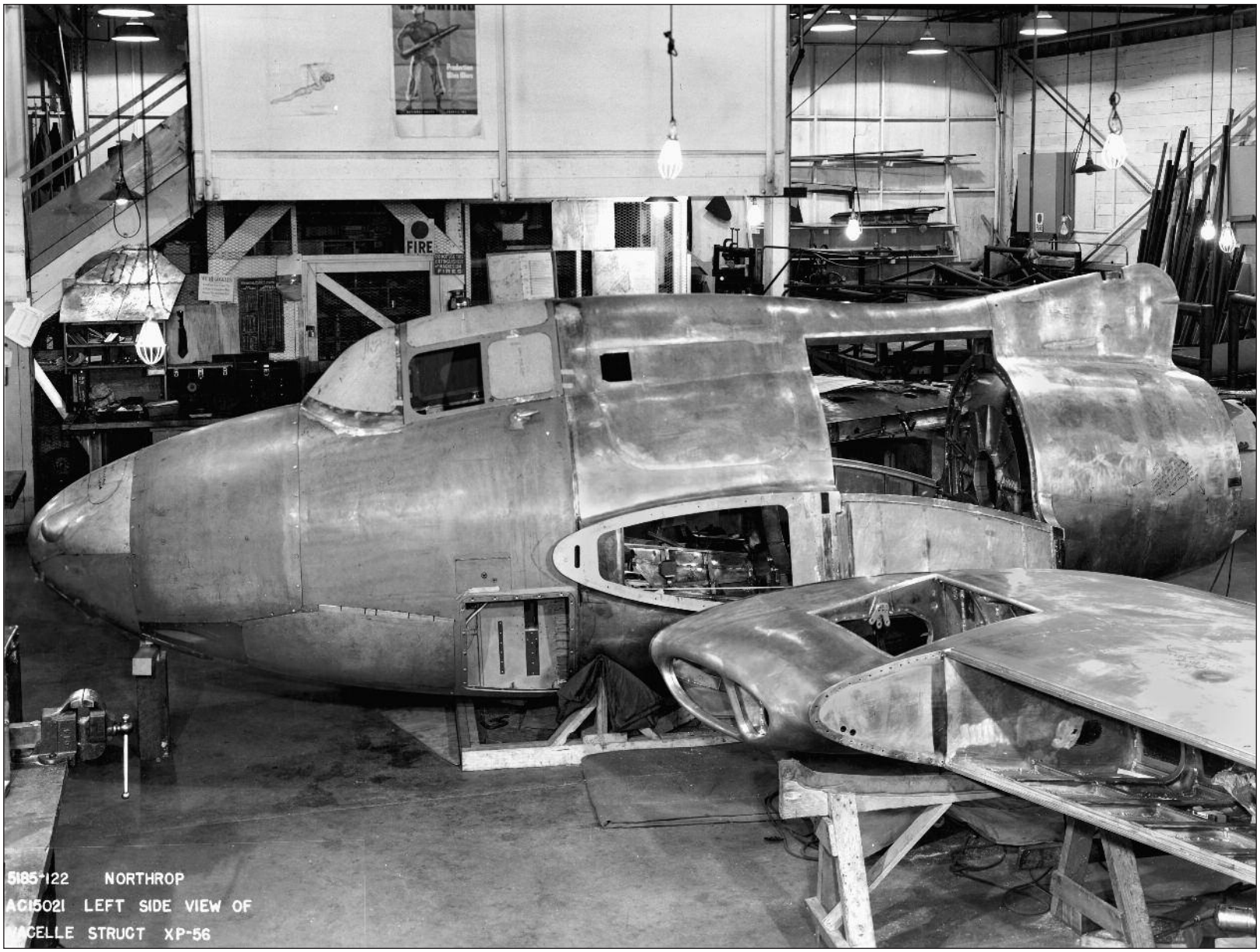
The powerplant of the XP-56 was described as a submerged installation. It was mounted to the aft face of the rigid bulkhead at fuselage station (FS) 146.5, which also carried the wing main spar loads. Attachment to the bulkhead was at six points, connecting to the aft face of the crankcase by means of Lord Flexible Pedestal mounting units, which suspended the engine at its center of gravity. The forward end of the crankcase was mounted in a rubber-lined collar supported at FS 191. In addition to carrying the engine support collar, a fixed vane stator was also attached immediately aft on the FS 191 frame assembly, to direct cooling air into the engine driven cooling fan. Immediately aft of the stator assembly the cooling fan was attached to the extension shaft at approximately FS 196.75. The propeller reduction gearbox was attached to the aft end of the extension shaft and installed into the fuselage at FS 235.

The cooling system for the fully submerged radial R-2800 engine required special attention, with cooling requirements uniquely different from a typical externally cantilevered, cowled radial engine. Concern for cooling the massive R-2800 was constantly being brought to Northrop's attention because of the engine cooling problems encountered on the early flight tests of the N-1M. To assist in resolving engine cooling problems, Northrop built an engine test stand simulating the complete aft fuselage, with engine, fan, gearbox, and coaxial propellers.



The first XP-56 (41-786) in final assembly. The surface smoothness of the heavy-gauge welded magnesium skins is shown to advantage. Also noteworthy is the openness of the wing structure, providing room for the self-sealing fuel tanks. (Northrop)

Cooling air lead-in ducts were incorporated into the leading edge of the wing roots on each side of the fuselage with approximately 70 percent of the inlet areas dedicated to the engine and oil cooling function. The remainder of the inlet areas were directed into the supercharger intercoolers, which was then exhausted out of a controlled opening in the lower surface of the wing. Engine and oil cooling air, supplied through the lead-in ducts, was discharged into a pressure/plenum chamber formed by the fuselage cavity forward of the engine installation, bounded between FS 101 and FS 146.5. The diffused air was then free to flow aft around the engine cylinders to provide the necessary cooling, as a function of the suction head from the cooling fan (ground operations) or ram pressure (flight operations), or a combination of both. The flow of cooling air was controlled in the aft fuselage by means of an inner cowl or duct approximately equal to the engine diameter, tapering aft from FS 146.5 to the air exit control flaps aft of FS 235. A cylindrical shroud around the driveshaft between the fan and the exit control flaps further controlled airflow aft of the cooling fan.

Oil cooling was accomplished in a similar manner. The oil cooling radiator was suspended under the engine, drawing off some of the diffused air supply. Oil cooling was further facilitated by a duct between the aft face of the radiator and the forward face of the cooling fan; this ensured a suction head across the aft face of the

The nacelle (fuselage) of the first XP-56 in final assembly during an engine fit check. The partially open panel above the nose wheel door is the high-lift door that could be deployed by the pilot to reduce diving moments induced by lowering the landing gear and flaps. (Northrop)