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 Tel: 01582 505999 Fax: 01582 560731
 ISDN: 01582 560854
 E-mail: regallitho@atlas.co.uk

Managing Editor:
 Paul E. Eden

Design:
 Steve Page

In-Tray, News and Reviews Co-ordinators:
 Bill Anderson
 Ernie Lee

Editorial Consultant:
 Mike McEvoy

Editorial Assistant:
 Frank Campey

Web Master:
 James Henry

SAM Shop/Back Issues:
 Jennifer Henry
 Tel: 01582 505999 E-Mail: jen@regallitho.co.uk

Worldwide Advertising:
 Tel: 01582 505999 Fax: 01582 560731
 E-Mail: jen@regallitho.co.uk

Subscription Department:
 SAM Subscriptions
 352 Selbourne Road, Luton, Beds. LU4 8NU
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Full-colour SAM
 The first issue of *Scale Aircraft Modelling* in my collection is Number 10, Volume 11, dated August 1988. In the 15 years since then and, in fact, in the history of the magazine, I am only the third editor to have taken its helm.

There is always a tendency for new editors to make sweeping changes, but I figure that a recipe that has been producing a magazine bought by tens of thousands of modellers and aircraft enthusiasts every month, can't be far wrong. What I hope to do, is continue to bring you the magazine that you have come to enjoy so much, but with ever increasing quality and value for money. You will already have noticed that from this issue *Scale Aircraft Modelling* is a full-colour magazine. Not only does this add to its value, but it also allows me to use the fabulous artwork and photographs that flood into the SAM office to maximum effect.

In the coming months we have some great modelling features lined up and some superb aircraft to profile - look out for the Super Hornet and some lavishly-illustrated Russian features. I hope you will continue to enjoy SAM as much as I do.

P. E. Eden
 Paul E Eden
 Managing Editor

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Acknowledgments: The Editor and the author of the Nimrod article would like to express their thanks to Gordon Bartley at BAE Systems.

Studio photography by John Ruddlestone Photography Ltd and Ray Ball
 Front cover: Using the Tamiya P-51D kit, Aeromaster decals and an Aries resin set, not to mention a great deal of modelling skill, Karel Vladek produced this astounding Mustang in 1:48 scale.

Features planned for next month include:
Aircraft in Profile: Steve Davies describes the Boeing F/A-18E/F Super Hornet, while Mark Rolfe provides profile artwork.
1:48 Modelling: Stephen J. Di Nucci reviews kits, accessories and decals available for the Wild Weasel Phantom.
SAM plans: 1:48 Savoia-Marchetti S.M.79 drawn by Peter Green

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First into The In Tray this month is a trio of re-releases from Airfix, all to 1:72 scale. The North American F-86F Sabre is a re-issue of the Heller kit and comes with decals for Major John Glenn's 25th FIS, 51st FIW F-86F-30-NA MIG MAD



MARINE. Next is the Northrop F-5E Tiger II, which, if you use either of the provided decal options – for the 527th AS at RAF Alconbury, 1990; or VMFT-401 at MCAS Yuma, 1996 – will leave you with a set of Mk 82 bombs and a Pair of Mavericks for the spares box.



Lastly, the Panavia Tornador F Mk 3 is now available with decals for three recent aircraft. These include aircraft of No. 111 Sqn, RAF at RAF Leuchers in August 2002; No. 56 Sqn at RAF Coningsby in July 2002 and an Italian air force machine of 36° Stormo, 12 Gruppo at Gioia del Colle in 1999.



Further news has also emerged from Airfix concerning the new 1:48 BAE Systems Hawk kits. Taking the form of the Hawk T.Mk 1A in Red Arrows finish and Hawk Mk 100 in Australian or NATO Flying Training in Canada markings, the kits should be available from the end of July and Airfix reports a great deal of pre-release demand.



AMTech has sent us its development of the 1:48 scale Escl Henschel Hs 123 kit. As well as the basic kit parts, the box contains a bag of finely detailed resin cockpit parts, plus a separate sprue of

components for unspatted landing gear. Decals are included for three Hs 123A-1 aircraft, of 3./JG 165 'Immelmann' at Fürstentumbruck, 1937; FFS Schule (A/B) 71 at Prossnitz, 1941 and No. 61 Sqn of the Spanish air force in 1945.



MPM has sent three resin upgrade sets for the 1:72-scale Eduard L-39ZA kit, under the name of CMK. Set 7085 is the armament set, but it is rather more than that. It supplies a complete nose, with access covers off, inside which are the boxes containing the radio, etc. Also included are the fold-down boarding steps, the underfuselage gun mounting and the exhaust system. Set 7084 is the exterior set and consists of the wheel well interior and doors, all the flying surfaces and the wheels, complete with etched-brass inserts. Set 7083 is for the interior and supplies a one-piece cockpit bath, seats, cockpit combing and instrument panel. Added to this are etched-brass instrument frets and many more etched items that are minute to say the least. Lastly, a vacform canopy is provided to show off the detail.



The latest kit from Azur is for the Dewoitine D.520C.1 in 1:32 scale. The quality is what we have come to expect from this company. Some of the delicate parts are in resin, but the canopy is injected. The decal sheet gives two alternatives, a machines from GC 1/3, 2nd Escadrille, at Cannes, France 1940 and GC III/6 as flown by S/Lt Le Glean, in Syria during 1941.

Staying with the same company, but this time under the Special Hobby label we have the DFS 230A in 1:48 scale. This, like other kits in the range, is barely discernible from products produced with steel moulds and comes with an injection-moulded canopy. The DFS also includes some cockpit detail in resin and etched



brass. Decals are for two aircraft, both in the standard splinter scheme with no indication of the unit. According to my reference they are both DFS 230Bs serving in Italy. Moving on to 1:72 scale we have two kits that missed earlier In Trays. The first is the long awaited Heinkel He 59B, a subject not previously produced as an injection kit. This is an earlier Special Hobby product – pre-injection canopies – but since the He 59B has only windcreens, this should not be a problem. As well as crisply-moulded injection parts, there is quite a bit of resin and a small etched-brass sheet. The markings are for two aircraft. A splinter-pattern example from 3./KüFlGr 106 and an all grey Condor Legion machine based at Pollensa in 1938. The second of these kits is for the Fiat CR.25, another machine not previously attempted as an injection product, having the same well moulded parts with injection canopies and resin engines. The decals are for three aircraft, though the difference is only in the serial number. All were part of 173 Squadriglia RST, based at Palermo-Boccadifalco, in 1942.



Still with Special Hobby and in 1:72 scale we have the latest in the company's Firefly series – the Mk I. The construction is similar to the previous kit with an etched-brass fret and lots of resin, much of it used in the highly detailed cockpit. Decals are for three aircraft, all from No. 1771 Squadron, FAA as follows: Z1905, 'Q', in HMS Implacable for the attack on Tirpitz, October 1944; DK431, '275/N', in HMS Implacable, as part of Task Force 37.1 in the Pacific during 1945 and flown

by Sqn-Ldr W. J. R. MacWhirter; and lastly DK438, '277/N' from the same unit.

Perhaps a little more exotic, is the 1:72-scale Eastern Express Sukhoi Su-17M-4 'Fitter-K'. This kit has decals for two camouflaged machines from unidentified units.



From Italeri we have two re-issued kits, the first for the EF-111A Raven, with decals for the 27th and 388th TFWs. The second kit is for the Sea Harrier FRS.1 with markings for an FRS.1 Mk 1 of No. 801 Sqn, RNAS, in HMS Invincible during 1982; an FRS.1 Mk 1 of No. 700A Flight, RNAS Yeovilton, in 1979; and an FRS.1 Mk 51 of No. 300 Sqn, in INS Vikrant, during 1982. Both these kits are to 1:72 scale.



Pavla, under the Octopus label, has sent in its latest release – the Consolidated TB-2 Sea Wolf in 1:72. It is a typical high quality, short-run kit, with vacform canopy and detail parts in resin. Decals are for the following aircraft: a first series Sea Wolf as, on its maiden flight; an aircraft from VT-154/155; and a machine based at NAS Norfolk in 1948.

Pavla has also issued a number of resin upgrade sets in 1:72, as follows: TB-2 Sea Wolf: bomb bay, rear cockpit, dorsal gun, turret details including gun barrels and MG pod plus a new vacform canopy; An-2: paratroop cabin, wheels and ASH-62M engine (designed for the Italeri or Bilek kit); An-2: pilot's cockpit and vacform canopy. The next is an unusual set, it is for an M-62 engine and ground trolley for the I-16 Type 18. Lastly, for modellers of British aircraft, a Spitfire PR.Mk IC/Mk IG/Mk IV conversion set, containing a drop tank, camera pod, deep

cowling, unarmoured seat and PR-type canopy for the PR.Mk IC. For the Mk IG the correct canopy, armoured seat and side camera bulge are provided, while for the Mk IV there is a new front for the oil cooler. There is only one set of main wheels, but Spitfire addicts should be able to produce two models from this set. A bonus with this package is decals for three aircraft: a PR.Mk IC of No 1 PRU in PRU blue, a Mk IG from the same unit in pink camotint and a Mk IV of 681 Sqn, SEAC, in 1943-44, also in PRU blue. Note if you wish to model both I PRU aircraft you will need to find another set of codes.

From Belgium comes news of the latest resin items from PJ Productions. In 1:72 expect kits for the Dassault Mirage 5F with EC 2/13 'Alpes' markings, the Mirage IIIR of ER 2/33 'Savoie', the Mirage IIIRD of ER 3/33 'Moselle' and finally the Mirage IIIRS of the Swiss air force's Fliegerstaffel 10. In 1:48 scale a seated modern French pilot is promised, while 1:32 scale modellers can look forward to a seated modern NATO pilot. All of these kits and figures should be on release in July.

SAM also has received details of a new model-paint range called Model Air and produced by Parabellum. The range includes many colours relevant to the aircraft modeller and the paints are specially designed for application by airbrush. They are acrylic and the manufacturer claims that they offer hitherto unknown covering power and durability.



Trumpeter has issued a Kawanishi Type 97 in 1:144 scale. Decals are provided for aircraft from six unidentified units, two in the standard Imperial Japanese Navy dark green and light grey and the others in overall light grey. Trumpeter has also released the long awaited 1:48-scale Savoia-Marchetti S.M. 79-II Sparviero. There are decals for an aircraft of 283 Squadriglia, 130 Gruppo Autonomia, AS, in the Mediterranean in 1942.

Compiled by Ernie Lee and Paul E Eden



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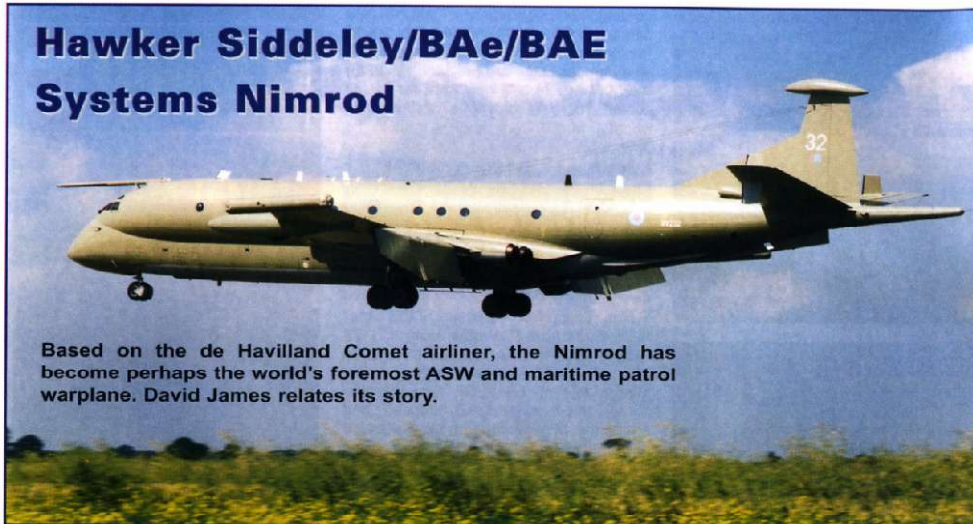
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Hawker Siddeley/BAe/BAE Systems Nimrod



Based on the de Havilland Comet airliner, the Nimrod has become perhaps the world's foremost ASW and maritime patrol warplane. David James relates its story.

In the Book of Genesis, Nimrod is the name of a King of Babalonia regarded in ancient times as being a mighty hunter. It was therefore highly appropriate that Nimrod was the name adopted for a new anti-submarine warfare (ASW) and maritime patrol (MP) aircraft developed by Hawker Siddeley. The first Nimrod entered service in 1969 and since then the aircraft has become widely acknowledged as one of the finest ASW/MP designs ever produced. Modernised over the years to maintain its effectiveness, Nimrod has also spawned an electronic intelligence (Elint) platform and an ill-fated airborne early warning (AEW) variant, as well as having proven its basic capabilities in combat operations.

Origins

In June 1964, the British government issued a requirement for a replacement to supersede the RAF's Avro Shackleton, which was in service as a land-based, long-range ASW and MP aircraft. Air Staff Requirement No.381 (ASR.381) called for a new aircraft to be in service by late 1966, which meant that the winning design team would have only a short time in which to develop the project.

Hawker Siddeley responded to the challenge, having studied an MP variant of its Trident airliner a few years earlier. This aircraft failed to attract support,

however, but the idea of modifying an existing airliner had proved sound and so when Hawker Siddeley responded to ASR.381, it again opted to use an existing airliner airframe as the basis for its proposal. This time the company decided to use the de Havilland Comet 4C, which had been adopted by the RAF as a strategic transport back in 1955 and had also been widely used by commercial airlines. By using an already proven aircraft, Hawker Siddeley was saving itself considerable time and expense as much of the design work had been done. Additionally, the company's factory at Woodford in Cheshire was fully geared up for building Comets, allowing more money to be

Nimrod MR.Mk 2 XV232 is shown here in its current configuration. The Nimrod has the ability to cover large areas of ocean on a range of missions, making it a valuable and versatile element in the RAF's inventory. (BAE Systems via David James)

saved by eliminating the need for retooling and workforce retraining.

By May 1965, the Type Specifications for the Shackleton replacement had been formalised and a month later the Government granted Hawker Siddeley the go-ahead for its HS.801 design (as the MP Comet was initially known). A £100-million fund was allocated for the development of two prototypes and the production of 38 aircraft for the RAF. Although the Government relaxed its



Above: The first Nimrod prototype, XV148, undergoes a test flight in May 1967. Of two prototypes, XV148 was the only one fitted with Spey engines. It was used to examine the Nimrod's flight and aerodynamic characteristics.

Left: XV147 was the second Nimrod prototype. Its use of Avon 524 turbojets meant that electrical generators had to be fitted in under slung pods below its engine nacelles, as can be seen here. (both BAE Systems via David James)



Hawker Siddeley/BAe/BAE Systems Nimrod



original in-service target date of 1966, it insisted that Hawker Siddeley have the new aircraft (which was soon named Nimrod) in service within 48 months of the contract being signed.

Design and development

Aware of the strict timetable, Hawker Siddeley opted to use two redundant Comet 4C airframes as the basis of the Nimrod prototypes, eliminating the need to build airframes from scratch. The Comets, actually the final pair to be assembled before production of the airliner ceased, were serialised XV147 and XV148 and were moved to Hawker Siddeley's Chester facility for immediate conversion.

Although the two prototypes were based on Comet 4Cs, the Nimrod featured a reduction in its fuselage length by 6 ft 6 in (1.98 m) which made it more akin to the earlier Comet 4. An unpressurised underfuselage section was to be added, protruding forward of the aircraft's nose and running back approximately three quarters of the length of its fuselage. This panner gave the Nimrod its distinctive 'double bubble' appearance and is used to store the aircraft's operational equipment, together with a large-capacity, 48-ft 6-in (14.78-m) long weapons bay.

Initially the panner was to incorporate a forward lookout's position that could only be manned when the aircraft was operating at lower, unpressurised

XV148 is shown here minus MAD, although it has been fitted with the tail fin ESM fairing. The Nimrod was the world's first jet-powered maritime patrol aircraft to enter operational service. (BAE Systems via David James)

altitudes. This, it was swiftly realised, would be impractical and so Hawker Siddeley decided to abandon it. The panner also led to an increased keel, which in turn created a large reduction in the aircraft's directional stability. To counter this, an enlarged dorsal fin was devised, at the top of which was mounted an elliptical fairing for some of the aircraft's planned electronic surveillance measures (ESM) equipment.

All but 11 of the original Comet fuselage windows were removed, while large observation windows were added forward. The flight deck windows were altered to provide far greater visibility for the pilots, this being considered essential if the Nimrod was to fly effectively at low levels in poor weather conditions.

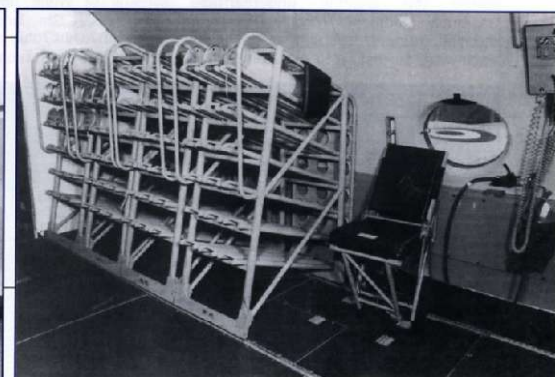
The first of the two prototypes, XV148, was fitted with four 12,140-lb (53.99-kN) thrust Rolls-Royce RB.168 Spey Mk 250 turbofan engines. This was the powerplant that Hawker Siddeley intended using on the production aircraft. As in the Comet, the new engines were wing mounted, but since the Speys were considerably larger than the Avons used on the Comet, Hawker Siddeley had to redesign the Nimrod's wing centre section to accommodate them. The Speys also required more air, so XV148's intakes had to be enlarged, as did its jet exhausts.



Left: The Nimrod MR.Mk 1 flight deck was a mass of switches, levers, dials and gauges. The Nimrod's cockpit windows were enlarged compared to those of the Comet, giving its pilots improved visibility.

Below left: An early shot of the Nimrod MR.Mk 1's radar display screen. The ASV.Mk 21 system was based on the Shackleton's radar and although effective for its time, was replaced by the far superior EMI Searchwater in the later Nimrod MR.Mk 2.

Below right: The internal sonobuoy storage racks of the Nimrod MR.Mk 1 allowed it to carry a wide variety of buoys, markers and other target indicators for use in ASW or locating a stricken vessel. Such devices are normally dropped into the water via rear underfuselage tube dispensers, or a rotary sonobuoy launcher. (all BAE Systems via David James)



The Nimrod retained the bullet-shaped leading-edge auxiliary fuel tanks of the Comet 4C. On the production aircraft the starboard tank was fitted with a powerful searchlight at its forward end, to aid the aircraft's surface-search capabilities in bad weather or at night. To protect against the salt laden environment in which the Nimrod was to operate, the whole airframe and engines were given a coating of anti-corrosion protection.

As the primary combat duty of the Nimrod was ASW, Hawker Siddeley incorporated a magnetic anomaly detector (MAD) unit to help the aircraft search for submerged submarines. This device is housed in a fuselage tail cone which extends aft, well beyond the aircraft's fin and rudder. In the rear fuselage section ample storage space is provided for a wide variety of sonobuoys, marine markers and other maritime sensors. These can be dropped through tube launchers and once in the water the information they provide was relayed to a pair of acoustic data processors onboard the Nimrod. These processors were to capable of accurately monitoring and interpreting the sonobuoy data and then transferring it to the aircraft's Marconi computer-based integrated navigational and weapons control system. Making use of four onboard computers, this system managed the Nimrod's various sensors and sent the appropriate information to the relevant operator's console in the aircraft's Tactical Crew Compartment in the forward fuselage.

The system also managed the Nimrod's surface surveillance radar. This was an EMI ASV.Mk 21D unit, similar to those carried by the Shackleton and was mounted in the Nimrod's nose. To provide accurate, long-range navigation, the aircraft was equipped with a new Tactical Navigation (TacNav) system, while a comprehensive communications suite, including various frequency radios and transmitters, provided a range of links with shore bases, aircraft and warships. To supply adequate electrical power, a new electrical generating system was developed using feed-off from the Speys.

As the Nimrod was considerably heavier than the Comet, Hawker Siddeley had to revise the existing undercarriage assembly. Additional modification work involved fitting a weapons pylon below each wing, so that air-to-surface missiles

such as the Martel or AS12 could be employed, revising the existing hydraulic systems, updating the fuel supply to the new engines and a general strengthening of the aircraft's framework.

First flight

Finally, in May 1967, XV148 took to the air on its initial test flight. It was extensively employed in researching the performance of the Speys, in aerodynamic trials and for assessing the Nimrod's flight systems. By April 1968, it was averaging 25 flying hours a month as the test programme intensified and weapons trials commenced.

By this time the aircraft had been joined by the second prototype, XV147. This aircraft retained its original Avon 524 turbojets for reasons of economy and because of the tight deadline imposed on Hawker Siddeley. Taking to the air for the first time during July 1967, XV147 was fitted with underslung pods below its engine nacelles to allow its onboard electrical generators to supply power for the Nimrod's avionics, which this aircraft was intended to prove.

While the two prototypes continued testing, Hawker Siddeley began constructing the first of the 38 production aircraft at its Woodford site. The first completed example, XV226, flew in June 1968 and the new aircraft received the RAF designation Nimrod MR.Mk 1. It was sent to the Aeroplane and Armament Experimental Establishment (A&AEE) at Boscombe Down for engineering trials, where it was soon joined by XV148. The second and third Nimrods to leave Woodford (XV227 and XV228) were handed over in February and March 1969, respectively, and they too joined the programme at the A&AEE, where they were employed in weapons, navigation and tactical systems research.

By November 1969, another trio of MR.Mk 1s had been delivered and the RAF was able to form a Maritime Operational Training Unit (MOTU) at St Mawgan in Cornwall. The MOTU's task was to train personnel for the first front-line Nimrod squadron. The first aircraft to join the MOTU was XV230 and like all the Nimrods being delivered, it wore a colour scheme of White upper surfaces and Light Aircraft Grey undersides, with 'D'-Class red/white/blue roundels and Black serial codes. With more Nimrods arriving,

the MOTU was redesignated as No.236 Operational Conversion Unit (OCU).

Operational service

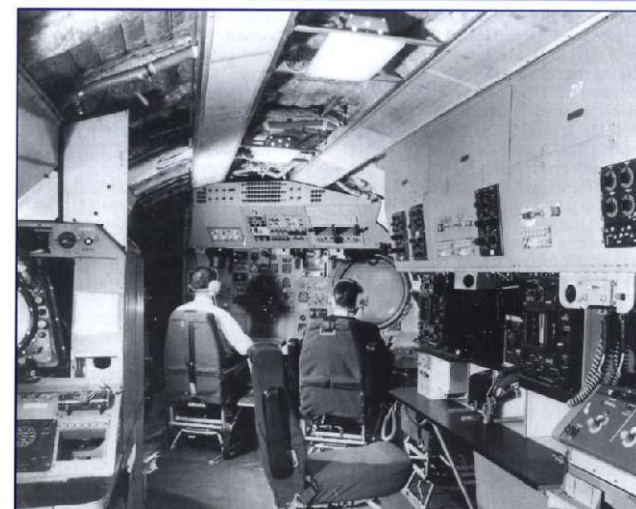
The honour of becoming the first front-line Nimrod unit fell to No. 201 Sqn, based at RAF Kinloss in Moray, Scotland. The squadron began to convert from its Shackleton MR.Mk 3s during 1970. By July of that year it had 10 Nimrods on strength and was declared operational.

Next to convert from Shackletons was No. 42 (TB) Squadron at St Mawgan. By August 1972, all 38 Nimrods ordered had entered service and the aircraft had also re-equipped Nos 120 and 206 Sqn at Kinloss, together with No. 203 Sqn at Luqa in Malta, allowing the remaining Shackletons to be retired. With this initial order completed, the British government placed a follow-up contract with Hawker Siddeley for eight more aircraft, to be delivered between 1975 and 1977.

In service the Nimrod normally carried a crew of 12 and apart from ASW duties it could also be used for routine MP, search and rescue (SAR) and anti-shipping strikes. Its large weapons bay could accommodate a range of torpedoes, depth charges, mines, bombs and additional sonobuoys. Although rarely used, the underwing hardpoints could also mount a selection of bombs, mines, gun pods or rocket launchers.

Performance wise, the Nimrod soon impressed. It could achieve a maximum speed of 575 mph (925 km/h), with a cruising speed of 547 mph (880 km/h) and a low-level patrol speed of 230 mph (370 km/h). With an operational ceiling of 42,000 ft (12802 m), the aircraft had a typical ferry range of 5,755 miles (9262 km) and an endurance of 12 hours. An on-station patrol time of 6 hours could be achieved at a range of 1,150 miles (1851 km) from base, by cruising on just two engines, with the other pair shut down. In an emergency, the Nimrod could even climb and cruise on just one Spey. To extend its range even further, the Nimrod could be fitted with up to six auxiliary fuel tanks in its weapons

Nimrod MR.Mk 1 XV.228, shows off the clean lines of the design and the original fuselage window arrangement. This aircraft was the third production Nimrod and entered service during March 1969, whereupon it was allocated to the A&AEE for service trials. (BAE Systems via David James)



This image shows the Nimrod MR.Mk 1's Tactical Crew Compartment. The aircraft's excellent flight qualities, airliner-style comfort and relatively spacious interior when compared to the Shackleton, soon endeared it to its crews, especially on long-range, long-endurance flights. (BAE Systems via David James)

four times during the 1970s and it continues to dominate it to this day.

Operational surveillance missions were undertaken for the first time from 1973, during the Cod War fishing dispute between Iceland and the UK. These patrols lasted until 1976, when a political settlement was reached, but the duty established the Nimrod as an excellent fishery protection aircraft. It was therefore no surprise when, in 1977, the aircraft embarked upon Operation Tapestry. Lasting until 1986, this mission involved Nimrods flying fishery protection flights over the North Sea and other UK territorial waters, as well as the monitoring of the newly developed offshore oil industry. At its height, Operation Tapestry involved three Nimrod sorties a week.

Nimrod R.Mk 1

Electronic Reconnaissance (ER) is composed of four sub-disciplines: Electronic Intelligence (Elint), Communications/Signals Intelligence (Comint/Sigint), Radar Intelligence (Radint) and Telemetry Intelligence (Telint). No. 192 Sqn, RAF was formed for the ER role as an 'operational signals research' unit in 1951. In August 1958 it

Another view of XV241, now in MR.Mk 2P configuration and in a typical Nimrod operating environment. The drilling rig in the background is a reminder of the days when Nimrods regularly patrolled Britain's offshore oil and gas fields as part of Operation Tapestry. (BAE Systems via David James)

bay and if necessary it could also fill in as troop transport, with seating for up to 45 soldiers in its fuselage.

