

Section G - Engine

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B *Crank Sensor*

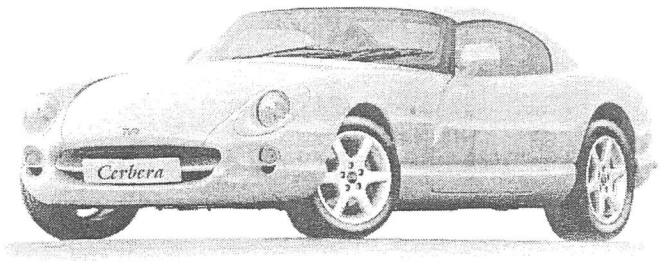
C *Tappets*

D *Spark Plugs*

E *Oil Filter*

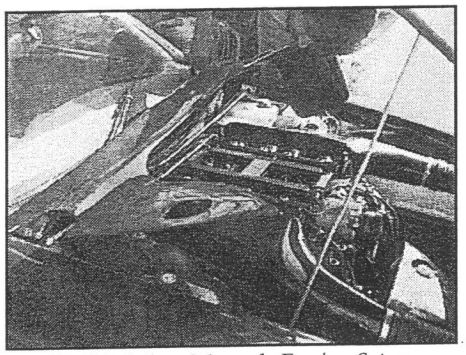
F *Air Filter*

G *Oil Pressure Switch*



Service / Workshop Manual

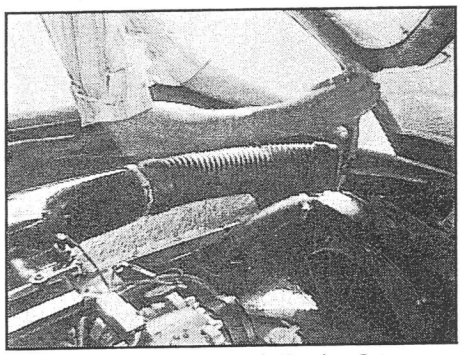
Engine Setup -Lap Top Instructions



Remove the 2 x M4 allen bolts that hold the top trim panel in place.

1

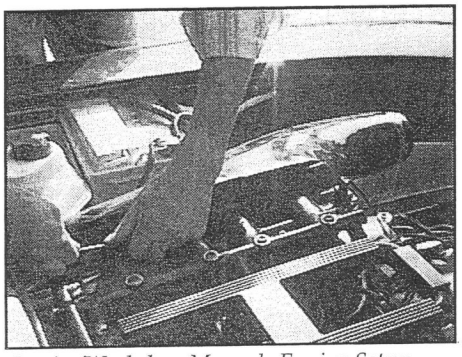
Service/Workshop Manual -Engine Setup



Remove both air intake pipes.

2

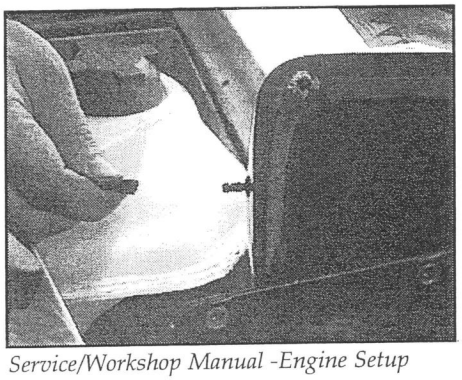
Service/Workshop Manual -Engine Setup



Remove all 5 M6 x 15 allen bolts on the throttle assembly that releases the air boxes.

3

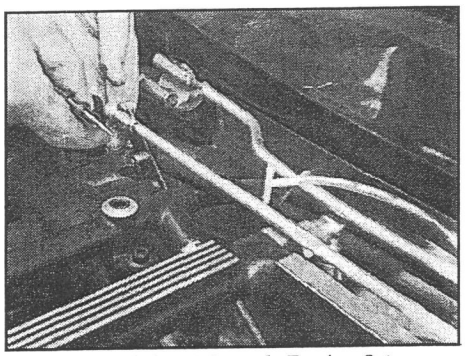
Service/Workshop Manual -Engine Setup



Remembering to remove the Air pressure sensor pipe on the N/S air box when removing.

4

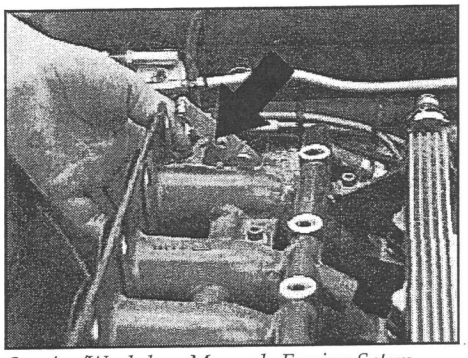
Service/Workshop Manual -Engine Setup



Service/Workshop Manual -Engine Setup

Remove the throttle linkage rod retaining clips and remove the rod.

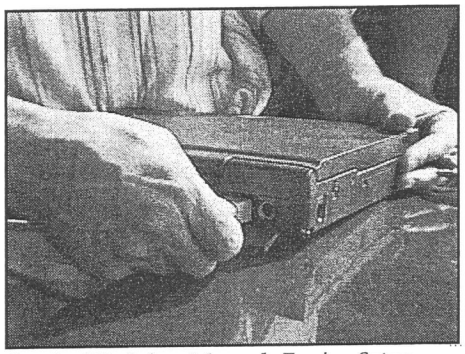
5



Service/Workshop Manual -Engine Setup

Adjust base idle screw to allow the throttle butterflies to be fully closed.

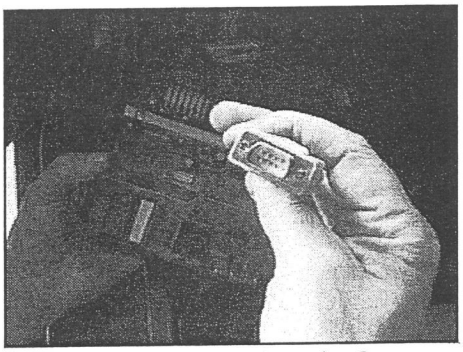
6



Service/Workshop Manual -Engine Setup

Ensure computer is fully charged, or connected to the mains. Then connect 9 pin connection lead as shown.

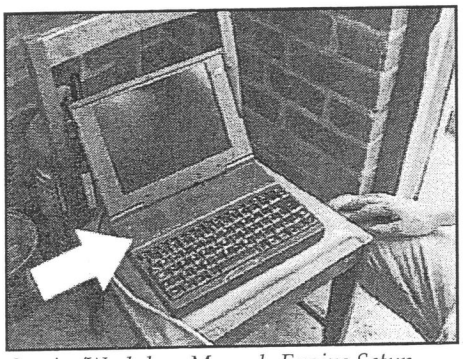
7



Service/Workshop Manual -Engine Setup

Next remove ECU from footwell and remove cover. Then connect the cable from the computer as shown.
N.B. Do not touch any wiring inside ECU.

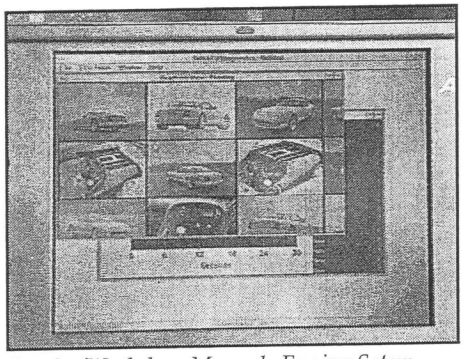
8



Service/Workshop Manual -Engine Setup

Turn on computer with ON/OFF switch as shown.

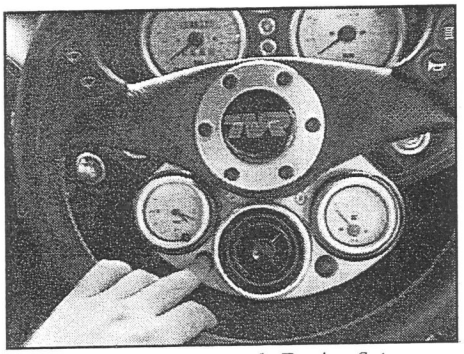
9



Service/Workshop Manual -Engine Setup

You should now see a TVR diagnostics page as shown opposite. **(A communication error will shown at the bottom of the page if the ignition is not on or the computer not connected correctly).**

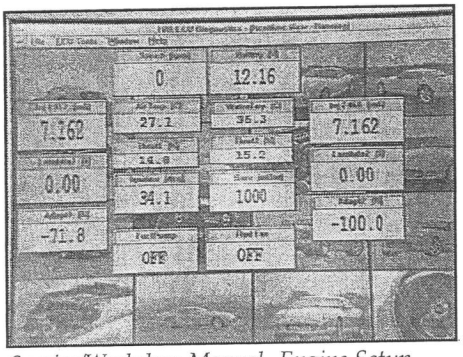
10



Service/Workshop Manual -Engine Setup

Turn the immobiliser off and then the ignition on, you should here the fuel pump run for a few seconds.

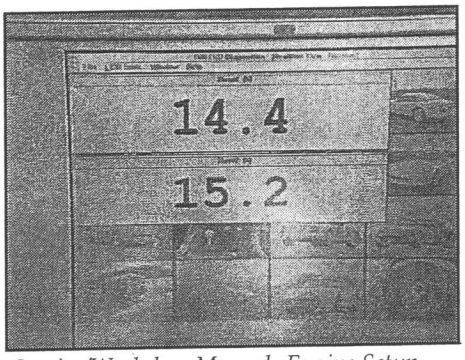
11



Service/Workshop Manual -Engine Setup

The computer should now show all the inputs and outputs of the system. Press page down to show current and logged faults.

