Police Aviation News

©Police Aviation Research

SHOW SPECIAL

July 2018



FARNBOROUGH 2018

In Europe even years are marked by the Farnborough air show. Once the must attend aviation event of the year for everyone it looks as if, this year at least, that the event is being challenged wholesale.

The year might be taken in isolation but even if it is there are no clear reasons why both visitors and media representatives were in short supply.

The halls were relatively quiet throughout – although the fine and warm weather might well have induced a migration out into the sun – and falls in customer visit numbers of 20% have been reported. The corporate spend on securing a place at Farnborough has always been high and will not have reduced since the last event in 2016 so a downward trend in booth visits is bad news for the future. An on-site rumour stating that "this is the last ever show" can be discounted but it was often repeated.

A great deal of investment has been pumped into the site and its exhibition facilities. New permanent halls and other buildings are progressively replacing the temporary. One of the major new structures is the plush new Media Centre. A permanent structure that replaced one erected and dismantled for each of the earlier shows. Normally this is bursting at the seams with an international mix of press hacks. Not this year. I visited on two days [Monday and Wednesday] and both of them were sparsely attended by the press pack – from others I learned it was general all week. Print issues of aerospace publications are on the wane and with that decline is reflected in a lower number of attending journalists. It is unfortunate that the new facility heralds a fall in a need for its undoubted attractions.

There are clear coordination issues between the show and the usual business aviation traffic run on-site by TAG but both appear to coexist well. If anything the constant flow of business jets arriving and leaving add to the event but perhaps to the confusion of the casual reader of the printed Air Display programme.

To put all of this in context I stumbled across one of the earliest editions of PAN while looking for something else. In that 5th edition [dated 1996] I wrote....



Farnborough 96 was preceded by dire warnings about a show that was not to meet the level of hype that was being put forward by many newspapers and magazines. The lack of an all important Eurocopter presence, with a show of their own scheduled for Oxford later in this month, clearly underlined the message of these harbingers of disaster. Even Cessna from the US, in the year it is reviving the production of the 172, declined to visit, declaring that the show was "too military".

The biggest police aviation news to come out of Farnborough was the announcement of the order of a new helicopter for PAS and Wiltshire That was the birth of the MD902 Explorer. The biggest deal in UK air support history.

What did I know!

Well push the clock forward to 2018 and Cessna are back, but not with the diminutive 172 of course, and both McAlpine and Eurocopter are now ancient history.

FRONT COVER: It was a surprise to once again see one of the Boeing 727 operated out of Doncaster Robin Hood Airport by 2ExCel Aviation taking something of a starring role at Farnborough. Over the trade days the ancient type probably flew the most hours of anything newer. I expressed surprise at seeing it perform at the show last time—but at least it was new to the role—its reappearance is most odd.

The rotor head is of a twin-engine Turkish Aerospace T625 parked out in the static area. It is believed to be a mock-up of the 12 seat type that has been under development for around eight years.

PAN—Police Aviation News is published monthly by POLICE AVIATION RESEARCH, 7 Windmill Close, Honey Lane, Waltham Abbey, Essex EN9 3BQ UK. Contacts: **Main:** +44 1992 714162 **Cell:** +44 7778 296650 **Skype:** BrynElliott or +44 20 8144 1914 E-mail: editor@policeaviationnews.com and admin@pavcon.org and policeaviation@hotmail.com

Police Aviation Research Airborne Public Safety Association Member since 1994—Corporate Member since 2014

SPONSORS

Airborne Technologies

Avalex

Babcock International

Broadcast Microwave

CarteNav

Enterprise Control Systems

FLIR Systems L3 Wescam

Powervamp

Trakka Searchlights

Airborne Public Safety Association

www.airbornetechnologies.at

www.avalex.com

www.babcockinternational.com

www.bms-inc.com

www.cartenav.com

www.enterprisecontrol.co.uk

www.flir.com

www.wescam.com

www.powervamp.com

www.trakkacorp.com

www.publicsafetyaviation.org#



Farnborough remains the launch pad of military programmes and airliners and less about the small stuff and helicopters. Leonardo keeps the faith though, they were there pushing rotary wing types and putting the others in the shade. The organisers claimed the presence of 150 aircraft at the event but in the background is a pricing policy that probably stopped many an organisation, large and small, from bringing their aircraft to swell the numbers. I must say it did not seem anything like 150 airframes were present at anytime.



