Testing Times

by Air Marshal Philip Rajkumar

Photo by Simon Watson.

Inducting the Antonov An-32

The C-47 Dakota, also affectionately called the 'Gooney Bird' by American airmen during the Second World War, formed backbone of the IAF's transport fleet for more than a quarter of a century after independence in 1947. The induction of the Fairchild C-119G Packet in 1953 and the Antonov An-12 in 1961 did not reduce the IAF's dependence on the Dakota for air maintenance particularly in the North East of the country. Finding a replacement for this extremely rugged workhorse gave IAF planners a difficult time in the late 1960s and early 1970s. The Avro (HS)748 turboprop was selected to be licence-produced in the country in 1961 but by 1970 it became apparent that the aircraft was a poor replacement for the Dakota. Air Head Quarters, therefore, issued an Air Staff Requirement in the early 1970s for a Medium Transport Aircraft (METAC) with a payload and range of 10 tons and 1500 kilometres respectively.

In August 1973, I had gone to the Soviet Union as a member of an IAF evaluation team led by Air Marshal YV Malse, then Vice Chief of the Air Staff, to evaluate the Sukhoi S-22 swing wing fighter against the ASR for a Deep Penetration Strike Aircraft (DPSA). During our stay in Moscow, Aviaexport, an organisation which dealt with export of non-military aircraft suggested the Antonov designed An-26 as a candidate to meet the METAC requirement. When a paper evaluation was done against the METAC's ASR, the aircraft fell woefully short in several areas especially the stringent hot and high performance requirements following engine failure on take off. The Soviet response to our observations was to modify the An-26 airframe as required to fit two enormous Kuznetsov AI-20D turbo prop engines rated at 5180 shaft horsepower (shp) each at ISA sea level conditions. The AI-20D was an uprated version of the extremely reliable AI-20M engine, rated at 4200 shp, four of which powered the An-12 and the Il-38 maritime reconnaissance aircraft of the Indian Navy. The Time Between Overhaul (TBO) of the AI-20D, however, was half that of the AI-20 M proving that there are no free lunches in the world of aviation.

The Soviets brought the prototype An-32 to India for environmental trials with Antonov design bureau test pilots and engineers in November 1976. They did not offer the aircraft for evaluation by the IAF at this early stage of development.

In August 1977, a prototype An-32 came to India and an IAF test team headed by then Wing Commander AS Lamba VrC of the ASTE evaluated the aircraft against the METAC ASR. Trials were carried out in the North East and Ladakh and several shortcomings were noted. The stall characteristics were considered unacceptable due to severe wing drop at the stall and absence of any aerodynamic stall warning. During side slip tests rudder lock to the left was experienced. During landings at ALGs in the North East the brakes overheated and had to be cooled by hosing them down with water from a water bowser! Paratrooping and cargo dropping requirements were not fully met. Noise and vibration levels were also reported to be high. Clearly the aircraft had a long way to go before it could meet the IAF's METAC requirements.

Photo by Wg Cdr RS Chauhan.

'Air Bridge' to the Himalayas: An-32 enroute to Leh.

The Antonov Design Bureau did not give up easily and promised to rectify all the shortcomings noted and offer the aircraft for evaluation again. As was common practice during those years, the Soviets insisted that a commercial contract for the supply of the required number of aircraft must be signed first! An IAF team went to Kiev and interacted with the Antonov designers and arrived at a standard of preparation which included the fitment of HAL-designed and third country avionics. The colour weather radar and the Ground Proximity Warning System (GPWS) were of US-origin. A contract was signed in 1980 with deliveries commencing in 1984. Indian aircrew engineers and technical tradesmen were sent to the Soviet Union for training in the second half of 1983.