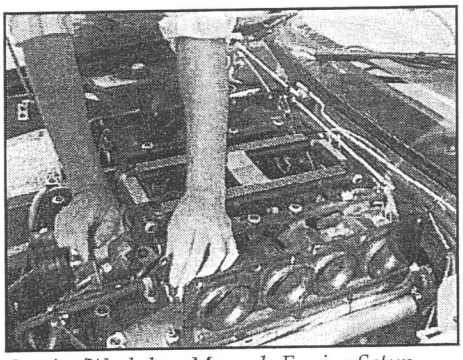
12



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Service/Workshop Manual -Engine Setup

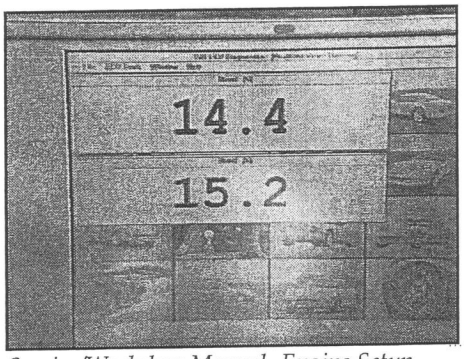
Press page down again to show throttle pot settings only, this allows computer screen to be seen clearly from a distance whilst setting throttle pots.



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Service/Workshop Manual -Engine Setup

Next ensure the throttle butterflies are shut.



15

Service/Workshop Manual -Engine Setup

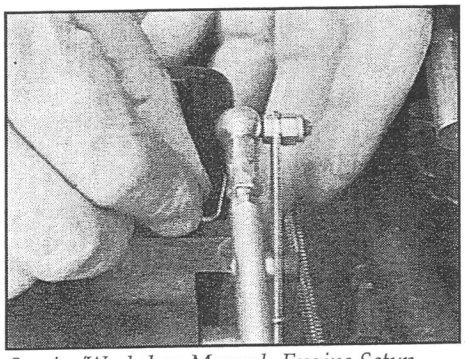
Adjust throttle petiometers to between 14.8% and 15.2 %.



16

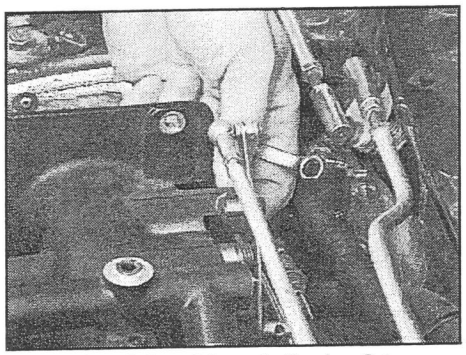
Service/Workshop Manual -Engine Setup

Then fit the throttle linkage arm back in position by rotating the bar to make it longer/shorter until it fits perfectly without moving either throttle arm. Tighten the lock nuts, ensuring that the linkage rod can still rotate slightly to prevent binding.



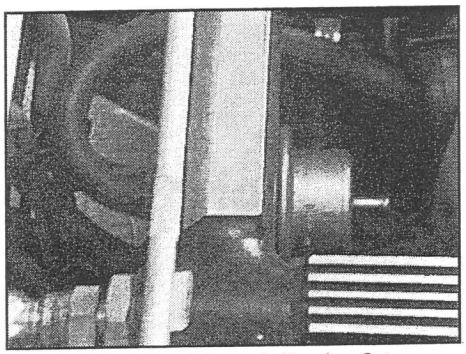
Then fit retaining clips.

17



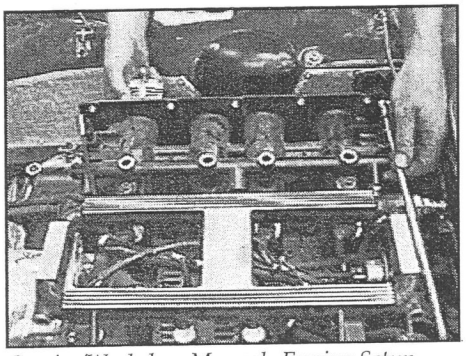
Unscrew the idler screw until the throttle pots read 19%.

18



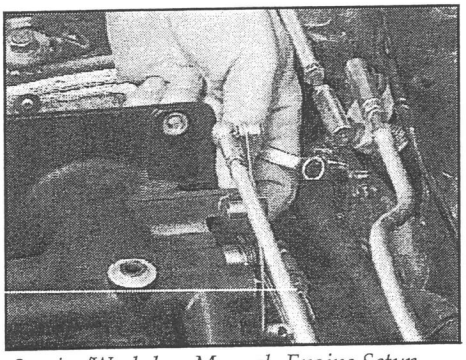
Block off the purge line with a pipe clamp as shown. Then start the engine and allow it to warm up to normal operating temperature. The engine should run between 900 and 950 rpm.

19



Measure the air flow with the air synchrometer. This should read between 4 and 5 on the scale on all cylinders. If one bank is different to the other adjust the link rod by slackening the two locknuts from the ball socket and rotating the link rod. (Note! one of the ends of the link rod has a LH thread).

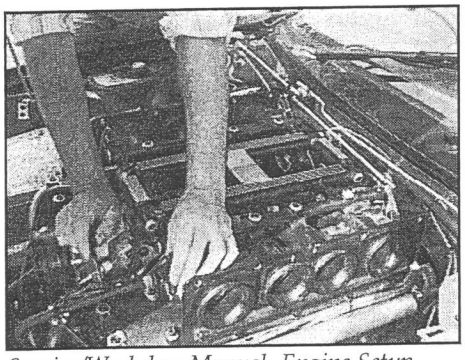
20



Service/Workshop Manual -Engine Setup

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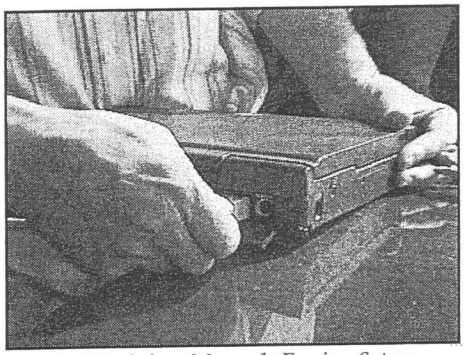
Adjust idler screw to set engine to speed. Re-adjust if necessary.



Service/Workshop Manual -Engine Setup

22

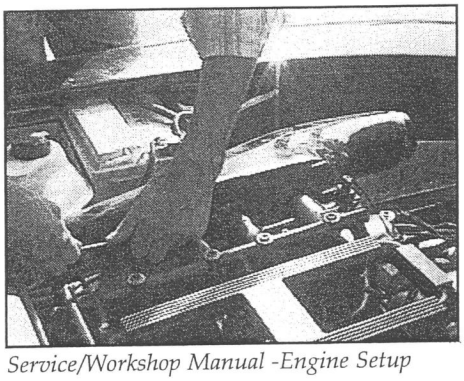
The two adaptive valves should be between 0 and -10 %. If it is not adjust throttle pot slightly. Increase throttle % by turning the throttle pot. This will decrease the adaptive valve for that bank and visa versa. Only small adjustments should be necessary at this stage. Adaptive valves are greater than +/- 15% indicate a fault elsewhere.



Service/Workshop Manual -Engine Setup

23

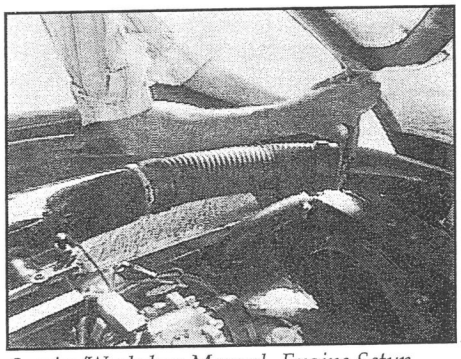
Once this has been done disconnect computer.



Service/Workshop Manual -Engine Setup

24

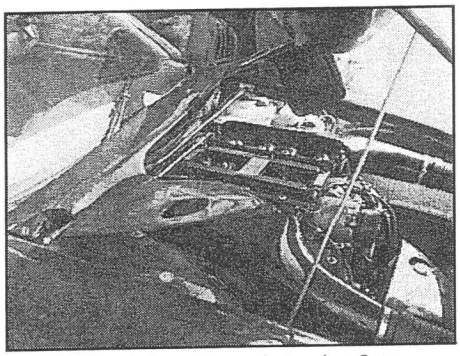
Unclamped the purge pipe and refit the airboxes. Remembering to re-connect the pressure sensor and crankcase breather pipe.



Refit the Air pipes.

25

Service/Workshop Manual -Engine Setup

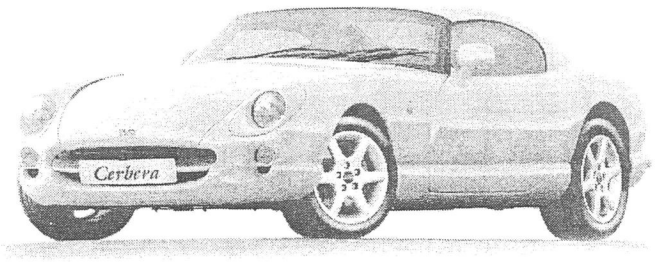


And finally refit top engine cover, remembering to connect the washer pipes.

26

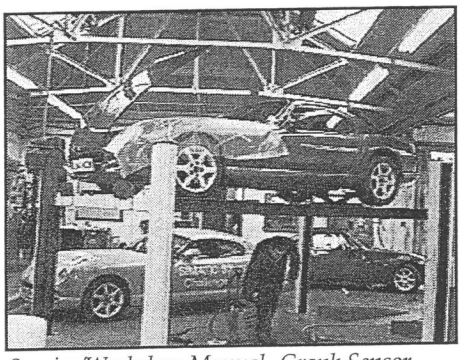
Service/Workshop Manual -Engine Setup

Notes



Service / Workshop Manual

Crank Sensor

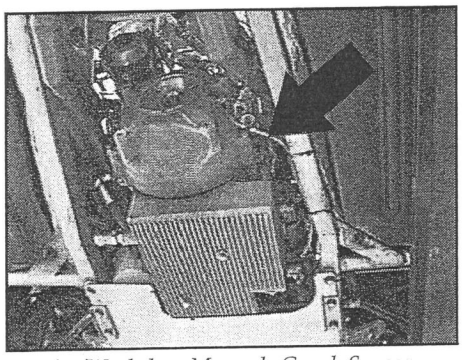


Service/Workshop Manual -Crank Sensor

To gain access to the crank sensor the car has to be raised on a ramp or driven over a pit.

