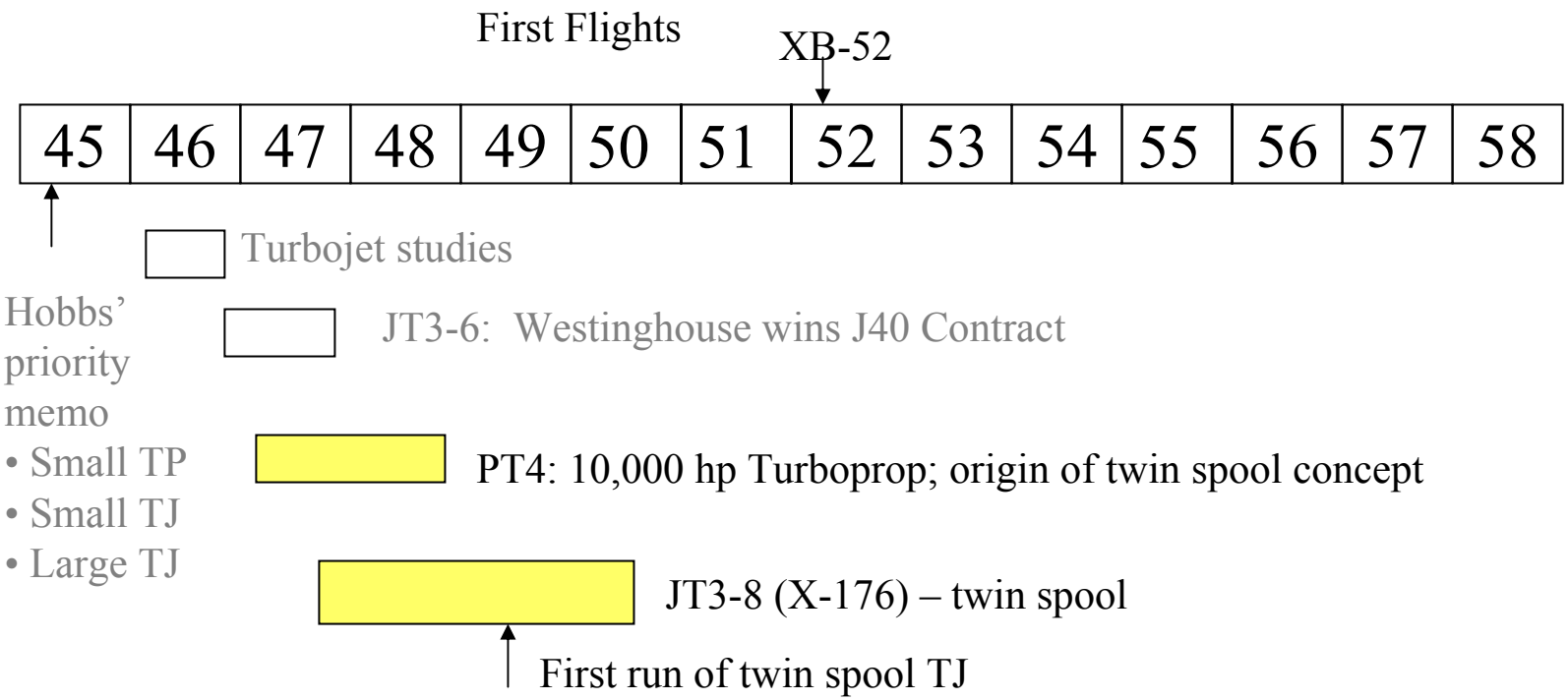
The JT3-8 Goes Twin-Spool



The JT3-8 Goes Twin Spool

Hobbs, rather than being discouraged by losing the J40 opportunity, pushed on to an 8:1 compressor pressure ratio to improve the specific fuel consumption. He still did not have a customer for whatever turbojet he was planning to develop. Since the Navy had committed itself to the J40, Hobbs decided to see what he could do with his other big customer, the Air Force. His contacts in the Air Force told him that if he wanted to break into the aircraft gas turbine market with the Air Force, he had to offer an engine for the B-52 – a long-range bomber. At that moment the B-52 was looking at a turboprop and a turbojet. Neither type had been selected yet.

The gas turbine text books at that time described the applications of gas turbines to short-range and long-range aircraft. There was no question about it. Short-range aircraft could use turbojets and long-range aircraft had to use turboprops because the fuel efficiency of turboprop engines was somewhat better than the fuel efficiency of turbojets. The challenge for Hobbs was (1) the B-52 turbojet of choice was already the J40, which was under development by Westinghouse for the Navy, and (2) the B-52 turboprop of choice was the T35, which was also under development in an Air Force program with Wright Aeronautical.

At this point in his career Hobbs had more than 20 years experience in military and commercial aviation and understood how customer needs develop over time. He understood that in aviation there was this never ending trend of "faster and farther." He proposed to the Air Force a 10,000 horsepower turboprop engine which of course offered more power and lower specific fuel consumption than existed at that time. This 10,000 horsepower turboprop became the Air Force T45 (Pratt & Whitney PT4). Hobbs' intuition told him that if the Air Force had a high-efficiency turbojet, which would permit higher cruise speeds than the T35 turboprop and a much greater range than the J40 turbojet, then the Air Force would likely go for it.

He upgraded his turbojet engine (JT3-6) with an 8:1 compressor. This new engine was designated as the JT3-8. His experimental effort was concentrated on engine components rather than running a complete T45 turboprop engine. The only complete engine testing was in the turbojet configuration. The conversion of this engine to a turboprop required the addition of a reduction gear ahead of the compressor and the addition of another turbine stage in the low pressure turbine.

One of the first challenges to surface was the relatively high starting horsepower to bring the engine up to idle speed. A year or so earlier Perry Pratt had studies done on dual-spool compressors. So Perry decided to make the JT3-8 compressor a dual-spool compressor to minimize the starting horsepower. Hobbs and Pratt pushed on with the JT3-8 in spite of the critics who predicted that the two spools would experience "aerodynamic coupling" and run at the same speed anyway.

The technology program progressed and it soon became clear that a 10:1 compressor pressure ratio would be needed to achieve the desired low specific fuel consumption.
It's interesting to notice that Hobbs and Pratt were making all kinds of technical decisions long before a dual-spool engine ever ran. It would be mid 1949 before the JT3-8 would run.