# A TRAINING SYSTEM FOR THE 21ST CENTURY: JPATS AND THE T-6A

## USAF TRAINER MASTERPLAN

Air Training Command (ATC) published the USAF Trainer Masterplan in April 1988 to coalesce Air Force thinking about the direction of pilot training into the early 21st century and to satisfy congressional mandates. The Trainer Masterplan addressed in broad outline how the Air Force intended to convert from generalized to specialized undergraduate pilot training (SUPT). Underpinning the SUPT concept was the idea of tailoring training to produce pilots better prepared to step into the cockpits of bomber, fighter, tanker, and transport aircraft. To do that ATC would have to obtain three new aircraft—a primary trainer to replace the obsolescent T-37, an advanced trainer to take the place of the aging T-38, and a brand new trainer suited to prepare pilots for airlift and tanker duties.[1]

ATC intended to begin the conversion process with the acquisition of the tanker–transport training system (TTTS). The command wanted to purchase 211 modified business jets to serve as tanker-transport trainers. With simulators, training devices, and other equipment, ATC estimated the total TTTS buy would cost in the vicinity of $1.5 billion. The final amount would depend in large measure on the aircraft selected. Manufacturers of seven aircraft showed interest in the program. The aircraft ranged in price from $3 to $5 million apiece. Initially, the schedule called for a draft request for proposal (RFP) by March 1989 and the final RFP by July 1989, with the contract award in October 1989. ATC hoped to take delivery of the first aircraft in March 1991, achieve initial operational capability (IOC) in 1992, and full operational capability (FOC) in 1997.[2]

The second major component of the carefully crafted roadmap was the acquisition of the primary aircraft training system (PATS), the replacement for the T-37. To bring PATS on line as quickly and cheaply as possible, ATC decided to adopt the same strategy as it had with the TTTS and look for a commercially available aircraft that could be modified to suit its purpose. With the candidate aircraft ranging in price from $2 to $4 million, ATC expected to buy a fleet of 538 aircraft at an estimated cost of $3.2 million per plane. The entire PATS program had a tentative price tag of $3.6 billion. At the outset, all the companies interested in competing for the PATS contract were foreign, but they were all seeking pairing arrangements with U.S. companies. ATC planned to release the Request for Proposal in February 1994 and award the contract later that year in October. The command anticipated taking delivery of the first aircraft sometime in 1995, reaching IOC in 1999, and attaining FOC in 2004.[3]

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[1] Plan, ATC/XPR, "United States Air Force Masterplan," Apr 88, SD III-1 in Hist (PV) ATC, 1988, material used is not PV; Hist (PV), ATC, 1988, pp 164-168, material used is not PV.

[2] Hist (PV), ATC, 1988, pp 164-168, material used is not PV.

[3] Ibid.

The final element needed to complete the SUPT initiative involved bringing the bomber-fighter training system (BFTS) on line as the T-38 replacement. ATC intended to buy 417 aircraft at an approximate cost of $6 to


**T-37B, the Air Force's longtime primary trainer, was introduced at Bainbridge AFB, Georgia, in January 1958**

$9 million per plane and $4.3 billion for the entire BFTS program. These amounts were a little more speculative than the TTTS and PATS costs, since it was likely some developmental costs would be involved. With the BFTS the command hoped to combine the performance characteristics of modern fighters with improved supportability. However, before beginning the formal acquisition process ATC had a lot of homework to do. Therefore, the command planned to undertake preconcept studies and a program analysis effort from 1988-2002, with an eye toward awarding the contract in 2003. Following that, ATC hoped to achieve IOC in 2005 and realize FOC in 2013. Once that was done, the Air Force would have its first completely upgraded trainer fleet in over five decades.[4]

Congress, however, had something else in mind. After reviewing the USAF Trainer Masterplan, the Congress, in the National Defense Authorization Act for FY 1989, directed the Office of the Secretary of Defense to submit a report to the House and Senate Armed Services Committees that outlined DOD's plans for future training aircraft for the Navy and the Air Force. To the maximum extent possible, Congress wanted the Navy and Air Force to procure similar aircraft and take advantage of the cost savings associated with joint-service procurement and development.[5]

## DOD TRAINER AIRCRAFT MASTERPLAN

Under Secretary of Defense for Acquisition, Dr Robert Costello, directed the Air Force to take the lead and develop a report that complied with congressional instructions. The result was the DOD Trainer Aircraft Masterplan, a document that differed in several respects from the original Air Force plan. One of the most significant differences was in the T-37 structural life extension program (SLEP), a program designed to keep the T-37s flying until a replacement could be secured. A durability and damage tolerance analysis (DADTA) study performed by the Cessna Corporation under contract to the Air Force indicated that there was a better, cheaper way to keep the T-37s in service during the lengthy transition to a follow-on trainer.[6]

[4] Ibid.

[5] Hist (PV), ATC, 1988, pp 168-176, material used is not PV.

[6] The DADTA data showed that instead of having to replace six fatigue-critical T-37 components in toto, the Air Force could replace only two components outright and three others as needed. A two phase inspection program, one accomplished at field level

In fact, the Air Force could save approximately $85 million by following the new procedure. The study found that the cost of adopting the new SLEP procedures came to $113.8 million as compared to the earlier estimate of almost $200 million.[7]

A joint conference committee authorized $9.6 million for the TTTS program and another $14 million to extend the structural life of the T-37. It also expressed some skepticism about Air Force plans for replacing the T-37 and T-38 trainers. The conferees noted that if the Air Force reversed its acquisition strategy it could obtain a variant of the Navy's T-45 as a replacement for the T-38 and take advantage of the cost savings linked with continuing a warm production line. Moreover, the Air Force could then develop a PATS aircraft in concert with the Navy to replace both the T-37 and the T-34 trainers.[8]

T-34C, used by the Navy in primary training.

The DOD Trainer Masterplan took issue with the Congressional notion that reversing the T-37 and T-38 acquisition strategies was the way to go. While the Defense Department and the Air Force in particular expressed considerable doubt about the wisdom of pursuing such an option, neither the DOD nor the services had any quarrel with the idea of joint-service acquisition. As the DOD saw it, the key to joint-service acquisition was in the joint identification of requirements far enough in advance to meet the projected needs of the parties involved. Based on that premise, the DOD Masterplan presented the alternatives, weighed them, and recommended a timetable that would create opportunities for the joint service acquisition of trainer aircraft.[9]

The whole matter revolved around the desirability and practicality of introducing a variation of the Navy's T-45A as a replacement for the T-38. That would require the Air Force to postpone replacing the T-37 and allow the Air Force and Navy to develop a common PATS aircraft as a replacement for both the T-37B and the T-34C. Beginning in 1990 the U.S. Navy planned to replace two aircraft with the T-45A and convert its strike track (the equivalent of the Air Force bomber-fighter track) from a three aircraft to a two-aircraft system. That development, incidentally, would set the stage for joint acquisition programs between the two services. The Navy viewed the purchase of the T-45A in much the same light as

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and the other done at depot level, would determine what was needed.

[7] Plan, HQ ATC/XPR, "Department of Defense 1989 Trainer Aircraft Masterplan," 29 Dec 88, SD III-12 in Hist (PV), ATC, 1988, material used is not PV.

[8] Hist (PV), ATC, 1988, pp 168-176, material used is not PV.

[9] Ibid.

the Air Force looked at the T-38 modification program, i.e., as a means of sustaining training operations until early in the 21st century when it anticipated the next generation of advanced training technology would be commercially available. And, for the Navy, it made sense. Besides bridging the gap, the T-45A offered the Navy significant savings in such areas as fuel and maintenance costs.[10]

**T-38, the Air Force's advanced trainer.**

If the Air Force purchased the T-45A toward the end of the production line (beginning in 1994), it would achieve the Congressional goal of commonality with the Navy in advanced bomber-fighter training. But that, basically, was all that would happen. The small cost avoidance benefits associated with capitalizing on a warm production line would be offset by the cost of retiring the T-38 early—after a sizable investment in the modification program and before the T-38 reached the limits of its useful service life. More importantly, the T-45A did not offer the Air Force the same advantages it provided the Navy. The Air Force estimated that whatever fuel savings it would realize by replacing the T-38 with the T-45 would be more than offset by the higher cost of maintaining the T-45. In effect, the Air Force would actually be taking a step backward, since the T-45A was less capable than the T-38 in most flight regimes.[11]

Moreover, from a DOD perspective, when it came to aircraft designed for carrier operations (as the T-45A was), it was more costly for the Air Force to follow the Navy in the procurement process than the other way around. That was because the Navy had to have a heavier nose gear for catapult launches, along with reinforced main gear and wing structures and an aft section with a tail hook to withstand the stress of carrier landings. All these features added to both the cost and the weight of the aircraft. That left DOD and the Air Force in the position of having to pay more money to eliminate these features from the production line or having to pay a penalty in terms of reduced performance and increased fuel consumption due to the extra weight. Either way, that was a losing proposition in DOD's eyes.[12]

In addition, there were several other penalties the Defense Department would have to pay, if it reversed the order of trainer aircraft acquisition. For starters, it would force the Air Force to undertake a second structural life extension program around 2006 to prolong the useful life of the T-37. Besides the expense involved in carrying out the SLEP, the Air Force would be faced with the dilemma of retaining the T-37 for an even longer period in order to amortize the modification investment or squandering the investment and

[10] Ibid.

[11] Ibid.

[12] Ibid.

replacing the T-37 soon afterwards to take advantage of the opportunity to jointly acquire a PATS aircraft with the Navy. Another penalty the DOD would have to pay was the procurement of an additional trainer aircraft to meet Air Force needs for a third generation BFTS trainer. The Air Force still needed a trainer that incorporated many of the technological advances of the last half of the 20th century and would prepare pilots to fly advanced aircraft expected to come on board during the early years of the 21st century, a need the T-45A did not meet.[13]

T-45A, the Navy's advanced trainer

Both the Air Force and the Navy favored a plan where they would each acquire three major aircraft systems between CY 1992 and 2025. The Air Force would gain TTTS, PATS, and BFTS and the Navy would get the T-45, PATS, and the strike training system—possibly a BFTS variant. The Navy also hoped to acquire a new naval flight officer training system (NFOTS), but in comparison to the other systems it was small in scale with only 20 aircraft involved. Under the reversal option suggested by Congress, the Air Force would need four major new aircraft system—TTTS, T-45, PATS, and BFTS—to do the same job. The Navy would still require the T-45, PATS, and STS.[14]

On 6 December 1988 the Air Force signed a memorandum of understanding (MOU) with the Navy that committed the services to cooperate in identifying the particulars for three aircraft training systems: one to meet Air Force tanker-transport and Navy naval flight officer training system needs; one to meet Air Force and Navy primary aircraft training system needs; and one to meet Air Force bomber-fighter and Navy strike training system needs. The Air Force was continuing with its plans to acquire the TTTS aircraft between 1990-1997, and the Navy had already demonstrated a strong interest in buying approximately 20 variants of the trainer starting in 1994. As far as the PATS was concerned, the Air Force intended to take delivery of the T-37's replacement from 1997 to 2004. If the aircraft selected for that purpose proved acceptable to the Navy, then the Navy would begin replacing the T-34C with the new system about 2003.[15]

Further down the line, between 2005 and 2015, the Air Force wanted to replace the T-38 with an aircraft that had a cockpit layout representative of 21st century fighters and was capable of pulling high G forces for a sustained period of time, an aircraft that could have variants compatible with both the Navy and Air Force training environment. The replacement aircraft

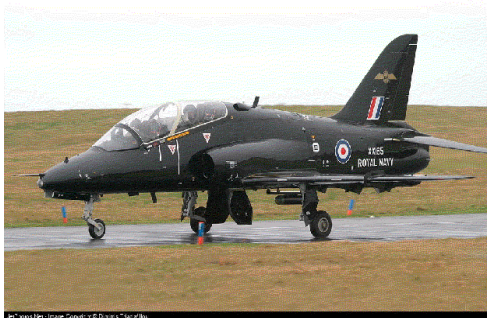
[13] Ibid

[14] Ibid.

[15] Ibid.

would also have a limited weapons delivery capability to accommodate Air Force lead-in fighter training and Navy air combat maneuvering requirements. With the service life of the T-45A expected to run out around 2015, the Navy was interested in looking at a variant of the BFTS for its strike training system.[16]

In creating and formalizing these opportunities through the MOU, the services reaffirmed their belief that joint-service acquisition represented sound defense policy. DOD hoped that the arguments assembled in the DOD Trainer Masterplan would convince the Congress that reversing T-37 and T-38 acquisition strategies was not appropriate. In addition, DOD was optimistic those same arguments would rebut a GAO audit of the USAF Trainer Masterplan, an audit which recommended a five-year slip in all trainer procurement programs. Moreover, the Defense Department came out strongly in favor of the Air Force's modified SLEP proposal and the USAF/USN proposal for joint specification of requirements and joint procurement of aircraft training systems.



British Aerospace Hawk, a JPATS candidate from the United Kingdom

DOD was especially adamant in urging that the Air Force purchase of the tanker-transport training system go ahead as planned. "The TTTS represents the linchpin for both Air Force Specialized Undergraduate Pilot Training (SUPT) **and** joint service procurement because it provides the means for the former while triggering the timetable for the latter," the Masterplan concluded. "In the Department's opinion, execution of the ATC acquisition Masterplan…is essential to satisfy the rated requirements of the Air Force, both in the very critical near-term, as well as into the 21st century."[17]

## EARLY INITIATIVES

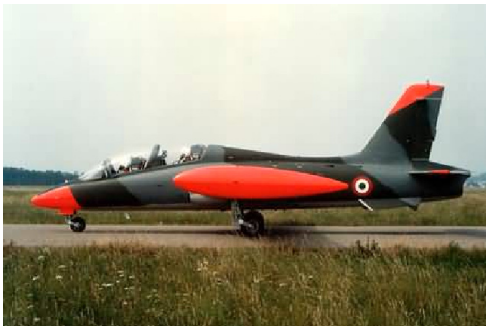
Meanwhile, ATC moved ahead, laying the groundwork and taking the preliminary steps needed to reach the goals outlined in the DOD Masterplan. In October 1988, ATC sent a team lead by the ATC vice commander, Maj Gen Robert S. Delligatti (other members of the team were Capt LynnAnne Merten, PATS acquisition manager, and Capt Patrick F. Nolen, the general's executive officer), to Europe to evaluate six potential PATS candidates. The team flew the British Aerospace Hawk, the Gruppo Agusta S-211 (Italian), the Pilatus PC-9 (Swiss), the Aermacchi MB 339 (Italian), and the CASA C-10 (Spanish). Because of bad weather, it had to cancel plans to fly the Proavia Jet Squalus (Belgian). The trip gave the team a chance to sample available technologies, as well as to reinforce the Air Force commitment to PATS. That same month other members of the ATC staff had an opportunity to evaluate still

[16] Ibid.

