Aircraft Aging is a Growing Maintenance Concern

Not too long ago we complacently believed in the immortality of commercial aircraft. Why, look at the benchmark DC-3, still flying regularly in whatever conditions the world can dish out to it after more than 50 years.

All you have to do to keep an airliner going is change the engines when they wear out and give it an occasional avionics and interor refurbishing, along with a new paint job, to keep it looking new and flying great for years and years.

Many of us who watched the introduction of the jet airline fleet may not necessarily equate the designations DC-8, Boeing 707, 727 or the "newer" 737 with the term "older aircraft" any more than we equate ourselves with the "older" population. To us, a Model A Ford is an old car — a '55 Buick Riviera is more like a classic. As they say; it's all relative.

Well, relative doesn't count any more. It's time to recognize that those "classic" DC-8s, 707s, 727s and even the 737s need more than new engines and a paint job to keep them going.

The first audible creak of age was when noise restrictions took on the clout of forcing airliners to be seen and hardly heard. Despite extensions and various time-buying ploys, operators of noisy airplanes had to replace them with newer models or refit them with hush kits. The latter was merely a case of postponing the inevitable, though, because the newer generation of air carrier aircraft was not only "noise compatible;" it was more fuel efficient and had built-in all the wonderful new aerodynamic and mechanical technology — things that don't adapt themselves to bolt-on retrofit so well.

The next creak was a crack heard around the air transportation world; when the roof ripped off the Aloha 737 and the word "corrosion" reared its ugly head into the limelight. And the 737 was referred to as part of the "aging air fleet." There was the usual clamor to do something now, even though Boeing had been waggling its cautionary finger at Aloha for some time. The FAA quickly ran out new inspection requirements and upped industry awareness of the special needs of older aircraft care.

We have yet to believe that the solution is to junk whole fleets of older-category aircraft, but we now recognize that it could become an alternative if the current awareness campaign fails to spread to all operators of older aircraft, and those who maintain them.

This applies especially to the many air cargo operators who inherited the oldest castoffs from the noise and technology battles.

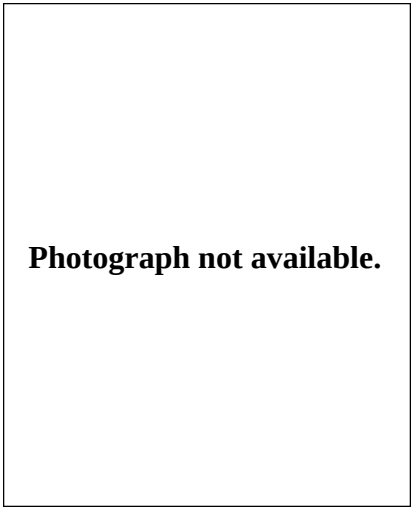
Maintenance, caring and very thorough maintenance, may be the key to extending the safe — yes, and profitable — life of older aircraft, but the regulators can't do much more than encourage it. Who can do something about it is the partnership of the operator and his maintenance people. The secret lies in the dedication of both partners.

If you maintain an older airplane, consider treating it like a favorite old aunt and make sure to keep her cane in top shape so she doesn't fall. We who love our dowager aircraft will salute you.

NEW PRODUCTS

Innovation Claimed for Through-Hole Rachets

A new, patented "thru hole" concept by the Ravencrest Tool Co. is said to allow the professional tool user to solve clearance problems by means of a unique socket head design. The manual O-Ratchet and air-powered Air-O-Ratchet have a hole through the head of the ratchet wrench that allows a fastener bolt up to 7/16-inch diameter to go through the ratchet, replacing deep-well and spark plug sockets for many applications.



The new ratchets are available with a comprehensive line of attachable adapters and sockets in both SAE and metric sizes.

More information may be obtained from the Ravencrest Tool Co., 1362 Exchange Drive, P.O. Box 850296, Richardson, TX 75085-0296, U.S., (1-800-456-3067).

Small Parts Attachment for Bead Blaster Cleaners

The Turbo Blaster was developed during the past eight years by an automotive accessory rebuilder as a means of cleaning small parts such as washers, nuts and bolts, springs and other items.