There were small one aircraft deals announced for helicopters, a hand over ceremony or two but overall the airborne emergency service were completely overshadowed by the ongoing battle between Boeing and Airbus. Even the side-line manufacturers of airliners – Bombardier and Embraer have their primary types being swallowed by the big fish. The C Series is now an Airbus even though it is still manufactured in Canada. That will not last long and a US factory site beck-

Everything is about survival of the fittest and with Embraer projecting that there will be twice as many airliners in the sky in twenty years time. It looks like it is going to be increasingly busy overhead even if they are slightly wrong.

Day one of the Farnborough International Airshow saw \$46.4bn in deals announced, massively surpassing the figure achieved on the first day of the 2016

Airshow which stood at \$23bn. Orders were placed for 311 civil aircraft across the show. More fodder for the commercial aircraft backlog which stood at some 14,327 on the opening day. That number was to grow in the coming days. Over the week over 1,000 aircraft orders were announced, 500 here (Boeing) and 500 there (Airbus) but a fair sprinkling of others in ones and twos. And yet at a show that is supposed to be military in nature there was no sign of an F-35.... even a plastic one.

The UK Prime Minister, Theresa May, attended and officially opened the show and said all the things politicians do about aerospace and the future as well as launching a new space race at a time when the country does not know whether it is coming or going.

Speaking at the Opening Ceremony, Mrs May stated: "This is an incredibly exciting time for aerospace. Not only is there huge growth potential, but many of the developments taking place have the potential to transform the way we fly."

Many disagreed with her sentiments but just 37 weeks before Brexit they were muted in their comments – which is more than politicians were doing at the time.

The Prime Minster was joined by astronaut Tim Peake who was at the Airshow's Space Zone following the announcement of a vertical launch spaceport in Sutherland, Scotland. Other than airliners, bids for the right to be a Spaceport seemed to be the news line of the event. If all the bids are to be believed there are apparent plans for Dan Dare – pilot of the future to launch into space from Scotland, Leicester and Cornwall. Confusing, from nothing to three in one leap?





RELENTLESS. JUST LIKE YOU

FLIR Systems continues to redefine what's possible with the new Star SAFIRE™ 380HDc. Unmatched multi-spectral HD imaging in a light, compact, low profile system designed for your Law Enforcement mission.

Star SAFIRE 380-HDc

To learn more visit www.flir.com/police-aviation or @@flir





PAN understands that at least two representatives of the UK police organisation NPAS [National Police Air Service] were at the show on the Wednesday and Thursday. Nominally NPAS are looking for new equipment in the not too distant future so whatever they might have seen at Farnborough might have been important. It is as good a place as any to start looking at potential purchases [even if you have a track record that suggests you may have already made your mind up about what you want to buy].

AIRBUS

As the company name suggests it was all about airliners but even so the full range was not present. The main theme was promoting the former Bombardier C Series and the rebranded Airbus A220. You may as well have forgotten about helicopters there was little promotion of anything rotary and what there was found itself pushed into the shadows. The rotary products were there in name only. News, such as it was related to stories released before Farnborough. It is great to know that the Ministry of Defence in Hungary are buying twenty new H145M helicopters rather than buying into the current police Hungary MD902 acquisition but there is no analysis available in house.

There was though the H125. There was a photo opportunity delivery of one of the latest of this thirty-year-old design being handed over to the Empire Test Pilots School but no in-your-face promotion of more modern types for military or civil use. Somewhere there were words announcing that the first preserial H160 has been fitted with its rear fuselage but not even a mock-up openly on-view in the static park.



Meanwhile the other multi-type companies were out there promoting their helicopters for all their worth. While they were able to announce sales into law enforcement and air ambulance Airbus chose not to go there, there was activity on the US emergency services front that could have been slipped into the news releases to highlight that Airbus is the leading helicopter sales source in the world today! If nothing else there was the option of bring a defence training EC135. Underlining this anti-helicopter stance was a marked lack of on-site media representation.

Not much there then for influencing the potential purchasing intentions of any local police that might have been passing.



Perhaps Airbus were hoping that their newly unveiled secure networked airborne military communications solution, *Network for the Sky* (NFTS), would resonate with the police. NFTS combines different communication technologies to form one resilient global mesh network, allowing aircraft to be fully part of a high-speed connected battle space.

