

# ATR family modification programmes

Besides several avionic upgrade programmes which all aircraft must be compliant with, the only major modification programmes for the ATR 42 & 72 are a selection of Class C & E freighter modifications.

**T**he two ATR models have led to a wide range of cargo modification programmes, including an original equipment manufacturer (OEM) large door freighter, several varieties of bulk freight carrier, a modular series of combis, and a rapidly installed cargo loading system that leaves much of the passenger interior in place.

## Engine and airframe

There are no major issues with the ATRs' engines. Pratt & Whitney Canada's fleet enhancement programme (FEP) gives operators the opportunity to trade in old engines, typically in conjunction with a shop visit. Under the FEP the value assigned to the old engine depends on its condition and utilisation status. An engine exchange also offers an opportunity for operators to join PWC's Eagle Service Plan (ESP) programme, under which they make a monthly payment based on a fixed rate per flight hour (FH) to cover most maintenance and overhaul eventualities.

A service bulletin (SB) requires the replacement of corrosion-prone ribs in the flaps with ribs of a more corrosion-resistant material. This is a manpower-intensive task costing EUR 40,000-65,000 (\$52,000-85,000), depending on the extent of the corrosion. Sabena Technics has been the only maintenance provider approved to undertake the work, but Air New Zealand, Cimber Air Maintenance Center in Denmark and M7 Aerospace in San Antonio, Texas, have been, or are about to be, added to the list of shops approved to incorporate the SB.

## Cargo conversions

The ATR 42's cabin has a maximum width of 101.2 inches and is 89 inches

wide at floor height. It includes a 219 cubic foot (cu ft) baggage/cargo compartment immediately aft of the cockpit, accessed by a door 50.2 inches wide and 60.2 inches high, at a sill height of 47.2 inches. The compartment is shortened in aircraft configured for more than 46 passengers.

There is a second cargo/baggage compartment in the tapered section of the rear fuselage, along with an airstairs passenger door measuring 29.5 inches by 60.2 inches. The aft cargo compartment has a volume of 85 cu ft in all but two of the aircraft below MSN 115. In later aircraft the baggage area is extended aft to provide 169.5 cu ft. The length aft of the flight deck to the rear of the aft baggage compartment is 45 feet, 5 inches in the aircraft with the shorter compartment, and 48 feet, 4.5 inches in the later examples.

The ATR 72's cabin has the same widths but is 17 feet, 7 inches longer, extending 63 feet from the rear of the flight deck to the rear of the aft compartment. Baggage compartment volumes are similar to those of the later 42s, and most ATR 72s also have a cargo door forward and a passenger door aft. However, 22 have a forward airstairs

passenger door instead of a cargo door.

Both models are offered in quick change (QC) configuration (option 03-011 container transport capability), with the floor strengthened to support 66lbs per square inch and class E fire protection, which involves extending the existing smoke detection system and installing isolating valves in the air conditioning system.

Class E certification, applicable to freighters, requires that the smoke detection system alert the flight crew within 60 seconds of smoke first appearing in the cargo compartment. Aircraft carrying passengers must have class C systems, which add fire suppression systems able to suppress combustion to controllable levels and prevent reignition or spreading of the combustion for at least 60 minutes.

The 99 cu ft containers have a tare weight of 168lbs and maximum gross weight of 1,102lbs. The ATR 42 can carry nine for a total containerised volume of 891 cu ft, while the ATR 72 can carry 13, providing 1,287 cu ft. Both can also carry bulk freight in the aft cargo compartment, but use of the standard flight attendant seat is not permitted during cargo operations.



*Modification programmes to class E freighters for the ATR 42 & 72 are provided by Aeronavali, ATS International and M7 Aerospace.*



*Once converted to freighter, the fuselage interior is strengthened and lined to provide protection during container loading and off-loading.*

wide and 71 inches high, enabling the ATR 42 and 72 fuselage to accommodate LD3 containers and 88 x 108-inch pallets. With an 88- by 108-inch cargo loading system the ATR 42-300/310 can carry three pallets for a maximum gross payload of 11,684lbs. The ATR 72-200 can take five pallets with a maximum gross payload of 17,842lbs. An 88- by 62-inch cargo loading system enables the ATR 42 and 72 to hold six and nine pallets respectively, giving them respective maximum gross payloads of 11,629lbs and 17,784lbs. With an LD3 loading system, the ATR 42 can take five containers and a maximum payload of 11,755lbs gross, while the ATR 72 can take seven and a maximum gross payload of 17,941lbs.

