

Author's final report on the Lavochkin La-5FN
(translation)

Rechlin Test Centre
Test No. 90014

Test of the Russian La-5 fighter with
M-82FNV direct-injection twin-row
radial engine

Final Report
SECRET!

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E2b 187/45

Summary

The La-5 represents a great improvement in performance, flying characteristics and serviceability compared to earlier Russian fighters, and its performance below 3000 m (9840 ft) is particularly noteworthy. Maximum speed is below that of our fighters at all altitudes; best climbing speed near ground level lies between those of the 8-190 and 8-109 (FW 190 and Bf 109 - *Ed*). In the climb and turns below 3000 m the La-5 is a worthy opponent, particularly for the 8-190. The type's manufacturing shortcomings should hardly affect the Russians, who are used to inferior flying characteristics. Range is short, flight endurance at rated power being about 40 mins. This report presents performance data, flying characteristics and tactical conclusions.

Prepared by:
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Seen by:
.....
Major and CO

Distribution

TO beim RM
Chef TLN a.d.D.
KdE
Chef TLR/Fl.E.
Chef TLR/Rü
Genst, Gen, Qu. 6 Abt,
Fü. St. Ic Chef
Fü. St. Ic fr. Lw. Ost
Gd J
Gd S
Gd A
Gd Fl. Ausb.
Chef TLR/Fl.E2
Versuchsverband Ob.d.L. 2. Staffel

E'Stelle Re. M2c
E2c
5x E2 Beute
Forschungsführung M.L.
DVL Forschungsanstalt O'gau¹
D.F., Friedrichshafen²
Focke-Wulf, Bremen
EHAG, Wien³
MKN
B & V, Hamburg
Ifa, Dessau⁴

Rechlin, 20 March, 1945

Prepared by:

Checked by:

Read by:

¹ Messerschmitt AG/Oberammergau

² Dornier-Werke GmbH

³ Ernst Heinkel AG

⁴ Junkers Flugzeugbau AG

| <i>Data</i> | | <i>Weight distribution</i> |
|--------------------------------|-------------------|-------------------------------|
| Equipped weight | 2773 kg (6114 lb) | Left wheel 1437 kg (3168 lb) |
| Fuel (460.1=101.2 Imp.gal) | 354 kg (780 lb) | Right wheel 1484 kg (3273 lb) |
| Lubricants (51.1=11.2 Imp.gal) | 46 kg (101.4 lb) | Tailwheel 426 kg (939 lb) |
| Ammunition (2 × 200 rds) | 96 kg (207.2 lb) | 3347 kg (7379 lb) |
| Pilot | 80 kg (176.4 lb) | |
| All-up weight | 3347 kg (7379 lb) | |

Span 9.80 m (32 ft 1 in)

Wing area 17.5 sq.m (188.37 sq.ft)

Wing loading 191 kg/sq.m (39.1 lb/sq.ft)

Take-off power 1850 hp

Armament: 2 × 20 mm cannon with 200 rds each

Armour protection: 57 mm armoured glass windscreen

68 mm rear armoured glass plate as head protection, and

7 mm rear armour plate

The engine and airframe have already been described in detail in a report prepared by TLR/Rü. The performance data are provisional; a more detailed report will follow.

| <i>Performance</i> | Manifold (boost) pressure | rpm |
|--|--|------|
| | 1000 mm C.S. (1.36 ata=19.9 lb/sq.in) | 2400 |
| | 1180 mm C.S. (1.605 ata=23.6 lb/sq.in) | 2500 |
| Airspeed, emergency power, sea level | 520 km/h (323 mph TAS) | |
| Airspeed, rated power, sea level | 490 km/h (304.5 mph TAS) | |
| Airspeed, emergency power, 1000 m (3280 ft) pressure alt | 540 km/h (335.5 mph TAS) | |
| Airspeed, rated power, 2400 m (7870 ft) pressure alt | 540 km/h (335.5 mph TAS) | |
| Airspeed, rated power, 5000 m (16,405 ft) pressure alt | 560 km/h (348 mph TAS) | |
| Airspeed, rated power, 6500 m (21,320 ft) pressure alt | 545 km/h (338.7 mph TAS) | |
| Supercharger change-over altitude (manual selection) | 3500 m (7720 ft) | |
| Rate of climb, rated power, at 300 m (984 ft) | 16.17 m/sec (3182 ft/min) | |
| Rate of climb, rated power, at 4000 m (13,120 ft) | 13 m/sec (2558 ft/min) | |
| Rate of climb, rated power, at 7000 m (22,960 ft) | 6 m/sec (1180 ft/min) | |
| Ceiling | 8000-9000 m (26,250-29,530 ft) | |

The supercharger must not be used at emergency power. The (full throttle) altitudes are so low that full emergency power cannot be achieved either in climbing or horizontal flight.

The aircraft itself was fully serviceable. Its flying hours are not known, but the machine has been in service for some time. Surface finish, especially that of the wings (wood) is good; the sideways and forwards-extending slats fit very accurately.