Network for the Sky aims to offer the same seamless experience that people have with their mobile phone when it switches from one network to another or from 4G to Wi-Fi without realising it. Just the sort of thing that the ESS was promising but has so far failed to deliver.

NFTS will integrate various technologies, such as satellite links with geostationary, medium and low Earth orbit constellations, tactical air-to-ground, ground-to-air and air-to-air links, voice links, 5G mobile communication cells and laser connections, into a single global secure network. Clearly the UK emergency services will not be able to afford it, but they can dream and continue to feed their pigeons I guess.

BELL

Bell were a little muted this year, but the Textron booth they occupied with Cessna and others was the same overall size as the last couple of times. The airframes on display reflected the current market in that the Model 505 was promoted as a military trainer and a civil operator Czech 429 was on view. King's Casino in Rozvadov bought a Bell 407GX, the first helicopter of this type to be sold into the Czech Republic, in 2014 but has now traded that in for the far more capable 429.



Unlike last Farnborough when they were pushing tilt rotor technology and the 525, presentation of the rest of the Bell line up was muted.

Oddly, the press releases emanating from Bell start by identifying the company as Bell Helicopter. Not what the company was hoping when they relaunched their name a while back (but perfectly understandable).

The global fleet of 429s has now exceeded 330,000 hours of operation. With 325 aircraft in operation in various roles. Recent sales include the addition of two to the Swedish Police Authority, taking their fleet to nine Bell 429s used for law enforcement across the country. The Indonesian Police has chosen to add an additional Bell 429 to their fleet, increasing their operation to three Bell 429s. An undisclosed Asia- Pacific government agency has selected two additional Bell 429s for their operation, and three others are ordered for customers in Germany, Bangladesh and Poland.

So passing members of a police purchasing research mission may well have taken note that two buyers of the Bell 429 were placing repeat orders.



LEONARDO

As a reflection of how the other manufacturers choose to display their wares Leonardo could be excused if they too showed more military airframes—or at least gave them more prominence. They chose not too and as a result each product had a similar level of exposure. Military trainers, the Falco UAS, a maritime patrol aircraft, the 609 tilt rotor they were all there as hardware.

The centre piece for marketing helicopters to the emergency services were the EH101, the AW189 and the AW169. Each of potential interest to the sector.

The EH101 is a big beast, but in the specific case of the Norwegian nation they are police owned and air force operated. Leonardo spent a lot of time promoting the sixth example for the highly important rescue helicopter for Norway to anyone who would listen. They hope to replace the elderly Norwegian Westland Sea King's – also police owned airframes – currently in service over the next couple of years.



There was interest from the Canadian Air Force, they were crawling all over the airframe taking on board what features they would like – and can afford – when their fleet is upgraded by Leonardo in the near future.

There are numerous features on the Norwegian airframe that were simply not available when the first of the Canadian craft were manufactured as the C-149 Cormorant eighteen years ago. The original Canadian fleet was fifteen but they additionally have bought up the seven hulks of the US Presidential VH-71 version of the EH-101 as a spares source so may be able to enlarge the final fleet if costs allow.





Centre of attraction.

The Norwegian fleet include feature that give 360 degree radar coverage using fuselage side modules rather than a close to ground under fuselage scanner in a radome.

When operating a close proximity to cliffs and other obstructions there is a system that senses how close the rotor tips are to the obstruction and provides the pilot with a visual and aural warning. In operation the system is very similar to the parking sensors of modern cars. The sensors are the black discs either side of the nose radome and high up on the tail.

Looking a little untidy thanks to the steps installed to save the visitors falling this shot [right] shows the two Goodrich hoists to good effect. ©PAR







Flash back a few Farnborough's - a few years ago — and Leonardo [then Agusta Westland] had the temerity to market its products in the dark blue and yellow conspicuity colours favoured by the UK police when promoting its new products [right image from an AW advert in PAN that year].

A number of people took a sharp intake of breath at the action.

Oh the AW169 was too big for a police helicopter in the UK, there would be no market. The EC135 and MD902 were plenty big enough for the air ambulance market and Agusta was too expensive and such a poor support organisation. So they said in 2010. The hook was baited the challenge on.

And now of course here we are in 2018 and what was then the poorest air ambulance of the many charities – Magpas – is ordering itself the AW169.