According to the manufacturer, the user loads a handful of small parts into the Turbo Blaster, inserts the nozzle of a bead blaster into the opening, and in 20 to 90 seconds the entire contents will be cleaned on all surfaces.

The unit is said to work for any small parts, including plastic, and in all blasting cabinets. More information is available from Energy Pie, 1409 South 5th, Kelso, WA 98626, U.S., (1-800-888-4743).

Tay Borescope Guide Available from Rolls

A comprehensive, 20-page graphic- and photograph-illustrated inspection guide has been published to help operators carry out inspections on the Rolls-Royce Tay turbofan engine that powers the new Gulfstream IV business jet.

The inspection guide was compiled to illustrate all borescope locations in the Tay engine, the diagrammatic route of the borescope after it enters the engine, and a view of the parts as they are seen through the borescope.

The guide will be supplied to all operators af the Gulfstream IV, and is available from Rolls-Royce (Canada) Ltd., 9500 Cote de Liesse Road, Lachine, Quebec, Canada, H8T 1A2, ATTN: Douglas Cribbes.

Screwdriver Bits Added to T-handle Torque Wrench

The Lowell Corp. has added a new series of screwdriving bits that fit into a single adapter for the company's existing T-Torker (r) line of T-handle, ratcheting torque wrenches.

Designed to fit into the palm of a hand, the die-cast T-Torker (r) clicks when the factory preset torque limit is reached. It has a 1/4-inch male drive and the new series of allen head and screwdriving bits fit into a single adapter.

The wrench has a flanged, reversing collar that disengages the ratcheting mechanism and locks for conventional backing off and loosening. Factory preset torque settings range from five to 80 pound-inch in five pound-inch increments. The unit uses standard allen head, phillips, torque, square recess, hex recess, slotted, clutch and nut driver bits with a service bit holder and retaining ring.

Details are available from Lowell Corp., 97 Temple Street, P.O. Box 158, Worcester, MA 01613, U.S., (508-756-5103).

Photograph not available.

GSE Catalog Available

An illustrated, 50-page ground support equipment catalog is published by Tronair with applications for a wide variety of aircraft.

The publication lists service and repair

equipment for commercially-produced, military fixed wing and rotary wing aircraft, airliners and general aviation fixed wing and rotary wing aircraft. It includes a wide variety of items from chocks to elevating work platforms and from tow bars to tail stands. A partial index of the publication includes: pressure washers, defuelers, deicers, ground power units, hydraulic units, jacks, lavatory servicers, maintenance stands, tire servicing equipment and engine slings and stands.

Tronair Aircraft Ground Support Equipment, South 1740 Eber Road, Holland, OH 43528, U.S., (1-800-426-6301).

Knuckle-Saving Tools Available as a Kit

Based upon the company's existing right-angle drilling attachment, the Tight Fit Drill Kit (tm) from Omni Manufacturing Co, Inc. is designed to ease repairs or installations in areas that have as little as two inches of clearance. The system allows drilling around corners or over obstructions, and working in deep, narrow or otherwise inaccessible locations.

Included in the kit are a right-angle drill attachment, familiar to many aerospace users, that is compatible with all 1/4-inch or larger drill motors,

Photograph not available.

plus a threaded six-inch extension, a chuck, a six-piece combination set of frequently used sizes of aircraft-quality, threaded Omni drill bits, a 5/16-inch wrench and a storage pouch. The chuck allows the threaded drills to be used conventionally for normal drilling, and the six-inch extension adds the utility of a set of extension drills.

Additional accessories include other drill types and sizes, screwdriver sockets and bits, collets, extensions and others. Also, standard off-the-shelf items such as sanding or buffing drums and wheels, wire brushes, rasps, files, countersinks and others can be used in places that otherwise would be inaccessible.

Omni Manufacturing Co., Inc., 12961 Sunnyside Place, Santa Fe Springs, CA 90670, U.S., (213-946-8444).

Bulletin Showcases Safety Goggles

A safety goggle is a safety goggle. Right? Wrong.

A protective eyewear bulletin from Mine Safety Appliances Co. (MSA) lists no fewer than 29 variants of safety goggles.

