

**Modern Combat Aircraft 6**



# PANAVIA TORNADO



**Bill Gunston**

First published 1980

ISBN 0 71101009 9

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photo-copying, recording or by any information storage and retrieval system, without permission from the Publisher in writing.

© Bill Gunston 1980

Published by Ian Allan Ltd, Shepperton, Surrey, and printed by Ian Allan Printing Ltd at their works at Coombelands in Runnymede, England.



# Contents

Preface	6
Glossary	9
Roots	10
Basic Design	18
Propulsion	28
The Programme	35
Flight Development	52
How It Works	66
Tornado in Service	79
The Air Defence Variant	93
An Overview	106
Appendices	110



*Left:* Beautiful portrait of the last pre-production aircraft, 16, in MFG livery and with four Kormorans; this is the kind of 200ft/90m environment in which Tornados will live./Panavia

# Preface

Unlike the other books in this series, this volume deals with a very new aeroplane only just entering service. But it has still been around long enough to be judged not merely of exceptional merit but almost certainly the most useful single type of military aircraft in the world today. And that is only one facet to a story rich in technical boffinry, human relations and the just triumph of patient engineers over many difficulties.

Some of the difficulties were concerned with the unique demands made of this aeroplane, which had to do everything and yet meet severe limitations on physical size and price. More difficult was the basic task of political survival. Tornado, originally known as MRCA (for Multi-Role Combat Aircraft), was conceived by three strongly different countries in Europe, each with great pride in its own capabilities. In these countries three air forces and a navy each spelt out their own set of demands. Then a team of engineers from the three nations set about meeting those demands. Any one set of requirements would have been a challenge; four might have been met by four different aircraft, but the idea was to meet them with one. Nothing like it had been done before.

On top of these valid problems were a host of unnecessary difficulties caused by the political environment. In Britain the government had lately cancelled all the new crop of home-grown combat aircraft and replaced them with American purchases, saying that the aircraft industry had 'failed the nation' and feeding the public a stream of astronomic costs, or supposed savings (by buying foreign aircraft), to create the impression that building one's own combat aircraft was done only by lunatics. Both in Britain and in Italy a substantial proportion of the Members of Parliament sincerely believed that defence was undesirable, and that money spent on it should be transferred to more socially desirable objectives. In FRG (Federal Republic of Germany) there were strong political and financial pressures to purchase equipment from the United States, to pay for the US forces in Central Europe.

Meanwhile, the media in most countries inside and outside NATO had gradually – and not unreasonably – come to regard major aircraft programmes in a totally different light, depending on the country of origin. If it was American or French it was taken for granted even at the paper stage, and even today potential customers go so far as to 'short-list' such aircraft before they have been developed and long before any figure for the price can bear any meaningful relationship to what the customer might eventually have to pay. But if the aircraft is British the media's chief preoccupation has been the date of cancellation. When the aircraft appears to be technically advanced, as in the case of MRCA, the obvious way to create a 'story' is to present the whole project as desperately complicated and expensive, and, if possible, as either useless or else inferior to some real or imagined wonder-plane from America or France. This appears to be thought the only way to attract the attention of the public, and in the case of Tornado it has been done in at least four major TV programmes, 10 radio feature broadcasts and 270 newspaper articles in Britain alone.

Perhaps the media are right. Maybe shrill attacks on the most important weapon programme in Western Europe and one of the greatest international collaborative projects in all history have indeed interested the public. But most people are not entirely



disinterested in a story of success; and the true story of Tornado is one of success, against very long odds, that is wholly exceptional in its completeness. The last book I wrote in this series dealt with an American aircraft designed to fly generally similar missions, the F-111. Though this was created by large teams of skilful and dedicated engineers in the richest country in the world, nothing seemed to go right (and it was a one-country programme). The contrast with Tornado could hardly be more vivid.

It is also worth noting that if war were ever to come in Western Europe, it would do so at night, in fog, rain or snow. No tactical aircraft in NATO could fly, except a handful of F-111s. Thanks to Tornado, the number of aircraft able to take off will grow by 809.

Thousands of engineers, officials, and specialists in uniforms of various colours, have created Tornado in the past ten years. Most of them have been at it so hard they never had time to stand back and look at what they were doing. Then, in 1978, they began to be visited by possible customers from outside the three nations. In making their presentations to these visitors

they were able to see that they had built something unique. Their achievement is so great that it cannot suddenly be rivalled by a competitor or adversary. Much of the credit is due to a handful of men of true greatness who had the vision and force of character to take correct decisions in many situations where these decisions might have seemed to be acts of weakness or even surrender. For example, Italy makes the wings which are pivoted to the German centre fuselage, but the flexible fairings over the slot into which each wing folds are a British responsibility. Think how tempting it is for each partner, in ten thousand localised design or development problems, to achieve a solution at the expense of the other! It is almost instinctive for big companies to exploit the weakness of others; Tornado was achieved by doing just the opposite and building on one's partners' strengths.

Tornado is now in full production. Because of it, Western Europe is less likely to be attacked. Because of it, Western Europe is not dependent on the United States for its combat aircraft. And perhaps the greatest importance of this programme to history is the sheer magnitude of the international collaboration which it demonstrates. If we go on like this we may eventually wonder just what we mean by the word 'foreign'.

*Below: MBB flight-test crew in front of 07 at the Hanover air show in April 1978: they came to watch the show, not because a Tornado needs looking after to this extent./MBB*

Bill Gunston  
Haslemere 1979