[17] Ibid.

another potential PATS candidate—the IA-63 Pampa—when the Argentine Air Force flew the plane to Randolph for that purpose. Earlier, in June 1988, ATC had sent a draft statement of operational need for the primary aircraft training system to the MAJCOMs for comment. ATC incorporated MAJCOM views in the document and, in December 1988, General Robert C. Oaks, ATC commander, validated the PATS SON and forwarded it to HQ USAF for review. The validation of the SON was the first step in the formal acquisition process.[18]

The next step, in ATC's view, was to initiate a preconcept study of PATS that would integrate primary training with TTTS and BFTS, using a total training system approach. The command, in conjunction with Air Force Systems Command's Aeonautical Systems Division, had already initiated such a study for the reconnaissance-attack-fighter training system (as BFTS used to be called) back in 1986. ASD had awarded that preconcept study to three contractors—McDonnell-Douglas, Lockheed, and General Dynamics—and received the final reports in the fall of 1988. Instead of exercising an option for a follow-on BFTS study, ATC wanted to use the funds it had programmed (approximately $500,000) to initiate the PATS study. Accordingly, in November 1988, ATC informed ASD that the preliminary results of the BFTS study were encouraging, and the command needed some time to digest the information presented, so there was no pressing need for additional study of the subject. ATC then asked for ASD's support in concentrating all available resources on a similar study for PATS.[19]



Aermacchi MB-339, an Italian JPATS candidate

At the beginning of 1989, ATC issued the statement of operational need for the primary aircraft training system to get the acquisition process underway. In addition to the aircraft, what became known as the joint primary aircraft training system (JPATS) included commercially available "off-the-shelf" simulators, plus a training management system and courseware that would be developed expressly for the JPATS. As noted earlier, ATC hoped to release the request for proposal in February 1994 and award the contract in October 1994. That timetable would allow the command to achieve an initial operational capability by June 1998, the time when the first class of students would complete primary training with the new system and somewhat earlier than originally estimated. The preliminary aircraft acquisition schedule and funding requirements for the aircraft are outlined in Appendix I.[20]

[18] Ibid.

[19] Ibid.

[20] Ltr, Brig Gen W. Kross, ATC/XP to HQ AAC/XPP, et al, "ATC 005-88, Statement of Operational Need (SON) for the Primary Aircraft Training System (PATS)," 11 Jan 89 w/atch SON,

**JPATS ACQUISITION PROFILE**
**($ in millions)**

| Time | FY95 | FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02 |
|---|---|---|---|---|---|---|---|---|
| Aircraft | 20 | 78 | 78 | 82 | 84 | 84 | 61 | 51 |
| Funds | $198 | $494 | $483 | $515 | $539 | $551 | $396 | $314 |
| | | | | | | | | |
| | | | | | | | | |

Source: SON, ATC 005-88, Statement of Operational Need for the Primary Aircraft Training System (PATS), 11 Jan 89

In June ASD awarded a contract for the PATS concept study to the Illinois Institute of Technology Research Institute (IITRI). Eagle Technology, a subcontractor for IITRI, performed the study. The study had three objectives. First, Eagle Technology had to identify and describe the flying skills a student should acquire in primary training and the tasks that had to be performed to acquire those skills. Second, the contractor had to define the total training system—the integration of ground and flight training in terms of the timing, phasing, and mix of instruction, as well as the appropriate media to use i.e., simulators, training devices, etc. Third, Eagle Technology had to identify the life cycle costs and benefits of the training system for four categories of aircraft—a turboprop, a twin engine jet, and two versions of single engine jets, one with a much more powerful engine than the other. The contractor issued an initial report in November 1989 and expected to have the final report ready by the summer of 1990. In the meantime, the Navy expressed interest in arranging a similar study. The Air Force hoped to be able to fold in the results of the Navy study with its own to identify areas of common ground that could lead to a joint acquisition effort.[21]

As a matter of fact, jointness was the byword throughout 1989 as the Air Force and the Navy continued to exchange information on primary pilot training. Representatives from the U.S. Navy played an active role in ATC's broad area review (BAR) of flying training, and members of the ATC staff attended the Naval Air Training System (NATS) 2020 conference (to consider the shape of aviation training in that year) where the Navy discussed its equivalent of the Trainer Masterplan. ATC representatives also visited Naval Air Station (NAS) Whiting Field, Florida, to observe Navy primary training operations. There they had a chance to observe firsthand the airspace restrictions facing the Navy and to gain an appreciation for the differences in the two services' training philosophies.[22]

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SD III-51 in Hist (PV), ATC, 1989, material used is not PV.

[21] Hist (PV), ATC, 1989, pp 127-130, material used is not PV.

[22] Ibid.

Pilatus PC-9, a JPATS candidate manufactured by a Swiss firm.

Some of the restrictions and differences were substantial, but none were so great that they would keep the Air Force and Navy from fielding a joint primary aircraft training system. Mainly, there was the question of limited airspace. Whiting Field, across town from NAS Pensacola and just a short distance from Eglin AFB, was hemmed in on all sides by military operating areas and air routes. As far as training philosophy was concerned, the differences were striking. The Navy, for instance, conducted much of the academic instruction for student pilots at NAS Pensacola, before the students began primary training at Whiting. Furthermore, the students did not go through flight training as part of a class; each student went through the the program on an individual basis. Commenting on other differences in training philosophies, such as the Navy's propensity to fly completely by visual flight rules (VFR) in a "see and avoid mode," Capt LynneAnne Merten, ATC's program manager for JPATS, observed that the Navy appeared to believe that "the best way to develop airmanship is to challenge the student to make his own decisions." She found this approach somewhat more dangerous than the Air Force's more controlled student flying environment.[23]

To address these and other matters, the services established an O-6 working group, formed a JPATS committee at the action officer level, and worked together on the drafting of a joint service operational requirements document (JSORD). At the first meeting of the O-6 working group on 30 November 1989, the Navy presented its NATS 2020 briefing that showed how its acquisition schedules dovetailed with those of the Air Force. The Navy was talking about replacing its primary trainer, the T-34C, four years earlier than originally planned, which would allow it to achieve an initial operational capability with JPATS in 2001. JPATS costs also came under discussion. Air Force and Navy representatives readily agreed on the need for a jointly developed estimate of what it would cost to fund the JPATS program. Until then, the only cost estimates available were those developed by ASD and ATC.[24]

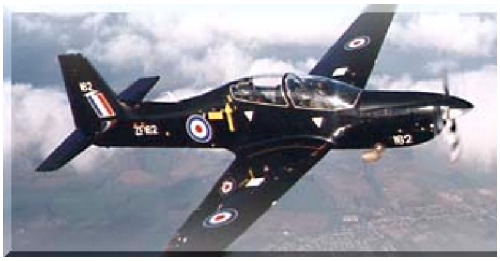
Subsequently, the two services also agreed on tandem seating as the preferred seating configuration for JPATS, citing "symmetric flight references, wider field of view, lower relative form drag, similarity to high performance cockpits, and increased perception of independence" as the reasons for their decision. On 12 December 1989, the Air Force and Navy signed a memorandum of agreement to that effect. This was a big step for the Air Force which had operated with side-by-side seating in the T-37 for over 30 years. The Navy, on the other hand, was accustomed to the use of tandem seating

[23] Ibid.

[24] Ibid.

in a primary trainer. Both services seemed optimistic at the end of 1989 about the prospects of acquiring JPATS.[25]

With the tandem seating decision made, that left the one-versus-two engine question and the type of power plant desired—turboprop, turbofan, or turbojet—as the main JPATS configuration issue still open. ATC had discussed both issues at length at the flying training broad area review. Some participants were leery of the idea of a single-engine aircraft as a primary trainer. There was a certain comfort zone, both psychological and tangible, associated with a twin-engine aircraft. Although no consensus emerged, most conferees leaned toward the twin-engine configuration. The participants did not reach a consensus on the power plant issue either. For the most part, the Air Force favored the turbofan, while the Navy preferred the turboprop. At least for the time being, BAR members decided not to decide. Instead, they concluded that it was more important to emphasize the performance characteristics required rather than settle on a particular configuration. General Delligatti agreed with this approach and reminded the BAR participants that throughout the selection process the focus should remain on the aircraft's fundamental handling characteristics.[26]



Shorts Tucano, a JPATS contender, produced by Shorts Brothers, an Irish firm

In the meantime, ATC sent a team to Europe from 21 August to 1 September 1989 to take a look at commercially available JPATS candidates. Led by General Delligatti, the rest of the team consisted of Lt Col Randy Starbuck, the general's executive officer, Lt Cmdr Clay Umbach, representing the Chief of Naval Aviation Training, and Captain Merten. The team had a chance to evaluate five aircraft as a potential primary trainer: the Fantrainer 600, a single-engine ducted fan aircraft manufactured by a German firm, Rhein-Flugzeubau; the PC-9, a single-engine turboprop aircraft manufactured by a Swiss company, Pilatus Aircraft; the MB-339, a single-engine jet aircraft produced by an Italian company, Aermacchi; the S-211, a single-engine jet aircraft made by an Italian company, Gruppo Agusta; and the Shorts Tucano, a single-engine turboprop aircraft, produced by the Irish firm, Shorts Brothers. All five aircraft featured tandem seating. Three of the manufacturers had already aligned themselves with American aerospace corporations; Rhein Flugzeubau was fashioning an agreement with Rockwell, Aermacchi teamed with Lockheed, and Gruppo Agusto worked with Grumman. By 1994, when ATC intended to release the request for proposal, competition promised to be keen with the prospect of a joint buy making an already attractive contract even more lucrative.[27]

[25] Ibid.

[26] Ibid.

[27] Ibid.

## BUILDING BLOCKS

Building on the groundwork that had been done up to that point, the Air Force and Navy formalized their intentions in April 1990, when Gen Larry D. Welch, Chief of Staff of the Air Force, and Adm Carlisle A. H. Trost, Chief of Naval Operations, signed an MOA to procure "a common land based primary training aircraft and as many other common components as possible while satisfying the unique requirements of each service." To distinguish between features that were joint and those that were unique to each service two new acronyms—AFPATS (Air Force Primary Aircraft Training System) and NPATS (Naval Primary Aircraft Training System)—came into use. The Air Force would serve as the lead service in the venture, and ATC and the Navy's principal acquisition agency (OP-59) would work together to develop operational, logistical, and cost requirements.[28]

The Fantrainer 600, a JPATS contender produced by a German company, Rhein-Flugzeubau

[28] Ltr, Lt Gen R. Oaks, ATC/CC to SAF/AQ, "Memorandum of Agreement (MOA) for the Joint primary Aircraft Training System (JPATS)," 11 Apr 90, w/atch MOA, SD IV-85 in Hist (PV), ATC, 1990, material used is not PV.

Even though the planned initial operational capability for JPATS was still eight years off, 1990 was a busy and productive year from ATC's standpoint. It began on an upbeat note when the command's POM submission for JPATS was included in the Six Year Defense Plan (SYDP) for FY92-97. The SYDP provided just over $1.1 billion toward the purchase of 136 aircraft (out of a total of 495 aicraft), along with associated aircrew training devices, logistics support, and a training management system. The bulk of those funds ($1.01 billion) was earmarked for the procurement of the aircraft itself. ATC expected to buy 20 aircraft in FY95, 56 in FY96, and 60 in FY97. In the interim, funding for the first two years was light—approximately $2.4 million each year—and consisted of research, development, and test and evaluation money for such things as the flight simulator and the JPATS training system.[29]

Early in the year, ATC also sent a team of logistics specialists to Europe to visit vendors interested in providing the JPATS aircraft. The team visited the facilities of the following companies: Agusta (Italy), Aermacchi (Italy), Pilatus (Switzerland), and Rolls Royce (United Kingdom). While at the factories, the team delved into numerous areas, including design, manufacturing, reliability and maintainability, technical manuals, support equipment, and programmed depot maintenance. Through discussions with company personnel, team members gained a better appreciation of vendor capabilities and what was available within the primary

[29] Hist (PV), ATC, 1990, pp 239-244, material used is not PV.

trainer market. With the information gained on this trip, ATC was in a better position to specify what it wanted in developing the system operational requirements document for the JPATS aircraft. The command then turned around and invited aircraft industry representatives to visit selected ATC facilities, so they could get a better feel for the command's operations and maintenance procedures and constraints. From 9-13 April 1990 representatives from 24 companies visited Randolph and Laughlin Air Force Bases.[30]

Saab SK 60, a Swedish JPATS candidate

The following month General Oaks led a team to Europe to learn more about some of the potential contending companies and evaluate some of the candidate aircraft. Accompanying General Oaks were Brig Gen George T. Babbitt, Jr., selected to become ATC's DCS/Logistics, Capt Tim Thorsen from the office of the Chief of Naval Operations (OP-59), and Captain Merten. In all, the team flew five aircraft: the Saab SK60, manufactured in Sweden; the RFB Fantrainer, produced in Germany; the Agusta S-211, made in Italy; the Shorts Tucano, produced in Ireland; and the Super Galeb G-4, manufactured in Yugoslavia. Such trips (this was the third in the past three years) proved useful in understanding the capabilities and limitations of the available JPATS candidates and expanded the lines of communication between the U.S. military and the aircraft industry.[31]

**Program Management Directive.** On 6 July 1990, HQ USAF issued a new program management directive (PMD) for specialized undergraduate pilot training that, for the first time, addressed the joint nature of the JPATS acquisition of the primary aircraft training system. The new PMD superceded an earlier version, published in February 1989, that dealt solely with the tanker-transport training system. Among other things, the new PMD directed ATC to coordinate with the Navy in the development of two documents that were key to fielding JPATS—a joint statement of operational need (JSON) and a joint system operational requirements document (JSORD).[32]

The Super Galeb G-4, a JPATS contender produced by Yugoslavia

[30] Ibid.

[31] Ibid.

[32] PMD, HQ USAF, "Program Management Directive for Specialized Undergraduate Pilot Training," 6 Jul 90, SD IV-66 in Hist (PV), ATC, 1990, material used is not PV.

**Joint Statement of Operational Need.** It would take some time to develop the JSORD (the services were still working on a draft at the end of the year), but it didn't take long to put together the joint statement of operational need for JPATS. ATC had already developed a SON for the primary aircraft training system (published on 11 January 1989), and the Navy was in the process of developing a similar document called a tentative operational requirement (TOR), for the naval primary aircraft training system. The Navy issued the TOR on 24 August 1990, and from that point on it was mainly a matter of integrating the two documents and organizing their contents in a coherent format. That, too, occurred in short order, and the JSON appeared on 14 September 1990.[33]

The document basically followed the Air Force SON format, modified to address the joint service aspects of the acquisition. In parallel discussions, the statement examined such areas as the missions involved, the basis of need for the new system, existing capabilities, and then concluded with a single joint assessment of the improved capability required. The JSON advocated an acquisition strategy that involved the purchase of "a missionized commercially available training aircraft and related ground-based training devices common to both services." Courseware, curricula, data management, and some maintenance practices, the JSON acknowledged, should be tailored to satisfy the unique requirements of each service. Also laid out in the JSON were the milestones remaining before JPATS became a reality, shown in Appendix 2.[34]

**Concept Studies.** Meanwhile, ATC was awaiting the final report of the concept study IITRI had begun in June 1989. For all practical purposes the study was completed when the Navy expressed its desire to undertake a similar study. Early in the year, therefore, the two services asked IITRI to extend the study to include the development of a design concept for NPATS to replace the T-34C and 'to assess the extent to which the USN and USAF can meet future primary training requirements by using the same aircraft and other common or similar training system components." After a delay of several months to revise the statement of work, obtain additional funding, and add a second subcontractor for the NPATS training analysis, ASD let the JPATS concept study contract in May 1990. Under subcontract to IITRI, Information Spectrum Incorporated undertook the NPATS concept development study. At the same time, Eagle Technology continued with the AFPATS concept study and completed its work in July 1990.[35]

For study purposes, all the candidate aircraft were divided into categories according to engine type (jet or turboprop), number (single or twin-

[33] Hist (PV), ATC, 1990, pp 240-244, material used is not PV.

[34] JSON, ATC/XPRP & CNATRA/N34B, "Joint Statement of Operational Need (JSON) for the Joint Primary Aircraft Training System (JPATS)," 14 Sep 90, SD IV-95 in Hist (PV) ATC, 1990, material used is not PV.

