

PC-7 & PC-9

The Pilatus turbo trainers



With its PC-7 the Swiss Pilatus Aircraft company formulated a winning mould for the military turboprop trainer, a class of aircraft that has proliferated in recent years. Just as its competitors began to catch up, so Pilatus introduced the PC-9 to keep itself ahead in the marketplace. Today the company is well into its stride with the third generation of turboprop trainers, in the form of the PC-21.

Text and photos: Emiel Slood

Pilatus Aircraft Ltd was established in 1939 at its present location at Stans to support and maintain aircraft of the Swiss air force, but soon after started to design and produce its own training aircraft. On 27 April 1945 the first of 54 P-2 aircraft made its maiden flight. The P-2 was a mainly wooden model with many parts taken from decommissioned German warplanes such as the Bf 109. The P-2 came in two versions: the P-2.05 was as basic trainer, while the P-2.06 was an armed version for weapons training. All served with the Swiss air force until the last ones were finally retired in 1981.

In the early 1950s, Pilatus developed the all-metal P-3, a dual-seat trainer in tandem configuration, powered by a Lycoming GO-435-C2A piston engine and featuring a retractable tricycle landing gear. The first flight of the P-3.01 prototype took place on 3 September 1953 with test pilot Georg Gisler at the controls, while the second prototype P-3.02 was delivered to the Swiss air force for testing in January

1956. This example was soon followed by an initial batch of 12 P-3.03 aircraft.

Destined to replace the AT-16 Harvard, 60 more P-3.05s were taken on charge by the Swiss air force during 1958 and 1959. The trainers equipped the Pilotenrekrutenschule (Basic Flying School), while others were to serve on liaison duties between the rather large number of military active and reserve airfields then in use with the Flugwaffe. In the latter role, the aircraft was withdrawn from use in April 1995. Pilatus even achieved a modest export success, as six P-3.04 aircraft were sold to the Brazilian Navy in 1963, which subsequently transferring the five survivors to Brazil's air force already in 1965.

PC-7 Turbo Trainer

During the mid-1960s, the factory studied a re-engined variant of the P-3 when it fitted the prototype with a Pratt & Whitney Canada PT6A-20

turboprop engine, more than doubling the installed power from 260 to 550 shp (194 to 410 kW). This aircraft, serialised HB-HON and dubbed P-3B, first flew on 12 April 1966, but following a forced landing due to fuel mismanagement while in its initial flight development phase, the innovative project was put on hold.

Do 27 and Do 28 aircraft. This was not by coincidence, since this West-German factory based at Oberpfaffenhofen assisted in developing these structural improvements, which were used to build the second PC-7 prototype. To cut costs, some parts like avionics were simply taken off the shelf. However, the cockpit layout was completely

redesigned in a more logical way.

During the flight test and trials programme of the two prototypes, additional modifications – this time regarding the aircraft's aerodynamics – were added. While the P-3 type dorsal fin was maintained, the ventral fin became much smaller and was relocated further aft. A small but slightly redesigned skid to prevent damage during tailstrikes was fitted. Much of the rear fuselage and tail were redesigned, adding a tailcone, while strakes were installed along the aft fuselage up to the



Aircraft of the Swiss PC-7 Team performing a loop

However, in the early 1970s, Pilatus re-examined the programme as they recognised the potential for a high-performance tandem-seat turboprop trainer to act as military flying training platform, placed before the fighter lead-in training and/or the jet conversion course. In the light of the worldwide oil crisis, low fuel consumption was then an important issue. Again a P-3 was used as the basis, this time a borrowed P-3-05 from the Swiss air force, serialised A-871. The engine fitted was a 650-shp (485-kW) PT6A-25A (flat-rated to 550 shp) connected to a three-bladed, constant-speed Hartzell HC-B3TN-2 propeller. Now officially designated as the PC-7 Turbo Trainer, test pilot Hans Galli took the prototype (reserialised HB-HOZ) to the skies on 12 May 1975. To make full use of the extra engine power, structural changes to the airframe were necessary.

Initially, a newly designed low-fatigue one-piece wing was incorporated, with the same span, plan and airfoil as the original P-3 wing, with integral fuel tanks just forward of the main spar. The landing gear was entirely redesigned as the maximum take-off weight increased by 57 percent. An electrically-actuated undercarriage was developed with oleo-pneumatic legs similar to those used by Dornier's

tailplanes, greatly improving the aircraft's spin characteristics. The tailplanes themselves were shortened slightly, while the elevators remained the same span, with the effect that they became horn-balanced. The cabin featured a one-piece clear-vision moulded bubble canopy, sliding backwards electrically. The cockpit is not pressurised, but the airplane has a maximum certified flight altitude of 25,000 feet (7,620 m), with the crew wearing oxygen masks when operating above 10,000 feet (3,048 m). Performance-wise, the aircraft is capable of reaching 33,000 feet (1,0058 m). The instructor in the rear has full override capacity to correct student control inputs.

By the time Hans Galli made the first flight by the first production aircraft (s/n 101, serialised HB-HAO) on 18 August 1978, all modifications as a result of the flight test phase had been incorporated.

In early 1979, civil certification was achieved successfully according to Federal Aviation Regulations (FAR) part 23 requirements. By this time the first of many military customers had been announced when Burma (now Myanmar) confirmed an order for eight aircraft in 1976, while the aircraft was still under development. An additional batch of eight was ordered in 1979, the same year in which the first aircraft was delivered. Other early export

customers were Bolivia, Guatemala, Chile, Iraq and Mexico, after which the home customer joined the ranks.

has to acquire an export licence from the Swiss government. In view of the engine and certain avionics, US export regulations have to be followed as well. This has forced Pilatus to cut off support to certain early customers like Iran, Iraq and Myanmar. Apart from these countries, all Pilatus training aircraft operators meet bi-annually in symposiums set up by the company to discuss operations and service bulletins, as well as existing and future modifications to the aircraft. All PC-7s are basically the same as there are no different sub-types. However, the cockpit layout and avionics fitted vary with each customer due to different requirements.

Although Pilatus stresses that exported aircraft are purely basic trainers and that weaponry to be carried is neither sold nor supported, the PC-7 wing has six stations that can be fitted with external loads. Of course, the potential for this has attracted some customers and these air arms have chosen to operate the aircraft for weapons training duties, or even in the light attack role for counter-insurgency. In view of this, the aircraft played a role in the 1980-1988 Iran-Iraq war, as well as during internal conflicts in Guatemala, Myanmar and



(above) a pair of Swiss PC-7s of the Pilotenschule, wearing the original colour scheme; (bottom right) Guatemalan PC-7 over the Pacific

As the Swiss air force's P-3 fleet was due for replacement, evaluation of the new Pilatus product was an obvious move. With a requirement for 40 aircraft announced in 1979, two aircraft on loan from the company were involved in an extensive trials programme late in the year, alongside the PC-7 prototype that adopted serial A-901 (A for Ausbildung – Training). Then, in June 1981, the 40-aircraft order was confirmed, the total including the two trials aircraft. Swiss PC-7s entered service with the Pilotenschule der Luftwaffe 85 at Magadino near Locarno, in the southern Swiss canton of Ticino. The final aircraft was delivered in November 1983. A-901 was initially retained for equipment testing but was later struck off charge. Currently, this aircraft is on display at the Flieger-Flab Museum at Dübendorf air base, near Zurich.



Market Leader

Following the Swiss order, worldwide export success continued, propelling Pilatus into the position of market leader for turboprop training aircraft, with no real competition in the early stages, although the Brazilian Embraer company introduced the Tucano soon after. For every international customer, Pilatus

Angola. As a result of this, a debate opened in parliament as to whether to treat foreign PC-7 (and also later PC-9) sales as arms exports. On 20 June 1985, the parliament voted against this issue, which was rather fortunate for Pilatus as this certainly would have jeopardized several future sales. Production of the PC-7 totalled 455 aircraft and was

ceased in 2000 when the last three were sold to a civil customer in the United States.

With the PC-7 being easy and relatively cheap to maintain and operate – mainly due to the lack of ejection seats – the factory has recently been approached by several potential undisclosed customers to examine an order for second-hand aircraft. When selling aircraft, Pilatus retains the first rights to buy back its aircraft when they are withdrawn from service. This aims to prevent aircraft from being sold to third parties not supported by Pilatus and embargoed by the Swiss government. To date, only a few aircraft have returned to the factory and been offered for sale after refurbishment, but it is expected that, during the next decade, several PC-7 operators will replace their aircraft and return them to Stans, opening the market for completely overhauled PC-7s.

