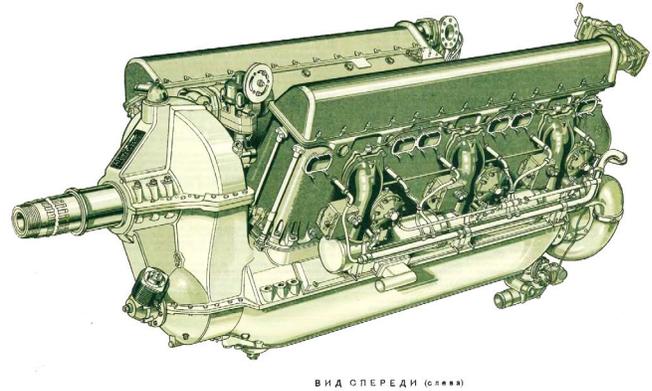
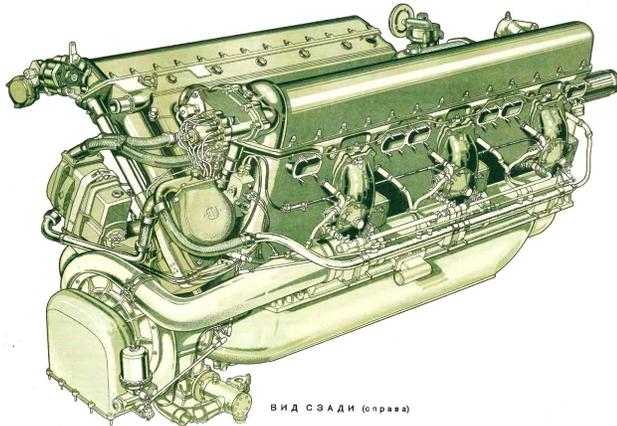
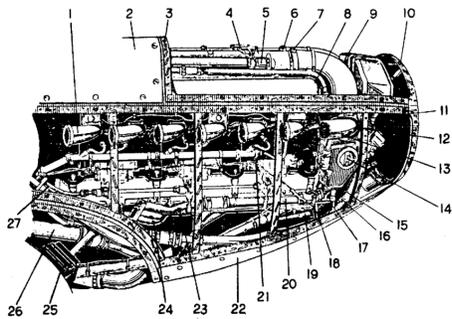


Appendix II The M-105 and M-107

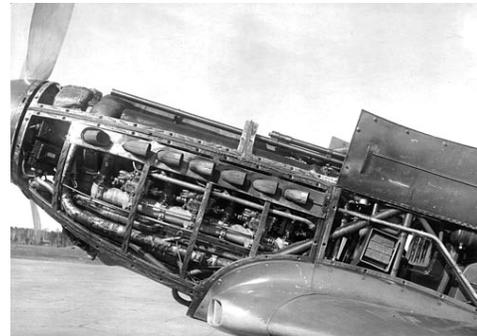


▲ Two superb illustrations of the M-105PF from the Yak-1 Album of Technical Drawings.



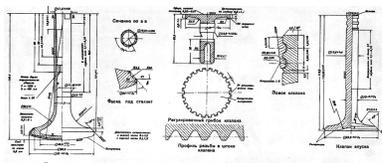
◀ The installation of the M-107A from the Yak-9P *Tekhnicheskoe Opisane*.

▶ M-107A installation in the Yak-9U, 1944.



What Went Wrong With the M-107?

Fundamentally similar to the extremely reliable M-105-- nearly identical in dimensions and displacement, and close in weight-- why should the M-107 (VK-107) engine have been so problematic? The answer can be expressed in only two words: *valve stems*. There were of course a number of problematic components and various teething troubles experienced during development, but these were all rectified in time. Engine cooling remained a persistent issue, but the Klimov OKB was perplexed as to why over-heating led to such catastrophic failures in the M-107, whereas not in the M-105? The answer lie in their valve stem technology, which was simply not able to cope with the increased heat, RPMs and pressures of the new four valve head. Valves are a highly over-looked and exceedingly critical component of engine performance and function, and were one to look for an explanation of the considerable superiority of engines made by **Rolls Royce**, for example, one need not look much further than these essential items. Merlin engines in WW2 already featured sodium cooled exhaust valve stems, something which the M-107 desperately needed, but which was decades ahead in technology. There was nothing inherently amiss with the M-107's design, and had the valves (and related hardware-- seals, guides, lubrication, etc) been supplied by Rolls, in fact, the engine would have performed with entirely satisfactory reliability. Alas, such technology was not available to Klimov, and the valves remained a fatal weakness of the M-107's design throughout its life.



◀ The M-105PF's valve details from the 1943 Yakovlev *remont*.

▶ Modern Inconel style sodium cooled valve stems, so fundamentally needed in the M-107.

