F-4E Phantom

The McDonnell Douglas PHANTOM II was the fighter aircraft of the 1960s and 1970s. Designed as a fighter aircraft for the US Navy, it was used in many roles: fighter, interceptor, fighter-bomber, reconnaissance, tanker, drone, defence suppression and laser designator aircraft. The F-4 was the mainstay of the Western Alliance air forces and during the Vietnam War it meant American airpower. A total of 5195 Phantoms were built in seventeen major variants. The RAAF operated the F-4E as an interim aircraft while awaiting delivery of the F111C from 1970-1973.

From a pilot perspective, the F-4E was a magnificent aircraft to fly and operate. The high thrust-weight ratio, (with the great afterburners), gave excellent acceleration, and the 8.5g limit (clean), multiple/heavy weapons loads and integrated air-to-air and air-to-ground radar/navigation systems, made the aircraft a formidable weapons platform.

Those of us who were fortunate to have flown and maintained the Phantom F-4E in Nos 1 and 6 Squadrons, RAAF, remember those years with pride and satisfaction of having flown one of the world's great fighters. The F-4 is the leading aircraft in the Warplane Hall of fame.

Background

Following delays in the delivery of the F111, Defence Minister Fraser led a team of RAAF specialists to USA to review the F111 program with US officials. Defence Secretary Laird was keen that Australia could meet its strategic interests in South East Asia and offered the F-4E Phantoms as interim strike aircraft, at short notice and on very favourable terms.

While the F-4E was a great combat aircraft of the 1960s, it was an all – weather fighter with a limited all – weather ground attack capability. In the strike/attack roles, it could carry 12 x 500lb (227Kg) bombs and up to 4 Sidewinder air-to-air missiles, unrefuelled, over a combat radius of 450 n miles (840Km). Air-to-air refuelling would extend this radius. DCAS at the time, Air Vice-Marshal CF Read, recommended the F-4E Phantom over two alternatives, the Grumman A-6 Intruder, a capable all-weather attack aircraft, and the British Buccaneer. Interestingly, the F-111 had a Navigation Bombing System (NBS) with similar capabilities to that installed in the A-6 aircraft.
While the F-4E had a Weapons Release Computer System (WRCS) and the Buccaneer had a basic weapons delivery system, neither had a weapons system

comparable to the F-111 or the A-6. US technology, together with a proven combat record and weapons delivery platform (albeit visual), were better indicators of the RAAF preference for the F-4E while awaiting the F-111 deliveries.

Fraser-Laird Agreement

A leasing agreement between Defence Minister Fraser and Defence Secretary Laird was agreed in June 1970 for 24 new aircraft from the McDonnell factory in St Louis. The cost to Australia was in the order of AUD40M for the lease period. Air-to-air refuelling support was included in the agreement; subject to a US overriding requirement, USAF would provide in-flight refuelling if a defence emergency requirement arose where Australia needed to deploy the Phantoms. Air-to-air refuelling was essential, as the F-4E was limited in range and could not deploy far outside Australia without tanker support.

Training And Ferry

Many aircrew and ground crew selected for the F-4E project had completed training on the F-111 in 1968 and were conversant with modern weapons systems. The first crews left Australia in early July 1970.
Of the original 24 navigators who trained on the F-111A at Nellis AFB in 1968, only ten remained at 82Wing. They were the first to depart for USA to train on the weapons system at Davis Monthan AFB, Tucson, Arizona, in July 1970. Pilots went direct to 4530 TTS, MacDill AFB in Florida and the navigators who trained at Davis Monthan, joined them in August for flight conversion to the aircraft. Following conversion, crews picked up new F-4Es at the McDonnell Douglas factory in St Louis before ferrying the aircraft to Amberley, via George AFB, Ca, Hickam AFB, Hi and Andersen AFB, Guam.
A mix of USAF and RAAF crews completed the ferry, with the last two Phantoms reaching Amberley on 4 October 1970. Captain Chris Patterakis (USAF) and FLTLT Lance Halvorson crewed the second last aircraft, 97234, to reach Australia. FLTLTs Brendan Roberts and Trevor Richardson were number 2 Phantom in this last Aussie flight.
By the end of November 1970, the RAAF had two squadrons of Phantoms operating at Amberley with minimal USAF support. Much of the ground support equipment procured for the F-111 was used and a limited amount of test equipment came as part of the ‘Peace Reef’ package.

Back Home

The project indicated the professional competence of the RAAF to train on a new aircraft, ferry the aircraft over the Pacific and have two squadrons operational in Australia six months after the decision was made to lease the F-4E Phantom.

The Phantoms were immediate hits with air and maintenance crews and the Australian public. During the RAAF's 50th Anniversary celebrations in March 1971, the Phantoms were the crowd pullers at major air shows in seven states. The GE J-79 engine gave excellent acceleration, and the multiple/heavy weapons loads and integrated air-to-air and air-to-ground radar/nav systems, were major technology leaps for crews who were used to the basic systems in the Canberra and Sabre.

As in all two-crew aircraft, teamwork between the pilot and navigator in the planning and air phases of a mission is the key to success. Management of the weapons systems was a continual challenge to improve weapons delivery accuracy and post flight analysis by air and ground crews, and it paid dividends. The serviceability rates achieved by the RAAF far exceeded that of many similar USAF units.

