Minor damage to engine parts, such as burrs, nicks, scratches, scoring, or galling, should be removed with a fine oil stone, crocus cloth, or any similar abrasive substance. Following any repairs of this type, the part should be cleaned carefully to be certain that all abrasive has been removed, and then checked with its mating part to assure that the clearances are not excessive. Flanged surfaces that are bent, warped, or nicked can be repaired by lapping to a true surface on a surface plate. Again, the part should be cleaned to be certain that all abrasive has been removed. Defective threads can sometimes be repaired with a suitable die or tap. Small nicks can be satisfactorily removed with Swiss pattern files or small, edged stones. Pipe threads should not be tapped deeper to clean them, because this practice results in an oversized tapped hole. If galling or scratches are removed from a bearing surface of a journal, it should be buffed to a high polished finish.

In general, welding of highly-stressed engine parts can be accomplished only when approved by the manufacturer. However, welding may be accomplished using methods that are approved by the engine manufacturer, and if it can be reasonably expected that the welded repair will not adversely affect the airworthiness of the engine.

Many minor parts not subjected to high stresses may be safely repaired by welding. Mounting lugs, cowl lugs, cylinder fins, rocker box covers, and many parts originally fabricated by welding are in this category. The welded part should be suitably stress-relieved after welding. However, before welding any engine part, consult the manufacturer's instructions for the engine concerned to see if it is approved for repair by welding.

Parts requiring use of paint for protection or appearance should be repainted according to the engine manufacturer's recommendations. Aluminum alloy parts should have original, exterior painted surfaces rubbed smooth to provide a proper paint base. See that surfaces to be painted are thoroughly cleaned. Care must be taken to avoid painting mating surfaces. Exterior aluminum parts should be primed first with a thin coat of zinc chromate primer. After the primer is dry, parts should be painted with engine enamel, that should be air dried until hard, or baked for ½ hour at 82 °C (180 °F). Aluminum parts from which the paint has not been removed may be repainted without the use of a priming coat, provided no bare aluminum is exposed.

Any studs that are bent, broken, damaged, or loose must be replaced. After a stud has been removed, the tapped stud hole should be examined for size and condition of threads. If it is necessary to re-tap the stud hole, it also is necessary to use a suitable oversize stud. Studs that have been broken off flush with the case must be drilled and removed with suitable stud remover. Be careful not to damage any threads. When replacing studs, coat the coarse threads of the stud with an anti-seize compound.

Cylinder Assembly Reconditioning

Cylinder and piston assemblies are inspected according to the procedures contained in the engine manufacturer's manuals, charts, and service bulletins. A general procedure for inspecting and reconditioning cylinders is discussed in the following section to provide an understanding of the operations involved.

Visually inspect the head fins for other damage besides cracks. Dents or bends in the fins should be left alone unless there is danger of cracking. Where pieces of fin are missing, the sharp edges should be filed to a smooth contour. Fin breakage in a concentrated area causes dangerous local hot spots. Fin breakage near the spark plug bushings or on the exhaust side of the cylinder is obviously more dangerous than in other areas. When removing or re-profiling a cylinder fin, follow the instructions and the limits in the manufacturer's manual.

Inspect spark plug inserts for the condition of the threads and for looseness. Run a tap of the proper size through the bushing. Very often, the inside threads of the bushing are burned. If more than one thread is missing, the bushing should be rejected. Tighten a plug in the bushing to check for looseness.

Piston and Piston Pins

If the old piston is to be reused, or a new piston is to be used, measure the outside of the piston by means of a micrometer. Measurements must be taken in several directions and on the skirt, as well as on the lands section. Check these sizes against the cylinder size. Most engines use cam ground pistons to compensate for the greater expansion parallel to the pin during engine operation. The diameter of these pistons measures several thousandths of an inch larger at an angle to the piston pin hole, than parallel to the pin hole. Inspect the ring grooves for evidence of wear. The groove needs to be checked for side clearance with a feeler gauge to determine the amount of wear in the grooves. Examine the piston pin for scoring, cracks, excessive wear, and pitting. Check the clearance between the piston pin and the bore of the piston pin bosses using a telescopic gauge and a micrometer. Use the magnetic particle method to inspect the pin for cracks. Since the pins are often case hardened, cracks show up inside the pin more often than they on the outside. Check the pin for bends using V-blocks and a dial indicator on a surface plate. *[Figure 10-14]* Measure the fit of the plugs in the pin. In many cases, the pistons and piston pins are routinely replaced at overhaul.