FOUR-BLADED CONVERSION

U.S. Federal Aviation Administration (FAA) has given STC approval to McCauley for a four-bladed propeller to be used on the Beechcraft King Air C90. Cost of the propeller system, excluding the installation, is $27,000 for two propellers and two spinners with complete de-ice, and all required hardware to make the conversion. A $2,000 credit will be given for the old propellers.

The 90-inch-diameter propeller has a full feathering, hydraulically actuated, constant-speed, over-counterweighted reversing system, with electric single element for de-icing. Pitch and speed control are maintained by an engine driven, single acting hydraulic governor, augmented by engine oil pressure.

Counterweights, assisted by the feathering spring, move the propeller to the high pitch position, while the governor boosted, engine supplied oil pressure moves the propeller toward the low pitch position, decreasing blade angle. Additional movement of the power levers by the pilot removes the low pitch stop during ground operation, permitting the propeller to be controlled in the beta range and reversed. The propeller does not incorporate ground latches, which allows it to fully feather on ground shutdown; it can be used on aircraft without autofeather.

The new propeller is three inches less in diameter than current three-bladed versions and offers lower noise levels, less vibration, improved aircraft performance, reduced fuel burn and reduced propeller tip erosion for longer blade life.

AIRPORT INSPECTION VIDEOTAPE

U.S. Federal Aviation Administration (FAA) reports the availability of an airports video tape that may be useful to many aviation mechanics.

The videotape was developed by the FAA's Office of Airport Standards and the Office of Aviation Safety with input from several regional offices. The 45-minute–long tape is divided into nine subject areas - pavements, safety areas, markings and signs, lighting, navigational aids, obstructions, fuel farms, snow and ice conditions, and construction - that should be examined as part of the daily inspection of airport facilities.

Copies of the "Airport Self Inspection" videotape may be obtained from the Dub Centre, 51 New Plant Court, Owings Mills, MD 21117, U.S., Attn: Ms. V.G. Jordan. The cost is $49.72 per copy either VHS II or Beta formats. The price does not include shipping costs. Telephone inquiries to (301) 363-4810 or 1-800-382-0080.

BEAM SEAL FITTING

New dynamic beam seal fitting to handle 3,000 psi hydraulic system tubing has been developed, and was recently selected by Allison as the primary separable connector for the LHX helicopter engine. This dynamic beam seal fitting has qualified for use with titanium and corrosion-resistant stainless steel tubing.

As a connector for the distribution of hydraulic fluid within aircraft systems, the fitting incorporates an internal groove configuration that improves sealing characteristics and simplifies manufacturing processes, making the fitting cost effective for production and maintenance programs. A shallow–angle ramp on the fitting retention grooves permits a smooth flow of material during swaging operations. Sealing characteristics of the metal-to-metal beam surface are enhanced as pressure within the system is increased.

CLEANING COMPONENTS IN TIGHT CLEARANCES

New solvent syringe has been developed for technicians working in tight areas, including printed circuit boards, switch contacts, pin connectors and small housings in aircraft systems.

This accessory for a trigger-grip remote applicator has a spot touch-up cleaning system and is designed for the defluxing of solder residues from delicate assembles and hard-to-reach component areas. It will prevent the user from having to scrape, blow and/or wipe away residues with a screwdriver. It also prevents possible damage to the work area by using high-pressure compressed air.

The solvent syringe is a small, spray-through stainless steel needle, from which a fine stream of virgin solvent is dispensed. Its manufacturer says it allows touch-up operators to rinse fluxes and other contaminates with accuracy. The syringe is adapted to cleanse micro-miniature areas, similar to those in microwave assemblies and surface mount components with very tight clearances, that often trap solder paste and associated residues in the work areas.

The miniature syringe is available in three sizes - .012 inches od, .010 inches od and .035 inches od. All utilize a trigger-grip applicator that fits into the user's hand.

In a demonstration of its use, the entire area was instantly cleansed, removing solder paste dirt and residues sticking to the base of terminal pins, leaving the area clean and dry for installation. This was accomplished on the pin connector terminal post under an instrument panel on the aircraft, with the pin connector mount disconnected and left hanging in mid-air for the re-

pair work. It demonstrated the ease with which a repair can be made.

ASSESSING GASKET SEALABILITY

Manufacturer designs gaskets into a product to provide maintenance accessibility as well as lower manufacturing costs. The manufacturer could weld all seams, but the product would be impossible to repair. Gaskets decrease manufacturing costs by allowing for imperfect flanges. Perfectly machined flanges would require no gaskets but would be expensive to produce.

The performance of a gasket is judged by its ability to seal. Sealability lies at the core of a gasket's very existence. It's properties - compressibility, latent curing, creep relaxation and homogeneity - affect the gasket's ability to seal over long intervals and under various application conditions.

The application also determines how well a gasket seals. One gasket material may have perfectly acceptable sealing properties for low-pressure oil or water but fail to seal hydrocarbon gases at high pressure. In addition a gasket may perform well at room temperature but not at temperature extremes.

