1152

Above one of the first production MD-ls. Apart from a few aero-dynamic fixes the aircraft was a little different to the XA4D-I prototype. Below an A-4C launches off the USS Enterprise. The Skyhawk's small
size facilitates shipboard storage

26, 1956. About 542 were built for the US Navy, the first entering service in 1957.
Some years later 66 ex-US Navy A^tBs were refurbished and supplied to Argentina as the A-4P (50 for the Air Force) and A-4Q (16 for the Navy). A further 43 surplus A4Bs were modified by Lockheed Air Services, Singapore, to A-4S/TA-4S standard.

The A-4 went all-weather with the A4D-2N (later A-4C), which first flew on August 21, 1958. Changes mainly in-volved the avionics, with the addition of a low altitude bombing system, terrain-avoidance radar, angle-of-attack indicator and all-attitude artificial horizon. The changes were so numerous that the nose had to be lengthened for extra room. Powered by the J65-W-16A, the skyhawk now weighed 9,6001b empty, compared with 8,1001b for the A4D-1. Douglas delivered 638 A4D-2Ns; from 1959 and much later a number of aircraft were updated to A4F standard. They were fitted with 8,5001b thrust engines and issued as the A-4L to USN and Marine Corps reserves.

At this point the smooth progression of Skyhawk models hiccups, with the cancellation in 1959 of the J52-powered A4D-3. The Pratt & Whitney engine was to have given the Skyhawk the power it needed to overcome weight growth and go on to better things. Was this the end of the line? After all, the Skyhawk had now been in production for the planned five years.
Fortunately it was not the end, and the J52-powered A-4 reappeared on July 12, 1961, in the form of the A-4E (actually A4D-5). Powered by an 8,5001b-thrust J52-P-6A, the latest Skyhawk had an empty weight of 9,3001b, a maxi-mum take-off weight of 24,5001b and could carry 8,2001b of stores on five hardpoints (two more than previous versions). Deliveries to the US Navy began in 1962 and 499 were built, some of which were supplied to Israel. June 30, 1965, saw the first flight of the two-seat TA-4E, later to assume the guise of TA-4F. Modified from an A-4E, a 28in fuselage extension was added with the resultant loss of 100 US gal internal fuel and the addition of 6001b to the empty weight. Powerplant was the 9,3001b-thrust J52-P-8A. The trainer retained most of the Skyhawk's combat capability, improving on some areas, such as the addition of Douglas Escapac zero-zero ejection seats. Deliveries to the US Navy began in 1966.
Vietnam combat experience began to feed back to the

FLIGHT International, 14 April 1979

designers, producing, among other things, the A-4F. The Marine Corps had been using Skyhawks from unprepared forward strips. Because of this, the AAF was provided with nosewheel steering, low-pressure tyres, wing lift spoilers which reduced landing runs by up to 1,000ft and improved crosswind landing behaviour. Cockpit armour was provided and the A-4F, the first Skyhawk to have the distinctive avionics hump, had most of the improvements fitted to the TA-4F. First flight was on August 31, 1966 and deliveries began in 1967.
In all, 146 A-4Fs were built, but the type fathered a number of sub-types. Proclaiming that the Skyhawk had "proved itself as rugged, easily maintainable and second to none in cost effectiveness," the Royal Australian Navy ordered 10 A-4G/TA-4G-S, later increasing this to 16. The aircraft, delivered in 1967, are used for fleet air defence and limited strike, operating from the carrier Melbourne. Israel received 108 A-4Hs and ten TA-4Hs between 1968 and 1972. Basically an A-4F with Israeli modifications and systems, the A-4H carried two 30mm Defa cannon in place of the 20mm Mk 12s. In 1968 New Zealand ordered 14 A-4K/TA4Ks to replace Vampires. As the aircraft were to operate from forward airstrips, a braking parachute was specified. The aircraft were delivered in 1970.

The next major Skyhawk variant was the TA-4J ad-vanced trainer. Deliveries of over 200 aircraft to the US Naval Air Training Command began in 1969. Based on the TA-4F, the trainer was powered by a J52-P-6A and most of the combat avionics were deleted. The prototype first flew in May, 1969.
Dubbed Skyhawk II when it first appeared, the A4M incorporates a wealth of combat experience. A redesigned cockpit has enlarged canopy and bulletproof windscreen and armour forward and below the pilot. The addition of a braking parachute permits operations from 4,000ft strips. Ammunition capacity is doubled, with 200 rounds per gun. The avionics fit includes Marconi Avionics head-up display, Lear Siegler inertial navigation system, APG-53A terrain avoidance radar and internal electronic countermeasures. All this added capability has increased weight and the empty weight now exceeds 10,4001b. The ll,2001b-thrust J52-P-408A has a self-contained starter, and generator capacity has been increased to cope with the added sys-tems. The first A-4M flew on April 10, 1970. Kuwait ordered a version of the A-4M, receiving the first of 30 A-4KUs and six TA-4KUs in 1977. Heir to the title Sky-hawk II was the A-4N, 104 of which were delivered to Israel. The A-4N was tailored to Israel's requirements, with 30mm Defa cannon and reduced engine smoke.

The A-4M is operated by the Marine Corps and remains the only Skyhawk variant in US front line service. US Navy and Marine Corps reserve and training units still operate various versions of the A-4 and the Skyhawk is expected to remain in US service until 2005. Israel is keen to sell off some of the older A-4s, notably to Malaysia, but will be operating the A-4Ns for some years yet. Skyhawks may not be immortal but continuous development has ensured a place in history for Heinemann's inspired design. *- page 1155