2) Characteristics

The pilot's sitting position is comfortable. Forward vision from the cockpit is normally adequate, but during take-off, landing and taxiing it is much obstructed by the twin-row radial engine. On the ground and in flight strong exhaust fumes are troublesome. The high-altitude oxygen system was apparently never used and leaked significantly when tested. It is a copy of the German diaphragm flow economiser system. The propeller pitch change, radiator, cooling gills, trimmers, etc. are operated mainly by Bowden and other cables, resulting in a lot of lost motion and mushy response.

Take-off

There is some swing proportional to engine power, but it can be held. The tail should be raised slowly and not too soon, bearing in mind the limited propeller ground clearance. Acceleration is good and the distance relatively short (flaps 15° to 20°). Correct setting of the elevator and rudder trimmers must be watched, because there are no trim-position indicators.

Stability, control power and effectiveness

Longitudinal stability at normal angles of attack, with undercarriage and flaps retracted or extended, is surprisingly good, even in a full power climb, and the elevator power is normal. In steep turns, elevator forces are fully positive and fairly high, so that nose-trim is advisable in a sustained, turn.

Static directional stability is combined with normal rudder forces, but these diminish sharply at low airspeeds. Rudder effectiveness also reduces at low speed. Dynamic directional stability is weak and damping is bad. Yawing oscillations only damp out slowly. But the yaw oscillation cycle (at Va 450 km/h 280 mph at 2000 m 6560 ft about 3 sec) is not so short that the pilot cannot immediately stop it at any moment with the controls. Gun-aiming is therefore quite easy. Roll response to rudder is mild: the nose rises or falls in response to rudder, but this is not particularly disturbing. Adverse yaw and rolling moments (Dutch roll *Ed*) are slightly negative but, because of the good directional stability, are hardly disturbing and can be cancelled out by small rudder movements. Aileron effectiveness is outstanding. At Va 450 km/h (280 mph) a roll takes barely 4 sec; at Va 600 km/h (373 mph) aileron forces become high but can be assisted by rapid rudder movements. Yaw attitude noticeably affects required stick movements.

Stalling

At rated power, flaps and gear retracted: at V_a from 210 to 200 km/h (130.5-124 mph) the slats extend and aileron forces reduce to the point of over-balance. At V_a 180 km/h (112 mph) roll damping seems to disappear, with yaw or further airspeed reduction the aircraft drops a wing. With throttle closed and flaps and gear extended, the same responses occur at similar airspeeds. If the pilot pulls the stick further back, the elevator force suddenly reduces to the point of over-balance and its effectiveness nearly disappears. At the very high angles of attack which ensue, the aircraft drops a wing.

A stall in a steep turn with power produces similar results, but aileron over-balance appears much more pronounced and occurs at rather higher airspeeds. Thus it happens at 2400 m (7870 ft) altitude at 320 km/h (199 mph) and 2.6 g, equivalent to 67° bank and a 30 sec turn (360° in 30 sec *Ed.*), and at a slightly lower airspeed or more g the slats have already opened. The condition is not pleasant when one is forced to make sharp aileron movements; the stick then has a tendency to move right to one side. Nevertheless this flight condition is still not dangerous, because after the extension of the slats there is a reserve of angle of attack before the break. Apart from the unpleasant aileron over-balance the smallest turning circle at rated power at this height is about 28 to 30 sec for a stable 360° turn at constant height. This implies a minimum time for a 360° turn at 1000 m (3280 ft) and with emergency power of about 25 sec.

Landing

Level-off at speeds below 200 km/h (124 mph) only with power. It is advisable to trim the aircraft, because elevator forces become quite high at the round-out. It is possible to achieve a three-point attitude and to touch down without difficulty. If this does not work, or if the ground is uneven, then the unpleasant low-speed characteristics appear and are emphasised by the poor undercarriage damping. The aircraft quickly goes beyond the three-point attitude, elevator forces diminish to the point of over-balance and the effectiveness of the elevator now immersed in the wing wake is hardly sufficient to stop the resultant porpoising (lit. 'galloping'). Because of the limited ground clearance the propeller is especially endangered. If greater angles of attack are reached the aircraft drops a wing, which is not drastic because of the wide undercarriage. In a cross-wind, the rudder is not powerful enough to prevent a break-away; the compressed air wheelbrakes have to be used to help out.

Tactical conclusions and advice

The La-5 is best suited to low-altitude combat by virtue of its engine performance. Its top speed at ground level is slightly below that of the 8-190 and 8-109 (using emergency power). The 8-109 with MW 50 is superior over the whole height band in top speed and best climb rate. Acceleration is probably comparable. Aileron effectiveness is better than that of the 8-109. Turning times at ground level are better than those of the 8-190 and worse than those of the 8-109. In best rate of climb, the 8-190 is poorer until 3000 m (9840 ft). Because of its higher weight, the 8-190 accelerates less well, but by the same token it is superior in all diving manoeuvres and when it turns away level at high speed. Apart from sudden evasive action, it is basically right to dive away (like the Thunderbolt) because of the higher weight and wing loading of the 8-190, thereafter to pull away in a high-speed shallow climb to reach a new attacking position (at best climb speed, the La-5 climbs at a steeper angle), not to let the speed drop and to avoid prolonged turning dog-fights, because you have to accept that the Russians, who are accustomed to poorer handling characteristics, will not allow themselves to be impressed by the La-5's handling in the turn as previously described.

Attention is drawn to the short endurance of about 40 min at rated power and less with the supercharger engaged.