The aircraft's crews were quick to praise its smooth flying characteristics and airliner-style comfort – a major bonus on long-range patrols and far superior to anything experienced on the Shackleton. The Nimrod's submarine detection qualities were also favourably commented upon and demonstrated during numerous NATO training exercises, while many a submerged Soviet submarine was tracked as it headed for the North Atlantic. Indeed, submariners soon remarked how difficult it was to spot the turbofan-powered Nimrod using air

detection equipment, when compared to its noisier turboprop-engined rivals such as the American P-3 Orion.

Soon the Nimrod began to achieve a number of firsts. As early as November 1971, aircraft from No. 201 Sqn were engaged in real SAR missions, activities which became important for all Nimrod units. Aircraft were frequently called upon to undertake long-range sorties in atrocious weather conditions to locate vessels in distress. During 1973, Nimrods won the prestigious Finccastle Trophy competition for maritime aircraft for the first time, beating crews from Australia, New Zealand and Canada. It was an event the Nimrod won another



became No. 51 Sqn, equipped with Canberras and, eventually, Comet R.Mk 2s. During the early 1970s, the RAF began to consider a replacement for No. 51 Sqn's ageing Comets and soon settled on a variant of the Nimrod, as suggested by Marshalls of Cambridge, which had originally worked on the Comet R.Mk 2. It was decided that three Nimrod MR.Mk 1s would be converted to Nimrod R.Mk 1 specification for the ER mission.

In July 1971 the first of these Nimrods, XW664, was handed over for conversion. The work took two years to complete and it was late 1973 before XW664 commenced flight trials in its new configuration. It was followed by XW665 and XW666.

During May 1974, the Nimrod R.Mk 1 was officially commissioned into service with No. 51 Sqn. By February 1975 the three aircraft were in place, allowing the last Comet to be retired. For training, an MR.Mk 1 (XZ283) was borrowed between 1976 and 1978.

The Nimrod R.Mk 1 is immediately recognisable by its lack of a MAD tail boom and the addition of radomes for various sensors on the noses of the external wing fuel tanks. It initially retained the MR.Mk 1's fuselage window arrangement, tail-fin mounted ESM pod, 12-strong crew and flight performance, including the ability to loiter for long periods which made it ideal for intelligence gathering purposes.

The R.Mk 1 was packed with a host of highly classified electronics equipment, housed in its fuselage and within the erstwhile weapons bay. In addition, collection of new antennae sprouted from the aircraft's underbelly.

Although the exact nature of the R.Mk 1's mission remains top secret, it is widely believed that the aircraft regularly operate on behalf of GCHQ and so they are thought to be both Elint and Comint capable.

The Nimrod R.Mk 1 was been employed over the Baltic Sea during the Cold War to monitor the air defence networks of several Warsaw Pact nations, including the Soviet Union's defences around what was then Leningrad. The aircraft have also scanned areas around the White Sea and are known to have been deployed to Malta and Cyprus to record the activities

of the Soviet Black Sea Fleet, as well as the electronic transmissions originating from a host of Middle Eastern states.

During the 1982 Falklands Conflict it was widely accepted that an element of No. 51 Sqn participated in Operation Corporate. One R.Mk 1 (XW664) is thought to have operated from Ascension Island on sorties to intercept and monitor Argentine signals traffic. Shortly after the conflict ended, XW664 was seen with a newly added inflight-refuelling probe. Similar modifications were carried out to MP Nimrods assigned to Operation Corporate.

At some point during the 1980s, the RAF's trio of R.Mk 1s received a classified updating that altered their external appearance. Among these alterations was the addition of an array of nine inverted 'L'-shaped antennae above the aircraft's forward fuselage, on both wing fuel tanks and also over the tailplanes. New, tubular ESM pods were added to the wingtips, while signs of improved communications equipment included a collection of UHF/VHF aerials along the top of the fuselage. The existing window arrangement was also revised, with a reduction in number.

Whilst XW664 had already received its inflight refuelling gear, the other two machines were similarly equipped during the course of their upgrading.

During the 1991 Gulf War with Iraq, No. 51 Sqn deployed to RAF Akrotiri, Cyprus, and from there to an unspecified location somewhere in the Gulf region.

From 1992 to 1993, the Nimrod R.Mk 1 found itself over the Adriatic Sea monitoring air defence systems in the disintegrating Yugoslavia. In May 1995, the small force suffered its first loss when XW666 crashed over the Moray Firth, following an engine fire.

The loss of this aircraft placed a huge burden on the two remaining aircraft. Therefore, a month after XW666 was lost, the Ministry of Defence (MoD) awarded British Aerospace (BAe) a contract to supply a replacement using a surplus MP Nimrod. XV249 was duly converted to R.Mk 1 standard and joined No. 51 Sqn

in December 1996. In January 1997, it was passed on to E-Systems for installation of the new SRIM-6113 Starwindow avionics system. This comprised a pair of high-speed search receivers, a wide-band digital direction-finder, a network of 22 digital intercept receivers supported by an interception unit for use against frequency-agile radar transmitters and an inflight technical analysis device. The system also incorporated a digital recording and playback suite, a multi-channel digital data demodulator and an enhanced pulsed signal processing capacity.

Suitably equipped, XV249 was finally declared fit for service in April 1997. It was considerably more capable and versatile than the other two R.Mk 1s some pundits suggested a redesignation to R.Mk 3. It is likely that both XW664 and XW665 now have Starwindow.

Most recently the R.Mk 1 variant has participated in NATO's Operation Allied Force against Serbia during 1999 and Operations Enduring Freedom against the Taliban regime in Afghanistan and Telic against Iraq.

MR.Mk 2 Upgrade

The RAF's Nimrod force underwent its first changes during 1975, when it was announced that 32 aircraft were to be upgraded to a new MR.Mk 2 standard. With submarine technology ever changing, the RAF had recognised the fact that no matter how good the Nimrod MR.Mk 1 was, if it was to remain effective to the end of the 20th century, then a measure of modernisation would have to be undertaken.

The MR.Mk 2 programme did not affect the Nimrod's airframe, but concentrated on improving its avionics. The work was to be carried out by Hawker Siddeley at Woodford, but in 1977 the company was absorbed into the newly created, nationalised, BAe group. It was under this new company's authority that the upgrading scheme was implemented.

BAe employed the original Nimrod prototype, XV147, to research the

The Nimrod has a maximum ceiling of 42,000 ft (12,802 m), although it rarely operates at such altitudes. After the addition of inflight-refuelling probes, the type's normal endurance of 12 hours can be exceeded. On-station time is also increased by shutting down two engines in cruising flight. (BAE Systems via David James)



Hawker Siddeley/BAe/BAE Systems Nimrod



Pictures of the Nimrod R.Mk 1 are still relatively rare, so to record two of the RAF's three aircraft together in flight is especially pleasing. No. 51 Sqn proudly decorates its aircraft with a red goose emblem, as seen on the tail fin of the aircraft nearest the camera. Both these R.Mk 1s underwent updating during the 1980s, as can be seen by their wingtip ESM pods, inverted 'L'-shaped antennae and reduced cabin window layout. (BAE Systems via David James)

meant that a large ram-air intake had to be added to the port side of the fuselage, just forward of the tail fin. This immediately created a recognisable feature unique to the MR.Mk 2 variant.

The first modernised MR.Mk 2 was returned to RAF Kinloss in 1979, wearing a new paint scheme of Hemp upper surfaces with Light Aircraft Grey undersides. Lower visibility red/blue roundels were carried, except below the wings, where the original 'D'-Class markings were retained. This new scheme was borne by all MR.Mk 2s and was slowly adopted by the remaining MR.Mk 1s.

While the programme of conversions continued, No. 206 Sqn became the first unit to begin MR.Mk 2 operations. By this time there was one less Nimrod formation, since No. 203 Sqn had disbanded in December 1977. The aircraft formally flown by No. 203 were either stored, or distributed among the remaining Nimrod units.

In November 1980, the first Nimrod to write off occurred, when XV256 crashed in the Roseisle Forest after suffering a bird strike while taking off from Kinloss. The aircraft's pilots were killed, but their brave actions in trying to control the Nimrod's impact enabled the remaining 18 personnel onboard to survive. Only three months earlier, XV256 had undergone conversion to MR.Mk 2 standard.

By the start of 1982, No. 120 Sqn had joined No. 206 as an MR.Mk 2-equipped unit, while No. 201 was in the process of converting. In April of that year, No. 236 OCU relocated to Kinloss in preparation for the MR.Mk 2, leaving only No. 42 (TB) Sqn at St Mawgan still flying the original variant. At Kinloss the aircraft were pooled in a common allocation and so rarely wore individual squadron insignia. Collectively, the units based there were referred to as the Kinloss Wing (KLW).

The Falklands Conflict

At the start of Operation Corporate to retake the Falkland Islands, it was appreciated by the British commanders that the Argentine navy's small force of diesel-electric patrol submarines posed a potentially serious threat to the Task Force and it's crucial supply lines back to Ascension. Although the Royal Navy's warships and ASW helicopters could guard against this risk, they would be stretched to the limit by other demands and could not be spared to guard ships heading back and forth between the Task Force and Ascension. The RAF's Nimrod force was the ideal solution to this problem.

upgrade, while the MoD decided that one of the additional eight MR.Mk 1s ordered in 1972 but not yet completed, would be delivered as a brand new MR.Mk 2.

One of the cornerstones of the whole MR.Mk 2 upgrade was the replacement of the existing ASV.Mk 21 radar with a new, more advanced and highly capable EMI Searchwater system. This offered far greater surface search and surveillance capacity and even today is regarded as being one of the best maritime radars around.

With newer-generation submarines able to dive to greater depths and run with far less noise, it was necessary to update the Nimrod's detection equipment. The MR.Mk 2 would feature a completely new Marconi AQS.901 acoustic monitoring

device, which could also employ the Anglo-Australian produced Barra long-range sonobuoy and sonics system. The four original 1600D tactical computers of the MR.Mk 1 were retained, but their capacity was increased by 50 percent.

Attention was also given to the Nimrod's TacNav equipment which was improved through the addition of an INS. Communications were boosted through the fitting of online encryption and revised radio teletype sets.

To provide adequate cooling for the increased amount of avionics installed, the Nimrod's existing duplicated Cabin Conditioning System (CCS) was supplemented by a third unit. This was fitted in the rear fuselage section, beyond the pressurised hull compartment and



Nimrod MR.Mk 2P XV241, was the first aircraft to receive the wingtip-mounted Loral ARI.18240 Yellowgate ESM pods. It also achieved notoriety in June 1992 when, flown by crews from No.120 Sqn, it escorted the restored B-24 Liberator *Diamond Lil* from Iceland to Britain. The B-24 had originally been intended for use by No.120 Squadron during World War II, but had never arrived owing to a pre-delivery accident. (BAE Systems via David James)



Just some of the Nimrod MR Mk 2's sensor displays are depicted here. The MR Mk 2 upgrade gave the Nimrod an enhanced detection capability to deal with advances in submarine technology. The Nimrod MR Mk 4 will ensure that the aircraft remains at the forefront of maritime aircraft design. (BAE Systems via David James)

Fortunately, a team at Woodford quickly devised a way of adding a pair of launcher rails for AIM-9G Sidewinder AAMs to the Nimrod's underwing hardpoints. Trials of this new fit commenced on 26 May, again using XV229, and the necessary acceptance tests were hurriedly rushed through two days later. On 31 May, XV232, which had returned from Ascension, flew for the first time as a fully Sidewinder-capable Nimrod. It returned to Wideawake airfield five days later.

During the conflict, the Nimrod also had its offensive weapons carrying ability improved. Some aircraft received cockpit-mounted bomb sights to enable them to use 1,000lb HE or BL755 cluster bombs against surface targets or land positions. An important new addition to the Nimrod's arsenal was the American AGM-84A Harpoon anti-shiping missile (ASHM). The Nimrod's weapons bay had to be modified for Harpoon and it was not until 10 June 10 that the first MR Mk 2P cleared to fire Harpoons (XV234) took to the air on test flights. This aircraft subsequently deployed to Ascension on 2 July, long after Argentina had surrendered.

During the course of Operation Corporate, 111 Nimrod sorties were launched from Ascension. Most were long-range ASW patrols or surface surveillance flights, of increasing duration and risk as the conflict intensified. For example, on 15 May, XV232 undertook a 19-hour 5-minute sortie, covering about 8,300 miles (13,357 km) and at one stage reaching a point just 60 miles (97 km) off the Argentine mainland. There it conducted a survey of the coastline with its radar, covering a strip of land 400 miles (644 km) wide by 1,000 miles (1,609 km) long. The purpose of this extraordinary mission was to confirm that the Argentine navy was still blocked in its home ports by the threat of attack from lurking British nuclear-powered submarines. Although extremely vulnerable to radar detection and air interception as it flew parallel to the Argentine shore at altitudes of between 7,000 and 12,000 ft (2,134 and 3,658 m), the Nimrod went unchallenged.

A total of two MR Mk 1s, three MR Mk 2s and five MR Mk 2Ps deployed to Ascension at some point during the conflict and by mid-June 1982 the number of Nimrods with inflight refuelling gear stood at 13. After the war there was still a need for vigilance and SAR cover, so Nimrods continued to fly from Wideawake until August 1982, when XV234 undertook the final sortie prior to returning to Kinloss.

1980s' Updates

After the Falklands conflict, the remaining MR Mk 1 aircraft were converted to

The first Nimrods involved in Corporate were the MR Mk 1s of No.42 (TB) Sqn. On 4 April 1982, the unit received orders to prepare two aircraft, three flight crews and the necessary ground support staff for imminent deployment to Ascension Island.

XV244 and XV258 arrived at Ascension's Wideawake airfield on 5 April, after an overnight stop over in the Azores. Two days later, the first operational sortie was flown when XV258 undertook a 6-hour 10-minute surface surveillance and submarine support sortie. The same aircraft repeated the mission two days later, this time staying in the air for 6 hours and 45 minutes.

Over the following days, both Nimrods flew long-distance missions, with XV244 logging the longest flight for the squadron on 11 April, when it completed a 9-hour 50-minute sortie. Meanwhile, back at RAF Kinloss, there were 13 MR Mk 2s cleared for operations and it was decided that because of their more advanced radar and avionics they would be better suited for deployment to Ascension.

On 13 April, the first Nimrod MR Mk 2 (XV230) arrived at Wideawake followed by XV255 four days later. Both of No.42 (TB) Sqn's aircraft then returned to St Mawgan, where the unit was put on standby to provide SAR cover for Harrier reinforcement flights heading to Ascension. One MR Mk 1 was assigned to this duty at St Mawgan, while a second aircraft flew out to Freetown in Sierra Leone to provide cover from there. Other MR Mk 1s assumed much of the KLF's SAR and fishery protection duties, thus allowing Kinloss to concentrate on supporting Operation Corporate.

As the Task Force continued to edge closer to the Falklands, the MoD began to consider ways of extending the range of the Nimrod so that it could continue to provide ASW cover far down in the South Atlantic. On 14 April, the MoD

instructed BAe at Woodford to proceed with equipping a number of Nimrods with inflight refuelling equipment, using surplus probes from the RAF's recently retired Vulcan bombers. A test aircraft (XV229) was quickly modified with the refuelling probe being mounted above its flight deck. This created a stability problem so the engineers at Woodford added a small ventral fin beneath the aircraft's rear fuselage and finlets above and below the tailplane. Thus modified, XV229 was employed in aerodynamic tests before moving back to Kinloss at the end of the month to commence inflight refuelling training.

Next to undergo this modification work was XV238, which went to the A&AEE for a series of intensive clearance trials. This resulted in the probe-equipped Nimrod being given the all-clear on 5 May. Aircraft that received inflight-refuelling capability were redesignated as Nimrod MR Mk 2Ps by the RAF.

The inflight-refuelling system received its operational baptism on XV227, which flew to Wideawake unaided during 7 May. Two days later, this aircraft conducted a 2,750-mile (4,426 km) flight south west of Ascension to provide ASW screening to elements of the Task Force. It was airborne for 12 hours 45 minutes, successfully refuelling several times along the way from Victor K Mk 2 tankers.

By this point the MoD had begun to express concerns that such long range sorties, gradually moving ever nearer to the Falklands and the Argentine mainland, might leave the Nimrod vulnerable to airborne interception. The Sea Harriers and Harriers of the Task Force were achieving air-to-air kills, but could not completely establish air supremacy in the area and so there remained a possibility that Argentine fighters could engage a patrolling Nimrod, which would be unable to defend itself against attack.

Hawker Siddeley/BAe/BAE Systems Nimrod

MR Mk 2 standard and eventually the whole force was brought up to a common MR Mk 2P standard complete with Sidewinder and Harpoon capabilities.

During the 1980s, the aircraft also began to receive enhanced ESM equipment in the shape of Loral ARL18240 Yellowgate wingtip pods. This allowed the Nimrod to detect and classify hostile radar emissions, as well as other electromagnetic signals. The first aircraft to receive the new system was XV241 and by the mid-1980s the whole fleet had been updated.

In June 1984, XV257 became the second Nimrod to be lost when it suffered a fire in its weapons bay. Severely damaged, the aircraft was withdrawn and later scrapped. However, it was more or less replaced by XZ284, which entered service that year (after having been originally ordered in 1972 and finished as an MR Mk 2P) and represented the last new-build Nimrod to join the RAF.

The Gulf War

In the wake of Iraq's August 1990 invasion of Kuwait, part of the RAF's contribution to Operation Granby was the deployment of three No. 120 Sqn Nimrods to Seeb, Oman, where they were to assist Coalition naval forces in blockading Iraqi seaborne traffic. Additional crews were provided by Nos 42 (TB) and 206 Sqn.

A number of urgent improvements were introduced to provide the Nimrods with greater operational flexibility and better combat effectiveness. A new self-defence suite (similar to the type installed on the RAF's fighters that were sent to the Gulf) comprising chaff/flare launchers and radar-jamming devices was added, as was a GEC-Marconi Ariel airborne towed decoy system which was mounted in the aircraft's tail fin housing in place of the ESM antennae normally situated there. A forward-looking infra-red (FLIR) sensor in an underfuselage turret was also incorporated, giving the Nimrod an improved night/poor weather surveillance capability. The onboard tactical control systems were revised and newer

communications links allowed for greater inter-service co-operation.

The Nimrod performed well and assisted in the sinking of a number of Iraqi gunboats. Working closely with other Coalition aircraft and warships, the Nimrods flew a total of 396 missions, amassing 2,367 flying hours during the blockade and subsequent liberation of Kuwait, before Iraq agreed to a ceasefire in February 1991. Even after the fighting had died down, the Nimrods continued to fly regular patrols over the Persian Gulf and racked up a further 169 hours spread over 25 sorties before they returned to the UK in April 1991.

Recent years

No sooner had the Gulf War ended, than the RAF's Nimrods were again being called upon to assist the United Nations. This time to action was in the Balkans and from 1992 to 1993, MR Mk 2Ps deployed to Sigonella, Italy, to help enforce a UN-sponsored maritime blockade of Serbia in a mission that was known as Operation Sharp Guard.

At this time, over 20 years of continuous and demanding service in some of the harshest maritime weather had begun to affect the Nimrod fleet. Corrosion and fatigue problems began to show up and in September 1991 XV238 and XV253 had to be withdrawn from use. Exactly a year later, XV242, XV247 and XV249 were taken out of service and placed in storage. Other aircraft also suffered varying degrees of wear and tear, which meant they were beyond economical repair at a time when Britain's defence budget was being cut yet again. They too were retired. By the end of 1992, only 26 Nimrods remained operational.

This number was further reduced during September 1995, when XV239 crashed into Lake Ontario, Canada, during an air display. All onboard were killed.

During 1992, the Nimrod OCU moved to Kinloss and in September of the same year No. 42 (TB) Sqn was disbanded. It later reformed as No. 42 (Reserve) Sqn in a shadow capacity for the OCU, whose role the squadron took over.



Modernisation of the remaining MR Mk 2Ps continued and in September 1998 it was announced that 10 aircraft were to receive Link-11 digital data buses, with the remainder of the force to undergo similar upgrading at a later point. At the 2001 Paris Air Show it was publicly acknowledged that the Nimrods had also received a Replacement Acoustic Processor (RAP), made by Ultra Electronics. Known officially as the AN/YUG-503, this new data processor provided the Nimrod with a vastly improved ability to detect, identify and track underwater sound sources. It is also thought that some aircraft have been given Missile Alert Warning System (MAWS) devices. Linked to the Nimrod's chaff/flare launchers, MAWS provides advanced warning of incoming surface-to-air missiles (SAMs) and directs the appropriate countermeasures.

Nimrod AEW Mk 3

Design studies for an aircraft to replace the RAF's Shackleton AEW Mk 2 began in 1973 and a Nimrod based proposal was soon put forward. The large fuselage capacity, excellent range and ample power reserves of the Nimrod made it an ideal candidate as an AEW platform. At the same time as the Nimrod was being suggested, the Americans were strongly promoting their new Boeing E-3A Sentry. This had been undergoing tests since 1970 and was due to enter service with the USAF during 1977. It was also on order for NATO, where a consortium of European member states was buying a force of 18.

While the RAF favoured the E-3A, the British government was unsure whether to develop the Nimrod variant or join the NATO programme. The drawback with the latter option was that by sharing a relatively small fleet of E-3As with other NATO nations, the aircraft would not be wholly available to serve the UK's national interests. In March 1977 therefore, the MoD announced that it was prepared to fund the development of the Nimrod AEW.

BAe was awarded the contract and it was planned to produce a force of 11 aircraft by converting surplus Nimrod MR Mk 1 airframes (redundant since the disbanding of No. 203 Sqn) together with completing two of the MR Mk 1s ordered in 1972 as AEW aircraft.

BAe opted to go for a fore-and-aft radar antenna arrangement on the Nimrod, with scanners mounted at each end of the aircraft's fuselage in large, swollen radomes. It was believed that this layout would not hinder radar performance, since the radar would not be screened by any part of the airframe.

At the end of a sortie, a Nimrod MR Mk 2P heads inland to its base at Kinloss. The tail fin fairing, originally used to house an ESM antenna, was later turned over to the storage of an Ariel towed missile-decoy system. This latter was first employed during the 1991 Gulf War. For many years the RAF's Nimrods were based at St Mawgan and Kinloss, but since late 1992 the entire force has been concentrated at the Scottish base, where it has gained the nickname 'The Kipper Fleet'. (BAE Systems via David James)

The heart of the Nimrod AEW was its Mission System Avionics (MSA) which was comprised of three main sensors – radar, signal processors and IFF devices. The Marconi radar was a multi-mode, pulse-Doppler unit. As well as detecting airborne targets, the radar could also provide surface surveillance and weather monitoring.

From the radar, information concerning target range, azimuth, radial velocity and altitude was passed to a Marconi 920ATC signal processing computer. This would then correlate the data with a ground control station if necessary, before relaying it to a GEC 4080M data-processing computer.

The 4080M would digest the information before passing it on to one of six appropriate Multi Function Display and Control Consoles (MFDC) located in the Nimrod's forward-fuselage Tactical Area. Each MFDC was operated by one technician who would deal directly with the appropriate command staff, warship or airborne interceptor via an Automatic Management of Radio and Intercom System (AMRIS) communication link.

In addition the 4080M would receive data from two wingtip Loral ARI-18240/1 ESM pods (a modified version of the type carried by the Nimrod MR.Mk 2). Extra support would be given by a Corsor Jubilee Guardsman IFF device, plus a pair of Ferranti FIN-1012 INS units.

To provide extensive communications support, the Nimrod AEW was to carry a range of UHF, VHF and HF transmitter-receivers, a radio telescope and a NATO-standard Link-11 datalink.

BAe envisaged giving the Nimrod AEW a flight crew of four, plus a six-strong tactical crew. Although part of the flight crew, the aircraft's navigator was also tasked with supporting the tactical crew and so occupied a station alongside them.

Within the Tactical Area all the MFDCs were arranged in a row along the port side, while the opposite side was used for housing the various avionics and communications modules. The main radar installations and spare avionics were positioned in the rear fuselage compartment.

Apart from its forward and aft radomes, the Nimrod AEW required very little structural modification. BAe anticipated that this would save time on flight development and allow for lower operating costs, since the RAF already held a large stock of basic Nimrod spares. Even the existing Rolls-Royce RB.168 Spey Mk 250 turbofans were retained as were the two wing leading-edge fuel tanks. However, as it was planned to operate the Nimrod AEW at higher altitudes than the maritime patrol variant, the aircraft's ability to patrol on just two of its four engines was deleted. Since additional electrical power would be required to support the aircraft's new avionics, BAe decided to supplement the existing engine-mounted electrical generators with new 48-kW alternators.

The RAF specified an in-service date of 1982 for the new aircraft and



Nimrod AEW Mk 3 prototype XZ286, flies alongside the Tornado ADV development aircraft for a publicity shot. This combination was intended to be the core of Britain's air defences for the latter part of the 20th century and beyond. Nimrod AEW failed to overcome a catalogue of defects, however, and was eventually cancelled in 1986. (BAE Systems via David James)

allocated it the designation Nimrod AEW Mk 3.

BAe produced the first development aircraft by converting Comet 4C XW626. On 28 June 1977 this aircraft, equipped only with the nose radome, took to the air on its maiden flight. The first aerodynamically representative aircraft, XZ286, undertook its initial flight two years later. Surprisingly only marginal changes in directional stability resulted from the airframe modifications and to correct these BAe increased the height of the Nimrod AEW's tail fin by 3 ft (0.91 m). Vortex generators were added around the rear fuselage to eliminate slight buffeting that had been noticed. Suitably revised, XZ286 was sent to the A&EE for trials.

The next aircraft to undergo conversion was XZ287 which flew in January 1981, followed by XZ281 in July. All three aircraft were to be extensively employed for research, before joining the eight other machines in front-line service with No. 8 Sqn. Some of the aircraft were to be equipped with inflight-refuelling gear and these were redesignated as AEW Mk 3Ps by the RAF, which intended to retrofit the whole force to this standard once it was operational.

AEW problems

However, it was not long before the Nimrod AEW programme began to encounter serious problems. Independently, the aircraft's systems worked fine, but once they were integrated a mass of faults appeared.

One of the most significant problems concerned the 4080M computer. Its

memory was simply incapable of handling the large amounts of data it was supposed to receive and adding additional memory failed to solve the problem. Marconi believed that in time the system's capabilities could be improved by 500 per cent, by changing its software. Initially it was thought that 300,000 man hours would be needed to improve the software but this estimate soon proved grossly inadequate and by tinkering with the existing programming, Marconi was creating extra problems.

The 4080M's lack of storage capacity had caused it to act slowly when providing a full multi-target tracking operation and numerous false contacts ended up being displayed as the computer became overloaded. As an interim solution to this particular problem, new software was introduced which allowed the individual MFDC operators to focus their attention on certain sectors by 'blanking out' others thus letting the computer concentrate solely on just a handful of targets in one area at a time. This clearly limited the Nimrod AEW's operational effectiveness, since by devoting attention solely to one zone, incoming hostile aircraft in other areas were being ignored.

In the longer term, Marconi had hopes of replacing the 4080M altogether with a new 4190 Series 32-bit computer. This offered a 300 per cent improvement in operating speed and capacity. Two 4190s could be carried, thus boosting the aircraft's operational effectiveness even more, but the system was expensive and would not be available for some time.

