TECHNICAL NOTES SERIES

JOWETT JAVELIN – PA, PB, PC, PD & PE

Ray Jowett's engine being installed using the purpose built engine and gearbox trolley.

PART VII – REMOVING THE JAVELIN ENGINE

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Introduction

Note: Items marked with an asterisk ***** signify parts which need not be removed and can be left on the engine until it is out of the car. Here it is assumed that a total reconditioning of the engine is to take place and these parts will have to be removed anyway. To anyone unfamiliar with removing the engine it is, in the opinion of the writer, advantageous to strip a good deal of the engine in situ to make it easier to handle. On the other hand some find the parts more accessible and easier to dismantle after the unit is out of the car.

Item 20 - Preparation

20.0. The car should be parked on a level concrete floor, jacked up and mounted on four secure chassis stands so that access to the gearbox can be gained.

20.1. Unscrew the oil filter drain setscrew (on the RHS of the rear timing cover) about 3/4" but do not remove it.

20.2. Drain coolant and oil from engine and gearbox.

20.3. Disconnect battery cables.

Item 22 – Removing Body Parts

22.0. Single-piece grille.

22.1. Raise bonnet and fully back off the two upper knurled brass nuts.

22.2. Unlatch lower catches and lift the grille assembly away.

22.3. Two-piece grille.

22.4. Raise bonnet and fully back off the two upper knurled brass nuts.

22.5. Lift the upper grille portion away.

22.6. With a large screwdriver, release the four quick-release fasteners, located at each corner between the slats, in the lower grille and lift it away.

22.7. Remove ¼" BSF setscrews holding apron (1836) noting exact position of spacers and grille fasteners for two-piece grille.

22.8. Taking care of rubber mouldings between apron and body, remove apron. (Rubber mouldings are attached to apron.)

22.9. Remove front bumper and engine sump protection bar together. Two large setscrews hold the bumper springs to the cast iron brackets protruding through skirt of front wings. Four bolts, two each along side of sump secure sump protection bar. Remove these and withdraw assembly complete with bumper.

Item 24 – Removing Ancillary Equipment

24.0. Mark plug leads from distributor with suitable self adhesive tags.

Do not cut notches in the insulation. Use the following notations:

'1' Near-side front; '2' Off-side front; '3' Near-side rear; '4' Off-side rear

'Coil' to HT coil socket. Remove distributor cap and disconnect low-tension cable.

24.1. Remove the advance-retard vacuum pipe from RHS carburettor. The union nut at distributor end is 3/8" AF SAE. Use two spanners, at the carburettor end, since using a single spanner will probably cause the union nipple to be detached from pipe.

24.2. Remove the distributor clamp bracket and note spacer under bracket. Lift the distributor clear of engine.

24.3. Disconnect flexible petrol pipe at upper end.

24.4. Disconnect petrol pump from delivery pipe to carburettors.

24.5. Carefully identify securing screws and remove them from the petrol pump flange and withdraw pump.

24.6. Withdraw the petrol pump operating rod (1506), place in plastic bag and keep safe.

24.7. Remove petrol delivery pipe (1495)***** connecting carburettors by unscrewing banjos on carburettors. These banjo bolts have fine mesh filter gauzes and they are a different thread size from the very similar bolts in the petrol pump.

24.8. Unscrew and remove choke wires from carburettors.

24.9. Slacken nut holding end of accelerator cable to throttle rod (1585) connecting carburettors.

24.10. Pull cable and its outer through its bracket on the RHS tappet chest cover. Fasten clear of engine.

Note: In order to fasten out of harm various parts of the car the type of rubber cables used for holding luggage in place are very convenient. If parts are simply left loose they will become trapped and damaged when the engine is withdrawn and replaced.

24.11. Slacken jubilee clips securing air intake bellows to carburettors. Disconnect bellows.

24.12. Remove nuts (two for each carburettor) securing carburettors (1595 and 1596)***** to cylinder heads. On RHS carburettor loosen link wire between choke and throttle arm. Move fast idle link wire to highest position to make access to nut easier.

24.13. Lift off carburettors.*****

24.14. Disconnect oil pressure gauge or, on some models the cable to the oil pressure switch on the LHS of the oil filter housing. Fasten clear.

24.15. Uncouple electrical cables to dynamo. Fasten clear.

Item 26 – Removal Of Water Pump, Fan, Exhaust System And Coolant Hoses

26.0. Remove top hose (437) from water pump to. radiator.

26.1. Remove heater hose from water pump (374) body on LHS. Fasten clear.

26.2. Loosen jubilee clips on hose (436) below pump attaching it to front timing cover.

26.3. Identify setscrews fastening water pump bracket to dynamo and front timing cover. Remove.

26.4. Remove fan belt (376).

26.5. Remove Simmons nuts holding fan shaft supports (402) to crankcase. Note double coil spring washers which must be replaced.

