



# MCCAULEY

PROPELLER  
SYSTEM  
TECHNOLOGY  
GUIDE



MCCAULEY PROPELLER SYSTEMS

*At McCauley, we take flying very seriously. Since 1938, we've been building propellers that maximize aircraft efficiency and performance. With research and innovation focused on the critical relationship between engine and propeller, McCauley has consistently led the aviation industry in the development of significant new propellers and related products. As we look toward the future, we are still committed to the uncompromising standards of quality and performance – in our products and in our service to our customers – that have made McCauley the propeller of choice for millions of aircraft owners and operators worldwide.*

*Whether you are considering a replacement propeller or simply curious about propellers in general, this booklet contains the information you need to know about propeller operation, selection and care. However, if you would like additional information, call our Product Support Department at **1-800-621-7767 (PROP) or 316-831-4021** or you may visit our web site at **[www.mccauley.textron.com](http://www.mccauley.textron.com)**.*

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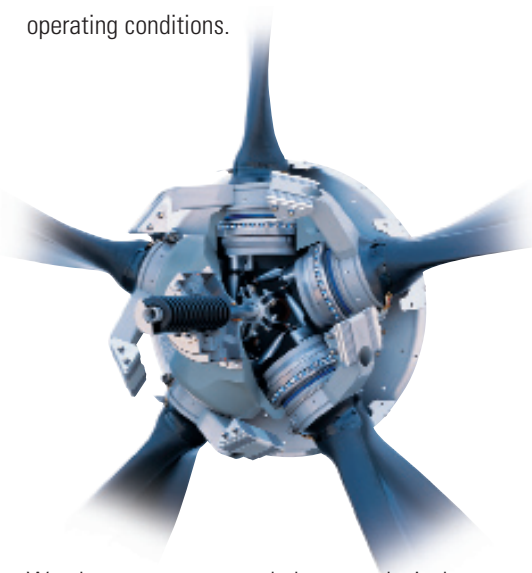


# PROPELLER OPERATION

## BASIC FACTS

The propeller blade is an airfoil which propels the airplane through the air by converting the rotating power of the engine into thrust.

Blades are twisted to optimize the performance of the propeller based on variable operating conditions.



Wooden props were used almost exclusively on personal and business aircraft prior to World War II. During the 1940s, solid steel propellers were made for military use. Modern propellers are fabricated from high-strength, heat-treated, aluminum alloy forgings. New composite materials are being used in applications where weight and mass are critical.

Propellers are typically designed with two to six blades. Generally, props with more than three blades are used primarily for twin-engine aircraft or single engine aircraft utilizing engine with horsepower rating above 900SHP. These blades tend to be shorter for increased ground clearance and more fuselage clearance. Multi-blade props also produce higher, less objectionable sound frequency; reduced

vibration; greater flywheel effect and improved aircraft performance.

McCauley propellers are identified by a model designation and a serial number. On one-piece, fixed-pitch props, the serial number is stamped on the camber side of the hub face. Variable pitch propellers have separate numbers for the hub (stamped on the side) and for each detachable blade (stamped on the butt end of the blade inside the hub).

## TYPES OF PROPELLERS

### MANUFACTURED BY McCAULEY

Propellers are classified according to pitch configuration. Blade pitch is the angle of the blades with relation to the plane of rotation and is a significant variable affecting the performance of the propeller.

**Fixed Pitch:** a one-piece prop with a single fixed blade angle. The pitch (blade angle) must be high enough to offer good cruising performance yet low enough to achieve acceptable takeoff and climb characteristics.

**Controllable Pitch:** a prop which allows the adjustment of blades to any desired angle during flight.

**Constant Speed:** a prop used with a governor, that automatically provides constant RPM by counteracting the forces acting on the propeller to change the blade angle within a preset range.

**Full-Feathering:** a prop which allows blades to be rotated to a high positive angle to stop rotation (windmilling) after an engine is shut

down, thereby reducing drag and asymmetric control forces on twin-engine applications.

**Reversing:** a prop with blades that can be rotated to a position less than the normal positive low blade angle setting until a negative blade angle is obtained, producing a rearward thrust to slow down, stop or move the aircraft backward. Typically provided for turbine installations.

**Beta Control:** a prop which allows the manual repositioning of the propeller blade angle beyond the normal low pitch stop. Used most often in taxiing, where thrust is manually controlled by adjusting blade angle with the power lever. These types of McCauley propellers are installed exclusively on turbine engines.