N.B. Only use a four post ramp.

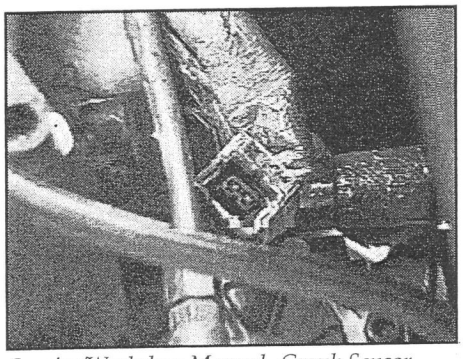
1



Service/Workshop Manual -Crank Sensor

The crank sensor is situated on the O/S of the car on the engine bellhousing, adjacent to the dip - stick tube.

2



Service/Workshop Manual -Crank Sensor

Firstly the crank sensor connector wire has to be removed. Press the spring C'Cup in to release the plug.

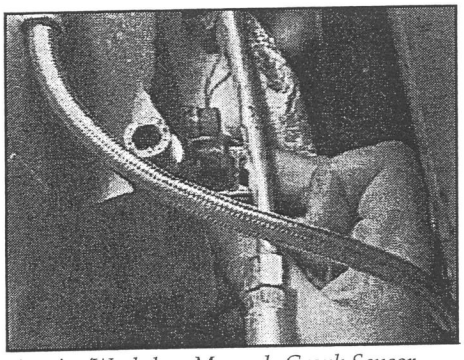
3



Service/Workshop Manual -Crank Sensor

Next the M8 allen bolt is to be removed using a M6 alan key - this is because of the size of the allen head.

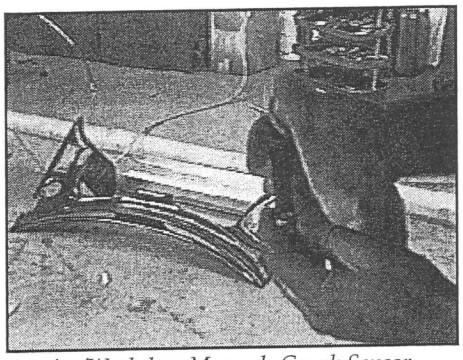
4



Service/Workshop Manual -Crank Sensor

Once this has be done the sensor will slide out freely. If it does not, it is acceptable to bend the dipstick tube very slightly to aid removal.

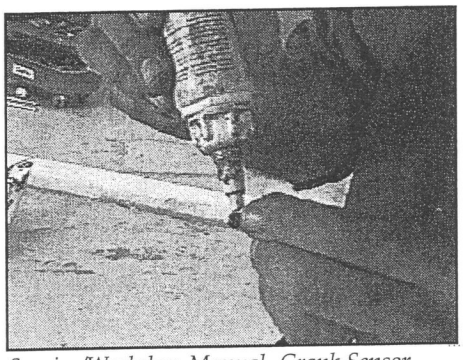
5



Service/Workshop Manual -Crank Sensor

Clean the sensor ensuring the hole at the end is free of dirt etc.

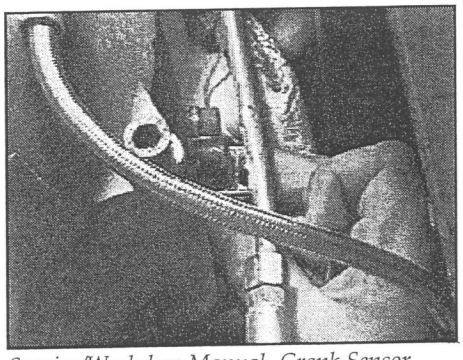
6



Service/Workshop Manual -Crank Sensor

Apply loctite to the sensor bolt and washer.

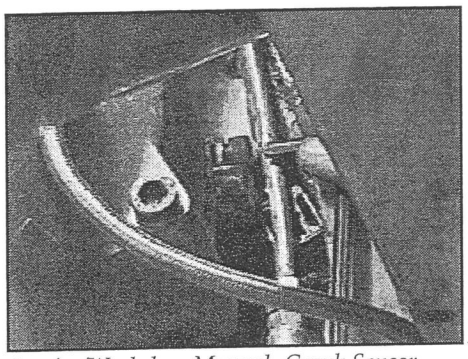
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Service/Workshop Manual -Crank Sensor

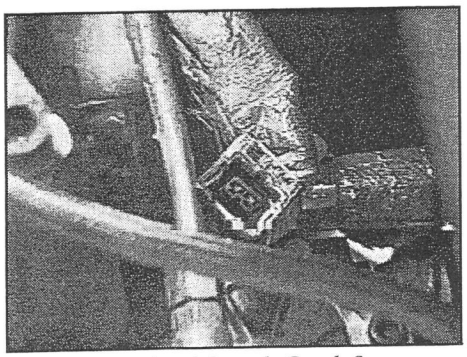
Replace the sensor with its bolt and washer.

8



Service/Workshop Manual -Crank Sensor

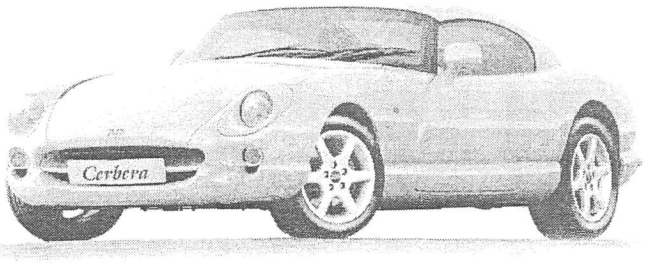
9 Tighten with an M6 allen key.



Service/Workshop Manual -Crank Sensor

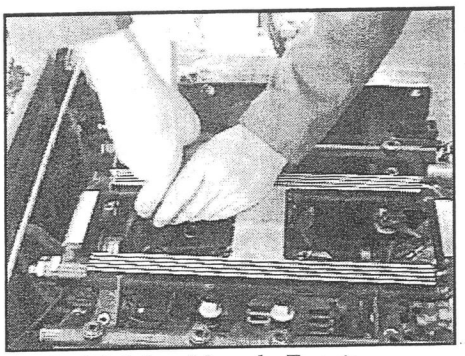
10 Reconnect the sensor wire.

Notes



Service / Workshop Manual

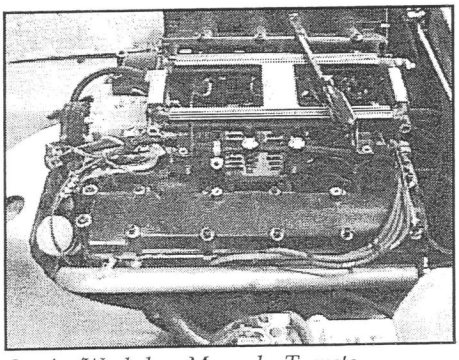
Tappets



Service/Workshop Manual - Tappets

Remove Air inlet pipes and Air boxes. Disconnect the Battery.

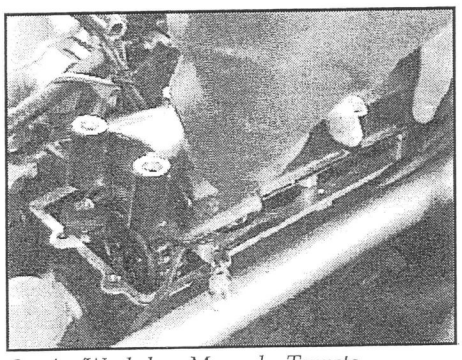
1



Service/Workshop Manual - Tappets

Remove the 12 M8 caphead bolts holding the inlet manifold to the cylinder head. DO NOT remove the fuel rail or throttle linkage. Remove the inlet trumpets as a complete assembly and place on one side. Note the spacers between the inlet manifold and cam covers. Ensure that these DO NOT fall into the inlet ports when the inlet assembly is removed.

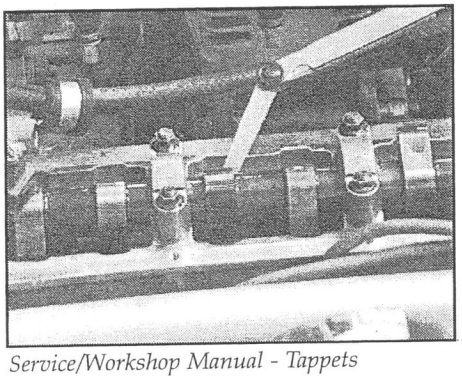
2



Service/Workshop Manual - Tappets

Remove the cam cover retaining bolts and then the cam cover of the bank to be checked. Only work on one bank at a time or the cam timing may be lost.

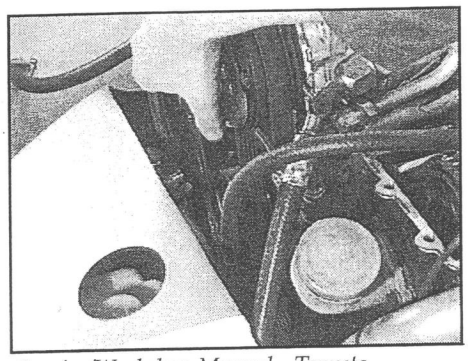
3



Service/Workshop Manual - Tappets

And check cam clearances with a feeler gauge as shown. Ensuring measurement is done at the back of the cam. (i.e. Directly opposite the cam lobe.) If adjustment is required, note down clearance for reference later.