Standard softframe goggles are made of a specially compounded vinyl that is said to keep its color with age, its firmness when hot and its flexibility when cold. They have a one-piece lens that provides a wide, undistorted field of view and excellent downward vision for bifocal wearers, according to MSA. Flush sides are designed to fit facial contours. Lenses and frames both are available in three colors: clear, smoke and light green; and, three frame styles include: perforated, four-vent and non-vented.

MSA also makes chemical splash goggles and specialty versions that include a model with a wire-screen lens that protects against flying particles and UV-resistant ones.

For more details, contact MSA, P.O. Box 426, Pittsburgh, PA 15230, U.S., (1-800-MSA-2222).

Modular Power Units Offer Design Flexibility

Peugeot Engines and Components is producing a new series of modular power units that utilize gasoline and diesel engines.

Photograph not available.

The design permits the building up of the power units to order, from the base engine to complete, ready-to-run packages. The benefit to the customer, says the manufacturer, is complete flexibility in selecting and purchasing only the equipment required for a specific application.

Presently available are the Modulpac 16 power unit, delivering 56 hp at 3,600 rpm using a 1.6-liter gasoline engine, and the Modulpac 19D that is powered by a 1.9-liter diesel engine and delivers 50 hp, also at 3,600 rpm.

Among available options are electronic governing for speed control flexibility, and thermostatically controlled cooling fans that can be mounted on the power unit or remotely located. Another option is a solid-state electronic instrument panel equipped with push-button start/stop, hour meter, tachometer and warning lights for critical operations. The panel also is equipped with engine shutoff for low oil pressure, high water temperature and engine overspeed.

Complete specifications on the Modulpac power units are available from authorized Peugeot distributors or from Peugeot Engines and Components, 301 Route 17 North, Rutherford, NJ 07070, U.S., (201-438-5559).

Tools to Fly By

A catalog with the above title is available from Aircraft Tool Company, a mail order house which deals solely in tools and equipment for the aircraft industry.

The index of the 60-page publication has 241 listings from Air Compressor to Yokes "C" Type. In between are production and maintenance tools, manual and electrical/air powered, compressors and accessories, metalworking equipment, engine tools, aircraft test equipment, welding aids and various shop equipment.

Aircraft Tool Supply Co., P.O. Box 370, 1000 Old U.S.-23, Oscoda, MI 48750, U.S., (1-800-248-0638; in Michigan 1-517-739-1447).

Flyer on Turbine Cleaner

A new flyer is available that describes the benefits of cleaning light turbine engines with R-MC gas turbine compressor cleaner, a product of ECT, Inc., a subsidiary of Sermatech International, Inc.

The cleaning agent inhibits and reverses contaminant build-up on gas-path surfaces and is claimed to achieve efficient in-service cleaning without engine shutdown. It is said to be approved by original equipment manufacturers, including the PT-6 and Allison 250, and ECT says that small aircraft operators have found that cleaning with this product can lead to up to 50 percent greater time between overhauls.

According to ECT, Allison operators have reported a three percent performance improvement over deteriorated engine condition and an average ITT drop of 18 degrees after one wash. PT-6 operators have reported an increase in TBO from 5,000 to 7,500 hours.

R-MC requires no mixing prior to use and the average cleaning time is 30 minutes. The product is non-flammable, non-toxic and is biodegradable.

More information is available from ACT, Inc., 771 First Avenue, King of Prussia, PA 19406-1401, U.S., (215-265-0556).

Technical Manuals Available from AMFI

The Aviation Maintenance Foundation International is again offering reprints of technical manuals from the FAA. According to the AMFI, the manuals are used for reference by experienced A&Ps and homebuilders and as texts by A&P students.

AMFI reports its list is growing steadily, and that the current inventory includes the AC 65 series, FARs for Mechanics and the "Mechanic's Bible," AC 43.13-1A and 2A, which includes the new Change 3. The new FAA Question Books used for the General, Powerplant and Airframe examinations are also on the AMFI book list. Besides maintenance manuals, the organization offers pilot training manuals such as the Pilot's Handbook of Aeronautical Knowledge, Aviation Weather, Aviation Weather Services, Flight Training Handbook, Instrument Flying Handbook and others.