## **COMMON TERMS**

**Blade:** one arm of a propeller from hub to tip.

**Hub:** center section of the propeller which carries the blades and is attached to the engine shaft.

**Spinner:** a metal cover enclosing the propeller hub, which improves the appearance of the propeller and may also streamline airflow for engine cooling purposes.

**Blade tip:** the part of the blade furthest from the hub.

**Blade shank:** the section of the blade nearest the hub.

**Blade butt:** the portion of a blade inside the hub used to retain the blade.

**Blade camber surface:** the cambered or most-cambered side of a blade (visible from front of the aircraft).

**Blade face or thrust surface:** the flat side of a blade (normally visible from the cockpit of the aircraft).

**Blade leading edge:** the forward full “cutting” edge of the blade that leads in the direction of rotation.

**Blade trailing edge:** the continuous edge of the blade that trails the leading edge in the direction of rotation.

**Governor:** a device, generally mounted on and driven by the engine, which senses and controls engine speed (RPM) by hydraulically adjusting the blade angle of the propeller.

**Prop diameter:** the diameter of the circle circumscribed by the blade tips.

**Blade station:** one of the designated distances along the blade as measured from the center of the hub.

**Blade thickness:** the maximum thickness between the cambered surface and the face or thrust surface at a given blade station.

**Blade width:** the measurement between the leading edge and the trailing edge at a given station.

**Chord line:** a theoretical straight line (perpendicular to blade length) drawn between the leading and trailing edges of the blade.

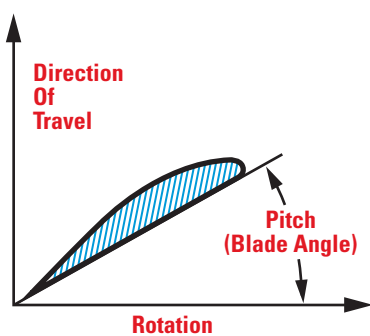
**Blade angle:** the angle between the chord line of a propeller blade section and a plane perpendicular to the axis of propeller rotation.

**Blade angle settings:** low and high angle settings of a controllable-pitch prop – for feather, reverse, latch and start locks – which are determined by built-in mechanical hard stops.

## VARIABLE PITCH PROPELLERS

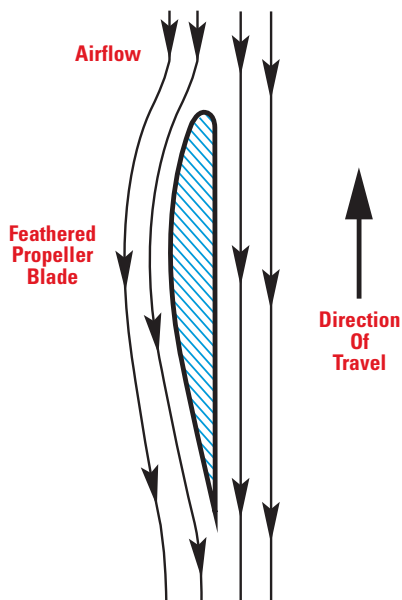
### FULL-FEATHERING VS. CONSTANT SPEED

A constant-speed (RPM) system permits the pilot to select the propeller and engine speed for any situation and automatically maintain that RPM under varying conditions of aircraft attitude and engine power. This permits operation of propeller and engine at the most efficient RPM and power. RPM is controlled by varying the pitch of the propeller blades – that is, the angle of the blades with relation to the plane of rotation. When the pilot increases power in flight, the blade angle is increased, the torque required to spin the propeller is increased and, for any given RPM setting, aircraft speed and torque on the engine will increase. For economy cruising, the pilot can throttle back to the desired manifold pressure for cruise conditions and decrease the pitch of the propeller, while maintaining the pilot-selected RPM.



A full-feathering propeller system is normally used only on twin-engine aircraft. If one of the engines fails in flight, the propeller on the idle engine can rotate or “windmill,” causing increased drag. To prevent this, the propeller can be “feathered” (turned to a very high pitch), with the blades almost parallel to the airstream. This eliminates asymmetric drag

forces caused by windmilling when an engine is shut down. A propeller that can be pitched to this position is called a full-feathering propeller.



