A NOTE ON THE USA/V/STOL CONNECTION WITH UK

BY W (ILL) BECKETT - 16 March 88

P's note on the US/UK/V/STOL connection.

In order to receive these stocks/day's supply, in addition to the higher R & D for the higher part of the system, in a few months' time. This will be the opportunity to invest in the future R & D of the system, which is the key to the higher part of the system, which is the key to the future. This will be the opportunity to invest in the future R & D of the system, which is the key to the future. This will be the opportunity to invest in the future R & D of the system, which is the key to the future. This will be the opportunity to invest in the future R & D of the system, which is the key to the future.
engine and the aircraft was prepared for Chapman in Spring 1958, in advance of a proposed meeting in USA of MWDIP's Technical Steering Group.

Prominent among members of this high-ranking committee, whose task it was to review proposals submitted by MWDIP for development, were Dr. Courtland Perkins of Princeton; John Stack, Deputy Director of NACA/NASA Langley; Alan Puckett of Hughes Aircraft; and Gene Root, President of Lockheed Missile Division. Their historic Washington, D.C. meeting of May 15, 1958, endorsed the faith of Chapman in Hooker's BE53 V/STOL engine and recommended support for its development. In the subsequent contract for six engines - four for bench development and two for flight - the US agreed to fund 75% of the cost. BAEL provided the remaining 25%.

Chapman recounts that he needed formal signatures before money could be transferred to Bristol. One was that of Mr. Richard Horner, then acting Assistant Secretary for R&D on the Air Staff. The second was that of Lt.Gen. Donald Putt, Chief of Staff for R&D in USAF HQ. General Putt had arranged for Chapman to brief Maj.Gen. Al Boyd, the Deputy Commander of the USAF's Aeronautical R&D Command, and recognized as the outstanding test pilot authority in the Air Force.

To quote Chapman's words in 1988, "As a result of Al Boyd's very evident interest during my briefing of the Pegasus engine and the P1127, I asked him to call Gen. Putt while I was there. He did, and told Putt, 'Hell; this is the first VTOL scheme I've seen that makes any sense!' That clinched things," Chapman said.

Bristol Engines were under contract by mid-1958 and the Pegasus first ran on an outdoor test bench in September 1959, at about 9,000 lb. thrust. Within months it reached 11,000 lb. which was the minimum that Hawkers could accept for flight.

Sir Sydney Camm and his aircraft team, however, could find no equivalent financial godfather for their P1127 design. No US money was available without a substantial matching UK contribution and nothing was on offer from the UK Services except a lukewarm moral commitment, despite the technical endorsement of the aircraft program by MWDIP and NASA Langley.

Bill Chapman visited Kingston in August 1958 with an assessment team which included Gen. Al Boyd and John Stack. Stack, who had joined NASA Langley pre-war, was respected for his technical judgment and renowned for his "go-get-it" attitude to new technology and aeronautical innovation. He was so taken with the P1127 and its "vectored thrust" principles of VTOL operation that he stimulated NASA Langley to build a 1/6th scale free-flight model and a 1/10th scale peroxyde-powered transonic tunnel model.

The free flight model - a technique pioneered and developed by a NASA Langley team led by Marion O. McKinney - successfully flew through transitions in the 60 ft x 30 ft full-scale tunnel early in 1960 and gave great encouragement to the Camm team at a very gloomy point in the project's life cycle. The prophets of doom in the UK aeronautical establishment had been unremitting in their advice that Camm's P1127 would never be flown through transition without full autostabilization as the SC1. This research airplane was a marvel of vacuum-tube avionics with a three-channel, majority-vote, "fly-by-wire" autostab for each axis. Small wonder that it carried almost no "operational" payload. Ralph Hooper (by then shouldering the technical lead as P1127 Project Engineer) and
his Kingston design colleagues, backed to the hilt by Camm who had a lifelong aversion to complexity in his airplanes, were determined to keep the P1127 simple and hence lighter and more reliable.

