

## **Chris Lewis Rocker**

F1108-F1114D01

### **Failure:**

Customer submitted 4 each rockerarm assemblies and pushrods from a Pantera engine. One rocker had the tail broken off originating approximately 3 threads up from the lower adjuster hole counterbore. The main part of the body was submitted but not the part with the remaining threads so it was not possible to examine the failed threads directly. See photo F1114S01.

Not much data was submitted with the broken parts. The few only known parameters are that the engine was mainly operated on the street, maximum RPM was around 7200 and that the failures were quick, sometimes within 40 miles. It was also said that the springs were .200 from coilbind and that the seat pressure was about 290#.

### **Procedures:**

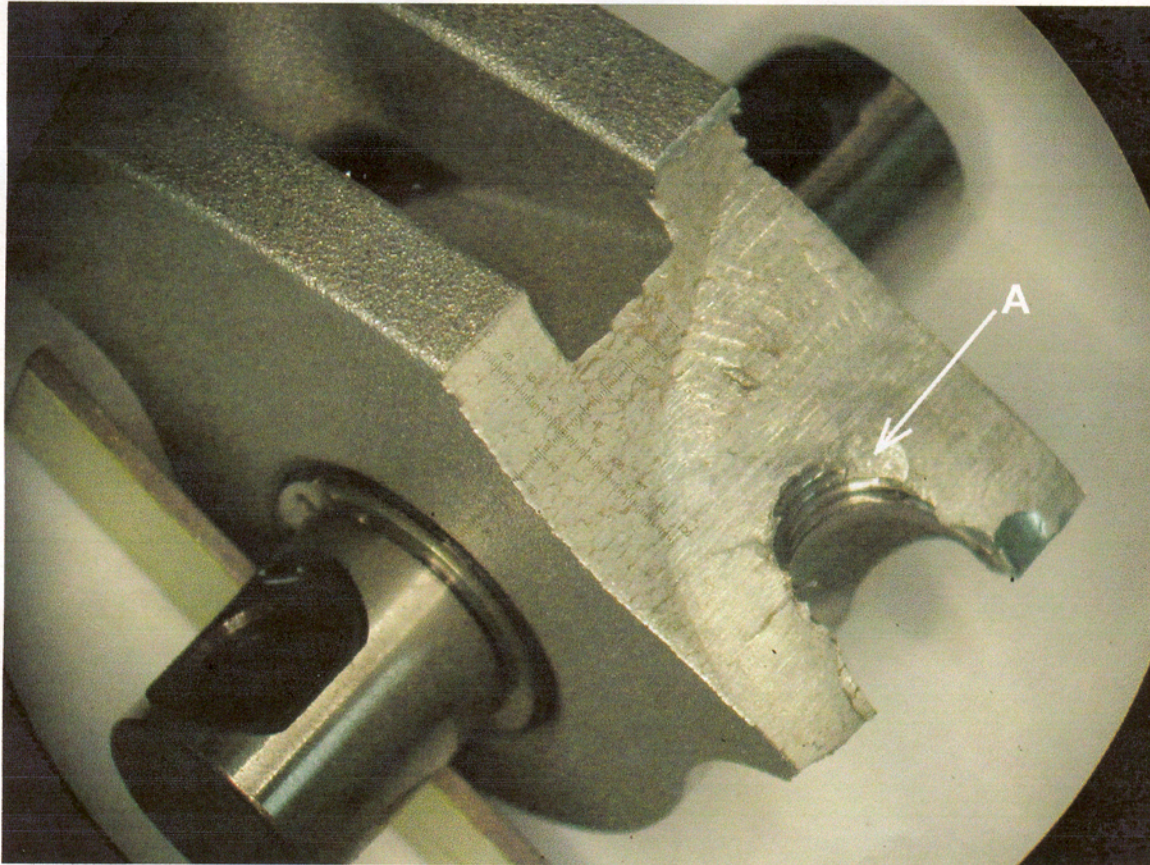
Parts were examined under a 5x - 100x optical scope for signs of metal failure as well as anything indicating possible reasons for the failures.

