciable quantity of oil. Consumption of up to 250 miles per pint of oil would be acceptable for an engine in good condition. Note that one of the steps taken to limit oil consumption was the adoption of mirror finish liners. If liners are re-bored they are rarely brought to this level of finish except by special order and the roughness of the bore can give rise to high oil consumption for several thousand miles until the engine settles down.

The under mentioned points assume that liners, pistons and rings are in good order.

1) The cylinder head is cast with two oil drain holes at the bottom corners. Oil returns to the sump through these. If they become choked in some way e.g. by sludge, oil will accumulate in the rocker covers and will be drawn into the cylinders down the valve guides.

2) Check the oil level: quantities above the normal level are inadvisable.

3) Run engine with rocker covers removed and check: -
   a) No fractures or leaks from oil feed pipe and banjo.
   b) No damage to fibre washers on banjo.
   c) Rocker shaft pedestal is properly seated and not leaking oil.
   d) No excessive wear on rocker shaft or rocker bearings.
   e) Special flat washers must be fitted to top of pedestals, and spring washers my cause oil

leakage.

4) Check sealing of balance pipe. An approximate check can be made by obstructing the intake tubes of carbs. If engine continues to run normally, air must be entering through balance pipe. There is no efficient method of checking balance pipe if it is this that is suspect, other than that described in the Manual.

5) Increased crankcase pressure will cause oil to travel down the push rods into the tappet chamber. This results from faulty pistons or rings.

6) Omission of sump baffle will result in high oil consumption.

APPENDIX III

Recommendations for reducing petrol consumption on Javelin and Jupiter engines.

The engine should be in good general condition and the tappet clearances should be re-set to inlet .004" and exhaust .008'.

Economical driving of the Javelin and Jupiter calls for steady speed without violent acceleration. Top gear should be used from 20 m.p.h. where possible, and 45 m.p.h. should not be exceeded. Petrol consumption is best between 30 and 40 m.p.h.

Carburettor:

1) Retain standard 23 choke and 90 main jet. Reduce compensation jet from 50 to 45. Progression jet can be reduced from 110 to 100 and sometimes 90. These settings can be applied also to 30 VM5 carburettors fitted to Jupiter in place of 30 VM but performance will be reduced of course.

2) Check petrol lines pump, unions, and carbs for petrol leaks.

3) Check carb flanges and unions on balance pipe assembly for air leaks likely to disturb carb adjustment.

4) Set tick over to as weak and slow a mixture as possible.

5) Ensure that chokes are completely open when knob is pushed fully home and that they are completely closed when knob is out.

6) Clean air filter and refill with oil.

7) Check that all rubber seals between carbs and air filter in bonnet are sound.

8) The petrol pump must not generate more than 2 lb. p.s.i. or less than 1.5 lb. p.s.i.

Ignition:

1) Examine distributor. Clean and set exactly points and centrifugal weights. Oil weight pivots with light oil.

2) Lubricate cam with a smear of Vaseline.

3) See that vacuum advance operates freely and that when under suction it does not slip back but remains in a steady position.

4) Ignition should be set at T.D.C. if not experiment with other settings possible. It should never be in advance of T.D.C.

5) Check condition and setting of plugs. Make sure plug leads and covers are in sound order.

Oil:

Flush out engine thoroughly and fill with the lightest multi-grade consistent with driving conditions e.g. 20/40.

Radiator:

Water temperature needs to be as near 75°, or slightly higher as possible for most of the time the engine is running. Check thermostat and fit modification to ensure efficient thermostat operation. (See also appendix 1). Use radiator muff in winter.

Transmission:

1) Use a lower viscosity oil in gearbox e.g. S.A.E. 20.

2) All brakes oust be perfectly free and car should push easily on flat road. Adjust handbrake to give 5 notches to full on position.

3) Check hub bearings and do not over lubricate.

4) Keep tyre pressures high a minimum of 30 p.s.i. subject to road conditions and comfort. Don't forget to take into account the fact that hard tyres have a smaller grip in icy or wet conditions.

5) Lubricate midship bearing regularly.
6) Balance prop shaft, front wheels and if possible the engine.

7) Rear axle oil must NOT be altered and recommended oil is essential.

APPENDIX IV

Part Modification arid Identification of Javelin and Jupiter Gearboxes.

Roughly speaking three classes of gearbox were used. The early box was made by Meadows. These boxes have a number stamped on the front nearside bottom corner of the casing. The second box appears to have been the close ratio box which Jowett Cars manufactured and these boxes are amongst those, which have serial numbers, prefixed 'J' in the same position as the serial number of the Meadows box. Later the Jowett Cars wide ratio box was introduced. (Officially this was because of popular demand but it was reintroduced to use up Meadows parts when Jowett wide ratio parts were in short supply.) The close ratio box can only be definitely identified by checking the teeth on the stem gear but the Meadows wide ratio stem gear will have the number 80020 etched on the clutch shaft. This can be seen without dismantling the box and if present indicates that the box is definitely wide ratio. Most of the gears are marked with the part numbers.

Interchangeability of parts: -

1	50020 Stem gear Wide ratio 18 teeth	Replaced by J54694 plus washer 54393 for either Meadows or J.C.L. box.
2	50080 Cluster gear Wide ratio 34 teeth	Replaced by J.84689 for J.C.L. box. Will not fit a Meadows box unless modified and will only fit a J.C.L. box if fitted with bronze washer J84851.
3	52733 Stem gear Close ratio 19 teeth	Fit either Meadows or J.C.L. box with washer 54393
4	52734 Cluster gear Close ratio 33 teeth	Fits Meadows Box but must have bronze washer J54881 if fitted to J.C.L. box.
5	54820 Cluster gear Close ratio 33 teeth	Fits a J.C.L. box. Will also fit a Meadows box if box is modified.
6	80025 Top and 3rd. sleeve 54440 Top and 3rd. sleeve 50024 Top and 3rd.dog.	Both sleeves must have two half teeth cut away. Sleeves and dogs ought to be paired. The latest dog with interlock holes can be used on mainshaft 54804 and on other main shafts if they are modified to give interlock operation.
7	50119 Mainshaft	Discontinued in favour of 50144.
8	50144 Mainshaft	Appears in two types, one with a counter bored interlock hole and one with and interlock dimple. The former must be modified before use. The dog 50033 with the counter bored interlock hole and its sleeve was discontinued.
9	54672 Mainshaft	Requires modification.
10	54804 Mainshaft	Can be used in any box providing appropriate hubs and sleeves are used. Interchangeable with modified 54671. Only 1st and

		2nd dog CD 9331 and sleeve 54817 or 50034 can be fitted to mainshaft 54804. Top and 3rd sleeve 54440 (50026 if modified) and modified dog 80024 can be fitted to this shaft.
11	50034 1st and 2nd sliding sleeve	Can be used on dog 50033 with the parallel inter1ock hole and then only on 50144 with dimple interlock. Sleeve 50034 can also be used on dog CD9331 and then fitted to mainshaft 54804.
12	54689 Cluster gear Wide ratio: 34 teeth	Fits a J.C.L. box. Will also fit a Meadows box modified.
13	54694 Stem gear Wide ratio 18 teeth	Fits either box provided with washer 54393
14	54670 1st and 2nd dog	Discontinued in favour of CD 9331

Information about some of the modifications is now incomplete and the modification diagrams are probably no longer in existence.

