TO STOCK OR NOT TO STOCK...

By Peter Lewis,
CEO and Founder of Alpine Air Support GmbH

WE LAST PROVIDED insight to the world of aviation parts and the various sources available to prospective business jet operators and FBOs in BART issue 91. It was made clear in that article that the various supplier options each catered for their own aircraft type or component sub-group, such as avionics, undercarriage etc. And so having covered the sourcing of parts, we are now going to concentrate on which spares are actually the right ones to keep on-site and which are just "nice to have".

In years past, when corporate flight department coffers were rather deeper than they are in 2005, many aircraft owners held a fairly impressive inventory of their own spares guaranteeing immediate availability and access.

THE BASICS
According to the author, Peter Lewis (pictured above), operators shouldn't hesitate to set aside a budget specifically for basic parts provisioning. (photos: Anja-Mae Lewis & Alpine Air Support)

Your writer can remember creating several "fly-away packages" for Gulfstream and Learjet operators back in the 1980s and early 1990s when full flexibility and reliability were paramount. These days however, with very few exceptions, corporate aviation owners shy away from spending their limited resources on spare parts and tend to rely on JIT (Just In Time) ordering or using their chosen maintenance company or FBO for parts support.

Suggesting you may need to ground your $40M jet for the sake of an inexpensive part is an excellent way to convince your Technical Director that a budget needs to be set aside for basic provisioning, even if you're never going to have the correct unit available all of the time. There are trends in the business jet world that remain as true now as they ever have, and I am going to outline a few of these in this article - although this must invariably be seen as impartial, independent advice based on personal and industry experience accumulated over the past 20 years.

Historical view. The age of the aircraft, the number operated in the fleet, manufacturer's warranty and geographical location play the most important roles in choosing the quantity and type of spares that one would ideally need to have to support daily flight operations. If we examine each of these factors alone, one can begin to comprehend the value of relying on practical experience and reality rather than just using the OEM's recommended spares listings.

The date of manufacture and type of aircraft are obviously the most important criteria regarding parts. Pre-1980 business jets such as Jetstars, Sabreliners and older Hawkers now have an extremely focused niche market in which a few specialized parts distributors operate, buying up the last line runs of components to keep aircraft flying. When OEMs no longer fully provide total dedicated customer support, then operators invariably also start to hoard their own spares or become dependent on a small number of parts companies. As we mentioned

in our last "Insider's Guide to Spare Parts" (BART 91), older Falcon jets are still easily kept flying, and there are also key repair stations still committed to overhauling Falcon components such as FR Aviation in Bournemouth, England. Gulfstreams are also easy to keep flying, with an abundance of spares freely available as GII and GIII models change hands; some aircraft have been torn down for spares reclamation as the cost of hush-kitting their R-R Spey engines may have been deemed to be too high to keep them as economical flyers. These parts donors have made provisioning much easier up to the GIV model, which still attracts normal marketplace level pricing and value based on current list price. The Learjet range of midsize jets in the 20 series is now all but history, whilst the 30 series has a ready following. The 40, 50 & 60 series of jets are also rather niche with a few specialized dealers providing parts coverage.

Which parts will you need? That's like asking a small child what he wants Santa Claus to bring him for Christmas. Nonetheless, your answer should be financially realistic and practical for the type of aviation operation you plan to run in the long term.

The parts that are always used should be the first area to examine: wheels, brakes and tires. I can't see why any operator would not own at least one main and one nose gear wheel fitted with a tire in case of a problem. Brakes are a little trickier. With an overhauled Learjet brake costing around $4,000 and a Gulfstream IV costing closer to $40,000, this one comes down to budget considerations. Plus with modern carbon brakes, wear and tear is often easier to calculate in advance. If an operator does not have an avionics dealer or repair station near its home base, it also makes sense to own at least one VHF comm. transceiver, VOR/ILS transceiver and Rad/Alt receiver as these are "no go items". It should be stated at this stage that there is a difference in aircraft using Rockwell Collins or Honeywell avionics. Most Collins ProLine equipment can be modified to different dash numbers, whilst Honeywell models tend to be specific per type, although the SPEX program is well stocked worldwide. On the whole, expensive avionics are best exchanged as and when required. Newer display units equipped with CRTs are parts to stay well clear of when considering which parts to hold in stock, as OEMs will inevitably want to charge for "bad tubes" and one can normally exchange such parts for less than an actual repair. North American, Caribbean and Asian flight departments operating in seasonally affected storm areas often like to keep weather radar equipment backed up with indicators and receiver/transmitters to cover their seasonal storm periods.