The radar also failed to live up to expectations and quickly proved susceptible to high clutter returns which confused the signal processing computer, causing it to overload. Modification work to this computer managed to reduce the amount of clutter to an acceptable level, but it was still far above what had originally been forecast.

Further difficulties arose concerning the radar transmission levels and frequency stabilisation, which caused reliability to become a serious issue. Target tracking was erratic, with numerous false returns being reported, while it soon became clear that BAe's fore-and-aft antenna arrangement actually failed to give the promised full 360 coverage.

During 1984 GEC-Avionics (as GEC and Marconi had now become) announced a Radar Performance Growth Programme (RPGP), aimed at resolving the numerous radar faults. By this time the whole project was already two years behind schedule and development costs were continually rising.

Tested on XZ281 and XZ287, the RPGP refinements showed a 200 per cent improvement in radar performance, as well as a considerable increase in reliability, especially in terms of target detection and maritime surveillance. RPGP was, however, horrendously expensive.

By 1984/85, Nimrod AEW was costing £5-6 million a month and the total bill for the project had soared to £816 million. This was already £300 million above the original budget forecasts and a final price tag of £1.05 billion was now being predicted. The Government was rightly concerned. It began to demand financial restraint from the MoD, while ministers were concerned over the public's reaction to a programme that was soaking up taxpayers' money like a sponge when other public spending schemes were being slashed. BAe was still unable to provide a definite date for when the Nimrod AEW would be fully operational.

From 1985 the RAF stopped publicly supporting the Nimrod AEW and once again began to grumble that all along it had wanted the Boeing E-3A. The RAF realised that if the Nimrod AEW was rushed in to service with its main faults still unresolved or with interim solutions adopted, it would be of little value. It had therefore had to persevere with its 'stop-gap' Shackletons. What was particularly galling for the RAF was that the E-3A had been in service with the USAF since 1977 and NATO from 1982, with outstanding success.

It soon became obvious that Nimrod AEW would not be ready before 1987 at the earliest and the government's patience began to wear thin. Three

This is part of the seven-station Tactical Team Position in the Nimrod MR.Mk 4. Using a new Tactical Command System developed by Boeing, the MR.Mk 4's avionics and sensors will be fully integrated, providing maximum efficiency. The type's Raytheon Model 960 computers will handle vast amounts of data transfer with ease. (BAE Systems via David James)

Hawker Siddeley/BAe/BAE Systems Nimrod

options were now open to the politicians in Whitehall. The first was to abandon the whole project. The second was to carry on with the project and spend an extra £1 million updating the Shackletons. The final option was to cancel Nimrod AEW and buy the Boeing E-3A Sentry.

The first of these options was politically and militarily totally unacceptable. The second idea was like signing a blank cheque and it was doubtful whether the Shackleton force could be successfully updated. The Government therefore began to seriously consider buying the E-3A. However, the Sentry was not cheap – it looked likely to cost between £600 million and £800 million to buy a small force of E-3s, on top of the £1 billion that would have been wasted on Nimrod AEW.

Finally, during 1986, the MoD issued GEC-Avionics with a six month deadline to bring the Nimrod AEW up to a specification acceptable to the RAF or the entire programme would be terminated. Working closely with BAe, GEC-Avionics tried hard to resolve the problems, but in September 1986 the MoD's deadline expired and the Government announced that the project was cancelled. A handful of updated E-3s was ordered in October 1986 and the RAF finally got the aircraft it had always wanted.

All eleven Nimrods that had been marked out for conversion had by this point been aerodynamically reconfigured. However, only the three development aircraft had actually received any of the planned systems or radar. The whole force was withdrawn upon termination of the programme and placed in to immediate storage, despite the airframes being in excellent condition. Some were held at RAF Abingdon, while others were located at various bases and robbed of spares before being cut up for scrap.

Nimrod MR.Mk 4

In January 1995, the MoD issued its Staff Requirement (Air) No.420 (SRA.420)



specification for a Nimrod MR.Mk 2 replacement (the MR.Mk 2P designation having reverted to MR.Mk 2 by this stage). Under this specification the new aircraft would have long-range, high-endurance, large load-carrying capability, excellent operational availability and low running costs, over an anticipated service career of 25 years. Envisaged world wide operations in a post-Cold War era dictated that the aircraft should be capable of wide-ranging autonomous missions from remote bases, with the minimum of logistical and personnel support.

SRA.420 attracted a number of interested contenders including the Dassault Atlantique 3 from France, refurbished P-3C Orions from the United States and Lockheed's proposed Orion replacement, the P-7. In Britain, BAe suggested an upgraded Nimrod variant known to the company as Nimrod 2000. After much consultation the MoD finally announced in July 1996 that BAe's Nimrod 2000 had been selected to fulfil SRA.420.

Although based upon the existing MR.Mk 2, the Nimrod 2000 upgrade involved an extensive reconstruction of 80 per cent of the airframe components, with sixty per cent of this work involving the replacement of certain structures with brand new parts. A whole new wing assembly was to be built, increasing span by 12 ft 2 in (3.71 m).

The aircraft's flight deck area was to be stripped out and replaced by a new two-crew cockpit, complete with fully digital instrumentation. The Tactical Compartment was also to be fully updated. A new powerplant, new undercarriage, new fin fillets, rudder, auxiliary fins, weapons bay doors, avionics and improved self protection devices were all to be included as part of the programme. Any original MR.Mk 2 components retained were to be zero-rated so that the new aircraft could remain operational until 2025.

After announcing that Nimrod 2000 had been chosen, the MoD issued BAe with



Contract MAR-21a/100 in January 1997. Worth £2.5 billion, this deal authorised BAe to produce a trio of development aircraft using stored MR.Mk 2s, followed by the conversion of 21 of the RAF's remaining Nimrods to the new specification. It was planned to have the development aircraft delivered between January and February 2000, with the first updated Nimrods being handed back to the RAF from 2001. All 21 were expected to be operational by 2003.

In February 1997 the three stored MR.Mk 2s highlighted for conversion (XV234, XV242 and XV247) were airlifted, in a HeavyLift Antonov An-124 transport, from Kinloss to FR Aviation at Hurn, Bournemouth. This company had been subcontracted by BAe to undertake much of the airframe refitting work, while BAe concentrated on engineering and ground testing of the Nimrod 2000 design at its Warton, Lancashire, factory using the MR.Mk 1 prototype, XV147, for the purpose. Once updated at Hurn, the Nimrods were to be flown to Warton for fitting out with avionics.

MRA.Mk 4 specifications

Nimrod 2000 included replacement of the Spey engines with four new BMW Rolls-Royce BR710 turbofans, each capable of 14,900 lb (66.26 kN) thrust. These provided a 23 per cent increase in power over the Speys, but were far more fuel efficient.

The BR.710 already powered the Gulfstream V executive jet, but for the Nimrod the engine required a certain degree of modification work. This centred on improved corrosion resistance, the adding of a new mixer unit to match the engine's combustion characteristics with the aerodynamic constraints imposed by retaining the original Nimrod wing root engine positions, and a new electrical network, including full-authority digital engine control (FADEC), to interface the powerplants with the Nimrod 2000's flight control systems.

Engine ground tests commenced during September 1998, followed by a four-week-long altitude performance research programme at the Defence Establishment Research Agency (DERA). In May 1999,

the first 150 hour endurance tests were being conducted in Germany, with the BR.710 demonstrating its superior thrust levels, greater reliability and far lower maintenance requirements when compared to the Spey. Service certification for the new engine was achieved in 2000, with production commencing the following year.

The new wings were to be of all-metal, twin-spar construction and comprised a centre section, two stub wings and a pair of outer panels. The centre and stub sections accommodated the increase in span necessary to allow the new powerplants and undercarriage assembly to be fitted. Also, greater capacity fuel tanks were incorporated, boosting the aircraft's fuel load by 15–17 per cent. The wing design work was allocated to BAe's Filton plant, with assembly being carried out at BAe Chedderton. Originally the company had planned to retain the existing outer wing panels of the MR.Mk 2 but, at the request of the RAF, these too were redesigned by Filton and built at Prestwick, Ayrshire, Scotland.

Nimrod 2000's fuselage had all-metal, semi-monocoque construction, with a fully pressurised upper component and unpressurised lower panner, as in the MR.Mk 2. Fuselage rebuilding was widely dispersed throughout BAe's factories, with Prestwick handling the design of the central section, while the panner and forward fuselage was drafted at Farnborough, Hampshire. The rear component was designed in France by Dassault, while the fuselage assembly was carried out at Brough, Humberside.

A cantilever, all-metal tail unit, surmounted by a glassfibre fin-tip pod, was drawn up by Farnborough and Prestwick, with the latter carrying out the construction in conjunction with FR Aviation. BAe's Farnborough centre also undertook the design work for the Nimrod 2000's weapons bay doors, elevators and rudder.

A brand new flap actuation mechanism was produced by Dowty, which was also responsible for the redesigned landing gear. Other new items included revised wingtip ESM pods and fin fillet, and enlarged finlets.

Retained from the MR.Mk 2 was the fuselage pressure hull and most of the empennage, both of these sections receiving new protective treatments.

The flight deck was fitted with a seven-screen Electronic Flight Instrumentation System (EFIS), made by Sextant. Each of the displays was a full-colour, liquid-crystal multi-functional display (MFD), able to supply both pilots with a variety of information. Full Night Vision Goggle (NVG) compatibility was also added.

The Tactical Compartment was revised with a new seven-station Tactical Team Position, plus two optional locations for visual observers and one for a sonobuoy loader. Thirteen additional seats were provided for support personnel or a relief crew. To improve crew comfort, the Nimrod 2000 employed an environmental control system (ECS) and new oxygen supply facility, both produced by Normalair-Garrett.

A major updating of the Nimrod's avionics was a key feature of the programme. At the heart of the new aircraft's systems was the Racal Searchwater 2000MR surveillance radar. This state-of-the-art unit offered high performance and better detection rates in all weather conditions, with much reduced clutter feedback. It could undertake automatic tracking of over a hundred surface targets simultaneously and could also be employed to localise aircraft when operating in its pulse-Doppler mode. A specialised SAR and weather monitoring programme was also included in the radar's options.

For submarine hunting a new set of AQS.970 acoustic processors, linked to the AN/UYS.503 data processor of the RAP-modified MR.Mk 2, was employed. Also carried over from the earlier Nimrods, though in an improved form, was the ASQ.504(V) MAD device, which became fully integrated into the aircraft's tactical system for the first time. An Electro-Optical Surveillance and Detection System (EOSDS), supplied by Northrop-Grumman, boosted the Nimrod 2000's sensory capabilities through the use of an underfuselage turret-mounted Nighthunter FLIR.

Hawker Siddeley/BAe/BAE Systems Nimrod

BAE Systems has released a number of artists' impressions of the Nimrod MRA.Mk 4 as it might appear in service. At left it is shown flying the anti-ship mission with AGM-84 missiles, while at right it is shown on an ASW sortie. The type will take over the anti-ship mission of the RAF's Tornado GR.Mk 1B fleet when it enters service, hence the addition of 'A' for attack into the type's core designation. The first MRA.Mk 4 is not likely to be delivered to the RAF until 2005. (BAE Systems via Paul E. Eden)

In a deal announced during July 1998 and worth \$US30 million, Boeing was contracted to equip the Nimrod 2000 with a brand new Tactical Command System (TCS). This combined high-speed, data-processing Raytheon Model 960 computers, with fully reconfigurable software controls at each of the Tactical Team Positions, allowing full processing and data display from the aircraft's sensors. The TCS also integrated, controlled and displayed information from the self-defence, communications and weapons-control systems. From the outset, the TCS was designed to reduce crew workloads, thereby enhancing mission success rates and promoting team co-ordination between the operator stations.

The flight systems were thoroughly revised with the fitting of a Smiths Industries Navigation and Flight Management System (NFGS). This interlinked, via a Mil Std 1553B databus, various avionics, such as the Rockwell Collins TCAS-2 Traffic Alert and Collision Avoidance System, a Sextant Automatic Flight Control System (AFCS) and a pair of Litton LN-100G GPS devices to provide automatic control of the Nimrod 2000's flight performance, route planning, navigation and waypoint steering. Also linked in to this was a TACAN unit, a Triplex air data system, a radar altimeter and a microwave landing guidance suite. The net result of this was a new aircraft with an optimum level of navigation and flight performance.

The communications equipment of the Nimrod 2000 featured an enhanced digital arrangement made by Telephonics supported by HF, VHF and UHF radio sets. Secure, long-range satellite communications links were provided by Raytheon for UHF and by MATRA/BAe for VHF transmissions. The Link-11 datalink was carried over from the MR.Mk 2.

To boost its self-protection capabilities, Nimrod 2000 was equipped with an Integrated Defensive Aids Sub-System (DASS) made by Lockheed-Martin. This utilised a Raytheon AN/AL-50 towed decoy device mounted in the tail fin housing. Vinten combined chaff/flare dispensers, an improved Sanders MAWS sensor and an AN/ALR-56M radar warning receiver. One key advantage of the DASS is that it allows for future upgrading, thus enabling the aircraft's self-protection devices to be thoroughly modernised as time goes by.

For offensive operations, a Smiths Industries Armament Control System (ACS), conforming to Mil Std 1760,



handled all aspects of the Nimrod 2000's weapons direction. The ACS automatically checks through the aircraft's inventory as well as undertaking test and fault diagnosis. Unlike the earlier Nimrod versions, the 2000 was fitted from new with four under wing pylons, each of which is able to carry a pair of Sidewinders or a single AGM-84 Harpoon. The internal weapons bay was capable of holding up to nine ASW torpedoes, such as Stingray or the newer Tigerfish, as well as a variety of depth charges, bombs, mines, additional sonobuoys or auxiliary fuel cells. Alternatively, for surface-attack missions, the bay could accommodate two Harpoons.

Inside the fuselage, a pair of Normalair-Garrett rotary sonobuoy launchers were fitted in the rear compartment, each one capable of handling up to 10 Size 'A' buoys, while supplementary racks provide storage for another 150. A new Sonobuoy Positioning System (SPS) provided the aircraft with improved dropping accuracy and location finding. The wingtip ESM pods incorporated the Elta EL-8300UK device in place of the previous Yellowgate system.

Development process

The Nimrod MR.Mk 2s allocated as development aircraft received new identity codes upon their arrival at Hurn, with XV247 becoming PA-1, XV234 becoming PA-2 and XV242 becoming PA-3. A fourth Nimrod (XV251) flew to Hurn in November 1998 to become PA-4. The aircraft undergoing conversion would receive similar identities from PA-1 to PA-21.

In March 1999 BAe announced that the new aircraft, which had already received its RAF designation of Nimrod MRA.Mk 4 by this stage, would not be ready for service before 2005. The company was not specific about the reasons for the delay and would only admit to 'resource and technical difficulties'. Privately it was believed that

BAe was less than satisfied with FR Aviation's handling of the subcontracted airframe work.

Meanwhile, the RAF had decided to allocate the MRA.Mk 4s new serial numbers, owing to the extensive rebuilding work involved. Originally it had intended to keep the MR.Mk 2 identities, but now a new ZJ514 to ZJ534 serial range was introduced. Hence PA-1 would become ZJ516, while PA-2, PA-3 and PA-4 would become ZJ518, ZJ517 and ZJ514, respectively, and so on.

In November 1999, BAE Systems (as BAe had become following its merger with Marconi Electronic Systems) cancelled FR Aviation's contract and transferred the MRA.Mk 4 airframe work to its Woodford factory. As conversion work had already commenced on PA-1, this aircraft remained with FR Aviation while the other three Nimrods were airlifted to Woodford at the end of 1999, again by An-124. There they were joined by XV258, which was delivered direct from the RAF to become PA-5 (ZJ515).

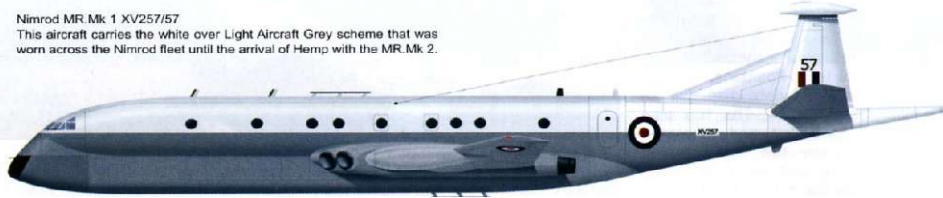
By September 2000, final assembly work had commenced on PA-1 and it was predicted that the first Nimrod MRA.Mk 4 test flights would commence during June 2002. Although it is behind schedule, the RAF is prepared to wait for the new Nimrod in the light of the enhanced capabilities it offers over the MR.Mk 2, and the fact that the MR.Mk 2 fleet is running out of airframe life. Indeed, BAe Systems is so confident of the new aircraft that it has begun offering it for export, although a bid to replace the US Navy's P-3 Orions has failed. Should any overseas orders be placed for the Nimrod MRA.Mk 4, then production would have to be relaunched.

For more than 30 years the Nimrod has faithfully and efficiently served the RAF as a long-range ASW and MP aircraft, with its Elint derivative, the R.Mk 1, performing equally well. With the new MRA.Mk 4 variant breathing new life into the design, the Nimrod will remain the mightiest of hunters for many years to come.

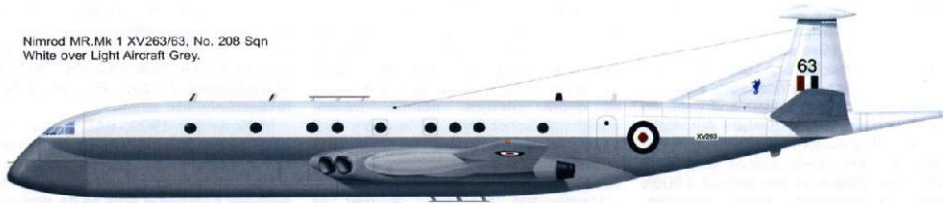
Nimrod MR Mk 1 XV235/35, No. 42 (TB) Sqn.
 The aircraft is shown in a temporary overall white finish.



Nimrod MR Mk 1 XV257/57
 This aircraft carries the white over Light Aircraft Grey scheme that was worn across the Nimrod fleet until the arrival of Hemp with the MR Mk 2.



Nimrod MR Mk 1 XV263/63, No. 208 Sqn
 White over Light Aircraft Grey.



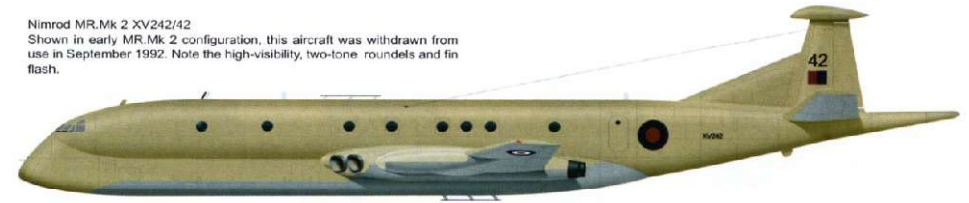
Nimrod MR Mk 2P XV234/34, No. 201 Sqn
 Depicted following full conversion to MR Mk 2P standard, XV234 is shown in the Hemp over Light Aircraft Grey scheme. Low-visibility roundels are carried on the fuselage, with standard D-Class markings under the wings.



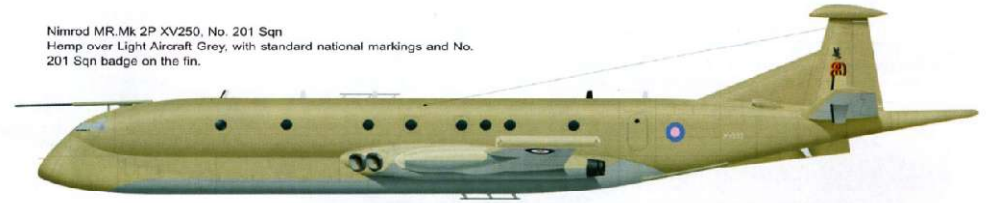
Nimrod MR Mk 2P XV235/35
 With the pooling of aircraft during the Hemp/Light Aircraft Grey era, squadron marking became less often used.



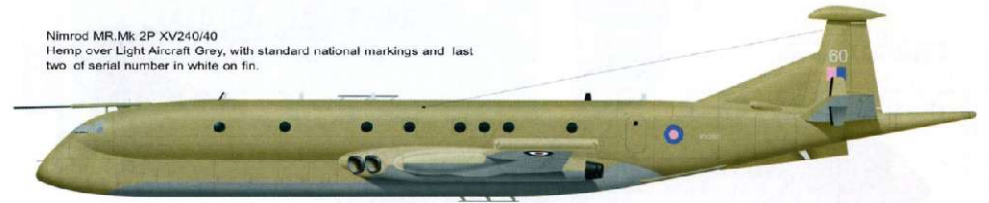
Nimrod MR Mk 2 XV242/42
 Shown in early MR Mk 2 configuration, this aircraft was withdrawn from use in September 1992. Note the high-visibility, two-tone roundels and fin flash.



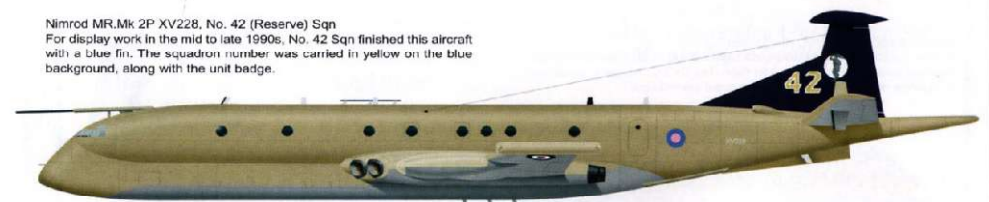
Nimrod MR Mk 2P XV250, No. 201 Sqn
 Hemp over Light Aircraft Grey, with standard national markings and No. 201 Sqn badge on the fin.



Nimrod MR Mk 2P XV240/40
 Hemp over Light Aircraft Grey, with standard national markings and last two of serial number in white on fin.



Nimrod MR Mk 2P XV228, No. 42 (Reserve) Sqn
 For display work in the mid to late 1990s, No. 42 Sqn finished this aircraft with a blue fin. The squadron number was carried in yellow on the blue background, along with the unit badge.

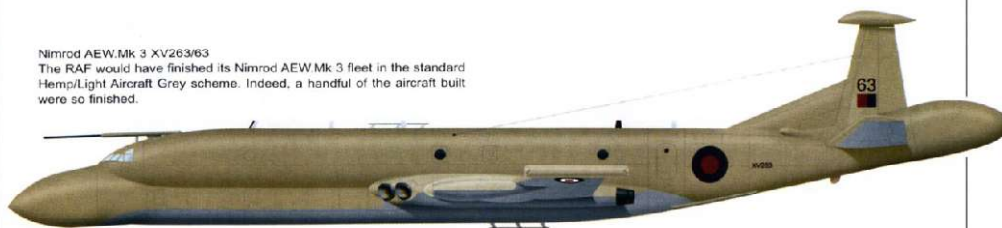


Nimrod MR Mk 2 XV236/36
 In recent years the RAF has abandoned the Hemp/Light Aircraft Grey scheme in favour of this rather anonymous overall grey finish. Nimrod MR Mk 4 is likely to enter service in this finish.



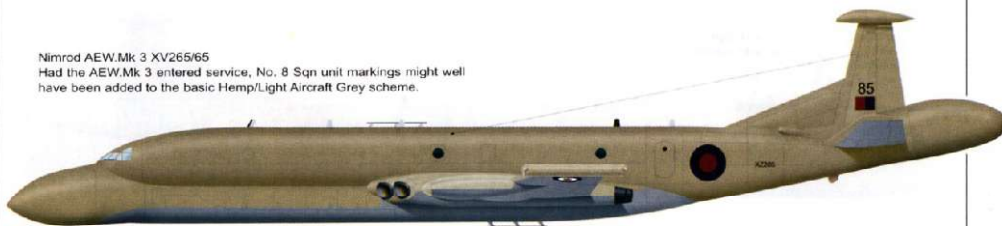
Nimrod AEW Mk 3 XV263/63

The RAF would have finished its Nimrod AEW Mk 3 fleet in the standard Hemp/Light Aircraft Grey scheme. Indeed, a handful of the aircraft built were so finished.



Nimrod AEW Mk 3 XV265/65

Had the AEW Mk 3 entered service, No. 8 Sqn unit markings might well have been added to the basic Hemp/Light Aircraft Grey scheme.



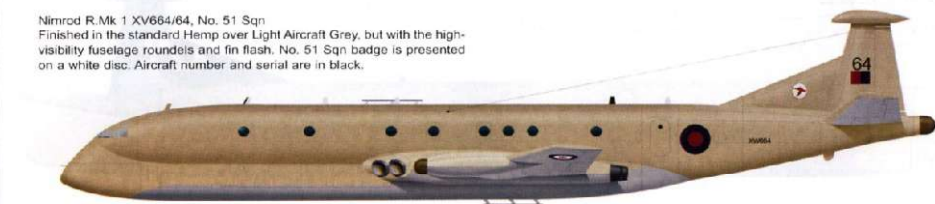
Nimrod R Mk 1P XV249, No. 51 Sqn

Finished in the standard Hemp over Light Aircraft Grey of the maritime aircraft, this R Mk 1P replaced XV656. Note the No. 51 Sqn goose applied directly to the fin.



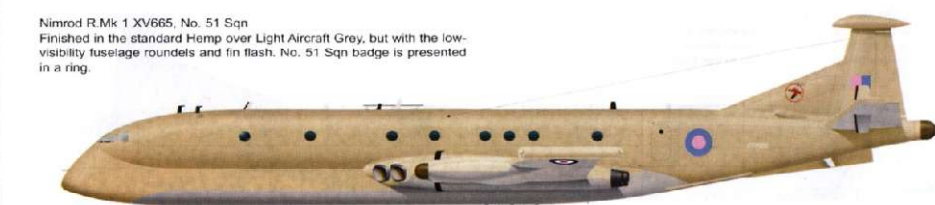
Nimrod R Mk 1 XV664/64, No. 51 Sqn

Finished in the standard Hemp over Light Aircraft Grey, but with the high-visibility fuselage roundels and fin flash. No. 51 Sqn badge is presented on a white disc. Aircraft number and serial are in black.



Nimrod R Mk 1 XV665, No. 51 Sqn

Finished in the standard Hemp over Light Aircraft Grey, but with the low-visibility fuselage roundels and fin flash. No. 51 Sqn badge is presented in a ring.



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A Battle of Britain '88



John McIlmurray converts the Italeri Ju 88A-4 into a Battle of Britain period Ju 88A-1 using his AIMS conversion set.

Economics is probably the main reason why the Ju 88A-1 has never been released as an injection moulded kit. When Italeri brought out its 1:72 Ju 88A-4, it knew from the start that such a tooling could also produce a Ju 88A-17 and C-6 at minimal extra cost. All well and good, but that does not help the modeller who wants to model earlier Ju 88 variants from such historically critical moments as the Battle of Britain. It has to be said, however, that the impetus for the modeller to resort to his or her own ingenuity has existed for quite some time. Both Falcon's Ju 88A-1 clear parts and

AeroMaster's Ju 88 Collection Pt. 1 (72-099) have been available for a while now, as have various reference materials. It is also a relatively easy conversion project – with the only real hassle being the backdating of the A-4 style engine faces to those of the A-1 standard, which have a quite different layout.