### CHANGING PITCH

Pitch is changed hydraulically in a single-acting system, using engine oil controlled by the propeller governor to change the pitch of the propeller blades. In constant-speed systems, the pitch is increased with oil pressure. In full-feathering systems, the pitch is decreased with oil pressure. To prevent accidentally moving the propellers to the feathered position during powered flight, which would overload and damage an engine that is still running, the controls have detents at the low RPM (high pitch) end.

In a single-acting propeller system, oil pressure supplied by the governor, acting on the piston produces a force that is opposed by the natural centrifugal twisting moment of the blades in constant speed models or counterweights and large springs in full-feathering systems. To increase or decrease the pitch, high pressure oil is directed to the propeller, which moves the

piston back. The motion of the piston is transmitted to the blades through actuating pins and links, moving the blades toward either high pitch for constant-speed systems or low pitch for full-feathering systems. (Figs. 1A & 1B)

When the selected RPM is reached and opposing forces are equal, oil flow to the propeller is reduced and the piston also stops. The piston will remain in this position, maintaining the pitch of the blades until oil flow to or from the

propeller is again established by the governor. (Figs. 2A & 2B)

From this position, pitch is decreased for constant-speed systems or increased for full-feathering systems by allowing oil to flow out of the propeller and return to the engine sump. (Figs. 3A & 3B) When the governor initiates this procedure, hydraulic pressure is decreased and the piston moves forward, changing the

