The Birth of Soviet Missile Defence
By M Gruntman

American Institute of Aeronautics and Astronautics, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344, USA. 2015. Distributed by Transatlantic Publishers Group, 97 Greenham Road, London N10 1LN, UK. 309pp. Illustrated £32, [20% discount available to RAeS members on request; E mark.chaloner@tpgltd.co.uk T +44 (0)20 8815 5994]. ISBN 978-1-624103-49-0.

The development and use of both atomic weapons and ballistic missiles occurred, in historical terms, simultaneously toward the end of WW2. While the US dropped atomic bombs on Japan, Germany’s terror campaign on England using the A4 missile (aka the V2) was concluded. At this time, both the US and Russia considered that the delivery of atomic weapons could be achieved by ballistic missiles and that a credible defence against nuclear-tipped missiles, in particular intercontinental ballistic missiles (ICBMs) needed to be developed.

After the end of WW2 missile expertise in both countries was enriched by the emigration of German scientists – coercion on the part of the US and imprisonment and forced labour in the case of the Russians. Thus the scene is set for the start of this book. The race to counter ICBMs was a main theme of the Cold War. The book concentrates on the development of the Russian Missile Defence systems that were to protect Moscow, briefly mentioning (in an Annex) that the US missile defence approach was more for the protection of deployed forces.

The US approach, demonstrated before the Russians, on 25 January 1960 was decidedly blunt. Atomic warheads attached to interceptor missiles would be used to counter the ICBM threat. However, as the book describes, the use of this approach has its disadvantages. Consequently, the Russian approach was to develop the almost impossible – to ‘hit a bullet with a bullet’. The advantages are clearly set out, along with extensive description of the test infrastructure necessary to develop and demonstrate the capability, a non-nuclear option. Coupled with declassified imagery from CIA-sponsored U-2 spy-plane flights and reconnaissance satellites, the Russian Test Range in Kazakhstan is assembled and the resultant defence shield is installed around the Russian capital. The return of the German scientists to their native country by the Russians heralded an independent turn in the strategy they took to missile defence which resulted, on 4 March 1961, of a successful missile engagement with a non-nuclear warhead of an incoming ICBM.

The twists and turns of the political situation, including the ousting of Nikita Khrushchev at a critical time, are described, as well as the developmental path that led, through the A35 system, to the A135 system currently protecting Moscow. The fact that this achievement by the Russians had been done a full 23 years ahead of the US is astonishing. This book maps out this amazing achievement and, in places, makes compelling reading. As necessary in a comprehensive historical account though, there are passages of detail less easy to digest.

This book is essential reading for the reader/scholar who wishes to understand not only the political landscape of the late 1950s/early 1960 against which the Russian missile defence system prevailed but also the system infrastructure and incredible advances in digital computing on a distributed network that was made possible at the time.

The author who was born and raised on a Soviet Cosmodrome related to the test infrastructure in Kazakhstan and his current position as a Professor of Aeronautics has impeccable qualifications to tell this story from a position of strength and personal knowledge. This story has not been told as comprehensively as this before.

Tim Marshall
FIMechE
The First War in the Air
By J Hamilton-Paterson


First impressions of this book are misleading. The dramatic title and uninspiring dust wrapper artwork give the impression of a fairly run-of-the-mill book, another ‘futility of war’ discourse, possibly a work of fiction. It is easy to pass this book in the shop, as I did, hardly even noticing it – and certainly not drawn in by it. This impression is totally wrong and does not do the book justice.

This is in fact a well-researched history of the air operations of WW1 from an unusual perspective. The author has not followed the usual path of re-telling the tales of heroism during the conflict, instead he deals with a number of important issues from a much more interesting viewpoint. The chapters begin with the air war and the State, although the period before the war is well described. The military’s early view of aircraft was somewhat dismissive but as performance and capability improved the capabilities were exploited and tactics developed aviation rapidly assumed critical importance.

The chapters cover technical matters, aircraft design evolution, armament, missions etc. Also covered are training – ‘The Making of a Flying Man’ and, perhaps most poignantly, ‘How they lived’, describing the pressures the men faced and the devastating effect they had on those who survived more than the briefest posting. The author does not shy away from some of the more brutal aspects of air combat. This is particularly apparent in ‘Airmen and Medics’ and ‘Parachutes and Fatalism’.