Wanting to make a Ju 88A-1 myself, and having both the Falcon parts and a number of decal options, I set about designing another AIMS conversion set, primarily for myself and secondly for those modellers not wishing to do their own conversions to the kit parts.

With the re-release of the old AMT Ju 88C-4/C-6 kit as an S-1/T-1 or S-3/T-3 by AMTech (albeit with some different parts), you may be tempted to want to use these kits as a basis for your A-1 conversion project. Certainly the latter kits are easier to get hold of than the

This view of the completed Ju 88A-1 shows just how far model has come from the basic Italeri Ju 88A-4 kit. Note the opened crew access hatch at the rear of the underfuselage gondola. (All photographs John McIlmurray)

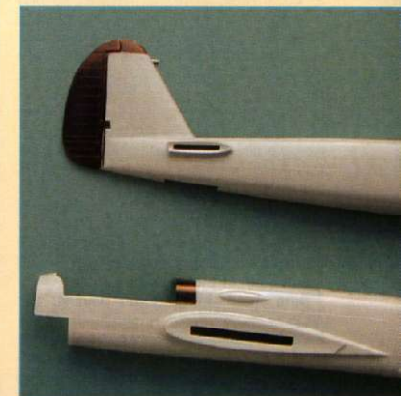
Italeri A-4 kit at the moment, but you must remember that the essential Falcon parts are based on the AMT or AMTech offerings. Neither do the AMTech kits supply a bomber gondola or starboard lower nose window.

Getting Started

Armed with an Italeri Ju 88A-4 kit, my own and other aftermarket products, plus a number of helpful references, it was time to go to work. First to go were the rudder and the top of the vertical stabiliser, the rear of the canopy, the wingtips, the engine mounts and the hot

Left: The contents of the AIMS set, including new engine nacelles, shown in detail, along with the Falcon clear parts.

Below: Modifications are required to the fin and rudder of the kit, as well as the rear part of the cockpit area. The fin tip is removed and replaced, while a new rudder, including hinge, is also installed. The parts to be replaced are highlighted in the darker shade.

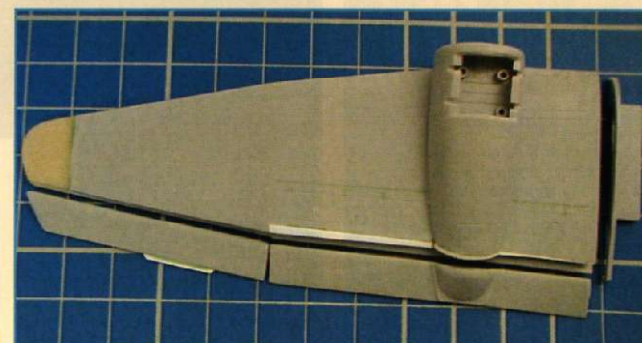
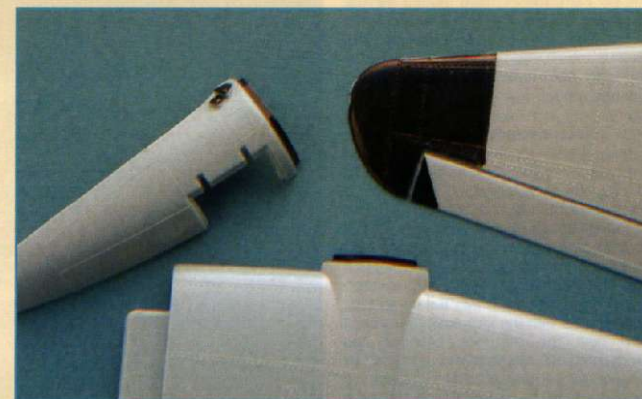


Right: Considerable work was carried out on the wingtips and the forward portions of the engine nacelles were modified to accept the new resin engine components. Again dark shading indicates the areas requiring attention.

air outlet fairings and, of course, those horrible underwing external control surface actuators. Next for the chop was the raised panel detail in favour of recessed panel lines, marked out with an Olfa P cutter. The scale plans in *Junkers Ju 88 Volume 1*, by Waldemar Trojca, were most helpful in this regard, showing many of the Italeri panel details to be located incorrectly. A good example of this must be the bomb bay, which is far too narrow.

Wing

I wanted to work on the wings first for some reason and made a number of modifications to them to bring them more in line with the Trojca drawings. I actually regret reducing the area between the engines and fuselage, since this measure gave me very little reward for stacks of extra work fabricating internal spars and using more filler than usual. I have



Above and left: John went to great efforts not only to blend in the Ju 88A-1 wingtips, but also to separate the ailerons and flaps, and reduce the distance between the engines and the fuselage. With hindsight he probably would not have attempted the latter, since the finished result does not justify the work involved.



Above: Italeri's Ju 88A-4 kit can still be found with a little effort, but is not current. It is worth looking for, since it is the ideal basis for this conversion.

Right: A selection of the aftermarket items that John used in his conversion, including his own AIMS Ju 88A-1 resin conversion set.



1:72 Scale Modelling

already mentioned the deletion of the large external control surface actuators, but after these came off I decided to remove the landing flaps and ailerons completely, in order to tidy them up and reposition them. I also removed the small stubs used to attach the kit's dive brakes at this stage. They were getting in the way of my scribing and the outboard ones had to go anyway, to make it easier to bed down the underwing crosses. Using scale plans can be a mixed blessing; you feel you have achieved something when you make a correction - like moving the landing light further outboard and re-scribing the detail more accurately - but afterwards you think to yourself, 'what was the point in all that work when I have failed to represent the wheel wells correctly? They are both too shallow and too narrow!' I just could not be bothered doing any more I guess. Incidentally, the wheel wells in the Italeri Ju 88s are far better - I wish the company had used them again in the newer kits.

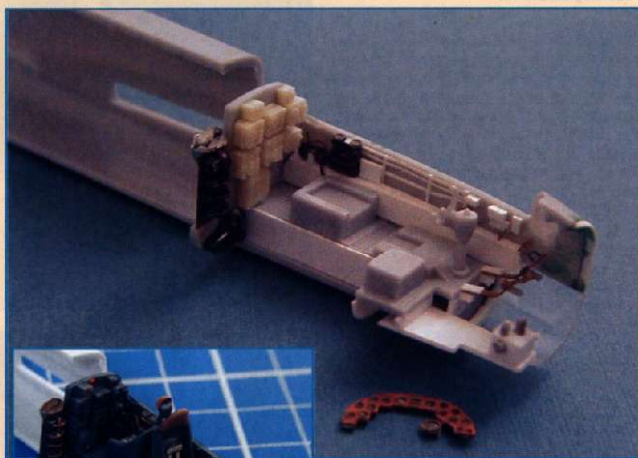
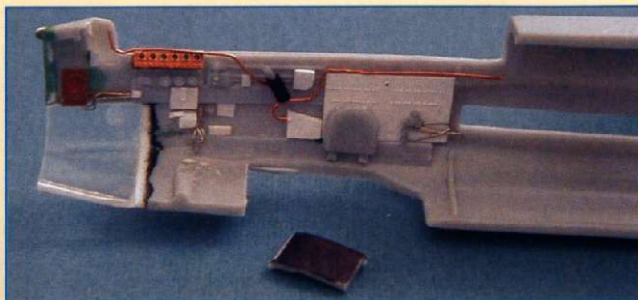
With the help of some pinning, the AIMS wingtips were superglued to the Italeri wings. When dry they were blended in with various grades of wet and dry, plus a small amount of filler. The aileron ends were modified accordingly. Ignore the plastic card trim I have added to the starboard aileron, I do not know why the Trojca plans show it like this, since in photographs it seems to be more like how you can see it in the photos of the finished model.

Nose, cockpit and canopy

I had given considerable thought to finishing my project as a machine used by KG 40. Xtradecal sheet X035-72 for the Junkers Ju 88A, C and G is an excellent sheet (although it has markings for a Ju 88D on it, not a Ju 88C) and includes some lovely unit badges. Among these is a colourful Staffel badge for KG 40. However, the more I looked at it, comparing photographs with the kit's nose, the more I saw how the distance between the windscreen and the nose glazing should be longer. Again, in the end, since I did not use the KG 40 badge, which needs the extra space, I really wonder if it was worth remedying? Remedy I did, however, by cementing a roughly 1 mm wide spacer to the nose halves to bring forward the clear lower nose kit part (I am sure I cut this clear nose piece into two pieces for a very good reason - I just cannot remember what that reason was).

Before work commenced on the cockpit detail, about 5 mm was cut back from the original forward edge of the fuselage entry/egress aperture. The rear of the kit's canopy aperture was also cut back, as suggested by Falcon and the AIMS instructions, in order for the Falcon canopy to fit (which includes this area as part of the canopy moulding to give you the fairing detail either side of the gun position). The canopy comes with detail to the front as well, which you may want to use by removing this kit area also).

With the corrections finished, it was now time to get stuck into the cockpit



This page: Four images showing the results of some very careful work in the cockpit area. A mix of etched brass, resin, scratch-built items and very careful finishing was used to produce this superb cockpit. The upper two pictures show the starboard fuselage half in various stages of completion, while the lower two give views to port.

detail using a mixture of scratch-built parts and surfaces, Eduard brass etch items and those lovely resin radio sets by Aires.

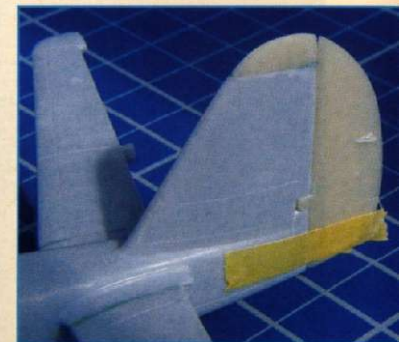
I did not want to go mad with the canopy, but the pilot's curtains are very

obvious and I think they need representing. There should be some curtains for the radio operator/gunner as well, but I forgot about them! The curtain I did add was made from rolled up surgical glove material; it is a good

Junkers Ju 88A-1



Left: The finished cockpit pictured in place, with the fuselage halves closed around it. Those sections of fuselage cut away around the cockpit are obvious in this view. Note that the resin engines have also been added.



Above: A strip of masking tape helps the AIMS rudder stay in place while the superglue hardens. The replacement resin fin tip has also been added at this stage.



direction finder detail on the Italeri kit, since I am pretty sure that most, if not all Ju 88A-1s did not have the clear disc seen on Ju 88A-4s and represented so well by AMtech.

Gondola

Before adding the clear Italeri gondola part, it is best to paint the area of the nose floor it is to occupy. A small sight was also added. What I failed to add, however, is a small bulkhead behind the sight, and so at certain angles and in certain lights I can see daylight when looking through the bombsight window. As for the Falcon rear hatch/gun position supplied with the AIMS set, a little repainting needs doing to change the framing layout and it will not hurt to put a little detail inside.

Engines

Perhaps the most identifiable aspect of the whole aircraft, the engines require modellers to add their own exhausts and cow plates that arch over the first exhaust in each bank. I used tin for mine, blended in with Milliput. They are quite

Here the Falcon vacuum canopy has been modified by the addition of Latex 'pilot's curtains'. The machine-guns held in the clothes pegs have been furnished with etched brass and scratch-built items.

enough colour to avoid needing painting and has the wonderful advantage of bonding to itself, or anything else, with just the tiniest hint of superglue. The kit's machine guns were also dealt with at this time, with the addition of Eduard magazines and scratch built cocking handles, from sprue, and early style 'spent cartridge' cases, from Blue Tac coated with PVA wood glue.

Fuselage

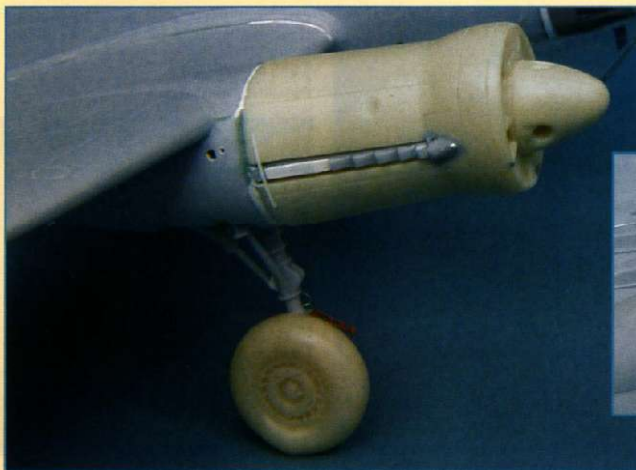
It was now time to start putting the whole thing together. From an AIMS point of view the concern here is to attach the replacement canopy, nose and upper vertical stabiliser part. The latter is dealt with in the same way as the wingtips. The main difficulty came from the fit of the nose glazing which, due to my having brought the area forward no longer fitted

true. Milliput filler was added and smoothed, and once dry gradually built up with further layers. The replacement rudder was 'dry fitted' at this stage, but became permanently attached prior to priming. As for the kit's own detail, at this point it is a good idea to add the box-shaped fuel dump pipes inside the fuel dump fairing immediately fore of the rudder hinge. It is also worth mentioning what a relief it is not to have to worry about how to represent the absent



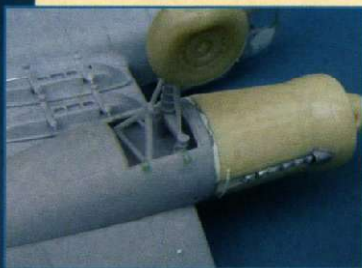
Right and far right: Before attaching the undernose gondola it is a good idea to paint the area of fuselage to be covered. Note the extra detail John added to the interior of the gondola hatch.





Left: John added revised exhausts to his resin engine cowlings. Note that the spinner has been drilled to accept new propeller blades.

Below: A minimum of filler was needed to blend the resin engine cowlings into Italeri's nacelles.



surfaces were then given a lighter dusting of RLM 65. (Some people go for a four-stage application and introduce highlights as well as lowlights.) After masking, on went the RLM 71, which had an enamel darker green applied neatly to the recessed panel detail, followed by a light dusting of the primary colour. After the tedious masking of the splinter pattern, the same process was repeated for the RLM 70. When all the masking (apart from that on the clear parts) was off, the model looked great, but for some strange reason it did not stay that way. The final step was to coat the whole model in acrylic Polyscale gloss varnish. In the process of doing this, I noticed that my model's painted surface was rather rough; either I had not buffed in the Halfords Primer, or I had got some Primer dust on the model while spraying some other parts. Whatever the case, the only solution I could think of was to use micro mesh wet and dry to polish my model without taking the paint off. Thankfully, I ended

its two ends to accept a small brass rod for extra strength when the leg was reassembled.

With the addition of the scratch-built aileron actuators, this concluded the main build and thus the model was ready for painting.

Painting

I am fortunate to own a warm integral garage where I can use Halfords Primer, most of the fumes being sucked out of the door by an old cooker hood. Once the Primer was dry, I set about applying the three primary Luftwaffe colours of this period, RLM 70 Black Green and RLM 71 Dark Green, over RLM 65 Blue Grey.

This stage is perhaps one of the most subjective stages and it all depends on what look you are after. There is nothing wrong with the 'display look' if that is what you like – after all it is you that has to look at the finished model every day. As for me, I prefer the 'in the field look', but try to be a little moderate. I have been very impressed with the pre-shading technique that you would probably have seen mostly in articles about 1:48 scale projects. I have not had much success with this in 1:72, but I had just purchased a Badger 150 twin-action airbrush and was keen to have another bash at that coveted technique. I decided on a three-stage application of each colour, with the main colours being in Polyscale acrylic and the lowlights in enamel. First on was the RLM 65, which was followed by a Humbrol mid-grey colour, applied as neatly as possible along the panel lines. The lower

Although primarily included to show the details and location of the fuel dump pipes at the extreme rear fuselage, this shot also shows the deflected rudder and elevator surfaces.



different from those seen on Ju 88A-4 machines and look more like the fairings seen on Bf 109s. The Italeri exhausts were modified slightly to include an extra exhaust port and raised box section on two of the kit parts, with two extra exhaust ports followed by a blanked off area being added to the other two. One of each style was then put on each of the engines, followed by the cowl straps at the rear. The fit of the engine to the rear nacelle only required minimal filler.

Undercarriage

With True Details weighted wheels, Eduard brass etch torque links and a bit of brake piping, any Ju 88 undercarriage will look rather nice. However, the sit of the Italeri Ju 88 is far too high and to reduce this I dissected the oleo leg in two at the boot. The boot was then reduced to half its height, before holes were drilled in

Right: Micro Set and Sol must be used in quantity, but with great care, in order to successfully employ John's technique of using decal strip for canopy framing.

Below right: The finished result is well worth the effort though. The 'pilot's curtains' add greatly to the cockpit area.

up with a nice enough surface on which to apply another coat of gloss before decaling. But where had my upper lowlights gone? They had either never been dark enough in the first place, or I had indeed polished them off, leaving slightly highlighted panel lines instead. I am at a loss as to how this happened, with even the darker paint in the recessed panel lines disappearing, but I actually like the look it gave me on the finished model.

Next on the 'to do list' was the painting of various smaller detail items, such as the exhausts. These were painted black and then dry brushed with Citadel Tin Blitz paint for what I think is a rather satisfactory finish.

Decals

In the end, I opted for the Ju 88A-1 on the AeroMaster sheet, since a clear photograph of this machine can be found in the Squadron/Signal *In Action* volume on the Ju 88. Surprisingly, AeroMaster fails to provide the underwing individual aircraft letters, in this case 'L'. I was thankful that the photograph also confirmed the absence of the additional cross markings on the dive brakes, since I was starting to feel rather lazy by this stage. A few stencils came from other sources – namely the old Tally-Ho Ju 88 decal sheets.

Finish

With the decals well bedded down, the model was given a coat of acrylic Polyscale flat finish. Onto this was brushed black pastel exhaust staining, followed by a trace of reddish-brown (as



seen in colour photos) using the airbrush. Once dry, another coat of flat sealed the pastel in.

The canopy and nose masking was then removed and work began on applying decal strips of the appropriate colours to the Falcon frame detail. It is a rather slow technique but one I am rather happy with. You must remember to use enough Micro Set and Micro Sol decal solution to 'melt' them on. Too much, however, will run onto the matt finish and stain it.

Finally, all those smaller detail items like the rack antennas (offset to starboard), machine-gun barrels, pitot tubes (which were replaced with steel guitar string), the radio mast, propeller blades, the gondola hatch, the entry ladder and the undercarriage doors were added. The bombs came from the spares box, since those in all the Italeri Ju 88/188 kits have the annular collar that makes them look like armour-piercing bombs used for anti-ship work. Braces were added to the fins of the bombs that I decided to use, and onto

John's painstaking work on the Ju 88A-1's canopy and nose glazing really paid off. Details like the end-sights on the machine-guns and the bomb shackles on the underwing racks really set the model off as something special.



the model they went, to complete a project that I have been wanting to do for a long, long time.

Conclusion

It is a little difficult writing a conclusion about your own products, so I will just say that the fit of the AIMS' parts on the kit and their appearance, are just like your average 'cottage industry' resin parts. As for the subject – go on, you know you really want to add a Battle of Britain-era Ju 88 to your collection.

John McIlmurray

Bibliography

Junkers Ju 88 In Action Part 1 – Squadron Signal

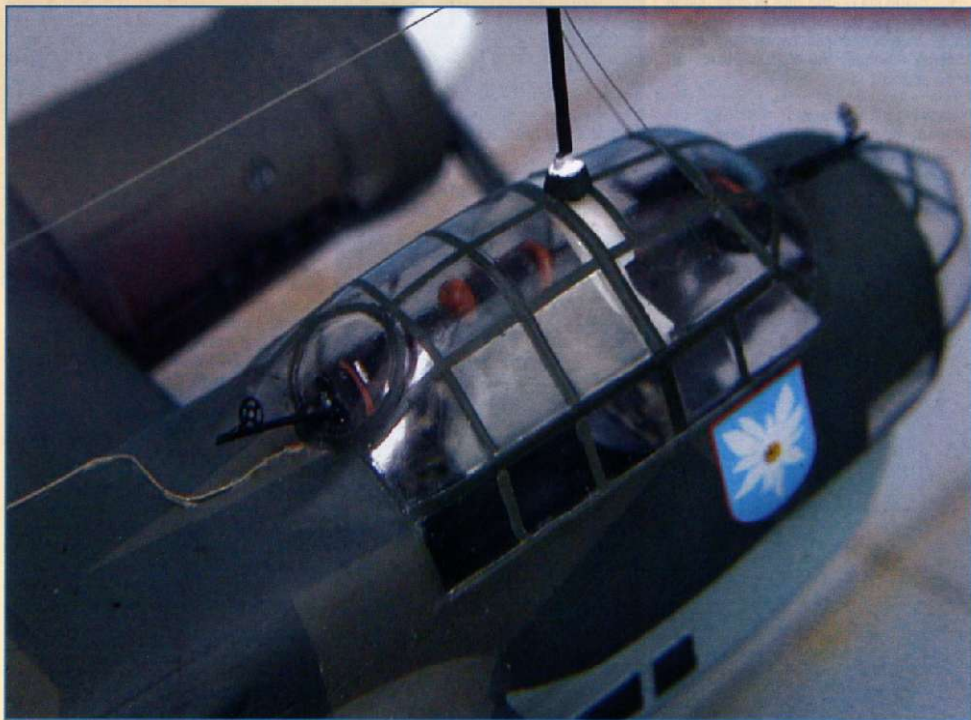
Junkers Ju 88 Volume 1 – Waldemar Trojca

Classic Fighters and Bombers of World War II – Aerodata International

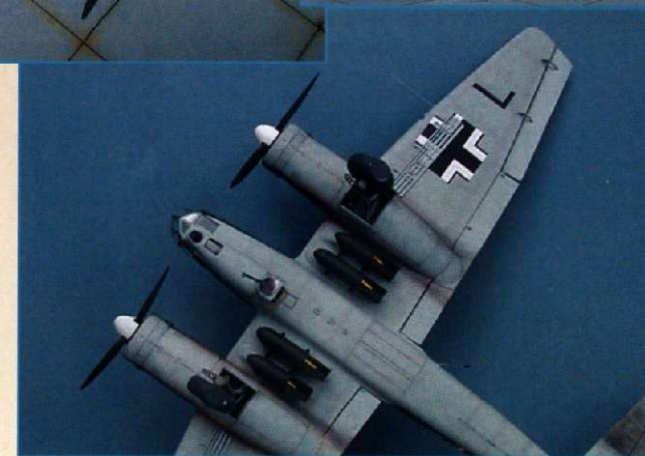
Ju 88 Kampfgeschwader on the Western Front – John Weal, Osprey Combat Aircraft No. 17

Luftwaffe Colours – Hikoki

Detail views and an overall rear shot serve to illustrate the excellence of John's model making. The availability of his AIMS set allows other modellers to attempt a similar project.



This page: Overall shots of the Ju 88A-1, as modelled by John McIlmurray from Italeri's 1:72 Ju 88A-4 kit. The Ju 88A-1 was the first of 17 Ju 88A subvariants and the type flew its first operational sortie in the hands of I./KG 30 on 26 September 1939. John finished his model, using AeroMaster decals, as an aircraft of 7./KG 51 that was active during the Battle of Britain.

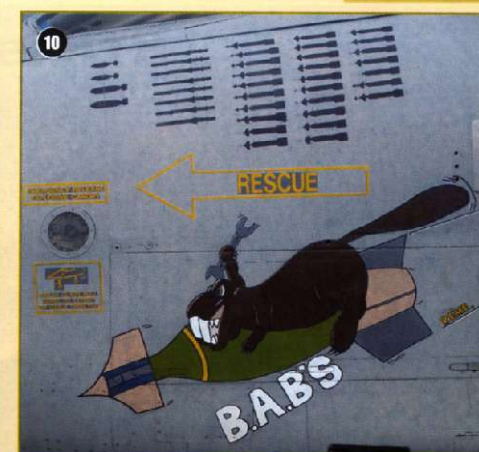
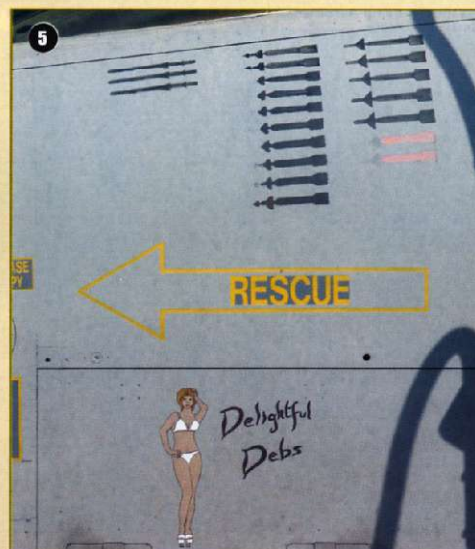
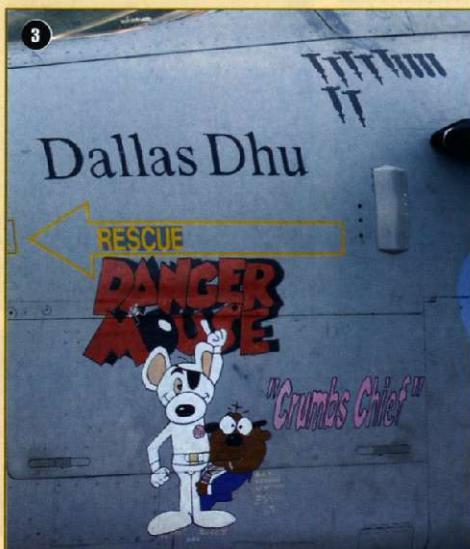


AIMS' Ju 88A-1 conversion sets can be purchased from:
Czech-Six Publications,
48 Station Road,
Stoke D'Abernon,
Cobham, Surrey, UK
KT11 3BN
Tel: 01932 866426
Fax: 01932 867099
E-mail: mark@kmzchemicals.ltd.uk
www.czechsixpublications.com

Having discarded the Italeri bombs as unsuitable, John found replacement items in his spares box. Not being entirely happy with the replacement items, he improved them by the addition of braces. The undervying dive brakes are also worthy of note here, as is the individual letter 'L', which is missing from the AeroMaster sheet.

TELIC NOSE ART

Kevin Stabler/Pol-tabs Ltd provides images of Tornado and Canberra nose art at RAF Marham.



1. Canberra PR Mk 9 XH135 returned to Marham with 30 Iraq mission markings and 16 marks for sorties out of Africa.

2. This is the Tornado Combat Air Wing badge – the combined marking of the Tornado squadrons deployed to the Gulf theatre.

3. Tornado GR Mk 4 ZA542/DM, carried the name *Dallas Dhu* and *DANGER MOUSE* nose art, as well as a record of weapons released. All were carried on the port side.