### **Appearance / Observations:**

When the intact rockers were disassembled, two potential problems were found. The first is that breakaway torque on the three adjuster nuts were 45, 45 and 33 ft-lbs. This indicates overtightening of the adjuster nut which is a known cause of this type of failure. The second is that the adjusters were turned out 3 to 3-1/2 turns from top position as opposed to Jesel's recommended 1 to 1-1/2 turns. This was presumably done to compensate for an incorrect length pushrod. Adjusters turned out this far render the pushrod geometry unacceptable and are another known cause of rockerarm and adjuster breakage.



F1114S01



The failure area was examined for signs of nonmetallic inclusions or any other defects that would act as a stress riser and initiate the fracture. None were found. The failure started at approximately the third thread from the bottom which is the most highly loaded area of the rocker body. The fracture origin is marked 'A'. Crack propagation was through a low cycle fatigue mechanism, indicating severe overload.

More potential problems appeared after disassembly and examination. These are described below with their accompanying photos.



F1108C01

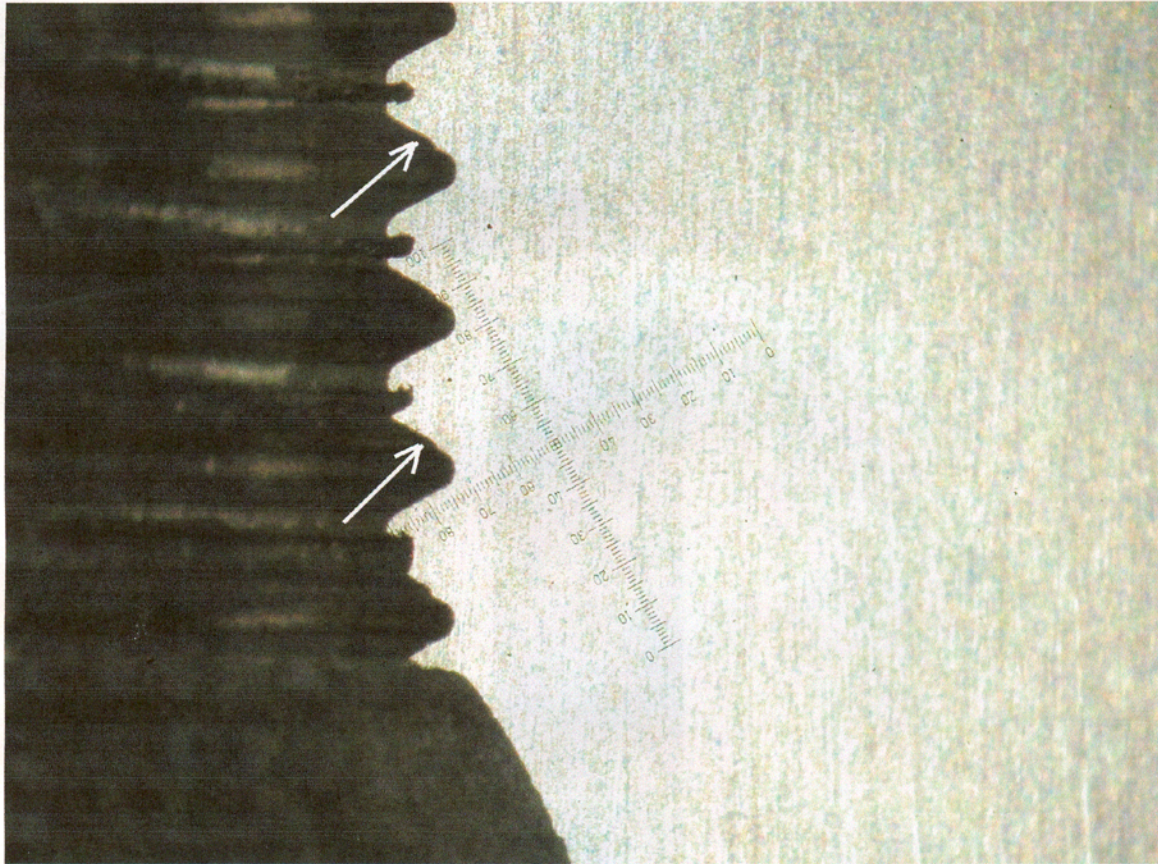


Photo F1108C01 shows the sectioned rocker thread at the bottom of the hole. It can be seen that in the bottom threads there is a small amount of thread distortion by brinelling of the adjuster into the rocker. This is the slight notch on the lower flanks marked by arrows. Thread distortion in this area is caused by the adjuster being driven into the rockerarm thread by heavy impact loading. This is commonly caused by uncontrolled or incorrect valve train behaviors. Examples include - 1) Forcing the system into coilbind or binding the retainer against the valve guide. 2) Severe spring surge or valve bounce which manifests itself as a resultant crash of the valve train components against each other as the system goes in and out of compliance and loft. This distortion causes stress risers and micro-cracks which can lead to failure such as is seen here.



