



# YURI BELY:

## “70% of the Russian-made fighters are fitted with our radars”

### Interview of Tikhomirov-NIIP Director General

February this year saw the conversion of the first Russian Air Force combat unit to the Sukhoi Su-35S advanced supermanoeuvrable multirole fighters. A key component of the comprehensive tactical performance of the fighter is its unique-range Tikhomirov-NIIP Irbis phased-array radar control system. Somewhat earlier, in November 2013, the military started taking delivery of Su-30SM two-seat supermanoeuvrable multirole fighters fitted with another of the Tikhomirov-NIIP phased-array radars, the Bars-R. MiG-31BM interceptors equipped with Tikhomirov-NIIP Zaslon-AM phased-array radars are returning to service with RusAF following their upgrade. The company successfully completed another phase of the trials under the three programmes last year. Throw in for a good measure a large number of flight and lab tests of the cutting-edge active electronically scanned array (AESA) radar designed for the PAK FA fifth-generation fighter and you can imagine the scale of the efforts made by Tikhomirov-NIIP. The results produced are a cause of rightful pride for the leading Russian developer of phased-array radars intended for fighter jets. The *Take-off* magazine has asked Tikhomirov-NIIP Director General Yuri Bely for his view of the efforts and plans.

**What are your institute's most important aircraft-related achievements over the past year?**

Tikhomirov-NIIP is a specialist in airborne electronically scanned array radars. About 80% of our military programmes fall to this field. We are proud that around 70% of the Russian-made fighters supplied to both the Russian Air Force and foreign militaries are equipped with our radars.

Over the past year, we brought as many as three of our advanced airborne radars to the final stages of the trials. Firstly, the Bars-R designed for the Su-30SM fighter has passed its special joint flight tests. In November, production-standard Su-30SMs began to field the RusAF combat unit. Secondly, the Irbis electronically scanned radar intended for the Su-35S was cleaned of the bugs revealed during Phase I of the Su-35S official trials. This allowed the manufacture of the first Irbis-carrying Su-35S batch in 2013 and their fielding in February this year with the fighter air regiment garrisoned in the Khabarovsk Territory (the manufacturer of the Tikhomirov-NIIP Irbis and Bars radars is the Ryazan State Instrument-making Enterprise). Thirdly, the upgraded MiG-31BM interceptor fitted with our Zaslon-AM fire control radar and advanced missiles wrapped up its official trials. The MiG-31BM's fielding with combat units is in full swing now, with several units throughout the country converting to them.

In addition, many test sorties were flown by two Sukhoi PAK FA fifth-generation fighter prototypes as part of the preliminary trials of our latest AESA radar. As is known, a T-50 prototype has flown in February this year to Akhtubinsk, where the bulk of the official tests

will be conducted. Other prototypes shall join it there soon.

**Could we start with the latter point? How is the PAK FA AESA radar system development and test programme doing?**

To date, we have made six sets of the forward-looking AESA radars intended for the PAK FA. The first two radars are being used by Sukhoi and us for bench tests to test advanced operating modes. Three more have been shipped to the customer to equip the third, fourth and fifth flying PAK FA prototypes. We kicked off the AESA activation test flights on the third prototype (T-50-3) in summer 2012. The aircraft has fulfilled the bulk of the flight tests of the AESA radar. In addition, the fourth flying example has been flying in Zhukovsky since last spring, having completed, inter alia, a number of tests of our system. The third PAK FA prototype furnished with our radar, T-50-5, ferried to Zhukovsky from the manufacturer plant, started flight tests recently. Thus, there are three Tikhomirov-NIIP radar-equipped T-50s undergoing trials now, with the number of activated AESA radar flights logged being close enough to a hundred.

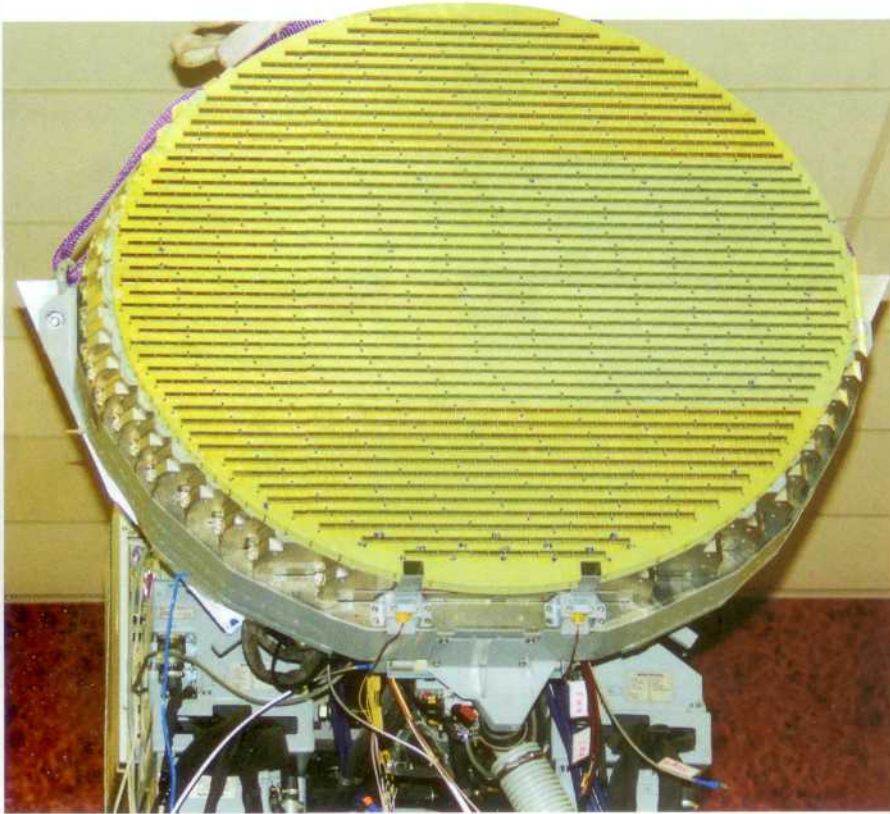
Most of the flights conducted have been successful. The main result is the stable enough operation of the forward-looking AESA radar in the air-to-air and air-to-surface modes from the very beginning. Having seized the opportunity, we dismantled the radars from the PAK FA prototypes undergoing planned debugging and bench-tested them. The AESAs' characteristics did not change and no modifications were required, so the radar were mounted back on the planes for continued flight tests.

