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Harrier

John E. Jackson

Francis K. Mason

Staar's book emerged from the press too early in 1982 for him to give us a complete treatment of more recent and cataclysmic events in eastern Europe.

The author has changed his angle of approach to his central theme according to the political situation in Europe early in 1982—that is to say, in contrast to what it had been in 1977, 1971, and 1967. For example, the third edition of Staar's book highlighted the strength and disposition on European soil of the armed forces of Nato and the Warsaw Pact countries. What Professor Staar appears to be showing in his latest edition is a widening discrepancy between fact and fiction within the client states of the USSR.

Staar reminds us that "historically, Soviet leaders have maintained a belief that whoever controls the East European countries will ultimately dominate all of Europe." As a corollary to this, he declares, Poland holds the key to the unity of all the eastern European nations, for it is the most important member of the Pact outside of the Soviet Union.

The present Polish constitution dating back to 1952 is based on the one which Stalin formulated in 1936 for the USSR. The former document describes the Polish state as imitative of the "historical experience of the victorious socialist constitution in the USSR, the first state of workers and peasants."

In this context, Staar makes clear, the Polish United Workers' Party, representing about 8 percent of the population, enforces a Marxist dictatorship in the name of the working class which itself has only a representation of 44.7 percent in the ruling party. When the new Communist regime of General Jaruzelski imposed martial law to curb the rising strength of the "Solidarity" movement of millions of organized workers and peasants, it reached the end of a dialectical process of an exotic kind. It found itself obliged to turn its massive engines of coercion, including its army and secret police, against the very social classes on whose behalf it supposedly spoke.

In a sense Staar's analysis is prophetic, for he reveals the basic underlying *cause* of the still unresolved political crisis in Poland. Accordingly, the reader is not surprised to find similar evidences of scholarly detachment and a patient search for the truth elsewhere in the pages of this fourth edition of *Communist Regimes in Eastern Europe.*

OSCAR M. VILLAREJO
Office of the Assistant Secretary
of Defense (P.A.)

Mason, Francis K. *Harrier.* Cambridge, England: Patrick Stephens Limited, 1981. 185pp. $18.95

In flight, a modern airplane appears to have severed all connection with the ground below, and freely roams the sky limited only by the excellence of the men who built the craft and the skill of the pilot in command. This airborne freedom is relatively short-lived however. The aircraft must soon come to rest on some surface. This is done only with the aid of thousands of feet of paved runway or, at sea, the steel deck and elaborate arresting gear of a massive aircraft carrier.

In future battles, combatants can be expected to focus a great deal of attention on destroying these "airstrips," which may prove to be the weakest link in the airpower "chain." In light of this fact, it might be expected that the development of technology which could overcome this vulnerability would be welcomed with open arms. The history of the vertical-lift Harrier aircraft, as told by Francis K. Mason in his book *Harrier*, shows this to be far from true.

Mason, a former senior project designer for Hawker Aircraft, begins the Harrier story with a short review of the history of fixed-wing vertical flight.

In the closing days of World War II, Nazi designers developed plans for several VTOL (Vertical Take-Off and Landing) aircraft. One design, the Bachem "Natter," was a rocket-powered airplane which was designed to be launched in a vertical position to attack Allied bomber formations. Upon reaching the desired altitude, the unlucky pilot would fire his weapons in a massive burst, and would then return to earth by parachute. Several Natters were flown experimentally, but as with many of Hitler's secret "victory weapons," the idea never reached operational status.

Following the war, the US Navy sought designs for a "fleet fighter" which could operate from small ships at sea.

In the early 1950s two prototypes, the Convair XFY-1 and the Lockheed XFV-1, successfully lifted-off vertically, transitioned to horizontal flight, and returned vertically to a tail-sitting position for landing. In 1956, however, the Navy abandoned its search for a VTOL fighter. Mason admits that the technical problems of vertical flight were far from solved, but he intimates that "politics" played a key role in the demise of these revolutionary aircraft. He states that "there was still a powerful, senior element within the U.S. Navy dedicated to the proliferation of the aircraft carrier as the major fleet element. Thus, so long as funding could be provided for ever larger carriers, the pattern of naval combat aircraft would be determined accordingly, and not vice versa." How much impact similar "politics" may have had on the adoption of the Harrier is open for discussion.