APPENDIX V

Vibration

Engine - The following faults can produce undesirable engine vibration: -

A.) Fan assembly incorrectly balanced.
B) Incorrect fitting of engine mountings.
C) Mass balance of engine incorrect.

A) Run engine without fan belt and if vibration is eliminated fan must be rebalanced. Fans were normally balanced by the factory but damaged blade tips produce imbalance.

B) Check front engine mountings for security and serviceability. To do this remove the three mounting to chassis set screws and move the assembly round by hand on the extension tube. If a drag effect is experienced it is correctly assembled. There are three flat washers between the mounting metal plates as standard but it may be necessary to add or remove washers to get the correct compression of the mounting rubbers. If the mounting is too tight the engine will seem rough, if too slack clutch judder may occur especially when reversing and additional strain will be thrown on to the front mountings.

C) To balance the engine assembly, carry out the following procedure with the engine warmed up to 75°C.
1. Remove clutch housing base cover.
2. Mark clutch cover set screws 1 to 6 with chalk.
3. Make a recording chart by drawing a circle representing the flywheel and numbering the six screws.

4. Ideally a clock gauge should be mounted on the steering column by the bracket shown in the manual with the plunger in light contact with the steering wheel. Otherwise the extent of the vibration can be judged by feeling the wheel rim with the fingers.
5. Run the engine to the r.p.m. at which the vibration is most noticeable and record the amount of vibration from the movement of the clock gauge needle.
6. Stop the engine and remove clutch cover set screw No.1.
7. Run engine to produce max. vibration again and record the amount of vibration on the chart.
8. Rep1ace No.1 screw and remove No.2 repeat stage 7.
9. Continue removing and replacing set screws until a chart of vibration with each individual screw removed is complete.
10. Removing a set screw without making any difference indicates that the assembly is approx. half a screw heavy at that point, i.e. removing that screw has gone from half a screw heavy to half a screw light thus canceling out differences in vibration.
11. With a bad vibration it is possible to remove a set screw and still require further reduction in weight at that point. In this case drill the flywheel without fitting the screw and test for improvement. When a satisfactory state is reached the set screw will have to be replaced and more weight will need to be removed from the flywheel to compensate for the weight of the screw.

12. When completed the chart will show the area of maximum imbalance and where the most weight must be removed.

13. To reduce the weight of the flywheel, mark the flywheel rim l" from the left and right side of the setscrew and drill two holes 3/8" dia. and ¼" deep towards the centre of the flywheel rim. The depth of the hole will be determined by the amount of vibration recorded on the chart at that point.

14. A half-length set screw may be used to determine depth of drilling required either before or during the drilling operation.

a. If a half set screw cures the vibration the 3/8" screw needs to be 1/8" deep.
b. If after drilling the replacement of a setscrew by a half-length screw effects a further improvement a further drilling can be carried out.

The half-length screw should under no circumstances be left in the flywheel permanently.

Propeller Shaft: -

Vibration of the propeller shaft will be felt only when the car is in motion. Before commencing the following procedure for balancing check the following points: -

1. Layrub couplings are in good order and the rubber bushes are not cracked or perished.
2. Coupling bolts are tight.

3. There is no excessive prop shaft damage.
4. Midship bearing support rubbers.
5. Try to ensure that midship bearing is serviceable this may also create vibration.
6. When possible check, the truth of the flange faces. If the flanges are distorted excessive wear will occur on the layrub couplings.

Generally speaking two groups of vibration occur, one between 30 and 40 m.p.h. which comes from the front prop shaft, and one at high speeds 55 m.p.h. plus which comes from the back shaft. It must be emphasised that this is by no means necessarily true always and high-speed vibration might be traced to a front shaft imbalance.

Lift the rear of the car and support it securely preferably on axle stands. Test the car by running it in top gear and noting the reading of the speedo when maximum vibration occurs both in the lower and upper ranges. (The upper range cannot of course be dealt with until a new engine is run in).

First disconnect the two front coupling bells and reposition the prop shaft turning it 180°. Replace bolts and retest. If vibration is worse revert to original position. Now balance the shaft as follows: -

I. Mark the prop shaft with chalk just behind the front layrub to indicate the four positions of the front coupling bolts. Number these positions 1 – 4 so that a record can be kept of the improvement or worsening of vibration when loading the shaft along these lines.
2. Fit a Jubilee hose cup just behind the front coupling with screw in position marked "1". Test the vibration as described above and record effect of this loading. Repeat and retest with clip screw by points 2, 3 and 4 recording results. This will indicate best position of clip.
3. Keeping the same line of the screw position just determined, move clip down the prop shaft 6" at a time, checking vibration. Beware of fitting clip where it will hit the wooden cross member.
4. If a position cannot be found where vibration is satisfactorily eliminated, fit another clip preferably of a light type and repeat the operation with this clip. If the screws of both clips end up in line then it is clear that two clips are required. If the vibration is still not cured remove lighter clip and fit one of a similar class to the first.
5. If the two screws are no in the same place. E.g. if they are approx. opposite, this indicates that the first clip was too heavy and one light clip should be used.
6. If the above procedure does not remove the vibration, leave clip(s) in best position obtained and repeat the process with the rear shaft.

7. Make a final test and adjustments in proper running conditions with car on road.

It should be added that the above procedure may appear lengthy and awkward but as a general rule most cases of vibration which do not result from gross damage or faulty assembly are cured by fitting a single clip to the front prop shaft. This makes the procedure well worthwhile and not time consuming.

Note that the car must be securely supported for safety.

APPENDIX VI

Later methods of Javelin and Jupiter liner sealing

As a result of racing experience it was found that under severe working conditions the compressed asbestos fibre ring, which is trapped between the lower liner flange and the crankcase, tended to collapse. Also the copper-asbestos-copper head gasket collapsed, possibly as a secondary effect of the lower seal's collapse. The first stop to combat this was the introduction of the copper-asbestos-steel gasket, at the head of the liner. This is the gasket generally available as the Jupiter gasket but standard on later Javelin engines also. The plain Hallite lower seal was abandoned in favour of a Klingerit 1000 compressed asbestos fibre ring, which had a reinforcing bronze mesh incorporated. This set-up was still not entirely adequate for high compression engines and a new technique was adopted.

This consisted of a new liner which had a radius machined in the corner of the lower flange to incorporate a narrow circular section neoprene synthetic rubber ring. At this position on the usual liner there is a square corner and a shallow groove on the liner barrel. A chamfer was machined on the inside edge of the crankcase facing to take the ring whilst the liner made a metal-to-metal contact with the crankcase.