After a two year instructional stint in Iraq I had returned to India in October 1983 and was posted to the ASTE as CO of the Test Pilots School. The Soviets sent two An-32 aircraft to India in February 1984 for evaluation by the IAF and Air Head Quarters nominated me as the leader of the trials team. Vladimir Kurlin, 56 years and Vladimir Tkachienko, 55 years of age, were the Antonov design bureau test pilots and the Soviet team had about 25 members. The other Indian members of the trials team were Wg Cdr AS Parab (navigator) Flt Lt AMS Kahlon (test pilot), Warrant Officer CG Shukla plus JWO Vijayan (Flight Engineers) and Warrant Officer Shekar and JWO Vivekanandam (Flight Signallers). Two Indian Army officers, Majors Dhaliwal and Purohit were included in the team to evaluate the paratrooping and supply dropping aspects of the evaluation. Group Captain CR 'Dada' Ghosh, CO designate of the Paratrooper Training School at Agra which was the first unit slated to re-equip with the An-32 and Wg Cdr BK 'Bundi' Sunder also of PTS were the other important members of the team. Their presence in the team was necessary because they had completed their conversion training on the An-32 in the USSR and their assessment of the suitability of the aircraft to perform its operational role was of vital importance.

One of the aircraft was manufactured to the IAF–specified standard of preparation and had HAL–developed VUC-201 V/UHF radio sets, a radio compass, HF radio, Primus 500 colour weather radar from Bendix Corp USA, US-origin GPWS and USSR-made VOR and VOR-DME. An Omega Navigation System Tracor 7500 and an Indian Cockpit Voice Recorder manufactured by the Electronic Corporation of India Ltd at Hyderabad completed the avionics fit. In the 1980s the Global Positioning System (GPS) was not available and the Omega area navigation system which used Very Low Frequency (VLF) signals transmitted by six stations around the world was a good choice. It gave a position accuracy of about five to ten nautical miles and was adequate for route navigation in the plains. The second aircraft had all-Soviet origin avionics and was packed with 1200 kg of flight test instrumentation to collect data for certification purposes in the Soviet Union. The ground support equipment brought by the Soviets was minimal, just a couple of ladders to enter the aircraft, some chocks, some first line maintenance tools and testers. They had not even brought a spare wheel with them which surprised me and when I asked them about it they very nonchalantly said that the new set of tyres on both the aircraft were good enough for 800 landings and only about 50-60 landings were planned for the trials! I was impressed by the confidence they had in their aircraft.

The aircraft had undergone extensive modifications since the 1977 evaluation in order to meet the METAC ASR. Installation of full length leading edge slats, triple slotted Fowler flaps inboard of the engine nacelles, double slotted Fowler flaps from the nacelles up to the ailerons, auto retraction of flaps from 38 deg full extension to 25 deg when throttles were opened beyond 90 deg, improved brakes, artificial stall warning in the form of an audio tone and flashing red lights, improved cargo hold to hold the specified number of paratroopers and dispatchers, a redesigned flight deck for three-man crew operation, improved cabin conditioning, removable floor rollers for supply dropping and an overhead gantry for ease of loading were the modifications carried out.

An-32 returns to Chandigarh, the large air base in the Punjab, after routine sortie to Leh.

Photo by Wg Cdr RS Chauhan.

The trials commenced at Agra on 22 February 1984 and my first task was to do a quick conversion on the aircraft. Tkachienko was my mentor and he briefed me about the aircraft's systems, cockpit procedures, emergencies and various speeds for circuits and landings. I flew a 1hour 30 mts familiarisation sortie during which we did general handling, single engine handling, stalls, clean and dirty, and a number of circuits and touch and gos. 'Dada' Ghosh and 'Bundi' Sunder got involved in the paratrooping and supply dropping evaluation on the other aircraft. I then did an engine failure at rotation with Katchienko by feathering the critical engine at Vr. The aircraft performed well even though large deflections of rudder and aileron were required to hold the aircraft in a steady climb. I then did a number of stalls in various configurations to assess stalling behaviour. In nine different configurations tested in both level and turning flight, the aircraft stalled without the slightest wing drop and recovery was immediate on relaxing the backward pressure on the control column which used to be almost touching one's chest at the stall. The artificial stall warnings were adequate. The control forces were also acceptable. During steady heading sideslips to either side there was no lightening of rudder force and there was no rudder lock. The aircraft cleared these tests literally with flying colours.