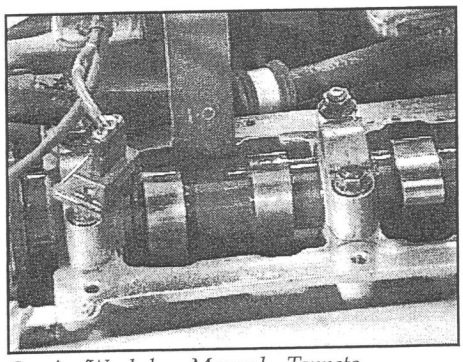
4



Service/Workshop Manual - Tappets

If adjustment is required proceed as followers, turn the front pulley until....

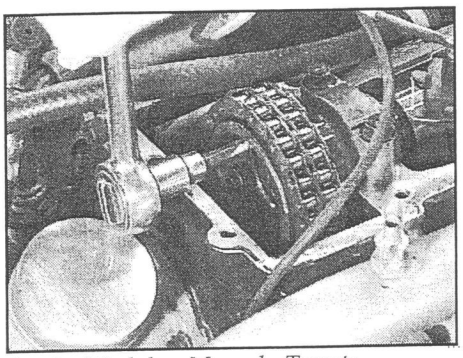
5



Service/Workshop Manual - Tappets

... the front two cam followers are on the overlap period (inlet just opening, exhaust just closing i.e. cam followers approx leave, or push the car in 5th gear, if a front pulley is not fitted.)

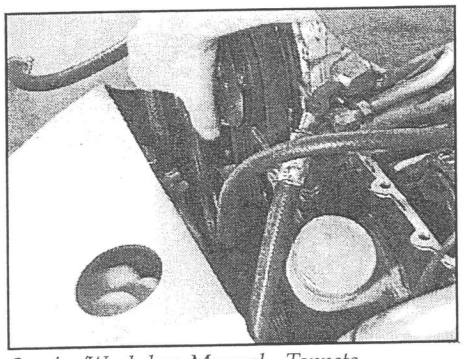
6



Service/Workshop Manual - Tappets

Remove the uppermost cam sprocket retaining bolts.

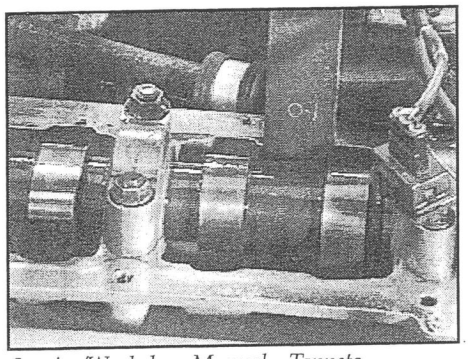
7



Service/Workshop Manual - Tappets

Turn the front pulley clockwise or push the car forwards in 5th gear, until...

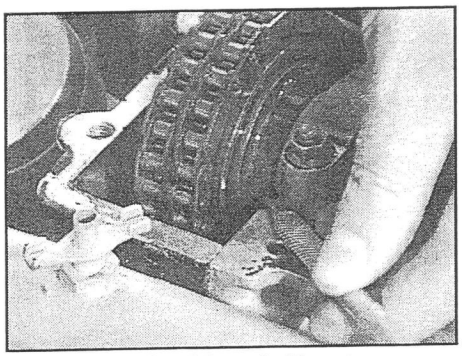
8



...The back two cam followers are level. Then carefully turn the crank clockwise slightly more until the inlet cam follower is exactly 1.5mm lower than the exhaust (check with cam timing piece) DO NOT TURN THE ENGINE BACKWARDS DURING THIS OPERATION !

9

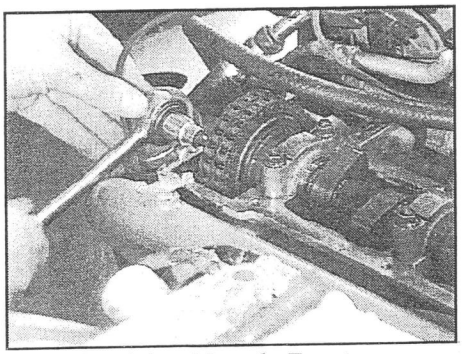
Service/Workshop Manual - Tappets



Now scribe the camshaft and camshaft sprocket with a horizontal line exactly level with the top of the cylinder head. These parts are very hard so a carbide tipped scribe is required.

10

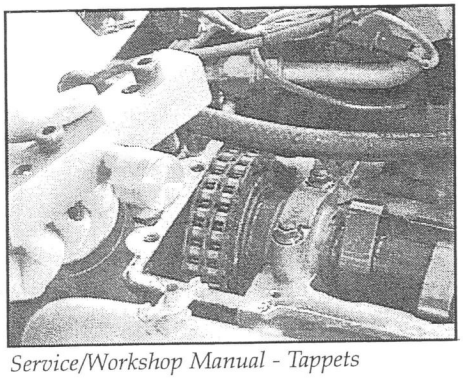
Service/Workshop Manual - Tappets



Next remove the remaining cam sprocket retaining bolts.

11

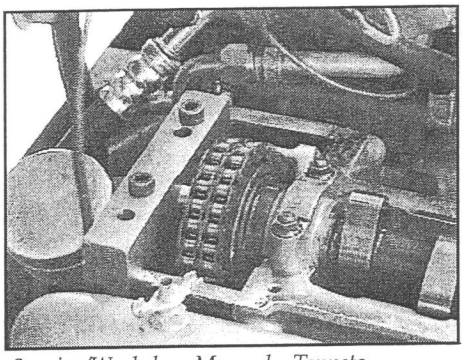
Service/Workshop Manual - Tappets



Then fit the cam sprocket retaining tool.

12

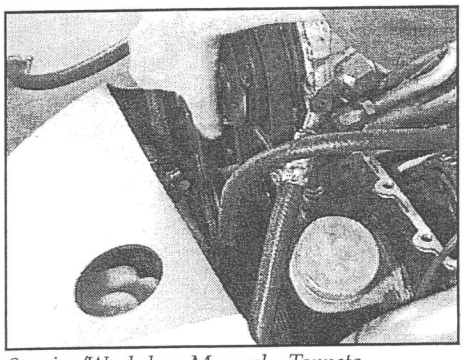
Service/Workshop Manual - Tappets



Service/Workshop Manual - Tappets

13

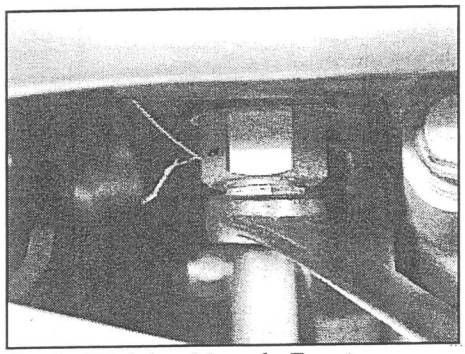
And tighten in place with the bolts provided.



Service/Workshop Manual - Tappets

14

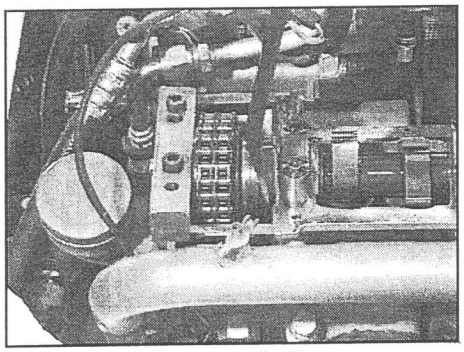
Now turn the crankshaft anti-clockwise until the camshaft has moved 1 1/2 teeth,if working on the odd bank (i.e. 1,3,5,7). If working on the even bank turn the crankshaft clockwise, until the camshaft has rotated 1 1/2 teeth. This puts the engine in a 'safe' position so that the valves are not bent when removing, adjusting or replacing the camshaft.



Service/Workshop Manual - Tappets

15

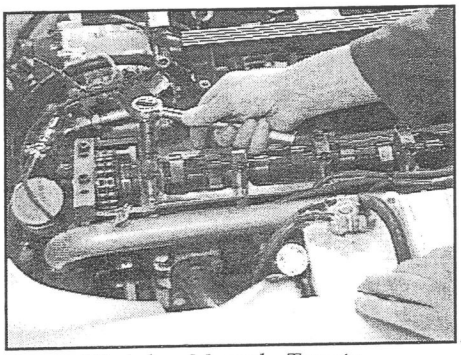
Slacken the timing chain tensioner but do not remove it completely.



Service/Workshop Manual - Tappets

16

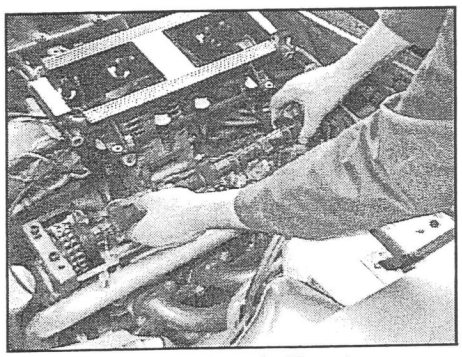
Then slide the cam sprocket off the cam and onto the retaining tool.



Service/Workshop Manual - Tappets

Now slacken all the cam caps evenly, remove 'K' lock nuts, and caps.

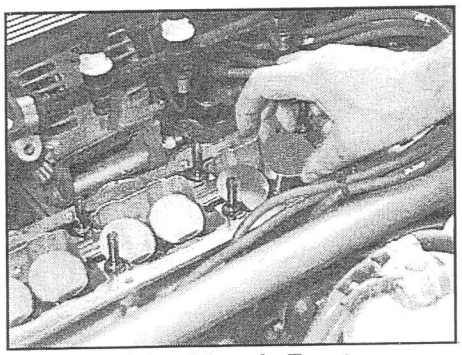
17



Service/Workshop Manual - Tappets

Remove camshaft.