At the top of the liner in some cases a Wills ring type of seal was adopted. The liners incorporating the neoprene lower ring only, and also those incorporating neoprene ring and Wills ring were longer than the standard liner. The Wills ring was a tubular ring 3 1/2" 0.D. 3/32" dia. of cross section in blued mild steel. This ring seated in a groove machined in the top of the liner 0.D. 3.510" ± 0.003", width 1/8" minimum, depth 0.072" - 0.075". Using this seal, the head had to come into contact with the liner top, metal to metal and the ring to do this is about 9, 900 lb. Under these circumstances this type of seal will withstand 5,000 lb. p.s.i. to 550^0C. The normal 42 ft. lb. torque limit of the cylinder head is fully adequate for this purpose.

The fitting of the Wills ring meant that the normal head gaskets could not be used and a Plexeal gasket was adopted. This was a laminated aluminium gasket sealing the outside of the water gasket only, the balance pipe being re-routed externally. To fit a Plexeal gasket, the head was placed in position without gaskets and the gasket space measured. The aluminium lamella were then removed from the gasket until the thickness was 4 thou. greater than the space measured. The assembly was then torqued up in the usual way with gasket and Wills ring in position. This proved a very delicate process; its rigidity resulting in frequent cracked crankcases even at the factory.

More recent experiments within the club have shown that the use of a soft copper lower sealing ring on the normal liner, preserving approximately .005" interference will give good results and obviate sinkage problems.

APPENDIX VII

Continental Touring Kit

The following list has been compiled by a member and has been more than adequate. Obvious adjustments may be made to this list depending on the condition of the car and when perishable parts were last replaced.

1 Piston (matched to existing bore) connecting rod and cap with bolts.
1 Set of big end bearings (matched to existing journal sizes)
1 Set of main bearings (matched to existing journal sizes)
1 Set of piston rings (matched to existing bore)

1	Rocker shaft	1	Engine mounting
2	Water pump seals	1	Water pump front cover
1	Set starter brushes	1	Set dynamo brushes
1	Doz. 35 amp fuses	1	Water pump fan bearing
1	Crankshaft front oil seal	1	Petrol pump diaphragm
1	Condenser	1	Set contact breaker points
2	Rubber front suspension bushes	1	Exhaust mounting rubber
1	Oil filter housing rubber sealing ring	1	Master cylinder overhaul kit
1	Front wheel cylinder overhaul kit	1	Rear wheel cylinder overhaul kit
1	Top hose	2	Bottom hoses
1	Water pump hose	2	Core plugs
4	Feet of heater hose	1	Hub puller
1	High pressure oil pipe	1	Set of bulbs
1	Gearbox output flange (puller)	1	Layrub
1	Sparking plug	1	Pair of gearbox selectors
1	Push rod	1	Exhaust valve
1	Inlet valve	2	Gearbox plunger spring seats
2	Gearbox plunger springs	2	Gearbox plungers
1	Gearbox plunger pivot rocker	1	Water pump fan stay
1	Fan belt	1	Complete overhaul gasket set
	Araldite	1	Selection of copper and fibre washers
1	Tube ‘Bostik’ weatherproof adhesive	1	Roll insulation tape
1	Roll of stout wire	1	Tin exhaust Gum-Gum putty
	Selection of elastic bands	1	Tube gasket cement
1	Large Jubilee clip	1	Small Jubilee clip
1	Torch	1	Roll electrical wire

APPENDIX VIII

Fitting an overdrive to a Javelin. K .W. Rumsey

In a previous Jowetteer article a few months ago I described the rebuild of my Javelin NXA 868. In this I mentioned that I had fitted a Laycock over-drive and would be writing an article on this after testing. The car has now done over 5,000 miles, some of it very hard motoring and no faults have appeared.

My initial investigations into this project commenced with discussions with two of the other club overdrive Javelin owners, Drummond Black and Nobby Saggers. Some very useful information was gathered from them, and it became very clear that various methods could be adopted dependant upon the availability of overdrive units and prop shafts etc. After a thorough search of local scrap yards I found that only one type of unit was freely available that being an "A" type as fitted to Mark II Jaguars. I found it impossible to obtain the smaller 'D' type unit as fitted to 1500 cc cars. The 'A' type unit is very bulky and it immediately became clear that one of the major problems would be ground clearance. As the car was completely stripped down I experimented with the overdrive in various positions and found that with the rear prop shaft (from the full hydraulic brake Javelins only) mounted at the front, the overdrive would 'mount' conveniently under the rear floor and if necessary could be raised, if the floor supporting flange at the bottom of the rear seat front panel is bent upwards to clear the unit in the centre (See Fig.B1).
A major problem was fitting a layrub 2-bolt flange to the overdrive main-shaft and a front plate to hold the overdrive mainshaft front bearing. I could get a front plate in either of two ways, I could machine it from a thick piece of mild steel plate, but this would prove to be very expensive, as the bearing location hole would have to be accurately located in relation to the securing boltholes. The second alternative, which I used, was to cut off the gearbox casting rear plate. This already had all the locating screw holes and bearing hole and could therefore be relied on to allow the main-shaft to run true. The gearbox casing is very thick about ¾" and there is a very large boss on the inside around the layshaft locating hole so it is absolutely impossible to saw through by hand. I had mine cut on a band saw. The face was cut to within .010" of being flat all over so milling was not necessary. As an oil seal housing has to sit squarely on this plate the cut must be made as accurately as possible A thick gasket behind the oil seal housing was enough to seal any imperfections in my plate but it may be necessary to mill the entire plate face if it is rough and uneven. Tap and plug the holes in the plate as shown in Fig.B3.

The mainshaft was stripped out of the Jaguar gearbox. I wanted this cut down and a Javelin rear axle splined flange welded on the front. This flange has a round outer spigot on which the overdrive front oil seal will run. Make sure that this ground surface is not grooved or scored otherwise the front oil seal will leak, I found that it was impossible to turn the mainshaft down on a lathe even with a tungsten carbide tipped tool so it had to be cut to length on a cutter grinder and ground down at the end to allow the Javelin flange to slip on. This flange was then <u>securely</u> arc welded onto the end of the shaft as shown in Fig B2.

The overdrive unit itself needs to have a dipstick and oil filler plug added as this is normally in the Jaguar gearbox, there being a drain channel between gearbox and overdrive. The dipstick I put into the overdrive front extension housing so that the tip of the dipstick when inserted

touched the bottom of tine oil drain channel. The correct oil level is to the bottom of this channel so that as soon as oil is shown on the dipstick it is at the correct level. The actual capacity required is approx. l 1/2 pints. The oil filler plug can be put anywhere that is accessible through the floor cover plate. My plug is in the centre and half way along the main aluminium casing and is accessible through a hole in the floor cover plate sealed with a Javelin gearbox floor grommet. Another is required for the dipstick.