The foundation began supplying reprints of FAA manuals in 1973 as a service to A&P schools that experienced long delays obtaining them from the Government Printing Office. AMFI, a non-profit association for aviation maintenance professionals, reports that it uses the revenue from sales of the manuals to help support the programs and services it provides such as career information for high school students, employment information, industry surveys and seminars.

Aviation Maintenance Foundation, P.O. Box 2826, Redmond, WA 98073, U.S., (206-828-3917).

Let's Clean the Air

Tired of noxious fumes, odors, gases and potentially hazardous stale air? An activated carbon filter media that can eliminate these impediments to good breathing and comfortable seeing is available from the Lewcott Corp.

The product is Activfilter (tm), a high-capacity, activated-carbon-impregnated filter media that the manufacturer claims is ideal for HVAC air purification systems and is capable of reducing radon levels and removing CO2, ozone and other potential irritants.

The filter material is fabricated to user specifications and system requirements. It is available in open cell foams and nonwoven polyesters and can be provided as disposable filters, sheets and permanent and submicro-

Photograph not available.

bial variations. It is available in rolls or die cut to customer requirements.

For more information, contact the Lewcott Corp., 110 Elm Street, Millbury, MA 01527, U.S., (1-800-225-7725).

Ready for the Future?

From who else but the publishers of *Aviation Week and Space Technology* magazine comes a video titled "Future Flight: Tomorrow's Airliner."

Targeted at all aerospace professionals and those interested in technology and the shape of tomorrow's aircraft, the video is the ninth release in the Aviation Week Video series.

According to the producer, it features exclusive animation and footage, as well as interviews with top aircraft designers and experts from the aerospace industry, who describe aircraft that will carry passengers at speeds of between Mach 2 and Mach 5.

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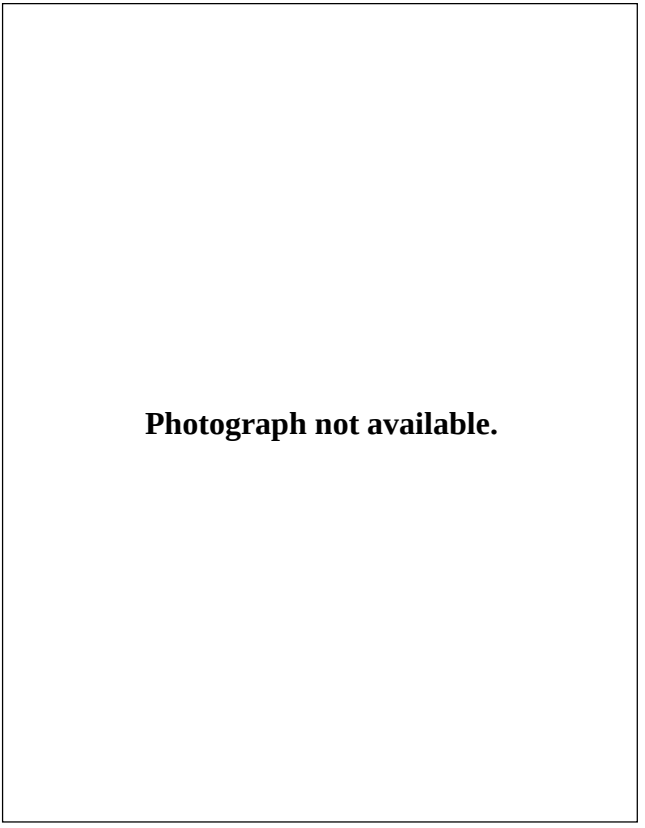
Programs that envision aircraft that can reach speeds of Mach 25 are explored in depth, and such efforts aimed at hypersonic flight, including the U.S. National Aero-Space Plane, are analyzed for their expected contribution to commercial transportation.

Reflecting back upon the Douglas DC-3 and Boeing 377, the video looks ahead into the 21st century for what aviation professionals will be flying — and maintaining — such as: radically different propulsion systems and fuels for high-altitude, high-Mach power; materials that will allow aircraft to have strengths and aerodynamic shapes previously unobtainable; new roles for propeller technologies; futuristic electronic flight controls for the cockpit; the advanced concepts simulator at NASA's Langley, Va., research center; and, efforts to develop an advanced supersonic airliner.