[35] Hist (PV), ATC, 1990, pp 239-244, material used is not PV.

engine), and power (thrust or horsepower). There were three categories of single-engine jets divided according to the amount of thrust generated by the engines: 1300-1600 pounds, 2500-3500 pounds, and 4000-4500 pounds; two sets of single-engine turboprops separated according to the shaft horsepower (SHP) of the engines: 900 SHP or less and 900-1200 SHP; and a single category of twin-engine jets in the 2500-3500 pound range. Generally, as aircraft performance increased so did a number of other things, namely costs, complexity, maintenance requirements, training capability, and student proficiency levels.[36]

The study's findings were wide-ranging. In some instances, Eagle Technology identified deficiencies such as insufficient instruction in instrument flying, formation flying, and visual flight rules (VFR) navigation in the T-37 primary phase. In other instances, Eagle recommended significant changes, e.g., an increase in flying hours in the primary phase from 80.9 hours to 91.2 hours and an increase in ground training from 31.5 hours to 68.8 hours. In still other cases, the contractor made some succinct observations, i.e., that the preponderance of life cycle costs were tied directly to aircraft operations and support costs. A corollary of that observation was that ground based training system expenses constituted only a small portion of life cycle costs, and investments in this area would likely improve the effectiveness of training without driving up the total cost very much. So, ATC obtained some valuable insights from the AFPATS concept study, but the command wouldn't have the full picture until the Navy study and then the joint study were completed. At year's end, the NPATS study was nearing completion, but it would be mid-1991 before the final JPATS concept study would be available.[37]

**Program Management Directive for SUPT.** Another document that played a key role in the JPATS acquisition process was the program management directive for specialized undergraduate pilot training. In February 1991, HQ USAF updated the PMD that directed the Program Executive Officer to acquire the T-1A Training System and instructed other agencies to take actions to obtain an enhanced flight screening aircraft and carry out the planning and preparations necessary to replace the T-37 with the joint primary aircraft training system. The PMD reiterated the need for ATC to work with the Navy to develop a joint system operational requirements document for JPATS.[38]

**Joint System Operational Requirements Document.**

ATC planners had already begun work on the JSORD with representatives from the Chief of Naval Air Training (CNATRA), located at NAS Corpus Christi, Texas. CNATRA was ATC's counterpart and was responsible for training all pilots for the Navy, Marines, Coast Guard, and the National Oceanic and Atmospheric Administration. The two parties sought to come up with a document that would

[36] Ibid.

[37] Ibid.

[38] PMD (FOUO), HQ USAF, "Program Management Directive for Specialized Undergraduate Pilot Training," ca. 19 Feb 91, material used is not FOUO.

spell out their requirements for a mutually acceptable replacement aircraft for the Air Force T-37B and the Navy T-34C aircraft. As the Air Force had done with the T-1A, the services intended to buy an aircraft already available on the commercial market and modify it for use as a trainer. Furthermore, the Air Force and Navy planned to purchase a complete training system—aircraft and a ground-based training system that included simulators and other aircrew training devices (ATD), courseware, syllabi, computer based instruction, logistics support, and a training management system. Wherever possible the services would acquire common hardware, e.g., the aircraft, simulators, and ATDs. Such items as courseware, training management, and logistics support would be tailored to the needs of the individual services. As they began fleshing out the JSORD, ATC and CNATRA officials were anticipating a buy of slightly over 840 aircraft—495 for the USAF[39] and 347 for the Navy.[40]

## TRAINER AIRCRAFT SUMMIT

The work of ATC and CNATRA planners culminated in a trainer aircraft summit at Randolph AFB on 18 October 1991. By that time the concept study of NPATS had been completed and the results assimilated with those of a similar Air Force study. Both studies attempted to answer such questions as what kind of flying skills should a student acquire in primary training and what kind of tasks had to be performed to gain those skills. Both studies produced strikingly similar results and reinforced the notion that the joint acquisition of a primary trainer was a sound idea. In a similar effort, the Air Force initiated a training system requirements analysis in March 1991 to define the various components of the ground-based training system. The Navy undertook a parallel analysis a few months later in June 1991. Neither study was scheduled to be completed until the latter half of 1992.[41]

As the name suggested, the trainer aircraft summit brought together interested parties from all quarters of the training and acquisition communities. Participants reviewed the status of the TTTS, the enhanced flight screener, and the JPATS. When it came to JPATS, the purpose of the summit was to take a close look at USAF and USN primary flight training needs and approve the release of the JSORD. The Air Force intended to use the JPATS aircraft to prepare student pilots to follow one of two tracks—the bomber-fighter track or the tanker-transport track. For its part, the Navy planned to use the JPATS aircraft to prepare student pilots to pursue one of four tracks—strike, maritime, helicopter, or the E-2/C-2.[42]

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[39] Just a few months later, in April 1991, ATC scaled down its requirements from 495 to 465.

[40] Ltr, Col J. Chapman, Asst ATC/XP to HQ USAF/XORJ, et al, "ATC 005-88-I, Joint Primary Aircraft Training System (JPATS) Joint System Operational Requirements Document (JSORD)," 3 Dec 91, w/atch JSORD dtd 22 Oct 91, SD IV-18 in Hist (PV) ATC, 1991, material used is not PV.

[41] Hist (PV), ATC, 1991, pp 219-223, material used is not PV.

[42] The E-2/C-2 track was roughly comparable to the tanker-transport track. The E-2 was the Navy equivalent of the

Both the Air Force and Navy planned to use the JPATS aircraft in a limited role in navigator training programs, and both services would obviously use the new aircraft in their instructor training programs. Furthermore, the Air Force wanted to use the JPATS aircraft to support the accelerated copilot enrichment (ACE) program, a special program designed to provide Strategic Air Command (SAC) copilots with additional flying experience.[43]

With so many different demands to meet, the JPATS aircraft had to be simple enough to provide most student pilots with their initial flying experience and complex enough so the step between it and more sophisticated advanced trainers would not be too great. Toward that end, ATC and CNATRA had identified a common set of training requirements that the summit participants examined and affirmed. One such requirement was an aircraft that would allow the students to perform the maneuvers required by the syllabus in a regime that extended from sea level to an altitude of 22,000 feet. Other objectives agreed on were an aircraft capable of maintaining a speed of 250 knots true air speed (and a dash speed of 270 knots) at an altitude of 1,000 feet; withstanding G-loads ranging from +6 to –3; sustaining a 60-degree banked turn at 22,000 feet; taking off and landing in a 25-knot crosswind; and handling well enough to tolerate a variety of student errors. The JPATS aircraft also had to have an ejection seat that would operate on the runway at speeds as low as 60 knots, had to accommodate students with a sitting height ranging from 34 to 40 inches, and had to be able to operate out of runways with a minimum length of 5,000 feet at varied altitudes and in a variety of climatic conditions.[44]

Through a procedure known as a solicitation for information, the system program office (SPO) had asked aircraft manufacturers who might be interested in competing for the JPATS contract to supply the command with information on the aircraft. Over a dozen firms responded to the first solicitation.[45] Interestingly, all the companies that actually had aircraft on the market that had seen service as trainers were European or Latin American, and most of the more established manufacturers had already teamed with large American aerospace corporations to put themselves in a more competitive position. For example, Siai-Marchetti, an Italian firm that wanted to market its S-211 aircraft, aligned itself with Grumann; Aermacchi, another Italian firm, teamed with Lockheed to push its MB-339 trainer; Pilatus, a Swiss company paired with Beech to sell the PC-9; Fabrica Militar De Aviones, an Argentinean company, teamed with LTV to back its Pampa IA-63 trainer; and Rhein-Flugzeugbau, a German manufacturer, paired with Rockwell to market the Fanranger trainer. In many instances, someone from ATC had flown the aircraft involved during the past few years, as the command tried to acquaint itself with

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Air Force E-3A Airborne Warning and Control System (AWACS) aircraft.

[43] Hist (PV), ATC, 1991, pp 219-223, material used is not PV.

[44] Ibid.

[45] ATC intended to repeat the process and maintain a dialog with the aircraft manufacturers in order to get a good handle on exactly what was available.

the capabilities of the trainers on the market. The Air Force and Navy had agreed on the need for tandem seating in 1990, but many important variables, such as whether the JPATS aircraft should have one or two engines or whether it should be powered by a turboprop or turbojet, remained open.[46]

Among those attending the trainer aircraft summit were Gen Merrill A. McPeak, Air Force Chief of Staff, and Adm Jerome L. Johnson, Vice Chief of Naval Operations. Both agreed with the JPATS planning presented at the summit, and they approved the release of the JSORD which was issued on 22 October 1991. According to the milestones outlined in the JSORD, the two services hoped to release the request for proposal for JPATS in July 1993 (with the contract award likely to take place early in 1994). The Air Force expected to begin student training with the JPATS aircraft at Laughlin AFB, Texas, in April 1998, and the Navy planned on starting at NAS Corpus Christi, Texas, in June 2001. Reaching full operational capability (FOC) with JPATS would take a few more years; the Air Force aimed at achieving FOC in December 2004 and the Navy in September 2007.[47]

## JPATS OPERATIONAL REQUIREMENTS DOCUMENT

On 3 April 1992, ATC and CNATRA published a new version of the JPATS operational requirements document. This was by design; the Air Force and Navy intended to update the

IA-63 Pampa, an Argentinean JPATS contender

document periodically until the release of the formal request for proposal (RFP), tentatively scheduled for July 1993. Each update built upon the last as the two services sought to clarify and refine their requirements. Once approved by General McPeak and Admiral Johnson, the JPATS ORD was released in July 1992 to aerospace companies that might be interested in bidding on the JPATS contract.[48]

Perhaps the most striking changes in the new document were the projected changes in the number of aircraft needed and shifts of some consequence in program milestones. The JPATS ORD said the total aircraft needed was 765, down considerably from the 812 figure that came out of the trainer aircraft summit in October 1991. Because of diminishing pilot and navigator production estimates, the entire decrease took place on the Air

[46] Hist (PV), ATC, 1991, pp 219-223, material used is not PV.

[47] Ibid.

[48] Ltr, Marilyn R. Smith, Dir of Contracts, T-1A and JPATS Training SPO, ASC/YT-IK, "Joint Primary Aircraft Training System (JPATS) Operational Requirements Document (ORD)," 8 Jul 92, w/atch JPATS ORD, 3 Apr 92, SD V-21 in Hist (PV) ATC, 1 Jan 92-30 Jun 93, material used is not PV.

Force side of the house where the numbers went down from 465 to 417 aircraft; the Navy total remained stable at 348 aircraft. The JPATS ORD also showed some slippage in training milestones. The anticipated start date for student training at Laughlin changed to June 1999 and at Corpus Christi to a window extending from April 2001 to April 2003.[49]

Potential use for the JPATS aircraft was widespread. As ATC transitioned to SUPT at Reese, Laughlin, Columbus, and Vance AFBs, the command planned to use it mainly in the primary phase to ground student pilots in the fundamentals of flying before they moved on to either the bomber-fighter or tanker-transport tracks. Additionally, ATC would use JPATS in specialized undergraduate navigator training (SUNT) at Randolph AFB to introduce student navigators to military aviation and low-level navigation. The command also planned to introduce JPATS in the primary phase of the Euro-NATO Joint Jet Pilot Training (ENJJPT) program at Sheppard AFB, where ATC prepared multinational students to serve as tactical jet pilots and trained ENJJPT instructor pilots. Other prospective JPATS instructor pilots would receive their training at Randolph AFB. Moreover, as the Air Force phased the T-37 out of the inventory, JPATS would be used to support the ACE program, designed to improve the flying skills of Air Mobility Command and Air Combat Command (ACC)[50] copilots.[51]

## REVISED DOD TRAINER AIRCRAFT MASTERPLAN

In addition to updating the JPATS operational requirements document, the two services collaborated in the fall of 1992 in revising the DOD Trainer Aircraft Masterplan. From the outset, the draft masterplan showed evidence of a much deeper Navy involvement than the 1989 plan. After coming late to the party (the initial Trainer Aircraft Masterplan in 1988 had been strictly an Air Force effort), by 1992 the Navy had come on board as a full partner. Interestingly, the Navy would substantially outstrip the Air Force in both pilot and flight officer/navigator production by FY95, before the two programs became almost mirror images of one another (see Appendix 3 and 4) in the last few years of the decade. So, it should have come as no surprise to anyone that Navy interest in joint training had intensified.[52]

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[49] Ibid.

[50] On 1 June 1992, Strategic Air Command (SAC), Tactical Air Command (TAC), and Military Airlift Command (MAC) were inactivated. On that same date, Air Combat Command (ACC) and Air Mobility Command (AMC) were activated. ACC inherited all of TAC's assets, most of SAC's assets, and a small portion of MAC's assets. AMC combined most of MAC's assets with key SAC assets.

[51] Hist (PV), ATC, 1 Jan 92-30 Jun 93, pp 147-153, material used is not PV.

[52] Ltr, Col Richard H. White, ATC Acting DCS Plans and Requirements, to AF/XOO, "Draft 1992 DoD Trainer Aircraft Masterplan," w/atch Draft DoD Trainer Aircraft Masterplan, SD V-22 in Hist (PV) ATC, 1 Jan 92-30 Jun 93, material used is not PV.

Among other things, the DOD Trainer Aircraft Masterplan unveiled a major change in the Air Force approach to SUPT with the addition of a helicopter track. In so doing, the Air Force introduced yet another use for the JPATS aircraft—as the primary trainer for those students going into rotary-wing aircraft. That meant rotary-wing pilots would receive the same primary training as bomber-fighter and tanker-transport pilots at one of the SUPT bases before moving on to advanced training at the U.S. Army Aviation Center, Fort Rucker, Alabama. Previously, student pilots had not flown fixed-wing aircraft and had received all their training in helicopters at Fort Rucker before earning their wings.[53]

Under the new arrangement, students would enter the helicopter track via the same route as all other pilot candidates, based on their class standing toward the end of primary training, their preference, and the number of slots open in each track. They would receive their wings after completing the UH-60 advanced track at Fort Rucker. Providing helicopter pilots with some fixed-wing training early on, the Air Force thought, would make it easier for them to make the transition to fixed-wing aircraft later in their careers, as helicopter pilots frequently did. The creation of a separate helicopter track had the beneficial side effect of bringing the Air Force and Navy undergraduate flying training programs into even closer alignment, perhaps paving the way for additional joint training.[54]

[53] Ibid.

[54] Ibid.

## THE ACQUISITION PROCESS

As they moved steadily toward the acquisition of JPATS, both the Air Force and Navy could draw from their own recent experiences in acquiring new aircraft and associated training systems. After several years of planning and procurement actions, the Navy took delivery in early 1992 of its first T-45 "Goshawk," a modified version of a British aircraft, for use in its strike pipeline. The Navy ran into some problems with the complex modifications needed to permit the T-45 to operate from carriers and had to accept delays in its procurement schedule. All the while, the development and acquisition of the various elements of the rest of the training system—simulators, courseware, interactive video, and training integration system—proceed like clockwork. As noted in the Trainer Aircraft Masterplan, "the two-year interruption in the T-45 air vehicle procurement proved a boon to fielding the rest of the training system in good order."[55]

The Air Force experience in obtaining the T-1A was quite different. ATC required relatively simple modifications to an airplane already available on the commercial market In order to field the tanker-transport trainer. While the Air Force didn't encounter prolonged delays, it did have difficulty making sure the ground-based components of the training system which were more developmental in character—simulators, courseware, and training management system—were ready on

[55] Hist (PV), ATC, 1 Jan 92-30 Jun 93, pp 147-153, material used is not PV.

time. That experience tended to confirm the obvious—that those elements of a training system that were developmental in nature were likely to take more time. It also affirmed that the development of courseware required the involvement of government subject matter experts.[56]

Typically, the ground-based portion of a training system took up only 10 percent of the total cost with the air vehicle consuming 90 percent or more. That put the services in the paradoxical position of facing the highest risk in the portion of the training system requiring the least investment. While disconcerting, it was a situation they could live with. When it came to the ground-based training system (GBTS), the acquisition of both the T-45 and the T-1A highlighted the importance of allotting an ample amount of time to develop courseware and other components and drove home the benefits of early, frequent, and intense service involvement throughout the development process. At first, the Air Force and Navy had expected to buy different GBTS hardware to meet their own needs. However, a series of meetings between ATC and CNATRA led both parties to conclude early in 1992 that they could agree on a common hardware buy.[57]

The trainer aircraft masterplan called the Air Force procurement of the T-1A "a benchmark for non-developmental aircraft acquisitions streamlined to cut costs and capitalize on competition and commercial capability." That approach resulted in a contract award that came in at 30 percent less than originally programmed. The masterplan also contended that the Navy T-45 "set new standards for training systems design in DOD aviation training programs." In that mold, the two services relied on the training systems analysis process to identify common components of the JPATS ground-based training system. Air Force and Navy planners favored firm fixed-price arrangements as most suitable for the purchase of ground-based hardware, but when it came to courseware they thought a cost-plus contract was a better way to go.[58] As for the JPATS air vehicle, it appeared the commercial marketplace offered sufficient quality candidates to encourage strong competition. The Defense Department acquisition strategy called for the purchase of an aircraft that was available commercially off-the-shelf, an aircraft defined as a non-developmental item.[59]

**Aircraft and Company Pairings.**

There were plenty of aircraft out there that seemed to fit the bill, many of them initially developed as trainers for European or South American air forces.