Te last job to complete the overdrive assembly is to bolt the front oil seal housing onto the front plate. As this housing should be positioned as accurately as possible to prevent oil seal failure, tap the bearing into the front plate and use the bearing as a guide to position the oil seal housing accurately. Clamp the housing to the front plate and drill three holes 17/64" dia. through the housing and front plate. Dismantle the parts and tap the four holes in the front plate to 5/16" BSF. Drill out the three holes in the oil seal housing to 5/16".

The overdrive unit should be stripped inspected and cleaned. I do not propose to describe this as a Jaguar Mark II overhaul manual can be borrowed from most district libraries. A full overhaul of the unit is usually covered in this.

The overdrive shaft and front plate can now be assembled in the following manner. Slide the oil seal housing onto the shaft followed by the gasket front plate, bearing, shims as required to prevent shaft end float, washer and circlip. The oil pump drive cam should then be slid on making sure that it is the correct way round. The assembly can then be offered up lightly smearing the front plate edge with sealing compound to prevent oil leakage and then bolted securely in position with 7 - 5/16" BSF bolts.

The 'A' type unit has a large Hardy Spicer universal joint flange at the rear and it would have proved very convenient if I could fit a Hardy Spicer flange to the rear axle thus eliminating, the necessity for a conversion plate to join the Hardy Spicer four bolt flange to the Layrub 2 bolt flange. As the Jaguar Mark II and Javelin axles are basically the same type (3HA) it seemed reasonable to assume that the splines on the rear axle pinion would be the same for both cars and that the Jaguar Hardy Spicer axle flange would fit the Javelin. I telephoned Salisbury Transmissions Ltd. to confirm my assumption but was informed that the splines were completely different. Personally I was not convinced so I purchased a second hand flange and found that it did fit! A second-hand Jaguar rear prop shaft with a sliding joint was purchased and cut to fit (see Fig.B9).

The front overdrive cross member was made from l 1/2" x 1" x 3/16' RSA cut and welded as shown in Fig B4. Drill two 11/32' dia. holes as shown for 2 off 5/16" BSF bolts which screw into two existing 5/16 BSF screw holes in the top of the gearbox end plate/overdrive front plate. The heads of the two bolts should be drilled and wired through the cross member as shown in Fig. B7, as these bolts must not drop out otherwise the whole overdrive unit will drop to the road. The ends of the cross member were drilled to take Javelin engine mounting rubbers which were supported on Javelin engine mounting brackets welded to the inside of both main frame members.

The rear cross member was made from l ½ x 1" x 3/16" RSA cut and welded as shown and welded to the two mainframe members. Two 11/32" dia. holes were drilled for two Javelin exhaust mounting rubbers. A l ½x l ½x 3/16' RSA adaptor plate was made as shown in Fig B8. which bolts onto the overdrive rear mounting. Two exhaust mounting rubbers are bolted below the adaptor and are supported on the rear cross member. This cross member when welded into position supports the battery securely and eliminates any possibility of the battery dropping out due to severe corrosion of the supporting tray.

I modified my floor considerably to allow the overdrive to be raised as far as possible. With the overdrive protruding through the floor I have obtained 7" ground clearance. The unit can be mounted below existing floor level but the ground clearance will probably be only 4" – 5". I retained the front floor board and discarded the rear and two side floor boards, Two new side floor boards were made from 3/8" ply and a sheet aluminium cover was beaten into shape to fit over the overdrive with two Javelin gearbox plugs for access to dipstick and oil filler plug.

The best method to use to assemble the overdrive, prop shafts and cross members etc. is to assemble them out of the care offer them up and secure them in position giving about 7" ground clearance whilst the two front mounting brackets and the rear cross member are welded into position. Adding shims and washers under the mountings can make any final height adjustments.

The final ground clearance will be dependant upon the type of overdrive drain plug fitted. The flat type will give about a ¼" more clearance.
If the hexagon boss type is fitted a flat one should be available through your local Jaguar or Laycock dealer. I have increased my clearance further by sawing off ¼" from the bottom of the overdrive sump and reduced the depth of the oil filter inside by cutting out ¼" and soldering up.

I have recently completed a 2,500-mile holiday in Western Scotland. During some really heavy thunderstorms when the roads were awash I found that the unit slipped in and out of engagement due to water in the solenoid contacts. The rubber cover over these contacts should be securely tied or wired up.

My unit from a 1964 Jaguar 2.4S type has a ratio of 0.778:1 giving an engine speed reduction of 22.2% and a fuel saving of up to one fifth should be obtainable on a long run.

My overdrive unit number is 28/1474/002093. Any unit prefixed 28/1369 fitted to 2-4 litre Jaguars and 28/3028 as fitted to 3-8 litre Jaguars are suitable but the ratio could be down to 18% these being the only ratios fitted to 'A' type units.
As they are designed to operate under heavy torque conditions no trouble should occur as long as the unit is operable when-bought from a scrap dealer. The usual overdrive faults are failure of the solenoid, which can easily be replaced, and non-functioning of the overdrive because of lack of oil pressure caused by pump wear. In theory, as there is a very large friction plate area inside these units to transmit the drive, it would probably make very little difference if the oil pressure should drop a little. The unit can be engaged at any time with the throttle open or closed. The car

is now capable of cruising at anything up to 85 m.p.h. Top speed is probably around 95 m.p.h.

I have the unit wired through a switch mounted on the steering column with a Jaguar reversing light switch screwed through the Javelin gearbox side plate So that it locates in a groove filed in the 3rd. and top gear Selector bar when in the neutral position. The overdrive can now be operated only in the. 3rd. and top gears and cannot be accidentally put into reverse which would demolish the internal components.

The total cost to my pocket has been under £10 but I had all my machining done free. For those without machine shop facilities I think that the total job could be done for around £25. Laycock Engineering Ltd. Archer Road, Millhouses, Sheffield S8 OJY can supply some very informative brochures on working principles and overhaul. Section 1 and 3 brochures are the most informative.

With the overdrive set at 7" ground clearance the drive shaft line is slightly curved which in theory causes vibration. Fortunately, there is none at all. The rear prop shaft does not require balancing as it is so short and no whip occurs.

An interesting point arose when I found that layrub couplings were designed for a maximum continuous misalignment of 3 1/2°. The Javelin front layrub runs permanently at 5°**, o**n mine it runs at approximately 7°.

The oil should be changed at every 5,000 miles or more frequently with a good S.A.E. 30 oil or 20/50W. Other than this, no maintenance should be required.

An important factor to take into consideration when fitting an overdrive is the braking. In 'overdrive' the engine braking is negligible and standard Javelin braking is not really up to modern standards. I would strongly advise anybody to fit a servo booster with heavy-duty brake linings.

This overdrive can be fitted to a hydro-mechanical Javelin but as the distance from the end of the rear axle flange to the centre line of the axle is 1" shorter than the fully hydraulic axle then the rear Hardy Spicer prop shaft should be made 1" longer to compensate. A fully hydraulic rear prop shaft must be used at the front as the early one is 1" larger and if used the overdrive will touch the rear seat lower panel.