PC-7 modification programme

In 2003, the Swiss air force began a study to have a JAR-certified training platform which enables students to receive a frozen ATPL licence with a single-engine IFR-rating. As the 1970s avionics package on their PC-7s, with single VHF/UHF radios and VOR/DME/ILS receiver, was unsuitable for this, the air force approached Pilatus with its specific requirements. In 2005, the factory took one aircraft (A-926) to serve as prototype for the new modification programme, and redesigned the cockpit layout. It is now centred around an Astronautics 6 x 8-in (15 x 20 cm) multi-function EFIS display for primary flight and navigation data, a single digital standby display for attitude, airspeed, altitude and heading information, and new avionics like GPS, a Honeywell KTR 908 VHF as well as a Magnavox VHF/UHF radio, two KNR 634 NAV receivers for VOR/DME and ILS, a KT 7 mode S transponder, and a KRA 405 radio altimeter. It is also the first PC-7 equipped with an autopilot. The three-servo KFC 325, which also features a control-wheel steering (CWS) mode, is also used in the PC-12 and is certified for cat I approaches. No autothrottle is installed. Both front and rear cockpits are modified to a similar layout.

Another new feature is the dual bus concept, similar to that used in the PC-9M and PC-21. The engine-driven 28V DC generator and the battery providing similar power act as independent power sources. Apart from this, an emergency battery is installed, able to provide 30 minutes of electrical power to the aircraft systems in case of a dual bus failure.

After approval of the programme in late 2005, Armasuisse, the Swiss defence procurement office, ordered Pilatus to modify 18 aircraft. A parliamentary vote to reduce the number to 12 to cut costs did not succeed. The second modified aircraft was redelivered to the Pilotenschule der Luftwaffe 85 in September 2006, with the last expected by the end of 2007. The remaining 19 PC-7s will stay in service in the existing configuration, and mainly act as liaison hacks from the various air bases. Since the average Swiss air force PC-7 has not reached 50 percent of its maximum service life, and likewise the engines, these aircraft can soldier on for years to come.

The first modified aircraft was resprayed in a black and white scheme, but after evaluation, the air force was not satisfied with the visibility of it and decided to adopt red and white, based on the same scheme. All aircraft are repainted by Pilatus, which opened a new production line for the PC-7 NC (New Cockpit) programme in a rented air force hangar on the other side of the Buochs air base, where the factory is co-located. The existing Pilatus site is quite narrow and outdated with respect to the production halls. The factory was one of the filming locations of the 1964 James Bond movie *Goldfinger*, and has largely remained the same ever since as Pilatus concentrated its efforts on research and development of new products. However, as its business has outgrown the present infrastructure, investments into these facilities are on the horizon. During the Pilatus Trainer Symposium in autumn 2006, the modification programme was demonstrated to worldwide PC-7 operators, hoping to attract customers which are investigating the feasibility of this upgrade versus buying a new trainer.

(left) forward cockpit of the NCPC-7; (right) NCPC-7 A-926 in the later rejected black & white scheme





A pair of Swiss NCPC-7s break over the Alps

PC-9

The success of the PC-7 and the expected requirement for turboprop trainers worldwide led Pilatus to the idea of creating a more advanced training platform, well suited for all aspects of *ab initio* through to advanced flying training.

To enter competition with the Embraer EMB-312 Tucano that first flew in August 1980, development of the PC-9 started in 1982 with the PC-7 as a start-point, although the commonality between the two became minimal. The engine was replaced by the Pratt & Whitney Canada PT6A-62. Fitted with a four-bladed Hartzell HC-D4N-2A prop, the power plant has a maximum take-off output of 1,150 shp (858 kW), flat-rated at 950 shp (709 kW), an increase of over 75 percent in power. However, the maximum take-off weight of 3,200 kg including underwing stores is only 500 kg more than that of the PC-7.

Two Martin Baker Mk.CH 11A ejection seats were fitted, with the rear seat elevated to give the instructor a clear forward view through a one-piece canopy without separate windscreen, hinged to the right. The seats provide a fully automatic escape system by ejecting through the canopy, from the ground up to 25,000 ft (7,620 m) and in a speed range of 60 to 400 kt, well beyond the maximum diving speed of 360 kt. An anti-g system supplies engine bleed air to the aircrew's suits.

A hydraulically powered airbrake with control switch on the power lever was added on the lower fuselage between the wing trailing edges, while the landing gear became hydraulically powered as well. Controls and displays were completely synchronised between front and rear cockpits. The endurance can be extended with a set of either 154- or 248-litre long-range fuel tanks on the centre underwing pylons.

Some of these features were initially flight-tested on a company PC-7, after which two pre-production prototypes were constructed for the test programme. The first prototype (s/n 001, HB-HPA) flew on 7 May 1984 piloted by Hans Galli, the second (s/n 002, HB-HPB) followed on 20 July 1984. After the initial flight test programme, the Swiss Federal Office for Civil Aviation (FOCA) approved the airworthiness certification for the type on 19 September 1985, based on FAR part 23 requirements. Just to demonstrate, the aircraft was flown to 39,000 ft (11,887 m) where it was still climbing with 100 ft per minute, although the maximum certified ceiling is 25,000 ft (7,620 m) since it lacks a pressurized cockpit.

British Aerospace connection

Development of the PC-9 coincided with the Royal Air Force's AST.412 requirement for replacing the Jet Provost trainer. Teaming up with British Aerospace, Pilatus became one of four contenders.

Although the PC-9 was certified three months ahead of schedule, the British MoD announced an order by late 1985 for the Tucano T.Mk.1, a modified version of the Embraer EMB-312 Tucano to be built by Shorts. Nevertheless, the BAe-connection proved to be fruitful the following year when the governments of the UK and Saudi Arabia signed the Al-Yamamah contract, in which BAe secured a major order for 48 Tornado IDS and 24 Tornado ADV fighters, as well as supplying a pilot training system with 30 Hawk Mk.65s and 30 PC-9s. Saudi Arabia turned out to be a demanding customer, with specific requirements like additional cooling of the hydraulic system, improved cabin cooling and several other small items to cope with the hot climate and the dusty environment. Pilatus, however, managed to solve these problems in time before delivery. All aircraft were initially flown to BAe

in offset package deals. Although the PC-7 was favoured initially because of lower costs, the more capable PC-9 was finally chosen with an order for 67 aircraft. Designated PC-9/A, the aircraft features a Bendix EFIS system and low-pressure tyres for operation on soft soil.



Swiss PC-9 target tug

Two Pilatus-built examples were delivered in October 1987, while as part of the deal, Hawker de Havilland in Australia set up a production line at Bankstown. Here, 17 Pilatus-built aircraft delivered as kits were assembled, of which the first three were delivered on 19 December 1987, followed by 48 locally constructed examples. The last PC-9/A rolled from the assembly line in May 1992. Interestingly, the licence production rights were returned to Pilatus in 1998, since it turned out to be uneconomical to maintain

Warton for acceptance testing, after which they were delivered.

Simultaneously, Australia approached the company since it had a running AFTS 5044 requirement for new basic trainers. The indigenous Hawker De Havilland A.10 Wamira programme was terminated in December 1985 because of delays and cost escalation. Pilatus offered both the PC-7 and PC-9

its own production line for RAAF spares supply. Simultaneously, Pilatus Australia Pty Ltd was established in Adelaide to provide product support.

