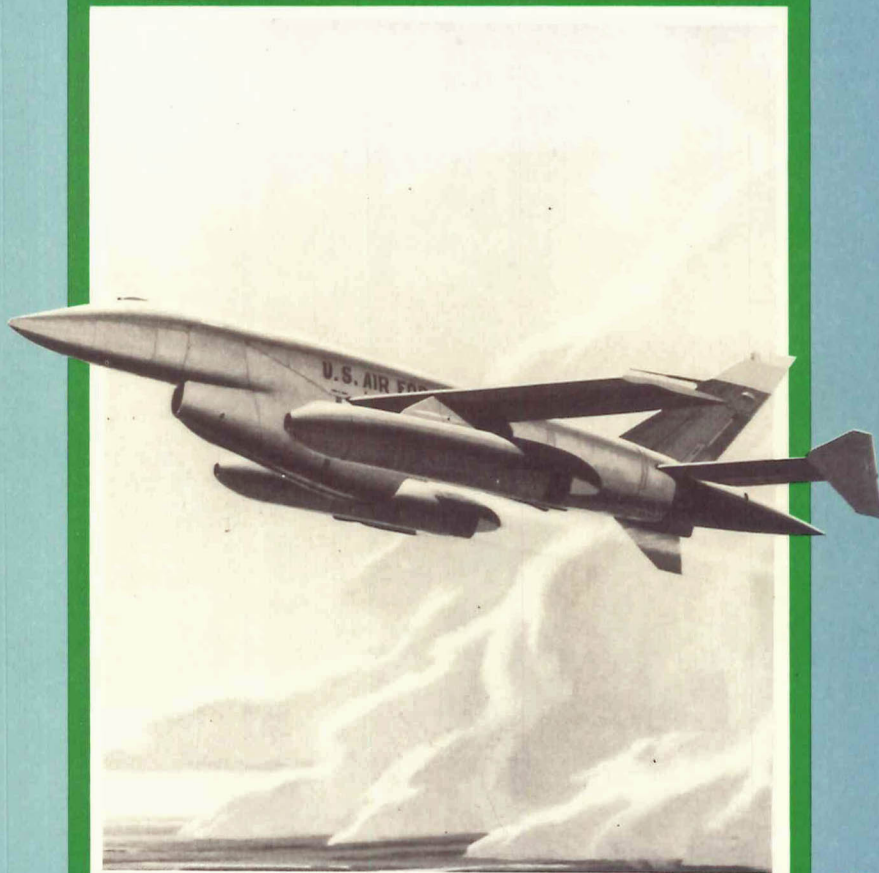




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# **UNMANNED AIRCRAFT**



Air Chief Marshal **SIR MICHAEL ARMITAGE** KCB, CBE, RAF

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# Introduction

Unmanned military aircraft can take several forms, but they are perhaps best defined as machines sustained in flight by aerodynamic lift over most of their path and guided without an on-board crew. They are, however, but one member of the wider family of vehicles exploiting the air for warlike purposes, and they are only one element in a wide and often overlapping range of platforms and weapons.

An illustration of the broad categories of aircraft and missiles is given in Figure 1, and a mention of the definitions the two main categories of unmanned aircraft, that is to say drones and remotely piloted vehicles, may also be useful at this stage. There seem to be no universally accepted definitions, but a drone can best be described as an autonomous and automatic pilotless aircraft. It will carry at least a mechanism to sustain stable flight, and it will either fly an uncorrected steady heading, in which case its only utility is likely to be as a target; or its course will be programmed in some way. An RPV, on the other hand, is a pilotless aircraft that transmits mission related data to a remote controller and reacts to his commands as well as to other control inputs.

One difficulty with all this is that some unmanned aircraft have the characteristics of both classes of machine, since they carry an automatic navigation and control system as well as a facility for remotely controlled over-ride. The reader should therefore expect to find some rather ill-defined boundaries between the various types of unmanned aircraft that are discussed in this volume.