## ATS International

Part of France's Group Aeroconseil, ATS International has developed four separate configurations for ATR 42 and 72 cargo conversions, all complying with the E class fire detection and suppression standard.

The first uses the wires for the passenger seats to secure horizontal nets on the ATR 42-300, while the second has vertical nets to separate the cargo zones in both the 42 and the 72. Ireland's Air Contractors uses several of the latter on services for FedEx. The ATR 42 has six cargo zones, with a total volume of 1,870 cu ft and accommodating a payload of 12,566lbs, while the ATR 72 provides 3,002 cu ft and a payload of 19,000lbs.

The conversions are carried out by manufacturer-selected shops, including Denmark's Cimber Air Maintenance Center and Toulouse-based Latécoère. The quoted prices of EUR 275,000 (\$360,000) for the ATR 42 and Eur 325,000 (\$422,000) for the ATR 72 include the STC, engineering services such as job cards, drawings and wire lists, plus design and provisioning of the installation kit, working party follow-up and certification. Ground time for the work is three to four weeks.

A third conversion, developed for the Swedish postal service, accommodates 29 mail trolleys that are used in the operation's rail and road networks.

ATS is working on a fourth, quick-change configuration in early 2007, with orders anticipated from South American operators.

The maximum payload of the basic ATR 42 is 10,141lbs, rising to 10,891lbs for aircraft that have incorporated SB ATR42-08-0003. In QC configuration, maximum zero fuel limited gross payload is 11,993lbs, but the cabin nets allow a maximum bulk payload of 10,582lbs and the aft cargo hold is limited to 1,693lbs, giving a maximum net bulk payload of 11,894lbs. This is reduced by 847lbs in the early aircraft with the shorter aft compartment. The maximum net containerised payload is 8,413lbs.

The ATR 72's maximum payload is 15,432lbs basic, with an optional increase to 16,094lbs. The longer model offers maximum payloads in containers of 17,527lbs gross, 17,377lbs net bulk and 12,152lbs in QC configuration.

The OEM also offers cargo conversions. Alenia, which manufactures the ATR fuselage, holds the supplemental type certificates (STCs), and the conversions are carried out by its fellow Finmeccanica subsidiary, Officine Aeronavali. In 2003 FedEx chose the ATR 42/72 to replace its Fokker F.27 freighters, highlighting their payload, Stage 3 noise certification and cabin width as factors in the choice. FedEx's aircraft have been converted to cargo configuration by M7 Aerospace. There are several other certified conversions, including various designs from ATS International and a C class combi version by Canada's First Air. Indraéro Siren offers a ball mat loading system designed for rapid installation.

## Aeronavali

ATR launched its cargo conversion programme in 2000, offering either a large cargo door, or a tube conversion

that uses the existing doors. The tube conversion involves: the removal of galleys, toilets, partitions, attendant seat and overhead bins; the installation of protective linings to the sidewalls and ceiling; reinforcement of the floor to 82lbs per square foot; window plugs; and modification of the cabin to meet E class cargo compartment requirements. Two additional floor rails are installed in the aft door area, and the cargo door is modified for opening from the inside.

The lining can be either a light or a structural tube. The light tube is supported by longitudinal elements attached to the frames with clips and is suitable for use with containers or with spider nets attached to the floor tracks. Screws and velcro fastenings are used for rapid installation and replacement of the lining panels. In this configuration the ATR 42 has a gross useable volume of 1,660 cu ft and a net payload of 12,683lbs. Comparable figures for the ATR 72 are 22,600 cu ft and 18,968lbs.

The structural tube is designed for rough loading operations. It uses thicker panels reinforced by a substructure supported by longitudinal tracks attached to the frames to protect the fuselage and systems, and to provide resistance to in-flight loads. It includes attachment points for 9G vertical nets and six additional longitudinal tracks for flexibility of net attachment positions. The nets can be secured in three minutes by one person and can withstand loads of 3,527lbs, reducing to 2,866lbs in the forward compartment. The resulting gross useable fuselage volume is 1,978 cu ft for the ATR 42 and 2,666 cu ft for the ATR 72. Respective maximum payloads are 12,374lbs and 18,569lbs.

The large cargo door is 116 inches

*FedEx selected M7 Aerospace in California won a contract from FedEx to convert 33 ATR 42s and 72s.*

## First Air

Ottawa-based First Air claims to be the world's foremost Arctic air carrier. Its fleet of eight ATR 42-300s have been converted to combi configuration, and given STCs by Air Canada. The conversion is approved for cold weather operations down to minus 54 Centigrade and remote runways.