Target-tugs for Switzerland

Following some sales to customers who appreciated their previous experience with the PC-7 – like Myanmar, Angola and Iraq – the Swiss air force

expressed interest for the PC-9 to serve as a target-towing platform for training ground-based air defence battalions. The ageing fleet of obsolete 1940s-vintage C-3605 Schlepp and only slightly less antiquated Vampire FB.Mk.6 aircraft was in desperate need of replacement. The Southwest RM-24 system was selected, consisting of two podded winches with 3,500 m of cable, each of which was attached to the inboard wing stations. The aft fuselage had to be reinforced for attachment of the cable routing bracket which tows the target sleeve. After the PC-9 was cleared for this task, the Schweizer Luftwaffe subsequently bought four aircraft in 1987, while eight more were acquired in 1991 and 1993. This raised a question by one member of parliament, asking why it was possible that Pilatus claimed to sell unarmed aircraft while Swiss PC-9s were involved in armed exercises. Obviously, he had not realised that the PC-9 (or rather its towed target) was shot at, rather than the aircraft doing the shooting. In a secondary role, the Swiss PC-9s can be fitted with the Ericsson Erihammer A100 (locally known as Vista 5) ECM jamming pod for training purposes.

gunnery ranges. Earlier, in 1988, the Cyprus Air Force Command bought two similarly-equipped aircraft. Unfortunately, one was lost in an unauthorised fly-by accident in September 2005. Cyprus is looking for a replacement, but since US export restrictions have tightened in the meantime, Pilatus is currently not allowed to deliver an attrition replacement because over 10 percent of the aircraft (engine and avionics) is of US origin.

While deliveries of the basic trainer version of the PC-9 successfully continued during the early 1990s to various countries like Thailand, again Myanmar, and the US Army – which leased three chase aircraft – South Korea approached Pilatus with its TX-10 requirement for 20 PC-9 trainers, confirming an order by 7 May 1993. Although these aircraft would primarily serve as lead-in trainers for the BAe Hawk, the Republic of Korea air force wanted a potentially armed aircraft for both training purposes and to deploy them in case of a conflict with their northern neighbours.

Although Pilatus offered the PC-9 to be fitted with its standard number of six underwing hardpoints, the Swiss government was unwilling to issue an export

licence unless these underwing stations were rendered incapable of carrying any ordnance prior to delivery. In this debate, the deal stalled and was finally cancelled by the Koreans in July 1994, who by then were developing their own arms-capable trainer in the form of the Daewoo KTX-1, which first flew in December 1991. Since there already had been a transfer of knowledge, the resulting Korean Aerospace Industries KT-1 – of which 85 have been recently



The RNethAF operates 13 PC-7s for selection and training

The target-towing version attracted a few foreign customers as well. The German company Holstenair, based at Lübeck-Blankensee airport, signed a contract with the Ministry of Defence to tow targets for training German armed forces crews (air force, army and navy), and subsequently ordered 10 aircraft that were designated PC-9B. They replaced Rhein Flugzeugbau's Rockwell OV-10B Broncos in this role. The PC-9B features a wingtip-mounted mirror and has an increased fuel capacity, allowing an extended endurance of 3.3 hours over the

delivered to the RoKAF – bears a remarkable resemblance to the PC-9. The Korean clone with lower performance has become a potential rival in the marketplace, with 10 KT-1Bs sold to Indonesia. However, Pilatus is confident that future customers will appreciate its knowledge, support and long-standing experience when it comes to choosing a new training platform.

PC-7 Mk.II

By 1990, the South African Air Force had a large fleet of ageing North American T-6 Harvard trainers

requiring replacement but was the subject of a wide arms embargo due to the apartheid regime. Although Denel successfully developed the ACE (all-composite evaluator) turboprop trainer, the project was rendered too costly and, since political changes opened the window for the acquisition of a foreign aircraft, Pilatus was approached.

After a brief evaluation of the available types, the SAAF issued a requirement for a trainer aircraft with specifications more or less in between the PC-7 and PC-9 performances – less powerful than the latter but equipped with ejection seats. This led to the development of the PC-7 Mk.II that, unlike the company-initiated designs of the PC-7 and PC-9, was the first customer-specified design. The aircraft closely resembles the PC-9, with identical airframe and dimensions, but is a downgraded version of it.

A large external difference is the increased-area fin fillet, later adopted by the PC-9M. The PT-6A-25C engine which has a maximum 850 shp/ 634 kW output (flat-rated to 700 shp/522 kW) provides a maximum operating speed of 300 kt, 20 kt less than the PC-9. Furthermore, it has a lower maximum climb rate. While the PC-9 takes 8 minutes 40 seconds to climb to its service ceiling of 25,000 ft, the PC-7 Mk.II requires exactly twice this time. Structural limitations, however, remain the same. Both aircraft have load limits of +7 and -3.5 g (in clean configuration) and can be fitted with six underwing stations with a maximum total load of 1,040 kg (2,293 lb). An aerobatic fuel tank of 12 litres allows for 30 seconds of inverted flight, and an on-board oxygen generator system (OBOGS) is fitted which removes the need to resupply oxygen after each sortie.

The first PC-7 Mk.II, a company demonstrator featuring all South African requirements, was first flown on 28 September 1992, and FAR part 23 type certification allowing both VFR and IFR day and night operations soon followed. The last obstacle to clear was getting the export licence, which became quite a challenge since the Swiss government was reluctant to issue it due to the apartheid regime. But, after the number of underwing hardpoints was limited to two, and since the first signs of democracy in South Africa appeared on the horizon, the government gave the green light. On 1 December 1992 the SAAF ordered 60 aircraft in a contract worth SFR 200 million, of which the first delivery took place on 30 November 1994. Denel/Atlas has been contracted to produce several sub-components such as flight control surfaces and engine cowlings as part of offset arrangements. All aircraft were built and test flown in Stans, after which they were disassembled and transported in containers to the reassembly line in Cape Town.

Today, Pilatus offers the PC-7 Mk.II as a light version of the present PC-9M. The aircraft has a modern avionics package with mainly Bendix/King

equipment, including two ED 551A EFIS displays with data supplied by the KDC 481T digital air data computer, two KTR 908 VHF radios, two KNR 634A navigation receivers for both VOR and ILS, an MST 67A digital mode S ATC transponder and, if required, a KTR 909 UHF radio. Additionally, a Flight Visions FV 2000E head-up display (HUD) can be installed, but is not certified a primary IFR instrument. As on the PC-9, an alternative landing gear with low-pressure tyres can be installed, however this option has not yet been chosen by any customer.

Following the South African deal, Pilatus sold four PC-7 Mk.II aircraft to Brunei, 19 to Malaysia and a single example to a private Swiss customer. The aircraft was also involved in a Japanese Air Self Defence Force competition to replace Fuji T-3 aircraft, but the air force chose Fuji's turboprop T-7 instead.



(above and next page) T-6A Harvard IIs equip the NFTC at CFB Moose Jaw, Canada

JPATS and the Raytheon T-6 Texan II

Although the British AST.412 competition was lost in the PC-9's development phase, this did not prevent Pilatus from taking the opportunity to compete for the US Joint Primary Aircraft Training System (JPATS) contract. Under a newly established training scheme called Specialized Undergraduate Pilot Training (SUPT), as part of a new training masterplan outlined by the USAF in April 1988, older training aircraft were to be replaced. JPATS was the programme to replace the Cessna T-37. Meanwhile, the US Navy also needed a similar new trainer to replace its T-34C at a somewhat later stage.

In January 1989, the USAF SON (Statement of Operational Need) with regard to JPATS was issued. Since it soon became apparent that Pilatus would stand no chance without local support, the company selected Beechcraft in Wichita, Kansas, as team member to enter the JPATS competition. For JPATS the PC-9 was redesigned with a strengthened fuselage, pressurised cockpit and new digital

avionics, including a Honeywell GPS and ATC transponder equipped with traffic alerting collision avoidance system (TCAS), as well as the provision to install a HUD. Pilatus used a company aircraft (HB-HPB) to act as an engineering testbed, which became available in 1991. Then Beech, which invested US\$ 100 million in the programme, assembled two prototypes with Pilatus support, designated PC-9 Mk.II. The first one flew on 23 December 1992, while the second prototype flew in July 1993. The JPATS RFP was officially issued on 18 May 1994, and in July 1994 the aircraft were involved in a one-week flight test programme at Wright-Patterson AFB, Ohio.

T-6A for student training were the 84th and 85th FTS, both at Laughlin AFB. US Navy's Training Air Wing 6 at NAS Pensacola received its first T-6A on 1 November 2002.

Compared to the PC-9, the T-6A basically has the same basic airframe but features a windscreen, while the pressurised cockpit extends the service ceiling to 31,000 ft (9,449 m). Like the PC-7 Mk.II, an OBOGS system provides oxygen. The digital fuel control unit to the installed PT6A-68 turboprop engine simulates jet-type engine handling, excellent for training future fighter pilots. Ejection seats installed are the zero/zero Martin baker US Mk.16LA. The main performance figures of the PC-9

and T-6A are similar.