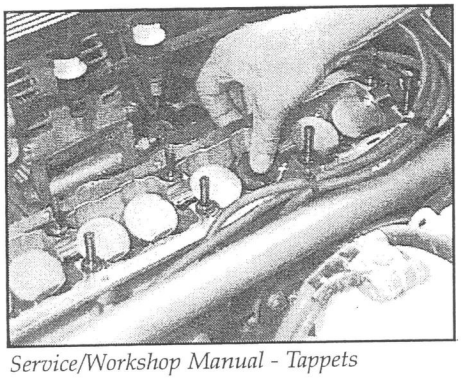
18



Service/Workshop Manual - Tappets

Remove any cam followers which need adjustment.

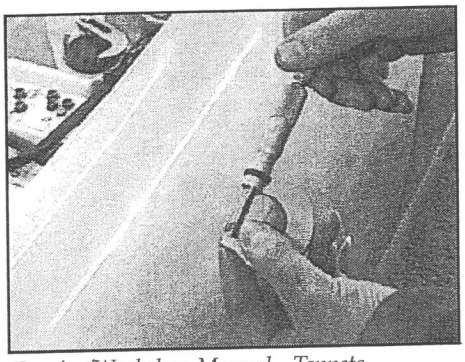
19



Service/Workshop Manual - Tappets

Remove 'Top hat' shim.

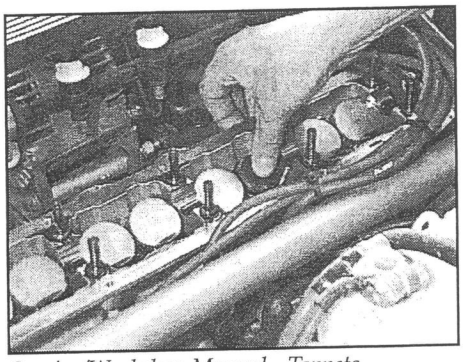
20



21

Service/Workshop Manual - Tappets

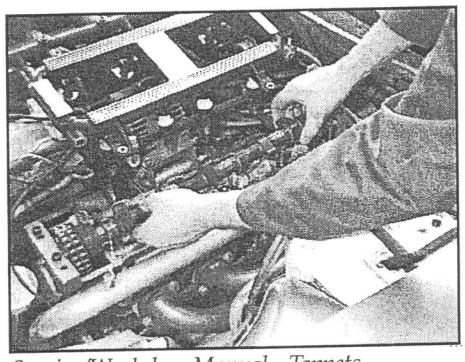
And measure shim with a micrometer.



22

Service/Workshop Manual - Tappets

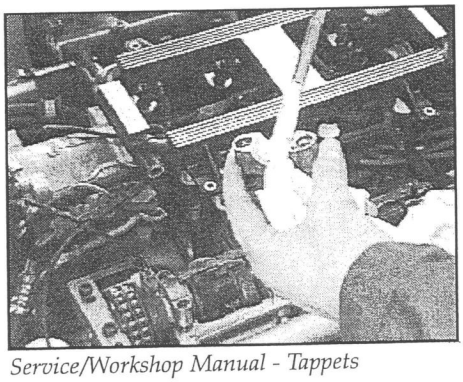
Replace with a new shim which gives a clearance of 0.010 inch on the exhaust valve or 0.008 on an inlet valve.



23

Service/Workshop Manual - Tappets

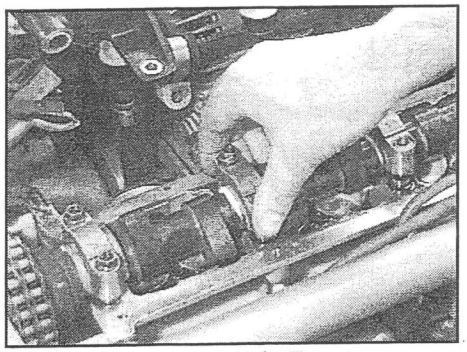
Replace the camshaft but do not connect the cam sprocket.



24

Service/Workshop Manual - Tappets

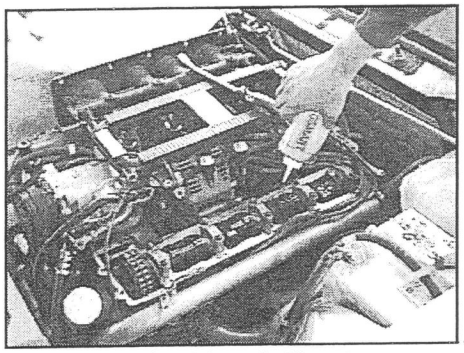
Lubricate cam caps with nulon or suitable engine build lubricant.



Service/Workshop Manual - Tappets

Replace caps and tighten progressively toward the back of the engine, note cam position whilst fitting caps.

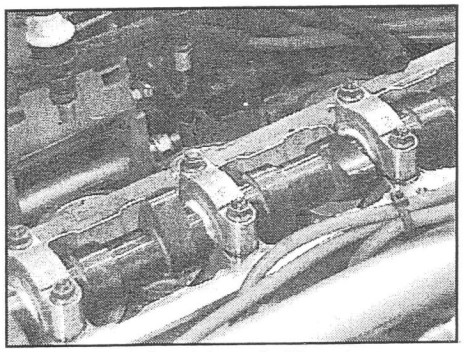
25



Service/Workshop Manual - Tappets

Apply engine oil to camshaft and cam followers.

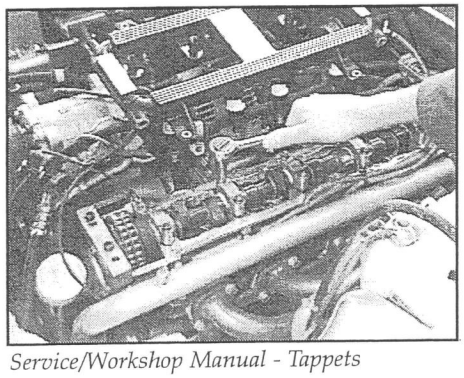
26



Service/Workshop Manual - Tappets

The camshaft may be rotated whilst the engine is in the 'safe' position in order to check the valve clearances DO NOT rotate the crankshaft or valve damage will occur. Repeat steps 17 to 25 until clearances are correct.

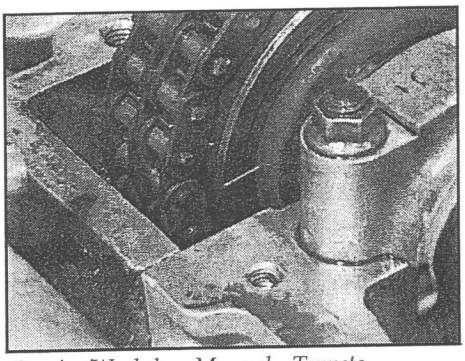
27



Service/Workshop Manual - Tappets

When adjustment is completed torque caps to 17 lb ft.

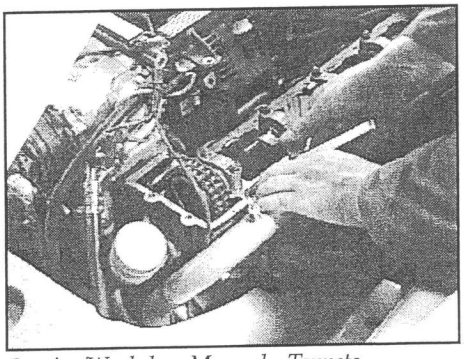
28



Service/Workshop Manual - Tappets

Turn cam until scribe marks line up with cylinderhead and...

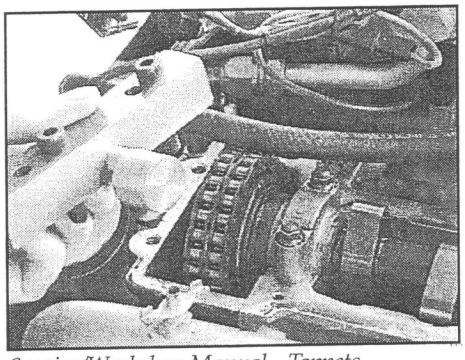
29



Service/Workshop Manual - Tappets

...slide cam sprocket on to camshaft.

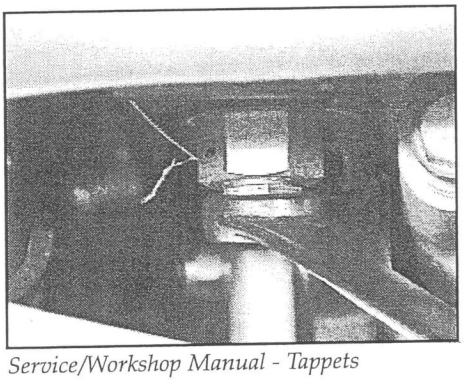
30



Service/Workshop Manual - Tappets

Now turn the crankshaft until the scribe lines match exactly on the cam and sprocket, now remove the sprocket retaining tool. Degrease cam sprocket retaining bolts with solvent, apply loctite thread locking compound and refit bolts, torqueing to 20 lb ft.

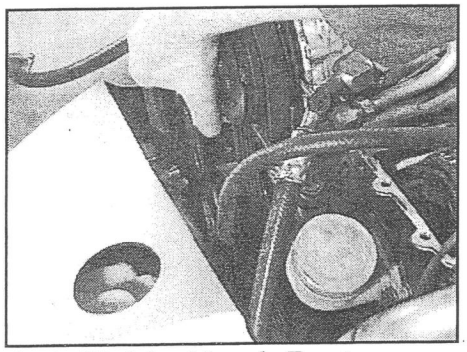
31



Service/Workshop Manual - Tappets

Loctite cam chain tensioner bolt. Tighten and secure with lockwire.

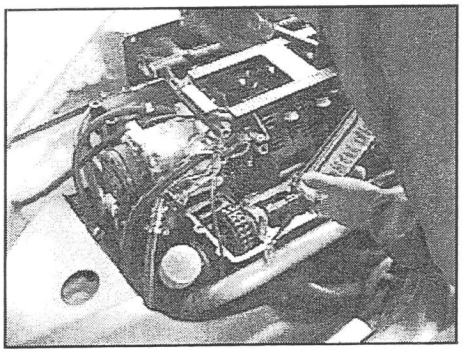
32



Turn crankshaft 1 revolution clockwise and refit remaining cam sprocket retaining bolts torqueing to 20 lb ft.