APPENDIX IX

Fitting an engine sump guard as recommended by Jowett Cars Ltd.

Ref: Service Bulletin Item No.111 Sept. 1952

Overseas agents have reported cases that, due to extremely bad road conditions damage is sustained to the engine sump. To prevent this, a sump guard has been designed which can be

manufactured and fitted to cars if so desired. The following instructions and Figs.C1, 2, 3, 4 will be of assistance in the manufacture and fitting of the sump guard.

1. Remove the bumper bracket frame assembly from the front end of the chassis frame.
2. Fabricate from 5/8" (15.875 mm) by 10 Gauge mild steel flat strip a Sump Guard Strap A (see Fig C1) and weld to the underneath side of the bumper bracket (see Fig.C2).
3. Cut and shape from 3/4" (19.050 mm) by 10 Gauge mild steel flat strip, two strap stiffeners B (see Fig.C3) and weld in position as shown in Fig.C2.
4. Fabricate from 5/8" (15.875 mm) by 10 Gauge mild steel flat strip three strap support brackets C (see Fig.C4) and weld in position as shown in Fig. C2.
5. Apply a coat of paint to the finished assembly and refit to the chassis frame ensuring that the sump guard does not foul the engine sump.

APPENDIX X

Difficult starting with the Javelin and Jupiter engines

An engine in a generally worn condition will prove to be very difficult to start. The following checks can be carried out if the general engine condition is known to be good.

The battery must be in good condition, fully charged and capable of turning the engine over at a reasonable speed. The engine may be flooded because of excessive use of the choke. To clear this return the choke, depress the accelerator fully and attempt to start. If successful release the throttle immediately to prevent over revving the engine. The load placed on the battery when starting can be reduced if the clutch pedal is depressed. This frees the starter from the gearbox load.

In damp weather a common cause is condensation which form inside the distributor cap, on the H.T. leads and plug caps and on all the low tension electrical lends and connections. These should be thoroughly dried with a cloth. Ensure that all wiring connections are sound.

Check that the chokes are operating correctly when the choke knob is pulled. Remove the distributor cap and with the ignition switched on and the contact breaker points closed, part the points with an insulated screwdriver. A spark should jump across the points. If no spark occurs the ignition system is at fault.

The ignition system can be checked using a 0-20 volt meter or a 12-volt bulb. A reading of 12 volts or just under should be given throughout the ignition system. If a bulb is used, the light intensity should be observed carefully. Any reduction in voltage or light intensity indicates a fault between the test point and the previous test point. Place one lead of the voltmeter on the positive terminal and the other on the negative terminal of the battery. 12 volts should be indicated. If zero, reverse the leads when 12 volts should be observed. The following points should be checked with the contact breaker points open, earthing the positive lead every time.

a) The starter solenoid contact (to battery)
b) The starter solenoid contact (to starter push) if zero the solenoid is faulty
c) The starter push (white and red lead terminal)
d) The starter push (white lead terminal) if zero the button is faulty
e) The ignition switch (white lead terminal)
f) The A3 terminal on the voltage regulator box. If zero the ignition switch or wiring is faulty.
g) The SW terminal of the coil
h) The CB terminal of the coil. If zero the coil is faulty.
i) The low-tension terminal on the distributor (coil to main distributor body). If zero the lead is faulty.
j) The moving contact of the points. A zero reading indicates faulty points.

The other contact of the points can now be checked to see if the base plate is earthing correctly by removing the positive (live) lead from the battery and touching the fixed contact whilst the other lead is earthed. Again a 12-volt reading should be given. A zero reading indicates a badly earthed base plate.

In these tests any 1arge voltage losses can be caused by a faulty unit or badly burnt lead terminal. A small drop of 1/2 or 1 volt at a terminal is probably caused by a dirty contact. Assuming a 12-volt reading at the battery, an ignition system in good order should read at least 11 1/2 volts.

An engine with incorrect ignition timing will be difficult to start.

The H.T. circuit can be checked by holding the plug end of each H.T. lead (using a rubber glove or insulated pliers) approximately 3/8" away from the engine block. A spark should jump from the lead to the block as the contact breaker points open (with the ignition 'on').

If the ignition system is in order the problem must be in the fuel system. To check remove the carburettor bowls, operate the fuel pump by hand and check that fuel squirts from the float needle valves in each carburettor body Should there be no squirt of petrol then there is either no fuel in the petrol tank, a blockage in the pipe lines or a faulty petrol pump. As the Javelin carburettor is of the Zenith fixed jet type it is highly unlikely that there will be a fault in the carburettor.

Many other factors can affect engine starting such as shown below: -

a) Correct valve rocker clearances
b) Balanced cylinder compressions
c) Burnt rotor arm and distributor cap contacts
d) Faulty sparking plugs or burnt contact breaker points
e) A sticking distributor cap centre carbon (this should be spring loaded and resting on the rotor arm with the distributor cap on. Check with the ignition off).
f) Faulty condenser.

A starting problem can often occur after a starter motor is replaced. The Javelin starter motor revolves in the opposite direction to most other motors. This fact is unknown to most car accessory shopkeepers so a starter turning in the correct direction should be obtained from the Jowett dealer, or a Lucas approved dealer. This fault has defeated many good car mechanics.

APPENDIX XI

Reconditioning Javelin carburettors

All numbers in brackets below refer to the carburettor parts shown on Page 13 in the PC PD and PE maintenance manual.

Some of the carburettor parts are small, easily lost and in some cases precision parts which require a delicate hand. When stripping the carburettor be careful to remember the exact method of construction. Great care is required in fitting the throttle spindle and butterfly as the butterfly has a slight chamfer on its edge and must seat correctly. See below for further details.

The following parts are required for each carburettor: -

i) Complete overhaul gasket set
ii) Throttle spindle (36) and butterfly (30)
iii) Needle valve (41)
iv) Fuel banjo sealer washers (46)
v) Air regulator screw (4)

A carburettor body should be selected that has a little free play between the throttle spindle and body as possible. This is the only place in the carburettor that wears and is not replaceable.

Commence by stripping every part out of the body. The choke and throttle butterflies are removed by releasing the two lock screws and carefully pulling the butterflies out through the ends, being careful not to turn them as they will jam in the bore.
The bowl gasket drive screws are removed with pliers turning anti-clockwise only. Check with a straight edge that the bottom flange is flat. It usually has smooth flanges pulled out of square. Carefully re-flatten using wet or dry on a sheet of glass until flat all over.

All parts should be inspected and if any are faulty replaced. Shake the float (37). If there is any liquid inside it is punctured and requires replacing. The main body should preferably have a strong blast of compressed air blown down all the internal tubes and bores. All the parts should be immersed in a trico or petrol bath and thoroughly cleaned.

All the jets (23, 31, 34 and 40) should be inspected for any blockage. (Do not put anything through the holes as they are micro-bored and fuel economy may be affected). Only change the jets if signs of damage are obvious.