Life for the P1127
By the spring of 1959, the Hawker Board of Directors, encouraged by the Ministry of Defence procurement staff’s promise of future Government funding on a research ticket—there was still no UK service commitment—launched the construction of two prototype P1127 aircraft on company funds.

Formal contract with MoD was entered in mid-1960 and the P1127 first hovered at Hawker’s test airfield, Dunsfold, in October 1960, in the hands of A.W. (Bill) Bedford, chief test pilot. The aircraft was held down by limited-freedom tethers. It was stripped to the bone of superfluous parts (no radio, no gear doors or retraction jacks, etc.) and carried only a few minute’s worth of fuel in order to match the limited thrust available from those early flight-cleared Pegasus engines.

The learning curve, for both pilots and engineers, was very steep in those early days. But within five weeks Bill Bedford had achieved steady free hovers.

Following its first conventional flights in March 1961, and then careful expansion of the part-jetborne speed envelope, the P1127 first flew transitions to and from wingborne flight in September 1961. By the end of that year the entire powered lift envelope had been covered: vertical and short take-offs and landings from concrete, from tarmac, and from grass. All were accomplished without drama; undemanding of special piloting skills and mostly flown without use of the limited-authority autostab system which, anyway, worked only in the pitch and roll axes.

Meantime, in the summer of 1959, Col. Chapman had been posted back to the Pentagon as Assistant for Foreign Developments in the office of the Deputy Chief of Staff for R & R in HQ, USAF. This enabled him to stay on top of the P1127-Pegasus initiative he had been responsible for starting. In 1961 he was promoted to Brigadier General. It was in this post and rank that it fell to him in 1962 to protest the transfer of responsibility, from the USAF to the US Army, for the 3-Nation V/STOL Evaluation aircraft. That was the XV-6A Kestrel, a 50 percent design of the original P1127.
Twenty years of USMC jet V/STOL operational experience are represented in this photo of (top) an AV-8A and (bottom) a Harrier II, AV-8B, which began to replace the AV-8A in Marine Air attack squadrons from 1985. The AV-8B provides twice the bombload-radius of the AV-8A. (McDonnell Douglas)

Dr. Harold Brown, then Deputy Director for R&D in the Office of Secretary of Defense, was unmoved by this USAF protest. The Army remained the responsible authority in America for the Kestrel XV-6A and for all US participation in the Evaluation Squadron flying in UK in 1965.

Incidentally, the first-ever non-British pilot to fly the P1127 was Jack Reeder of NASA Langley, in June 1962.

The enthusiastic report of their UK evaluation flying by Reeder and his NASA colleague, Fred Drinkwater, played a significant role in gathering US Tri-Service support for the Kestrel Evaluation Squadron phase of the vectored thrust fighter's development.

Flight Evaluation and the Harrier McKewenether & Henderson

Support for the P1127 by the RAF had been sparse up to this time. In 1963, they had embarked with more enthusiasm on the development of a larger supersonic V/STOL fighter, the P1154. Fortunately - and that word is used advisedly, since this ambitious 40,000 lb. jumping jet was an aircraft well before its time - the P1154 was cancelled in 1965 when about half-complete. But the RAF, by that time deeply immersed in the Kestrel Evaluation Squadron program, were sufficiently convinced of the practicability of off-base jet V/STOL to sponsor the 90 percent plus redesign of the Kestrel which flew in 1966 as the Harrier, the world's first operational jet V/STOL fighter/attack weapons system. The RAF formed their first operational Harrier squadron in 1969. It was the UK flight evaluation of the Harrier in 1968 by two US Marines, Col. Thomas H. Miller (now Lt.Gen.-Ret.) and Lt. Col. Clarence (Bud) Baker (alas, now deceased), which led to the procurement of 110 AV-8A and TAV-8A Harriers for the USMC from 1971 to 1976. The success of these V/STOL fighters in the hands of Marine Corps aviators in the 1970s, operating around the world from austere bases and from a range of previously helicopter-only ships, led in turn to today's Harrier II program.