[56] Ibid.

[57] Ibid.

[58] The purchase of hardware was pretty much a straightforward proposition where the services could select the product they wanted off the shelf. Getting the right courseware often required considerable give and take between the buyer and the contractor with numerous changes along the way. A cost-plus contract made it more likely the services would attract contractors willing and able to take on some of the more complex developmental work required.

[59] Hist (PV), ATC, 1 Jan 92-30 Jun 93, pp 147-153, material used is not PV.

Initially, the Defense Department acquisition strategy for JPATS was patterned after the T-1A buy, inasmuch as it looked for a prime contractor to integrate the modification and production of the aircraft with the development and provision of a ground-based training system. On that premise, the teams of foreign aircraft manufacturers and domestic aerospace companies looked for partners to provide simulators and other elements of the ground-based training system. Thus, British Aerospace joined the Beech/Pilatus team, Hughes went with Grumman/Agusta, Loral with Vought/Fabrica Militair De Aviones, AAI with Lockheed/Aermacchi, Quintron with Northrop/Embraer, and CAE Link with Rockwell/Deutsche Aerospace MBB.[60]

As called for at the trainer aircraft summit meeting at Randolph in the fall of 1991, the Aeronautical Systems Division's JPATS System Program Office, set up an operational demonstration for the candidate aircraft at Wright-Patterson AFB, Ohio, to run from 6 July-28 August 1992. ASD's 4950th Test Wing was to conduct the demonstration that would include participation by select ATC and CNATRA pilots. Such demonstrations gave the companies a chance to show off their wares and gave the government an opportunity to size up the candidates and evaluate the risk areas associated with the potential competitors before the release of the first draft request for proposal.[61]

Only two of the candidates—the Grumman/Agusta S-211 and the Lockheed/Aermacchi MB-339—had completed a week-long, nine-flight program, when Donald J. Yockey, Under Secretary of Defense for Acquisition, called a halt to the demonstration. Mr Yockey, it seemed, was concerned that the process was causing contractors to spend research and development money on the operational demonstration. Questioning the efficacy of the flights was just one of several questions defense acquisition officials raised in the summer of 1992. Staff members from the Defense Acquisition Board (DAB) and Mr Yockey's office wanted to reexamine what was meant by the term non-developmental item and look again at the idea of letting a single contract that provided for the integration of the aircraft and the GBTS.[62]

No one doubted the legitimacy of the questions, but they had been raised and answered before. The only certain result in raising them again was a slip in the JPATS schedule. There seemed no clear answer as to what constituted a non-developmental item. Some manufacturers were offering what was virtually off-the-shelf aircraft, while others were making changes—lengthening the fuselage by several feet like Embraer or going to a new engine and instituting major design modifications like Deutsche Aerospace-MBB. So, some of the candidates would be derivatives of existing aircraft rather than literal off-the-shelf versions. How much that mattered was open to question. Each candidate aircraft had been developed to either foreign commercial or military standards and, at

[60] Ibid.

[61] Ibid.

[62] Ibid.

the time the contractor submitted a formal proposal, the baseline aircraft had to have an acrobatic civil certificate or equivalent military qualification. After contract award, the SPO would test and qualify those modifications made, e.g., the installation of a new ejection system or a birdstrike resistant windscreen, to meet JPATS mission requirements. Production capability was the real concern. Whatever the configuration of the aircraft, could the manufacturer deliver 30 to 50 aircraft per month once the assembly line opened? That question could be answered only after the contractors had made their proposals.[63]

**Acquisition Strategy.** In the meantime, defense acquisition officials backed away from the notion of using a single, integrated procurement contract for JPATS. That created concern in the corporate offices of the aerospace industry. Apparently, it never dawned on the aircraft manufacturers or the simulator companies that the Air Force and Navy would change their minds about the JPATS procurement process after the services had encouraged them to get together in the first place. Most had already begun the process of sharing proprietary information and the change in acquisition strategy caught them unawares. Decoupling from one another was not a simple task, and it was not inexpensive.[64]

The Defense Department decision created concern in the halls of Congress, as well. Exasperated by this most recent turn of events, Sen Trent Lott (D-Mississippi) made his feelings known to Donald J. Atwood, Deputy Secretary of Defense.

> *The Air Force structured a reasonable and acceptable acquisition strategy for the JPATS. Responsible and responsive contractors responded to the Air Force acquisition strategy. Numerous contractors invested significant amounts of money to structure their bids consistent with the Air Force strategy. Now the Department is changing the rules in mid stream. Contractors can't afford it and the country cannot sustain the delay*.[65]

Such protests notwithstanding, defense acquisition officials pressed forward with plans to scuttle the single, integrated procurement contract. In its place, they favored a strategy that had the government awarding two contracts after separate competitions among the aircraft contractors and the companies that would furnish the ground-based training system. First, the Air Force[66] would release the request for proposal and evaluate the bids made by the aircraft makers. After selecting the JPATS aircraft, the Air Force would then solicit bids from GBTS contractors—the companies that could provide he simulators, aircrew training devices, courseware, and an automated

[63] Ibid.

[64] Ibid.

[65] Ibid.

[66] For such things as joint studies, joint projects, and joint acquisition programs, the Department of Defense designated one service as the lead or executive service. In the case of JPATS, the Air Force was the lead service.

training management system. Proponents of this approach reasoned that it would allow the services to obtain the best aircraft and the best ground-based training system, as opposed to the compromises frequently connected with team competition. Moreover, they maintained that going to two contracts would promote more intense competition between both sets of bidders and result in savings to the government. The SPO agreed with the office of the Under Secretary of Defense for Acquisition on this point and estimated the savings could come to as much as $100 million.[67]

However, everyone didn't change course overnight. This change in direction generated a good deal of discussion both within and outside the Defense Department. The review, begun by the Under Secretary of Defense for Acquisition in July 1992, wasn't completed until the next year, when the two-contract strategy was formalized on 19 January 1993 in an Acquisition Decision Memorandum. With the issue apparently settled, the Air Force finally released the first draft RFP for JPATS on 2 February 1993.[68] It intended to release a second draft in the spring and, once it had digested the comments and feedback, the formal RFP in September 1993.[69]

But the issue wasn't settled. Congress intended to have a say in the matter. At the budgetary authorization conference early in the year, some members expressed the belief that the services should proceed with the JPATS buy as initially planned, i.e., under a non-developmental, single integrated procurement contract. That put the Congress and OSD at loggerheads. Out of this disagreement came more discussion and more delay and, in the end, a curious compromise--a decision by the Defense Acquisition Board in May 1993 that incorporated prominent elements of both strategies.[70]

The new approach continued to call for the acquisition of a non-developmental aircraft. It also provided for the selection of an aircraft prime contractor who would ultimately be responsible for the performance of the total system. The big change in the revised strategy had to do with the manner in which the GBTS contractor would be selected. Once the Air Force and Navy had chosen the contractor that would produce the JPATS aircraft, the services would turn to the selection of the GBTS contractor. With some input from the winning aircraft manufacturer, the services would then orchestrate a second competition to choose the firm that would produce the GBTS. That firm would then become a major subcontractor to the aircraft prime contractor via a contract change proposal. The idea was to allow the

[67] Hist (PV), ATC, 1 Jan 92-30 Jun 93, pp 147-153, material used is not PV.

[68] The process of producing draft RFPs in advance of the formal RFP served a number of purposes. It provided the government with a vehicle to pass its minimum requirements to potential contractors and receive feedback from them in order to craft a more effective RFP for proposal and secure a good contract.

[69] Hist (PV), ATC, 1 Jan 92-30 Jun 93, pp 147-153, material used is not PV.

[70] Ibid.

government to select the best aircraft and the best ground-based training system and still have a single prime contractor to deal with day in and day out. The protracted discussions about which avenue to follow most likely pushed the release of the formal request for proposal into 1994.[71]

In putting his stamp of approval on the revised JPATS acquisition strategy, John M. Deutch, the new Under Secretary of Defense for Acquisition, laid down several stipulations. Prime among them was a mandate to ensure that JPATS was fully consistent with DOD's policies on women in combat. In the past, the size of the cockpit had worked against women who were generally smaller in stature than men. To remedy that situation, Mr Deutch wanted the Air Force to tailor the JPATS system to make it accessible to equal percentages of the eligible populations of men and women. Failing that, he directed that "…the Air Force shall assure that the JPATS system accommodate not less than 80% of [the] population of eligible women."[72]

A key factor that had excluded many women from consideration as pilots was sitting height. Much like the interior of a car, the interior of a cockpit was designed so the pilots could easily reach the pedals, switches, and other controls. In years past, the Air Force had tailored cockpits to accommodate the average male pilot, and that meant many women and shorter men could have difficulty reaching the rudders and flight controls and seeing over the nose of the aircraft and might also experience a problem with operation of the ejection seat. Before Mr Deutch made known his concerns about the design of the JPATS cockpit, sitting height parameters stretched from 34 inches to 40 inches. That restriction prevented approximately half the eligible women from qualifying for pilot training.[73]

A Defense Department working group, with the participation of the JPATS SPO, determined that lowering the bottom end of the sitting height scale to 31 inches could accommodate 95 percent of the eligible women and men, if taller men were excluded in favor of shorter men. However, it would cause all the JPATS contenders to mount a full-scale development effort to make the modifications needed, and that translated into higher costs and significant delays. A more realistic approach altered the sitting height threshold so it ranged from 32.8 to 40 inches. That adjustment would satisfy the requirement that the JPATS aircraft accommodate at least 80 percent of the population of eligible women and would place far fewer demands on the JPATS contenders.[74]

The latter alternative seemed more in keeping with the under secretary's other stipulations about the JPATS acquisition strategy—stipulations that favored proposals presenting the lowest development risk and lowest total system cost. Mr Deutch also wanted the Air Force, in the next draft request for proposal, to solicit contractor recommendations on streamlining actions that would reduce cost. He expected the Air Force to delete all unnecessary references to military

[71] Ibid.

[72] Ibid.

[73] Ibid.

[74] Ibid.

specifications, military standards, service regulations, and technical orders. He considered these references as impediments to the greater use of commercial practices, inasmuch as they tended to undercut the whole idea of purchasing a non-developmental item. Finally, in his acquisition decision memorandum, Mr Deutch said he wanted to see the Air Force and Navy produce a substantially updated trainer aircraft masterplan by September 1993. So, as the summer of 1993 began, ATC and CNATRA had their work cut out for them, as the JPATS acquisition process moved fitfully but relentlessly toward a conclusion.[75]

If it wasn't one thing it was another. The Air Force, as the lead service had a tough time keeping the program moving straight ahead. Like a race car with a blowout, the program careened from side to side as defense officials several times changed the ground rules governing the selection process. The result each time was the same; the yellow flag came out and the pace of the race was slowed.

**Updated Operational Requirements Document.**

On 1 September 1993, Air Education and Training Command[76] and the Chief of Naval Air Training issued the updated version of the operational requirements document for JPATS. This was the third such document the two services had drawn up. Each version built upon the last as the Air Force and Navy clarified and refined their requirements for a primary training aircraft and a complementary ground-based training system. The idea of obtaining a common primary trainer to replace the Navy's T-34C and the Air Force's T-37B aircraft (both equipped with technology from the 1950s) surfaced first in the 1989 Department of Defense Trainer Aircraft Masterplan and assumed center stage in 1993 as the Air Force grew closer to releasing the formal request for proposal. Making the latest ORD available to aerospace firms that were interested in securing the JPATS contract was another step on that journey.[77]

Not unexpectedly, the new ORD showed another decrease in aircraft requirements, since the JPATS force structure was tied to projected rated officer production. Projections indicated the two services needed a force structure sufficient to support a maximum student load of 350 primary students per squadron per year. The Navy had three primary squadrons at NAS Whiting Field and two at NAS Corpus Christi and the Air Force had one each at Columbus, Laughlin, Reese, and Vance AFBs. In addition, both the Air Force and the Navy needed to train about 250 instructor pilots each year. The Air

[75] Ibid.

[76] On a July 1993, HQ USAF redesignated Air Training Command as Air Education and Training Command (AETC). With the change AETC assumed responsibility for Air University and its education mission as well as the advanced flying training mission for select fighter, airlift, and special operations aircraft.

[77] ORD, AETC/XORA & CNATRA N34B, Operational Requirements Document (ORD) for the Joint Primary Aircraft Training System (JPATS) 005-88-II, 1 Sep 93, w/atch Chg 1, 16 Feb 94 , SD III-73 in Hist (PV), AETC, 1 Jul 93-31 Dec 95, material used is not PV.

Force conducted its IP training at Randolph, while the Navy accomplished instructor training at three locations—Corpus Christi, Whiting, and Pensacola. To support such a structure, the services said they needed a total of 711 aircraft, a considerable drop from the previously stated requirement of 765 aircraft. Air Force requirements dipped from 417 to 372 and Navy numbers went from 348 to 339.[78]

Besides those alterations to the force structure, the new JPATS ORD contained some significant changes in program milestones. First, there was the matter of training the instructor pilot force. Instead of a February 1998 start date for the first PIT course at Randolph, AETC was looking at March 1999. Initial cadre training, however, would start in January 1998—at the contractor's facility. The contractor would train about 30 instructor pilots in small groups over a 4-6 month period. These IPs would return to Randolph to put the first few aircraft through their paces, gain some experience, and set up the transition training course. As outlined, the first transition course—for T-37 IPs from Reese—would start in June 1998, with three more classes slated over the course of a year. Each class would last from 60-90 days, and the IPs would return to Reese to prepare for the start of student training sometime in FY00.[79]

When it came to the start of student training, not only did the dates change, the locations did too. Where the Air Force had planned on initiating JPATS student training at Laughlin in June 1999, it now intended to start at Reese in FY00. Much the same was true for the Navy. It had planned to begin at Corpus Christi between April 2001 and April 2003 but decided to start training students at Whiting sometime in FY01. The explanation was simple. Reese and Whiting were where the services got joint training rolling in July 1993 with an exchange of instructor pilots after Defense Secretary Les Aspin told them earlier in the year to consolidate fixed-wing aircraft training across the board and to get started right away. Closely tied to the start of student training was the initial operational capability date. By definition, a unit achieved IOC when it had sufficient assets in place to train approximately 44 students and complete an operational validation period that ran through the end of Phase II primary training. Thus, the Air Force expected to achieve an IOC at Reese in FY00 and the Navy at Whiting in FY01. Each service would achieve full operational capability when it had all the aircraft and all the GBTS components, as well as their operational and logistical support, in place. For the Air Force, FOC was pegged as FY07; for the Navy it was still to be determined.[80]

Funding for JPATS would also be a joint venture with the Air Force and Navy sharing the costs. The estimated bill for 711 JPATS aircraft and the associated ground-based training system came to over $6.4 billion. The Air Force share of that bill was just over $3.5 billion, with $3.3 billion in procurement funds and the rest devoted to research, development, testing, and engineering (RDT&E). As noted earlier, the Air Force expected to buy a total of 372

[78] Ibid.