The bowl can be reassembled in the following order. Put new jet sealing washers in position (32 33 & 39) followed by the jets. The two in the bottom of the bowl can be tightened with the square ended bolt (48), which secures the bowl onto the main body. Dc not over tighten, as the body is only soft alloy. Replace the capacity tube (next to the slow running jet). Locate the emulsion block (28) and gasket (29) in position by screwing in the bottom screw (26) and washer (27) followed by four other screws and washers. The bottom screw should be tightened first followed by the other four. The bowl is now ready for fitting.

A new bowl gasket (43) is the first item to replace on the main body. Secure the gasket in position by gently tapping the 4 brass drive screws (44) into position. If you were unable to remove all 4 old screws, a couple of new ones securing the gasket will be sufficient.

Assemble the throttle spindle (36) and butterfly (30) in the choke tube being very careful to see that the butterfly seats as shown in Fig.54 and the throttle opens and closes exactly as it did before. Secure the butterfly in position with the two screws (35). These should be tight and the ends flattened over the throttle spindle to prevent them falling out. Use a rod under the screw when striking to ensure that the spindle is not bent. Assemble the choke spindle (3) and butterfly (53) in the same manner. NOTE: - do not use pliers to force the butterflies into position as the precision butterfly will be scratched or burred over on its edges.

There are usually 3 thicknesses of needle valve seating washers (42) included in the gasket kit. Replace the needle valve (41) using the 1 mm. thick washer. Check this carefully as slow running and economy may be affected if the wrong one is used.

Replace the throttle and choke operating levers and return springs as removed ensuring that they open in the same way as before. There is a linkage between the throttle and choke on the offside carburettor. When the choke is closed the throttle is to be opened slightly. The offside carburettor has a vacuum connection to the distributor. Ensure that there is a small hole in the bottom of the vacuum connection hole in the body of the carburettor. The near side carburettor has no small hole. If it has, this has to be plugged with a brass blanking screw. Replace the bowl, not forgetting the float and tighten in position ensuring that the bowl seats easily and squarely onto the main body. Screw in the new air regulator screw and spring. Screw in finger tight only and unscrew 2 turns which will be the approx. Setting required for starting.

Note that on some carburettor bodies there are two screw holes just below the choke flap on the rear face. These must be plugged with screws to ensure that no air is drawn in when choking the engine.

To assist in adjusting the slow running, adjust the throttle stop screws at this stage. Holding the throttle firmly closed; tighten the stop screw until it just touches the throttle lever (19) without

opening it. Turn approx.2 turns on each carburettor. When readjusting with the engine running the two screws must be turned the same amount together.

APPENDIX XII

Overheating

If a normal running temperature of over 87°C. is exceeded one of the following may be at fault: -

i) Incorrect ignition timing
ii) Loss of water
iii) Temperature gauge registering incorrectly
iv) Incorrect carburettor adjustment
v) Brakes binding
vi) Thermostat sticking
vii) Fan belt slipping
viii) Blocked radiator core (very common in Javelins now)
ix) Excess build up of sludge or rust in cylinder heads or block
x) Incorrect valve timing
xi) Decoke necessary.

APPENDIX XIII

Competition tuning notes for the Javelin

These instructions apply to the Javelin car and are intended as a guide to tuning for maximum performance.

It is extremely important that these are read in conjunction with the Maintenance Manual for the Javelin, which describes in detail the work involved in stripping and assembling the units concerned. In addition it is important that the standards of workmanship and cleanliness are of the highest order if success is to be assured. Note that Jowett Cars Ltd. carried out all the following engine modifications to all series III engines.

1. Engine

It is important that the Cylinder Heads arc polished and subsequently corrected for capacity in the following manner.

a) Induction and Exhaust Valve Ports (see Pig.39) -
In addition to generally polishing out the ports some benefit may be obtained from attention to the following: -
Exhaust ports. On Cylinder Heads fitted to early cars, the radius under the lower side

of the exhaust Valve Seating may be considerably increased. Metal has been removed here on later castings increasing the cross section area at the throat of the port.

b) Inlet ports (see Fig.40) –
As with exhaust ports, early castings have more metal than is desirable under the Valve Seating. On later castings, metal has been left on the opposite wall with improved results. This cannot be done on the early castings, but the rough edge may be faired off to reduce the buffer effect under the shoulder.

c) Combustion chamber (see Fig.41) –
All sharp edges should be removed. The undercuts round each valve should be blended off to ensure a smooth gas flow and to assist turbulence.

c) Alignment of Exhaust Ports with Induction Manifolds -
This is particularly important and can be checked by blueing the flange faces and then bolting up with paper between; by observing the pattern on each side of the paper the points where metal is to be removed to make the ports coincide can be observed.

e) Valves (see Fig.42)
The Valves and Seats must be in first-class condition with no signs of pitting or excessive narrowness. A seat width of 3/32" should be maintained for the Exhaust Valve and 1/16" for the Inlet Valve. It is important that the turbulence angle is maintained on the Valve seats as shown on the sketch below.

f) Valve Springs -
If it is desired to lift the Valve Bounce point at the Engine above 5,500 rpm. stronger Outer Springs should be fitted, our Part No.52964.

g) Cylinder Head Capacity -
After the above work has been completed the capacity of the Combustion Chamber should be checked as follows: -
Remove the Cylinder Head and lay flat on a bench with the Combustion face up. Insert a set of spare Spark Plugs. Fill the Combustion Chamber with fluid, flush to the face. This capacity should be between 40 and 41 c.c.s.

h) Compression Ratio -
With the above Cylinder Head Capacity of 40 to 41 c.c.s and a standard Gasket which has a Combustion Space Capacity of 7 c.c.s compressed, the following Compression Ratios may be obtained by the use of the Pistons quoted: -

Piston part No. 50656 gives 7.2 to 1
53228 " 7.6 to 1) Higher Compression
53227 8.0 to 1) Ratios

It is recommended that the higher Compression Ratios should not be used unless fuel of at least 80 Octane rating or 25% Benzole mixture is available.

In a final check the Compression Ratio on the Engine can be checked as follows: -
With the Head in position on the Engine and the Pistons at T.D.C. fill with liquid to the

level of the Sparking Plug Facings rocking the Engine to make sure that all air is ejected. The relative volumes should be as follows: -

7.2	to 1	58 cc
7.6	to l	56cc
8.0	to 1	53 cc

These figures are obtained using the standard Javelin piston. Jupiter, or flat-topped pistons will produce a considerable increase in compression ratio up to a maximum of 9.25 to 1.

