12 Piston/connecting rod assembly - inspection

1 Before the inspection process can begin, the piston/ connecting rod assemblies must be cleaned, and the original piston rings removed from the pistons.

2 Carefully expand the old rings over the top of the pistons. The use of two or three old feeler gauges will be helpful in preventing the rings dropping into empty grooves **(see illustration)** . Be careful not to scratch the piston with the ends of the ring. The rings are brittle, and will snap if they are spread too far. They are also very sharp - protect your hands and fingers. Note that the third ring incorporates an expander. Always remove the rings from the top of the piston. Keep each set of rings with its piston if the old rings are to be re-used. Note which way up each ring is fitted.

12.2 Removing a piston ring with the aid of a feeler gauge

3 Scrape away all traces of carbon from the top of the piston. A hand-held wire brush (or a piece of fine emery cloth) can be used, once the majority of the deposits have been scraped away.

4 Remove the carbon from the ring grooves in the piston, using an old ring. Break the ring in half to do this (be careful not to cut your fingers - piston rings are sharp). Be careful to remove only the carbon deposits - do not remove any metal, and do not nick or scratch the sides of the ring grooves.

5 Once the deposits have been removed, clean the piston/ connecting rod assembly with a suitable solvent, and dry thoroughly. Make sure that the oil return holes in the ring grooves are clear.

6 If the pistons and cylinder bores are not damaged or worn excessively, and if the cylinder block does not need to be rebored, the original pistons can be refitted. Measure the piston diameters, and check that they are within limits for the corresponding bore diameters. If the piston-to-bore clearance is excessive, the block will have to be rebored, and new pistons and rings fitted. Normal piston wear shows up as even vertical wear on the piston thrust surfaces, and slight looseness of the top ring in its groove. New piston rings should always be used when the engine is reassembled.

7 Carefully inspect each piston for cracks around the skirt, around the piston pin holes, and at the piston ring "lands" (between the ring grooves).

8 Look for scoring and scuffing on the piston skirt, holes in the piston crown, and burned areas at the edge of the crown. If the skirt is scored or scuffed, the engine may have been suffering from overheating, and/or abnormal combustion which caused excessively high operating temperatures. The cooling and lubrication systems should be checked thoroughly. Scorch marks on the sides of the pistons show that blow-by has occurred. A hole in the piston crown, or burned areas at the edge of the piston crown, indicates that abnormal combustion (pre-ignition, knocking, or detonation) has been occurring. If any of the above problems exist, the causes must be investigated and corrected, or the damage will occur again. The causes may include incorrect ignition timing, intake air leaks, or incorrect air/fuel mixture.

9 Corrosion of the piston, in the form of pitting, indicates that coolant has been leaking into the combustion chamber and/or the crankcase. Again, the cause must be corrected, or the problem may persist in the rebuilt engine.

10 New pistons can be purchased from a BMW dealer.

11 Examine each connecting rod carefully for signs of damage, such as cracks around the bearing cap. Check that the rod is not bent or distorted. Damage is highly unlikely, unless the engine has been seized or badly overheated. Detailed checking of the connecting rod assembly can only be carried out by a BMW dealer or engine repair specialist with the necessary equipment.

12 The piston pins are of the floating type, secured in position by two circlips. The pistons and connecting rods can be separated as follows.

13 Using a small flat-bladed screwdriver, pry out the circlips, and push out the piston pin **(see illustrations)** . Hand pressure should be sufficient to remove the pin. Identify the piston and rod to ensure correct reassembly. Discard the circlips - new ones *must* be used on installation.

12.13a Prying out the circlips . . .

12.13b . . . to remove the piston pins from the pistons

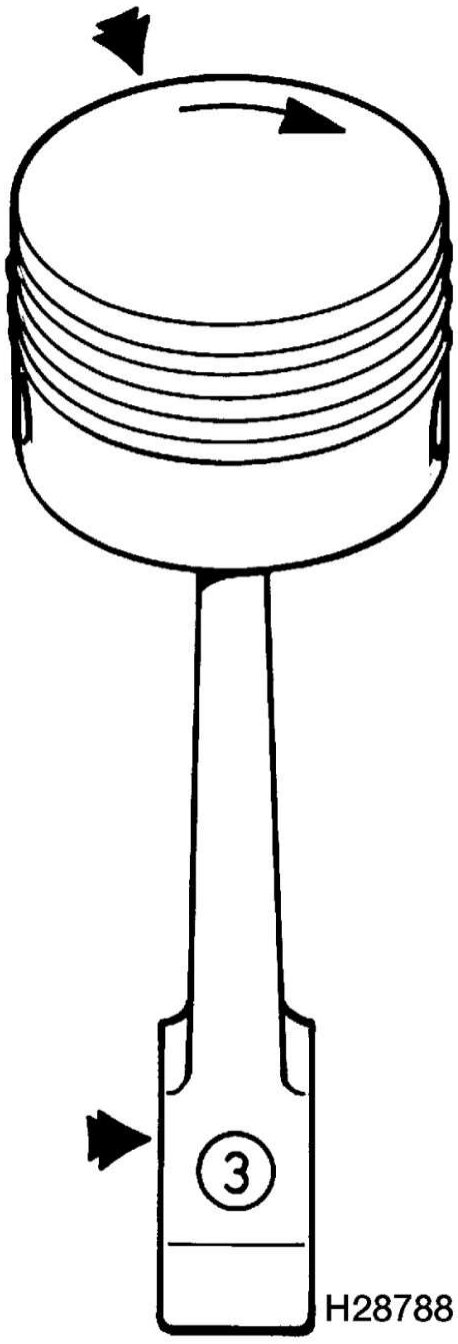
14 Examine the piston pin and connecting rod bushing for signs of wear or damage. It should be possible to push the piston pin through the connecting rod bushing by hand, without noticeable play. Wear can be cured by renewing both the pin and bushing. Bushing replacement, however, is a specialist job - press facilities are required, and the new bushing must be reamed accurately.

15 The connecting rods themselves should not be in need of replacement, unless seizure or some other major mechanical failure has occurred. Check the alignment of the connecting rods visually, and if the rods are not straight, take them to an engine overhaul specialist for a more detailed check.

16 Examine all components, and obtain any new parts from your BMW dealer. If new pistons are purchased, they will be supplied complete with piston pins and circlips. Circlips can also be purchased individually.

17 Position the piston in relation to the connecting rod, so that when the assembly is refitted to the engine, the identifying cylinder numbers on the connecting rod and cap are positioned on the exhaust manifold side of the engine, and the installation direction arrow on the piston crown points towards the timing chain end of the engine **(see illustrations)** .

12.17a The cylinder number markings should be positioned on the exhaust manifold side of the engines, and the arrow on the piston crown should point towards the timing chain end of the engine



12.17b Installation direction arrow on six-cylinder engine piston crown

18 Apply a smear of clean engine oil to the piston pin. Slide it into the piston and through the connecting rod bushing. Check that the piston pivots freely on the rod, then secure the piston pin in position with two new circlips. Ensure that each snap-ring is correctly located in its groove in the piston.

© 2024 Haynes Manuals, Inc. Contact us