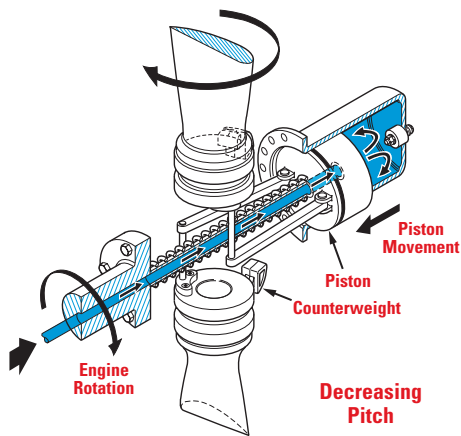


Fig. 1A Full-Feathering

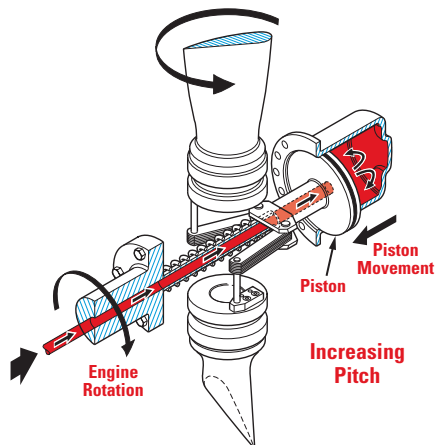


Fig. 1B Constant Speed

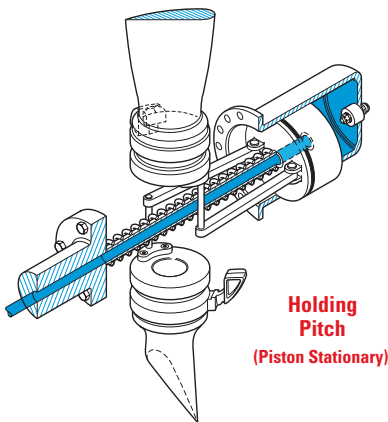


Fig. 2A Full-Feathering

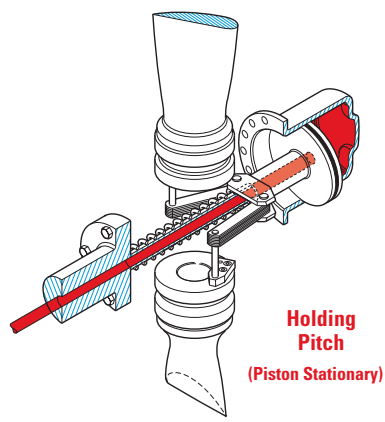


Fig. 2B Constant Speed

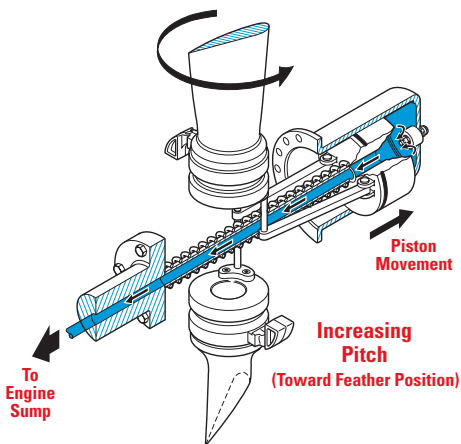


Fig. 3A Full-Feathering

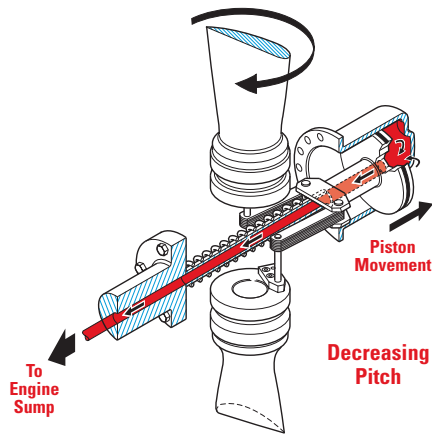


Fig. 3B Constant Speed

pitch of the blades. The piston will continue to move forward until the selected RPM is reached and opposing forces are once again equal. Mechanical stops are installed in the propeller to limit travel in both the high and low pitch directions.

### FULL-FEATHERING AND CONSTANT-SPEED GOVERNING SYSTEMS

Besides the propeller, the other major component of the system is the governor. Each governor mounts on and is geared to the

engine, which drives the governor gear pump and the flyweight assembly. The gear pump boosts engine oil pressure to provide quick and positive response by the propeller. The rotational speed of the flyweight assembly varies directly with engine speed and controls the position of the pilot valve. Depending on its position, the pilot valve will direct oil flow to the propeller, allow oil flow back from the propeller, or assume a neutral position with minimal oil flow. These oil flow conditions correspond to increasing pitch, decreasing pitch or constant pitch of the propeller blades. (Figs. 4A & 4B)

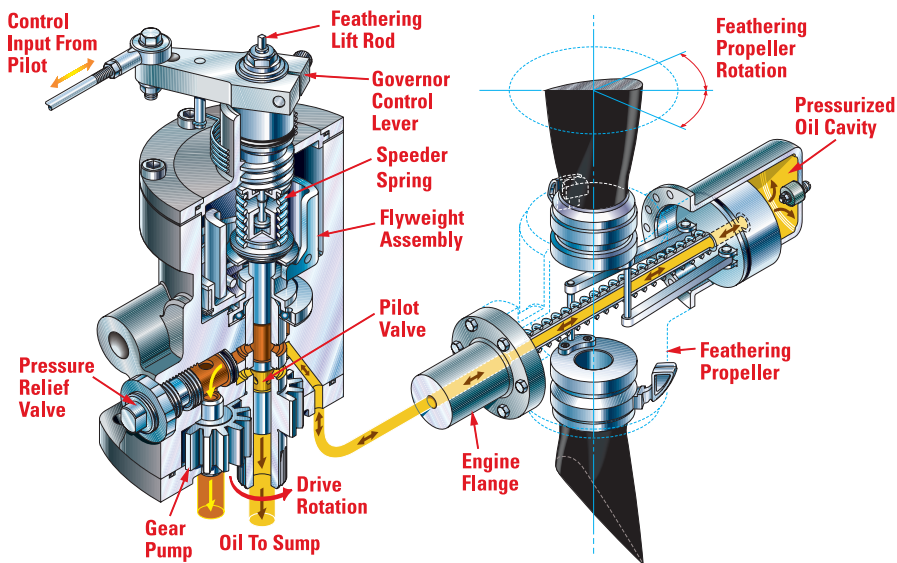


Fig. 4A

Full-Feathering.