The PAK FA kicks off its official tests in Akhtubinsk this year. In the near future, the aircraft fitted with our AESA radars will be ferried there. There will be an opportunity to try them under proving ground conditions as well. As is known, the schedule of the PAK FA test programme is pretty tight. The programme's Phase I must be complete by late 2015, so that the manufacture and operational evaluation of early production-standard aircraft can begin as soon as 2016. We cannot see a reason to derail the plan as far as we are concerned.


**How many AESA radars more are planned to be made for the tests, and when their production could commence?**

Within two years, we will supply the customer with four more AESA radar sets to fit four PAK FA flying prototypes. In addition, a set is due for interdepartmental tests. The AESA radar production is to be launched by the Ryazan State Instrument-making Enterprise in 2016. Mind you, the plant has taken part in making our AESA radars starting from the earliest prototypes, supplying us with individual mechanical and electronic parts and units. For now, we handle the final assembly, debugging and calibration of AESA radars, but the plant in Ryazan will productionise the radar in due time.

To fit the PAK FA, Tikhomirov-NIIP is developing both the main forward-looking AESA radar, which has been installed into three fighter prototypes, and a number of other subsystems. For instance, we unveiled a side-looking AESA for the PAK FA at last year's MAKS 2013 air show. There will be two SLARs like that onboard the fighter. In addition, the fighter's leading-edge slats will house L-band



The Irbis's predecessor, the Bars, fits approximately 250 Su-30MKI, Su-30MKM and Su-30MKI(A) fighters that the Indian, Malaysian and Algerian air forces have operated with success. The radar has cleared all of the phases of its trials, has been streamlined to perfection and is capable of all the tasks it was designed for. At the same time, India wants the radars equipping its Su-30MKI fighter fleet modernised as part of the fleet's upgrade, with its intent on having such an upgrade voiced several years ago. At Phase I, the Bars was supposed to be refined while retaining its passive electronically scanned array through extending its range, enhancing its resolution and ECM immunity and adapting it to advanced airborne weapons. Phase II was expected to replace the Bars's antenna with the AESA. Apparently, it makes sense to do so after the AESA radar designed for the PMI fighter has been tested, so that the lessons learnt are put to use. I presume that other operators of the fighter family – Malaysia and Algeria – will show interest in such modernisation too, just as India did.

Now, a few words on the Bars for the Russian Air Force are due. The Irkut corporation is fulfilling two contracts for 60 Su-30SM fighters for RusAF. The aircraft is a derivative of the Su-30MKI, while its radar system is a derivative of the Bars. The Russianised version, the Bars-R, embodies a number of improvements meeting the requirements of the Russian Defence Ministry and has higher performance than its export-oriented baseline model. Last year, we completed our part of the Su-30SM's special joint flight tests with success, and fighters of the type, carrying Bars-R radars, are in service with combat units now. Nonetheless, further modernisation of the system is planned. 

AESAs too, which we have displayed at MAKS air shows. Another four PAK FA flying prototypes will carry the complete integrated multirole radar system, including forward- and side-looking AESAs and L-band AESAs.

It is an open secret that the AESA radar we are developing to fit the PAK FA is to serve the basis for deriving a radar system for the Russian-Indian fifth-generation Prospective Multirole Fighter (Russian acronym PMI), or the FGFA, as it is known in India. Tikhomirov-NIIP has been selected as prime contractor to develop the radar to equip the PMI, but Indian engineers will participate in the development too. The Indians are supposed to develop and manufacture some of the subsystems of the radar system, with the precise number of those being discussed now.

Finally, I cannot but mention that the experience we have gained from the development of the AESA radar for the PAK FA can come in handy in developing an AESA multirole radar intended to equip the Future Long-Range Bomber (Russian acronym PAK DA). We have completed its preliminary design. If we are awarded the development order, our institute, which has been a fighter and interceptor radar specialist, will expand its envelope and start developing radars for long-range bombers as well.

**Do you continue your work on passive phased-array radars?**

Our Irbis passed-array radar is second to none in the world, as its characteristics demonstrated in the trials have shown. Its

flight tests on the Su-35 fighter have produced unique results in terms of target acquisition range far exceeding 400 km. Thus, the Su-35 equipped with our Irbis can see farther than any other fighter in the world.

GRPZ is running full-rate production of the Irbis. About 20 production-standard Su-35S fighters delivered to the Russian Defence Ministry under a contract for 48 fighters of the type carry Irbis radars. Last year, we successfully completed the tests designed as part of the debugging resultant from Stage I of the official trials that led in 2012 to the issue of the preliminary report clearing the productionising of the aircraft.