With the same payload-radius as an F-16A or an A-7, and retaining the startling maneuverability attributes that gave the Falklands Harriers a 25-to-zero kill ratio in air combat in 1982, the Harrier II is the first US-UK truly interdependent military airplane program. Airframe components are single-sourced between, and fly-away aircraft assembled and delivered by, McDonnell-Douglas in the USA (AV-8B for the USMC) and British Aerospace in the UK (GR Mk 5 for the RAF).

Brig. Gen. Bill Chapman, retired since 1965, has quietly observed and followed all these later consequences from his home in Falls Church, Va. The go-for-it aspects of his character remain very evident, although golf balls are today the principal focus of his drive. Bill Chapman spoke recently of those far-off P1127 times:

"...the greatest satisfaction for me was the working relationships and mutual confidence established so rapidly with men of the caliber of Stanley Hooker and Sir Sydney Camm and their colleagues at Bristol and Hawker. In all our frequent exchanges there was never any sales puff, no over-optimism, no exaggeration - just facts; whether favorable or adverse. Each man was trying to do more than his assigned share to promote the earliest successful
VISION AND UNSTINTED SUPPORT, THIS AIRCRAFT AND THE PEGASUS WOULD NEVER HAVE EXISTED. ALL AT BRISTOL SEND THEIR THANKS AND BEST WISHES, PARTICULARLY YOUR HUMBLE SERVANT: STANLEY HOOKER."

Sir Stanley Hooker (he was knighted by the Queen in 1971 for his lifetime of service to aero-engine progress) died after a long sad illness in 1984. Michel Wibault died in 1963. Sir Sydney Camm passed away on a favorite golf course in 1966. Ralph Hooper, having inherited the Camm mantle at Kingston, retired in 1984. Bill Bedford stepped down from test flying in 1967. Gordon Lewis retired from Bristol in 1987. The torch of vectored thrust V/STOL has now passed to a new generation at both Kingston and Bristol, in alliance with their partners at McDonnell-Douglas in St. Louis.

After more than 20 years in service and the best part of a million operational flying hours with five arms on land and at sea, the Harrier remains the world's most misunderstood fighter. Nonetheless, V/STOL is now ineradicably established as a growing sector of our tactical airpower inventory. Bill Chapman waxes enthusiastically about the benefits jet V/STOL has brought to the RAF and to Marine Air and regrets that his own service has yet to reap any harvest from his initiatives of a third of a century ago.

In Catch 22, that classic novel of the European air war in 1944-45, the fictional bomb group was operating from a fictional island. Bill Chapman grins as he admits that Col. Cathcart, commander of Heller's bomb group in the book was based, at least in part, on himself.

Cathcart is presented as a gung-ho but rather shifty, looking-over-the-shoulder, promotion-seeking officer. By this test Bill Chapman fails totally as a prototype. Would anyone reading Catch 22 have dared predict that its caricatured group commander would become the visionary and persistent godfather to the Pegasus engine and its P1127 airframe and thus, as is Bill Chapman today, an unsung hero of the Harrier's vertical revolution in tactical airpower and the founding sponsor of a still-continuing Anglo-American engineering and operational adventure?

John Fozard joined the Camm fighter design team at Kingston-upon-Thames, Surrey, UK, in 1950. He was Chief Designer of the P1154 supersonic jet V/STOL fighter project up to its cancellation in 1965, then becoming Chief Designer, Harrier, until 1978. Subsequently, for seven years, he was Marketing Director for Harrier and Hawk (now the USN's T-45) for British Aerospace at Kingston. He retired from BAe in 1989 after 45 years service. In addition to his prestigious Lindbergh Chair appointment through 1988, John Fozard served as 55th President of the UK's Royal Aeronautical Society in 1986-87. He lives in Alexandria, Va, with his US National wife, Gloria.

His first book, Sydney Camm and the Hurricane, is due to be published by Smithsonian Institution Press this Fall.