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RUSSIA'S Secret Sonic Fighters

Latest MIG-9 twin-jet fighter has new cockpit canopy, repositioned radio mast. Maximum speed at low altitude is believed about 515-520 m.p.h.

Have we underrated Soviet warplanes? Two European journalists say Red fighters rank with best in U.S.

By WILLIAM GREEN and ROY CROSS

HAVE WE underrated Soviet warplanes?

It becomes increasingly apparent that we have. Surprisingly to many, it is not only German advancements taken over by the Soviets that contributed to the new Red warplanes, but native Russian genius as well.

After several months compiling and checking original sources, we have here the most comprehensive and authentic review of Russian jet design progress that has yet been published.

We can say unhesitatingly that Soviet fighter planes are rugged and simple. They are easy to maintain and are easier to operate off rough advanced airfields than are comparable British and American types. They are extremely serviceable—and they are fast.

Three or four of the latest Red designs equal in performance the North American *Sabre*—most advanced fighter in service in the U.S.

At the end of World War II, the Soviets were rudely shocked to discover their planes weren't as good as they had assumed by comparing performance with that of obsolescent Nazi types they met on the eastern front. But the Kremlin's designers made a rapid about-face and exploited German research and development data to the fullest.

(*Continued on next page*)

Using Nazi scientists, Reds build advanced sonic craft

As a result, they reached advanced conclusions on supersonic flight about the same time as the U.S., and are keeping pace with the U.S. at present.

What little we know of Russian aeronautical research between the two World Wars is studded here and there with brilliant experimental work. In these instances it was bureaucratic suppression rather than lack of original Soviet thinking which dictated the conventional design of Soviet planes.

For example:

In 1936, B. N. Yuriev designed a prone-position, jet-powered, sweptback, all-wing airplane. It resembled the Northrop XF-79B but anticipated that craft by nearly a decade. The design was intended as more than a doodle; it was to have been powered by Russian jet units (possibly ram-jets) which were advanced in theoretical form by professors in the Zhukovski Air Engineering Academy. The design was emphatically rejected by the Soviet Office of Inventions.

Since the 1920's, the little-known designer B. I. Cheranovski has worked on advanced designs of lifting-fuselage and all-wing airplanes. Several designs using his principles were built before World War II. Between 1935 and 1937, Cheranovski and A. A. Kalininem created the BICh-14 twin-engined tailless bomber. Though it was powered only by two small M-11 radials of 125-h.p., it had a top speed of 156 m.p.h. The design was turned down (after flying far and well) by the Air Force and industry because of its radical layout.

After a long silence, due perhaps to being politically out of favor, Cheranovski recently produced a small glider research craft, the BICh-22. It appears to compare favorably with Canadian and British all-wing research gliders of recent years.

Instead of exploiting advanced thinking prior to World War II, the main Soviet effort was bent on producing orthodox aviation equipment. Plane types were strictly functional—they wanted a lot of planes and they wanted them fast. Sometimes they appeared to consider production and availability more important than the fullest fighting efficiency.

But in the main, Soviet military planes were reduced to a few simple types that were highly efficient for their particular roles. During the latter part of the war, these planes were opposed only by a few older-type *Luftwaffe* craft while the Nazis threw their best new combat planes against Allied onslaughts on the Western Front.

The Russians had no experience in dealing with modern rocket-equipped fighters like the *Mustang* and *Typhoon,* heavily-armed and fast medium bombers such as the *Marauder* and *Mitchell,* and gun-bristling day and night bombers such as the *Fortress* and *Lancaster.* Nor could they make headway with jet designs.