[79] Ibid.

[80] Ibid.

aircraft with that money. Early funding profiles showed the Air Force taking delivery of its first JPATS aircraft in FY98 and its last in FY07. Neither the dollar amounts nor the delivery schedule were set in concrete. They were subject to change, and they did change, but that was to be expected given the magnitude of the purchase, the complexity of the process, and the vagaries of congressional funding practices.[81]

## REQUEST FOR PROPOSAL

Early in 1994, preceding the release of the long-awaited RFP, the pace picked up. Back in July 1993, in approving the JPATS acquisition strategy, John Deutch had added several stipulations that he wanted addressed before the release of the RFP. One involved making the JPATS system available to at least 80 percent of the eligible women, one favored proposals presenting the lowest developmental risk and lowest total system cost, and one sought contractor recommendations for streamlining actions that would reduce cost. In addition to these considerations, a lot of attention during the RFP review process focused on streamlining the JPATS acquisition.[82]

Part of the review was a discussion on 23 February 1994 among senior acquisition officials that centered around whether or not the JPATS request was in line with ongoing acquisition reform initiatives. OSD made it clear that the RFP was way too long at almost 1,000 pages and way too detailed. More specifically, the draft RFP was laced with too much language telling the contractor how to do something instead of stating the requirement and leaving it up to the contractor to decide how to carry out the particulars. It also contained too many military specifications and delivered data items, i.e., provisions and details the military insisted on that went beyond the standards commonly accepted in commercial practice. Such deviations almost always added to the cost. When it became clear during the meeting that OSD would not allow the RFP to be released unless the Air Force and Navy did something to further streamline the document, Ms Darleen Druyen, from the Office of the Assistant Secretary of the Air Force for Acquisition, agreed to form a "Red Team" for that purpose. The team consisted of representatives from those agencies with a direct stake in the JPATS acquisition process and included AETC, CNATRA, and the JPATS SPO.[83]

One of the first things to change as a result of the Red Team's deliberations was the RFP release date. Already slipped from February to April to allow OSD to deal with cockpit anthropometrics, it slipped once more to early May 1994. True to its charter, the team pared the RFP page count significantly (25 percent), eliminated much of the "how to" language (30 percent), and reduced the contractor data requirements list (50 percent). In addition, it recommended advancing the priority accorded to the contractor's ability to make the transition from manufacturing the aircraft overseas to

[81] Hist (PV), AETC, 1 Jul 93-31 Dec 95, pp 142-147, material used is not PV.

[82] Ibid.

[83] Ibid.

making it in America from third place among the source selection criteria to second place—over the price of the aircraft. First, of course, was performance. The team also suggested altering the acquisition strategy for the GBTS. Under the existing strategy, once the Air Force and Navy had chosen the contractor to produce the JPATS aircraft, the government would turn around and conduct a second competition (with some input from the aircraft contractor) to select the firm that would produce the GBTS. The firm would then become a major subcontractor to the aircraft contractor via a contract change proposal. The idea was to allow the government to select the best aircraft and the best ground-based training system and still have a single prime contractor to deal with on a regular basis. The Red Team feared that approach would permit the prime contractor to point the finger at the government if the GBTS contractor did not perform up to snuff. Therefore, it suggested a strategy that had the prime contractor competitively selecting the GBTS contractor (with some input from the government).[84]

Other changes that helped streamline the JPATS acquisition process were also made prior to the RFP's release. The services, for instance, whittled down to 64 the number of military specifications in the JPATS RFP—in sharp contrast to the Navy's T-45 program that had 367 specifications and standards. Military specifications would be used only in instances where safety requirements or military utility made them necessary or in circumstances where commercial standards did not exist, as in the case of ejection seats. In casting aside military specifications, the Air Force and Navy showed a willingness to accept commercial quality standards and best industry practices. Commercial standards were set by the International Organization for Standardization, its American component—the American National Standards Institute—and the American Society for Quality Control. Technically, the standards agreed on by the international agency and the two American entities were identical; the only differences were in language and phrasing. Shifting from military to commercial standards sometimes produced dramatic results. For example, a simple declarative sentence describing how a product should be handled—"The supplier shall provide methods and means of handling that prevent damage or deterioration"—replaced a military standard that went on for almost 75 pages.[85]

Along the same lines, with the designation of JPATS as one of five DOD acquisition pilot programs and the regulatory relief that status provided, the SPO was able to incorporate a number of other streamlining measures in the RFP. A prime example was a waiver of the requirement to install military Global Positioning System equipment on the aircraft; commercial equipment would do just fine. Additional streamlining measures found their way into the RFP in such areas as commercial avionics, engines, commercial maintenance manuals, tailored computer-aided logistics support requirements, commercial vendor warranties, cost reporting, and a single integrated test program. Pared down, modified and

[84] Ibid.

[85] Ibid.

improved, the formal RFP was released by the Aeronautical Systems Center's Flight Training System Program Office on 18 May 1994.[86]

Central to the RFP were a number of elements the services considered key. First of all, the JPATS aircraft had to be able to perform all existing primary track syllabus maneuvers and mission profiles. It also had to sustain a minimum airspeed of 250 knots, operate in a G-envelope of +6 to –3, and take off and land on 5,000 foot runways. In addition, the Air Force and Navy wanted JPATS to have a pressurized cockpit with stepped tandem positions and a windscreen that could sustain a 4-pound birdstrike at 270 knots. Finally, the aircraft had to have an ejection system capable of operating at ground level while moving forward as slowly as 60 knots and had to accommodate at least 80 percent of the eligible population of women candidates.[87]

Coincident with the release of the RFP, the SPO issued a gag order that prohibited any further contact with participating offerers until the source selection was made. Making up the source selection team were Air Force and Navy personnel who represented the joint program office, the operational commands, the responsible test organizations, and both service headquarters. The source selection process itself included assessments of each offerer's proposal and flight evaluations of all the candidate aircraft.[88]

Seven contractors responded to the RFP. In every case but one, the aircraft involved was manufactured by a European or South American firm that had teamed with a major American aerospace company expressly for the competition; the one exception was Cessna, which had modified one of it business jets. All the JPATS competitors agreed in advance that at least 70 percent of the components would be made in the United States. The first company to display its wares in the flight evaluation phase that began at Wright-Patterson AFB in late July 1994 was Grumman. It was paired with Agusta, an Italian company that made the S-211 turbofan-powered trainer. Each of the contenders got a chance at 2-week intervals. Next, Vought showed off a turbofan aircraft called the PAMPA 2000, produced by Fabrica Militair De Aviones, an Argentinean firm. Rockwell then exhibited another turbofan, the Ranger 2000, manufactured by a German company, Deutche Aerospace-MBB. Cessna followed with its own twin-turbofan CitationJet. Northrop offered the Tucano H, a turboprop manufactured by Embraer, a Brazilian firm. Lockheed displayed the MB-339, a turbojet aircraft made by the Italian manufacturer Aermacchi. Lastly, Beech presented the PC-9 Mk II, a turboprop manufactured by Pilatus, a Swiss firm.[89]

Just a few weeks into the flight evaluation process, the whole JPATS acquisition strategy seemed to be unraveling. In early August 1994, with the RFP finally on the street and the anticipated contract award barely six months away, OSD was having second thoughts. The issue surfaced during a

[86] Ibid.

[87] Ibid.

[88] Ibid.

[89] Ibid.

meeting of the Defense Resources Board when Mr William Lynn, chief of OSD's program analysis and evaluation shop, suggested delaying the JPATS acquisition as a way of solving some of DOD's budgetary woes. Mr Lynn noted that pilot production had declined about 50 percent as part of the defense drawdown, thereby prolonging the service life of the T-34 and T-37 training aircraft. Under the circumstances, he questioned whether the services should go ahead with the current JPATS plan and suggested the services might want to postpone the contract award from February 1995 to February 2002. A recent Congressional Budget Office (CBO) study seemed to buttress that view when it maintained that both services could use the Navy's T-34 turboprop trainer for much of primary training. Such joint training, the CBO contended, would extend the life of the T-37 beyond 2005 and that of the T-34 into the 2008-2010 time frame. That was definitely not the joint training the Air Force and Navy had in mind.[90]

Nor was it the course of action favored by a number of prominent U.S. senators. With two of the seven JPATS contenders—Cessna and Beech—hailing from Kansas, Sen Robert Dole, in particular, took an active interest in any measure that might derail the JPATS train. Accordingly, he and eight other senators made their feelings known to Secretary of Defense William J. Perry:

> *It has come to our attention that OSD is considering a budget proposal that would, if approved, terminate all Joint Primary Aircraft Training System (JPATS) funding for Fiscal Years 1996 through 2001, effectively canceling the program.…Congress has been deeply involved in structuring and guiding the JPATS effort since its inception….We were convinced then of the need for a new primary trainer aircraft and we are even more convinced today that JPATS is urgently needed and that it cannot be delayed again*.[91]

Nonetheless, Deputy Defense Secretary Deutch instructed the Air Force to draw up a couple of options to the planned JPATS acquisition strategy. The Air Force was to look at one option that would defer the acquisition up to 7 years and one that would reduce costs by increased reliance on commercial practices, a slower procurement profile, and enhanced joint training. From the Air Force perspective, delaying the contract award from 1995 to 2002 would sound the death knell for the existing JPATS program. It assumed competition among the contractors would still be viable in seven years, and that just wasn't realistic. Many of the contractors had already invested in the neighborhood of $50-60 million, and each was spending about $1million per month during source selection. Moreover, that option would force the Air Force to continue training in the T-37 despite known shortcomings in training effectiveness, supportability, and safety. It would also require the Air Force to fund aircraft wiring and GPS modifications for the T-37 that would otherwise not be required. If

[90] Ibid.

[91] Ibid.

implemented, it would save $1.54 billion in the Five Year Defense Plan (FYDP).[92]

The Air Force saw slowing the procurement profile as the lesser of two evils. This option would preserve the contract award in February 1995 but would stretch out the purchase and slow the production rate from a peak of 42 aircraft per year to 36 per year. It would also delay the FOC date until 2011. In the end, it would save $494.2 million by providing 88 fewer aircraft in the FYPD than originally planned. It also had the advantage of permitting the services to implement the Joint Fixed-Wing Aircraft Training Plan submitted to OSD in June 1993 and allowing the services to capitalize on the commercial practices already incorporated in the RFP.[93]

## CONTRACT AWARD

As it turned out, the Air Force did not meet the 1995 contract award date nor did it have to defer the award to 2002. After one or two more course changes and shifts in direction, on 22 June 1995, Secretary of the Air Force Dr Shiela E. Widnall announced the selection of the Pilatus PC-9 and the Beech Aircraft Corporation to develop and deliver the Joint Primary Aircraft Training System. Despite all the stops and starts along the way, the JPATS acquisition program had remained remarkably intact. As announced by Secretary Widnall, the program called for buying up to 711 aircraft, 372 for the Air Force and 339 for the Navy.[94] A total of $7 billion had been budgeted for JPATS manufacturing, development production, and the initial support program. As the lead service, the Air Force would award two contracts to Beech, one for aircraft missionization and production options for the Mk II aircraft and one for contractor logistics support. Once the Air Force awarded those contracts, Beech would begin a competitive selection process for the JPATS ground-based training system to include flight and ground simulators, training courseware, and a management information system for tracking student training information. However, no sooner was the selection announced when one of the other firms in the competition filed a protest. As a result, everything was put on hold until the protest was reviewed and resolved. As 1995 ended, that still had not happened.[95]

T-6A Texan II, the JPATS winner, manufactured by Raytheon

After a delay of 7 months, the Air Force was finally able to award the JPATS contract to Raytheon Aircraft

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[92] Ibid.

[93] Ibid.

[94] Aircraft numbers fluctuated as additional requirements surfaced. Besides 29 aircraft to support JSUNT, additional T-6s were needed to support increases in SUPT pilot production and for the ENJJPT program. By the end of FY96, the requirements were up to 448 for the Air Force and 368 for the Navy

[95] Ibid.

Corporation on 1 February 1996.[96] As the prime contractor, Raytheon, shortly thereafter, chose Flight Safety Services Corporation, headquartered in Denver, Colorado, to develop the ground-based training system. Flight Safety's office in San Antonio, Texas, would be responsible for courseware development. In addition, one of the company's divisions would handle the production of aircrew training devices and another would produce visual systems for the simulators. Another subcontractor, Logicon, a firm from Colorado Springs, Colorado, signed on to develop a key component—the software for the training integration management system (TIMS). Other key contractors included Pratt and Whitney Canada who would provide engines for the JPATS aircraft from its plant at Bridgeport, West Virginia, and Martin Baker Aircraft from the United Kingdom who would provide the egress system.[97]

With the contractors selected, the next step was to come up with an official designation for the aircraft. Apparently there was more to the process than met the eye; it took the better part of a year to get that done. After some discussions among their staffs, the AETC and CNATRA commanders agreed on T-6A Texan II, and Gen Billy J. Boles, the AETC commander, notified Gen Ronald R. Fogleman, Air Force Chief of Staff, of their choice. They settled on that designation in large measure because of the prominent role the North American T-6 had played as a trainer for both services during World War II and beyond. Alternative candidates were T-6A Mustang II and T-6A Mark II. HQ USAF approved T-6A as the Mission Design Series designation on 16 December 1996, and the Assistant Secretary of Defense for Public Affairs (ASD/PA) approved Texan II as the official name for the JPATS aircraft on 9 April 1997.[98]

## FIELDING THE T-6A AND ITS GROUND BASED TRAINING SYSTEM

Like a juggler struggling to keep several balls in the air, AETC tried to keep the acquisition of the JPATS aircraft and the various components of the GBTS in motion as the command moved toward achieving IOC for the Air Force in August 2001. For its part, CNATRA expected to reach IOC in July 2003. A major milestone on the timeline leading to those dates was the initial flight of the first production T-6A Texan II. That took place on 15 July 1998 at Raytheon Aircraft's Beech Field in Wichita. In a 1.8–hour sortie, the Texan II flew a profile that included basic flying qualities investigations, idle power stalls, baseline aerobatics, including a loop, aileron roll, and barrel roll, and a functional systems check. Subsequently, this aircraft (PT-4) would be used for Federal Aviation Administration certification flight testing, military qualification flight testing, and an operational assessment.[99]

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[96] In the intervening period Raytheon bought out Beech and became the prime contractor for the Joint Primary Aircraft Training System.

[97] Hist (FOUO), AETC, 1996-1999, pp 189-193, material used is not FOUO.

[98] Ibid.

[99] Ibid.