4. Tornado GR Mk 4 ZA592/BJ acquired this shark mouth, as well as mission markings on its port side.

5-7. ZA607/AB, another Tornado GR Mk 4, became *Delightful Debs*, with mission markings on its port side. *MAKE ALL SURE* artwork was also carried on the port side, with *WE ARE ONE* artwork on a starboard side maintenance panel.

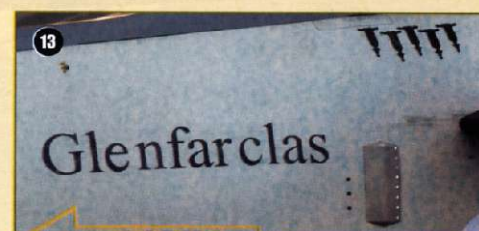
8. Tornado GR Mk 4 ZD714/AJW *Johnny Walker*, gained mission markings on its port forward fuselage.

9. Tornado GR Mk 4 ZD850/AJT wore this colourful *Op TELIC* 2003 nose art on its port side, with a message to the effect that *The glory is in the giving*.

10. ZG707/B, a Tornado GR Mk 4A, displayed *B.A.B'S* nose art on the port side, as well as a large weapons tally.

11-12. Another Tornado GR Mk 4A, ZG726/K featured *Kylie* nose art to starboard, with mission markings carried to port.

13. ZG794/F a Tornado GR Mk 4, displayed the name *Glenfarclas* to port, as well as mission markings.



British Taylorcraft Auster Mk III

Tony O'Toole builds the Sword 1:48 Auster Mk III and provides an overview of wartime Auster variants.



The little Air Observation Post (AOP) aircraft of the British Taylorcraft Auster family served in almost every theatre of operations in which the British Army fought during World War II, primarily providing support to the Royal Artillery. The motto of the Royal Artillery is 'Ubique'.

Right: Just two Auster Mk IIs were built, concerns over continuing supplies of their Lycoming O-290 engine leading to the mark being abandoned. The Lycoming installation gave an abbreviated nose entry when compared to the de Havilland-powered Auster variants. (Aerospace Publishing Ltd)

Below: As the Auster variant, the Mk I was little more than a militarised version of the British Taylorcraft Plus D civilian cabin monoplane. As such, it was powered by a 90-hp (67-kW) Cirrus Minor engine in a nacelle not altogether unlike that of the later Gipsy Major-engined aircraft. Some 100 Auster Mk Is were built. (Aerospace Publishing Ltd)

which translates as 'everywhere' and this motto could apply equally to the Auster units which spotted for the Royal Artillery's guns worldwide. The Royal

Above: Tony's finished Auster Mk III looks resplendent in its Dark Earth and Dark Green camouflage. The model is finished in the markings of a No. 656 Sqn aircraft, based in India and Burma.



Artillery also provided the pilots for the AOP units, with the RAF providing the ground crews, and the drivers and cooks for the units coming from both services. Although the units themselves were formed as RAF squadrons, their operation could be described as an early example of today's fashionable 'jointability'. The AOP units were obviously fully mobile and were capable of operating from small grass strips just behind the front line, sometimes near to artillery batteries or HQ's, since the Auster only needed a landing run of 150 yards (137 m).

The first AOP unit was a small experimental detachment that went to France in 1940 with the British Expeditionary Force and this laid down the foundations for the formation of the later AOP squadrons. These units went on to serve with distinction in North Africa, Sicily, Italy, north east Europe and Burma and many continue to serve today as modern squadrons of the Army Air Corps.

Sword is likely to want to get the most out of its Auster Mk III kit and the breakdown of parts suggests that other Auster variants could be produced. Apart from engine differences, there were few major changes between the Auster marks, with the exception of the split trailing-edge flaps and revised cabin glazing that were introduced on the Mk III and the enlarged cockpit glazing of the Mk IV and V. Comparing the Mk I illustrated with Tony's Mk III model shows how similar these two marks were. (Aerospace Publishing Ltd)

Austers also served with the Royal Australian Air Force in the south west Pacific and later versions served with post-war British squadrons on operations in Malaya, Suez and Korea.

The version of the Auster modelled in this article is the Auster Mk III and it is based on the recently released 1:48 scale kit by Sword.

Auster Mk III and the Sword kit

The Auster Mk III was powered by a de Havilland Gipsy Major I engine, owing to worries about the supply of the American Lycoming engines of the previous Mk II. These problems never arose, however, and after 467 Mk IIIs

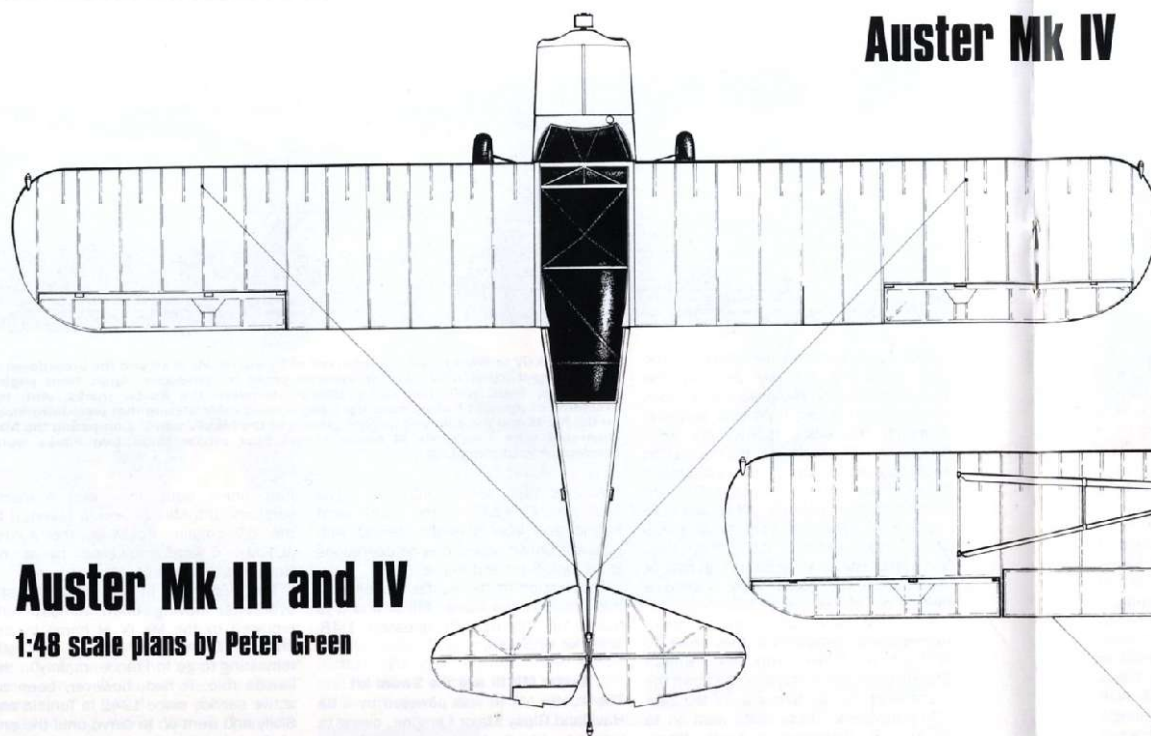
had been built the later wartime versions, the Mk IV and V, reverted to the US engine. Post-war, the Auster AOP Mk 6 was powered by a de Havilland Gipsy Major VII.

The Auster Mk III saw action mostly overseas, having been almost fully replaced by the Mk IV at home by the time of D-Day, with only a few still remaining to go to France, mainly in the liaison role. It had, however, been on active service since 1942 in Tunisia and Sicily and went on to serve until the end of the war in Italy, Burma and with the Australians in the Pacific. The Australian Mk IIIs gave tremendous service and went on to serve well into the 1950s.



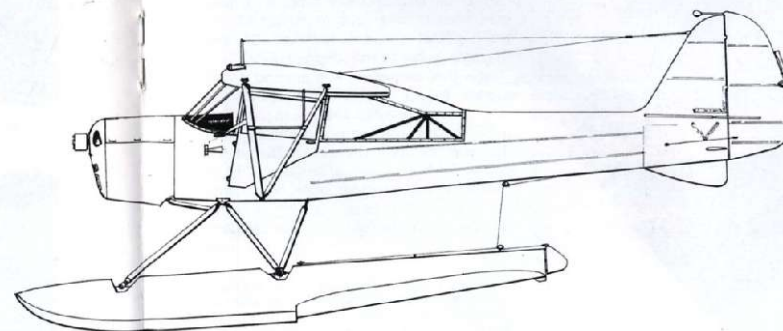
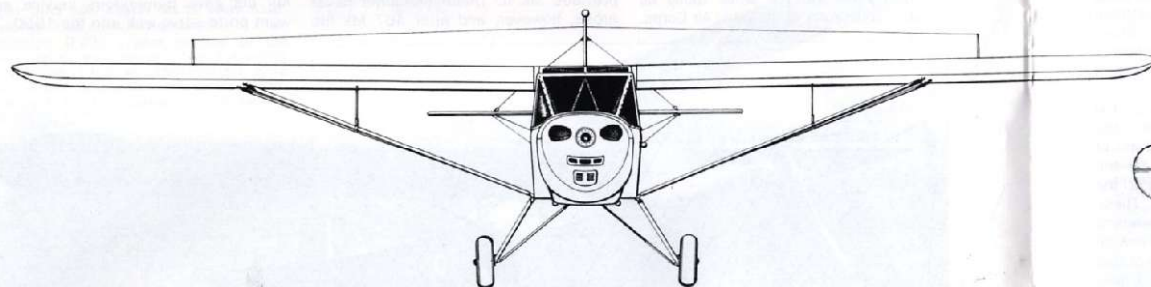
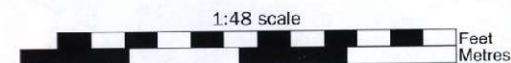
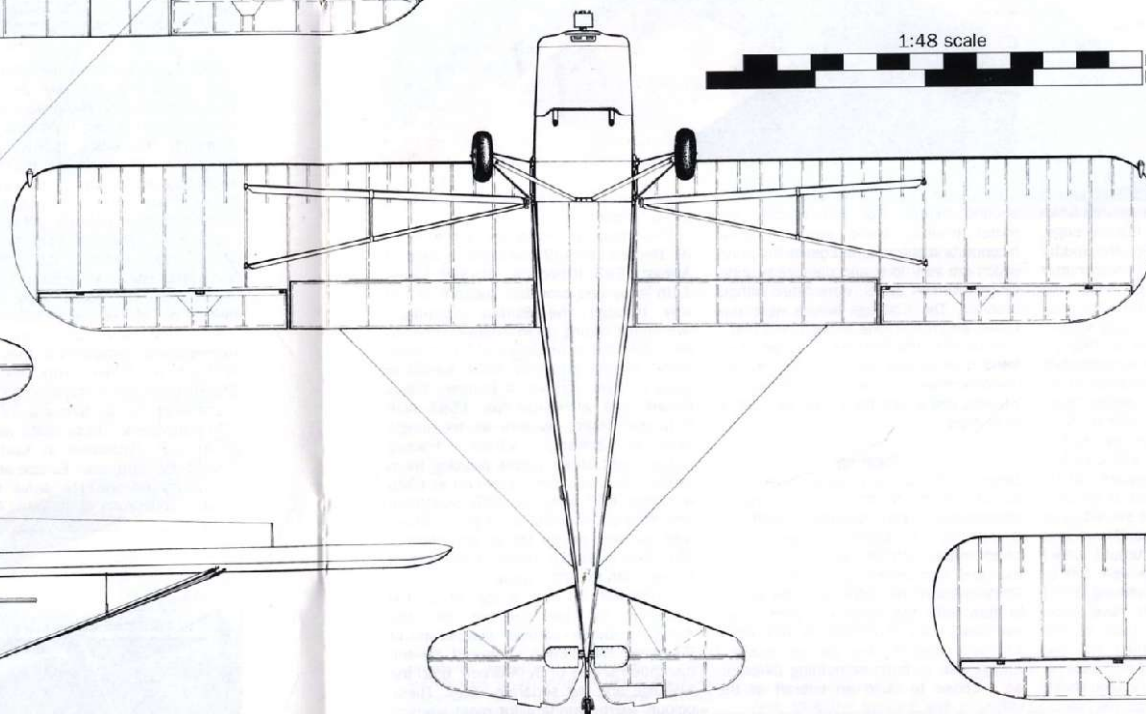
With supplies of the Lycoming engine secured, British Taylorcraft reverted to the American engine for its Auster Mk IV (above left). The Mk V, shown at right, differed little from the Mk IV, but was fitted with a blind-flying panel. The Mk IV introduced the bulged upper rear cockpit glazing that was also retrofitted onto some Mk IIIs. It was also the first Auster model to feature three seats. (both Aerospace Publishing Ltd)

Auster Mk IV

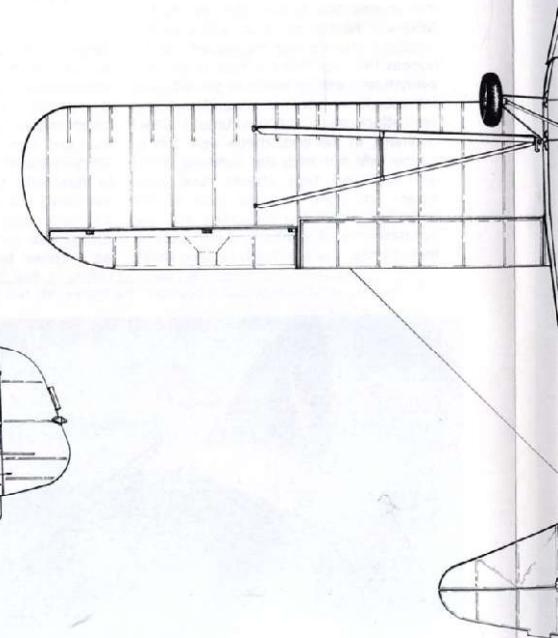


Auster Mk III and IV

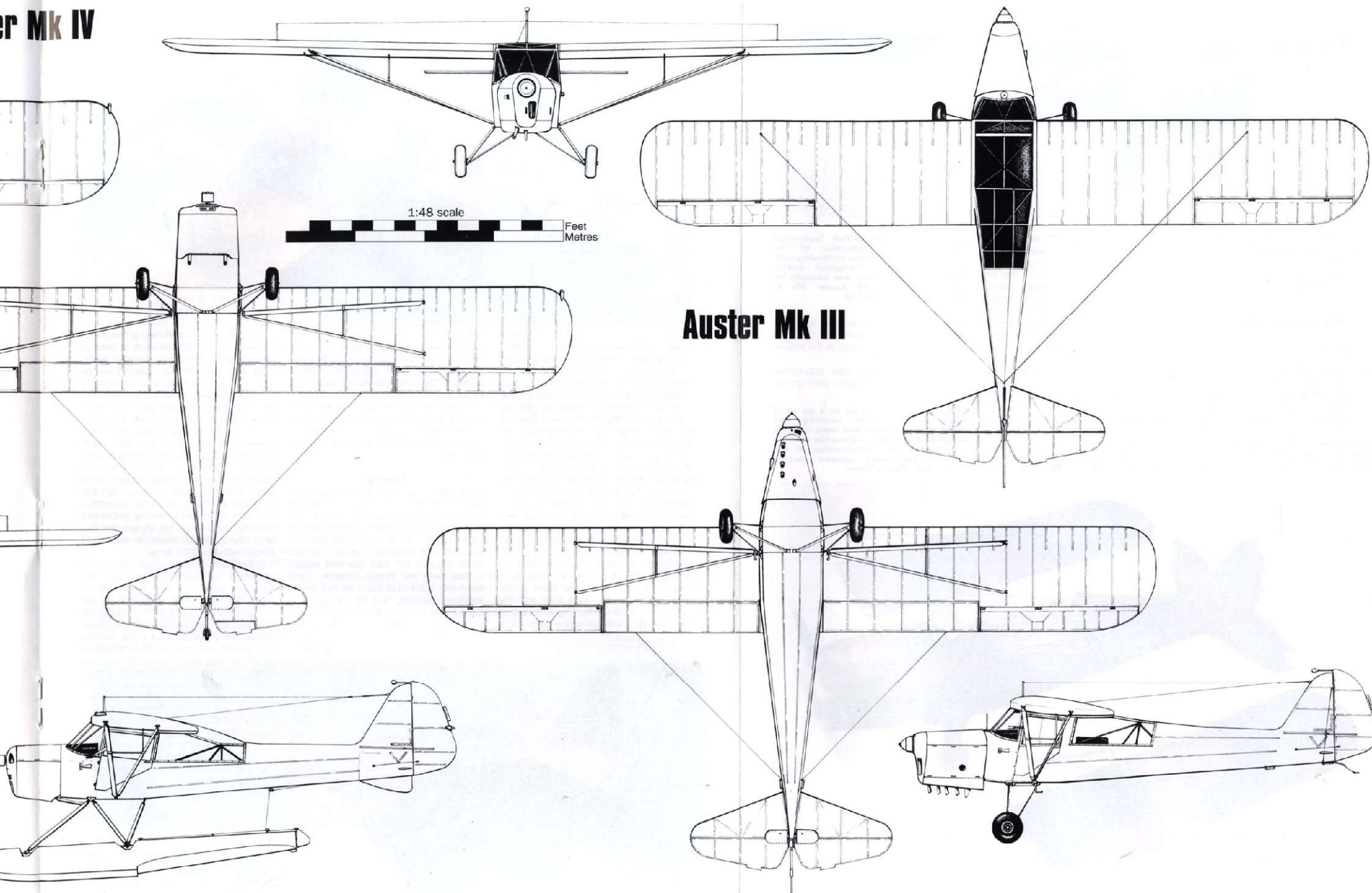
1:48 scale plans by Peter Green



Auster



er Mk IV



Auster Mk III



The Sword kit is really very nice and consists of well detailed, limited-run injection-moulded plastic for the main airframe parts, with a vacform canopy, of which two examples are supplied in case of mistakes.

Beginning construction

Among the injection-moulded parts are the many small pieces that will eventually represent the interior framework that is visible through the canopy. These parts need a lot of care to remove from the sprues and will all need a lot of cleaning up afterwards. I managed to snap a couple of mine and I hope that the repair work does not show up too much on the finished model. After all of these parts had been cleaned up, they were painted Interior Grey Green and left to one side.

While the framework parts were drying I removed the cockpit floor, seats, control columns and the instrument panel from their sprues and dry fitted them into the already removed fuselage sides. Once I had worked out where everything fitted, I scored small lines to indicate this on the inside of the fuselage and then painted the interior parts in the same Interior Grey Green as the framework, with the exception of the insides of the doors and the instrument panel, which were painted satin black. The insides of the doors were painted black to represent the leather interior of the actual doors. The real doors also had large map pockets incorporated into them, essential equipment for the AOP role.

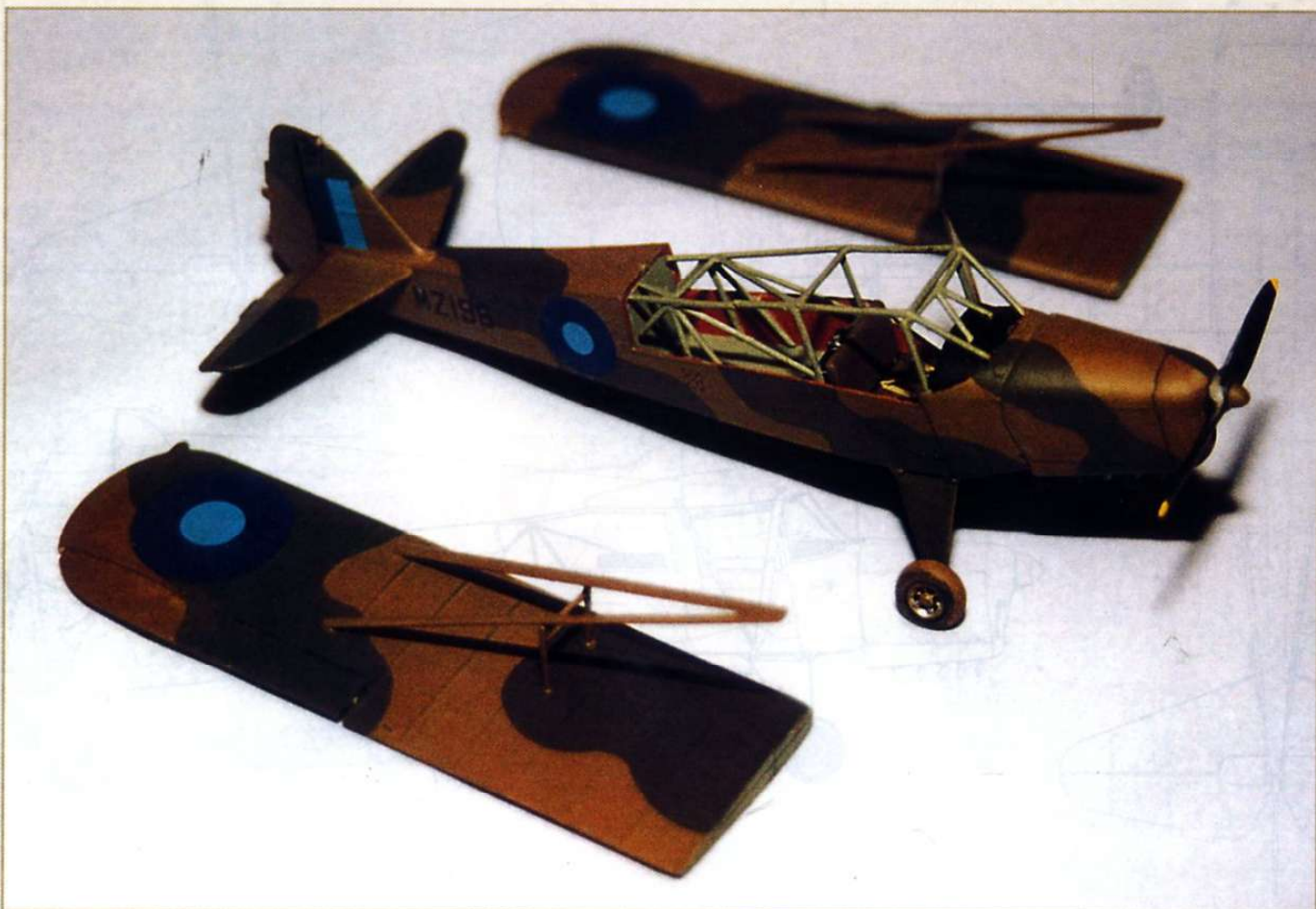
The breakdown of the kit in the engine area might suggest that other Auster

On 8 March 1946 British Taylorcraft became Auster, production of the company's AOP machines continuing with the Gypsy Major 7-engined Auster AOP Mk 6. This aircraft was basically an improved, re-engined Auster Mk V. (Aerospace Publishing Ltd)

versions could be released with the Lycoming engine, or someone from the cottage industry could come to the rescue with some resin parts.

The engine cowlings were assembled next, while the interior parts were drying,

Tony built the Sword kit as a series of major subassemblies, painting and decalling the fuselage and wing sections before final assembly. His worries over the potentially tricky construction of the internal framework proved largely unfounded. (Tony O'Toole)



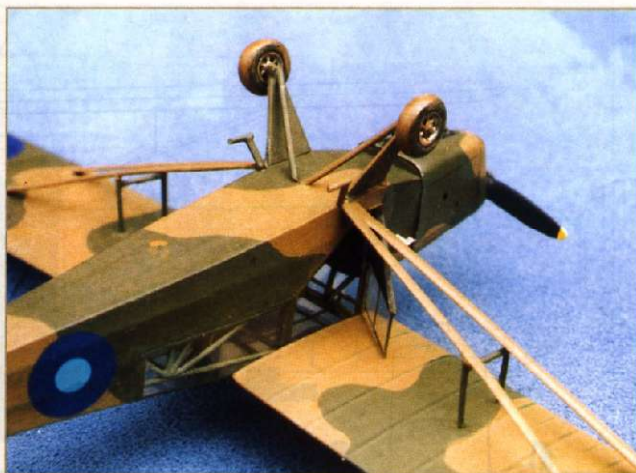
Since the basic product is fine, there was little to be done in terms of improving the kit. However, Tony added some life to the model, by deflecting its control surfaces and opening one of the pilot's doors. (Tony O'Toole)

and they consisted of three parts for the sides and bottom with a one-piece frontal section, into which was fitted a very nicely detailed part to represent the front of the engine, as viewed through the air intake. The lower part includes the distinctive separate exhaust pipes of the Auster Mk III. The engine cowling went together with no trouble and was then left aside until later on.

Assembling the wings

As the interior parts were still drying, I decided to assemble the wings. These were simplicity itself to put together, being an upper and lower section for each wing. To make the model a little more interesting I decided to separate all of the control surfaces and reattach them slightly displaced. The ailerons were removed using a sharp scalpel blade and a razor saw. They were then sanded down and given a more rounded leading edge, before being reattached. For the rudder and elevators it was just a simple matter of scoring over their hinge lines and bending them into the desired positions.

Now that the interior parts were dry they were all dry brushed in silver to bring out the detail and then the floor was attached to one fuselage half, in preparation for adding the seats. The only addition that I made here was to place a radio set from the spares box behind the two seats. Next was the first part that I was dreading – adding the interior framework. To be honest this was not too bad at all, with everything meeting where it should, with the exception of the 'V'-shaped bars that are attached to the instrument panel coaming. In the end, these were left to simply butt-join onto the coaming, but I am sure that they should have been longer and gone into the back of the coaming so that they were flush with the windscreen instead of sitting well back as they do now. I will certainly replace these



with longer plastic tube when I build a second model. Notwithstanding this minor trouble, there were no other hiccups and the unique control columns, which are very long and disappear under the instrument panel, were fitted without problem. The fuselage halves were now joined and the engine section attached.

Once all of the parts were dry they were sanded to remove the joint lines and the undercarriage, with its pre-painted wheels, along with the pilot's foot steps, were added.

Painting

Sword has provided some really nice colour options in the kit, including an anonymous D-Day striped aircraft, an overall-green Australian machine with a shark mouth and an immediate post-war example with underwing codes from the Polish-manned No. 663 Sqn that served in Italy with the Polish Division. I will eventually build all of these as they are all excellent options, but for an article I always like to build something different, so I chose to build an aircraft of the

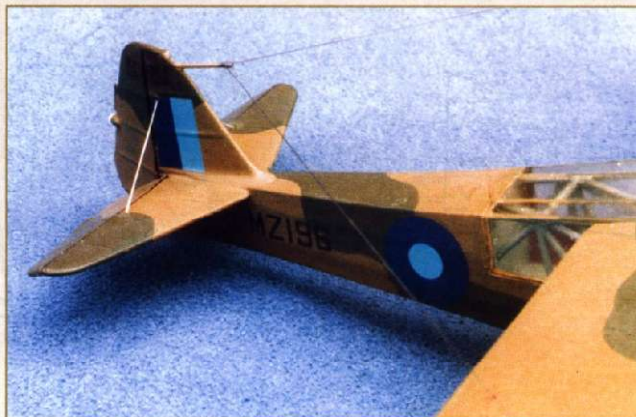
India/Burma-based No. 656 Sqn, wearing SEAC roundels.