An error of ± 2% is allowable in the above values. Any correction to the capacity can be made by machining the Cylinder Head Gasket Facing .011" (2.794 mm) removed here reduces the capacity by 1 c.c.

i) Bearings -
Engines up to No.E0/PB.8902 were fitted with White Metal Connecting Rod and Main Bearings and an un-hardened Crankshaft. If it is advisable to replace this Assembly by an induction hardened Shaft to our part No.50647, which will necessitate the use of Copper Lead Bearings, except for the Rear Main Bearings which remain in White Metal the Part Nos. of these are Connecting Rod assembly J.54444 Main (Front and Centre) Bearings 52573 Rear Main Bearings 50646.
It is vital when refitting Bearings that absolute cleanliness is assured and rag should under no circumstances be used to wipe components: they should be washed in clean petrol and blown off by air. Great attention should also be paid to the sealing of the Crankcase Balance Pipe Rubber Ring as detailed on Page 35 of the Maintenance Manual.

j) Clutch - It is desirable to replace the Clutch Friction Disc with one of a heavy-duty woven type having a greater coefficient of friction, this is available under our Part No.52420/A.

k) Carburettors - Special 30 V.M. Carburettors with the following settings: -
27 m.m. Choke 110 Main 50 Compensating
2.2 Vent over Capacity 45 Slow Running
120 Progression 1.5 m.m. Needle Seating (1 m.m. Washer)
should be fitted in place of the standard V.M. 4 or 5. These carburettors are interchangeable and carry our Part Nos: L.H. 1.53732, R.H. 1.53733. The throttle Spindle operation is in the reverse direction and the Throttle cable must consequently be rearranged. A suggested method is to fit a cable approx. 9" (25 cm.) longer than standard, securing the Inner Cable to the Bracket on the left hand Tappet Cover and the Outer Cable to the Throttle Rod. The throttle Return Spring should be connected to the Clip to which the original Outer Cable was secured on the right hand Tappet Cover.

l) Water Pump (see Fig.43) –
On all engines prior to PA.5857 the Water Pump should be modified to increase its capacity to 7 gallons/min. at 1500 r.p.m. On Engines subsequent to the above number the modification was incorporated. The modification consists of a modified Cover and the addition of a Shroud Assembly to the Impellor. In addition to the above, the thermostat should have the 2 Bleed Holes enlarged to 3/16" dia. if prior to the above number.

m) Oil Pump - It is recommended that an Oil Pump of increased capacity be fitted to our Part No. AS.52403. Engines built subsequent to PA.800 have this modification incorporated.

n) Oil Cooler -
It is recommended that an oil cooler is fitted.

o) Fan-
The Fan Blades should be stiffened by the addition of extra welding along the base of the Blade where it abuts on the centre spider. This will necessitate re-balancing the Fan assembly which can be done by mounting it on a suitable arbor and rolling on knife edges, metal being removed from the tips of the Blades in order to restore static balance.

p) Ignition Setting –
The recommended setting is with the points breaking at approx. ¼" (6.5 mm) A.T.D.C. (measured on the Flywheel Rim). This setting will cause the Engine to 'pink' on 1/3 to ½ Throttle at 20 - 30 m.p.h. (32 - 18 k.p.h.) when suction advance is operating. The 'pink' should disappear completely on Full Throttle.

2. Gearbox

Special constant mesh Gears, providing a higher ratio in the Intermediate Gears are available, and we are therefore, including a chart showing the road characteristics with the various ratios.

These carry our Part Nos. as follows: Stem Gear - 52733
Layshaft - 52734

Cars fitted with gearboxes numbered J1 upwards on the gearbox top incorporate these ratios.

3. Transmission

Propeller Shaft Universal Joint (591). These joints particularly at the Front should be carefully examined on all cars which have run more than 6 000 miles (9.500 kilometers.) and if any rubbers show signs of cracking round the studs, the Joint should be replaced.

4. Brakes

It is recommended that high duty Linings be fitted for high-speed competition work and we would recommend: -

Mintex M.14 or 15
Ferrodo M.R. 41.

Care should be taken to specify whether the car has the early Hydraulic Front, Mechanical Rear operated system or the Full Hydraulic, when ordering these.

5. Suspension

Rear Shock Absorber Upper Pin (see Fig.44). A modification to stiffen up the Rear Shock absorber Upper Pin was introduced at Car No.17672. Check that this has been carried out

and if not modify the Mounting of the pin in accordance with Fig.44.
Shock absorbers. A 25% stronger all round setting is recommended for most types of Competition work. As an alteration in the setting involves complete dismantling of the Shock Absorbers, replacement by the stronger type is advised, these carry our Part Nos: -

Front 54385 (fitted as standard from Engine No.16500)
Rear 50467S (Competition)

6. General Equipment

Batteries. It will be found advisable to protect these at the front and base with a sheet metal case for high speed motoring over loose surfaces.

7. Normal Service

In addition to the special work described above it is very necessary that the normal servicing of the car, as detailed in the Instruction Book and the Maintenance Manuals be carried out.

8. Javelin Road Characteristics

Back-: Axle Ratio	4.875:1	
Gear Ratios	Standard Gearbox	Modified Gearbox
First Speed	1:19	1:17.4
Second Speed	1:11.6	1:10.6
Third Speed	1:7.34	116.7
Top Speed	1:4.875	AS standard.

Rolling Radius of Tyre 12.7” Tyre Size 5.25 x 16

Valve Spring Surge occurs at 5,500 Revs, per min. with Standard Valve Springs.

For engine/road Speed Chart please see Fig.45.

Key to Chart

SGFG.	Standard Gearbox First Gear
MGFG.	Modified Gearbox First Gear
SGSG.	Standard Gearbox Second Gear
MGSG.	Modified Gearbox Second Gear
SGTG.	Standard Gearbox Third Gear
MGTG.	Modified Gearbox Third Gear.

APPENDIX XIV

Recommended Towing attachment for loads up to 15 cwt.

The following notes and diagrams (see Fig.47 (a) and (b) were issued by Jowett Cars Ltd. on the 15th February 1949. Due to the increasing age and possible rust damage to Javelins nowadays this method of fixing may cause damage to the rear structure. It is therefore recommended that loads be kept to a minimum. For loads of over 10 cwt. it is recommended that a strut be fixed between the tool compartment and the rear seat structure.

Jowett Cars Ltd. notes: -

The sketches showing a towing attachment fitted to the car and details of the parts involved, may be useful to an agent who is asked to adapt a Javelin for towing.

It should be noted that the Javelin is not considered suitable for towing loads over 15 cwt. (750 kgs).

COMMON PARTS LIST

The following lists are of parts, which may be used as alternatives to the original Jowett parts. Every effort has been made by the handbook committee to authenticate the information given. No responsibility can be accepted by any member of the committee or club for any false information. Members are requested in their own interests to expand these lists remembering to give the correct classification.

Class A

Identical parts fitted to Jowetts and other vehicles the only difference being part numbers.

Class B

Parts, which are similar to the original and have proved to be reliable without modification.

Class C

Parts, which can be made to fit by minor alterations. Where possible details of the modifications have been given.

Class D

Parts, which are rumored, or may fit, no reliability test having been done.