33

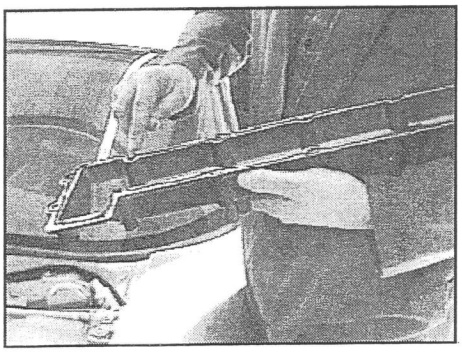
Service/Workshop Manual - Tappets



Place a bead of silicone over the joint between the cylinder and the front cover.

34

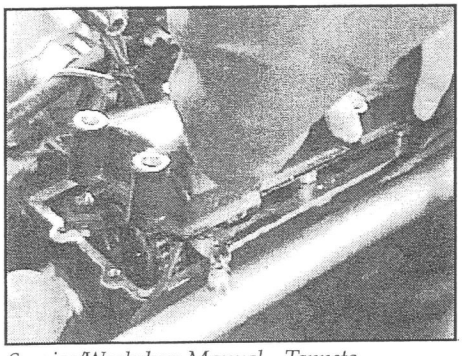
Service/Workshop Manual - Tappets



Apply a thin bead of silicone all around the cam cover ensuring silicone is applied all around the bolt holes.

35

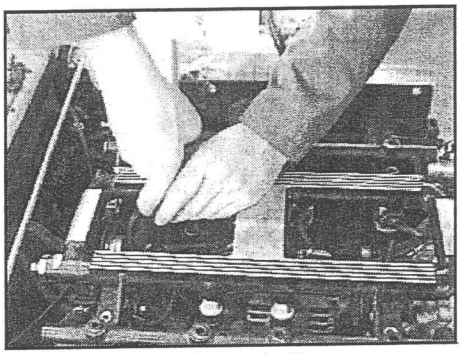
Service/Workshop Manual - Tappets



Refit the cam cover, torque M5 bolts to 10 lb ft and M8 bolts to 15 lb ft.

36

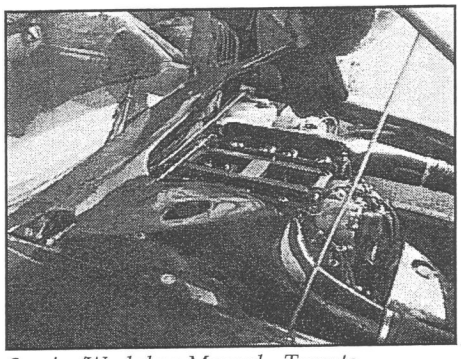
Service/Workshop Manual - Tappets



37

Refit the manifolds remembering to refit the spacers between the manifolds and cam covers. The spacers must be an exact fit in their respectively caps or cracking will occur around the cam cover bosses, fit shims if necessary.

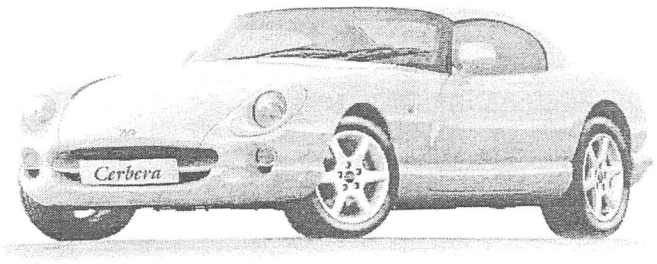
Service/Workshop Manual - Tappets



38

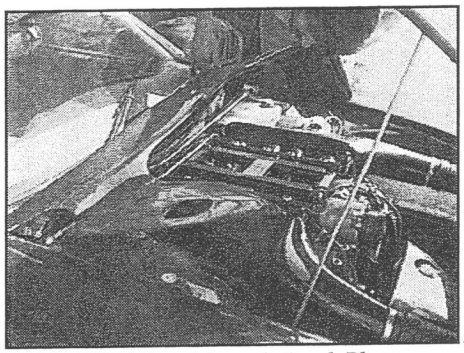
Refit the airboxes and air inlet pipes, reconnect the battery and refit top engine cover.

Service/Workshop Manual - Tappets



Service / Workshop Manual

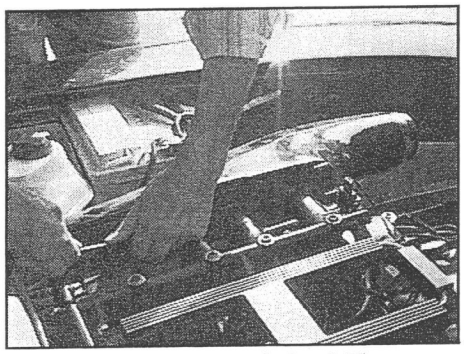
Spark Plugs



Service/Workshop Manual -Spark Plugs

To obtain access to the spark plugs the top engine cover needs to be removed first.

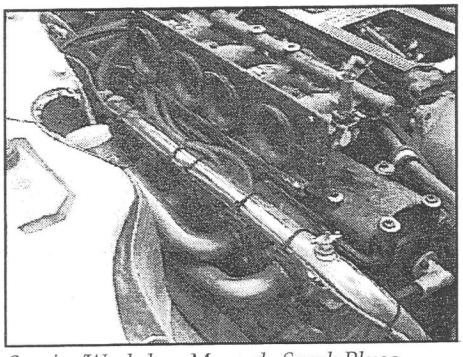
1



Service/Workshop Manual -Spark Plugs

Next remove the air boxes and air pipes.

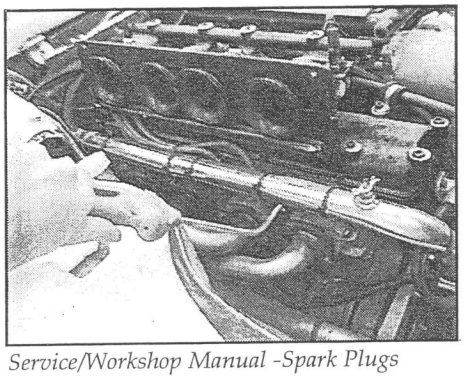
2



Service/Workshop Manual -Spark Plugs

The spark plugs are situated under the coolant rail and run down each side of the engine.

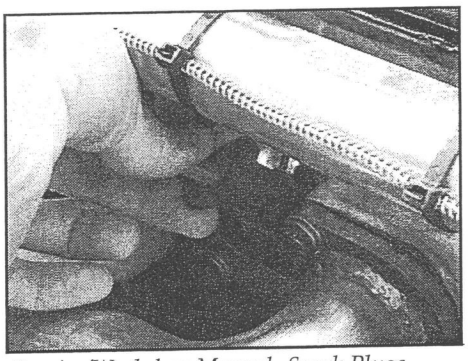
3



Service/Workshop Manual -Spark Plugs

It is advisable to remove any dirt from around the plug recesses with a dry brush or air line before removing the plug to prevent any dirt dropping into the cylinders.

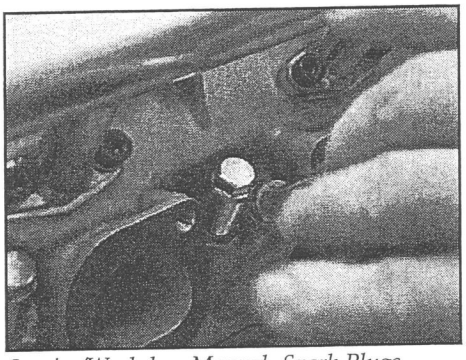
4



Service/Workshop Manual -Spark Plugs

Remove the plug leads and label.

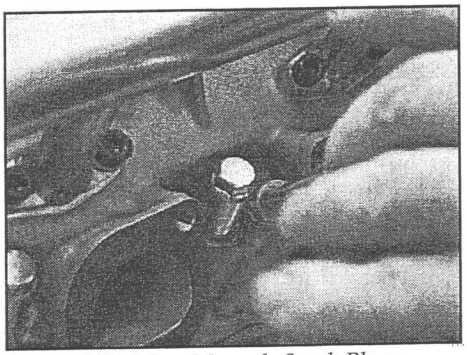
5



Service/Workshop Manual -Spark Plugs

Once this has been done the spark plug can be unscrewed using a spark plug spanner, suitable box spanner or a deep socket and extension bar.

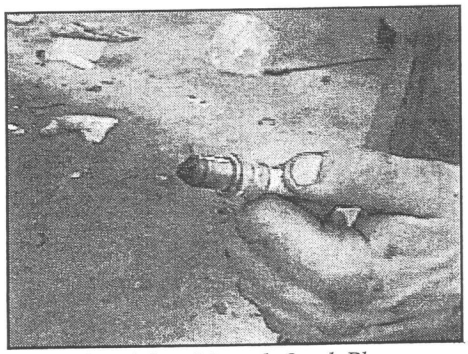
6



Service/Workshop Manual -Spark Plugs

Remembering to keep the socket aligned with the spark plug, otherwise the ceramic insulator maybe broken.

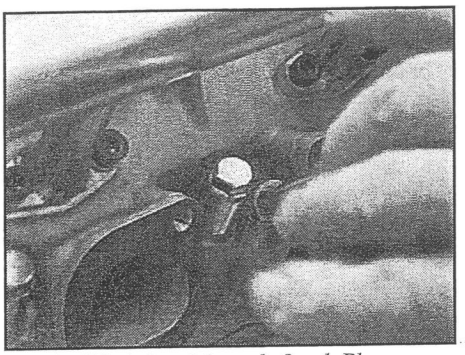
7



Service/Workshop Manual -Spark Plugs

Once the spark plug has been removed they should be checked.