26.6. The water pump/fan assembly can now be removed. (This may require some juggling, but it is quite possible!)

26.7. Remove front wheels (1720).

26.8. Uncouple exhaust at rear of LHS manifold (86). Nuts may be stainless steel or brass and if so should be noted.

26.9. Remove both manifolds complete with front pipe.*****

NOTE: If you do not remove the front pipe (1640) do not be tempted at any stage to use it as a handle to move the engine! The manifolds will almost certainly break.

26.10. Slacken jubilee clips holding water hoses (438) at bottom of radiator to rear of crankcase. These clips may be accessible beneath wheel arches or else by a long screwdriver from inside the engine compartment.

Item 28 – Removal Of Cylinder Heads*

Items 28.0. to 28.12. are optional at this stage.

28.0. Working under the front wings remove the rocker covers (91) from each side of the engine.

28.1. Loosen-off the nut on the central cylinder head stud securing the oil feed banjo (229).

28.2. Remove retaining nuts and special washers on long studs holding rocker shaft pedestals (239) to heads. loosen both nuts a little at a time so as not to put a strain on the rocker shafts. Identify washers.

28.3. Remove centre stud nut, plain washer and fibre washers retaining the banjo (229) in the centre of the head, withdrawing the rocker shaft assembly after doing so.

28.4. Prepare some means of identifying (neither a hacksaw nor a file) push rods and their original position in the engine, e.g. a piece of stiff card with numbered holes.

28.5. Remove the push rods and store so that they can be returned to their same position on reassembly.

28.6. Strictly following the sequence shown in the Maintenance Manual, remove cylinder head nuts and washers, releasing all a little at a time.

NOTE: Nut on stud number ‘1’ has, already been removed (28.3.)

28.7. Remove any traces of lead wire around cylinder head studs.

28.8. With a sharp point tool, prise out centre head stud water seal (321). (Rubber ring to be found in recess round base of number ‘4’ stud.)

28.9. Attempt to pull off head. If necessary tap around head with wooden mallet.

28.10. If head still does not move try to lever with a broad slim lever just behind the top corners of head **and nowhere else**. Under *no* circumstances must screwdrivers etc. be used to lever the head in positions where the head gasket is situated, this action will ruin the crankcase.

28.11. Another method of releasing the head is to reconnect the battery lead temporarily. Put about 100 cc of engine oil into the cylinders through the plug holes. Replace the plugs and keeping clear of the engine operate the starter. The cylinder compression may well force the head off.

28.12. If the gasket seal is once broken the head can usually be removed by a gradual rocking movement. Otherwise a special puller illustrated in Technical Notes Series Part III, may ,be needed.

Item 30 – Starter Motor Removal

30.1. Check that the battery leads are disconnected.

30.2. From under the car, uncouple the heavy cable to the starter motor. Fix it clear.

30.3. The starter is held to the clutch housing (495) at the top by a bolt and nut and at the bottom by a stud and nut. Remove the nut and bolt, and the nut from the stud.

30.4. Note the position of the starter terminal, in order that the starter motor can be returned to the same position.

30.5. The starter can now be manipulated around the flywheel ring gear and removed.

Item 32 – Detachment Of Gearbox

32.0. It is possible to remove the engine from the car, and leave the gearbox in-situ but this is not the recommended method, since there is a risk of damage to the gearbox input shaft.

32.1. Remove the clutch housing base cover (495).

32.2. Support the front prop shaft (800) loosely.

32.3. Two bolts secure the front Layrub coupling (801) to the gearbox output flange (622) and two to the front prop shaft. The nuts are secured by split pins.

32.4. Remove split pins and all four nuts and bolts. This will require the rotation of the shaft, entailing a rear wheel to be raised and the car out of gear.

NOTE: Above the front Layrub there is a domed metal plate in the floor board. Normally this is held by permanent rivets but these can be removed and replaced by self tapping screws. This allows access to the Layrub bolts in a way which may be found more convenient.

32.5. The Layrub sleeves are a tight spigot fit in the flanges and usually need to be prised out gently with a lever.

32.6. Remove Layrub. Do NOT let propeller shaft hang far out of its normal line.

32.7. Remove split pin from gearbox main (third motion) shaft and nut (624)

32.8. To remove nut it will almost certainly require that car is placed in bottom gear. If this does not hold the gearbox mainshaft, the ring gear can be held with a hardwood wedge. The ideal tool for removing this nut is shown in the sketch in Appendix I, which can be bolted on to the output companion flange.