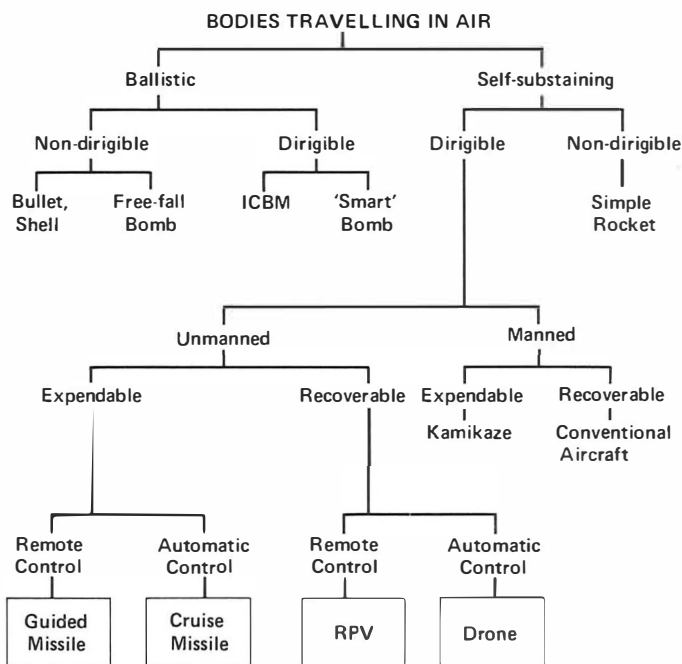


FIG. 1. Unmanned Air Weapons—A Family Tree.

Because of the sometimes uncertain boundaries that exist between definitions of missiles, glide-bombs and drones, and because of the influence that refinements in one type of device have had in the development of others, the approach adopted in this book is to deal with the more significant members of the whole family of unmanned airborne vehicles, including many that are, strictly speaking, missiles. The work does not claim to be a complete history, and it is certainly not a catalogue of all unmanned aircraft past or present. The approach adopted is, first, to give an account of the origins of unmanned aircraft, and then to trace the significant developments in the emergence of the first generation of unmanned aircraft during the first three decades of this century.

Next, the use of unmanned aircraft by the protagonists in the Second World War is discussed, and this covers the employment of the first operational cruise missile, the German V-1, as well as unmanned aircraft and such stand-off weapons as guided bombs, both free-fall and glide versions. The considerable post-war work on cruise missiles, notably in the United States, is then examined, and the decline of interest in these systems is explained as well as the subsequent revival of enthusiasm over their potential as developing technology made their attributes so much more attractive operationally. This is followed by an account of the convoluted emergence of the definitive US cruise missiles, before an account is offered of the activities of unmanned aircraft in the combat and near-combat conditions of the Far East and the Middle East.

Next a discussion is offered of the concepts within which unmanned aircraft find their place in modern air warfare, including the arguments on cost and effectiveness; and finally an analysis is made of the current state of the art of unmanned aircraft, and some thoughts are offered on their likely future utility.

In trying to cover such a wide historical, technical and international field, sources have not surprisingly proved to be of varied availability and reliability. At one end of the spectrum there are the Official Histories from which material has been drawn when treating US and British weapons systems, through to a large number of sometimes inconsistent secondary sources when dealing with, for example, the more esoteric German weapons of the Second World War, and down to informed speculation when dealing with episodes such as the Israeli employment of unmanned aircraft. Rather than use numerous specific footnotes therefore, the author offers a bibliography of the sources he has consulted.

Finally, the opinions offered here are those of the author only, and do not necessarily reflect the views of the Ministry of Defence or of the Royal Air Force.





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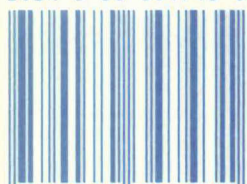
Air Chief Marshal Sir Michael Armitage KCB, CBE, RAF

This volume examines the past, present and future roles of unmanned military aircraft in modern warfare, outlining the characteristics of cruise missiles, remotely piloted vehicles and drones. Unmanned aircraft are traced from their origins in the First World War, to the V1 offensive during the Second World War, and American operations in Vietnam, and current trends are evaluated. The text is well supported with diagrams and photographs and incorporates a section of self-test questions.

**Contents:** Introduction. Origins. Emergence – The V1 Weapon. Unmanned Aircraft at War. The Missile Age. More Second Generation Cruise Missiles. Towards Third Generation Cruise Missiles. Operational Experience With Unmanned Aircraft. United States Cruise Missiles Revived. Concept of Manned and Unmanned Aircraft. Present Programmes. The Future of Unmanned Aircraft.

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