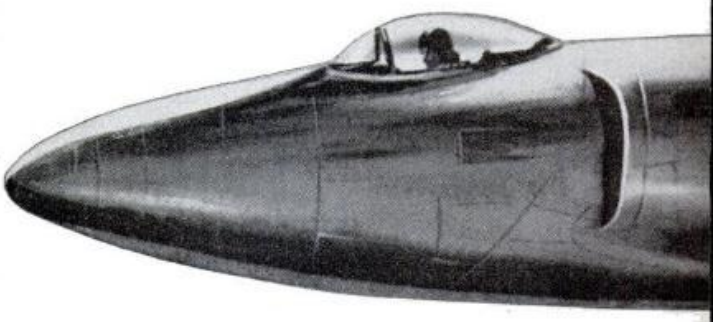
Thus, they approached the war's end with inferior equipment which they mistakenly assumed to be the best for their particular use.

The Reds were alarmed in the closing days of the war when they dug up advanced aircraft and engine data from captured German military, scientific and aeronautical establishments. Shocked into action, Soviet aeronautics began to loom from that time as a rival to U.S. and British air power—both in quality and quantity.

They started by experimenting with existing piston-engined fighters fitted with German pulse-jet motors beneath the wings and small rocket boosters in the tail. At the same time, they built the first Red jet fighters powered by Nazi-designed turbojets. (Illustrated with this article is the most accurate photo, somewhat retouched to include latest information available, of the La-9 piston-engined fighter with rocket unit in the modified tail assembly. It's doubtful if these machines entered squadron service but they no doubt furnished the Soviets with much valuable data on use of rocket units to boost performance of both piston-engined and jet-engined fighters.)

After World War II started, Russian research teams —headed by Abramovich and Stechkin—started working on jet and rocket propulsion. They were only moderately successful. Big trouble was the turbojet itself: as soon as a unit was captured from the Germans a hastily-designed test model was built around it and flown within a few months. This was a low-wing monoplane with two powerplants—a piston engine driving a propeller in the nose and a turbo jet in the rear fuselage with intake under the wing and exhaust duct under the tail.

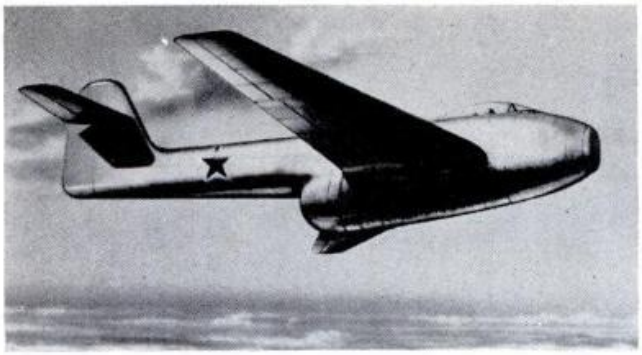
Early Soviet jet fighters, powered by turbojets based on Junkers and BMW designs, were the first hint to the West of the new ideas imported from Germany. First of these, and most successful until recently, was the MIG-9 (designed by a team headed by Maj. Gen. Artem Mikoyan, M. Gurevich and N. Matyuk). The MIG-9 is a simple, sturdy, hard-hitting machine in the best Soviet Air Force tradition. It's reportedly quite a handful to fly but is probably the best close-support craft in service today.



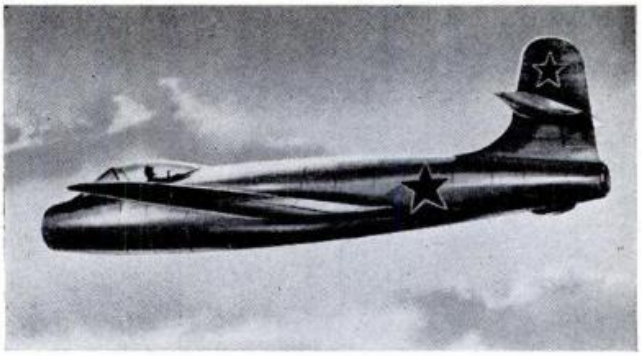
TRANSSONIC research plane, one of Reds' most advanced, is reconstructed from three authentic photos. Craft resembles British Supermarine 510, has 35° sweepback on wing leading edge. Note large side air intakes.