This squadron was formed in the UK on 31 December 1942 and went to India in August 1943. It became attached to the 14th Army and provided support all the way through the Burma campaign, eventually ending up in Kuala Lumpur to be disbanded in January 1947. The main home for the squadron while based in India was the airstrip of Deolali. It was based here alongside No. 1587 AOP Refresher Flight, as well as the jungle artillery school, which trained replacement crews before passing them to the active squadron. Later on in 1945 a further AOP unit, No. 659 Squadron, was sent out to India, arriving in October with the later Auster Mk Vs and Mk Vis, after having already served in north west Europe with the 21st Army.

I decided at this stage of partial assembly to start painting the little Auster. I brush painted two coats of Polyscale Dark Earth, followed by the disruption shade of Dark Green, onto the fuselage and the separate wings. These colours were standard for most wartime AOP aircraft, with the exception of certain aircraft based in India late in the war that carried an all-over silver scheme. I have only seen photographs of Auster Mk Vs wearing this scheme, however, so this may only apply to the later versions.

Now that the model was painted it was starting to look very nice, but I decided to add one more extra feature to it, apart from moving the control surfaces, and this was to open up one of the pilot's doors. To do this was a simple matter of scoring along the door panel lines until the door came away, cutting out the window from the vacform canopy and adding this to the door. The door was

With its radio fit being such an integral part of the AOP mission, Tony was keen to simulate the Auster Mk III's antennae. Careful use of elastic monofilament, brass and super glue produced this excellent result. (Tony O'Toole)



With its extensive cockpit glazing, the Auster Mk III pays great dividends for time spent on its cockpit interior. The internal framework is very evident in this image, although Tony is not convinced that the forward 'V' struts are correctly positioned. (Tony O'Toole)

then added to the model in the open position and the edges of the door were cleaned up and painted, as was the doorway, adding a little bit of silver to represent wear and tear. At this stage the propeller, which had been pre-painted black with yellow tips, was also added.

Adding the decals

Before adding the vacform canopy I decided to add the decals. To build the SEAC aircraft I had to rummage through my references to eventually come up with the serial MZ196, but unfortunately no photograph. During the campaign through Burma, No. 656 Sqn operated from many rough strips, but one of the favourite operating surfaces was a beach. I found a photograph of one of the squadron's aircraft operating from such a location, as well as another picture in *Scale Aircraft Modelling Vol 16 No 4* in an excellent feature on SEAC. Although the serials of both aircraft could not be deciphered in the pictures, I based my model of MZ196 on both of these.

The Austers wore the SEAC dark blue and light blue roundels, but these appeared quite large when compared to the very small type seen on most larger aircraft. I used items from the spares box to represent these markings, but there are decal sheets from Modeldecals (sheet 117) and Almark (sheet A3) that provide these roundels also. The serial came from Xtradecal sheet X021-48 and once the decals were added to the previously glossed surface, they were sealed with a further coat of gloss varnish. Finally, once the gloss was dry, the model was toned down using Polyscale acrylic matt varnish.

A low-angle shot shows the open cabin door, the pilot's boarding steps and the tailplane rigging to advantage. The substantial underwing struts played an important role in Tony's chosen method for attaching the wings to the fuselage. (Tony O'Toole)



British Taylorcraft Auster Mk III



Adding the wings and glazing

I could no longer put off this next stage – it was finally time to add the vacform canopy and attach the wings. The canopy had been pre-painted and was removed from its plastic surround using a fresh scalpel blade. I scored along the panel lines, making the canopy a little larger than necessary to leave a bit of plastic to work with when fitting it to the fuselage. As ever, the inclusion of a spare canopy is very welcome, even though in this case it was not required. The canopy was dry fitted to the fuselage and the waste plastic whittled away gradually until the piece fitted. To attach it to the fuselage I used Humbrol Clear Fix, but reinforced this with very small amounts of super glue, making sure that this was only on the outside of the canopy to prevent the dreaded white mist. If any of this appears on the outside of the canopy then a stroke of a brush with a little gloss varnish will remove it.

Now that the canopy was attached, I had to work out how to put the wings on

while keeping the whole thing nice and strong. I considered putting brass rods through the canopy to act as spars, but these would appear as extra framework and would be very obvious through the clear, glazed roof. With a little forethought I could have incorporated these into the interior framework at the beginning, but I did not, so I had to do something else. In the end I decided to add the wing struts to each wing, making sure they were nice and strong, and then attach the wings to the canopy using a mixture of Clear Fix and super glue. The struts supported the wings very well, but while they were drying a simple jig, made out of two stacks of books, was used to support them. The next day, when I removed the model from the books, it was nice and strong, so it is up to you whether you wish to add wing spars or not.

AOP aerial

The main role of an AOP aircraft was to use its radio to communicate with the ground-based gunners, so the aircraft had

Your chance to write to SAM with topics of interest to Scale Aircraft Modellers

Tornado GR.Mk 4A details

Dear Paul

I read with interest Trevor Glover's article on constructing a Tornado GR.Mk 4A and would like to offer some comments on the real thing. Post-MLU aircraft no longer have the area in front of the windscreen painted black. Since all the aircraft have fully NVG-compatible cockpits, the inside of the canopy frame, cockpit sill, and rear cockpit instrument top box are all painted black (see attached cockpit pictures). As the Revell kit is based on the German IDS Tornado, the fin-mounted RWR fairings are too wide. If you compare the picture of the real thing on page 318 with that of the model on page 319, you will see that the width of the fairing on the model needs to be reduced. This is because the Luftwaffe uses a different system to the RAF. I have included further pictures to show other differences between the Tornado GR.Mk 1 and GR.Mk 4. One image shows the intercooler intake underneath the aircraft, which has a larger inlet than that on the GR.Mk 1 and now has holes drilled into its fairing. The final shot shows the pre-cooler intake at the base of the fin. This is also larger than on the GR.Mk 1 and is now similar to that on the F.Mk 3. The exhaust at the base of the fin has also been increased in size. Finally, on the subject of external stores, unfortunately Trevor has fitted the outboard stores the wrong way round - Sky Shadow only fits on the left side of the aircraft. The pictures of the real 'U' in the article show it carrying a live BOZ on the right and a dummy BOZ (for ballast) on the left. On the picture on page 318 you can just make out the blue band around the nose of the pod indicating that it is inert. I hope you find this information helpful.

Neil Bannister
via e-mail



Beaufighter colours

Dear Paul

I have long been an admirer of David Howley's artwork and your excellent magazine. I agree with Mr Howley (June issue, 25/5) that the separation between Extra Dark Sea Grey and Dark Slate Grey is hardly detectable in monochrome pictures. I believe most of No. 45 Sqn's Beaufighters had the standard Day Fighter Camouflage of Dark Green and Dark Sea Grey, with Medium Sea Grey undersurfaces and a Sky (fighter) fuselage band. The fuselage band was definitely not white, as stated in Wg-Cmdr C. G. Jefford's book on the history of No. 45. There is a picture of a No. 84 Sqn Beaufighter with the band in *Beaufighters in Action* and it clearly shows that the band is a colour appreciably darker than white. When the Beaufighters were repainted and given post-war 'D-Type' roundels the fuselage band was dropped.

An equally puzzling feature of No. 45 Sqn is the painting of the spinners on its Hornets. According to Jefford they had alternate bands of Dark Blue/Red/Dark Blue/Pale Blue/Dark Blue (from the front). Does anyone know the reason for this?

E. S. Koh
Singapore

Jaguar colour schemes

Dear Paul

I have to question the descriptions of the current RAF Jaguar colour scheme as given in your previous issues (May, 25/3 and June, 25/4). You call the lower surface colour Medium Sea Grey and the upper surface colour Dark Camouflage Grey. Surely the correct colours are Dark Sea Grey (BS381C:638) upper surfaces with Dark Camouflage Grey (BS381C:629) over the rest of the airframe - the same shades as carried by Tornados GR.Mk 4s and Harrier GR.Mk 7s. Neither of these colours are the same as Medium Sea Grey (BS381C:637) or Camouflage Grey (BS381C:638), the former being carried on most Royal Navy aircraft (Sea Harrier FA.Mk 2, Merlin, etc). The latter shade, the BS381C incorporation of the colour known as Barley Grey, is carried on Tornado F.Mk 3s and as an ARTF finish on Operation Warden Harriers and Jaguars. Both of these shades are lighter than Dark Camouflage Grey.

I hope you do not think of this as nit picking, but I think it is important that these colours are described correctly.

Dave Fleming
via e-mail

Please send your letters to: The Editor, Guideline Publications, 352 Selbourne Road, Luton, Bedfordshire LU4 8NU

Editor's note

Thanks are due to Mike Ingham of Wantage, Oxfordshire, who also wrote in to tell us of our error concerning the Jaguar camouflage colours in the May (25/3) and June (25/4) issues. Our apologies for any inconvenience caused to readers.

Paul E Eden

Korean War Firefly FR.Mk 1

Dear Paul

Apart from the photograph referred to by Davide Di Odoardo in the June (25/4) issue, most photographs of Korean War Firefly FR.Mk 1s show the aircraft before theatre stripes were added. The one exception to this is on page 21 of *The Korean Air War* by Dorr and Thompson, published by Motorbooks International in 1994. This shows an FR.Mk 1 which is unfortunately largely hidden by canvas covers over its propeller, engine and cockpit canopy, with the rear of the fuselage out of shot. Nevertheless, it is clearly painted in the old scheme of Extra Dark Sea Grey/Dark Sea Grey/Sky, as illustrated in the *Warpaint* series. The 'C-Type' roundel on the upper surface is over the stripes on the upper surface of the wing. The stripes are painted across the outer part of the wing, as shown on page 11 of *Warpaint No. 11*, for the Royal Australian Navy. The fuselage stripes are not visible in the photograph, but it is probably safe to assume that they were similar to those on the Seafire Mk 47s.

The aircraft number on the canvas covers is '272' and the serial number on the propeller cover is V978. Most VG-serialised Fireflies were converted to FR.Mk 4s, but this would seem to be an exception.

Bob Sturrock
Dundee

Model show views

Dear Paul

Concerning Neil Robinson's comments, in the May (25/3) edition of my favourite model magazine, about the length of model shows, there are a number of factors that I believe have contributed to the return of the one-day show, in the UK at least. I am interested in model railways as well as model aircraft and make the following comments based on my experience.

Our last model railway exhibition was held at the local school. For the hire of school facilities for two and a half days, the cost was in excess of £3,500. The local civic hall was asking a similar fee for its facilities. We are now planning a move to the church hall where we hold our regular meetings. Here we could hold a one-day show at a much reduced cost. We also hold an open day, which is free to the public to help attract more interest to our society.

The setting up of any exhibition is time and energy consuming and it often seems that the same people take on this responsibility again and again.

In addition, the society I belong to was, when I first joined, the only model railway society to hold an exhibition for miles around and therefore our events were well patronised and we gave a pretty good show. Now, however, there are at least six other shows within a four-mile radius and one tends to see the same layouts more often, so that their impact is lessened. We try to bring in layouts from other parts of the country, but the downside to this is again the cost - of fuel, accommodation, etc.

Lastly, the size of the club or society has an impact on how large or ambitious a show can be planned. Larger clubs can offer more in the way of show facilities because they have more finances and greater manpower to actually organise and run shows.

Michael D. Keeley
Stockport, Manchester



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Set 3: On Patrol - Battle of Britain period Luftwaffe fighter pilot and two groundcrew.

The correct answers are:

1: Who designed the Irvine flying jacket used by the RAF?
Leslie Irvine

2: After which famous 1930s film star was the RAF's floatation vest named?
Mae West

3: What was the filling used in many of the Luftwaffe's floatation vests?
Kapok



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Over the twelve issues of this 25th Anniversary Volume, we will be featuring a monthly, ongoing 'running competition' asking one question in each issue. All you have to do is to answer each of the twelve questions, (the first of which was in the March 2003 issue), and then send all twelve answers, by 1 June 2004, to:-

SAM's 25th Anniversary Celebration Competition,
352 Selbourne Road, Luton, Bedfordshire
LU4 8NU United Kingdom

Question No6:-
With what aircraft is the South African Air Force planning to replace its surviving Atlas Cheetah fighters?



North American's P-51 Mustang has, of course, been the subject of kits from many manufacturers, with the likes of Hasegawa, Monogram and Revell for example, all offering the type in 1:48 scale. One of the more recent 1:48 Mustang kits, however, is Tamiya's P-51D. The kit consists of 54 grey plastic parts and four clear plastic parts, all of excellent quality. The surface is moulded with fine recessed panel lines. Before building my P-51D I collected together the references I would need and obtained the relevant detail set from Aires.

Aires detail set

The Aires set provides items for the cockpit, wheel bays and guns and includes a complete engine compartment with covers.

I began my work with modifications to the surface of the model, adding rivet detail by reference to drawings. My next step was to complete the cockpit. Here I added some additional small details to the completed resin assembly. The cockpit was finished overall in Aeromaster's Interior Green acrylic, with weathering



provided by drybrushing and washing with raw umber oil colour. The instrument glasses were simulated with clear varnish. I made a new canopy by vacforming, using the kit canopy as a mould.

Rear fuselage and engine

Open access covers were made for the rear fuselage and complete interior structure was built for the tail wheel bay and the rear fuselage, from plastic and brass wire.

Next, attention turned to the engine compartment, paying careful attention to the exact geometry of the engine. The Aires engine was detailed with wires and other details. A black-grey colour was used on the engine, while the engine firewall was painted Zinc Chromate Yellow and the engine bearers and other structure were painted natural metal.

The wings were modified by the addition of the Aires wheel wells, which are very accurate and fit perfectly into the Tamiya wings. The wheel and gun bays were painted Zinc Chromate Yellow, but the undercarriage legs and doors were finished in aluminium. New covers need to be made for the gun bays, those supplied in the detail set being for a Korean War-era F-51D Mustang. The final construction work to be completed was on the tail section, where all of the control surfaces were deflected.

Finishing

The model was finished as a P-51D used by Robin Olds with the 434th FS. I used markings from Aeromaster sheet 48-479, *Mustangs Forever Pt 4*. The model was airbrushed with Testor's metalizer aluminium and after buffing a protective coat of varnish was applied. I then sprayed the black identification stripes on the wings and horizontal tail surfaces, using Tamiya masking tape for masking. An Eduard Express Mask was used for masking the canopy, its application being simple and the result perfect. After painting, the Aeromaster decals were applied with the aid of Micro Set and Micro Sol. After an airbrushing with clear varnish, the model was washed with raw umber oil colour. This final wash must be applied very gently, since the metalizer surface is prone to damage.

I have no complaints about this project, having chosen a good quality kit and supplemented it with an excellent aftermarket resin set. I enjoyed it entirely.

Bibliography

P-51D Aerodetail No. 13, Dai Nippon Kaiga

P-51D Walk Around No. 7, Squadron Signal

P-51D In Detail & Scale No. 51, Squadron Signal

Model Art No. 401

Monografie Lotnicze, AJ Press

Modelmania No. 3, AJ press



AEROSPATIALE SA 365F DAUPHIN 2 OF THE IRISH AIR CORPS.

Pictures and words by
Patrick J. Cummins



Five Aérospatiale SA 365F Dauphin 2s (Nos 244-248) were delivered to the Irish Air Corps throughout 1986. These twin-engine helicopters, which were equipped with the latest navigation, radar and flight-control systems, were to be used for short-range maritime search-and-rescue missions in adverse weather conditions, by day and night, up to 100 miles from the Irish coastline. Two of the Dauphin 2s (Nos 244 and 245) were also equipped for shipborne operations from the vessel *L. E. Eithne* of the Irish Naval Service.

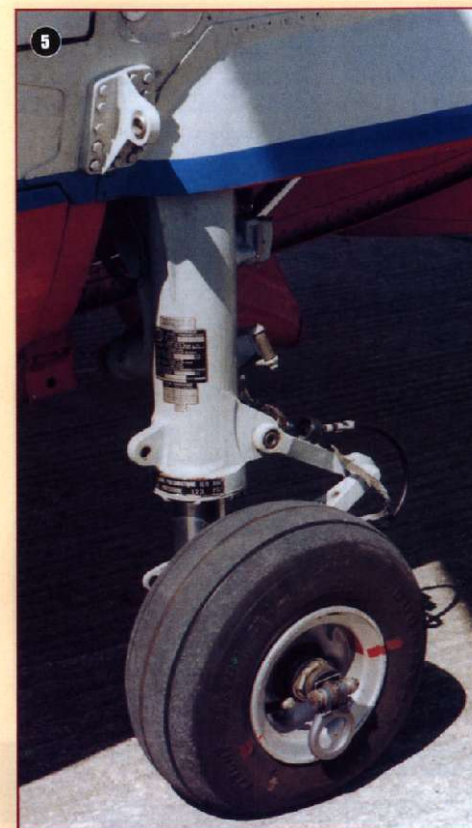
The Dauphin 2s entered service with No. 3 Support Wing and were operated by the Search and Rescue Squadron and the Naval Squadron, which were combined and re-designated as No. 301 Squadron, No. 3 Operations Wing, in 2002. Commencing in 1987, the Dauphin 2s were deployed to Casement Aerodrome, Shannon International Airport and Air Station Finner, Co. Donegal, on search-and-rescue duties, until replaced between 1991 and 1998 by the Sikorsky S-61N under contract to the Irish Marine Emergency Service. On 1 July 1999, No. 248 was deployed to Waterford Regional Airport to provide 24 hour search-and-rescue service for south-east Ireland. On the following night this helicopter crashed during a search-and-rescue mission, killing all the crew.

The Dauphin 2s are also used for air ambulance missions, with stretcher cases inserted into the helicopter through the central door. The helicopters also fly VIP sorties, transporting the President, Cabinet Ministers and visiting dignitaries. Padded seats covered with blue material, with blue carpet on the floor, are installed in the aircraft for these missions.

Above: Dauphin 2 No. 246 of the Irish Air Corps, showing the overall light grey fuselage, with medium blue stripes as demarcation lines between the white upper section of the engine compartment, and the bright red undersides of the helicopter. The extreme top of the engine compartment, endplate fins, fin tip and bottom of the fenestron fairing were also painted bright red.



1. Details of the forward bright red areas and the medium blue demarcation lines are seen in this view. The winch housing is attached to the starboard side of the helicopter.



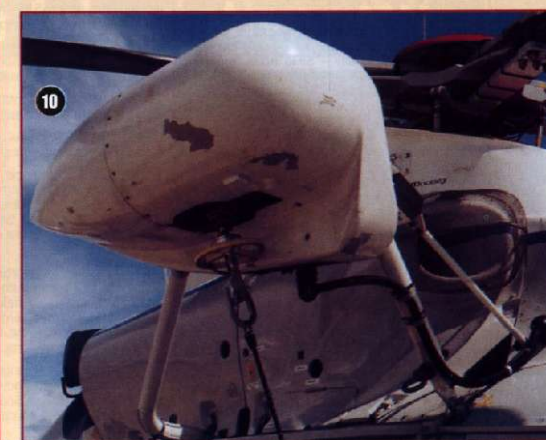
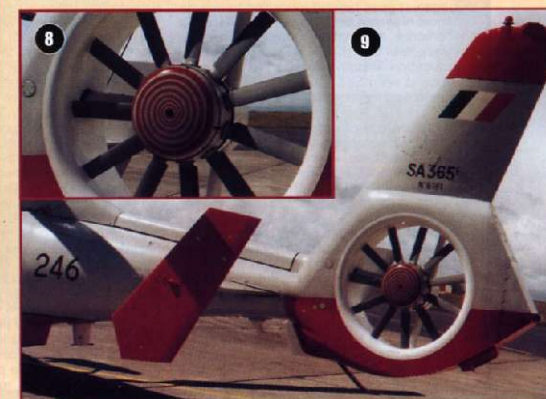
2. The all-red pitot tubes on the port side of the Dauphin 2.

3. A swivelling, high-powered searchlight is used for night SAR operations. It is attached to the underside of the fuselage below the rear entrance door.

4. This view of the nose gear, also shows various stencils.

5. A close-up view of the retractable main undercarriage unit on the port side of the helicopter.

6. As well as showing the Irish Air Corps insignia – the Celtic Boss – this shot also shows the helicopter's serial number, which is displayed to port and starboard.



7. A starboard view of the engine compartment shows the engine intake cover and the inscription *Paddy Mooney*, which commemorates one of the crew killed in the crash of No. 248 in July 1999. Each of the Air Corps's Dauphin 2s displays the name of one of the crew that was killed in the crash of this helicopter.

8-9. The endplate fins, the fenestron, and the representation of the aircraft's designation and construction number are shown here. The small 'F' in the designation is unique to No. 246. The finish on the fenestron hub was introduced as a safety measure.

10. Here the housing for the winching gear on the starboard side and the engine intake grills are shown. The undersides of the composite rotor blades are light brown.

PHANTOM WILD WEASELS

Stephen J. Di Nucci reviews the story of the USAF's Wild Weasel Phantoms and takes a look at kits available in 1:72nd scale



The initial EF-4C Weasel Phantom was barely adequate, but the war in Vietnam was winding down. Some of the F-105 Thunderchief Weasels had been sent home, and the EF-4C did not initially get a posting to South East Asia at all. The Americans then pulled out of Vietnam completely. As a result, the final product of Project Wild Weasel, the F-4G Phantom II, first conceived in 1968, was left to languish.

The US military appeared to need a fresh reminder of the threat posed by radar-guided surface-to-air missiles, and the Arab/Israeli Yom Kippur War of 1973, during which the Israelis lost significant numbers of aircraft to several new, Soviet-designed SAM missiles, provided that reminder.

Dedicated Air Force Weaseleers would have preferred a new-build aircraft, but resource issues once again dictated conversions of existing aircraft. The F-4E airframe was really the only game in town, since it was available in quantity and many aircraft had plenty of flying hours left. The E was favoured in particular owing to the space afforded by its canopy fairing beneath the nose, provided that the resident Vulcan cannon was removed. The prototype F-4G, previously F-4E 69-7254, flew for the first time on 6 December 1975. A decision was taken to convert a further 115 FY69 (Fiscal Year 1969) F-4Es to F-4G standard, fitted with 'smokeless' General Electric J79-GE-17C engines and slatted wings.

At the heart of the F-4G was its AN/APR-38 HAWC (Homing and Warning Computer). This was able to identify

One of the early F-4E to F-4G conversions, 69-0263 shows off the revised underside features of the F-4G to advantage. It is finished in the South-East Asia colours and does not represent the full-standard conversion - note the rear-view mirror style. (McDonnell Douglas via Aerospace Publishing Ltd)

multiple enemy threat emitters, simultaneously track and prioritise the 15 most dangerous threats, and then present them to the back seat EWO (Electronic Warfare Officer), or 'Bear', for human consideration. Much more than this, however, the system also interfaced with the F-4G's weapons delivery system, providing attack data and, when necessary, an automatic blind-bombing capability.

New antennas

The APR-38 required no less than 56 (later 52) fresh antennae in forward, beam and aft positions, operating in low, medium- and high-frequency bands. Some of these were enclosed within the more obvious external changes that had been made, but there were many other antennae on the flanks of the fuselage below the pilot's windscreen, along the spine of the aircraft, on the fin and in the wings. It is unfortunately beyond the scope of this work to describe the nature and location of all these.

Very early in its career, the F-4G was adapted to carry the F-15's more highly stressed 600-US gal centreline drop tank, with the result that centreline fuel no

Since the USAF retired its F-4G fleet, it has been without a truly capable Suppression of Enemy Air Defences (SEAD) platform. The F-4G shown here has both AGM-45 Shrike and AGM-78 Standard ARM (the larger weapon) missiles underwing, while the trailing F-4E machine carries AGM-88 HARM. (Aerospace Publishing Ltd)

longer had to be dropped the moment a dogfight threatened. Another early modification affected the EWO's twin external rear-view mirrors, which were fitted in the 10 o'clock and 2 o'clock positions around the canopy frame. These emitted a most disturbing noise when subjected to the airflow around the canopy, and the easy and perfectly peaceful solution to this problem was a single external mirror mounted at the top of the frame. Many other Phantom variants of course benefited from this modification.

The first production F-4G, 69-0239, roared into George AFB California - as only a Phantom can - on 28 April 1978. By July 1980 three squadrons at George were fully converted to the new Weasel, these being the 561st TFS (yellow fin flash), the 562nd TFS Weasel training squadron (blue fin flash) and the 563rd TFS (red fin flash). Overseas-based



Weasel units were also re-equipped, the first Gs destined for the 81st TFS at Spangdahlem and the 90th TFS in the Philippines, touching down in March 1979 and July 1979, respectively. Delivery of all first-batch machines was completed by June 1981.

Spangdahlem Weasels

At Spangdahlem in 1987, the hunter/killer teamwork approach to successful Weaselling was taken a step further. Hunter/killer operations begun with the EF-100F and its attendant F-105Ds, continued with the EF-105F/F-105G with F-105D/F-4E support, and continued again with the pairing of F-4Gs with Es. Now the USAF reshaped the 52nd TFW into a fully unified F-4G/F-16C/D unit. The 23rd TFS, 81st TFS and 480th TFS were all eventually equipped with 12 F-4Gs and 12 F-16s. Nevertheless, the Weasels of the 90th TFS at Clark continued to operate with the resident F-4Es.

In late 1988, conversion work began on a second batch of 18 FY69 F-4Es, but this time the resultant F-4Gs were fitted with the even more advanced AN/APR-47 HAWC. The APR-47 provided much more memory, faster processing and greater range, with the result that it was able to pick up and hold enemy radars emitting either weak signals, or signals for only very short periods. The new system also enabled the F-4G to take the fullest advantage of the range of its air-to-ground missiles. First-batch machines were updated with the more powerful HAWC.

Although the F-4G was a hugely capable warplane, the F-4 airframe was geriatric, and after only ten years service, consideration turned to its retirement. In spite of the invasion of Kuwait on 2 August 1990 and the commencement of Operation Desert Shield, plans for the withdrawal of the first F-4Gs from active duty went ahead, the first two aircraft leaving Clark AB on 19 December 1990.

Desert Weasels

The details and the importance of the Weasel presence over Iraq during Desert Storm is well documented elsewhere;

here it perhaps suffices to say that, as in Vietnam, bomber crews making up attack packages were happier going into action if there was some attendant Weasel life insurance. The actual 'hit' rate achieved by the F-4G is classified, but the aircraft performed beyond expectations, and its ground maintenance crews achieved some phenomenal daily availability figures, in spite of the age of the Phantom. No F-4G was lost due to enemy fire, but this was partly due to the fact that the very long-ranged AGM-88A/B missile usually allowed Weasel crews to operate from outside the lethal envelope of identified SAM sites, and also much of the anti-aircraft artillery.