A full load of paratroopers was dropped over the Agra DZ which was followed by the second aircraft doing heavy load drops using palettes. Supply dropping using skid boards was also done. I was onboard during these flights. Meticulous records of the paratrooping, supply and palette drops were maintained by the team. Kurlin gave a flying demonstration before a big gathering of Air Head Quarters and station personnel which included a full barrel roll! He pitched the aircraft 30 degree nose up and then rolled through the inverted position back to level flight with the nose on the horizon. Due to its big wing span the aircraft has a lot of roll inertia and to be able to roll through 360 deg was an impressive demonstration of lateral control power.

We then proceeded to Jorhat for trial landings at Mechuka, Tuting, Along, Walong and Pasighat. As at Agra, I requested Dada and Bundi to evaluate

Photo by Simon Watson.

supply drops at DZs in Arunachal Pradesh, Nagaland and Mizoram while I went for the trial landings with Kurlin. There was no problem landing anywhere except at Along and Walong. At Along a large crowd of locals had gathered to see the aircraft. When requested by the local authorities to allow the civilians to take a look at the inside of the aircraft the HQ Eastern Air Command representative allowed the locals to climb into the aircraft through the front door and exit out of the rear cargo door. No stay rod was in place and as the crowd moved towards the tail the nose wheel lifted and the aircraft came to rest with the fuselage bottom touching the ground! When this happened the crowd panicked and ran forward and the nose wheel crashed into the ground with a loud bang. I thought it would take a few hours to inspect the damage and clear the aircraft. The Soviets took one look at the nose wheel said 'Kharashov' (good) and we took off without further ado. It was an impressive demonstration of ruggedness! The supply dropping trials were satisfactory and again meticulous records were kept.

Walong, at 3600 feet amsl, had a 1100 yard semi-prepared dirt runway running north east to south west. At the north eastern end was the Lohit river valley and at the south western end there was a small hill which was about 400 feet high. After several approaches and overshoots from both directions in two sorties Kurlin decided to attempt a landing. Air Officer Commanding Jorhat and HQ EAC at Shillong were not comfortable about landing at Walong but they left the decision to me. As Kurlin was very keen and confident I went ahead. For this sortie Kurlin was in the left seat with Dada in the right seat and I in the jump seat between the pilots. There was a Soviet navigator on board and the aircraft had just enough fuel for the round trip from Jorhat. Kurlin came down the river valley from the north west, did a 90 deg turn right over the narrow river valley and approached the runway facing south west. As we came over the runway he unlocked the props, allowing them to disc and the aircraft dropped from about 5 feet. We thumped down on the runway with a terrific thud and I thought the gear would have been damaged but Kurlin was unfazed. Stopping was no problem. We turned around and faced north east for the take off. Kurlin switched off, all four of us got out and the Gorkha battalion there presented him with a khukri while I anxiously looked at the wind sock because the winds were picking up. The wind was about 5-6 knots when we started the take off downwind with 15 deg flaps. As the aircraft attained a speed of 200 kmph, Kurlin lowered flaps to 25 deg, the runway ended and we literally 'fell' into the valley. Disaster appeared imminent because the cliff face on the other side was barely a kilometre away when Kurlin raised the gear and put on about 20 deg bank to the left to follow the valley. For an interminable second or two the aircraft seemed to hang in the air, held aloft only by the immense power of its two Kuznetsovs and then she slowly built up speed and climbed away. It was a

Antonov An-32s with the IAF

The first three, of a total of 95 Antonov An-32s on initial order for the Indian Air Force, were officially received in India on 10 July 1984 at Palam airport (Delhi), enroute to their base at Agra, replacing the venerable C-119 Packets in service. The An-32, named 'Sutlej' after the river of Punjab, will replace C-119s, C-47s and Caribous of the medium transport squadrons of the IAF over the next two years. Although initially Hindustan Aeronautics Ltd. were to assemble the An-32 at Kanpur, it was decided to import the entire lot of 95 aircraft from the Soviet Union, albeit fitted with HAL-manufactured instrumentation and avionics.

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masterly demonstration of flying skill and aircraft capability by a master craftsman. Unbeknownst to me, beads of sweat had appeared on my forehead! When we radioed Jorhat that the trial landing was successful, the sigh of relief echoed down the Assam valley from Chabua to Guwahati!