F1108C02

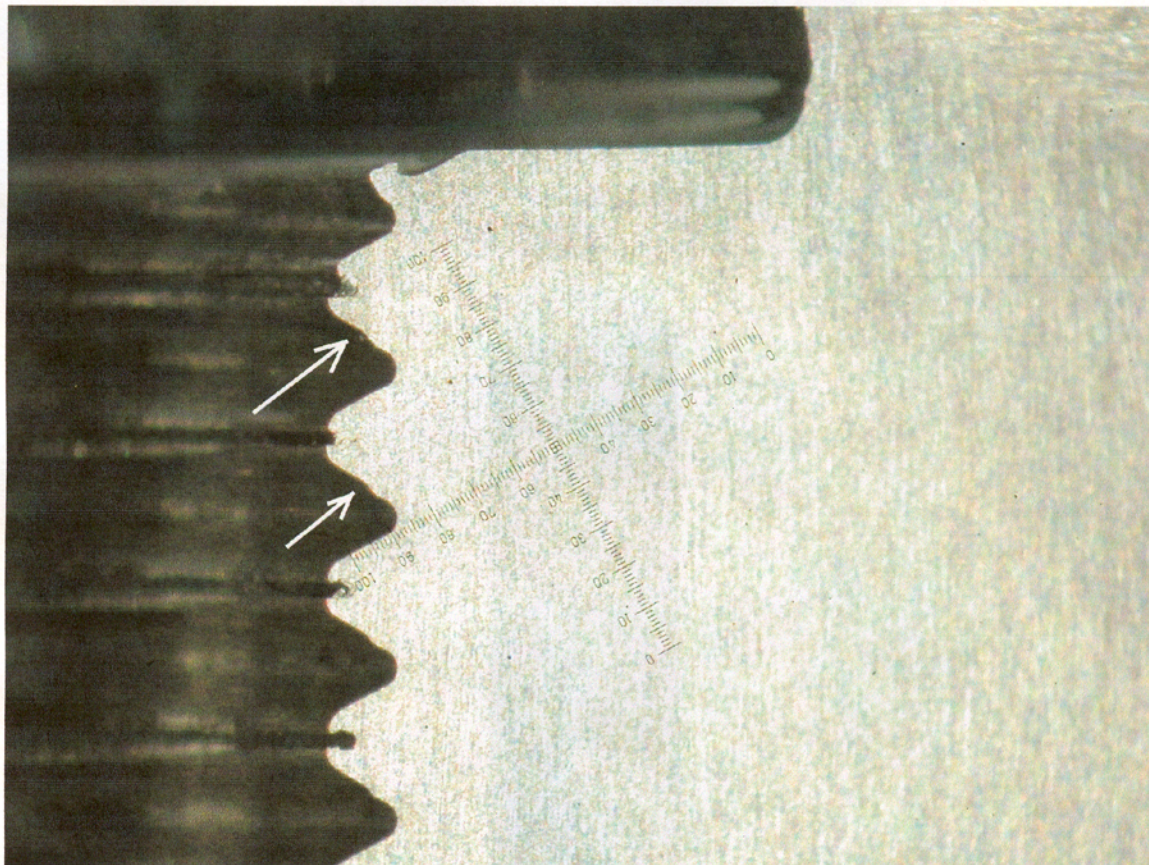


Photo F1108C02 shows the threads near the top of the adjuster hole. The arrows show the distortion by brinelling is deeper here than at the bottom of the same part. The only possible cause for this is overtightening the adjuster nut. All operating forces are transmitted from the bottom of the rocker so they can not cause this type of distortion. This is the most common cause of rockerarm tail failure.