In August 1998, Lt Col Paul R. Boland, AETC's JPATS program manager, issued the first of a series of periodic reports on the status of the program. The summary commented on such facets of the program as the aircraft, TIMS, courseware, aircrew training devices, subject matter experts, logistics, and site activation. For the most part, things were going well, though AETC had already experienced some glitches. But that was to be expected in a major acquisition program such as JPATS. Icing certification procedures, for instance, revealed a disconnect between the ORD and Raytheon's interpretation of the requirement, and that necessitated testing that would extend the certification process into FY00. On the positive side, two more production aircraft were expected to fly by the end of September.[100]

In other areas, Logicon, the TIMS contractor, had prepared scheduling, grade book, and flight following prototypes for the Preliminary Design Review (PDR) scheduled to take place in October. Similarly, Flight Safety was on schedule in developing courseware for both student and instructor pilot training, for the administration of the GBTS, and for the conversion of existing courses to make them compatible with JPATS hardware. In addition, AETC had provided the contractor with inputs to support the development of the visual data base for aircrew training devices for both Randolph and Laughlin and was generally satisfied with the progress made in several logistics areas. Moreover, the JPATS team already had six subject matter experts (SME) at work—four Air Force and two Navy—and they were actively engaged in everything from courseware development to flight manual review.[101]

By January 1999, a lot more was happening. The program manager reported that the second and third production aircraft had successful first flights, birdstrike testing of the T-6A windscreen was completed, and sled testing of the escape system had been conducted with mannequins weighing from 103 to 245 pounds. The JPATS team had conducted a 100 percent review of the flight manual and both the preliminary design review and critical design review of the joint primary pilot training syllabus. While these actions were proceeding as planned, AETC was concerned that congressional funding actions might undercut the overall acquisition schedule. During FY99 budget deliberations, Congress cut $10 million of the $37.2 million the Air Force had requested to procure the ground-based training system for JPATS. On top of that, the SPO underestimated the cost for TIMS production and installation by over $14 million. That brought the GBTS funding shortfall to almost $25 million, and left enough to bed down the TIMS at only two bases—Randolph and Moody AFB, Georgia—and meant AETC had to ask for additional FY01 funding to bed down TIMS at the remaining SUPT bases.[102]

The GBTS and TIMS, in particular, were central to the whole concept of introducing joint primary training for the Air Force and Navy. Simply put, the services could not

[100] Ibid.

[101] Ibid.

[102] Ibid.

conduct training without the GBTS components. The joint primary pilot training syllabus required access to computer-based training system (CBTS) components and simulators. The CBTS was a server-based set of computer aided instruction (CAI) workstations that would support all CAI undergraduate flying training requirements. For AETC, that meant the CBTS would host not just T-6 training, but T-37, T-38, T-1, IFF, PIT, and navigator training, as well. In a similar vein, TIMS would link all AETC and CNATRA undergraduate flying training bases and provide such functions as automated scheduling, electronic grade books, maintenance of instructor and student data, curriculum development and management, data collection and analysis, reports generation, and ATD management. Without access to the GBTS, the services would literally have to park the aircraft and delay the start of student training.[103]

AETC expected that TIMS would become operational at Moody in June 2001 and at Randolph in August 2001. If funding were restored in FY01, as anticipated, the other bases might field TIMS sometime late in FY02. In the meantime, the command expected to have the T-6A and GBTS in place and ready to start student training at Moody in June 2001. Before the 12 FTW could begin T-6A pilot instructor training at Randolph in August, a considerable amount of testing had to take place: Multi-service Operational Test and Evaluation (MOT&E), Developmental Test and Evaluation (DT&E) of the GBTS aircrew training devices, and a comprehensive JPATS system test called the System Level Formative Evaluation (SLFE). Much of this activity would take place at Randolph in addition to instructor pilot transition training (from the T-37 to the T-6) for the initial cadre. After the PIT program was established, plans called for AETC to start training with the T-6A at Laughlin in April 2002, at Vance in January 2005, at Columbus in June 2006, and at Sheppard in September 2007. For its part, the Navy intended to start student training with the Texan II at NAS Whiting Field in June 2003, followed by NAS Corpus Christi sometime in 2008 and NAS Pensacola in 2010.[104]

Problems with the JPATS engines produced by Pratt and Whitney Canada came to a head in November 1999. Early in the month, a JPATS prototype experienced an unexplained oil pressure drop for the third time during routine flight maneuvers. After the aircraft landed, maintenance personnel found metal particles in the oil. As a precaution, the Air Force announced that it would not accept additional production aircraft until it had confidence that the engines could be fielded with acceptable levels of reliability and performance. Toward that end, a Pentagon testing official indicated an investigation of manufacturing tolerances of engine shaft and bearing components was underway. The spokesman also said that the Air Force would not proceed with operational testing nor authorize full-rate production until the manufacturer resolved the problem A spokesman for Raytheon said, "If the current situation is resolved within the next several months, which we believe probable, the impact on the program will remain small….We

[103] Ibid.

[104] Ibid.

don't feel this is any kind of show-stopper." Nonetheless, at the end of 1999, there was an air of uncertainty about the JPATS acquisition timetable.[105]

## AIRCRAFT DELIVERY SCHEDULE

Budget and engine problems notwithstanding, the first production model of the T-6A aircraft arrived at Randolph AFB in March 2000. Over the next 7 months, test pilots from AETC, AFOTEC, and the Navy flew this aircraft as part of the T-6A MOT&E to ensure it met both services' training requirements. Meanwhile, on 23 May 2000, the 12 FTW received the first operational T-6A that the wing would use to train a whole IP force. At the beginning of 2000, the total buy was slated to be 782 T-6As—454 for the Air Force and 328 for the Navy.[106] As far as the T-6A engine was concerned, the gearbox didn't meet design goals and the engine experienced problems under certain conditions. Safety was not an issue, but performance was. That caused AETC to accept some aircraft under an interim agreement with Raytheon until the problem could be fixed.[107]

In keeping with the Operational Requirements Document, after Raytheon trained the initial cadre of IPs at its facility in Wichita, they returned to Randolph to fly the aircraft, gain experience, and prepare to conduct transition training. During the delivery cycle, Randolph was to act as a holding pen for the aircraft before they were shipped to the other flying training bases.[108]

Projected aircraft cost also became a problem. For aircraft purchased in FY02 and beyond, the price rose from the $3.9 million per aircraft the Air Force had planned on spending to $4.7 million. The increase in cost was due in part to a general rise in manufacturing costs, in part to manufacturing inefficiencies, and in part to the fact that projected international sales never materialized. Consequently, the Air Force couldn't buy as many aircraft with the funds it had programmed for each fiscal year and would have to stretch out the buy over more years. Early on, AETC expected to achieve IOC at Moody in June 2001, but the combination of engine problems and cost increases was likely to make itself felt down the road and delay aircraft delivery at the other bases. Planners expected Moody to experience only a

[105] Ibid.

[106] The initial buy was set at 372 T-6s for the Air Force and 339 for the Navy. Changing pilot production requirements accounted for the new numbers. The bulk of the increase for the Air Force involved the addition of 69 T-6As for the ENJJPT program at Sheppard. While the Air Force would ultimately buy 454 aircraft, it would bed down only 453 since it had lost 1 in a Class A mishap at Randolph in August 2000.

[107] Hist (PV), AETC, 2000-2001, pp 206-217, material used is not PV.

[108] ORD, AETC & CNATRA, "Operational Requirements Document for the Joint Primary Aircraft Training System (JPATS)," 1 Apr 00, SD IV-48 in Hist (PV), AETC, 2000-2001, material used is not PV.

slight delay toward the end of its delivery window but expected the situation to grow progressively worse at each succeeding base. The delays, of course, had a direct impact on the dates that student training started at each base.[109]

Any delays in aircraft delivery schedules affected the length of time it took bases to make the transition from one aircraft to another. It meant the wings would have to maintain both aircraft and share facilities for a longer period of time. It also meant that some instructor pilots might even have to get by with a syllabus that provided for little or no simulator instruction as they tried to orchestrate the removal of the old simulators and the installation of the new ones. If the delays became protracted, that might hinder the wings' ability to meet program flying training (PFT) requirements.[110]

**TRAINING WITH THE T-6A**

With all that in mind, AETC turned its attention to Moody,[111] where the command would initiate student training with the Texan II. AETC counted on Moody to enable the command to meet its SUPT primary training requirements. Without the relief that Moody offered, the command would soon exceed the training capacity it could sustain at the three remaining SUPT bases—Columbus, Laughlin, and Vance—even when supplemented by USAF participation in the ENJJPT program at Sheppard. Based on experience, planners knew that the flying training wings could operate at only about 90 percent of their capacity over an extended period of time. If Moody weren't in the mix, AETC would exceed that mark in FY00, would reach 95 percent in FY01, and would go over 100 percent in FY02 and beyond. However Moody provided a relief valve for primary training at the other bases and lowered those figures to slightly over 90 percent for FY02 and slightly under 100 percent for FY03 and beyond.[112]

Before the command could initiate student training at Moody, it needed to train the trainers. It did that by establishing a transition course at Randolph where the 12 FTW qualified T-34 and T-37 instructor pilots from the other JSUPT bases as T-6A IPs. By December 2000, the wing had turned out 18 T-6A IPs who then transferred to the 479th Flying Training Group at Moody to fly the newly assigned aircraft. The first T-6A had arrived at Moody on 1 May 2001 and the formal arrival ceremony took place on 7 May 2001.[113]

As already noted, AETC had hoped to achieve a T-6A IOC in June 2001 but that proved impractical when it was clear that TIMS could not be brought on-line by then. AETC and CNATRA agreed that IOC would occur when there were "sufficient assets in place to start a class of primary pilot training students in Phase I (academics) followed by an operational validation period terminating when that class

[109] Hist (PV), AETC, 2000-2001, pp 206-217, material used is not PV.

[110] Ibid.

[111] AETC activated the 479 FTG at Moody on 31 July 2000. Moody, however, remained an ACC base.

[112] Ibid.

[113] Ibid.

completes Phase II (Primary)." Before the services could begin student training, they had to have certain required assets available (RAA) for a minimum of 30 days. The JPATS ORD III listed the RAA as 15 T-6A aircraft, 1 ejection set trainer (EST), 1 egress procedures trainer (EPT), 1 instrument flight trainer (IFT), 1 unit training device (UTD), 1 operational flight trainer (OFT), the TIMS, the CBTS, and all joint primary pilot training (JPPT) courseware.[114]

In July 2001, AETC planners, led by Mr Steve Martin, the JPATS program manager for AETC, drew up an alternative plan that called for the command to begin Phase I training at Moody in October 2001 even before it declared IOC. If the TIMS were delivered in November as scheduled, RAA could also be reached at that time. That would permit the command to declare IOC by using the T-6A, ATDs, and the longstanding time related instructional management (TRIM) system. Gen Hal M. Hornburg, the AETC commander, approved the new plan allowing the 479 FTG to begin the academic phase of training with the entry of Class 03-01 on 10 October 2001 and the flying phase on 20 November 2001. There were 13 Air Force and 2 Navy students in the first class. When the contractor was unable to meet the TIMS delivery schedule, the 479 FTG was not able to achieve IOC in December 2001. It would be a while before each service could achieve FOC.[115]

[114] See note 106 above.

[115] Hist (PV), AETC, 2000-2001, pp 206-217, material used is not PV.

## TESTING AND EVALUATION

Meanwhile, like any new aircraft brought into the fleet, the T-6A underwent a comprehensive series of evaluations. First, Raytheon conducted an Operational Assessment (OA) of the T-6A in three phases. Next, came the Multi-Service Operational Test and Evaluation (MOT&E) that was actually a string of evaluations. The MOT&E (A) assessed just the air vehicle, the MOT&E (I) was an in-plant appraisal of the three ATDs, the MOT&E (O) included an on-site review of the status of the GBTS, and the MOT&E (S) examined the full system. AFOTEC acted as the lead Operational Test Agency for the MOT&E and was supported by the Navy's Operational Test and Evaluation Force (OPTEVFOR) and personnel from AETC and CNATRA. In conjunction with the MOT&E, the JPATS System Program Office conducted a System Level Formative Evaluation.[116]

The Operational Assessment of the T-6A ran from March 1997 to April and found the air vehicle potentially effective and potentially suitable. With the early identification of a number of issues, it directly supported the decision to begin the MOT&E.[117]

[116] Rpt, AFOTEC & COMOPTEVFOR, "Joint Primary Aircraft Training System (JPATS) Multi-Service Operational Test and Evaluation, MOT&E (A) and MOT&E (I) Final Report," 9 Jan 01, SD IV-59 in Hist (PV), AETC, 2000-2001, material used is not PV.

[117] Ibid.

AFOTEC conducted the MOT&E (A) at Randolph from 6 June to 29 November 2000 where eight Air Force, Navy, and Marine test team pilots flew a total of 200 sorties and 303.5 hours. Test team pilots had considerable experience as IPs in either the T-37B or T-34C and the contractor provided them with training for pilot-in-command status before the MOT&E started. They flew a representative sample of contact, instrument, formation, and navigation missions, mostly out of Randolph. However, the test team also deployed to NAS Corpus Christi where they evaluated day and night missions in the Navy environment during an intense week of flying. In addition, test team maintenance personnel from AFOTEC and AETC performed evaluations during test missions to assess operational suitability.[118]

The MOT&E (A) got off to a shaky start when AFOTEC had to suspend testing for a week right after it began because of problems with the landing gear. In fact, other maintenance issues, not the least of which were inadequate technical orders (TO), hampered the test team throughout the month. The TOs were especially weak when it came to troubleshooting and fault detection and isolation. "In maintainer terms," said the final report," the aircraft broke too often and once broke it was too difficult and took too long to identify the required fix." Other major problems included an environmental control system (ECS) that didn't provide adequate cooling and a UHF radio that experienced intermittent reception cutouts and created the potential for missed radio calls by students.[119]

On 31 August 2000, two 12 FTW pilots, not involved with the test, were involved in a Class A mishap.[120] They ejected and suffered only minor injuries when their aircraft crashed near Stinson Field on the outskirts of San Antonio. AETC temporarily halted all T-6A operations and the test team curtailed flying operations until the mishap investigation could be completed. During this period, the test team went through ATD training and conducted the MOT&E (I) from 5-12 September 2000 at the Flight Safety Services Corporation facility at Broken Arrow, Oklahoma. Shortly after the crash, a Canadian T-6 had an in-flight engine failure and had to glide to a landing. An investigation revealed problems with the engine oil cooler and the Air Force issued a TCTO on 14 September 2000 that grounded all T-6As until the engine oil coolers had been replaced. By 2 October 2000, the accident investigation was completed and the oil coolers had been replaced, so the test team was finally able to resume flying the remaining MOT&E (A) sorties. The team flew its last test sortie on 16 November 2000.[121]

The test results were mixed. The MOT&E (A) and MOT&E (I) final report, released by Maj Gen William A. Pack, Jr., Commander, AFOTEC, and

[118] Ibid.

[119] Ibid.

[120] A design problem resulted in the loss of the aircraft when the engine was inadvertently shut down by a T-37 pilot who grabbed the wrong handle when feeling for the flap handle.

[121] Ibid.

Rear Admiral Robert E. Besal, COMOPTEVFOR, stated that "Based on demonstrated performance, the T-6A is an operationally effective aircraft for use in the USAF and USN joint primary pilot training (JPPT) environment, but is presently not operationally suitable to meet user sortie generation requirements." Projected student pilot production rates, the report conceded, might not be met and the time to train as well as operating costs would likely exceed expectations. However, it also allowed that suitability requirements could be met by fixing the discrepancies in what was, after all, a brand new aircraft.[122]

On the plus side, test team pilots noted a marked improvement over the training platforms the services had used for years, namely the T-37B and T-34C. Particularly noteworthy were the T-6A's improved instrument displays and capability, quick power response, excellent cockpit visibility, and improved ejection seat capability. That said, the aircraft, although it was effective, also had some system deficiencies that had to be corrected for the services to get the most out of the T-6A. In particular, the inadequate ECS would restrict operations in moderate to hot climates, the very locations where the training bases were situated. Another drawback of some consequence was the performance of the UHF radio.[123]

As far as the in-plant evaluation of the aircrew training devices was concerned, the test team was unable to assess the operational effectiveness or suitability of the ATDs because of the system's immaturity. In their current form, the test team thought the ATDs would not adequately support either joint primary pilot training for entry level students or, for that matter, instructor pilot training. The impact of known system limitations proved to be greater than anticipated. The team, for example, had difficulty in completing almost every mission without some kind of failure that resulted in an operating system crash. All agreed, however, that the three devices had great potential and the team knew it would have a chance to reevaluate the ATDs during the on-site evaluation and the full system test. Since the development of TIMS was not progressing as quickly as expected, the test team simply made an operational assessment of TIMS and CBTS, concluding both were potentially operationally effective.[124]

Next up was the System Level Formative Evaluation that the SPO conducted at Randolph from January to June 2001. It doubled as a combined Developmental Test and Operational Test and was held in conjunction with the MOT&E (O), AFOTEC's on-site evaluation. An experienced band of instructor pilots ran the SLFE. They included five USAF pilots who were prior T-37 IPs, two USN pilots who were AFOTEC IPs, a USMC pilot who was a T-34 IP, and contractors from Flight Safety International and LOGICON. As part of the SLFE, a test class of 15 students—5 Navy pilots, 4 Air Force pilots, and 6 non-rated Air Force officers who were awaiting SUPT—completed the pre-solo portion of the JPPT syllabus. That meant all of the students went through 186 hours of

[122] Ibid

[123] Ibid.