While Pilatus receives an undisclosed amount of revenues for each T-6 delivered, Raytheon has also become a new source of competition in the turboprop trainer market. Raytheon has successfully sold the T-6A to the Canadian Bombardier company that uses the aircraft in the NATO Flying Training in Canada (NFTC) programme, a joint venture between the Canadian Armed Forces and Bombardier as main contractor. On 4 November 1997, a 20-year contract worth CDN\$ 2.85 billion was signed in which Bombardier and its subsidiaries supply the aircraft, maintenance and other training aids like flight



Simply because of the fact that the JPATS selection committee appeared to be focussed on a jet-powered aircraft rather than a turboprop, it proved to be a big challenge to convince it that this was the aircraft it needed. Of the some 300 sorties during the competition, the first 250 were mainly flown with lower ranking officials – even the hangar cleaners were offered a ride in the back seat.

Towards the latter part of the demonstration the committee's position shifted in favour towards turboprop-powered aircraft, realising that these high performance yet fuel-efficient aircraft could indeed be the future training platform. From that point on, the backseats were filled with high-ranked officers with a large influence in the JPATS selection.

Raytheon (formerly Beech) was awarded a contract to build the T-6A, of which 372 were required for the USAF and 339 for the US Navy. Having briefly been known as the Raytheon Beechcraft Mk.II, the aircraft was officially named Texan II on 2 June 1997.

Deliveries started in March 1999 to the 559th Flying Training Squadron at Laughlin AFB, Texas, for instructor training and establishing the training syllabus. The first training squadrons to receive the

simulators, while the participating air forces – including Canada, the United Kingdom, Hungary, Denmark, Italy, Singapore and the United Arab Emirates – provide the instructors and train their students. Twenty-six T-6A aircraft, locally designated CT-156 and called Harvard II, were acquired in 1998 and are in use for NFTC phase IIA and IIB training, covering the basic flying training (IIA) syllabus, as well as advanced manoeuvring and basic tactics (IIB) for those selected to fly jets. The Harvard II also equips the 2nd Canadian Forces Flying Training School at CFB Moose Jaw, Saskatchewan where it replaced the Canadair CL-41 Tutor, formerly in use here for training.

Greece chose the T-6A in favour of the Embraer EMB-314 Super Tucano and the PC-9, acquiring 45 aircraft in 1998 for operation by 361 MVE at Kalamata. These aircraft replaced the T-37.

Raytheon is currently also offering the T-6B, featuring an FV 4000 modular mission display processor, a SparrowHawk HUD, stores management and multi-function displays (MFD). At the time of writing no customers have acquired this armed trainer with six underwing stations.



A three-ship formation of Slovenian PC-9M Hudourniks

PC-9M

As well as the major contracts won in South Africa and the USA, Pilatus meanwhile remained successful in selling the PC-9. Under Al-Yamamah II, BAe Systems secured another deal for aircraft to Saudi Arabia, including 20 PC-9s. These aircraft were flown to Warton between October 1995 and July 1996, again for acceptance testing prior delivery. Furthermore, three PC-9s leased earlier to the US Army were returned to Pilatus and after refurbishment were sold to Slovenia.

Since 1996, Pilatus has marketed the PC-9M (M for Modular trainer), which adopted the enlarged dorsal fin of the PC-7 Mk.II. Apart from introducing an automated rudder trim and the OBOGS system, new avionics also feature in the PC-9M. The clean cockpit layout is centred around a single-screen Astronautics 6 x 8-in (15 x 20-cm) Active Matrix LCD primary flight display, flanked by a Meggitt Avionics secondary flight display for back-up, a digital engine parameter display, a TEAM CDU 4057 audio/navigation control and display panel, and a Honeywell KLN 900 GPS panel, capable of providing basic area navigation (B-RNAV). Front and rear cockpits are virtually the same, but the front cockpit can additionally be fitted with a CMC Electronics FV 4000 head-up display, while the rear can house a VGA video display in the same position, displaying the HUD view while simultaneously recording it for debriefing purposes.

The first customer for the PC-9M was the Croatian air force, which bought 17 aircraft in 1996, together

with three regular PC-9s taken off the shelf. As was the case with the South African PC-7 Mk.II order, the number of hardpoints had to be reduced to receive an export licence, this time to none. Neighbouring Slovenia followed the next year with an order for nine aircraft to augment its modest PC-9 fleet. Soon after delivery these aircraft were modified by the Israeli Radom Aviation Systems with new flight instrumentation such as the Litton INS-100G INS/GPS, HOTAS controls, a HUD, mission computer and stores management system. A single chaff/flare dispenser can be carried and possible weapon systems include 12.7-mm gun pods, LAU-7A and LAU-19A rocket pods and bombs (125, 250 or 500 lb). Furthermore, the Radom ATMS (Advanced Training Missile System) pod can be carried to simulate AIM-9 Sidewinder (or similar) air-to-air missile firings with an electro-optical missile seeker simulation device in the front, while dropping IR sources from the back. The upgraded version is locally called Hudournik (Swift) and the first converted aircraft was displayed at the Paris Air Show in 1999.

In 2002, for the first time in its history, Pilatus officially supported an aircraft to be fitted with armament, when the Irish Air Corps acquired eight aircraft to be used as armed trainers. Manufactured by FN Herstal, two 12.7-mm (0.5-in) HMP-250 gun pods can be carried, together with two LAU-7A pods containing 70-mm (2.75-in) folding fin aerial rockets. The PC-9M replaced the SF-260W in exactly the same role.



Latest customers for the PC-9M were Bulgaria, buying six aircraft for basic training, while Mexico – still operating the largest fleet of PC-7s worldwide – obtained two aircraft in 2006.

By mid-2006, 264 PC-9 and PC-9M aircraft had been built, including single prototypes for each version as well as the two JPATS demo aircraft assembled by Beech. One PC-9M demonstrator (HB-HPJ) is still operated by Pilatus. With a life of 10,000 flying hours on the airframe for both the PC-9M and PC-7 Mk.II, these aircraft will remain operational for decades of service.

The privately owned Pilatus Aircraft Factory is keen on retaining its position as market leader in the segment. To assist this, it has opened representation offices in Australia, Malaysia and Abu Dhabi for sales and technical support for its products. It also offers a complete integrated training system in alignment with the customer's requirements, since many operators have different advanced training platforms. Multi-media computer-based training aids and fixed-base flight simulators with 3D vision graphics are part of this total package. After delivery, Pilatus will detach a representative for product support for one year, or longer if requested. With its flexible approach to customer requirements and its ability to offer an affordable quality product, Pilatus has maintained its share in the trainer market despite growing competition. ■

(above) Slovenian PC-9M showing external stores; (below) two Swiss Air Force NCPC-7s of the Pilotenschule der Luftwaffe 85 go vertical over the Swiss Alps



Pilatus PC-7/9 operators worldwide

Angola

The first 12 PC-7s ordered in 1981 (serialled R-401 to R-412) were followed by six more (R-413 to R-417 plus one replacement for an unknown crashed example) bought in 1986, and another eight were acquired in 1989 (serialled R-418 to R-423, R-405 and R-407, the latter two again acting as attrition replacements). Angola also obtained four PC-9s in 1986 (R-600 to R-603), deliveries following one year later.

The Força Aérea Popular de Angola (Angolan People's Air Force), then supported by Eastern Bloc and Cuban advisors, used these as trainers as well as for counter-insurgency and reconnaissance against UNITA rebels. When the communist advisors withdrew following the end of the Cold War, the Angolan government turned to the South African private security company Executive Outcomes, which assisted the Angolan military between 1993 and 1995. EO has made use of FAPA's hardware, including PC-7s, during their campaign against UNITA. EO operated the aircraft from Cabo Ledo, reportedly armed with French and Korean rockets, and Brazilian rocket pods. One PC-7 was lost in April 1994 to 23-mm ground fire, while another one was shot down on 15 July 1994 during a battle around the strategic diamond town of Cafundo. A ceasefire was signed on 20 November 1994. Some 10 PC-7/9s are believed to be still in service at the time of writing.