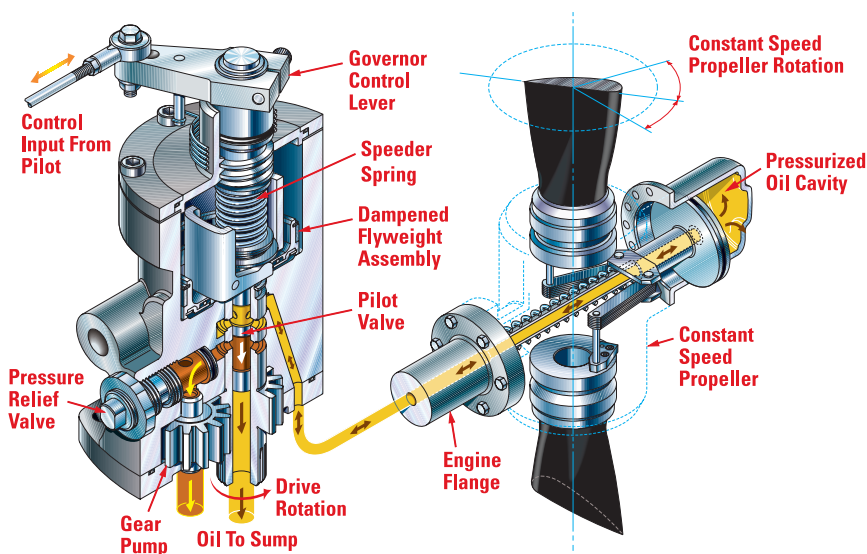


Fig. 4B

Constant Speed.

The flyweights change the position of the pilot valve by utilizing centrifugal force. The L-shaped flyweights are installed with their lower legs projecting under a bearing on the pilot valve. When engine RPM is slower than the propeller control setting, the speeder spring holds the pilot valve down and oil flows to the propeller in a full-feathering system and from the propeller in a constant-speed system.

(Fig. 5) As engine RPM increases, the tops of the weights are thrown outward by centrifugal force. The lower legs then pivot up, raising the pilot valve against the force of the speeder spring so no oil can flow to or from the propeller. (Fig. 6) The faster the flyweights spin, the

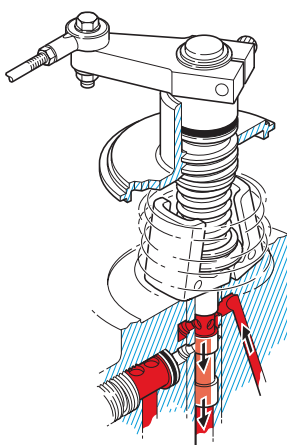


Fig. 5 Flyweight

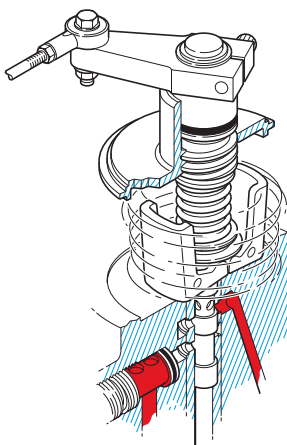


Fig. 6 Flyweight

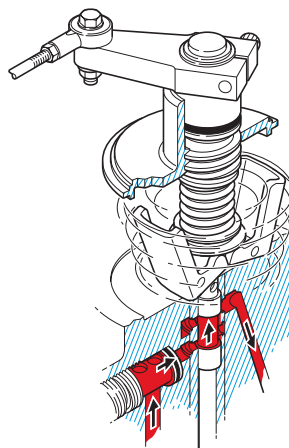


Fig. 7 Flyweight

further out they are thrown, causing the pilot valve to be raised and allowing more oil to flow from the propeller in a full-feathering system and to the propeller in a constant-speed system. (Fig. 7)

The cockpit control lever is connected to the governor control lever which in turn is attached to a threaded shaft. As the lever is moved, the threaded shaft turns and moves up or down to increase or decrease compression on the speeder spring. (Fig. 8) For example, when the cockpit control is moved forward, the governor control shaft is screwed down, increasing compression on the spring. This increases the speed necessary for the flyweights to move the pilot valve and produces a higher RPM setting. The cockpit control lever allows the aircraft pilot to shift the range of governor operation from high RPM to low RPM or any area in between.