The book is concluded by a Postscript and several sub-chapters which are very useful in themselves as contextual references. The book covers the earliest days of powered flight through WW1 – less than two decades but what progress! The author has a very articulate and engaging style, and this, combined with meticulous research, has resulted in a high quality historical work which is at the same time highly readable. Indeed, on the cover J G Ballard describes the style as ‘elegant and intensely evocative’. It would be a worthy addition to a collection.

Ian Wilson
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German Research and Development on Rotary-Wing Aircraft (1939-1945)
Edited by B van der Wall

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This slim but very revealing book, published under the aegis of the American Institute of Aeronautics and Astronautics (AIAA), describes German rotorcraft design and development as revealed following WW2. It is based on one of a series of monographs produced by German research establishments under orders by the British Ministry of Supply. The original typescript, some of which was barely visible, has been transcribed and edited with modern nomenclature by Berend van der Wall to give a justifiable tribute to the German rotorcraft pioneers.

The majority of the chapters were written by Gerhard Sissingh, then head of the rotary-wing branch of the Emperor Wilhelm Aeronautical Institute at Göttingen. After an introduction of general rotorcraft principles, a concise but detailed survey of the ‘Developed and Planned Vehicles’ contributed by Nagel follows from the first practical helicopter, the twin-rotor Focke Fa61 first flown in 1934, to the heavier Fa223, the Fa284 flying crane and the diminutive autogiro gliders and kite aircraft, finishing with Flettner’s autogiros and single-rotor helicopters. Projects described include jet-powered machines, ‘Knap sack’ helicopters, a massive quad-rotor transport and finally an unmanned tethered electric motor helicopter for raising radio antennae flown successfully in 1944. A further chapter by Nagel follows, covering testing and a review of accidents and their contributions to development of the helicopter. Good three-view drawings are included but unfortunately there are no photographs.

With limited theoretical background to go on, the design houses adopted an empirical approach paying much attention to testing and development, particularly with regard to control and flight characteristics. Their work on blade and hub movement and control forces remains relevant in modern practice. The core of the book by Sissingh comprises a summary of rotary-wing theory derived from extension of the work of Glaeuer, Lock and Wheatley on autogiros in which forces are derived from the instantaneous flow at the blade element. Use of force coefficients then allow simple expressions to be developed for the overall total forces and moments of a rotor. This leads into rotor dynamics, performance assessment and flying qualities given in relatively simple algebraic manner, aiding an understanding of the moving rotor in flight which is perhaps not fully appreciated in modern numerical analysis. The performance section nicely finishes off the theoretical treatment deriving simple formulae for power and speed calculations in the different modes of flight.

The final chapter covers Flying Qualities with an aside analysing the effectiveness of the Young stabiliser bar mechanism as used in the American Bell two-bladed helicopters, accepting its stabilising nature acting as an autopilot reacting to angular diversions of the aircraft. Control effectiveness, defined as reaction of the aircraft to control inputs, is then covered with graphical demonstrations of the resulting perturbations with time. Other topics include, very briefly, flight in ground effect, an oddball comment on flapping propulsion in which the blades are forced to move up and down during a revolution, jet-powered rotors and trials of the use of a helicopter as take-off assistance for fixed-wing aircraft. Apparently a 40% reduction in take-off distance was achieved while noting that rocket assistance was somewhat simpler.

While accepting that it was early days, it was clear to Sissingh in his chapter on ‘Prospects’ that helicopters had enormous potential for a multiplicity of roles.

Mike Breward
CEng FRaE(S)
Intercept 1961 focuses on the events that led to the first nonnuclear intercepts of long-range objects, scientists and engineers, analysts, and ballistic missile warheads in 1961. It introduces specialists in international relations and non-proliferation leading participants, now largely forgotten. Professor Gruntman's Intercept 1961 takes historians, engineers, and other interested readers from the design of Soviet antiaircraft missiles, air defense systems, and work on a missile tracking radar in the late 1940s into the formulation of ballistic missile defense concepts in the 1950s. The book explains how, despite professional rivalries and "political scheming" among key individuals, chief designers, and top government officials in the totalitarian
On March 4, 1961, a Soviet guided missile performed the first nonnuclear intercept of an intermediate range ballistic missile (SS-4) at the Saryshagan test site in the Kazakhstan desert when it destroyed an approaching warhead. The book focuses on the events that led to the first nonnuclear intercepts. It is especially relevant today as the United States and other countries continue facing the eternal "protect-or-avenge" dilemma when balancing retaliatory offensive capabilities against defensive protection.