ENGINE CLUTCH & GEARBOX

Class	Part Description	Alternative Vehicle
C	Bottom hose	Hillman Imp Part No.7103230 shortened 1960-2 Morris Oxford

		1960-2 Wolseley 15/60
A	PA/PB Front Hub Oil Seal inner	Morris Commercial Series III 1956-60
B	Water pump seal	1956-62 Austin A35, Triumph Herald 1961 on Austin Cambridge 1959 on Morris Oxford Series V, VI 1951-56 Ford Consul Mk I
A	Crankshaft Front oil seal	Bradford CC (early)
A	Crankshaft rear oil seal	1939-58 Dennis 6-8 ton Max 6 worm shaft
A	Rear hub oil seal	Jaguar 1955-59 Mk 1 rear hub Singer 1949-56
A	Steering box oil seal	Seddon 1954-60 8 ton Mk 12 prop shaft centre Albion 1955-58 MR 5-7 C1aymore gearbox rear
A	Pinion oil seal PC-PF	Jaguar 1955 on 2.4 3.4 3.8 litre
B	Waterproof plug cap Seals	Ford 'D' Series Phase II commercial rear brake compensator seal 111036
A	Oil filter after El/PC. 16603	Daimler 250 V8 2 litre 1967 on, MG Magnette ZB and Mk III, IV 1956 on Riley 1.5 litre, Wolseley 1800 18/85 1967 on
A	Heater	Morris Minor
A	Rear axle shaft PC-PF	Daimler 1953-58 Conquest and Century Lanchester 1951-54 Leda Singer 1946-56 SM 1500
A	Crankcase breather valve	Vauxhall Cresta l965 HA Viva
A	Fan belt	Any good machine tool shop should be able to supply
SUSPENSION & STEERING		
C	Front suspension small rubber bushes	A60 upper shock absorber - use with washer to match
D	Metal front suspension lower l ¼" No.2410, 1" No.2408.	Swivel pin bushes are standard glacier Grease grooves must be cut in bushes as original
BRAKES		
A	Master cylinder 1948-50 hydro-mech.	Rover 60, 75 1948-49 Armstrong Siddeley 16 & 18 h.p. 1945-54
A	Front wheel cylinder 1948-50 hydro Mech.	Landrover rear 1950-53
A	Rear wheel cylinder 1950-54 full hydraulic	Ford Consul Mk I 1951-55 Austin 40 1951-55
A	Front wheel cylinder 1950-54	Austin 40 1950-55 Ford Consul MK 1 1951-55

		Riley l litre 1952-54
A	Supply tank 1950-56 full hydraulic	Austin A40 1950-55 Jaguar Mk VII, VIII (clutch) 1951-59 MG Magnette Mk III 1959 on Riley l ½2 ½litres 1952-54 Rover 60 75, 90 1949 on
A	Supply tank 1948-50 hydro mech.	Austin 40 1947-50 Ford Pilot 1947-51 Riley l ½2 1/2 litres 1945-54 Rover 60' 75 1948-49
A	Rear high pressure hose1950-54 full hydraulic	Austin A40 1950-55 Ford Anglia F/R 1954-59 Ford Consul 1951-55 MG Magnette MR III F/R 1959 on Rover 3 litre 1962 on
A	Front high pressure hose 1950-54 full hydraulic	Humber super snipe II rear 1959 on Jaguar Mk VII, VIII 1951 on Reliant Regal Mk VI 1962 on Rover 80, 100 rear 1959 on
A	Master cylinder high pressure hose 1949-50 hydro mech.	Daimler DE 27, DE 36, DC 27 1945-51
A	Front High pressure hose 1949-50 hydro mech.	Austin 25 cwt. van 1949-53 Seddon Mk 14 clutch 1955 on
A	Low pressure hose 1950-54 full hydraulic	Ford Pilot 1947-51 Jaguar Mk VII, VIII 1951
A	Adjuster assembly rear 1950 - 54 full hydraulic	Austin A40 1950-55 Ford Consul Mk I 1951-55
A	Master cylinder kit 1948-50 hydro mech.	Riley 1 1/2 litre 1948-52 Rover 60-75 1948-49
A A	Master cylinder kit l950-54 full hydraulic Front wheel cylinder kit 1948-50 hydro mech.	Daimler DB18 & Consort 1948-52 Riley 2 ½litre 1946-52 Riley l 1/2 litre rear 1950-52 Rover 60 75, 90 rear 1950-54
A	Front wheel cylinder kit 1950-54	Austin A40 1947-56 Ford Consul Mk I 1951-55 Riley 1 1/2 litre 1952-54
A	Rear wheel cylinder Kit 1950-54	Austin A40 1951-55 Ford Consul Mk I 1951-55
A	Rear brake shoes 1948-50	Austin A40 1947-51 Singer 9 HP l950-54
A	Rear brake shoes 1950-54	Ford Consul Mk I 1951-55 (beware of inferior pad material).

A	Front brake shoes 1950-54	Ford Consul Mk 1 1951-55 (beware of inferior pad material) Austin A55 van 1957 on
A	Rear brake shoe return spring l948-50	Austin 10 HP/16 HP 1937-48 Ford 10 cwt. van front rear 1939-57 Riley 1 1/2 2 1/2 litre 1945-52 Rover 75 1949-50
A	Front brake shoe return spring1950-54	Ford Consul MK I 1951-55 Riley l ¼litre 1952-54
A	Rear brake shoe return spring 1950-54	Ford Consul Mk I 1951-55 Triumph TR3 1957 on
A	Dust cover rear 1948-50	Ford Anglia 1939-53
A	Dust cover plate 1948-50	Austin A40 1947-51 Singer 9 HP 1950-54
A	Low pressure hose 1951-54	Ford Pilot 1947-51 Jaguar MR VII, VIII 1951-54 Lanchester Leda l4 1951-54
BODY		
A	Courtesy straps	Same as Rover and Rolls Royce
B	Boot sealing rubber	S.R.S.64 8'6" long from C.O.H. Baines Ltd. 9 Park Road, Tunbridge Wells, Kent.
D	Door sealing rubbers	Ford Cortina Mk I E259-Ad-l & E260-AD-1 Ford Corsair part No.E269-AD1-1/170624
D	Windscreen sealing rubber	Rover 80 Series Part No.310479. Great care required in fitting - glass groove too deep.
D	Rear window sealing rubber	Rover 80 Series Part No.310479. Great care required in fitting - glass groove too deep
D	Door chrome strips	Morgan plus 4 bonnet, same section but cut down in length to suit Javelin
A	Roof Radio aerial	Used on existing Rovers Rolls Royce.
A	Boot lid handle (late Javelin)	Rover, Daimler
A	Rear light (late deluxe models)	Vitesse Rover Daimler Bristol Lagonda & Aston Martin
A	Rear light (late standard models)	Morris 1000 Mini Herald
A	Bonnet tape	5/8" double beaded from C.0.H.Baines 1td. 9 Park Road, Tunbridge Wells, Kent.
ELECTRICAL		
B	Distributor	Lucas '25D4' type part No.40795 (latest type)

B	Headlamps	Morris 1100 sealed beam (requires new 1100 connector on supply wires).