Australia

As a replacement for their MB-326 fleet, the Royal Australian Air Force requested Pilatus to forward proposals based on both the PC-7 and PC-9 in offset packages to meet the AFTS 5044 requirement for new trainers. Although the RAAF initially favoured the PC-7, the PC-9 – which had just become available – was chosen in 1986. Two Swiss-built PC-9s (A23-001/002) were delivered in 1987. In the meantime, Hawker de Havilland at Bankstown obtained licence rights and had established a production line. First, 17 kits supplied by Pilatus were assembled (A23-003/019), followed by 48 locally built examples (A23-020/067), both designated PC-9/A, of which the last one was delivered in May 1992. The first full-scale training syllabus (158 hours in nine months) on the PC-9 started in August 1990. Australia returned licence rights to Pilatus in 1998 since it was not economical to keep them.

The main operator is the basic flying training unit 2 FTS at RAAF Pearce, with graduates transferring to No. 79 Sqn's Hawk Mk.127s co-located at the same base. The Central Flying School (CFS) at RAAF

East Sale is equipped with 16 PC-9/A and also hosts the six-aircraft formation of the 'Roulettes' display team. All CFS aircraft are sprayed in the red/white Roulettes colour scheme. No. 77 Sqn of No. 81 Wing at RAAF Williamtown used three grey PC-9/A(F) in the FAC-role from early 1994 until the aircraft were transferred to the Forward Air Control Development Unit (FACDU) in February 2002, still based at Williamtown but now under control of No. 82 Wing at RAAF Amberley. The main tasks are training Hornet pilots in the 'fast FAC' role and to train forward observers for the Army.

Finally, three aircraft are in use for equipment and system testing with the Aerospace Operational Support Group (AOSG) at RAAF Edinburgh, a unit formerly known as Aircraft Research and Development Unit (ARDU).

Austria



Deliveries of 16 Turbo Trainers (locally known as PC-7OE, serialled 3H-FA to -FP) that were ordered in 1982 (ten) and 1985 (six) started in January 1984, and all aircraft are still in use today with the Fliegerschule (Flying School) at Zeltweg, which is a JAR-FCL certified institute. Those students destined to fly jets who have successfully past the 30-hours grading course on the Cessna 152 with the civil Oesterreichische Luftfahrtschule (Austrian Aviation School) at Graz, continue training on the PC-7 for 125 hours. During this 11-month course, basic flying as well as primary tactics training is performed. For this latter task, the aircraft can be fitted with two 12.7-mm (0.5-in) gun pods and an LAU-7 dispenser containing seven 70-mm (2.75-in) rockets, a configuration also used for air surveillance duties against slow-moving intruders, a secondary task for the unit. Future jet pilots move on to the Saab 105OE at Linz for another year of training.

Bolivia

The Fuerza Aérea Boliviana placed two PC-7 orders for 12 each, in 1977 and 1980, with deliveries

starting in 1979 (serials FAB450 to FAB473). They were initially used for basic training at Santa Cruz-El Trompillo, painted in a white scheme with tricolour rudder, while some wore a large attractive eagle's head painting on the nose. Since 1986 the remaining aircraft, of which only a few are operational today, now serve with Escuadrón de Caza 340, part of Grupo Aéreo de Caza 34 at Cochabamba-Jorge Wilsterman. Between 1992 and 1996 six PC-7s took part in the Peace Eagle programme, an anti-narcotics operation in which the aircraft were used to intercept drug-smuggling aircraft. In 1,527 sorties, 337 intercepts were accomplished.

Unfortunately, two aircraft were lost in a mid-air collision on 22 June 2004 in preparation for an air show. Some of the aircraft still in use have recently been resprayed in a camouflage pattern.

Bophuthatswana

The small Tshireletso ya Bophuthatswana, the air arm of the Bophuthatswana Defence Force based at Mmabatho air base, operated three PC-7s in the Training Wing (serials T-400, T-410 and T-420). The aircraft were acquired in 1989 and put into service from 1 February 1990. A training syllabus became operational in 1992 to train future pilots for the Transport Wing operating the CASA 212, CN.235 and PC-6, while the PC-7s also were used by the 'Leopard' aerobatic team from 1992.

Following the first free post-apartheid elections in South Africa, Bophuthatswana ceased to exist as an independent homeland on 27 April 1994. The air force equipment was subsequently integrated into the South African Air Force. The PC-7s were transferred to the Central Flying School (CFS) at Langebaanweg which was about to receive its first PC-7 Mk.II, but due to the lack of commonality the aircraft were returned to Pilatus, which sold them on the civil market.

Botswana

The Flying Training Squadron, designated Z7, of the Botswana Defence Force Air Wing took delivery of seven PC-7s in 1990 (serialled OD1 to OD7). After one was lost in an accident in 1997, a replacement was bought from Pilatus the same year, being a second-hand aircraft from Surinam and adopting the same serial (OD5). Another one was lost in 1999.

The aircraft initially operated out of the Gaborone International Airport until the BDF's new air base at Thebeaphatshwa near Molepolole became operational in 1996. Furthermore, they are deployed to Francistown in the north of the country on a regular basis for border patrols. Botswana's PC-7 fleet is still highly operational and active, as during 2005 some 2,908 flying hours were accumulated.

Brunei

The Angkatan Tentera Udara Diraja Brunei (Royal Brunei Air Force) became the second customer to buy the PC-7 Mk.II, of which four were acquired in 1996, serialled ATU301 to ATU304. The aircraft serve as trainers with No.3 squadron at Brunei Darussalam International Airport, the ATUDB's only operating base. The aircraft replaced the air arm's SF-260s and were intended to train pilots which have yet to be obtained, despite Brunei's interest in 10 Hawks.

Bulgaria

The Bulgarski Voenno Vzdushni Sili (Bulgarian Air Force) was one of many air arms to trade its jet trainers for turboprops when it acquired six PC-9Ms (serials 663 to 668) on 5 December 2003 to replace the Aero L-29. The order, worth over SFR 50 million, also included ground-based training systems, an integrated logistics package and one PC-12M transport plane. The first Bulgarian PC-9M made its first flight from Stans on 20 September 2004, and the first three aircraft were delivered on 18 November 2004 to 12.UAB (Uchebna Aviacionna Basa) at Kamenec. The air force training centre located here is directly subordinate to the air force headquarters. Bulgaria has expressed a requirement for six more PC-9Ms.

Chad

The Escadrille Nationale Tchadienne, or Chad National Flight, received two PC-7s from the French civil market in 1985, serialled TT-QAA and TT-QAB. The ENT armed them with 20-mm GIAT cannons mounted in underwing pods. Some years ago, the aircraft were flown to Reims-Prunay for overhaul with Reims-Cessna, of which one reportedly returned to service while the other one remained stored for years. In 2006 Chad acquired a single PC-9 from Pilatus.

Chile

The only naval air arm worldwide to use the PC-7 is the Aviación de la Armada de Chile, which ordered 10 aircraft (serials 210 to 219) in 1979. These are operated by pilot training squadron VT-1 at Viña del Mar air base. The PC-7s operate alongside eight Cessna O-2A aircraft that serve with the same squadron, although mainly for search and rescue as well as coastal patrol duties.

Croatia

Shortly after the arms embargo was lifted following the 1995 Dayton peace treaty, the Hrvatske Zračne Snage (Croatian Air Force) obtained 20 PC-9s the

next year to establish a flying training unit, together with their existing fleet of UTVA-75 trainers. However, for Pilatus to receive an export licence, delivery without hardpoints was a condition set by the Swiss parliament. Three PC-9s (051 to 053) were delivered off the shelf, while 17 new-build PC-9Ms (054 to 070) soon followed. With the air force presently called Hrvatsko Ratno Zrakoplovstvo, the aircraft are in use with the Rudolf Peresin Air Force Academy's I. Ezkadrila za Temeljnu Obuku (I. EzTO, Basic Training Sqn) and the II. Ezkadrila za Visu i Namjensku Obuku (II. EzViNO, Advanced Training Sqn) at 93 Zrakoplovna Baza (93rd Air Base) Zadar-Zemunik, alongside the UTVA-75s. At Pula, 25 Mješovita Eskadrila za Elektronsko Djelovanje i Izvidanje (25 mixed electronic intelligence squadron) uses three PC-9s in the Elint role, on loan from the academy.

