16 Piston rings - installation

1 Before fitting new piston rings, the ring end gaps must be checked as follows.

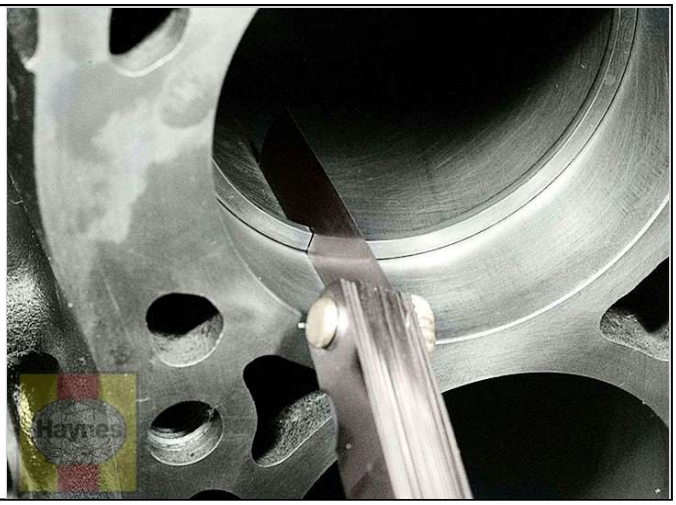
2 Lay out the piston/ connecting rod assemblies and the new piston ring sets, so that the ring sets will be matched with the same piston and cylinder during the end gap measurement and subsequent engine reassembly.

3 Insert the top ring into the first cylinder, and push it down the bore using the top of the piston. This will ensure that the ring remains square with the cylinder walls. Position the ring near the bottom of the cylinder bore, at the lower limit of ring travel. Note that the top and second compression rings are different. The second ring is easily identified by the step on its lower surface, and by the fact that its outer face is tapered.

4 Measure the end gap using feeler gauges.

5 Repeat the procedure with the ring at the top of the cylinder bore, at the upper limit of its travel **(see illustration)** , and compare the measurements with the figures given in the Specifications.

16.5 Measuring a piston ring end gap



6 If the gap is too small (unlikely if genuine BMW parts are used), it must be enlarged, or the ring ends may contact each other during engine operation, causing serious damage. Ideally, new piston rings providing the correct end gap should be fitted. As a last resort, the end gap can be increased by filing the ring ends very carefully with a fine file. Mount the file in a vise equipped with soft jaws, slip the ring over the file with the ends

contacting the file face, and slowly move the ring to remove material from the ends. Take care, as piston rings are sharp, and are easily broken.

7 With new piston rings, it is unlikely that the end gap will be too large. If the gaps are too large, check that you have the correct rings for your engine and for the particular cylinder bore size.

8 Repeat the checking procedure for each ring in the first cylinder, and then for the rings in the remaining cylinders. Remember to keep rings, pistons and cylinders matched up.

9 Once the ring end gaps have been checked and if necessary corrected, the rings can be fitted to the pistons.

10 Fit the piston rings using the same technique as for removal. Fit the bottom (oil control) ring first, and work up. When fitting the oil control ring, where applicable, first insert the expander, then fit the ring with its gap positioned 180° from the expander gap. Ensure that the second compression ring is fitted the correct way up, with its identification mark (either a dot of paint or the word "TOP" stamped on the ring surface) at the top, and the stepped surface at the bottom **(see illustration)** . Arrange the gaps of the top and second compression rings 120° either side of the oil control ring gap, but make sure that none of the rings gaps are positioned over the piston pin hole. **Note:** *Always follow any instructions supplied with the new piston ring sets - different manufacturers may specify different procedures. Do not mix up the top and second compression rings, as they have different cross-sections.*

16.10 Typical piston ring fitting

1 Top compression ring

2 Second compression ring

3 Oil control ring