From Jorhat we then flew to Pathankot for trials in Ladakh. Kurlin and Dada did the first landings at Leh and Thoise. In March 1984 Thoise had a shingle runway 2300 yards long and when we landed there was a terrific clatter of stones hitting the fuselage but fortunately there was no damage. Kurlin and Dada did an engine failure after take off at Thoise and the aircraft performed satisfactorily. Tkachienko and Bundi went and did a supply drop at the Chang La DZ and this too was satisfactory.

During all this flying the trial team accumulated data on performance of the HAL and third country supplied avionics. The HF R/T set was unsatisfactory as was the performance of the cockpit voice recorder. When I informed Air Head Quarters about this problem I was ordered to take the Indian SOP aircraft and proceed to Hyderabad to show the problems to the concerned designers. HAL and ECIL designers came and heard our complaints and promised remedial action. We then went back to Delhi for the debriefing at Air Head Quarters.

The trials were conducted between 21 February and 11 March 1984. About 65 sorties totaling 100 hrs were flown. All aspects of the aircraft's operational role were tested and found satisfactory. I gave a presentation on the results of the trials to the DCAS, Air Marshal JW Greene, ACAS (Ops) AVM SK Mehra (later CAS) and a number of senior officers at Air Head Quarters in which I said that the aircraft had met all ASR requirements except for noise and vibration levels which would needed to be reduced. However, I said routine operations at Walong were *not* recommended. Key members of the Soviet team were also present at this presentation. Kurlin congratulated me for the very positive tone of my presentation and AVM Mehra gave me a pat on the back for smooth and successful conduct of the evaluation.

The Lohit River, flowing through the narrow valley, as seen from a Mi-8 helicopter cockpit. The short landing strip of Walong is beyond the bend and aircraft have to take a sharp 90° turn at that point and then rapidly descend.

The An-32s arrived just in time because the fleet was soon to form the backbone of the air transport fleet and air bridge set up between India and Sri Lanka during Op *Pawan* in 1987-1990. With upgradation now underway at Kiev, the IAF's Antonov An-32s will continue to serve the IAF with great heart for the next quarter of a century.

Air Marshal Philip Rajkumar (Retd.)

25 Years in Service

Eventually, some 105 An-32s were received by the Indian Air Force and these equipped the Paratroop Training School at Agra plus Nos. 12, 19, 33, 43, 48 and 49 Squadrons (as also the ARC).

The An-32s have remained backbone of the Indian Air Force's tactical transport force, maintaining an air maintenance bridge to the ground forces in Ladakh as also the north-eastern frontiers of the country.

During the 33-month deployment and operations of the Indian Peace Keeping Force (IPKF), in Sri Lanka ('Operation Pawan') An-32s (primarily of Nos. 19 and 33 Squadrons) provided logistic air support, operating from the Air Force Station Tambaram and some other airfields in southern India to Palaly (Jaffna), Vavuniya, Trincomalee and Batticaloa.

Now in their third decade of service with the indian Air Force, the An-32s are undergoing mid-life upgradation at Kiev in the Ukraine (see Vayu Issue III/2010).

The ubiquitous shapes (and virtual sounds) of the IAF's Antonov An-32s are captured

An-32 takes off from the advanced landing ground at Tuting in Arunachal Pradesh, not far from the border with Tibet.

With near ramp deployed, An-32 awaits loading.

Tribal at Tuting airstrip, with supplies being unloaded from An-32 (photos by Gp. Capt. 'Nanu' Narayanan).

Army Shaktiman backs into ramp to unload supplies.

AOC's Gypsy with An-32 of No.48 Squadron.

The load, secured inside An-32 cabin.

An-32 of No.48 Squadron at Leh.

Commander ground inspecting the An-32 before sortie.

in this portfolio of photographs taken by Vayu's editors over the past two decades.

SOP chart, detailing load, role and performance capability.

An-32 at Palaly airfield, Jaffna in support of the IPKF.

Line up of An-32s at Tambaram during 'Op Pawan'.

'Meat on hoof', air transported to various garrisons by An-32s.

An-32s maintain regular air links to the IAF station Car Nicobar in the southern Bay of Bengal.