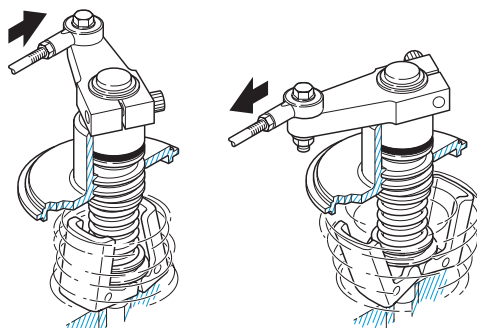
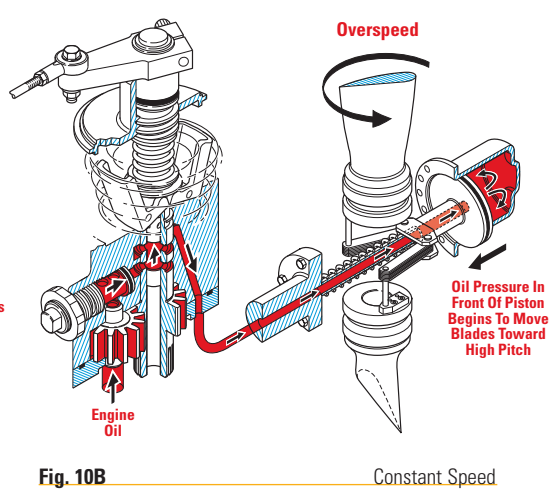
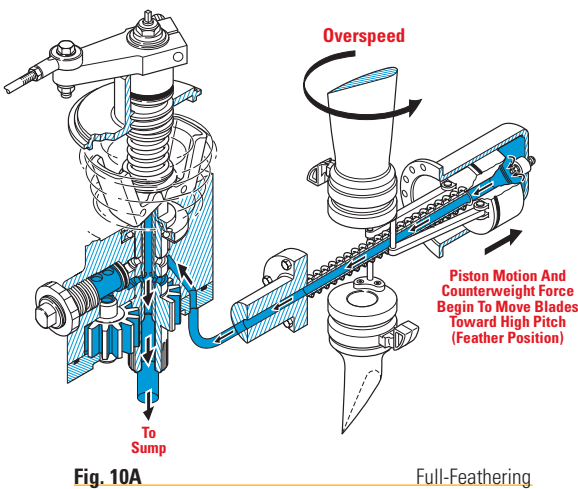
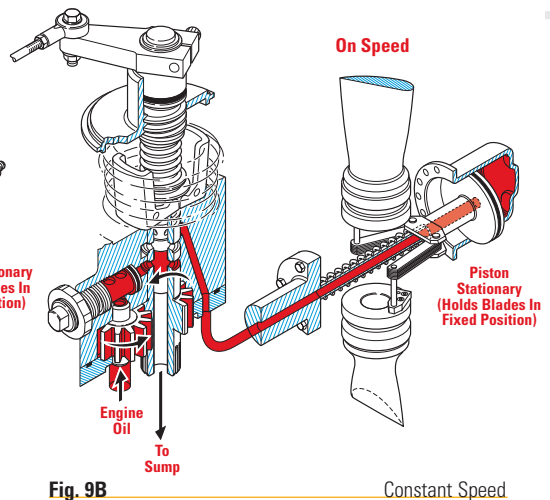
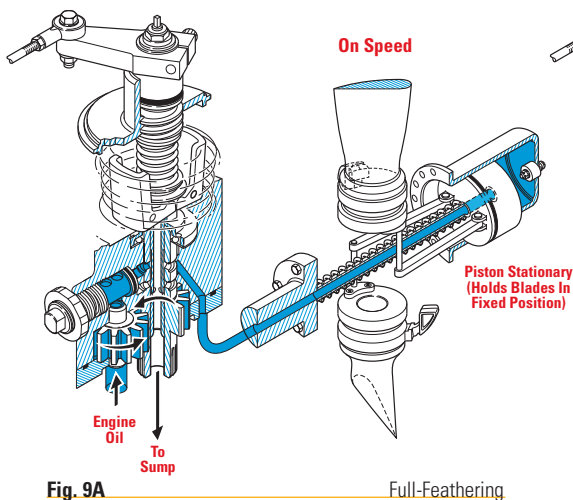