The MIG-9 is studded with one 30-mm. or 53-mm. gun and two 20-mm. ShVAK cannon. It's powered by two M-003 jet units, each with maximum thrust of over 2,000 pounds s.t. The jets are mounted side-by-side in the fuselage belly and exhaust together below the channeled rear fuselage. Top speed is apparently about 515-520 m.p.h. at low altitudes.

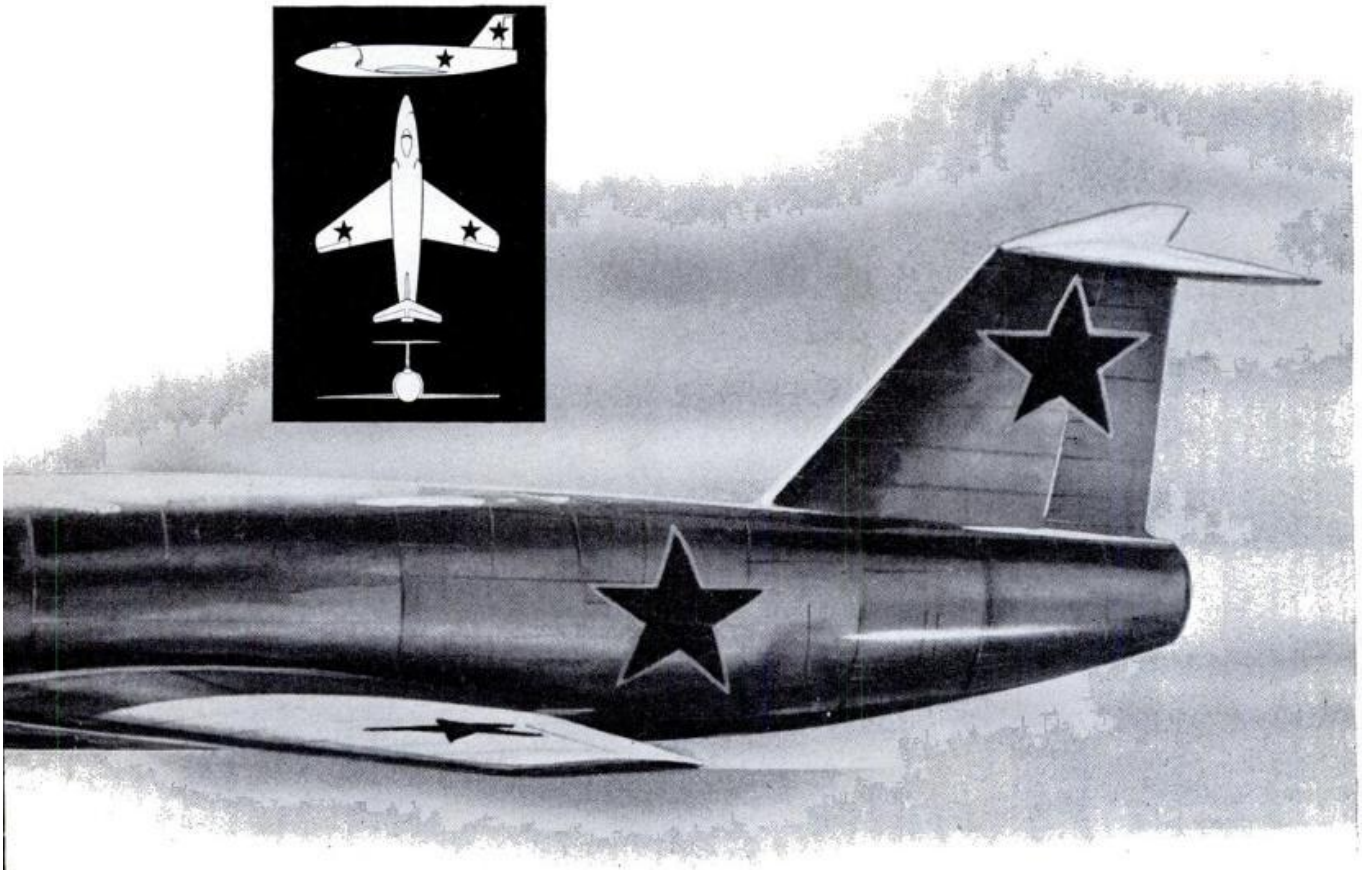
A smaller, lighter fighter, the YAK-15, has been designed by Colonel-General Yakovlev. It presumably is intended more for fighting and interception than for ground support, and is reported not so successful as the MIG-9. Wingspan is little more than 30 feet but the plane appears faster than the MIG-9, with a top speed of about 560-570 m.p.h. Internal equipment and armor are cut to a minimum, following Soviet wartime practice. Powerplant is a single axial-flow M-004 turbojet of 2,200-2,500 pounds thrust (a deriv- (*Continued on page 56*)