The First Air combi conversion can provide one, two, three, four, five or six bulk cargo zones combined with seats at 33-inch pitch for 42, 34, 30, 22, 18 or 10 passengers respectively. In the ATR 42 passenger version the single cargo zone occupies the standard forward cargo compartment. Associated cargo volumes are 325, 471, 617, 763, 909 or 1,055 cu ft, while in full cargo configuration it offers 1,275 cu ft.

The existing forward cargo door is used, and new floor panels are installed to give 82 lbs per square foot. The cargo zones are separated by 9G barrier nets.

The removable sidewall and ceiling liner provides 1.5G lateral load protection and acts as a fire and smoke barrier. The cargo compartment complies with Federal Aviation Administration (FAA) class C requirements.

The reconfiguration procedure involves removing the cabin side wall and ceiling panels and overhead bins, and installing the cargo side wall panel system, partition, posts and aisle nets. The cargo positions match those of the overhead bins: each section is 49.5 inches long with a limit of 1,400lbs, but 99-inch long double bays, able to carry 2,800lbs, are an option. In each case the maximum loading is 6.6lbs per cubic foot.

## Indraéro Siren

France's Indraéro Siren has sold 20 of the quick-change cargo loading kits it has designed for the ATR 42 and 72. They are in service with operators in Europe, Africa, South America and the Asia Pacific region, and are offered by Erie Aviation in the United States.

Weighing 353lbs and 463lbs respectively for the two types, the Indraéro Siren kit enables the ATR 42 to carry nine dedicated containers and the ATR 72 to take 13. The containers measure 83.5 by 43 inches and are 50 inches high, with a maximum gross weight of 1,102lbs. The respective



maximum payloads for the two models are 8,413lbs and 12,152lbs, and both can carry 1,693lbs in the rear cargo hold.

The conversion requires E class smoke detection and fire suppression, along with strengthening of the floor to 82lbs per square foot and modification of the forward cargo door so that it can be opened from inside.

The conversion process involves removing the forward cargo masts and nets, the forward partition and the passenger seats. Other passenger amenities, including the galley, can be left in place. A passenger ATR 42 can be converted and fully loaded with nine containers in as little as 45 minutes.

## M7 Aerospace

M7 Aerospace was formed at San Antonio International Airport in December 2002 with the acquisition of three Fairchild Aircraft support units, including aircraft manufacturing facilities. It subsequently added the assets of Dornier Aircraft North America and started operations supporting Dornier Do 328s and Fairchild Metros and Merlins under its own name in April 2003.

In July 2004 M7 acquired Springfield, Missouri-based Worldwide Aircraft Services, which had a contract to convert 33 ATR 42 and 72 aircraft for FedEx. It completed the ATR 42 STC and by June 2005 had converted 20 ATR 42s to freighter configuration. Three months later M7 was awarded an additional STC for the ATR 72.

The M7 conversion removes all passenger amenities, adds hardpoints for netting and reinforcement of the cabin floor, and modifies the smoke detection, lighting and air systems. Conolite cargo

liners are installed, the passenger windows are removed and plugged with aluminium, the structure surrounding the forward and rear doors is protected with stainless steel, and the rear door is converted from airstair to top-hinge opening to improve accessibility for personnel and loading equipment.

The reinforced floor structure is supplemented by increased load-capacity floorboards from Teklam, enabling the floor to be certified to a limit load of 100 lbs per square foot. Options include a floor roller/conveyor system and a new tail stand, which protects the aircraft from the risk of improper loading and is stowed behind the co-pilot's seat. Additional services include structure and systems repair, maintenance up to C check level and avionics installations.

The M7 ATR 42 has seven or eight cargo zones separated by 9G vertical netting. The narrow forward zone can carry 400lbs, and each of the next five zones has a volume of 294.5 cu ft and a load capacity of 2,600lbs. Zone 7 in the tapered section of the aft fuselage has a volume of 273.3 cu ft, while later aircraft with the extended aft cargo compartment have an eighth zone of 138 cu ft that can take a further 800lbs. The converted ATR 72 has two additional zones.

By January 2007 M7 had converted a total of 45 ATR 42s and 72s, most for FedEx but also some for other customers. For more flexibility in the size of the zone the maintenance and repair operations (MRO) modified the design to include the option of a continuous cargo net rail. Farnair of Switzerland was the first customer. **AC**

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