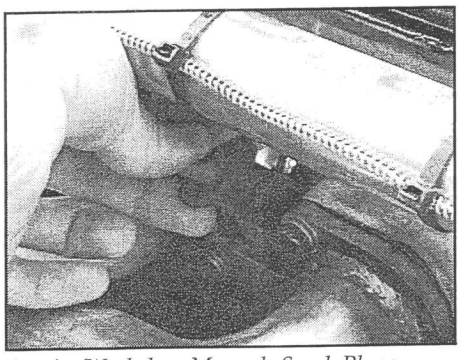
8



Service/Workshop Manual -Spark Plugs

Replace with a new pre-set plug or with the old checked plug. Excharge every 6,000 miles.

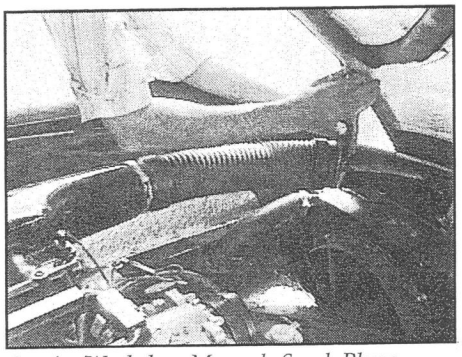
9



Service/Workshop Manual -Spark Plugs

Replace the plug leads onto the correct plug ensuring they click on.

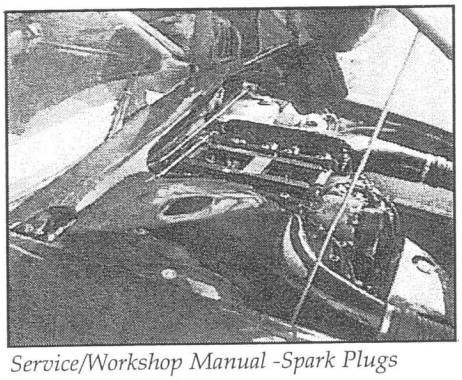
10



Service/Workshop Manual -Spark Plugs

Reseal air boxes with 1/4 inch sticky foam before fitting, if required and then refit air pipes.

11

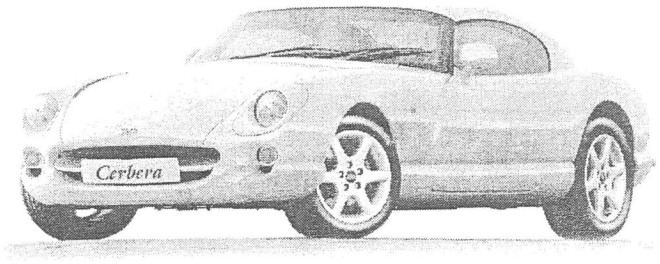


Service/Workshop Manual -Spark Plugs

Finally replace the top engine cover.

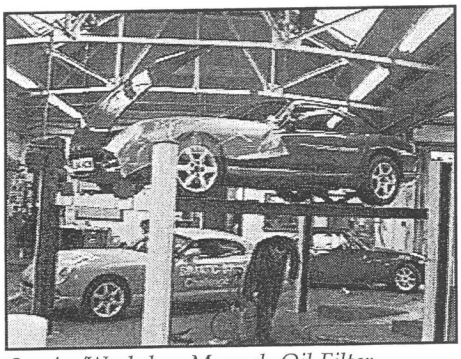
12

Notes



Service / Workshop Manual

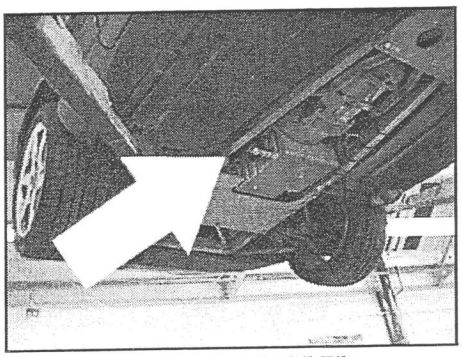
Oil Filter



Service/Workshop Manual -Oil Filter.

To obtain access to the oil filter the car must first be raised on a ramp or driven over a pit.

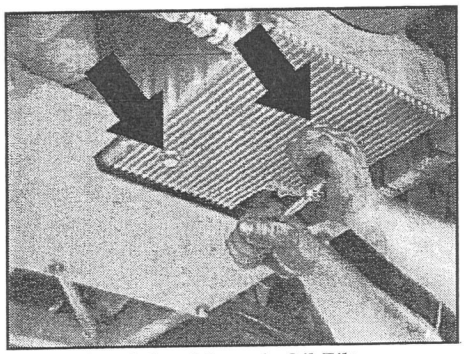
1



Service/Workshop Manual -Oil Filter.

The oil filter is situated to the N/S of the car.

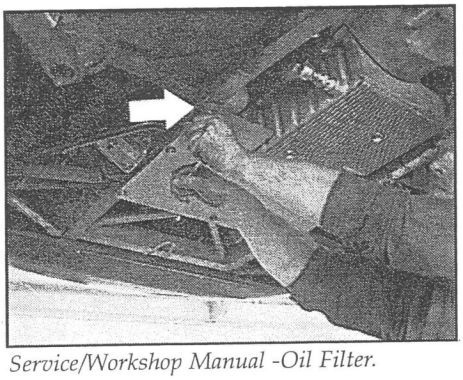
2



Service/Workshop Manual -Oil Filter.

The engine oil has to be drained first, by removing the two sump plug bolts (M10x15) and filler cap. There are two sump plugs as shown because the sump is divided into two canals.

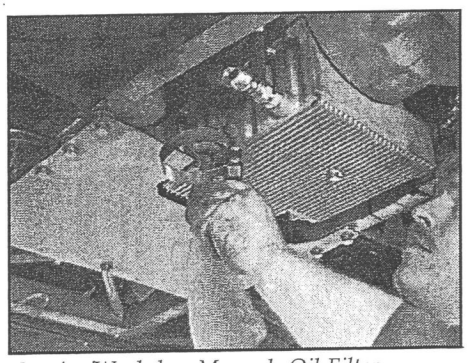
3



Service/Workshop Manual -Oil Filter.

Once all the engine oil has been drained then the sump plate bolts (M10x15) have to be removed to release the anti-roll bar cover to create better access to the oil filter.

4

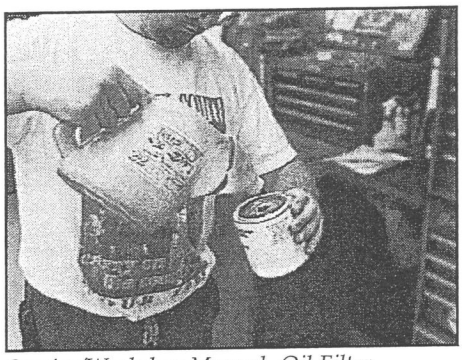


Service/Workshop Manual -Oil Filter.

Once this has been done the oil filter is ready to be removed using a strap wrench.

N.B. This picture shows the anti roll bar cover still fitted.

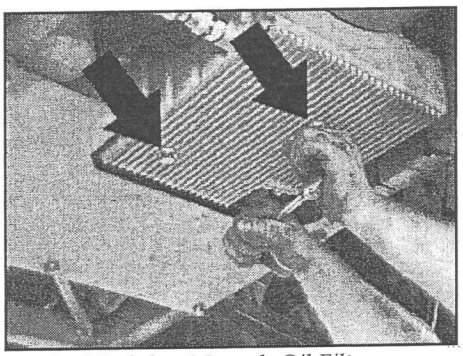
5



Service/Workshop Manual -Oil Filter.

Before replacing the new oil filter it must be filled with new oil and refitted as quickly as possible so as the oil doesn't drain from the pump.

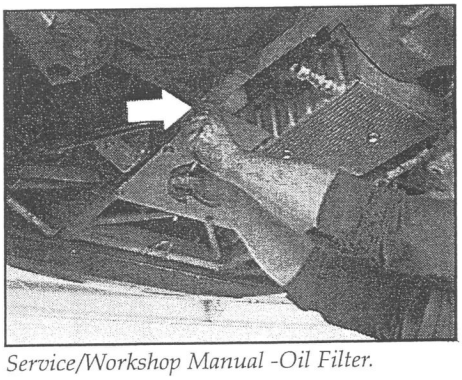
6



Service/Workshop Manual -Oil Filter.

When the sump bolts are replaced they should be torqued to 25 ft lb. When this has been done the engine can be filled with new oil and the filler cap refitted.

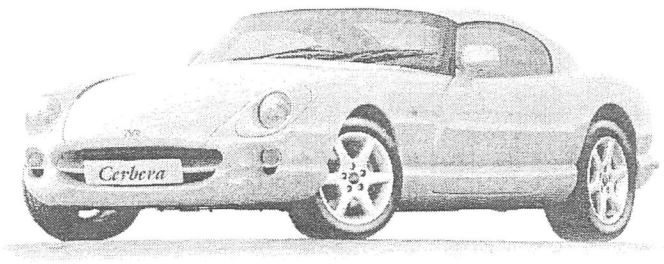
7



Service/Workshop Manual -Oil Filter.

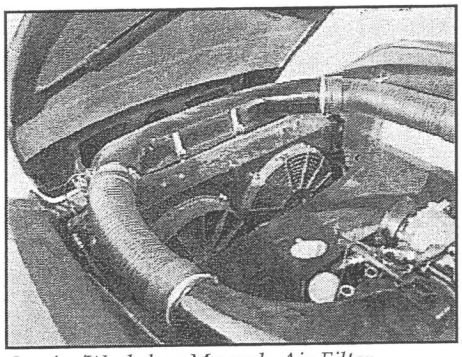
Finally the anti-roll bar cover can be replaced torqueing the M10x15 bolts with washers to 30 ft lb. Run engine and check for leaks. Remembering to check oil level after switching the engine off. Wait 2 mins before checking.