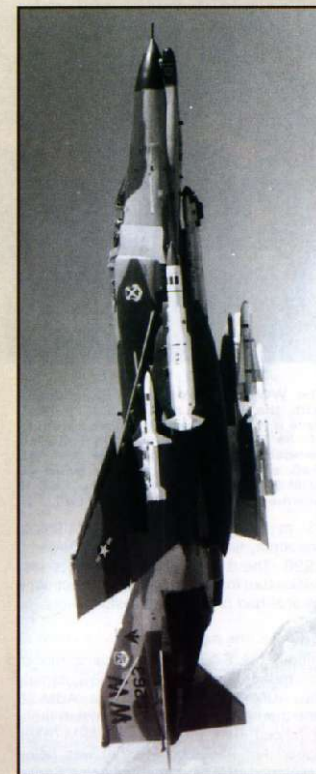
The Gulf War brought home to military planners the fact that without the F-4G, the Air Force could not perform the full Wild Weasel mission. The F-4G won itself a reprieve. Starting in July 1991, the Idaho Air National Guard's 190th FS at Gowen Field, Boise Air Terminal, began receiving 24 F-4Gs recovered from storage at the AMARC (Aircraft Maintenance and Regeneration Center) at Davis-Monthan AFB, Arizona. During much of 1992, the 190th was the only home-based Weasel unit.

Although the Gulf War was over, the Iraqi military machine had not been destroyed, and Operations Northern Watch and Southern Watch were established, in order to police the northern and southern no-fly zones over

Right: A combination of AGM-45 Shrike, AGM-78 Standard ARM, AGM-88 HARM and AGM-65 Maverick missiles makes up an unusual display load for this F-4G. The performance of Shrike during the 1991 Gulf War was questionable and the Weasel community soon switched to exclusive AGM-88 operations. (McDonnell Douglas via Aerospace Publishing Ltd)

Below: The F-4G and F-16C made a fine hunter/killer Weasel pair. With the retirement of the F-4G, the F-16 finally received proper AGM-88 compatibility in its Block 50 versions, with the podded HARM Targeting System. Even so, the Weasel F-16CJ still cannot match all of the capabilities of the trusty F-4G. (Department of Defence via Aerospace Publishing Ltd)

Iraq. These operations required Weasel support, and the Department of Defence was forced to the view that a regular USAF F-4G Weasel unit was again required to be based within the continental United States. The 561st FS was reactivated at Nellis AFB on 1 February 1993. Thereafter, the 190th and 561st took turns, as required, over Iraq through until 2 January 1996, the date of the last F-4G combat patrol over the country. The 561st





The 'WW' tailcodes became synonymous with the Weasel mission and, indeed, gave it its name. Here the nose contours of the F-4E (trailing) and the F-4G are compared to advantage. Note that the F-4G carries a mixed load of AGM-45, AGM-65 and AGM-78, while the F-4E is unarmed. (Aerospace Publishing Ltd)

FS at Nellis, the USAF's last 'Rhino' squadron, was deactivated on 26 March 1996. The 190th at Boise flew its last F-4Gs the following month. Project Wild Weasel had breathed its last.

F-4G weapons

Initially the F-4G used the same mix of anti-radar missiles as the F-105G, namely the AGM-45 Shrike and the AGM-78 Standard ARM, but a new and much more advanced ARM, the AGM-88 HARM (High-Speed Anti-Radiation Missile) was being developed. HARM began replacing Shrike in 1983. The 1980s saw the termination of production of both the Shrike and Standard ARM, but Weasel F-4Gs were still using Shrike during the Gulf War.

AGM-88 has many new virtues, but its really big advance was that it can lock on to an enemy radar emitter and then home directly to its location, even though the emitter may subsequently have been turned off. HARM can also be used in different modes, one of which flies the missile on a ballistic trajectory, allowing it more time to search for specific threats. Without underwing fuel, the F-4G could carry four HARM rounds.

F-4G crews also took enthusiastically to another new Weaseling weapon, this being the AGM-65 Maverick air-to-ground missile. Maverick was by no means new and was already being used by other versions of the F-4, and other attack aircraft. Maverick is available in several different versions, but the AGM-65D's

infra-red seeker head offered Weasel crews the chance to lock on to ground transmitters, even if they had already shut-down, the seeker picking up the wash of infra-red heat surrounding the radar control vans, etc. The final version of Maverick used by the F-4G was the AGM-65G, combining TV and imaging infra-red guidance with a larger warhead. The G-model was first used in combat during the Gulf War. Three rounds of Maverick could be carried beneath each of the F-4's inner wing pylons. The F-4G was also able to carry a range of additional conventional ground attack munitions, together with the standard pair of 370-US gal drop tanks hung from the outer wing pylons, plus the 600-US gal centreline tank previously described.

For self defence the Phantom Weasel normally utilised up to three rounds of the AIM-7 Sparrow missile, located in both of the rear underfuselage recesses, and in the forward right side recess. In the fourth recess on the left side it was normal to fit an electronic countermeasures pod. In the early days the AN/ALQ-119(V)-17 noise/deception jammer pod was most favoured, but further development of this pod eventually resulted in the AN/ALQ-184(V)-2 ECM pod, which was rather similar in appearance. Also frequently used was the shorter and stubbier AN/ALQ-131(V)-12.

F-4G colours

F-4G Weasels initially operated in the South-East Asia disruptive camouflage scheme of light grey undersides, and tan, green and dark green topsides, Federal Standard numbers for these shades respectively being 36622, 30219, 34102 and 34079. Quite soon after its service inception, the F-4G received a variation to

the scheme that deleted an area of tan 30219 previously applied behind the rear cockpit. Around 1980 the application of this scheme to many F-4s was modified by deleting the grey and extending the other colours to the undersides in a wraparound pattern.

The European 1 scheme, introduced in 1983, brought the first real facelift to the F-4G in the shape of a new wraparound scheme comprising greens 34102 and 34079 again, plus 36081 dark grey. The application pattern was the same as the previous wraparound, the grey merely replacing the previous tan, but the overall effect was, of course, much darker. Eventually, many underwing stores were also finished with either one of the fuselage colours, or with olive drab, and even some Sparrow missile rounds received the treatment.

Starting in 1987 the F-4G began receiving a further and completely different camouflage scheme, with a semi-gloss finish. Hill Grey II utilised grey 36270 over the nose, tail fin, the flanks of the air intakes and the outboard wing panels above and below, while dark grey 36118 went everywhere else – that is basically the entire central fuselage area and the majority of the wings above and below.

As originally introduced, the Hill Grey II scheme kept 36118 completely away from the nose of the F-4. However, very quickly the scheme was varied, and the dark grey 36118 was soon being carried forward, all along the ventral nose canoe towards the chin radome, and all through the cockpit canopy frames and beyond, so as to form an anti-dazzle panel for the pilot. Hill Grey II was popularly known as Egypt 1 and the F-4Gs ultimately ended their days in this scheme.

Modelling the F-4G

Fujimi, Kit No. 7A-G6

Fujimi's F-4G hit the streets in 1985, and was one in quite a series of different Phantom family kits, including all the major American- and British-engined variants. Eventually almost 30 kits were issued if re-boxings are taken into account. I remember the excitement that these kits generated, in particular their finely-recessed details and modern design, moulding and packaging methods, but all things in retrospect are relative.

Assembly begins with the cockpit unit. The basis of this is a single moulding that supplies a floor and side consoles, plus a bulkhead at the back of the rear cockpit. Into this is installed a pair of vertical instrument panels, a pair of control sticks and a pair of ejection seats. There are decals for all the instrument panels. The ejection seats are constructed from just two pieces each and will not satisfy most modellers these days, but there are plenty of alternatives around on the accessory market. The completed cockpit section is then fixed to an underpan which includes the nosewheel well, and the fuselage halves are assembled around this subassembly.

At least that was Fujimi's intention, but Ian Howland, who built this kit for me, soon found that this route leads to the cockpit sitting so low that the pilot and EWO would be unable to see out! It became necessary to jack up the cockpit floor by 3 mm so as to raise the seats, and to raise the side consoles as well. Ian said there was also a large void in the rear cockpit area, and overall a lot of unexpected work with plasticard was required. This eventually left him feeling rather disappointed.

With the fuselage complete the engine intakes and intake splitter plates can be added, but as usual these need to be painted first. On the right side of the forward fuselage, panel lines are indented for a retractable refuelling probe, but this is not correct for Air Force F-4s and needs filling. The wings are made up from a single-piece lower wing moulding which is let into the fuselage from below, and then left and right upper wing halves are added from above. The

fairings for the leading-edge slat hinges are separate items, and holes need to be drilled to locate them before the wings are fixed.

Attention can now turn away from the basic structure and onto some of the details. The cockpit glassware was surprisingly found to be moulded in one piece, with the single external mirror set-up for the EWO. The canopy was a particular surprise, given that Fujimi's RAF Phantoms have a multi-section canopy and, it must be said, a rather better cockpit representation as well. For safety, the tailplanes are best added right at the end for most F-4 models, and although Fujimi's location tabs are robust and large, the location slots in the side of the tail are even larger and either superglue or amendments to the slots are required.

Most modellers will want to add the undercarriage, minus wheels, at this stage. Both front and main gear sets are well done by Fujimi, the only omission being some location lugs for the large front nose gear door. The jetpipes can be left until major painting is done; these are a touch too small and they leave a slight stepped appearance against the edge of the rear fuselage.

The F-4G's undernose canoe is a wholly separate item in this kit, but looks good once in place, except that the black-finished APR-38 beam antennae set into either side of its chin are poorly defined.

On the right side of its spine the F-4G sports a prominent twin-antenna set, but although Fujimi moulds these as separate items, there are no location aids for them, and the instruction sheet would have you believe that these go on the dorsal centreline. In fact the only external antenna actually on the centreline is the F-4's standard TACAN blade antenna, and the kit moulds this integrally with the left-side fuselage half. The wing-tip RHAWs antennae are a little too large, and the fin-tip fairing enclosing the rear-looking antennae is slightly too small.

Although Fujimi offers the modeller a fairly comprehensive set of weapons and fuel tanks to go beneath its F-4G, unfortunately there are no dedicated Weasel ARMs. An acceptable ALQ-119 ECM pod is supplied, together with both wing and fuselage tanks, however, the centreline tank is not the F-15 Eagle-style

tank with the additional connection to the fuselage at the rear. The pylons are moulded integrally with the tanks, but separate pylons are also included. The wing inner pylons have moulded chaff dispenser detail.

F-4Gs are capable of carrying AIM-9 Sidewinders for self-defence, but these were rarely seen mounted, the Weasels relying instead on the AIM-7 Sparrow. Fujimi supplies both missile types, but the AIM-9s are not useable anyway. The inner wing pylons have slots cut in them to allow the fitting of Sidewinder launch racks, without the racks these will need to be filled.

Given the design date for this kit, the three colour schemes offered by the kit decals unavoidably concentrate on the ubiquitous South-East Asia two greens, tan and grey. First of all, there are two George-based aircraft, 69-7582 with 'WW' tailcodes and 69-7290 with 'GA' codes, both apparently operating with the 39th TFS, which therefore should date them both at the late 1970s. The latter machine is particularly interesting, since it has been claimed that only two F-4Gs picked up 'GA' tailcodes – hopefully '290' was one of them, certainly 69-7263 was the other. The third machine is 69-7210 with 'PN' tailcodes, serving with the 90th TFS at Clark AB in the Philippines.

In our case the decals were missing from what was a second-hand copy of Fujimi's F-4G, and Ian Howland therefore modelled 69-7561 'WW', the personal aircraft of the Commander of the 561st FS at George AFB. The decals are dated post-Gulf War at March 1992 and are therefore close to the demise of the base. The decals were drawn from Superscale's set 72-660 and there were no application problems.

In terms of airframe design and avionics, the basic F-16C was a world away from the F-4G. However, the F-4G had been fitted with a range of systems for the SEAD mission and these had been steadily improved. It also had the airframe space available for the additional equipment and antennae needed for the Weasel equipment. Perhaps most importantly, however, it had a two-crew cockpit, a configuration likely to have considerable advantages when flying a complex mission in real combat. (Department of Defence via Aerospace Publishing Ltd)



Reviews of some of the latest kits received by Scale Aircraft Modelling

AZUR
+ TMA

Bloch MB.151

1:72 Injection-moulded

This is a new Czech company that is combining the basic Azur kit with modified parts. A number of variants of the basic Bloch design were produced, with most of the differences between variants being around the cowling. *Aviation News Volume 18, Number 5* contains drawings of the Bloch fighters and based on these a new cowling and engine are supplied in the kit. These are for the Gnome-Rhône 14 N-25



engine fitted to the Bloch MB.151 before its evolution into the MB.152.

The kit is moulded in the usual light grey plastic with incised panel lines. The parts are sharp and without flash. Starting with the interior, the kit supplies a floor, seat, bulkhead, instrument panel, control column and centre console. The seat is embellished with etched-brass seat belts and there is also an etched-brass instrument panel. The cockpit sidewalls have some embossed detail and, after painting, the cockpit assembly was cemented to one side of the fuselage and the two halves joined. The wings consist of a single lower surface, with port and starboard upper surfaces. These were fitted next, followed by the new resin

engine cowling. The engine itself must be assembled, cylinder by cylinder. The only other components that I fixed before painting were the horizontal stabilisers, underwing air scoop and tail skid. There are four units depicted on the decal sheet, all the depicted aircraft being painted in the three-colour disruptive scheme. After painting the delicate parts – undercarriage, pitot tube and aerial masts – were added. Decals are provided for one of three French air force aircraft: No. 364 of the Etampes flying school, 1940; one from the Vichy Navy at Ecole de St Raphael, 1942; and No. 68 of Escadrille AC 3, 1940. The fourth machine belonged to the Greek air force. I chose the flying school aircraft and after applying a

coat of matt varnish I fitted the vacuum canopy and the propeller – this latter item is a challenge. As with many short-run kits, separate blades need

to be fitted to the spinner. In this case there is no guide to where the three locating holes go. This means the modeller has to find a geometry compass and use what is, hopefully, a well known principle, to mark out the holes. Just in case you have forgotten, draw a circle on a piece of paper, subdivide the circumference by the radius, pick out three of the six sections and draw a line to the pivot hole. Place the spinner in the centre, mark where the lines touch it and drill holes equidistant from the back of the spinner. This is a surprisingly quick process, taking no more than five minutes. You now have an excellent replica of an early variant in the Bloch fighter series. The kit has no vices and the decals adhere perfectly to a gloss surface with no decal film.

Ernie Lee

Reference suggestion: *Les Aéronefs de L'Aviation Maritime 1910-1942*

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CMB
CZECHMASTER
RESIN

Sikorsky S-38 1:72 resin

This is the first kit I have built by this company and what a cracker it is. This amphibian was used by Pan American Airways on its Caribbean routes from 1927. Small private companies and the US Navy also used it.

The instruction sheets contain a number exploded views to aid construction, even down to the rigging. Also included are a number of photographs of the actual aircraft, including some colour shots of a replica. All this is very good, since reference material is not easy to find. For starters, a copy of *World Aviation in Spain* volume 1 by J Miranda is useful, because it contains a set of 1:72-scale drawings of the S-38, although the kit is more detailed than the drawings.

Colour scheme information and decals are provided for five aircraft. Each scheme is subject to a four-view colour drawing with detailed colouring instructions. You must decide immediately which scheme you want to model, as there are variations in the window configuration – two fuselages are provided to cover this. My first task was to remove the fuselage halves from the pouring core and clean the membrane from the windows. The fuselage is split vertically, allowing insertion of the cabin detail. This consists of floor and bulkhead castings, to which are added the seats and control column. All this detail was painted, the passenger windows were fitted, the interior was cemented in place and the fuselage joined. At the rear end of the fuselage is a sliding hatch and since I intended to sit it in the partially open position, I left it off until after painting. It is obvious from the start that external painting must be done in-between construction stages, since it will be difficult, if not impossible, to get to the fuselage when the wings are attached. Having test fitted the lower wings, which are located into the fuselage with



pegs, I painted the latter. Next I attached the floats to the wings, painted each assembly and then cemented them to the fuselage. The engine nacelles are attached midway between the lower and upper wings. Fixing such items is usually fun, especially in resin, because the glue you have to use does not have a semi-stick stage when angles can be adjusted. In this case, however, there is no problem because the aircraft has a large centre strut with two arms, onto which each nacelle is fixed. Every modeller has his or her own method of attaching upper wings on biplanes. Usually I fix the upper wing using a minimum of struts and fill in with the others. However, with this aircraft the upper wing assembly is heavy – very heavy – and

with the engines being central attaching it can be tricky. After a couple of false starts, I decided to assemble the whole upper area before fitting the wing. I first fixed the centre strut to the underside of the upper wing, then the nacelles to each side strut. It was then a matter of adding the nacelle struts one by one. Once complete, the struts and nacelles are extremely rigid. The tail booms came next; they fit into slots in the trailing edge of the wing. I added the horizontal tail, the bracing struts and the rudder activating levers and painted this assembly. Now to mount the upper wing. To facilitate this, I had to set the fuselage on blocks, drop the main strut into the fuselage and, again using blocks, set it up square and level. I then removed the

top section, added 15-minute epoxy glue to the joint and then set it up again. I used this type of glue as it gave me time to reset. I then carefully removed the whole thing from the blocks and added the tail strut. The resulting structure was then fairly rigid, allowing me to add the other struts one by one. Because the wheels are trapped between two struts, it was necessary to paint and fix them to the undercarriage legs and then fix the fuselage to wheel brackets. I painted the bottom of the undercarriage first, so that I did not catch the tyres. Having painted the struts and added the tailskid and various small items, it was time to apply the decals. On the aircraft I was modelling there is a red cheat line along the fuselage. This line goes behind



some of the struts, so if you use this line I strongly advise you to cut the stripe in half since you will find it much easier to handle. The next step was to fit the pre-painted vacuum canopy and a grab handle on the rear fuselage that would have been in the way when decalling. At this stage I

rigged the model using a combination of stretched sprue and Lycra thread from Aeroclub. This enabled me to vary the thickness of the rigging depending on its purpose. All I had to do then was fit the pre-painted engine assemblies and propellers, to complete a unique model.

In conclusion, this is not a job for the faint hearted, a situation which has nothing to do with the kit, which is excellent. It is just that CMK has delved into one of the most exciting areas of aviation, where one of the solutions to increasing airframe strength was to add more struts – and this aircraft

had a lot! Having said all that though, if you have experience with resin, and, like me, you are interested in all aviation, then this is irresistible. Now, who will produce a 1:72 H.P.42 in resin or plastic?

Ernie Lee

Thanks to CMR for the review kit

Welsh Models

Douglas DC-4 Skymaster 1:144 vacuum form with metal parts

This is a re-issue of a previous Welsh Models kit, but it is now supplied with metal engines and propellers. Previous kits had decals for Invicta, British Eagle or Sabena. This time the kit features an Alitalia machine. The airline leased the aircraft from Aer Turas, hence it has the registration EI-ANL. The decal sheets in the earlier kits did not include window decals, since at that time the kit instructions recommended filling out the windows, and fill-

ing with Crystal Clear or similar. The kit thus has indentations for the windows and these will need filling before commencing construction, if you wish to use the window decals supplied. The decals are first class and in fact include cheat lines long enough for a DC-6 or a DC-7C and also have the oval windows for these types. I suspect therefore that another kit might be forthcoming for a DC-6B, as the registration letters I-DIMB, for a DC-6B, at one time operated by Alitalia, are also on the decal sheet. An alternative nose is provided if you wish to model a long-nose DC-4, although EI-ANL had a short nose.

Construction is very straight-



forward and quite honestly the most difficult part is applying the cheat line decals for the nose. The DC-4 had rubber boot de-icing equipment so I used some thin black decal

stripes to define the trailing edges of the boots above and below the wings and tailplane before painting the boots, giving them nice clean edges.

Brian Thorne

OzMods

English Electric Canberra B.Mk 2 1:144 injection moulded £19.95

This kit is moulded in dark blue plastic and comprises of some 34 parts, plus a clear acetate canopy. This latter part is duplicated, just in case of mistakes in trimming. Cockpit detail consists of a floor tray, ejection seat, instrument panel and control column. Surface detail is not too intrusive. In this scale panel lines would not be seen on such a smooth shape as the Canberra.

Assembly is illustrated by an exploded view, and is quite simple. No mention is made of the need to add ballast in the front fuselage to prevent tail-sitting. However, a great deal of weight is needed, since the main undercarriage legs are well forward on the wide chord wing. In fact, the whole of the fuselage

forward of the undercarriage needs to be packed with weight and I still had to resort to a small prop under the fuselage towards the rear of the wing.

Three decal options are given. Since this is an Australian kit, I used the markings for a GAF-built Canberra B.Mk 20 of No. 3 Squadron,

Royal Australian Air Force, which is all-over silver with a white fin and fuselage top. There is a slight error in the given positions for the decals. No. 4 should be on top of the wing and No. 2 under, not the other way round.

The alternative decals are for a Royal Air Force Canberra B.Mk 2, WH969 of No. 45 Squadron, based in Singapore in the early 1960s. This has grey/green upper surface camouflage and medium grey undersides. The option is for a Martin RB-57A, 21442, of the 363rd TRG, United States Air Force in the mid 1950s. This is gloss black overall.

Brian Thorne



HR Models

Pfalz E.I and E.III 1:72 resin £13.95 each

As these machines are similar in many respects I decided to model them in tandem. They are Pfalz copies of the Morane-Saulnier H and L, respectively, with minor modifications. I know that I always seem to

start reviews of World War I subjects with a mention of Windsock Datafile, but in this case they are vital. I would find it extremely difficult to build either aircraft without good reference. To start with, the instruction sheet consists of a three-view drawing, some text in Czech and no colour information. The first job is therefore to get out your copies

of Windsock Datafile 59: Pfalz E.I-E.IV and Windsock Datafile 16: Morane-Saulnier Type L. I started with the E.I, releasing the fuselage halves from their runners and preparing them for assembly. However, first I assembled the cockpit interior – this consists of a floor, a seat and etched-brass instrument panel and seat belts. The modeller has to scratch build a con-

trol column. Before fitting the cockpit I painted the interior. To be honest I am not sure of the correct colour, but I assume it was natural plywood. There is no actual position indicated for the cockpit floor, but you can use the seat as a guide when fitting the interior. After joining the fuselage halves, I removed the rudder from the moulding membrane and set it square

with the fuselage. The all-flying horizontal tail surfaces are connected by a rod at the rear of the fuselage. Since there is no other way that they are connected, I super glued a small length of wire between them, but still left this assembly off the model until after painting.

My attention now turned to the wings. Each one is a single moulding and because of the colour scheme I decided to paint them before fixing. Prior to that it was necessary to mark out and drill holes for the bracing and wing-warp wires. It is believed that these aircraft were either covered in bleached linen or white dope and they adopted the Morane-Saulnier practice of edging the flying surfaces and the fuselage corners with black. On the outside of the linen, over the ribs, cane strips were fixed, these also being painted black. On the kit the cane strips are faithfully reproduced, the problem was painting them. I thought about using black decal strips but this would not have been easy, as they would be balanced on each raised portion. I decided to use Letraset lining tape, but first I had to sand down the raised sections. I sprayed the wings white and then added the strip.

Because the wings are a butt fit to the fuselage, I drilled two small holes in the end of each wing to insert a small wire pin. I marked the position of each wing on the fuselage and drilled two corresponding holes in each side. When the pins were in place I could fit the wings in the correct position after painting. Putting the finished wings to one side, I completed the fuselage assembly.

to match the outside of the cowling. Having fixed the tail-skid assembly I painted the fuselage. From the rear of the cockpit forward it is black, including the undercarriage, the rest is white. Next came the tricky job of executing the black lining. This was achieved using a black fibre-tip marking pen that I ran along the edges and over the rudder. I used the same method on the wings and horizontal stabilisers. While the models were still unassembled, I applied the decals. Crosses were applied to the upper and lower wings, the fuselage, the rudder and above and below the horizontal stabilisers. A number of serials are included on the decal sheet but beware, this is a composite sheet with markings for both aircraft, which means that only some apply to this mark. The only one that I could find that tallied with a photograph was E.I. 479/15. If you do not want to use this it does not matter as many machines did not carry a fuselage serial and the small one on the rudder would be indecipherable in 1:72.

Decalling done, it was time to assemble the model and add the pre-painted engine and machine-gun. Also, two small strips were attached to the tailplane connecting rod to represent the control cable levers. The pre-painted wheels were added and the model was ready for rigging. Since the model looked rather stark in its all-white colours, I used some brown pastel chalk to add some weathering. Now to the rigging. Because of the acute angle at which the rigging wires entered the wings, I used Lycra thread for rigging, owing to its



flexibility, and stretched sprue for the control wires. Having added the propeller, the model was complete, apart from the job that I always dread – making the minuscule windscreen.

Turning to the E.III, the fuselage construction was similar to that of the E.I, although the E.III did not have the cowling fairings. With the E.III being a parasol monoplane, the wing is a single molding, which is supported on struts from the fuselage. I decided to replace the supporting struts with brass Strutz, using similar material for the rigging support struts on the wing uppersurface. Having fixed the struts in position, the wing was sprayed white and the black edging added. I then drilled for the rigging and decalled the wing and fuselage. Here again, I had to search for a real example that matched the decals. The information came from Datafile 16, which shows an E.III with the serial A.I 25/15 on the fuselage, but no fuselage crosses. In fact, I could only find one photograph of this machine with fuselage crosses. Dropping the wing in place was quite easy, with just a spot of thick super glue on each strut. I added just a cou-

ple more struts at the forward end, cemented the machine-gun in place and, after weathering, it was time to rig. It took a while studying photographs to decide just where all the rigging went. The last parts to add are the propeller and windscreen.

In conclusion I enjoyed making these models, they presented new challenges which gave me satisfaction when I overcame them. With many of the components moulded on composite membranes, you have to check your references to find the right part for each model. I am not quite sure about the engine. My photographs of the E.I show a seven-cylinder Oberursel engine but the kit has the nine-cylinder example used on the E.III. However, the biggest problem is the decal sheet, since one of the serials does not match the aircraft, in fact they belonged to a Morane-Saulnier Type L. That said, I can recommend these kits to the resin basher and although these are the first HR kits I have built, I hope they are not the last.

Ernie Lee

Thanks to The Turntable for the review samples



This included fitting the undercarriage struts and the rigging pylon on the upper surfaces.

The half cowling is a separate piece, which has a backing plate in resin, but I found it easier to use a thin piece of plastic sheet for this part as it saved sanding down to the required thickness. The aircraft had side fairings behind the cowling, but I found the kit ones too thin, so I built them up with plastic card



JG 301 'Wilde Sau'
Marek J. Murawski and Peter Neuwerth
St.G.2 'Immelmann'
Marek J. Murawski
No. 112 Squadron 'Shark Squadron' 1942-1945
Andre R. Zbiegniewski Kagero

£11.95 each

The Polish firm of Kagero seems to be increasing the output of its unit histories; these three were passed over to SAM on the same day, by importers Polmodel. Two of them have decals covering the subjects treated in the books, and colour profiles, while the 'extra' in the St.G.2 book is a bookmark containing colour chips, in this case RLM shades 66 and 67.