Cyprus

The Deekisi Aeroporias Kyprou (Cyprus Air Force Command) bought two PC-9s in 1988, which were delivered in 1989 to the Mira Elikopteron-Aeroskafon (MEA - Helicopter-Aircraft Squadron), serialised 901 (nicknamed 'Kyrenia') and 902 ('Ammochotos'). This unit, based at Paphos, equipped the camouflaged aircraft with the RM24 target-towing system for training ground-based air defence units. The aircraft also simulated air-to-ground attacks for training purposes. After a reorganisation on 12 November 2001, the aircraft were allocated to 4 sminos, the fixed-wing flight of 450 ME/P (Mira Elikopteron) controlled by 55 Pteriga at Paphos, from where the PC-9 operates alongside a single BN-2B-21 Islander and the Mi-35P helicopters of the squadron's other three flights.



Unfortunately, 902 was lost in a controlled flight into terrain (CFIT) accident on 10 September 2005. Cyprus is looking for a replacement, but US export limitations on the engine and avionics, in view of the still tense political situation with close US ally Turkey, may preclude additional procurement.

France

Within a large fleet of various aircraft and helicopters, the Centre d'Essais en Vol (CEV) – France's governmental flight test and research establishment – operates five PC-7 aircraft (serialised 576 to 580, coded AF to AJ) in support of the Ecole du Personnel Navigant d'Essais et de Réception (EPNER) test pilot school at Istres-Le Tubé. EPNER's graduates progress to prototype testing or carry out acceptance flights. The aircraft were readily available due to an embargoed Iraqi contract, and were delivered between April and June 1991.

Germany

In 1990, Holstenair Lübeck Luftverkehrsservice GmbH took over the target-towing contract from Rhein Flugzeugbau (RFB), which previously operated from Lübeck-Blankensee airport with a fleet of OV-10B Bronco aircraft and four IAI-1124 Westwinds. The Westwinds were transferred to Holstenair, which also bought 10 PC-9B in 1990 (serials D-FAMT to D-FJMT) for target-towing duties in support of the Luftwaffe and Bundesmarine. A former PC-9B demo aircraft (D-FKMT) was delivered at a later stage.

The target-towing contract with Holstenair, as well as the nine surviving PC-9Bs, were taken over by E.I.S. Aircraft GmbH at Dahlemer Binz airfield, although they mainly operate out of Kiel-Holtenau. Beside the RM-12 system, the PC-9B can also carry two pods sensing laser energy radiated by practice gunners, for hit registration purposes.



Guatemala

In 1978, the Fuerza Aérea Guatemalteca (Guatemalan Air Force) ordered six PC-7s, which arrived at the Guatemala-La Aurora air base on 29 May 1979 by airlift, sprayed in a three tone camouflage including pink (serialised 212, 215, 220, 229, 267 and 274). A follow-up order for six more was placed in 1980 (serialised 211, 219, 265, 269, 278 and 284). After some remarks by air force staff, they were delivered in a similar scheme, but with green instead of pink. An unconfirmed report states

that Guatemala ordered 12 more, which were put into storage immediately after arrival at La Aurora, because Pilatus was unwilling to hand over these aircraft due to funding difficulties. They were subsequently returned to the factory.

Although frequently used in the past by the Escuela Militar de Aviación at Retalhuleu for training, they are generally operated on armed reconnaissance missions by No. 2 Escuadrón at La Aurora, also known as the Escuadrón de Ataque y Reconocimiento. In this configuration, the PC-7 has seen widespread use during the civil war between government and communist guerrilla forces, which was not ended until December 1996. Seven aircraft survive at the time of writing, although few of them remain operational at any given time. In 2005 the Guatemalan government approved funds to get some of the FAG fleet back into the air, including five PC-7s. A detachment to Base Aérea General Danilo Eugenio Henry Sanchez near Santa Elena in the northern Petén province is maintained on a regular basis to cope against aerial drug-runners.

Iran

Following the 1979 revolution, Pilatus and Embraer have been the only Western factories with aircraft exports to Iran. The Islamic Republic of Iran Air Force (IRIAF) received 35 PC-7 aircraft (serialled 8-9901 to 8-9935; some now have prefix 7) ordered in 1982 for flying training. Integrated into the Flying Training School, the aircraft equip one or two training squadrons at Tactical Air Base (TAB) 11 Ghale-Morghfi near Tehran, where the aircraft operate alongside EMB-312 Tucanos. Although acquired during the war with neighbour Iraq, the PC-7s have reportedly only been in use for training.

With a large need for trainers in an embargo environment, the Iranian Aircraft Manufacturing Company HESA has repaired several PC-7 airframes that were badly damaged in accidents, by reverse engineering. Known as the S-68, the first three examples returned to service this way in February 1998.

Iraq

No fewer than 52 PC-7s (48 ordered in 1979, four in 1980, serialled 5000 to 5051) have been delivered to the Al Quwwat Al Jawwiya Al Iraqiya (Iraqi Air Force and Air Defence Forces) to equip the 6th Flying School, as part of the Air Force Academy at Tikrit. In 1986, 21 PC-9s were ordered.

The Pilatus aircraft were used both as trainers and for light strike duties from bases such as Umm Qasr near Basra. An unknown number of aircraft were destroyed on the ground during the 1991 Gulf War. On 22 March 1991, one PC-9 was lost over the northern 'No-fly' zone just after operation Desert

Storm when its pilot, escorting a Su-22 which was shot down, was intimidated in such a way by Lt Robert W. 'Digs' Hehemann flying an F-15C of 53rd TFS/36th TFW that he ejected upon intercept. On 27 August 1992 a second 'No-fly' zone, south of the 32nd parallel, was established. Before that, Iraqi aircraft including PC-7s flew missions against the Shiite minority in the south.

The remaining PC-7s and -9s soldiered on until the 2003 invasion by the US-led Coalition Forces, when most of the fleet was destroyed or damaged.

Ireland

Ireland is an interesting customer in that Pilatus technically supported an armed version of its training aircraft, with armament bought separately from FN Herstal. Looking for a replacement for their retired SF-260W Warriors, the Irish Air Corps bought eight PC-9M aircraft (260 to 267) in 2002 in a contract worth Euro 60 million, including training aids and logistics. The aircraft can be fitted with two HMP-250 pods with one 12.7-mm (0.5-in) machine-gun each, and two LAU-7A pods with 70-mm (2.75-in) folding-fin aerial rockets. The PC-9 was favoured over the EMB-314 Super Tucano ALX and T-6A Texan II. The first three were officially handed over on 21 April 2004 at Casement Aerodrome, Baldonnel, where the PC-9Ms equip the Flying Training School of the Air Corps College.

Malaysia

In 1983 and 1984, the Tentara Udara Diraja Malaysia (TUDM), or Royal Malaysian Air Force, took delivery of 44 PC-7s (M33-01 to M33-44) which it ordered two years earlier for US\$ 53 million as replacement for their Scottish Aviation Bulldog 102. They equipped Pulatibang 1, or 1 Flying Training Centre (1 FTC), at RMAF Alor Setar, Pulatibang 3 (3 FTC) at RMAF Kuantan, and the Flight Instructor School at RMAF Alor Setar. The camouflaged shark-mouthed 3 FTC aircraft were also fitted with a pair of 7.62-mm minigun pods for weapons training. From 1985 the 1 FTC also maintained the 'Tamin Sari' ('Magic Sword') display team, a nine-ship formation featuring a white-blue-red scheme. The team was later disbanded to cut costs.

In 2000, Malaysia ordered nine PC-7 Mk.IIs (M50-01 to M50-09) to operate with Pulatibang 3, which moved to RMAF Alor Setar and transferred their old PC-7s to the sister training units.

One PC-7 Mk.II was lost in an accident on 2 January 2002. After a number of fatal crashes in which PC-7s were involved, the TUDM examined possible updates for these aircraft. However, in 2006 it was decided to acquire 10 more PC-7 Mk.IIs (M50-10 to M50-19), the deal also including ground-based training systems and complete integrated logistic

package as total replacement for the PC-7, a deal worth over SFR 70 million.