8



Service / Workshop Manual

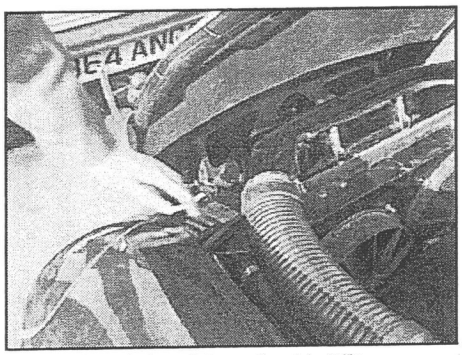
Air Filter



Service/Workshop Manual -Air Filter.

Access to the air filter is gained through the air filter box which is situated at the front of the engine bay.

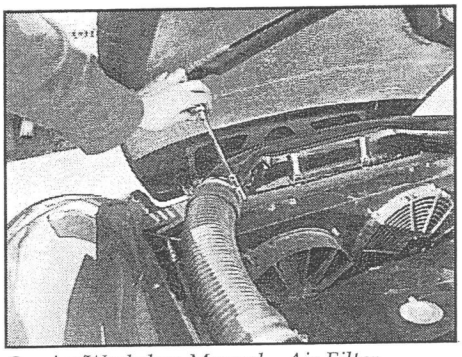
1



Service/Workshop Manual - Air Filter.

Firstly remove the air flow sensor plug which is situated on the N/S of the car.

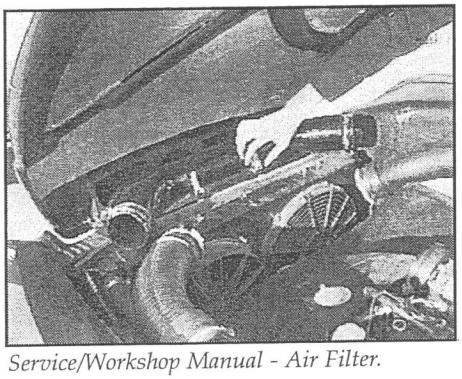
2



Service/Workshop Manual - Air Filter.

Remove the air pipes from the air filter box by loosening the Jubilee clips.

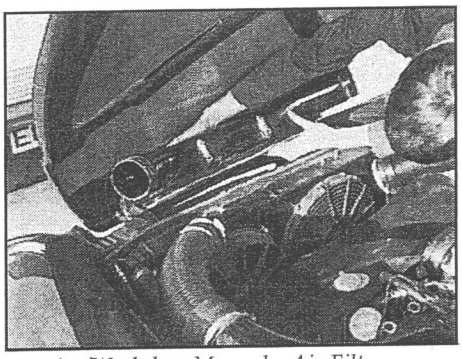
3



Service/Workshop Manual - Air Filter.

Next remove the split pins on the two securing clips on the front of the box.

4



Service/Workshop Manual - Air Filter.

The filter box should now come free.

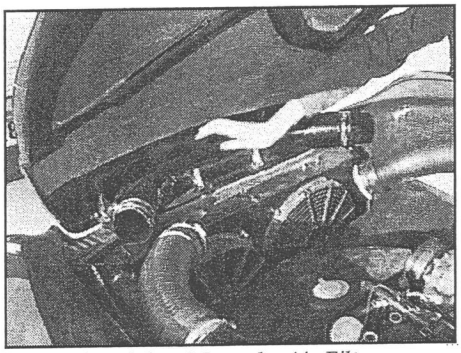
5



Service/Workshop Manual - Air Filter.

Once the filter box is free the air filter can be removed and replaced with the course side down.

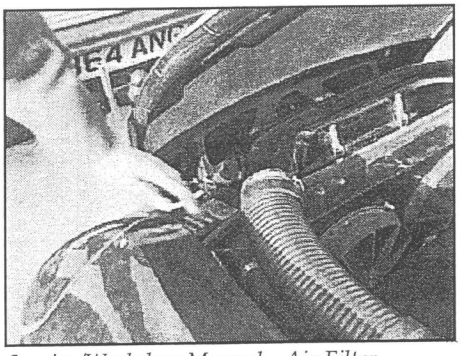
6



Service/Workshop Manual - Air Filter.

Then refit filter to cut out in bodywork and refit filter box back onto car.

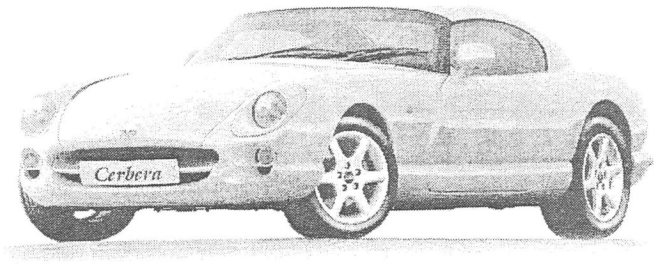
7



Service/Workshop Manual - Air Filter.

Finally replace split pins on securing clips and then refit the air pipes and reconnect the air flow sensor.

8



Service / Workshop Manual

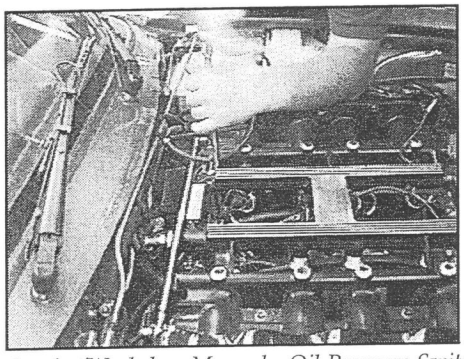
Oil Pressure Switch



To gain access to the oil pressure switch, firstly remove the top engine cover by the two M4 allen bolts then disconnect the battery and remove washer pipes - as shown.

1

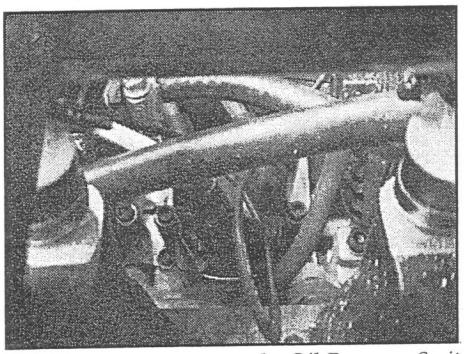
Service/Workshop Manual - Oil Pressure Switch



The switch is located under the rear coil which is held on by 4 x M5 allen bolts. These have to be removed using a ball end socket.

2

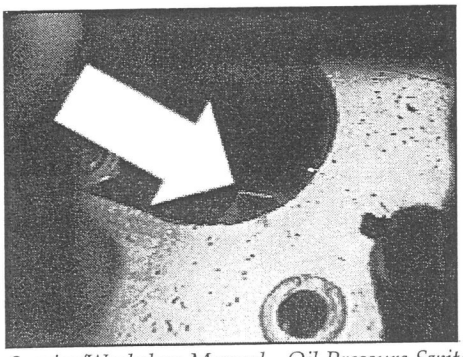
Service/Workshop Manual - Oil Pressure Switch



Once all four bolts have been removed it can then be pushed to one side to reveal the switch.

3

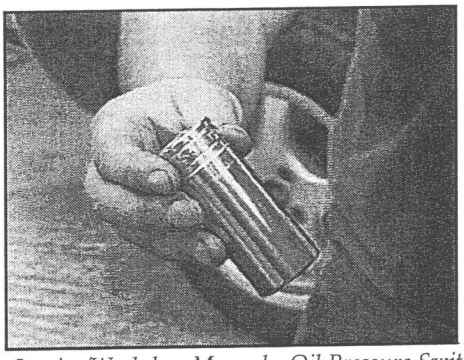
Service/Workshop Manual - Oil Pressure Switch



Remove the oil pressure switch wire.

4

Service/Workshop Manual - Oil Pressure Switch



Service/Workshop Manual - Oil Pressure Switch

5

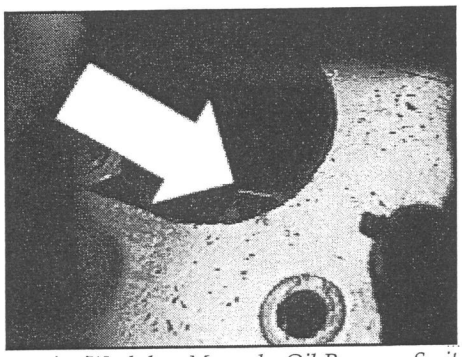
Using a deep 1 inch scocket with an extension carefully undo and remove the switch.



Service/Workshop Manual - Oil Pressure Switch

6

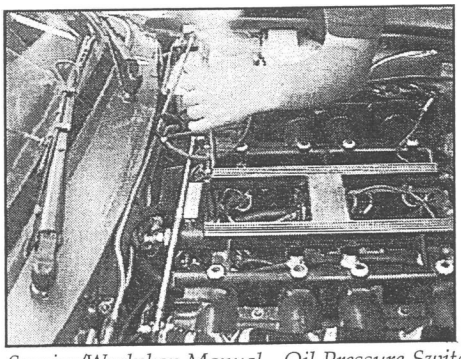
Replace with new switch and washer
(Note : Apply a small amount of grease/glue on the washer to ensure it does not fall into the engine bay when fitting.)



Service/Workshop Manual - Oil Pressure Switch

7

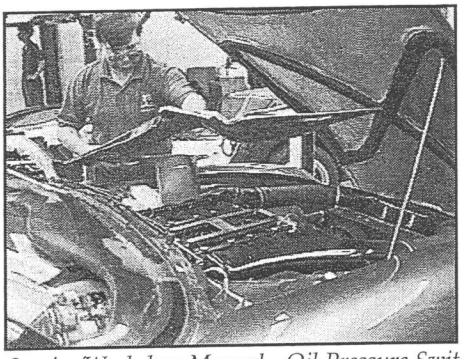
Replace the oil pressure switch wire.



Service/Workshop Manual - Oil Pressure Switch

8

Refit and tighten bolts on coil and make sure plugs leads are all o.k. and no other wires have been disturbed.



Service/Workshop Manual - Oil Pressure Switch

Replace washer jets and top engine cover.

Notes