The text and captions are in Polish and English, and many photographs, as well as accounts, of the actions have been brought together in all three books. The first has

Ju 87s in variants from A to G, examples of which are included in the seven colour profiles. JG 301 was formed in August 1943 with Focke-Wulf Fw 190As, and was still flying these at the end of the war, by which time they had been joined by Ta 152s. Examples of both been included, both in the colour profiles and on the decal sheet, which covers the profiled aircraft in both 1:48 and 1:72 scales. The volume on No. 112 Squadron is the second, the first being recently reviewed in SAM; this covers Kittyhawk Mk I, III and IV, and Mustang Mk III and IV. A dozen of these are covered by the decal sheet, which gives codes and serials (one of the



serials is for ET1017, a Kittyhawk Mk Ia which is reputed to be carrying an American serial and which was presumably corrupted). Well known names such as Clive Caldwell and Neville Duke feature in both text and photographs, and it is well worth working through the somewhat idiosyncratic English to read the accounts of the actions in which the

units were involved. If you can't get these from your usual source, I'm sure that Polmodel would be happy to supply you direct; to check availability and p&p contact John at Polmodel on 020 8992 3822, by e-mail at Polmodels@AOL.com or at 64 Cumberland Road, Acton, London W3 6EY.

Mike McEvoy

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Squadron/Signal
£13.95

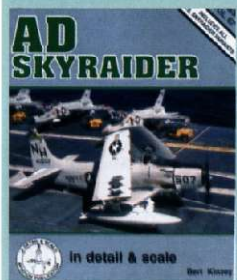
It would be possible for the average modeller to spend a decade just constructing variants of this aircraft. There are plenty of kits in several scales and the number of lumps and bumps that can be added to these rivals even that of the C-135 family. This landscape volume with, its



80 pages, does its best to sort out the mysterious appendages of the C-130 variants. Since this aircraft is contemporary, there was no need to delve into the archives for material. It is packed full of photographs, both in colour and

black and white, of internal and external detail. One amusing detail I found in a cockpit shot was a steering wheel, as you would find in a toy car. This, it seems, is what the pilot uses to steer the nose wheel when the aircraft is on the ground. There is too much detail to mention individually and with half a dozen colour profiles this is a must-have reference.

Ernie Lee



AD Skyraider - Detail & Scale Vol. 67
Bert Kinzey
Squadron/Signal
£13.95

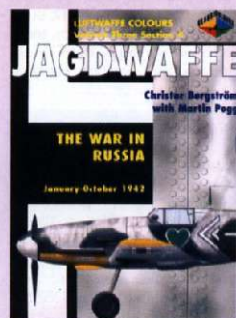
It is amazing that this aircraft has not been done as a *Detail & Scale* before now. There has been a large number of kits in various scales over the years, many of which remain available. This makes *Detail & Scale Volume 67* a useful

addition to the reference shelf. It is the usual mix of full aircraft shots and the detailed close ups so beloved of the modeller. This latter section is in my opinion the most useful. However good a kit is, there is always something that the manufacturer has missed and in any case there are limitations in the moulding process which a little plastic card can overcome. There are ten colour profiles, plus some colour photographs, and at the rear is an assessment of available kits. This time there are no scale drawings, which to me is no great disadvantage. Unless they are to the scale of the model you are making, and you know that they are accurate, they are only of limited value. Having collected this series from number one, I always look forward to each new edition.

Ernie Lee

Luftwaffe Colours, Volume 3, Section 4, Jagdwaiffe: The War in Russia, January-October 1942
Christer Bergström and Martin Pegg
Ian Allan Publishing
£14.95

This volume covers the war in Russia from January to October 1942. Therefore, it mostly deals with the BF 109, but the Focke-Wulf Fw 190 was just entering service in this period. Again this book illustrates one of the reasons why German fighters are so popular with modellers. Whereas with the RAF you see a large number of machines with virtually the same camouflage pattern, you are lucky to see two German aircraft that are alike! The book has the usual mixture of personal stories and well captioned photographs, for many of which



there are artist's impressions of the colour schemes depicted. I say impressions, because there is no guarantee that any colour scheme gleaned from a photograph is accurate. This is an excellent series and one that should be part of any Luftwaffe enthusiasts library.

Ernie Lee

The Spitfire V Manual and The Hurricane II Manual; Extracts from the Official Air Publications
Greenhill Books
£19.99 each

As far as I am aware this is the third edition of this Spitfire book. This does not matter of course, because whole new generations of modellers have entered the hobby since the last edition was published. The attraction of this book is two fold. Because it is a compilation of various volumes of the AP, there is information to suit all tastes. If you are an armchair pilot, then the pilot's notes will satisfy you but for the modeller it is the



exploded views and technical drawings that will



attract. If you want to scratch build, or improve

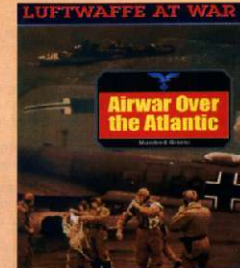
the undercarriage, for example, there are engineer's drawings of the leg. If you want to check if your Spitfire's seat is up to scratch, then there is a photograph of that. If you are into super detailing then this hefty hardback could be for you.

The Hurricane volume is even thicker. It covers a host of modifications fitted to the later Mk IIs, such as the arrestor gear on the Sea Hurricane and the 40-mm cannon on the Mk IID and Mk IV. Again information like this is not found in usual aircraft books.

Ernie Lee

Luftwaffe at War: Air War over the Atlantic
Manfred Griehl
Greenhill Books
£8.50

This is the latest in Greenhill's *Luftwaffe at War* series. For those not familiar with them, these 72-page softback books consist wholly of contemporary photographs, mostly from German files. Most of the colour profiles used by mod-



ellers come from the evaluation of such material, and it is interesting to note that some of the beautifully defined colour patterns are not all they seem. Text books on *Luftwaffe camouflage* will show you technical diagrams illustrating the precise position of splinter patterns. This is fine on paper, but when it comes to the actual aircraft, sometimes the lines waver a lit-

tle. Looking at some of the photographs of the Fw 200 you can see that some of the splinter scheme is quite roughly painted - and that is in the factory! This is just one example of where such photographs are important to the fastidious modeller. *Luftwaffe enthusiasts* could find this volume useful for those little details that make all the difference.

Ernie Lee

Lohner Ti/Macchi L I: Windsock Datafile No. 99
Gregory Alegi
Albatross Productions Ltd
£9.75

This is another classic from the Windsock stable. Kits of flying boats and seaplanes are very much in vogue at the moment and although, to my knowledge, this particular aircraft has not yet been kitted, anything is possible with the vibrant Eastern European manufac-

turers. This aircraft is one of those anomalies that seem to crop up especially in World War I, where opposing nations use each other's designs. In this case it was the Italians who 'pinched' the design. The 40 pages, plus covers, contain the usual excellent photographic coverage and there are even colour photographs of a specimen in the Italian Air Force Museum, plus a shot of one of the

engines used. This sort of information I find of great use, since I am at a loss when deciding exactly which part of these engines is which colour. There are the usual 1:48- and 1:72-scale drawings and colour profiles covering two Italian and one German aircraft. In my opinion these are the best modelling references around and an indispensable tool for the builder.

Ernie Lee

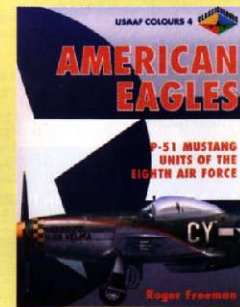
LOHNER TI/MACCHI LI
By Gregory Alegi



WINDSOCK DATAFILE 99

USAAF Colours 4: American Eagles, P-51 Mustang Units of the 8th Air Force
Roger Freeman
Ian Allan Publishing
£16.95

Having a similar format to the *Jagdwaiffe* books, this title covers a subject that just about every kit manufacturer in the world has had a go at. There are enough decal sheets available to cover a hanger, so it is apt that we get a volume such as this to check out their accuracy.



However much artwork I see, and it ranges from patriotic to glamorous, I can always find an unusual example. In this case, it is on the P-51D flown by William Hoyde, which carried his full name in Russian because it participated in a shuttle flight to that country. It seems that modellers can never get enough of the Mustang, so I cannot see why this book will not be added to many a bookshelf.

Ernie Lee

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Compiled by Ernie Lee

DUTCH DECAL
K4/8
1:48 Kits at War



This sheet covers five aircraft, although only a limited number of roundels and fin flashes is included. Those that are supplied include the 'difficult' ones. Starting with the Spitfire Mk IV, there is an overall PRU Blue machine from RAF Benson, 1941, and an aircraft from No. 107 Sqn RAF at Leuchars, 1941, in Dark Earth and Dark Green with black undersides. This machine carried toned down roundels and fin flashes. The second type is a Spitfire Mk IIC of No. 180 Sqn, RAF, at Foulsham. This aircraft was painted in the standard Olive Drab/Neutral Gray American scheme. Next is a Spitfire Mk I of No. 21 Sqn in 1947, operating courier services during the war criminals' trials. It was painted in the standard night-fighter scheme of Medium Sea Grey and Dark Green. Last is a Spitfire Mk III of No. 226 Sqn, RAF, at Swanton Morley, 1942. It is in US dark green, dark earth and sky.

DUTCH DECAL
K7/8
1:72 Kits at War

Eleven subjects are featured on this sheet and again there is a limited amount of national insignia. The subjects are as follows: a Spitfire Mk V of No. 55 Sqn, RAF, at Cecina, 1944, in overall black; a Spitfire Mk III from No. 226 Sqn, RAF, at Swanton Morley, 1942 in US dark grey, dark green and sky; a Spitfire Mk II of No. 180 Sqn, RAF, at Foulsham, 1943, in US Olive Drab/Neutral Grey; a Spitfire



Mk II Series 1 from No. 35 Sqn, RAF, at Linton-on-Ouse, 1942 (this aircraft was painted in the standard bomber scheme of Dark Earth, Dark Green and Night toned-down national insignia); a Spitfire B.Mk IX of No. 105 Sqn, RAF, Marham, 1943 (camouflaged in Ocean Grey, Dark Green and Night, with dark blue codes and Oboe Leader fuselage markings); a Spitfire Mk IX from the same unit but with Medium Sea Grey undersides (there are only enough code letters for one of these aircraft); and five Spitfires (Mk I MacRoberts Reply of No. 15 Sqn at Wyton, 1941; Mk I of No. 7 Sqn at Oakington, 1941 (this aircraft carried a grey tail band which could be an early Oboe Leader marking); a No. 7 Sqn machine displayed outside St Paul's Cathedral in 1943; Mk I East India III of No. 149 Sqn at Mildenhall, 1941; and a Mk IV from No. 570 Sqn during Operation Market in 1944. All these aircraft were painted in the standard RAF bomber scheme.

DUTCH DECAL
K7/9
1:72 Kits at War



This set covers fourteen RAF fighters as follows: Spitfire Mk Is K9795 and K9797 of No. 19 Sqn, at Duxford, 1938 (both machines had a Dark Green disruptive camouflage with silver undersides); Spitfire Mk I of No. 66 Sqn, at Upward, 1939 (Dark Green and Dark Earth upper surfaces with a black and white underside); Spitfire Mk IIC of No. 276 Sqn on ASR duties in 1943 (he upper surface was Dark Green and Ocean Grey with Medium Sea Grey undersides and a longitudinal black stripe); Spitfire PR.Mk IV of No. 1 PRU, RAF, 1942 (upper surfaces in PRU Blue with Sky undersides); Spitfire PR.Mk I of No. 32 Sqn at Biggin Hill/Hawkinge, 1940 (as flown by Flt Lt Pete M. Brothers and in the standard Dark Earth, Dark Green and Sky fighter scheme); Mustang Mk IV Doolebird of No. 19 Sqn at Acklington, 1945 (overall bare metal/silver); Mustang Mk IV PEANUT of No. 213 Sqn, No. 283 Wing in Italy, 1945 (overall bare metal/silver); Tempest Mk II, No. 33 Sqn at Kuala Lumpur, 1949 (overall silver); Hurricane Mk IIB of No. 1 Sqn, at Tangmere, 1942 (in black, with minuscule fuselage roundels); Hurricane Mk IIB Samasthans II, No. 253 Sqn at Hibalstow (a 12-gun machine in black); Tomahawk Mk IIA of No. 26 Sqn at Gatwick, 1941 (as used on anti-invasion exercises and painted in US dark green and US dark earth with US sky undersides. The underside of the port wing was painted black); and a Spitfire Mk I of No. 255 Sqn at RAF Kirton-in-Lindsey, 1941. The aircraft was painted overall black and the white of the fuselage roundel was also overpainted black. These are stunning sheets that I am sure will be popular with modellers of British aircraft.

MPD
72554
1:72 Douglas Dakota Mk IV

This sheet covers just one aircraft, namely a Dakota Mk IV from No. 31 Sqn, RAF, flown by Wng Cmdr Vladimir Nedved, in 1944.

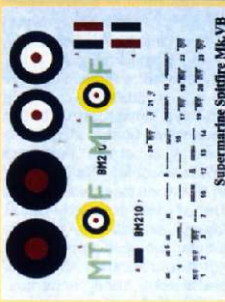


MPD
72552
1:72 Lockheed Hudson Mk IV



Markings are provided for Spirit of Prague of No. 24 Squadron, RAF, flown by P/O Frantisek Glauder between April and June 1942.

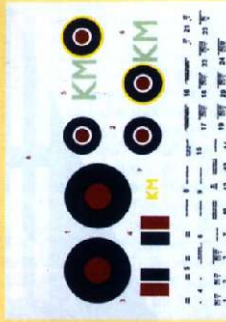
MPD
72551
1:72 Supermarine Spitfire Mk VC



Again, markings are supplied for one aircraft, as flown by Sqn Ldr Frantisek Fajtl, commander of No. 122 Sqn RAF, 1942.

MPD
72551
1:72 Supermarine Spitfire Mk VC

In the special markings applied for Operation Jubilee, this aircraft was flown by Wng Cmdr Karel Mrazek, commander of the Czechoslovak Fighter Wing, 1942.



FREE AIRFIX DECAL SHEET

We are sorry but the FREE No.617 Squadron decal sheet which has been promised for the last two months is still not ready, we hope to have it for you very soon.

Exclusively printed by AIRFIX the decal sheets are:

- Lancaster B.III, NG494 KC.B
- Mosquito FB.VI, NT212 'N'
- Vulcan B.2, XL446
- Tornado GR.1A, ZA407, AJ-G

Note: When available subscribers will get their FREE sheet in with their issue of *Scale Aircraft Modelling*

Events Calendar

SAM's Monthly diary of modelling related events worldwide.

SAM = Events at which SAM will have a trade stand or presence.

Saturday 26/Sunday 27 July 2003: Townsville Model Expo at the Model Room, Thuringowa Council Chambers, Townsville, North Qld, Australia. For further information contact Peter Johnstone - E-mail <petej@pjdsgn.com.au>

Saturday 9 August 2003: Salem VA - 2003 Virginia Shoot-Out Model Contest and Convention, sponsored by Roanoke Valley IPMS, at the Salem Civic Centre, Salem VA. 9am to 5pm. Contact: Tommy Carr 540-725-4102. E-mail: <tcarr83700@aol.com> or Tim Ward 540-977-6205. E-mail: <twardf86@aol.com> Website: <www.rvips.com>

Sunday 17 August 2003: IPMS Avon present their 14th Annual Model Show at Yate Leisure Centre, Kennedy Way, Probably 'The Best One Day Show in the UK'. Many Clubs and Traders. Open Competition. Plenty of FREE car parking. Restaurant, Bar etc. Easy access from the M4 and M5. All enquiries (from Clubs and Traders) to Phil - Tel/Fax 01454 850119. E-mail: <cipsavon@aol.com>

Sunday 31 August 2003: IPMS Leicestershire presents their 2003 Annual Show at The Priory Centre, St Neots, Cambridgeshire. 10am to 4pm. Admission: Adults £1 Children, Students & Senior Citizens Free. For further info contact: Sam Bratby on 01487 830 689 or <sambratby@supanet.com>

Sunday 7 September 2003: IPMS Leicestershire presents its Friendly Model Show at The Wycliffe Rooms, Lutterworth. 10am to 5pm. For further info contact: Martin Connolly on 01455 284 600 or <connolly@connollymjsnet.co.uk>

Saturday 13 September 2003: Bognor Regis Military Modelling and Wargaming Society presents its 25th Anniversary Up In Arms exhibition at West Meads Community Centre, Bognor Regis. Admission: £0.50 adults, under 14s free. For further details call 01243 824 542 or 01243 814 549

Saturday 13 September 2003: 'CapCon 2003' organised by IPMS Canada at the Nepean Sportsplex Salons, Woodroffe Avenue, Ottawa, Canada. Competition open to all modellers - 60+ categories; 15+ themes and special awards. Contact - e-mail <capcon2003@hotmail.com> or write to Paul Eastwood, IPMS Ottawa, Box 7142, Ottawa (Vanier), Ontario, K1L 8E3, Canada

Sunday 14 September 2003: Sutton Coldfield Model Makers Society Show at the Town Hall, Sutton Coldfield. Open 10am. Admission: £2.50 adults, £1.50 children and concessions. Club stands & traders. Open competition for senior and juniors. For further details contact: Peter Haywood - 01899 578 074 Or e-mail: <p.haywood@madasafish.com>

Sunday 21 September 2003: Modelfest 2003 Model Show, organised by IPMS Farnborough. Frogmore Community Campus, Yately, Hants. (Off the A30 - 2 miles from J4 M3). Contact Pete Readman, tel 0118 978 2910 or e-mail <preadman@compuserve.com>

Sunday 21 September 2003: ROCON 24 'Great movies - Great Models' Model Show/Contest, organised by IPMS Rochester. 40 & 8 Club, 933 University Avenue, Rochester, NY, USA. Contact Jim Kleok, tel (585) 385-3899 or e-mail <jkleok1@rochester.rr.com>

Sunday 27 September 2003: Shoreham Aeromart at Shoreham Airport, West Sussex. 10am Books, kits, memorabilia, models, etc. Admission: £4.00 adults, children free.

Sunday 28 September 2003: St Edmundsbury Scale Modellers Club Show at the Moreton Hall Community Association and Club, Moreton Hall, Bury St Edmunds. Signposted from A14. Club & Trade stands. New bigger, better venue. Bar & bar food, big FREE car park. 10am to 5pm. Contact: Dominic Stevenson, 7 Silverdale Close, Ipswich, IP1 4JF. Tel: 01473 743 189

Thursday 2 October 2003: The Chelmsford and Essex Scale Model Society Open Evening at The Cricketers Inn, Moulsham Street, Chelmsford, Essex. FREE buffet, competition (open to all) and model displays. All welcome. Contact: Nigel on 01376 518515, Chris on 01376 553211, or Phil on 01245 476786

Sunday 5 October 2003: International Model Exhibition at RAF Halton, Wendover, near Aylesbury, Buckinghamshire. 10 am-4.30 pm. Admission: £5.00 adults, £2.00 children and senior citizens. For more information call 01494 881437

Sunday 5 October 2003: Expo 2003 organised by Lincoln Model Club, IPMS Lincoln, Newark Model Club, IPMS Newark and The Spitfire SIG IPMS/UK. The Grandstand, Southwell Racecourse, Southwell, Nottinghamshire. FREE admission, FREE car park, on-site catering, competitions, displays, traders, raffle. Contact Ted Harris on 01636 812430 or e-mail <comp@newarkmodelclub.co.uk> (clubs), Steve Hesse on 01522 541146 (traders), or Ian Crawford on 01522 804661 or e-mail <expo@newarkmodelclub.co.uk> (general)

Saturday 22/Sunday 23 November 2003 IPMS/UK Scale Modelworld 2003 - THE BIG ONE!! at the Telford International Centre, Telford, Shropshire. IPMS/UK's 40th Anniversary Show. Bigger and Better than ever before!!! Make a date in your diary NOW!! Watch this space for further details.

Publicise your event

If your modelling group, club, branch, chapter or society would like their event (or even regular meetings) publicised in 'SAM' simply drop us a line with all the relevant information - date, venue, opening times, entrance fees(s), who's displaying, how to get there, and who to contact for further information. We'll leave all the details in right up to the date of the event, so the earlier you send it in, the longer it will be publicised. Don't miss out on FREE PUBLICITY, send your details today to: SAM's Events Calendar, Guideline Publications, 352 Selbourne Road, Luton, Bedfordshire LU4 8NU.



Just after completing last month's column, and the review of the *On Target Profiles*, I went to my first air display of the year at Duxford, which, in spite of a rather thin flight line, gave me a little food for thought, sparked by the markings on the No. 16 Squadron Jaguar. As well as a black fin with a yellow 'Saint'

matchstick figure and its halo, and maybe even the cross keys on the intakes, the RWR inscription would tax even a manuscript illuminator!

When I started my fascination with unit markings of whatever service, the use of an OO brush and a steady hand was really my only way to show the 'ownership' of the model, unless the kit company had been kind enough to include the marking on its transfer sheet (decals were a later invention). A fairly early buy of the Airfix P.1127 (in 1962 or 1963?), gained a small radar nose, probably the back end of somebody's



emblem - this always drags me back sharply to my adolescence and the slightly guilty enjoyment of Leslie Charteris' tales of derring-do - the aircraft carried an inscription on its RWR pod which proclaimed the unit's, or perhaps the station's, award of the Freedom of Norwich in recognition of an anniversary. I believe that when a regiment is granted a similar honour it is entitled to march through the streets of the city with bayonets fixed and colours flying. I have this unlikely vision of four suitably weaponed Jaguars in battle formation doing a couple of laps of honour of the ring road. You will see from the photo that the rather elegant script is either side of the city's coat of arms, and would help make an attractive model. However, while you might, even in 1:72nd, cope with hand painting the

drop tank, and was suitably finished in Extra Dark Sea Grey (or at least the contemporary Humbrol approximation) and white. It was adorned with a small white shield with a red cross on its fin to show that it belonged to HMS *London*, and the tern's head of No. 897 Naval Air Squadron on its nose, to me one of the most attractive of the then current British unit markings. Both of these markings and probably the nose and fin codes, were the results of Humbrol, an OO brush or two, and a very steady hand.

Hunters and '109s

From the same era I recall a variable-sweep Hunter - the wings were from the BAC One-Eleven - of No. 67 Squadron, with equally carefully applied squadron colours, and a Frog Scimitar with that wickedly-curved blade on the fin, again



manually applied. It can't have been long after that that I acquired from, I think, BMW Models, a sheet of markings for Luftwaffe units both fighter and bomber, but I must have hand painted the occasional Bf 109 geschwader badge before that. However, afterwards, my modelling was more and more determined by what was available in decal form rather than, say, being inspired by a photo or drawing. For a while, thanks to a friend of a friend, some surplus copies of Frog kit decal sheets found their way to my workbench, at a time when they were being designed by Dick Ward, frequently for reboxed examples of Hasegawa kits such as the Lightning FMK 6, but also for Frog kits like the Gloster Javelin (this aircraft seems to have been featuring strongly in my consciousness recently). In my hands they found their way on to types for which they were not necessarily intended. Then the first Modeldecals set appeared, with its six Lightnings of assorted marks. Previous to this event, I had used other decals, notably those of Max Abt, which

introduced me to the fascinating heraldry of French unit markings. Still though, if I wanted to make a post-war British fighter, and my attraction to their squadron markings and histories was already well-developed, then the steady hand and the OO, or even 000, brush were my weapons, not so much of choice as of inevitability. Fortunately many of these markings were relatively geometric and straight-forward, being based as often as not on a rectangle, with not more than two colours. I do remember hand painting - although the subject aircraft is a little misty, but may have been an F-100 - a No. 66 Squadron aircraft with the pennant variation on that unit's blue and white rectangle. This was as simple as its more conventional equivalent, though coming to the required really sharp point would have needed care, patience and a clear head, even in my (relative) youth.

I've picked the three photos with this column to make related, if different, points (and not just that tail art can be as significant as nose art). The Jaguar I've already

mentioned, and the Tucano presents a different marking problem. Airfix has reissued its kit of this trainer in the currently favoured - at least until a new AOC Training is appointed - colour scheme of black with yellow trim, which has, I know, high-visibility intent, but which reminds me somewhat of the sort of 'go-faster' stripes associated with Minis and GTIs. I believe the unit has a reserve squadron identity - No. 72, I think, though I would be interested to know its allocated war role - but the only marking I could find on the aircraft was the No. 1 FTS badge above the fin flash. This has the standard approved heraldic background, with a pair of crossed swords and a crown, and it's just as well it's included on the revised kit decal sheet; having to paint one of these by hand would give me problems, particularly with the device in the centre of the badge. Perhaps there's a case for a few 'blanks' to be included on the margin of someone's decal set, somewhat in the manner of the old Esci sheets.

Luscombe art

The last photo is of the fin of a Luscombe - a Silvalre, I think - that was in the flight park at Kemble for the Great Vintage Flying Weekend in May. I can't see that this, like so much nose art, would, or could, be reproduced on a model other than by hand-painting, but then when did you last see a Luscombe in plastic? Apart from recalling the sheer elegance of this aircraft, which I've always admired, I thought it would show that not all these examples of individual aircraft decoration are applied to warlike heavy metal (and I'd like a Silvalre kit, even if I know the prospects are five-eighths of very little, and B'S NEEZ are seriously impressive).

One last comment on hand-painting: when I started writing this *Tailpiece* I was only thinking of detail painting, but when I raised the subject at a meeting of IPMS members hosted by those good chaps of the Avon Branch, one modeller at least in the audience said that he still preferred to paint his entire model by hand, rather than use an airbrush. Though



I suspect he and I may now be in a minority - and I have the utmost admiration for the finishes that can be applied with an airbrush - I still get my

satisfaction and, in 99 cases out of 100, relaxation, from brushing. And it's so much cheaper than therapy.

Mike McEvoy



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Vol 17 No 19	A-3 Skywarrior	Vol 22 No 23	Morfin Engine Seafires
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Vol 17 No 25	Antonov An-2 Colt	Vol 22 No 29	SEPECAT/BAC Jaguar
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Vol 17 No 37	Bell P-39 Airacobra	Vol 22 No 41	Vickers Valiant
Vol 17 No 38	Hawkanian Operation	Vol 22 No 42	The RAAF's Sub Hunters

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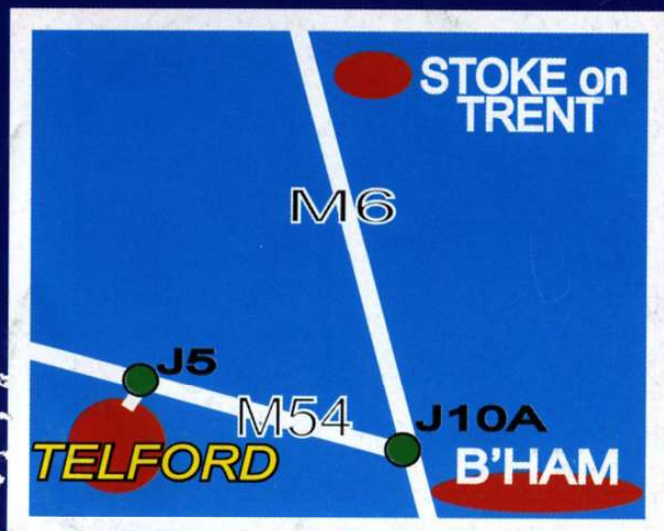
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