Without having access to component failure lists, it is hard to substantiate, but the avionics and instrument rule regarding spares seems to hint that the parts that are frequently touched during the course of the flight are invariably the ones that break. Autopilot control panels, altitude alerters, attitude indicators (everyone seems to have an urge to pull the cage knob) are cases in point. With altimeters requiring 24-month inspections, having at least one spare unit readily available is advisable.

Power generation equipment such as starter generators and ignition units are commonly stocked items for business jet operators. Starter generators and related voltage regulators are often part of a provisioning package as they are clearly "no go" pieces and normally require at least a week or two to get overhauled when sent to a repair facility. These days, complete APUs are no longer kept as regular fly-away kit type stock as pricing often exceeds several hundred thousands of dollars in tied-up capital. However, APU accessories such as start valves, starter motors and ignition exciters should form part of the basic provisioning kit. Air pressurization parts, such as shut-off valves and cabin pressure controllers have a frequent failure rate and are commonly held spares that one will always need to keep ready.

When it comes down to actual engine spares, few operators seem to hold many parts other than basic expendables such as oil filters and seals for routine inspections and basic checks. Engine accessories are by their nature expensive to buy and non-predictable in their turnover. At Alpine, we see items such as anti-ice valves, solenoid valves and fuel flow regulators being used sporadically, with most operators leaving engine work and parts supply down to the larger independent maintenance facilities or to the OEM.

Undercarriage parts are one of the areas that can be skipped; the spares are either just too expensive or not available. While military air forces operating civilian certified business

INDICATORS *A Horizontal Situation Indicator (HSI) manufactured by Astronautics Corp. (Alpine Air Support)*

jets may want to perform their own depot level maintenance, regular flight departments will leave the gear to the specialized repair shops, OEMs or aircraft manufacturers. Aircraft lighting in comparison is one area that can be easily procured and held in stock. Upper, lower and stabilizer beacons are moderately priced and, when stocked with appropriate replacement lamps, will soon prove their worth.

FULL STOP
A Goodyear helicopter brake assembly. (Alpine Air Support)

Interior equipment is almost worthy of its own article. Many corporate jets interiors suffer from being "one-off prototypes" that were delivered "green" (in an unfinished interior condition) from the OEM to a completion center and fitted out with the then "state-of-the-art" entertainment system, galley and electronic gadgets. No sooner delivered and the source of spares replacement becomes lost in a maze of minor non-aviation companies that either can't supply last year's model or have no idea what airworthiness certification means. Even ten-year-old satcom equipment is now worthy of the Smithsonian as far as customer support is concerned, so buying ample spares for one's fleet is a must at the time of outfitting. This problem becomes even more complex when aircraft start to change owners or even worse, are subject to a refurbishment, and the vendor maze becomes even more confused. Everything that isn't OEM or prime vendor supplied equipment (items known as BFE – Buyer Furnished Equipment) will cause problems when re-procurement is required. Don't forget the galley area including coffee makers, ovens and other specific BFE units. Provisioning for interior lighting products is a must – suppliers such as BE Aerospace (previously Aerospace Lighting Corp) offer a wide range of replacement lamps in varying lengths and appropriate power supplies and inverters which should be procured in advance and held in stock rather that relying on AOG supply.

Safety equipment is one area that seems to catch everyone out. APU and engine fire extinguishers with their limited shelf-lives may seem like definite spare parts to avoid during provisioning, but in reality, these units and their relative low value are well worth keeping on hand as shipping and overhaul costs when facing an AOG situation will often exceed their purchase value. Ensure that fire extinguisher cartridges are also available as these tend to all cost a small fortune in shipping costs when they are required at the last minute.