How important is the application's seal? Some seals may be used only to protect equipment from dust or weather, requiring minimal sealability. Others must prevent the leakage of lethal gas under high pressure.

All gaskets leak to some degree. The key question is how much leakage is acceptable for a particular application. That is usually an engineering or marketing decision. Marketing becomes a factor when a product with acceptable leakage from an engineering standpoint is perceived in the marketplace as having low quality.

While gross leaks are obvious, detecting small leaks can require sensitive and sophisticated equipment. During engine dynamometer tests for example, technicians can check coolants for the presence of minute levels of hydrocarbons that indicate leakage in the head gasket.

For moderate leaks however, relatively simple laboratory fixtures can measure volumetric leakage to compare gasket sealability. A sealability device has been developed and is available for measuring pressure-loss rates of nitrogen gas from gasketed joints. This is known as an EMALT.

Today, with the emphasis on non-asbestos-based materials, the key to successfully meeting sealability performance criteria is gasket material diversity. To accommodate the needs of many applications, the successful gasket manufacturer must produce a larger number of different materials in

smaller quantities. In some cases, gasket materials are being formulated for specific applications.

Future development of a single non-asbestos material to meet most gasket application requirements is unlikely, however. The EMALT device quickly screens new gasket formulations for sealability. In one observed test, the gasket ring was loaded to the desired flange pressure, and then subjected to 14 psi/nitrogen pressure. The time for a pressure drop of one psi provides the psi/min/leakage rate.

The EMALT can evaluate the gasket's ability to provide the seal desired and provide the user with information that can assist in future maintenance and repair efforts.

LIGHTWEIGHT WINDOWS

A first in the development of lightweight, polycarbonate composite aircraft windows has been certified for commercial use by the aviation industry. The windows are currently being used on the Embraer EMB-120 and on the Israeli Aircraft Industries' Astra aircraft. The windows have been certified by several regulatory agencies. They contain a heating grid that adds strength to the polycarbonate composite window, which is constructed of glass and plastic.

This particular design (by Sierracin/Sylmar) provides significant weight savings over conventional all-glass construction, high strength all-glass designs and the standard stretched acrylic composite window. In addition, it provides improved bird impact resistance and higher light transmission.

FROST COSTS

Incidents each winter are directly attributable to disregarding the effects of frost on the aerodynamic characteristics of airfoil surfaces and the subsequent flight performance of aircraft. There are also instances in which the dangers of frost are fully respected, but little or no consideration is given to removing it properly.

The presence of frost on wings, tail surfaces, etc., must be taken seriously. Safe operation depends upon its removal and an evaluation of what effect it will have on the aircraft performance. Too often, these are not completely understood until the aircraft has gone too far down the runway to abort safely. At this point, the facts are of little value without the necessary air speed, altitude and control to make a safe landing.

Moisture can become a problem in freezing temperatures, if it does not completely drain off the aircraft systems and balanced control surfaces.

Like any other maintenance and service practice, frost must be removed in accordance with the aircraft manufacturer's recommendations.

CANADIAN AVIATION SAFETY AWARD

Transport Canada has instituted an Aviation Safety Award program similar to that of the U.S. Federal Aviation Administration's Aviation Technician of the Year Award.

The FAA's program has been a success since its inception in 1966, and Transport Canada will now recognize its outstanding aviation technicians. The award is open primarily to nominees who have contributed to Canadian aviation safety over a long period of time. The award was established to stimulate safety awareness in Canada and to recognize exceptional contributions.

TIMELY TIPS

If you can't remember, look again. How often have you been in doubt? Did you or did you not install that cotter pin, that lock nut, that safety wire, that oil cap, etc.? The best advice is to look again.

Remember, the most important thing for any aviation mechanic is to be sure, even if it costs money and/or time.

When checking, servicing or replacing anything that is to be securely covered for the next 100 hours or 500 hours of flying time, doublecheck and write it down. Use a flashlight and a mirror to look in all directions. You will sleep more soundly if you look again.

Itemized work sheets with space for footnotes are invaluable. No maintenance should be performed without a work sheet. They come in various sizes, including small, easily stored types for minor work to full-sized, itemized sheets, for periodic maintenance and overhaul. The use of work sheets helps to ensure work completion, track work and parts costs, inspection, test and repair criteria.

Every mechanic should learn to doublecheck. It is a self-training process one learns through practice. It is not difficult. It is a matter of self control, self discipline and practice. It prevents accidents, mistakes, cost overruns and other problems. Doublechecking is a way of life that can produce good workmanship and good life habits - but, above all, peace of mind. That alone, makes doublechecking worthwhile.

KING AIR 90 FUEL CONTROL LEVER

This item concerns a snag that disrupted six flights, including three engine shutdowns, before a correct analysis was made.

The problem appeared as fluctuations of torque, fuel flow and fuel pressure and then as a hot start. Finally, during the fourth, fifth and sixth flights, the pilots were unable to reduce power on the affected engine. It was then shut down, and the aircraft was landed safety.