32.9. It is unlikely that the output flange will be easily removed from the shaft, but it is worth a gentle tap with a hammer for luck! A suitable puller will be required. The proper tool is shown in Figure 12, Page 154 of the Maintenance Manual. However, a tool can be made up by using a spare output companion flange. Two Layrub bolts can be used to fasten the spare companion flange to the one on the gearbox, face to face using a substantial washer or spacer pad to bear on the end of the main shaft.

32.10. The method of using a puller of this kind is to tighten the two bolts dead tight By doing this the flange may be removed, but more probably it will require a sharp blow with a heavy hammer. Beware of the flange suddenly springing off with some force – keep well clear!

32.11. Remove the speedometer drive cable from RHS rear of the gear box (616), The brass knurled nut may require a multi-grip hand wrench more often than not. Fix the cable out of the way.

32.12 Remove the split pin from the clutch operating rod clevis pin (520) and lift out the pin, disconnecting the clutch operating rod (518). Tie the rod up out of the way.

32.13. From inside the car remove the gearbox cover (2153) from the toe board, extracting the screws.(The screws are threaded into captive nuts).

32.14. Remove split pin from the gear change link socket (716) at gearbox end of rod. Now unscrew the socket adjustment screw (718) and lift off the rod.

32.15. The selector change link (see 753) is best removed with the ball joint which is bolted onto its lever (638) on the gearbox. Alternatively, it can be removed by pushing back the tabs on the ends of the spring clip around the socket, but this action is likely to damage (break) the spring clip.

32.16. Tie the gear change and selector change links out of the way.

32.17. Through the same opening feel the gear change stay which connects the gear change column to the centre top of the clutch housing. (This may not be present on cars prior to Chassis Number E1 PC 20135) Remove the nut and dished washer from the stud on the clutch housing and lift off the stay and rubber bush. It may help to slacken-off the bolt securing the column end of the stay assembly.

32.18. Remove the electrical cables to the reversing light switch on the gearbox if it is fitted.

Item 34 – Removal Of Engine Mountings

34.0 It is quite possible to remove the engine by supporting it well and pushing the car away from it. Some in fact prefer to do this, but the correct method is to use some form of trolley on which the engine and gearbox unit can be wheeled out. A suitable trolley is illustrated on the front cover. It is most important that such a trolley has a wide enough base to carry the engine safely. If a small lightweight trolley jack is used there is always the danger of the engine falling off the jack.

A very adaptable trolley can be fabricated from lightweight square steel tubing, with four castors and three scissor type car jacks. The three jacks should be the same and can be obtained from a wrecker's yard. See Appendix II.

NOTE: It will be assumed from here-on that a trolley is used.

34.1. *Place a piece of clean dry towelling cloth on the trolley where the sump will be supported, to help prevent slippage.*

34.2. Just support the engine and gearbox on the trolley. The cradle shown in "the Maintenance Manual Page 21, Figure 20 is ideal but not essential. From that figure it will be seen that the centre of gravity of the engine and gearbox is about three inches in front of the flywheel, with the cylinder heads in position.

34.3. From underneath the car withdraw the three set screws holding the rear mounting to the chassis cross member.

34.4. Remove the bolts from the front engine mounting brackets (299 and 300), from the frame side member extensions (2185 and 2186), one set screw and one nut and bolt each side.

NOTE: Carefully adjust the three trolley mounted jacks so that the front and rear mounting bolts can be withdrawn without damaging their threads.

Item 36 – Removing The Engine Assembly

36.0. The engine and gearbox unit is now free, and can be gently edged forward.

36.1. Special care must be taken when moving the unit, particularly that it does not fall off the trolley. Fingers must be kept clear of places where a movement of the engine could trap them against the body of the car. It would be quite easy to lose a finger in this way, if the engine was to slip. Remember that it is a very heavy and rather ungainly object.

36.2. Do not wear loose clothing, a scarf etc. Strong protective gloves are desireab1e and substantial boots.

36.3. Once removed from the car make sure the unit is securely supported.

36.4. Remove the gearbox from the engine by removing the two nuts from the top of the gearbox and the two from inside the bell housing below.

36.5. Once the box is free remove it. Do *not* leave it hanging on the clutch (first motion) shaft when partly drawn back.