For more information, contact Jean C. Egan, Aviation Week Video, McGraw-Hill Aerospace & Defense Group, 1221 Avenue of the Americas, New York, NY 10020, U.S., (212-512-3213).

Torque Tester for Power, Hand Tools

Portable torque testers are available from Assembly Systems Group, Division of Jergens, Inc., to provide on-the-spot measurement of the torque output of both power drivers and handheld torque tools. Units are designed to be fast and easy to use, and to minimize scrap and rework in the manufac-



ture and assembly of electronic, aerospace and other delicate assembly products.

The H-100 tester gives a digital readout of torque from 0 to 86.0 ft-16/m or 0 to 100.0 ft-kg/in; readout is switchable. Material and shock force may also be tested. Nickel cadmium batteries allow 20 hours of continuous use without recharging.

Each tester comes with a carrying case, battery charger, driver adaptor and certificate of calibration traceable to the National Bureau of Standards.

More information on the H-100 and a complete catalog of controlled-torque drivers, testers and accessories are available from Assembly Systems Group, Division of Jergens Inc., 19520 Nottingham Rd., Cleveland, OH 44110, 216-486-2100.

MAINTENANCE ALERTS

Flight Forced Back with Fitting Failure

The Boeing 747 was departing London for Washington, D.C., when, shortly after takeoff, an unusual vibration was noticed that the crew initially thought was turbulence. When it became more pronounced, flap retraction was stopped, and the cabin crew reported to the captain that a section of leading-edge flap was projecting upwards on the left wing, just inboard of the Number Two engine.

After more than 140,000 pounds of fuel were jettisoned at 8,000 feet altitude, the aircraft returned to Heathrow Airport and landed safely after accomplishing a "one-leading edge flap inoperative" procedure. No handling problems were encountered by the crew.

Meanwhile, debris had been reported on the runway the 747 had used for takeoff, and it was found to be a piece of the Number 11 Kreuger flap that had detached from the airplane.

Upon examination, it was found that the gimbal fitting attached to the Number 11 Kreuger flap assembly had failed. The fitting is made up of two splined end fittings connected by top and bottom plates. The bottom plate was missing, which allowed the ballscrew nut to drop away from the failed fitting, freeing the Number 11 Kreuger flap to move upwards under the aerodynamic loads during takeoff. When it was forced against the Number Two engine pylon, a portion of the flap was broken off and later found on the runway.

The missing bottom plate could not be found, which led investigators to believe it had become detached prior to the most recent flight. A detailed metallurgical analysis revealed a small area of fatigue, and investigators felt the fracture that separated the bottom plate could have been caused by either the metal fatigue or by failure of the assembly's attachment bolts.

Past failures of these fittings have been attributed to looseness or fracture of attachment bolts. A Boeing service bulletin specified an increase in the torque on the eight attachment bolts in each gimball fitting.

The bolt material on the aircraft with the fitting failure was made of H11 steel, which is said to have a high failure rate, particularly in stress corrosion cases. The manufacturer has switched to Inconel bolts.

The gimbal fittings throughout the operator's fleet were checked after the incident, and a number of bolts were found with reduced torque and some were missing.

Subsequently, the operator, who maintains all UK-registered aircraft of that version, has replaced all H11 gimbal attachment bolts with Inconel ones, changed all fittings identified as having attachment bolts with too low a torque, and amended the maintenance schedule to check bolt torque regularly (the manufacturer's service bulletin called only for a one-time check).

Bad "Eye" Leads to Gear Collapse

The pilot of a Cessna 310 had just moved the gear selector lever to the

down position preparatory to landing. However, instead of the expected three green gear-down lights he noticed that the left main gear green light did not illuminate and that the red gear unsafe light stayed on.

The pilot did a fly-by, and tower personnel reported that the left gear appeared to be extended and in a similar position to that of the right main gear. The pilot tried a number of procedures to obtain a green light for the left gear, including manual extension, but the unsafe indication continued.

After emergency equipment was called out, the pilot executed a normal landing. Upon touchdown, he shut down both engines. As the airplane slowed down to between 30 and 40 knots, the left main gear collapsed. There were no injuries but the airplane sustained scrape damage to the left wingtip, a bent propeller and a broken rod end fitting in the landing gear mechanism.