Magpas Air Ambulance has selected the AW169 as its new generation helicopter. Specialist Aviation Services (SAS) will customise the aircraft with an advanced medical interior and will operate the helicopter on behalf of Magpas, providing pilots and maintenance services in a deal similar to its current MD902 operation.

Magpas now styles itself as a leading HEMS provider and the oldest emergency medical charity of its kind in the UK, operating 24/7 throughout the year. It is fundraising to put its AW169 into service in the spring of 2019.



The current Magpas Air Ambulance MD 902 Explorer entered service 17 years ago and has been with Magpas Air Ambulance since June 2012. Whilst the current model has flown to thousands of patients over the last six years and has helped the charity respond to its highest number of activations ever, in 2017; it is now coming to the end of its operational life.

SAS has placed orders for 12 AW169s and is also an Authorized Service Centre for the AW169 in the UK, providing a range of support and maintenance services to AW169 customers. SAS has also recently been appointed as an Authorised Service Centre for the AW139 to support the growing number of customers in the UK that are operating the type. Expanding the level of customer service worldwide is part of Leonardo's commitment indicated in the Industrial Plan launched earlier this year.

The first four AW169 air ambulances to enter service in the UK in their first year of service have performed nearly 3,000 lifesaving missions and have flown more than 2,200 hours.

So, far from having no interest in a type that is 'too big' I guess that passing members of a police purchas-

ing research mission may well have taken note that increasingly the AW169 is the type of choice when it comes to air ambulances.

On display in the Leonardo static is one of the latest AW169s set for delivery to an air ambulance shortly. Again the charity was once blighted by poor fundraising and dissention among other charities relating to its fundraising methods.

All that is gone and the once penniless Children's Air Ambulance will soon take delivery of two AW169 helicopters with a primary aim of looking after young people.

The unique role means that the SAS designed medical fit is significantly different to that of the other AW169s. More gas is carried and this is starkly obvious from the number of oxygen bottles placed in the front of the cabin.

Transferring young people is seen to require access to more oxygen and in its aviation version it is not a commodity you can simply collect en-route if it runs short.

The system is plumbed into the airframe—the days of loose bottles tucked into a handy corner of the cabin are now far behind us.





SIKORSKY

Now a Lockheed Martin company, the company marked 35 years of partnership with the UK Maritime & Coast-guard Agency (MCA) by recognising recent lifesaving efforts of the MCA in a ceremony at the Airshow.

The relationship between Sikorsky and the MCA dates back to 1983 when the MCA, through Her Majesty's Coastguard, began operating the Sikorsky S-61 helicopter. The HM Coastguard fleet currently includes 12 Sikorsky S-92® aircraft operating from Newquay, Caernarfon, Sumburgh, Stornoway, Humberside and Inverness. Since April 2015, the MCA has utilized its S-92 fleet to conduct 4,500 search and rescue missions.

CIRRUS PERCEPTION®

THE BEST-SELLING PISTON AIRPLANE HAS A NEW MISSION



The ceremony included honouring recent lifesaving efforts by the HM Coastquard helicopter crew at Inverness. The Sikorsky Winged-S Rescue Award is bestowed upon those who perform a lifesaving rescue with a Sikorsky aircraft.

In June 2018, two boys were winched to safety by a four-person HM Coastguard crew operating an S-92 helicopter. The boys, ages 11 and 14, were swimming in the ocean when the tide began to rise and they found themselves unable to swim back to shore.

The boys were able to climb atop an offshore rock formation as the rising tide threatened to submerge the rocks. A concerned citizen spotted the boys and notified HM Coastguard. The Inverness-based crew responded within three minutes and winched the boys safely to the nearby beach. The Rescue Award is the 50th presented to the MCA by Sikorsky.



Introducing the Latest Addition to L-3's MX™-Series

The L-3 WESCAM MX™-8 is a highperforming HD EO/IR surveillance system with a low 10-inch clearance level and an install weight of only 15 lb./6.5 kg. Engineered to capture critical ISR intelligence from light, manned rotorcraft and small tactical UAVs, the MX-8 is configured with a fully stabilized 4-axis gimbal design, 4-sensor payload suite and advanced processing capabilities. Compatible with L-3's Kinetic™ situational awareness and target detection capabilities, our MX™-GEO suite of target location technologies and third-party mission equipment, the fully digital MX-8 is compact, powerful and lives up to its legendary "MX" name.