While safety items make one think of extinguishers and oxygen equipment, life vests and life rafts are often overlooked. Most life saving equipment have strict shelf life and life limitations imposed by manufacturers, and suitable replacements may not always be readily available at short notice. Rotating equipment between the operational aircraft and the repair station will ensure ready availability. There are too few safety shops catering for business jet operator requirements in Europe and the Middle East, so there is a clear reliance on US-based companies for service.

MELs. Minimum Equipment Listings (MEL) issued by aircraft manufacturers are also useful guides suggesting which parts may require provisioning to avoid grounding a jet. The three MEL categories listed by OEMs (A = 24-hour replacement mandatory, B = 72-hour and C = 10 days) highlight the flight safety priority for each area of the airplane's system. Some can be minor, but others such as components affecting cabin pressurization will affect flight operations, forcing aircraft to be operated at lower altitudes for example.

Case in point, the GIV (G300 & G400) MEL section 24-3 regarding Electrical Power Converters, (two are installed) states that this part is listed as category B and that the aircraft may be flown with only one unit operating if the:

a) Transformer Rectifier Unit (TRU) is operative,
b) APU Alternator is used for takeoff, en-route and landing, and
c) Airplane is operated at or below FL 300 or up to FL 350 and below with Electrical Load Warning System (ELWS) installed or ASC420 installed.

Based on routine operations, the operator will soon learn which MEL components will cause major changes to flight profiles or may, in fact, ground their executive jet altogether. Close proximity to an FBO or maintenance center will ease the MEL supply allowance (see logistics further on).

Embraer's Legacy for example, as well as the forthcoming wave of smaller independent business jets, the need for self-sufficiency and cost effectiveness will take on a new dimension as hitherto little-known sub-vendors enter the spares marketplace.

A word of advice to corporate aviation owners and managers: speak to your maintenance people, the engineers and mechanics working on the airplanes in the hangar. They are most knowledgeable about the parts and systems that have caused problems or which may potentially create problems for your business jet investment in the future. In the long term, their insight regarding provisioning will pay back much more than any printed "Minimum Spares Equipment Listing" recommended by your OEM.

Operator's opinions. Speaking to Martin Paul from JetClub AG in Zürich, Switzerland operating four GIVs, two GVs and a G550, the company's general rule is to rely on FBO support from local Swiss FBOs such as Jet Aviation and SR Technics, or go back to Gulfstream rather than build up their own spares pool. With their fleet of various types of aircraft, which also includes a Citation and Airbus A320, it is almost impossible to stock all the parts they frequently need due to a lack of type commonality. Another Swiss operator – REGA, flying three CL-604 Challengers - takes an alternate view as their mission is medical evacuation, and they need a large in-house inventory to keep their aircraft airworthy, says Roland Hunold, Purchasing Manager. With their CL-604s just starting to come out of their warranty period, REGA now has several years of experience in planning parts requirements.

VALUABLE *Your maintenance team's insight will pay you back in full. Here, an Arriel engine starter generator made by Thales Avionics - Electrical Division for the Eurocopter AS365 Dauphin series. (Alpine Air Support)*

Shipping and Logistics. Shipping considerations and real-time logistics fall a little out of the scope of this article on provisioning, however, it must be noted that there is a big difference on how many parts need to be stocked or pre-purchased depending on ones location. For business jet owners flying in and around North America or Europe, the ready availability of courier companies and prolific point-to-point airline connections that facilitate same-day (or at the very worst, next day) AOG parts delivery has created a certain level of indifference towards stocking ones own spares when one can be assured that FedEx will appear at dawn the next day brandishing the replacement valve. For operators further afield, one has to reckon on days until that "critical part" wends its way through airline hubs and exotic customs formalities before it becomes available for installation. Alpine's own customers in Africa, for example, keep a healthy stock of "flyaway components" because they know that it will take at least 7-10 days to physically receive a part due to freight delays and inevitable bureaucratic hassles.

With OEM product support becoming more of an issue than it has been for the past decade, the real benefit of stock provisioning may have become moot. However, with newer aircraft types having entered the arena, such as the Dornier 328JET (Envoy 3) and

Peter Lewis is a BART contributor and CEO and Founder of Alpine Air Support GmbH, an independent aircraft and helicopter parts trading company based near Zurich International Airport in Switzerland. He can be reached via email at mail@alpine.aero.