Inspection later revealed then an "eye" end on one of the left gear actuating rods had a fatigue crack that had led to a fracture which opened the eye, disconnecting the rod from the actuator. The fatigue crack had begun in the bore of the eye-hole, in which there is a grease nipple. There were microscopic grooves that could have acted as local stress raisers, but a technician noted that there was no unusual stiffness in the gear mechanism when it was checked afterwards, and that the fatigue would have begun some time previously.

Flap Flummoxes Flight Crew

The Boeing 747 was arriving at London's Heathrow Airport after an uneventftul trip from Abu Dhabi. The ILS was intercepted at 3,000 feet with 20 degrees of flaps set, the gear went down at 2,400 feet and the aircraft set up in a stable approach with 30 degees of flaps at 800 feet above the ground. The captain had selected 145 knots airspeed, carrying a little extra in anticipation of possible low-level windshear.

As the aircraft descended through 600 feet, the captain felt a "thump" and the aircraft yawed and rolled to the right. He suspected a bird strike and engine failure, so he leveled the airplane and asked the flight engineer if they had lost an engine; the reply was negative. The pilot had a problem realigning the airplane with the ILS centerline, and almost full aileron deflection was needed to get the aircraft back on course. The landing was accomplished without further incident.

The flaps were left extended after landing and taxi-in. An inspection revealed extensive damage to the right inboard flap assembly that had resulted from the fracture of the Number Six flap track (the outboard of the two tracks that support the flap assembly).

The track fracture had originated in a bolt hole about six inches to the rear of the forward attachment, which had allowed the rear section of the track to pivot upwards about the rear spar to inflict major damage to the spoiler support beam and impacted the spoiler above it. There was substantial damage to both the wing and flap structure, along with the flap mechanism, that occurred either during the initial failure or during the final short period of flight.

The initial metallurgical finding was that stress corrosion caused the failure, originating from a corrosion pit in the Number One bolt hole. This was the fourth documented in-flight failure of a Boeing 747 flap track, all of which occurred during the approach phase of the flight. The flap track and the bolts are made of high-tensile steel alloys that have high notch sensitivity and low fracture toughness.

Boeing issued an Alert Service Bulletin after the first in-flight flap track failure in 1984 that called for certain inspections, including visual and ultrasonic; it was followed by numerous revisions.

Five days after the fourth failure, the U.K. CAA issued an emergency airworthiness directive that called for ultrasonic testing within the next 15 cycles and at 35-cycle intervals thereafter, corrosion inspection of bolt holes and a flap extension limit to 25 degrees with 30 degrees allowed only for emergency use. The failed flap track is undergoing continuing metallurgical examination by both U.K. and U.S. safety agencies.

Stiff Joints Bad for Legs

The Cessna 340A had completed an uneventful business flight and was approaching to land. However, when the pilot selected gear down, he failed to obtain a green light for the right main gear, but he did get a gear unsafe light and the associated audible warning. Several attempts to lower the gear, using both normal and manual systems, were attempted to no avail. A fly-by resulted in a report that all three gear appeared to be down, and a landing was carried out.

The touchdown went without incident and the rollout was normal until the airplane slowed down — when the right main gear collapsed. The airplane swerved to the right and hit a runway light before stopping; it suffered damage to the right engine and propeller, the underside of the wing, flaps, aileron and landing gear door. There were no injuries.

The cause of the accident was traced to insufficient lubrication of the gear operating mechanism. The resulting stiffness in several joints prevented the gear from lowering to the fully locked position. The last maintenance check was an annual inspection accomplished nine months previously.

Bad to Worse

Five hours before this flight, the crankcase of the Lycoming O-360-A1A engine on the SA750 Acroduster had been changed because of a crack. However, the pilot was not satisfied with the engine's performance and was flying the airplane to a maintenance facility to have it checked out.

While he was cruising at 1,000 feet agl, the pilot noticed a slight mist on the windshield but all engine indications were normal. However, within minutes oil was splattering on the windshield. The pilot's vision became totally obscured, and the oil pressure dropped quickly to zero. He carried out a forced landing into a rolling field surrounded by woods and had to ground loop the airplane to stop short of trees.