Mexico

The largest operator of the PC-7 is the Fuerza Aérea Mexicana, which received no fewer than 88 aircraft in five batches ordered in 1979 (501 to 508), 1980 (509 to 538), 1982 (539 to 555), 1986 (556 to 575) and 1991 (576 to 588). About a dozen are in use with the Escuadrón Avanzado of Escuela Militar de Aviación (Military Flying School), as part of the Colegio del Aire located at Base Aérea Militar 5 Zapopán. Most aircraft, however, operate in the light strike and COIN role with a number of squadrons, all controlled by the 2 Grupo Aéreo headquartered at Pie de la Cuesta: Escuadrón Aéreo 201 based at Base Aérea Militar 4 Cozumel, EA 202 at BAM 6 Tuxtla Gutiérrez, EA 203 at BAM 9 La Paz, and EA 204 at BAM 7 Pie de la Cuesta. Other squadrons to operate the PC-7 were EA 205, 206 and 207, but they were all disbanded following a reorganisation in the 1990s. The PC-7 is also in use with the EMAATFA (Escuela Militar de Aplicación Táctica de la Fuerza Aérea at BAM 11 Santa Gertrudis. Survivors later received a 4-digit serial: the operational aircraft became 25xx while the trainers at the school were reserialled 65xx, with reference to their old serial.

PC-7s flew armed missions during a peasant's revolt started on 1 January 1994 by Zapatista rebels of the EZLN from Chiapas. This revolt was swiftly put down. However, as a result, the Swiss government denied an export licence for 48 PC-9s to be ordered in 1995 for which hardpoints were specified. Much later, in 2006, two PC-9Ms were ordered successfully for training purposes. Additional purchases are expected.

Myanmar

Myanmar was the launch customer for the PC-7, when the country ordered eight aircraft in 1976, followed by another eight in 1979 and an additional three in 1989, the year in which the country changed its name from Burma. The aircraft were serialled 2301 to 2319, of which 2310 crashed before delivery but was replaced by the factory. Positive experiences with the PC-7 also resulted in an early order for four PC-9s in 1986 and three more in 1990. Together with some dozen remaining PC-7s, they serve with the Tamdaw Lay (Myanmar Air Force) Flying Training School at Namsang air base. Apart from training, the aircraft have been used for various armed counter-insurgency operations against communist and ethnic guerrillas. One such occasion was the November 1986 Sisiwan-Tarpang battle against BCP (Burma Communist Party) troops. Of the four armed PC-7s involved, one was lost on 22

November, killing both pilots.

As with the PC-7, Myanmar became one of the early customers to buy the PC-9, purchasing four in 1986 (serialled 3601 to 3604). Today, technical support for the aircraft is very limited due to international embargoes laid down on the military regime which, apart from being a member of the economic ASEAN pact, follows a policy of non-alignment.

Netherlands

Until 1990, the Koninklijke Luchtmacht (Royal Netherlands Air Force) screened future military pilots at the Selectie Vliegopleiding (SVO - Selection for Flight Training), using the Beech F33C Bonanzas of the government-owned civil aviation school (Rijksluchtvaartschool) located at Groningen-Eelde airport. Since graduates moved straight on to the Cessna T-37C at Sheppard AFB, Texas, the learning curve was very steep, resulting in a rather large number of drop-outs. During the late 1980s the air force staff studied alternatives to minimise this number and, as a result, the acquisition of a more advanced, turboprop-engined trainer was considered.



After evaluation of the Embraer Tucano and the PC-7, the latter was favoured since its rival was regarded as too sophisticated for use as screener and basic flying trainer. Subsequently, 10 PC-7s (serialled L-01 to L-10) were ordered in 1988 and deliveries started in 1989 for use with the Elementaire Militaire Vliegopleiding (Elementary Military Flight Education) at Woensdrecht. As the Marineluchtvaartdienst (Naval Air Service) transferred its basic pilot training from Eelde to Woensdrecht as well, three additional PC-7s (L-11 to L-13) were ordered in 1997. Later, the EMVO was renamed 131 EMVO squadron, while the badge formerly in use with 313 squadron (which became a NATO Tiger squadron while adopting a new tiger badge) is currently used. The KLu PC-7 Solo Display Team has been a regular sight to European air shows since 1995, equipped with two underwing smoke pods. Starting in August 2005, the fleet is being gradually resprayed in a black scheme during major overhaul and corrosion inspection with RUAG

at Oberpfaffenhofen.

Oman

The Royal Air Force of Oman bought 12 PC-9M trainers in 1998 (serials 426 to 437) for service with the Sultan Qaboos Flying Academy at Masirah. The aircraft, which replaced the BAe Strikemaster Mk. 82, sport a two-tone grey camouflage scheme and are in service with 1 squadron alongside the Scheibe-Falke motorglider and the PAC Super Mushshak elementary trainer.

Saudi Arabia

After the Royal Air Force AST.412 competition was lost, the close cooperation with British Aerospace for this requirement soon led to a deal with Saudi Arabia in 1986 when the Al-Yamamah contract was signed between the UK and Saudi governments. Beside the delivery of Tornado ADV/IDS aircraft, BAe offered a pilot training package built around the PC-9 and Hawk T.Mk. 65 trainer. The Al Quwwat al Jawwiya as Sa'udia, or Royal Saudi Air Force, therefore became the first customer for the PC-9 and Pilatus built 30 aircraft (serialled 2201 to 2215 and 4201 to 4215), which equipped 22 squadron of the King Faisal Air Academy at King Khaled air base near Riyadh.

In 1994, Al-Yamamah 2 was signed, comprising additional Tornado IDS and Hawk trainers as well as 20 more PC-9s. These aircraft (901-920) were initially delivered to Warton between October 1995 and July 1996, for a minor modification by BAe, after which they were delivered between December 1995 and August 1996 for service with 9 squadron, which is also part of the King Faisal Air Academy. One PC-9 (2204) has been transferred to BAE Systems at Warton in December 2005.

Slovenia

The Slovenian Air Force acquired the three former US Army PC-9s from Pilatus in 1994 (registered S5-DSL 'Škofja Loka', S5-DPT 'Ptuj' and S5-DPI 'Piran'). The aircraft came into service with 15 Brigada Vojaskega Letalstva (15 Air Force Brigade), which was initially based at Ljubljana-Brnik airport but later moved to Cerklje air base. The aircraft were soon camouflaged (and reserialled L9-51 to 53). The idea was to keep the country's former Yugoslav air force fast-jet pilots current until the arms embargo on all former Yugoslav republics could be lifted, clearing the way for combat aircraft.

While the combat aircraft have yet to materialise, the fleet was strengthened by nine PC-9Ms bought in 1997 (serialled L9-61 to L9-69). They were modified by the Israeli company Radom, which fitted the aircraft with new flight instrumentation, HOTAS

controls, a HUD, mission computer, stores management computer and weapon systems including 12.7-mm gun pods and LAU-7A rocket pods. Furthermore, the Radom ATMS (Advanced Training Missile System) pod can be carried. The modified aircraft is locally called Hudournik, or Swift.



On 8 November 2004, 15 Brigade was disbanded and the newly established Letalska Šola (Air Force School) took on the 11 remaining PC-9(M)s.

South Africa

South Africa's specific requirements led to the development of the PC-7 Mk.II, a downgraded PC-9 with basically the same airframe, including ejection seats. After certifying the type and following parliamentary approval to export the type to South Africa, which then was still governed by an apartheid regime, the SAAF ordered 60 PC-7 Mk.II (2001 to 2060) on 1 December 1992 in a contract worth SFR 200 million. The PC-7 Mk.II, locally known as the Astra, has replaced the T-6 Harvard. Most serve with the Central Flying School at Langebaanweg, some equipping the 'Silver Falcons' aerobatic team. Two aircraft are used by the Test Flight and Development Centre at AFB Overberg for flight test duties. Four CFS aircraft have been written off in various accidents, of which one is at the Pilatus factory to be rebuilt. However, it is currently stored at Stans, awaiting a final approval by the SAAF.

Three ex-Bophutatswana Defence Force PC-7s joined the CFS in 1994 where they briefly operated alongside the first PC-7 Mk.IIs before being put into storage. Later, these aircraft were returned to the Pilatus factory in exchange to a single Pilatus PC-12 now in use with No.41 Sqn at Waterkloof.

Surinam

After a civil war broke out in 1986, the Surinam Air Force bought one PC-7 (SAF-111) from Pilatus in the same year for counter-insurgency tasks, to counter the guerrilla threat by the Jungle Commando led by Ronnie Brunswijk. The aircraft was armed with rocket pods and operated out of Zorg en Hoop, but was only in use for a brief period.