At the time, the F-4E model was the leading fighter in the west. It was a solid, stable weapons launch platform, yet highly agile given the aerodynamic design and dependable GE engines. Full afterburner to idle and back to full military power produced no stalls or other adverse effects, a trait not seen on many engines at that time. With a clean aircraft (about 12500lb/5700Kg fuel), from brakes off to 600 knots took a little under 40 seconds and a 3-4g rotation and climb to 40,000 feet took another minute. Perhaps slow by some of the aircraft today, but incredible 36 years ago.

Air to ground gunnery with the nose-mounted GE M61 Vulcan 20mm gun was a new experience to many. A typical pattern was entered at 4000 feet, followed by a 15º low angle run-in, opening fire at 1800 feet and cease firing at 1200 feet slant range. A yaw string on the nose in front of the pilot, assisted in balancing the aircraft for weapons release or gun firing. The gun had 6000 rounds per minute rate of fire, with a rounds limiter switch. Rate of fire could be reduced to about 4500. Total rounds carried was 650 – 10sec or 14 secs at the lower rate.

Crews used all the bombing modes, including, dive, skip, dive toss and level radar but the most accurate was the dive-toss, which required a radar 'lock-on' to ground return for slant ranging for the computer which calculated the release point as the pilot initiated a 4g pullout.

The RAAF used the Phantom primarily in the strike role although most sorties included training in the air-to-air role. Crews practised dive bombing from 30-60 degree (max 30 degree at night was exciting).
The Phantom suffered from an adverse yaw problem – at high angles of attack when aileron was applied, the aircraft would turn the opposite direction and depart controlled flight—to prevent this, the pilot had to use rudder only, which took a bit of getting used to. In a tight turn of 5-6g, to reverse the turn, it was a boot full of top rudder (or bottom, depending on the circumstances) and hold the back stick. The aircraft would really whip around, so crews had to be on their toes!

Pilot induced oscillations (PIOs) brought on by control inputs out of synchronisation with aircraft movements, often produced a 'vicious' un-planned change of flight direction. Excessive power changes resulted in rapid trim changes with similar results.

Landing the Phantom was like any other Century series aircraft. Normal practice was to maintain speed around 125-130KIAS and fly at a constant angle of attack, no round out, until touchdown. Boundary layer control (BLC) improved the low speed handling of the aircraft. Ground effect and rounding out did flatten the approach slightly. The drag chute was very effective and often pilots would need power to make the turnoff before dropping the chute; nose wheel steering was engaged at 70KIAS. The E model brakes were very effective and with good judgement, the aircraft could easily stop in 1500 feet.

Landing Accident 97234

The first major incident with Phantoms in the RAAF occurred with 97234 on 19 October 1970. On its first flight in Australia after arriving from USA, 97234 (with about 27 total airframe flight hours), the flight lead aircraft flown by FLTLT Jack Ellis, suffered a right generator failure and malfunctioning bus tie contactor. As a result, the brake anti-skid system and nose wheel steering were not available. As there was a prevailing 15 knot crosswind, normal USAF procedure with these systems inoperative was to fly an approach-end engagement of the hook cable. USAF instructor pilots in the Amberley tower recommended the same action.

Following touchdown, at about 150KIAS, the hook engaged the cable on RW15 centreline. As the nose wheel trampled the cable, the cable oscillated and, together with slack in the cable, caused the cable to come off the drum, run out and break. The Phantom yawed to the right and ran off the runway before yawing back left when the left main wheel hit soft dirt. The cable whipped back around the aircraft, damaging the external tanks, landing gear doors and the radome. In addition, 234 suffered extensive damage to the front fuselage, right wing and left and nose landing gear structures. The aircraft was repaired by 3AD in 11 months – the major repair was replacement of the right wing, the first time a depot repair task of such magnitude was carried out on a Phantom by any Air Force maintenance crews.

Loss Of 97203

Unfortunately, the RAAF lost an F-4E and crew on the night of 16 June 1971 near Evans Head bombing range in NSW. Following a bombing detail and on clearing the range to the north, the crew was completing a visual re-join on the flight lead when radio contact was lost. SQNLDR Stu Fisher and FLTLT Rob Waring were tragically lost in the accident. The following day, wreckage was positively identified as being from the missing Phantom.

Return To USA

Two years after arriving in Australia, the first 12 of the RAAF F-4Es left Australia on 4 November 1972 with the final 11 departing in June 1973.
Most of the 23 Phantoms returned to USA were modified to F-4G Wild Weasel (electronic warfare) aircraft and continued flying until the USAF retired the type in the late 90s. Nearly all the remaining ex-RAAF tail numbers were modified to QF-4 drones and employed as targets or are stored at AMARG (boneyard) at Davis Monthan AFB, Arizona.

Summary

The RAAF crews who were fortunate to have been involved with the Phantom in RAAF service remember the years with pride and satisfaction of having flown one of the world's great fighters. The aircraft certainly introduced the RAAF into the American way of the fast, high technology fighter/bomber with advanced systems. However, it did not have the capability that the RAAF required in an all-weather strike aircraft that the F-111 would provide from June 1973.

Article by:
Dave Rogers F-4E pilot and Lance Halvorson F-4E navigator.
Both Dave and Lance were on the Phantom ferries from USA to Australia in Sep and Oct 1970 – Lance with Capt Chris Patterakis USAF in 97234.
Dave and Lance were in the 4 x F-4E flight when the flight leader, Jack Ellis, had a right generator failure and loss of the bus tie contactor in 97234, on its first flight in Australia—with a total of 27hrs flown since new. Jack Ellis chose to carry out an approach-end engagement, when the cable ran out, unlatched and broke.