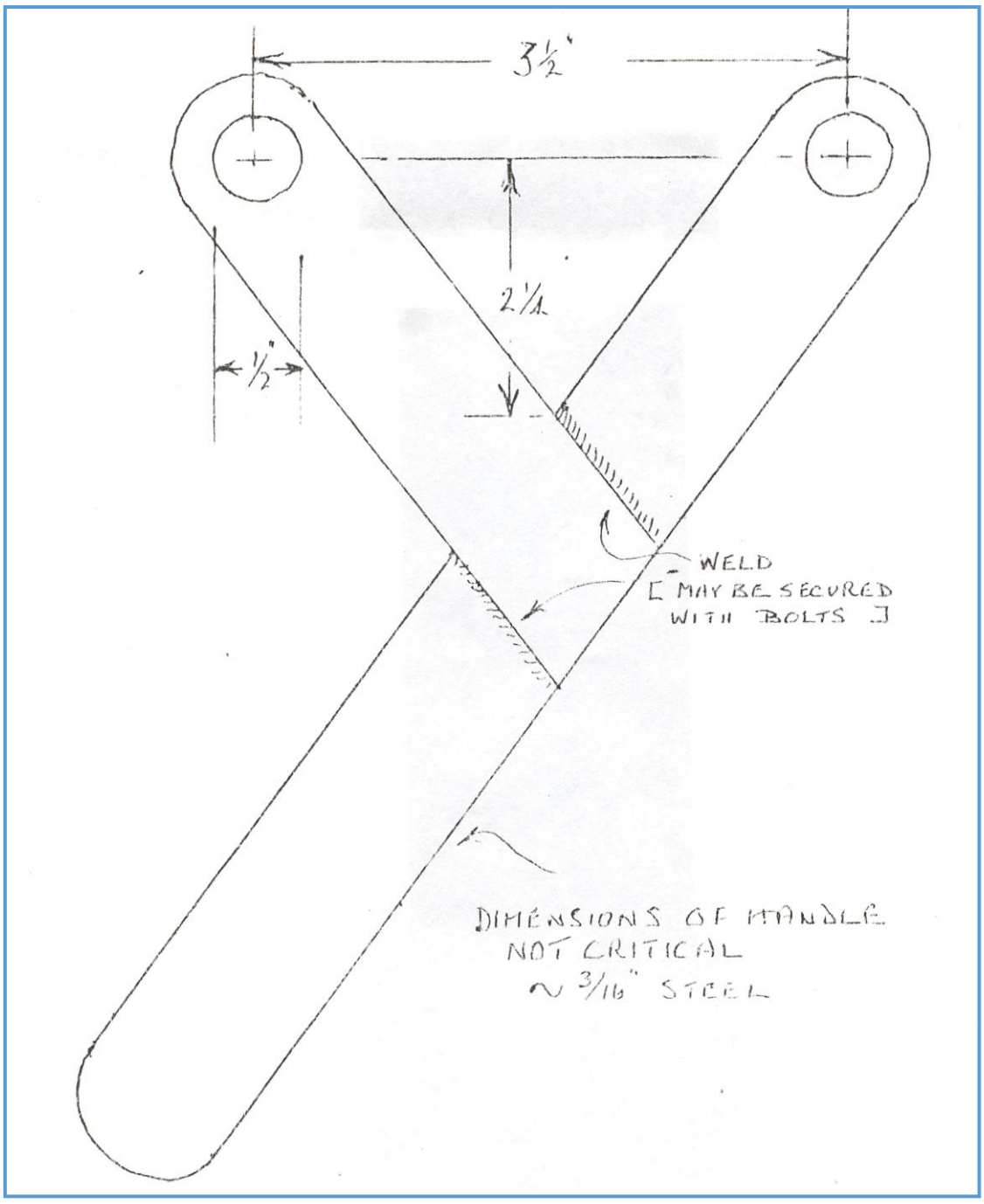
36.6. The engine is now ready to be dismantled.

Final Note

The engine can be removed with distributor, dynamo and starter motor attached.

APPENDIX I

Companion Flange Holder



Companion flange holding tool.

Description

Fabricated from flat mild steel bar stock, the handle needs to be sufficiently long to provide an easy hand grip that provides enough leverage to handle torque values of approximately 150 lb.ft. Dimensions are as follows:

Distance between hole centres (after Welding)	3.50”
Distance from holes’ centreline to intersect point on handle	2.25”
Hole diameter (nominal clearance)	0.53”
Material thickness	5 mm

APPENDIX II

Engine Removal And Replacement Trolley

Description

This trolley, perhaps a little over-the-top, but most convenient all the same, was designed to operate on a level concrete floor. The framework is constructed from 1” square tube with 16 SWG wall thickness. Three identical scissor jacks have been employed to provide accurate adjustment for height and tilt – both sideways and fore and aft. The wooden platform sits on two ball sockets and can tilt two ways to sit flat under the engine oil sump. A yoke, formed from round steel bar welded to the gearbox support jack, holds the gearbox extension tube snugly forward of the rear mount bracket. The centre of gravity is forward of the rear set of castor wheels, just to the rear of the front pair of jacks.. The trolley also has storage facility for the jack ratchet handle.

This trolley provides complete control for lining up the engine and gearbox mounting brackets so that the hardware can be removed and replaced with ease.

Caution: This design of engine trolley has revealed that, should any of the wheels lodge on the floor, the engine can slide forwards off the wooden platform.