YAK-15 single-jet fighter represents little more than a passing phase in Red high-speed design. Redesigned version is illustrated.



YAK-17, "Russia's Thunderjet," is believed in service in Eastern and Asiatic areas. Drawing is reconstruction from photograph.



EXPERIMENTAL version of Lavochkin La-9 has liquid rocket unit in rear fuselage with exhaust efflux orifice below modified rudder. Another La-9 has been fitted with impulse duct motors under each wing. It is unlikely that any of these machines entered squadron service.

Sonic Fighters

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ative of the Junkers *Jumo-004*). Armament consists of one 20-mm. ShVAK cannon and two 12.7-mm. Beresin machine guns.

Both these planes were rushed through design and experimental stages in order to get turbojet experience. They are little more than a passing phase in Russian high-speed design thinking.

About this time the Russians sat back for a breathing spell and took another, and closer, look at what was going on abroad—and what the Germans had dropped into their laps. They immediately saw that the sweptwing layout should be a prime target for fighter and interceptor equipment. Evidence shows, however, that they didn't see the value of swept wings for close support and light jet bombers. In fact, working on domestic and German data as did the U.S., the Russians reached similar conclusions—at about the same time—as did American designers.

They first built a sweptwing research craft to investigate sonic speeds. One of these machines flew in 1948 and is presented here in fully-substantiated detail for the first time. Accompanying illustrations are not "artist's impressions" but accurate reconstructions of actual photos. This is probably the most interesting genuine aeronautical information to come from Russia since the end of the war.

The sleek Russian transsonic research single-seater embodies a number of interesting design features that apparently are repeated in the latest Soviet fighters to enter service:

It employs a reasonably low aspect-ratio wing plan with sharp (35°) sweepback on the leading edge. Aerodynamically it is exceptionally clean, bearing a marked resemblance to Britain's Supermarine 510. Cockpit canopy (smaller than the 510's) is well forward, giving exceptionally good all-round visibility.

The tailplane is sweptback (20°-25°) and is T-positioned on the large-area fin and rudder. This type empennage appears to be repeated on at least one of the latest Soviet sweptwing fighters. Apparently it offers advantages in avoiding broken flow from the "bubble" canopy.

The single turbojet, aft of the cockpit, is fed via "elephant ear" scoops set well forward of the wing-fuselage intersection. It exhausts below the tail unit. These side intakes don't appear ideally suited for high-speed flight, as very low efficiencies have been recorded on some fighter types with similar intakes.

Data on Soviet turbojet development is sketchy, but it is known that two powerful turbojets of German origin are being developed for production. One, the *Jumo-012* (redesignated as the Soviet M-012) originated with the large Junkers organization which was forcibly transferred to Russia complete with its technical personnel. The M-012 is a large axial-flow turbojet designed to give 6,400 pounds static thrust. It has an 11-stage axial compressor and a two-stage turbine. Though heavy—and some 17-feet long—the engine is suitable for installation in the research plane since its length obviates the need for a long jet pipe.