As soon as the dispute came to an end during the late 1980s, the aircraft was withdrawn from use and subsequently returned to Pilatus, which later transferred it to Botswana.

It has been reported that Surinam simultaneously operated another PC-7 (SAF-112) that was acquired on the civil market, and sold later to another civil operator.

Switzerland

The Schweizer Luftwaffe took delivery of 40 PC-7s (serialled A-902 to A-941) between October 1982 and November 1983 to replace its ageing P-3s after extensive trials with the prototype (A-901) and two production aircraft (A-902 and A-903), the latter being eventually taken on charge. Most of them serve with the Pilotenschule der Luftwaffe 85 at Magadino, while others are dispersed at bases throughout the country for liaison duties. The aircraft is also used by IFIST 14 (Instrumentflugstaffel) for IFR training. IFIST 14 is parented by the Pilotenschule, but operates from various bases. The type also equips the PC-7 Team, one of the air force's official aerobatic teams that performs around a dozen shows each season with nine aircraft. Of the 37 remaining airframes, 18 are currently being upgraded. Pilatus installs a MFD and new avionics suite that allows the air force to give their students a frozen ATPL licence with single-engine IF-rating. The modified aircraft are being resprayed in a new red/white colour scheme. Maintenance for the air force's PC-7 and PC-9 aircraft is conducted by RUAG Aerospace at Lodrino.



The Swiss air force acquired their highly visible PC-9 aircraft in three batches (four each in 1987, 1991 and 1993). The main role is target towing to train ground-based anti-aircraft units, for which the Southwest RM-24 target-towing system is carried. A secondary role is ECM jamming with the underwing Vista 5 pod (containing the Ericsson Erijammer A100), similar to those carried by the air force's F-5Fs. The 11 PC-9s (one was lost after a mid-air collision) equip Zielflugstaffel 12, which frequently operated from Samedan near St.Moritz over the

nearby ground-to-air gunnery range. Following a reorganisation with the armed forces, this detachment stood down in December 2003. The squadron presently operates from various bases. Reserve squadron Fliegerstaffel 24 also operated the PC-9 after retiring its Hunters in 1994, but was disbanded in the late 1990s.

Thailand

As the Royal Thai Air Force was not satisfied by the performance of its newly delivered RFB Fantrainers, 20 PC-9s were ordered in 1990 to replace them and were delivered the following year for use with the 2 Flying Training Squadron 'Mustang' based at Kamphaeng Saen. 2 FTS is controlled by the 4th Air Division. The fleet was gradually expanded with three more ordered in 1993, and another three in 1996. The PC-9 is locally designated as B.F.19 and the aircraft are serialled F19-01 to F19-26.

United Arab Emirates

The Western Command of the United Arab Emirates Air Force, also known as the Abu Dhabi Air Force, initially received 14 PC-7 trainers (serialled 901-914) ordered in 1981 for use with the Flying Training School at Maqatra. A follow-up order was placed in 1985 for 10 more (915-924), while an additional seven (925-931) were acquired in 1993. Presently, all surviving PC-7s operate with No.4 Squadron of the Flying Training School, also known as the Khalif bin Zayed Air College at Al Ain.

As discussions had been underway for some time to replace the PC-7s, Pilatus took the opportunity to demonstrate its new PC-21 to the UAEAF during the Dubai 2005 air show and the Al Ain Air show two months later.

United Kingdom

On 27 July 1989, BAe at Warton took delivery of one PC-9 (ZG969), mainly to act as chase plane during various flight test programmes. The aircraft was recently resprayed in the company colours and nicknamed 'Percy'. An additional PC-9 (ZK119) was taken over from the Royal Saudi Air Force by BAe Systems on 15 December 2005 for similar duties.

United States

The US Army Test and Experimentation Command (TEXCOM) Airborne and Special Operations Test Directorate at Fort Bragg, North Carolina, chose the PC-9 over the Tucano to replace its T-28 Trojans, used to chase a variety of airdrop aircraft to photograph and evaluate their operations. A lease-to-purchase contract worth US\$ 10 million for three orange/white-coloured PC-9s (91-0071 to 91-0073)

was signed in early 1991. Although being well-suited for the task, it soon became clear that the aircraft were too costly to operate within the tightened ASOTD budget and were returned to Pilatus in October 1992. They were overhauled and sold to Slovenia in 1994.

Uruguay

The Fuerza Aérea Uruguaya operates six PC-7Us (serialled 301-306) in the training role with the Centro de Instrucción y Entrenamiento de Vuelo Avanzado (Advanced Flying Training Centre) at

Base Aérea 2 'General Urquiza' Durazno, although the unit was later renamed Escuadrón de Vuelo Avanzado (Advanced Flying Squadron). Locally designated AT-92, the aircraft bought in 1991 and delivered in February 1993. They can be fitted with four hardpoint to operate as tactical trainers for exercises over the La Carolina range north of Durazno. One aircraft (304) was involved in an accident in April 1994, but the FAU requested Pilatus to rebuild the aircraft in 1996, with Pilatus using many parts of the crashed airframe. The repaired airframe received serial 307. ■

The author would like to thank Pilatus Aircraft Ltd in Stans, Switzerland, especially Mr. Frank Beetz, Mr. Hermann Spring, Mr. Tony Odermatt and Mr. Pascal Blaettler, for their kind assistance in preparing this article.

It has been completed for publication in International Air Power Review (UK/USA – Vol.21). Furthermore, images have been used in various articles in other magazines, while Pilatus Aircraft used pictures for official presentations.

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Specifications

	PC-7	PC-7 Mk.II	PC-9M
Length	9,78 m (32 ft 1 in)	10,12 m (33 ft 2 in)	10,12 m (33 ft 2 in)
Span	10,40 m (34 ft 1 in)	10,14 m (33 ft 3 in)	10,14 m (33 ft 3 in)
Height	3,21 m (10 ft 6 in)	3,26 m (10 ft 8 in)	3,26 m (10 ft 8 in)
Wing area	16,60 sq m (178.7 sq ft)	16,28 sq m (175,3 sq ft)	16,28 sq m (175,3 sq ft)
Engine	P&W PT6A-25A (650 shp, flat rated 550 shp)	P&W PT6A-25C (850 shp, flat rated 700 shp)	P&W PT6A-62 (1,150 shp, flat rated 950 shp)
Propeller	3-blade Hartzell HC-B3TN-2	4-blade Hartzell HC-D4N-2A	4-blade Hartzell HC-D4N-2A
Basic empty weight	1,330 kg (2,932 lb)	1,670 kg (3,682 lb)	1,725 kg (3,803 lb)
Max t/o weight (aerobatic config.)	1,900 kg (4,189 lb)	2,250 kg (4,960 lb)	2,350 kg (5,181 lb)
Max t/o weight (utility config.)	2,700 kg (5,952 lb)	2,850 kg (6,283 lb)	3,200 kg (7,055 lb)
Max oper. speed (EAS Vmo/Mmo)	270 kt / M 0.55	300 kt / M 0.60	320 kt / M 0.65
Max cruise speed (sea level)	203 kt	242 kt	271 kt
Max cruise speed	220 kt	251 kt	298 kt
Service ceiling	33,000 ft (10,058 m)	30,000 ft (9,144 m)	38,000 ft (11,582 m)
Max oper. altitude	25,000 ft (7,620 m)	25,000 ft (7,620 m)	25,000 ft (7,620 m)
Max rate-of-climb (sea level)	2,150 ft/min (655 m/min)	2,840 ft/min (866 m/min)	3,880 ft/min (1,183 m/min)
Max range at long range cruise speed	730 NM (1,353 km)	810 NM (1,500 km)	860 NM (1,593 km)
Load limits (clean config.)	+6/-3 (aerobatic) +4.5/-2.25 (utility)	+7/-3.5 (aerobatic) +4.5/-2,25 (utility)	+7/-3.5 (aerobatic) +4.5/-2.25 (utility)
T/o distance incl. 50' clear. at SL	400 m (1,312 ft)	415 m (1,360 ft)	397 m (1,300 ft)
Ldg distance incl. 50' clear. at SL	510 m (1,673 ft)	674 m (2,210 ft)	687 m (2,255 ft)
Hardpoints	6	6	6

(EAS=Equivalent Air Speed)