Following the introductory chapter, the author proceeds to detail the multitude of problems which were overcome in the development of the vectored-thrust system which allows the same engines to be used for both vertical lift and horizontal flight. By January 1964, the concept was embodied in the model P-1127 aircraft, known as the Hawker Kestrel. A series of flight tests was conducted by a group of aviators from Britain, West Germany, and the United States, which formed the Tripartite Squadron. Following these tests, six Kestrel aircraft were delivered to the United States for further evaluation. At this point, the United States Marine Corps began to campaign actively for the adoption of the aircraft they felt was especially suited to become part of the Marine Corps Air/Ground Team. The Marines repeatedly fought Navy efforts to substitute conventional aircraft for the Harrier, and the strong Marine "lobby" and congressional pressure managed to keep the program alive. It now appears that the AV-8B Advanced Harrier, built by The McDonnell-Douglas Corporation, will form the backbone of Marine aviation in future years.

In light of the superb performance of the Royal Navy's Sea Harriers in the recent war in the Falkland Islands, the chapter which describes the development of the naval version of the Harrier is especially interesting. In 1971, the Royal Navy began design studies for a shipboard version of the V/STOL fighter. It was not until mid-1975, however, that production of the Sea Harrier was authorized and it was September 1979 before the first Sea Harrier squadron was commissioned. Paralleling the development of the aircraft itself was engineering design-work on a revolutionary new "angled" flight-deck, dubbed the ski-jump ramp. A Royal

Navy engineering officer, writing an academic thesis at Southampton University, postulated that significant performance gains could be achieved by a vectored-thrust aircraft if it were launched in an upward trajectory from an inclined ramp. Following extensive testing on ramps of various angles, the Royal Navy ordered a 7° ramp installed on the command cruiser HMS *Invincible*. It was the combination of the ski-jump ramp and Sea Harrier aircraft that turned the tide in Britain's favor during the Falkland's war.

The British have claimed a "kill-ratio" of nearly 30-0 against Argentine aircraft. Observers have noted a number of factors which contributed to this record. The superior training and experience of the British pilots played a significant part, as did the fact that the Argentines were fighting at the combat radius limit of their aircraft from their mainland. Another reason for the Sea Harrier's remarkable performance is discussed in Mason's chapter "The American Partnership." In 1971, the US National Aeronautics and Space Administration undertook experiments to determine if improvement in maneuverability could be brought about by the use of VIFF (vectoring in forward flight). By rotating the thrust nozzles forward, the Harrier can come to a virtual standstill in mid-air, and can make other sudden course changes impossible to match in a conventional aircraft. A Harrier being chased by a faster aircraft can suddenly stop in its tracks, causing the chase plane to overshoot the target. At this point, the Harrier becomes the hunter, unleashing American-made Sidewinder missiles (or similar weapons) to complete the attack. It was the extensive use of the VIFF technique that allowed the subsonic Harrier to defeat supersonic opponents over the South Atlantic.

Harrier is a book written by an engineer, and will be best appreciated by a reader interested in the technical details of each model change and variation. Regretably, the book does not provide an equally comprehensive look at the plane in operational roles with the Royal Air Force, Royal Navy, US Marine Corps, or Spanish Navy, all of which have operated extensively with the unique jump-jet. A few good "sea stories" would have been welcomed and would have been a pleasant counterbalance to the many pages of technical data.

Harrier is a good book, but could have been better if more attention had been paid to the employment of the aircraft.

JOHN E. JACKSON
Lieutenant Commander, Supply Corps, US Navy

Canan, James. *War in Space*. New York: Harper & Row, 1982. 186pp. $13.95

War in Space is misnamed. A more apt name would be "The Wizard War II" after R. V. Jones' book *The Wizard War* which this book parallels but updates by 37 years.

The book is not limited to space systems. James Canan provides a fascinating *tour de horizon* of the technology of modern war and intelligence collection. Space does indeed loom large but there is much more to the book than hunter-killer satellites, space lasers, and charged particle beam weapons.

Both James Canan and Jones quote Winston Churchill as the coiner of the term "The Wizard War" and Churchill gave a good synopsis of Mr. Canan's message when he wrote "This is a secret war whose battles were lost or won unknown to the public, and only with difficulty comprehended, even now, by those outside the small high scientific