To learn more, visit WESCAM.com.

WESCAM













It may be relatively old but the daily flight demonstrations by the LM-100J, the civil offering of the C-130J, were spirited and in many ways outshone those of the US Air Force F-16 Fighting Falcon. There were times when it was clear that the co-pilots tea was definitely getting spilled as the air freighter zoomed vertically skyward pretending to be a point-defence fighter.

Lockheed Martin's LM-100J (Model 382J) is a derivative of a C-130J-30 Super Hercules, which is currently the airlifter of choice with 16 nations throughout the world. Through select design changes, the LM-100J will perform as a civil multi-purpose air freighter capable of rapid and efficient transport of cargo. The first production standard LM-100J is on the line, meanwhile the prototype has been performing at various disasters across the world. At successive days at Farnborough proved this beast can loop the loop. Check out You Tube for numerous videos on the recent displays.

Hmmnn... it has a high wing, multi-engines and is a great viewing platform. I understand it has long held the ability to fly into known icing and appears pretty nimble. Unfortunately it has turbine engines and is unlikely to fit into your average hangar.











CHOOSE THE CORRECT GROUND POWER SOLUTION WITH THE

Powervamp Ground Power Selector Guide

ENTER your aircraft manufacturer and model



> VIEW the most suitable turbine start unit and power supply for your needs from Powervamp's extensive, internationally renowned range

IT'S QUICK . IT'S CLEAR . IT'S INFORMED

Decision-making made easy. Go to: www.powervamp.com/product-selector



+44 (0)1934 643000 info@powervamp.com









GVH AEROSPACE/NOVA SYSTEMS

The Bournemouth, UK based company brought an Airbus Helicopter to the show! GVH Aerospace offers conversions of transport and general aviation aircraft and helicopters for special mission roles. This includes VIP reconnaissance, remote sensing, special communications, maritime patrol, search and rescue, medevac and para-military.

The company has been awarded the EASA STC for the installation of the *AeroStretcher* Mk IV Modular Aeromedical System on the Airbus H135 helicopter. They were at the Singapore Air Show displaying the kit earlier this year. The system is a the latest product evolution borne of the demanding Australian aeromedical operating environment and an evolution of the AeroStretcher® Mk III system which was well accepted by the oil and gas helicopter transportation industry in Australia. It pioneered the single transfer concept for aeromedical transfer, allowing critical care patients to be transferred between helicopters, fixed wing aircraft and road ambulances without the need for stretcher transfers or disconnecting medical equipment. This improves patient outcome by speeding up the transfer, and minimises the potential for causing injury to the patients and the medical staff during stretcher transfers. The advantage of being able to use the same aeromedical system in several different helicopter and aircraft types significantly improved supportability.

The *AeroStretcher* Mk IV system is installed directly on the aircraft seat tracks using a patent-pending multi-fit floor interface system. The system is installed and removed in minutes without the need for tools and can be quickly adapted to any aircraft with standard seat track fittings. The modular design of the system provides multi-role and utility operators with mix-and-match flexibility in configuring their aircraft to provide different levels of medical care capability, from simple casualty evacuation to inflight critical care. The product family include litter stretcher, standard stretcher, stretcher bridge and oxygen bottle stowage racks.

The AeroStretcher® Mk IV product has been selected by RUAG as the standard medical and casualty evacuation equipment for the Dornier 228 aircraft. Further STCs on other popular helicopter and fixed wing aircraft types are currently in work. GVH Aerospace were demonstrating the system on the H135 aircraft, G-NSYS, owned by sister company Nova Systems UK outside Hall 4. Nova who are based at Thruxton Airfield occupied a similar spot at the 2016 Farnborough event.

GVH were selected to design, manufacture and supply a hoist light for Boeing Defence Australia's Helicopter Aircrew Training System (HATS). The selection concludes the competitive tender process and the hoist light product will be used for night hoisting training to provide the aircrewman with adequate illumination to carry out hoisting operations safely.

The hoist light, when installed, illuminates the area directly under the aircraft. The LED light not only complies with the Australian Civil Aviation Safety Regulations requirements for hoisting operation, but also provides a greater level of redundancy due to its multi-element design.