The Russians also got much material on the BMW-018, and they are developing this engine, though only BMW's chief of research went to Russia. German project engineers and specialists on the BMW managed to wriggle out of the Soviet's clutches, and thus it's doubtful if the M-018 is as far advanced as the M-012. This engine has a 12-stage axial compressor, an annular combustion chamber with 24 burners, a three-stage turbine, and an adjustable propelling nozzle. Designed thrust is 7,500 pounds.

Meanwhile, the Soviet fighter regiments needed equipment. The MIG-9 apparently was put through the development mill—and out came a newer fighter about which few details are known except that it's a refined and smaller version of the original. It retains the side-by-side engines in the fuselage belly. The square-cut wing is higher than on the MIG-9 and the rear fuselage appears slimmer, almost looking like a tail boom.

Another design, about which more external details are known because we've studied a very clear photograph, is provisionally called the YAK-17. It's called in some quarters the Russian *Thunderjet*, but it only superficially resembles the

LOOKING BACK

IT'S COMMON knowledge that rear-facing seats in transport planes give added safety during emergency landings. British medical investigators recently said that 50 per cent of the past year's air fatalities could have been prevented

—if seats had been installed facing to the back of the planes.

As a result of English investigations, a number of RAF transports are being fitted with rear-facing seats. First of these is the Vickers-Armstrong Valetta VIP Mark 1 (see diagram).

U.S. Republic F-84 (*Thunderjet*). It is, though, very clean aerodynamically and of typical Soviet simplicity.

Both these planes are probably in the same class as the *Thunderjet* and the *Vampire*. In some respects they may be slightly superior to the U.S. craft—for example, in maneuverability, climb and ability to rough it in and out of small grass airfields. But they don't represent the last word on Russian high-speed aircraft—and if they went into service at all it was probably only in comparatively small quantities. The YAK-17 is the more likely of the two to have reached operational status.

Recently the Reds have built swept-wing fighters that are modern in every essential—probably better than any production plane Britain can show and likely to perform well even against the F-86. Information on these planes is scant but three and possibly four designs are indicated.

First of these (dating back to 1947-48) appears to be a logical development of the YAK-15 single-jet fighter. The YAK-15 had poor visibility but the new machine has the cockpit closer to the nose—so the pilot has a good view over the wing's leading edge. The old wing, practically like the YAK-3's, is replaced by a new structure in the same position but with 30°-35° sweepback. It is square-cut, and has a medium-taper, straight-edged planform.

Tail surfaces are squarish, and the tailplane (sweepback 20°) is set high up on the orthodox fin.

It's possible, but not likely, that this aircraft is for research purposes only. Improvements are obviously directed toward making the plane a better fighter as well as a faster flyer, and it can be assumed it is a legitimate fighter design.

In contrast, later planes show even more pronounced sweepback on the tail plane, plus sweptback fins and rudders. It might be assumed that the research plane and the YAK sweptwing fighter were limited to around 650-m.p.h. by the design of their tail units. The Russians probably discovered this in air tests and eliminated this factor on recent fighters (notably, those of Yakovlev and Lavochkin).

Logically, therefore, the latest fighters are designed for the speed of sound, and since they're based on practical flying experience at high speeds they will likely perform well at high Mach ratings.

Most disturbing to Western military authorities is the fact that the Soviets have been quick to apply their aeronautical knowledge to service designs. They are probably ahead of Britain—and have fighters which, for tactical work over their own soil under their own special conditions, could not be bettered by production aircraft of any of the Western Union nations.

It may well be possible that these craft suffer from such shortcomings as poor handling qualities at extreme altitude, light armament and limited internal equipment. But at least their limiting Mach numbers are probably higher than any standard fighters now in service with the European Air Forces. END