[124] Ibid.

academics (86 percent of total requirements), 15 aircraft sorties (47 percent of total), and 18 ATD sorties (38 percent of total). At the point where they normally would have soloed, the non-rated students were released, and the nine remaining students—all pilots—went into one of three tracks: instrument, contact non-strike formation, or strike-formation navigation. The surrogate students averaged 12 more aircraft sorties, 10 more ATD sorties, and 30 more hours of academics and sampled all remaining syllabus events in abbreviated versions of the different tracks.[125]

The SLFE indicated that many of the shortcomings unearthed in the previous tests had been addressed and overcome. In a briefing to AETC's senior staff, Maj Scott Wallace, the SLFE flight commander, conveyed the impressions of the personnel who had conducted the evaluation. He termed the T-6A a highly effective trainer and noted, for instance, that the glass cockpit displays provided a manifold increase in student and instructor situational awareness. Major Wallace lauded the operational flight trainer as "The crown jewel of the simulators" that "…significantly improved pattern and emergency procedure training with the added benefit of teaching basic formation procedures." He went on to describe the instrument flight trainer as an efficient flight simulator that was effective in teaching instrument, basic contact, and some emergency procedures. Overall, the test team believed that the ATDs provided a solid foundation for flying sorties, noting that there were no simulator busts and that all students were well prepared for early block sorties. In sum, "All SLFE participants expressed strong confidence in JPATS potential for enhancing student training over current USAF and USN primary training systems." Unfortunately, the test team still could not complete the testing of TIMS because of the system immaturity. The next opportunity to evaluate TIMS would be at Moody during the MOT&E (S) when the first class of students began training in October 2001.[126]

In the interim, Thomas P. Christi, Director of Operational Test and Evaluation for the Department of Defense, expressed his misgivings to Secretary of the Air Force James G. Roche about beginning JPATS student training before the safety and suitability issues identified in the MOT&E had been resolved. In a 7 August 2001 letter to Secretary Roche, Mr Christi also questioned the wisdom of making a full-rate production decision—scheduled for November 2001—until the effectiveness and suitability of the T-6A significantly improved. In his response, Secretary Roche said, "Through ongoing and planned hardware change, focus on training procedures, and additional testing, we are resolving all 15 safety concerns." To buttress his position, the secretary attached a letter from the AFOTEC commander in which General Peak wrote "AFOTEC withdraws our safety concerns regarding the UHF and ECS. Adequate mitigation/workaround procedures are in-place at Moody. We will continue to retest T-6A improvements as they are incorporated." Nevertheless, Mr Christi released an

[125] Hist (PV), AETC, 2000-2001, pp 206-217, material used is not PV.

[126] Ibid.

OT&E report in November 2001 that repeated and expanded on his earlier concerns about JPATS.[127]

While Mr Christi's concerns drew headlines in the aerospace industry press, Secretary Roche's position prevailed. AETC began student training at Moody in October, as planned. Moreover, on 3 December 2001, Darleen Druyun, Air Force Principal Deputy Assistant Secretary (Acquisition and Management), announced, "As a result of Milestone II discussions and information provided to me, I authorize the T-6A air vehicle portion of the JPATS program to enter full rate production."[128] With TIMS still in the developmental stage, the Air Force slipped the start of the full system MOT&E to December 2001 when Class 03-02 entered JPPT at Moody. It planned a follow-on review of the GBTS once the MOT&E was completed in the summer of 2003.[129]

## AIRCRAFT DELIVERY CHANGES

AETC still had one more storm to weather. Raytheon was having trouble meeting the T-6A contract delivery schedule. Early on, the company had difficulty meeting its projected delivery dates because of parts shortages for the aircraft. In addition, the company did not have enough people devoted to the wing assembly process during the first half of 2001. On 25 June 2001, Raytheon made a commitment to increase its efforts to meet the contract delivery schedule by the end of December, but the company continued to struggle over the summer months. In August, in response to a request by Byron Nash, chief of AETC's Requirements Division, Col Toni A. Arnold, director of the Flight Training System Program Office at Aeronautical Systems Center, offered an assessment of how realistic Raytheon's recovery plan was. She compared the required contract delivery date with a recovery schedule put forward by Raytheon on 23 August 2001 and then provided her idea of a realistic delivery schedule and an alternative schedule based on Raytheon's past delivery rate.[130]

Colonel Arnold's assessment took into account improvements that Raytheon had made with respect to parts availability and assembly labor productivity while the past rate schedule did not. It merely extrapolated Raytheon's existing delivery capacity of three aircraft per month. The percentages in the figure below represented how confident she was that the company could reach the totals indicated.[131]

Concerned by the SPO's pessimistic prognosis and the potential impact on the command's training plans, Lt Gen John D. Hopper Jr., AETC vice commander, after taking a briefing on the subject, asked that SPO and Raytheon representatives visit Randolph to discuss the delivery schedule. Because of travel restrictions following the

[127] Ibid.

[128] The Air Force already had 168 aircraft on order through eight earlier production orders under the Low Rate Initial Production (LRIP) phase of the program.

[129] Hist (PV), AETC, 2000-2001, pp 206-217, material used is not PV.

[130] Ibid.

[131] Ibid.

terrorist attacks on 11 September, that discussion was held via a video teleconference on 27 September 2001. Lt Col Ron Joseph, the SPO JPATS Program manager, reviewed the bidding on what it would take to meet the contract delivery schedule. If Raytheon delivered the aircraft at the rate of 3 per month as it had in the past, the Air Force would have only 45 aircraft by the end of the year. If Raytheon delivered the aircraft at the rate of 4-5 per month (the number the SPO thought most probable), the Air Force would have only 49 aircraft by 31 December 2001. For Raytheon to meet its recovery schedule and deliver 54 aircraft to the Air Force by the end if December, the company would have to produce 6-7 aircraft per month.[132]

To be fair, the situation had substantially improved. Raytheon had reduced assembly and delivery time to the Air Force from 234 days for the last 5 months of 2000 to an average of 105 days for 2001. In fact, the last 5 aircraft were delivered in an average of only 86 days. On top of that, the company boosted manpower from 234 in January to 405 in September 2001, an increase of over 65 percent. As the additional workforce gained experience, Raytheon implemented new manufacturing process improvements and added new members to the management team.[133]

The combination of these and other actions pushed the production rate up to 5-7 aircraft per month. Prime among the other actions the company took was to increase overtime hours until they reached between 30 and 40 percent of the total assembly effort. Another important step was to delay the delivery of the T-6As to the Greek Air Force. With such a concerted effort, Raytheon was able to fulfill its contract commitment and deliver the 54th aircraft to AETC by the end of December 2001. However, parts shortages continued to be a problem, and Raytheon had to send aircraft to the final paint station with shortages that required their return to the assembly line for installation and inspection. The touch-up and rework that this approach necessitated added another 6-8 days to the process and threatened to put Raytheon behind schedule again. Barring unforeseen problems, the SPO projected that Raytheon would be back on track by the end of April 2003.[134]

That didn't happen. By the end of January 2002, Raytheon was once again behind what the contract called for—this time by three aircraft. And the situation got worse before it got better. The company was five aircraft behind by the end of February and still five aircraft behind by the end of March, although it was able to whittle that number down to four by the end of April. The culprit was parts shortages—mainly hydraulics—from one of Raytheon's own plants and from outside suppliers. If parts shortages were the only issue, Raytheon could conceivably have gotten back on schedule by the end of May. But there were other issues, namely the need to make production line changes for the installation of an enhanced environmental control system.[135]

To permit that to happen, the SPO accepted a company proposal to

[132] Ibid.

[133] Ibid.

[134] Ibid

[135] Ibid.

delay the delivery of 13 aircraft (PT-73 to PT-85). AETC bought off on this arrangement that would allow Raytheon to improve the air conditioning system and get back on the original contract schedule by the end of FY02. In addition, at a SPO production team meeting on 17 January 2002, Raytheon had made a commitment to eliminate parts shortages, and by May shortages were no longer impeding production and aircraft were going to the paint shop with all parts installed. In fact, Raytheon had switched to a new paint system and intended to introduce the use of appliqués and decals during the summer in an effort to reduce production delays due to paint issues. Mr Steve Martin, AETC's JPATS Program Manager, projected that the T-6A beddown at Laughlin could begin as planned (taking into account the 120-day slip in the schedule) in November 2002.[136]

## INITIAL OPERATIONAL CAPABILITY

In the meantime, AETC moved toward achieving JPATS IOC. As previously mentioned, AETC had hoped to reach IOC in June 2001, but that was not possible once it became clear that TIMS could not be brought on-line by then. Moreover, TIMS was only one of the things that AETC had to have on-hand before it could declare IOC. The other main components included 15 T-6A aircraft, a handful of aircrew training devices, and all the joint primary pilot training system courseware.[137]

AETC initiated joint primary undergraduate flying training (UFT) at Moody AFB in October 2001. The 479 FTG began the academic phase of training with the entry of Class 03-01 on 10 October 2001 and began the flying phase for student pilots (13 Air Force and 2 Navy) on 20 November 2001. This inaugural class completed its six-month JPATS training on 26 April 2002. In the absence of TIMS, the command turned to the reliable but limited TRIM system. Meanwhile, AETC completed the actions needed to bring TIMS on-line. The final developmental test was conducted at Randolph AFB from 18 March to 1 April 2002, and from 2 April until 2 May the contractor fixed the discrepancies identified during the test. The 479 FTG had TIMS installed at Moody on 29 May 2002, and the SPO formally accepted TIMS on 12 June 2002. With that, all the pieces of the JPATS RAA were in place, and Moody began using TIMS with the start of joint primary UFT on 14 June 2002. In line with the JPATS ORD III, AETC had to wait 30 days after RAA was achieved before it could declare IOC. When that time came, Gen Donald G. Cook, AETC's commander, announced that the command had reached IOC for JPATS effective 12 July 2002.[138]

[136] Ibid.

[137] Ibid.

[138] ESSS, Col Douglas V. Bell, AETC/XP to AETC/CC, et al, "JPATS Initial Operational Capability (IOC)," 28 Jun 02, w 3 tabs, 1) Memorandum, Gen Donald G. Cook, AETC/CC to HQ USAF/CC, "Initial Operational Capability for the Joint Primary Aircraft Training System," 1 Jul 02, 2) SSS, Col Douglas V. Bell, AETC/XP to AETC/CC, et al, [JPATS IOC], 14 Jun 02, and 3) Proposed News Article, SD IV-39 in Hist (PV), AETC 2002-2003, material used is not PV.

## FIELDING THE TRAINING INTEGRATION MANAGEMENT SYSTEM

Achieving IOC by that date was no easy matter. Fielding a brand new system as complex as TIMS was a daunting task. When the contractor could not deliver TIMS in time to meet the start of T-6 student training at Moody because of a multitude of software problems, the pressure to bring it on line as soon as possible quite naturally mounted. One of the frustrating aspects of the whole thing was that AETC did not own the process and could not directly control the pace at which things proceeded or the areas where emphasis needed to be placed. For example, it was the SPO that dealt with Raytheon, the prime contractor, on the timing of most milestones. And it was Flight Safety Service Corporation, a subcontractor, who developed the T-6 syllabus, instead of AETC's experienced undergraduate flying training division staff. Moreover, in the rush to integrate TIMS with the T-6A and JPATS, the fact that TIMS had to support other undergraduate flying training aircraft, namely the T-37, T-38, T-1, and T-43, was sometimes lost in the shuffle. The issues were not the same for each aircraft; the T-1 accommodated two students instead of one, for instance, and the T-43 held multiple students. The tendency was for the SPO to focus on the T-6 in the TIMS acceptance testing process to the detriment of the other aircraft systems. As late as mid-April 2002, as many as 250 software trouble reports (STR) were still open. Fortunately, the STRs were non-critical and the SPO was able to accept TIMS for the government with some of them not yet resolved. Next up was the multi-service operational test and evaluation of the system that began with Class 03-11 at Moody on 14 June 2002.[139]

At Moody, plans called for the 479 FTG to gain experience with TIMS and to work with the contractor to identify and iron out the kinks in the system. Based on its experience at Moody, the command hoped to introduce an improved version (1.0.8) of TIMS software at the 47 FTW to support the beginning of T-6 flight line operations with the start of Class 04-04 on 18 February 2003.[140] In the meantime, after several months of working with earlier iterations of TIMS

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[139] Email, Lt Col Dan Leonard, AETC/DOZ to AETC/DOF/DOR/XPR, "Periodic TIMS Update," 29 Jan 02, SD IV-40 in Hist (PV), AETC, 2002-2003, material used is not PV; Email, Lt Col Dan Leonard, AETC/DOZ to AETC/DOF/DOR/XPR, "Periodic TIMS Update #2," 18 Feb 02, SD IV-41 in Hist (PV), AETC, 2002-2003, material used is not PV; Lt Col Dan Leonard, AETC/DOZ to AETC/DOF/DOR/XPR, "Periodic TIMS Update #3," 15 Mar 02, SD IV-42 in Hist (PV), AETC, 2002-2003, material used is not PV.; Email, LtCol Dan Leonard, AETC/DOZ to AETC/DOF, AETC/XPR, 19 AF/DO, "Periodic TIMS Update #4," 12 Apr 02, SD IV-43 in Hist (PV), AETC, 2002-2003, material used is not PV; Email, Maj Gen Thomas A. O'Riordan, AETC/DO to Brig Gen Scott S. Custer, AETC/XP, "TIMS," 13 May 02, SD IV-44 in Hist (PV), AETC, 2002-2003, material used is not PV.