There were no injuries to the sole occupant, but the airplane sustained

damage to the landing gear, propeller, engine and two wing ribs.

The oil loss, it was found, had been caused by the failure of an aluminum alloy oil line fitting from the propeller constant speed unit where it attached to the crankcase. An exhaust pipe had also fractured. Further, the engine was found to be out of timing by 25 degrees in advance.

A Scary One

The pilot was recovering from a two-turn spin in the Cessa 152 at about 3,000 feet above ground when the lower hinge pin of his door broke and caused the door to partially open at the front lower edge. The door then unlatched and folded up toward the wing and a loud crack was heard, possibly caused by the upper hinge pin breaking. The door separated and bounced off the wing, and the pilot watched it descend in a side-to-side float towards a busy highway. However, it landed in a corn field.

The pilot landed safely and so did the door, which was recovered undamaged the next day. A check of previous incident reports revealed several hinge pin failures, and investigators noted that this seems a common enough fault for regular inspection.

Landing the Hard Way

Part of the main landing gear refused to function properly as the Boeing 727-200, with 98 passengers and crew, was approaching to land; the nose gear was the only one that would extend and lock.

The captain made a belly landing and passengers were evacuated from the aircraft by emergency chutes. One passenger was reported to have sustained an ankle injury, and the airplane suffered damage to the fuselage underside. There was no fire.

One Down, Two Left

Shortly after takeoff, a Lockheed L-1011 TriStar carrying 61 passengers and 16 crew members "blew" a turbine and lost all power in one of its three engines. The pilot returned and made a safe landing eight minutes after takeoff.

Engine Failures

Upon return to its home base from a round trip flight, the Robinson R22 helicopter suffered power failure during the landing phase. In the ensuing hard landing, the helicopter was substantially damaged and both occupants were seriously injured.

An engine on the McDonnell Douglas DC-10 failed as the airplane was departing from New York with 256 occupants aboard. Climbing through 200 feet, the captain noticed a vibration in the Number One engine and the instruments indicated that the temperatures were too high, so he shut the engine down. Since the aircraft was too heavy for an immediate emergency landing, the pilot had to dump 55,000 gallons of fuel over the city.

The jettisoned fuel did not vaporize completely because the aircraft had not attained enough altitude, and a person on the ground was treated for eye irritation. The DC-10 landed without

incident, and the passengers were deplaned normally.

A Cessna P206D was carrying live lobsters to market when it developed engine trouble and began to lose altitude rapidly. The pilot was able to find one area of green in the middle of a densely populated area and made a successful forced landing. No damage to the airplane was reported and there were no injuries to the pilot or his "passengers."

One of the three engines on a Lockheed L-1011 TriStar malfunctioned shortly after takeoff for a transatlantic flight. Many of the 306 passengers aboard reported that they heard a loud crack and the airplane began to shake. Flames were seen coming from the engine under the left wing, and passengers said that smoke seeped into the cabin.

The pilot made a safe emergency landing, and the passengers proceeded on another airplane. The airline reported that the engine malfunction had caused it to vibrate and dangerously high temperatures were produced, but there was no fire. The engine had been shut down, and the airplane returned on two engines without further incident.

Nose Gear Failures

A Hawker Siddeley HS748 was being prepared for a compass swing when the nose gear collapsed. The aircraft sustained damage to both propellers and engines. There was no fire and no injuries.

A few minutes after an instructor and a student took off on a training flight in a Beech Duchess they ran into problems with landing gear operation. The nose gear would not work properly so the instructor, who had managed to lower the two main gear, returned to land sans nose gear. The aircraft landed all right on the main gear but, during the roll-out, these, too, collapsed.

Disconnected Struts

The 1939 Aeronca Champ had been taken up on a test flight after a long period of rebuilding and maintenance. The flight was to consist of three go-arounds and one landing.

As the first go-around was begun and the airplane was at an altitude estimated at between 50 and 70 feet from the ground, observers saw the right wing quickly drop and hit the ground. The Aeronca cartwheeled to the right of the runway and came to rest in an inverted position.

The pilot escaped with a head injury possibly caused by contact with the instrument panel. The airplane had an exemption from installation of a shoulder restraint.

When the airplane was examined, it was seen that the rear lift struts on each wing were disconnected from their respective spar attachment fittings.