After the third inflight shutdown, the inspection, as before, showed that the engine control lever was in the open position. The lever would jam at that point rather than returning to the closed position by spring tension. The cam-box was removed for closer inspection.

During disassembly, a small piece of metal resembling a portion of a split pin was found under the lever. Also of note is the fact that the location of the main pivot shaft hole was drilled slightly off center, causing the lever to move with a cam-like action. This reduced clearance between the lever and cambox brackets, and the presence of the small piece of metal probably jammed or interfered with the operation of the lever in high power settings during flight.

In this case we sympathize with the maintenance personnel who did the troubleshooting. In each instance a reasonable action was taken, including at one stage, changing the fuel control unit.

The culprit was the hidden portion of the lever jamming in the high power setting position. Mechanics who work on this type of engine will recognize that this presented a nasty problem. Would you have found it on the first try? If an off-center bored camlike lever is found in service, it would be a good idea to change it.

PROPELLER GOVERNOR SCREEN SLUDGE

Owner of a Cessna 185E equipped with a Continental IO-520 engine reported an engine failure resulting from sludge plugging the propeller governor screen.

This cut off lubrication to the governor feed collar and may have contributed to metal scoring found on the crankshaft front main bearing. The scarred crankshaft required replacement and resulted in an unscheduled major overhaul of the engine at great expense.

The owner reported that the aircraft had operated for a number of years on straight mineral oil before he switched to a detergent multi-grade oil. The aircraft owner agreed with the Cessna representative's opinion that the sludge accumulation was due primarily to operation on straight mineral oil for a number of years.

It is accepted practice in aviation maintenance to pull and inspect all

screens and filters and monitor carefully for sludge released into the system after switching from straight mineral oil to detergent oil. In this case, the governor oil screen was overlooked.

Engine overhaulers have mixed opinions about the practice of distributing propeller governors between normal periods set for engine overhaul, unless there is reason to suspect sludge or other containment. One reason for not disturbing the governor is that a well-maintained engine using approved modern detergent oils would not have the governor screen contaminated by sludge.

The only purpose for this screen is to prevent minute contaminating particles from reaching the propeller governor where they could interfere with proper governor operation.

From this story, we would like to leave maintainers of aircraft equipped with propeller governors two safety messages:

Be aware that most propeller governors are protected from contamination by an oil screen. This screen is usually part of the governor installation and may not be covered by the engine or airframe inspection schedule. The inspection than becomes a matter of judgement on the part of the maintainer who, after taking into account the operational history of the particular aircraft, must decide whether or not to remove the propeller governor for further inspection of the screen.

The second message is that after prolonged use of straight mineral oil, a change to detergent oil requires a careful monitoring period of all screens and filters for excessive sludge released into the oil system as a result of detergent action.

ALERTS

Continental GTS10-520L Fuel Line (PN 641486)

There have been two recent reports of finding the fuel line to the left front cylinder broken at the brazed joint. It is believed that the chain lanyard attached to the oil filler cap wraps around the line and that the line is bent during attempts to reinstall the filler cap. The submitter advises that, when the line is bent back into place, strain hardening is induced. Normal vibration can result in line failure and fuel spray on the engine.

Learjet 24D Hydraulic Tube (PN 2307024)

The hydraulic tube ruptured during normal flight. There was a complete loss of hydraulic pressure caused by the ruptured tube. Identical reports were filed with part times 496, 554, and 932 hours

.Beechcraft 1900C Hydraulic Service Door

Hydraulic service door, located on the left wing, upper center section, came open during flight. When left engine power was reduced, the aircraft developed a severe pre-stall buffet at approximately 25 KIAS higher than normal pre-stall buffet. The turbulent air struck the stabilon, which made it appear as though a problem had developed in the tail area of the aircraft. The hydraulic service door aluminum latch strike plate was replaced by a steelplate.

Piper Seneca (PA-34-200) Doubler Assembly (PN68678-00)

The doubler assembly was found to be severely corroded. The doubler assembly is in the channel member beneath the baggage floor and is inaccessible during normal maintenance. The submitter advised that the area can be viewed with a borescope through the foot step outboard attachment boltholes. (Aircraft time - 4,111 hours).

Slick Magnetos 4200 and 6200 Series Loose Distributor Electrode

Center bushing in distributor block was recessed too far during the manufacturing process, causing the gear shaft not to bottom in the bushing when installed. This caused the nylon that retained the center electrode to ride on the block material and wore the nylon retaining the electrode finger, which caused a loose electrode.

A check was made on four serviceable blocks in stock and the depth of the distributor block bushing was found to vary .027 inches. On one distributor block, that was removed at 500 hours, evidence of excessive wear was noted. A measurement should be made prior to installation of the distributor gear in the block to ensure operating clearance. The submitter advises that, if the bushing in the distributor block is recessed in excess of .030 inches from the surface, the block and gear assembly should be rejected.