[140] An earlier version (1.0.7) had the required functionality and stability to support the start of T-6 and T-37 academic training at Laughlin on 8 January 2003.

software, the 479th operators were still experiencing some fairly significant problems. Among the problems were connectivity with the RSU, the inflexibility of the squadron scheduling function, the inadequacy of the TIMS scheduling engine, the inability of the SOF to view the entire flying period, the inability of flight and squadron schedulers to see the entire schedule, and numerous GBTS courseware issues. At that stage of development, Lt Col George D. Sciss, the group's deputy commander, termed TIMS "a monster that eats resources—both people hours and computer hardware." The group's experience with the scheduling aspect of TIMS was that it was so time consuming that it took a full-time person to make it work.[141] Colonel Sciss cautioned against sending TIMS to Laughlin before additional refinements had been made. "TIMS will work and work well," he said, "but not yet."[142]

On 13-14 November 2002, a team from HQ AETC traveled to Moody to assess the status of TIMS software at the 479 FTG and evaluate its suitability for migration to the 47 FTW. They were briefed by Lt Col Beamon, the assistant operations officer of the 3 FTS, the squadron that had used TIMS since its activation at Moody in June 2002. Lt Col Beamon traced the evolution of the system since its inception with the installation first of version 1.0.4.and later version 1.0.6 and version 1.0.7. While the 3 FTS initially experienced various problems with the functioning of the software, it eventually included most of the needed elements except in the areas of squadron scheduling and the automation of the Go/No-Go decision process. Colonel Beamon pointed out that the next version (1.0.8) was designed to address these shortfalls and would be tested by the 3 FTS prior to its use at Laughlin. With that expectation, the team felt comfortable with the plan to introduce TIMS version 1.0.8 at Laughlin in February. Subsequently, Maj Gen James E. Sandstrom, the Nineteenth Air Force commander, approved the plan with the understanding that the scheduling function in version 1.0.8 prove itself at Moody prior to going to Laughlin.[143]

Early in January 2003, the 47 FTW began the T-6 and T-37 pre-flight

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[141] If TIMS was not functioning properly, squadron schedulers had to individually manage the academic training and flight training of every student and that wasn't at all practical.

[142] Email, Lt Col Joe Dylewski, AETC/DOFI to Lt Col Charles W. Johnson, AETC/DOF, "Moody TIMS Issues," 1 Oct 02, SD IV-45 in Hist (PV), AETC, 2002-2003, material used is not PV; Email, Lt Col George D. Sciss, 479 FTG/CD to Terry Long, AETC/DOFI, "TIMS," 25 Oct 02, SD IV-46 in Hist (PV), AETC, 2002-2003, material used is not PV.

[143] Memorandum, Maj Chuck Leonard, AETC/XPRI to AETC/XPR, "JPATS-TIMS Site Visit-Moody AFB (13-14 Nov 2002)," 25 Nov 02, SD IV-47 in Hist (PV), AETC, 2002-2003, material used is not PV; ESSS, Brig Gen Stephen T. Sargeant, AETC/XP to AETC/CC, et al, "Joint Primary Aircraft Training System (JPATS) Training Integration Management System (TIMS)," ca. 26 Nov 02, w/atch Laughlin Migration Plan, SD IV-48 in Hist (PV), AETC, 2002-2003, material used is not PV.

phase of Class 04-04 using the 1.0.7 version of TIMS, but that's as far as it went. The continued use of TIMS at Laughlin was predicated upon the successful development and fielding of version 1.0.8 prior to Class 04-04's entry into the primary phase in February. When continued testing at Moody indicated that TIMS functionality was still not sufficient to support the required scheduling actions in primary training, Big Gen Stephen T. Sargeant, AETC's Director of Plans and Programs, announced that the 47 FTW would transfer student academic data to the TRIM system and continue to use TRIM until AETC was satisfied with the capabilities of TIMS version 1.0.8. He anticipated the command might try to stand up TIMS at Laughlin again with Class 04-10 starting on 22 May 03.[144]

## MULTISERVICE OPERATIONAL TEST AND EVALUATION

In the interim, AFOTEC and OPTEVFOR completed the JPATS MOT&E (S) at Moody on 30 January 2003. The results were mixed. The test agencies found that JPATS effectively trained students with the Joint Primary Pilot Training Syllabus. They noted, for example, that JPATS produced students who were better prepared for their initial solos and who performed better on instrument flights. In addition, the aircrew training devices exceeded ORD suitability requirements and the T-6A was rated safe and effective after the contractor corrected problems with the environmental control system and the UHF radio. The computer based training system also performed well and received a satisfactory rating. On the other side of the coin, TIMS was considered unsatisfactory due to the immaturity of the system during the test period, a rating that was not unexpected. On the question of whether the aerospace vehicle could support the sortie generation requirements of joint primary pilot training, AFOTEC and OPTEVFOR said no and rated the T-6A unsuitable. In reality, this finding was based on a technicality inasmuch as the T-6A achieved a mission capable rate of 90 percent when the ORD called for 91 percent and a mission reliability rate of 96.6 percent when the ORD required 98.5 percent. Although the evaluators rated the aircraft unsuitable, they conceded, "it is almost there."[145]

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[144] ESSS, Brig Gen Stephen T. Sargeant, AETC/XP to AETC/DO & 19 AF/CC, "Joint Primary Aircraft Training System (JPATS) Training Integration Management System (TIMS)," 30 Jan 03, SD IV-49 in Hist (PV), AETC. 2002-2003, material used is not PV; Bkgrd Paper, Maj Papachriston, AETC/DOZF, "Training Integration Management System (TIMS)," 18 Feb 03, SD IV-50 in Hist (PV), AETC, 2002-2003, material used is not PV; Bkgrd Paper, Lt Col Adams, AETC/DOZF, "TIMS at Moody," 21 Jan 03, SD IV-51 in Hist (PV), AETC, 2002-2003, material used is not PV.

[145] ESSS, Michael J. Snedeker, AETC/XP to AETC/CC, et al, 'AFOTEC & OPTEVFOR MOT&E (S) Briefing," ca. 13 May 03, w/1 Tab, Brfg, Lt Col Glenn Quarles, USAF, AFOTEC OL-VG & CDR John Garbelotti, USN, AFOTEC OL-RT, "Joint Primary Aircraft Training System (JPATS) MOT&E (S)," 30 Apr 03, SD IV-52 in Hist (PV), AETC, 2002-2003, material used is not PV.

A few days after the completion of the MOT&E (S) and the decision to temporarily revert to the TRIM system at Laughlin, General Sargeant expressed his concern to the SPO about the contractor's poor performance in developing and delivering TIMS software. "This situation," he said, "is unacceptable as the TIMS software system is designed to be an integral component of AETC Undergraduate Pilot and Navigator training." General Sargeant wanted to know what contractual remedies the SPO was pursuing to get the contractor to deliver a usable product on time; what actions the contractor was taking to deliver future software releases on-time and error-free; and what changes were being made to the contractor testing protocol to make it more operationally representative.[146]

Colonel Arnold, the SPO director, shared General Sargeant's concerns. She observed that there was a fundamental problem with the management structure in the way that responsibilities were split between AETC, CNATRA, and the SPO. Under the contract, AETC and CNATRA were responsible for configuration control, approving and directing contractor software changes, and directing the contractor's work effort. Colonel Arnold recommended that AETC and CNATRA continue to prioritize TIMS software requirements, but that the SPO get more involved in providing contractual direction to implement changes to TIMS software and in enforcing delivery schedules. "We can no longer divorce the administration and enforcement of the TIMS contract," she said, "from the act of directing the contractor efforts to deliver TIMS version releases on time." With the additional attention focused on the development and delivery of TIMS software, the situation gradually improved.[147]

The fielding of TIMS was in full swing in the summer of 2003. At Moody, the 3 FTS had fully implemented the system and the contractor was working on syllabi to permit the use of TIMS in the T-38C Introduction to Fighter Fundamentals (IFF) program. At Randolph, the 12 FTW was using TIMS in T-6 computer assisted instruction (CAI) laboratories, and the contractor was completing syllabi to introduce TIMS to the pilot instructor training (PIT) and undergraduate navigator training (UNT) programs. At Laughlin, the 47 FTW had used TIMS in CAI laboratories since January 2003 and in T-6 and T-37 flight rooms with Class 04-10 since 22 May 2003. Moreover, the 47 FTW intended to introduce TIMS in the T-1 and T-38 tracks with Class 04-07 on53 8 September 2003. At Columbus, the 14

[146] Memorandum, Brig Gen Stephen T. Sargeant, AETC/XP to ASC/YT, "Training Integration Management System (TIMS) Fielding Concerns," 3 Feb 03, SD IV-53 in Hist (PV) AETC, 2002-2003, material used is not PV.

[147] Email, Col Toni Arnold, ASC/YT to Col Frank Palumbo, AETC/XPR, "Gov't Management of TIMS Ltr to Gen Sargeant," w/atch Draft Memorandum, ASC/YT to AETC/XP, "Government Management of the Training Integration Management System (TIMS)," 10 Feb 03, SD IV-54 in Hist (PV), AETC, 2002-2003, material used is not PV.

FTW planned to initiate TIMS in the T-37 primary phase (the wing had no T-6s yet) on 16 June 2003 with the start of Class 04-11. In addition, the wing had begun using TIMS in T-38C CAI laboratories with Class 03-12 on 2 June 2003. And, in September, the 14 FTW planned to introduce TIMS in the T-1 and T-38C tracks with Class 04-07. AETC intended to implement TIMS at Vance in September 2003 and at Sheppard in January 2004.[148]

## FOLLOW-ON OPERATIONAL TEST AND EVALUATION

Also on the horizon was the follow-on operational test and evaluation (FOT&E). In the FOT&E, AFOTEC and OPTEVFOR intended to address the issues remaining from the MOT&E (S) with the emphasis on T-6A suitability and TIMS effectiveness and suitability. Actually, the FOT&E involved four major activities: a Navy-specific T-6A evaluation at NAS Pensacola, an Air Force TIMS evaluation at Laughlin, an Air Force T-6A suitability evaluation at Laughlin, and a Navy TIMS evaluation at NAS Corpus Christi.[149]

Unanticipated problems at Laughlin forced the postponement of the TIMS evaluation, originally scheduled for August 2003. It turned out that the electrical infrastructure at Laughlin could not handle the power requirements that were part and parcel of the TIMS footprint. There were daily connectivity problems with the local area network, occasional brownouts, and server failures. Compounding the problem was the need for additional operator training and the lack of qualified computer administrators. Laughlin operators were not yet using the RSU and SOF functions and were even creating schedules on grease boards and then entering them into TIMS. In addition, the help desk at Laughlin had authorizations for only three personnel. While this was adequate for Moody which had only 6 flights, it was not near enough for Laughlin with its 24 flights. As far as operator training was concerned, the vast majority of operators (90 percent) received only OJT and that wasn't sufficient. To remedy the situation, a 2-hour training course was available to cover the upgrade of TIMS in January 2004, and the SPO was looking into additional training opportunities.[150]

But, before that happened, AFOTEC and OPTEVFOR kicked off the Navy-specific T-6A FOT&E at NAS Pensacola on 21 October 2003. The purpose, of course, was to evaluate the T-6A in the Navy training environment that emphasized Navy-specific maneuvers and Navy-type patterns and to identify anomalies. They also wanted to assess the suitability of the aircraft and look at such things as the effects of

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[148] Brfg, Maj Chuck Leonard, AETC/XPRI, "AETC/CV JPATS-TIMS Update Briefing," 2 Jun 03, SD IV-55 in Hist (PV), AETC, 2002-2003, material used is not PV.

[149] Brfg, Richard Wetzel, ASC/YTJ (DRC), "JPATS AF TIMS FOT&E Readiness Review," ca. 15 Nov 03, SD IV-56 in Hist (PV), AETC, 2002-2003, material used is not PV.

[150] Ibid., Brfg, Lt Cdr Tom Cecil, ASC/YTJG, "JPATS AF TIMS FOT&E Readiness Review," 16 Dec 03, SD IV-57 in Hist (PV), AETC, 2002-2003, material used is not PV.

salt air and increased wash rates. The evaluation was done in conjunction with Joint Navigator Training classes at Pensacola.[151]

As a result of the assorted problems associated with the introduction of the system at Laughlin, the FOT&E and TIMS readiness certification had to be postponed once more. That decision was made by Brig Gen Ted F.Bowlds, Air Force Program Executive Officer, on 16 December 2003, after he was briefed on the continuing problems with fielding the JPATS TIMS at Laughlin. So, instead of beginning in late January 2004, the FOT&E slipped about four months and was projected to begin in late May and last most of the summer until August 2004. The postponement did not, however, affect the FOT&E of the suitability of the T-6 that was still slated to take place from March through May 2004 at Laughlin. And, the fourth and final component of the JPATS FOT&E—the evaluation of the Navy portion of TIMS—was still scheduled to begin at NAS Corpus Christi in September 2004.[152]

[151] See note 145 above.

[152] See note 146 above; Email, Richard B. Wetxel, ASC/YTJV to Capt Anthony Sidotu, ASC/YTJG, et al, "Final Minutes from 16 Dec 03 Readiness Review for JPATS AF TIMS Review," 22 Jan 04, w/atch Minutes of Joint Primary Aircraft Training System (JPATS) Training Integration Management System (TIMS) Follow-on Operational Test and Evaluation (FOT&E) Readiness Review, 16 Dec 03, SD IV-58 in Hist (PV), AETC, 2002-2003, material used is not PV.

## CONCLUSION

As the Air Force moved into the 21st Century, it was time to retire the primary trainer that had been in service for more than four decades. When it was introduced in 1958, the T-37 was a state-of-the-art aircraft and the Air Force's first jet trainer. As time passed, the T-37, with its outdated instrumentation, ceiling and range limitations, and inefficient engines, had become increasingly expensive to maintain and operate. More to the point, it was no longer the best vehicle in which to train beginning pilots.[153]

After a considerable amount of planning and information gathering, the Air Force decided on the Pilatus PC-9 MkII, a Swiss manufactured aircraft, as its next primary trainer. Designated the T-6A Texan II, the new trainer was powered by a turboprop engine and featured stepped-tandem seating. The T-6A was also fully aerobatic and had a pressurized cockpit with an anti-G system, an ejection seat, and an advanced avionics package with liquid crystal displays. It provided the Air Force, once again, with a state-of-the-art primary trainer. But the T-6A was more than that. It was part of a larger package—the joint primary aircraft training system—that would permit the Air Force and Navy to provide joint primary training. That package included a ground-based training system that consisted of computer-aided instruction workstations, aircrew training devices,

[153] Plan, HQ ATC/XPR, "Department of Defense 1989 Trainer Aircaft Masterplan," 29 Dec 88, SD III-12 in Hist (PV), ATC, 1988, material used is not PV.

courseware, and the training integration management system.[154]

Despite the difficulties encountered in getting TIMS to do what it was supposed to do, the fielding of other JPATS components, especially the T-6A Texan II, had gone rather well. In 15 short years, JPATS had gone from a concept outlined in the DOD Trainer Aircraft Masterplan to a full-blown reality. A complicated enterprise under any circumstances, the acquisition of a new aircraft was made more complex by the need to jointly determine requirements and project milestones with the Navy. As announced by Secretary Widnall in June 1995, the JPATS acquisition program called for a buy of up to 711 aircraft, 372 for the Air Force and 339 for the Navy, at a cost of $7 billion.[155]

Over the next few years, aircraft numbers fluctuated as additional requirements surfaced. Besides aircraft to support the JSUNT program at NAS Pensacola, additional T-6s were needed to support increases in SUPT pilot production mandated by the CSAF and for the ENJJPT program at Sheppard where NATO nations had expressed interest in the Texan II. These added requirements swelled the projected aircraft buy to 782—454 for the Air Force and 328 for the Navy. By the end of 2003, AETC had a total aircraft inventory of 119 T-6As—35 at Randolph, 46 at Moody, and 38 at Laughlin. By September 2004, Laughlin expected to have its full complement of 96 aircraft. After that, AETC would field the T-6A at Vance, Columbus, and Sheppard and complete the acquisition of the joint primary aircraft training system sometime in 2011.[156]

[154] Air Force Link-Fact Sheet, "T-6A Texan II," n.d., http://www.af.mil/factsheets/factsheet.asp?fsID=124, accessed 15 Apr 04

[155] Hist (PV), AETC, 1 Jul 93-31 Dec 95, pp 142-147, material used is not PV.

[156] ORD, AETC & CNATRA, "Operational Requirements Document for the Joint Aircraft Primary Training System (JPATS)," 1 Apr 00, SD IV-48 in Hist (PV), AETC, 2000-2001, material used is not PV; Summary, AETC/LG, "Current Aircraft Maintenance Summaries, Dec 2003," ca. 30 Jan 04.