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STABILITY AND CONTROL SUB-COMMITTEE.

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AERONAUTICAL RESEARCH COMMITTEE.

The P-47 Versus FW-190 at Low Altitude.

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Objective.

1. Comparative performance tests were conducted between the P-47 and the FW-190, for the purpose of ascertaining just what the P-47 airplane could do in combat against the FW-190 at low altitude, and to aid the P-47 pilots in their initial encounters with these enemy airplanes.

Factual Data.

2. The tests were conducted by the U.S. Army Air Force in Italy during December 1943, between sea level and 10,000 feet.

(a) Aircraft.— The airplanes used in the tests were a P-47D4 with combat load and a FW-190 with two loaded cannons mounted in the wings and two loaded 30 caliber MG, firing through the propeller. The P-47 was equipped with water injection. The FW-190 was in exceptionally good condition for a captured airplane, and developed 42 inches on take-off which is believed to be slightly above normal maximum boost.

(b) Pilots.— The pilot of the P-47 had nearly 200 hours in P-40 type airplanes with seventeen months of combat experience and had flown the test airplane five hours. The pilot of the FW-190 had 300 hours in twin engine aircraft and 500 hours in single engine airplanes but had no combat experience. This pilot also had five hours in the test airplane, and it is believed that the pilots were evenly matched in individual flying ability.

Results.

3. Four separate flights of one hour each were conducted. All speeds given are indicated airspeed.

(a) Acceleration:

(1) 210 m.p.h. to 275 m.p.h. at 2000 ft: The FW-190 accelerated faster than P-47 and gained approximately 200 yards.

(2) 210 m.p.h. to 275 m.p.h. at 5000 ft: Results were the same as at 2000 feet.

(3) 200 m.p.h. to full power at 5000 ft: The FW-190 accelerated faster than the P-47 initially and gained about 200 yards, but at a speed of 330 m.p.h. the P-47 rapidly overtook the FW-190 and gained about 2000 yards very quickly and was still accelerating. Water injection was used by the P-47.

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(4) 220 m.p.h. to 300 m.p.h. with full throttle at 15,000 ft: Again the FW-190 initially gained about 200 yards but the P-47 quickly overtook it. The FW-190 high speed supercharger cut in automatically at this altitude, and this supercharger seemed to cut in at lower altitudes when a speed in excess of 340 m.p.h. was attained by diving.

(b) Climb:

(1) 2,000 feet to 7,000 feet, starting at 250 m.p.h. Both airplanes were pulled up rapidly to the angle of maximum climb and held until an altitude of 8,500 feet was reached. The FW-190 climbed faster than the P-47 through the first 1,500 feet, but the P-47 quickly overtook it and steadily outclimbed it by 500 feet per minute. The P-47 used water injection and slightly overheated, while the FW-190 did not overheat.

(2) 10,000 feet to 15,000 feet, starting at 250 m.p.h. Again the FW-190 initially outclimbed the P-47 through the first 1,000 feet; however, the P-47 rapidly overtook it and reached 15,000 feet while the FW-190 was at 14,500 feet.

(c) Diving:

(1) 10,000 feet to 3,000 feet, starting at 250 m.p.h., diving at angle of 65° with constant throttle setting. The FW-190 pulled away rapidly at the beginning but the P-47 passed it at 3,000 feet with a much greater speed and had a decidedly better angle of pull out.

(d) Turning:

(3) Turning and handling in excess of 250 m.p.h. The two airplanes alternately turned on each other's tail, holding in the turns as tightly as possible, and alternating the turns from right to left. The P-47 easily out-turned the FW-190 at 10,000 feet and had to throttle back in order to keep from over-running the FW-190. The superiority of the P-47 in turning increased with altitude. The FW-190 was very heavy in fore and aft control, vibrated excessively, and tended to black out the pilot.

(2) Turning and handling below 250 m.p.h. Turns were made so rapidly that it was impossible for the airplanes to accelerate, and the ability of the FW-190 to hang in its propeller and turn inside the P-47 was very evident. The FW-190 was also able to accelerate suddenly and change to a more favorable position. It was found, however, that the P-47 could gain more advantage by making slow turns on an oblique axis. The FW-190 accelerates slowly in the dive and when the P-47 pulls up to the top of the oblique axis, the FW-190 has insufficient speed to follow through.

(e) Remarks:

(1) The FW-190 performs nicely in all acrobatic maneuvers with the exception of a very slight fore and aft control which makes low altitude maneuvers dangerous. This airplane has an extremely bad high speed stall in turns which is not so evident in high speed pull outs, but if trimmed and pulled hard enough it will spin violently straight down without warning. Aileron control is very good at all speeds and rudder control is normally good. Forward and side visibility are very good while rear visibility is very poor. The cockpit is uncomfortably small for a pilot taller than 5'11". "Bailing Out" of this airplane would be difficult for any pilot. The airplane is quite nose heavy which would make dead stick landings dangerous and high speed dives near the ground dangerous. The engine seems to run very rough at all times and the vibration transmitted through the control column almost completely destroys any feel of the flying characteristics. This characteristic is partly responsible for the lack of warning in high speed stalls.

(2) The P-47 has good visibility in all directions, and has no bad characteristics in take offs, landings, or in flight. All controls are good. The nose is too large to allow good visibility for straffing, but with practice this airplane may prove successful in ground attack. The inability of the airplane to pull out of vertical dives makes low altitudes dive-bombing impractical.

Conclusions.

(4) The P-47 with its tremendous fire power is at least as good as the FW-190 at low altitudes. There should be no question about engaging the FW-190 in a dog fight at low altitude, but it should be remembered that the FW-190 is a good airplane and its advantages are gained at slow speeds.

Brief Details of P-47 & FW-190.

	<u>P-47 ("Thunderbolt").</u>	<u>(FW-190).</u>
All up weight lb.	14,500	8,500
Wing area (sq.ft).	300	197
Wing loading lb/ft ² .	48.2	43
Max. speed m.p.h.	400 at 27,000	395 at 20,000
at		
Power	2,000 B.H.P.	1530 B.P.H. at 20,000
	SL - 27,000	