The Boeing HATS programme provides the Australian Defence Force with helicopter aircrew training using 15 Airbus Helicopters EC135T2+ helicopters, and on maturity, will train up to 130 students each year from the Australian Army and Royal Australian Navy, in addition to qualified aircrew returning for instructor training.



Close by could be found Cobham. They were in Hall 4 under cover from the often searing rays of the sun and they had an attraction of whom I was not in the least bit jealous.

The Cobham Cool were a 'three man' mime act that appeared on the Cobham stand in all their glory. Between times they were to be found nearby entertaining and intriguing the passing crowds. Like many of those they sought to entertain they wore suits and ties. This year was no time for suits and ties, let alone heavy blue make-up!

The blue people [not just three and definitely including at least one woman] were clearly a hit.



GOOD SPOT FOR A BIT OF BUSINESS

Potentially the most high-profile position at Farnborough is that on the roundabout between the rows of chalets and Hall 1. It may not always attract visitors but there will be few who ignore whatever is located in the commanding position over the roundabout. Even though the main facility for car manufacturer Jeep was located some distance away from the spot it had an outpost there to get as much publicity as possible.

H3 Mission Systems took the high ground with their ISR role equipped Cessna 208B Grand Caravan EX to sell a high interest ITAR free intelligence, surveillance and reconnaissance mission system.

The parent company of H3, Grob Aircraft is promoting its broadening range of capabilities, including its proven G120TP trainer and – in a debut appearance – that special-mission development of the Cessna Caravan.

Grob has spent the last year working on the Icarus adaptation to the high-winged utility type, which adds an intelligence, surveillance and reconnaissance pod beneath its fuselage – replacing its usual cargo space with options that include a Leonardo Seaspray 3300 surveillance radar and a Hensoldt Argos-II, 406mm (16in) EO/IR sensor and associated operator stations.







The 208 based system has sold into Africa and the next move is to widen the carrier aircraft options to include the Beechcraft King Air. The overall plan is to meet the aspirations of a market where the customer cannot afford a high value ISR platform. The systems on offer can be incorporated into new or pre-owned airframes.

Also exhibited was a Grob G120TP trainer with a podhoused surveillance payload, which could be used to support training or operational requirements. Integrated on the starboard wing using a glove mount that is similar in intent if not engineering to that offered by the Airborne Technologies SCAR pod in Austria.

The Grob version has kept the total weight down to around 60kg (132lb), incorporating the Trakka Systems TC-300 305mm EO/IR turret, Leonardo PicoSAR lightweight synthetic aperture radar and a line-of-sight downlink.



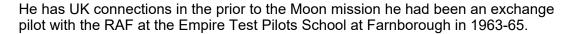
Airborne Technologies may not have been very evident at Farnborough but their SCAR pod was to be found in the Textron display.

Aviation Specialties Unlimited [ASU] obtained an EASA STC on the Leonardo/Agusta Westland AW139 type to install night vision imaging system lighting. ASU obtained the STC for Airgreen in Italy and it will therefore be initially used primarily in the HEMS and fire fighting roles.





On the USA Pavilion Kallman Worldwide set up the presentation of a framed US flag to the Royal Air Force to mark the current celebration of the 100th year of the RAF. The flag was one taken to the moon on Apollo 15 way back in the summer of 1971. **Apollo 15** was the ninth manned mission in the series, the fourth to land on the Moon, and the eighth successful manned mission. The men that landed on the Moon were David Scott and the late James Irwin but the presentation was made by the Command Pilot Alfred Worden, now 86 years old. He remained in Moon orbit as the others spent days on the surface.

















PUBLIC SAFETYDRONE EXPO 2018

Police • Fire • Search & Rescue

Public Safety Drone Expo 2018 will offer a combination of interactive public safety specific UAS courses, classes and general sessions focusing on law enforcement, fire and SAR applications.

Attendees will learn from top experts and public safety operators offering their insights into best practices, fundamentals and integration. The Expo Hall will be teaming with industry service providers, manufacturers, advocates and thought leaders who bring together cutting-edge technology and applications.



RENO, NV October 1-4, 2018

Public Safety Drone Expo is produced by the Airborne Public Safety Association, Inc. For more information or to register today, visit www.publicsafetyavation.org.

ASIA PACIFIC AIRLINE TRAINING SYMPOSIUM



28-29 August 2018

Marina Bay Sands, Singapore