Closer scrutiny revealed no evidence that the attachment bolts were even installed at the time of the flight, and a search of the wreckage did not locate them. The holes for the bolts were found to have fresh paint in them.

The effect of a disconnected bolt in this location would be to destroy the

torsional rigidity of the wing and would twist its leading edge down in flight, especially if aileron was applied.

A caution was expressed by accident investigators that a possible reason for the omission of the spar fitting attachment bolts was that two welded taper washers at either end of the bolt holes can give the appearance of a shear tube, which is used instead of a bolt on similar type aircraft such as the Piper Cub and the Auster.

It was recommended that technicians and pilots make doubly sure when inspecting aircraft, especially after rebuilding or major repairs have been carried out, that a visible hole through a fitting actually is a shear pin rather than a location where a bolt belongs.

When is a Climb Not a Climb?

When the cabin altitude climbs but the airplane doesn't.

The HS125-700 business jet was cruising at FL350 when the cabin altitude suddenly began to climb at the rate of 2,000 fpm. The pilot could not bring the cabin level under control using either the automatic or manual modes. He declared an emergency and descended to 10,000 feet and returned to his home base.

Thorough leak checks on the cabin door, windows and emergency exits revealed no problems, a leak check on pressurization was satisfactory, and the cabin-to-atmosphere venturi checked out all right. However, the cabin rate of climb was found erratic when it was checked. The problem was found to be a malfunctioning outflow valve. When this valve, along with the cabin rate-of-climb indicator, was replaced, the problem ceased.

Took the Wrong Bypass?

During cruising flight, the oil filter bypass light for the Number Four engine of the Boeing 747 illuminated. The captain had the engine thrust reduced, and the light went out near idle rpm.

During the descent, nacelle anti-icing was turned on and power on the engine was advanced to 50 percent N1; the oil filter bypass light again came on. The engine again was retarded to idle rpm, and this time the light remained on. The engine was shut down.

After a normal landing, the magnetic plugs were checked and found to be normal, the oil filter was found to have no metal in it but was replaced as a precautionary measure, and the oil filter differential pressure switch was replaced when it was found to be intermittently faulty.

When Electrons Cease to Flow

The Socata TB20 had just reached 300 feet after takeoff when it suffered a complete electrical failure.

The pilot lowered the landing gear using the emergency system and returned to the airport. The aircraft was landed on its main wheels, but as the nose wheel was lowered to the runway the right main gear leg began to retract. The pilot lifted the right wing

and steered the airplane onto the grass at the side of the runway. By turning a tightening right turn while the speed dropped, he was able to hold the wing off the ground until the airplane was almost stopped and minimized airframe damage.

Later, examination revealed how one problem had led to another. First, the battery was completely dead and would not accept a charge. Second, the emergency landing gear valve had two seals that were degraded and prevented the valve from working properly.

Mystery Engine Stoppage

The Boeing 767 had entered moderate turbulence, so the pilot had disconnected the autothrottles and set the two engines at turbulence power. At this point, the left engine suffered a compressor stall.

The pilot notified air traffic control and began a drift down in altitude. Since he could not stop the compressor stall, he shut down the malfunctioning powerplant. Relight attempts at FL 290 and FL 270 failed and a single-engine landing was safely made.

No definite fault was found. Bleed outlets checked out all right and so did freedom of shaft rotation. Fuel system filters were replaced, fuel nozzles were cleaned, and the fuel tanks were drained for a water check. Engine start and power checks were satisfactory.

Sniffer too Sensitive

Slightly more than two hours into the flight, the avionics smoke warning of the A310 appeared intermittently. Later, it remained on steadily.

There was no evidence of smoke with the sniffer fan on; however, the pilot decided to land as a precautionary measure. When the airplane landed, the warning disappeared.

Subsequently, the avionics smoke detector and the avionics filter were replaced with no further warnings experienced in later flights.

Blade-Bending Bird

As the A300 was climbing out, Engine Number One struck a bird and began to vibrate heavily with no other unusual instrument indications.

Upon landing, the nose cowl was replaced, and seven sets of fan blades were replaced. A borescope inspection revealed four blades damaged and out of limits, and the fan inlet case was damaged.♦