Fig. 8 Flyweight

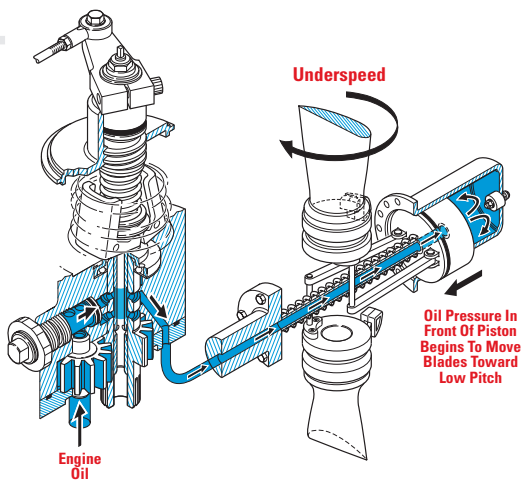


This system results in constant speed by producing what is known as an ON SPEED condition, which exists when the RPM is constant. Movement of the cockpit controls have set the speeder springs at the desired RPM. The flyweights have positioned the pilot valves to direct oil to or from the propellers. This, in turn, has positioned the propeller blades at a pitch that absorbs the engine power or RPM selected. When the moment of RPM balance occurs, the force of the flyweights equals the speeder spring load. This positions the pilot valves in the constant RPM position with no oil flowing to or from the propellers. (Figs. 9A & 9B)

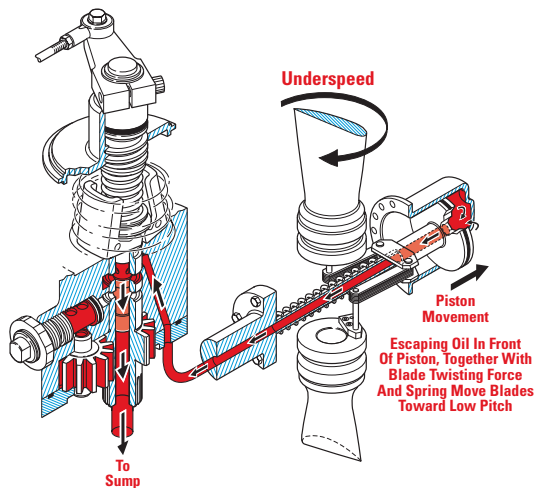
At constant-speed, an OVERSPEED condition results and airspeed increases when the airplane begins a descent or engine power is increased. Since the pitch of the propeller blades is too low to absorb engine power, the engine RPM begins to increase. At the instant this happens, however, the flyweights move out and raise the pilot valves, causing oil to flow from the propellers in a full-feathering system (Fig. 10A) and to the propeller in a constant-speed system (Fig. 10B), increasing the pitch of the blades in both cases. Engine speed then slows to the original RPM setting.



If the airplane begins to climb or engine power is decreased, an **UNDERSPEED** condition results. Airspeed is reduced and, since the pitch of the propeller blades is too high, the engines begin to slow down. At the instant this happens, the flyweights will droop, causing the pilot valves to move down. Simultaneously, oil flows to the propellers in a full-feathering system (Fig. 11A) and from the propeller in a constant-speed system (Fig. 11B), reducing the pitch of the blades in both cases. This automatically increases the speed of the engines to maintain the original RPM setting.



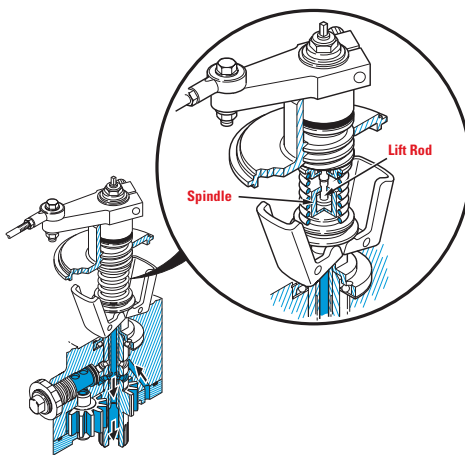
**Fig. 11A** Full-Feathering



**Fig. 11B** Constant Speed

## FEATHERING

Feathering is achieved through a mechanical linkage that overrides the flyweights and speeder spring. When the cockpit control is moved to “feather,” the governor lever and shaft are turned beyond normal low-RPM operating limits. As the threaded shaft backs out, the shaft lift rod engages the pilot valve spindle and lifts the pilot valve. This causes oil to flow out of the propeller, and it moves to feather pitch position. (Fig. 12)

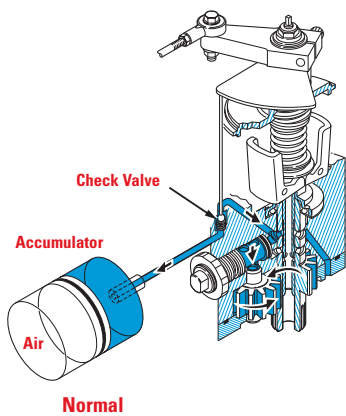


**Fig. 12** Full-Feathering

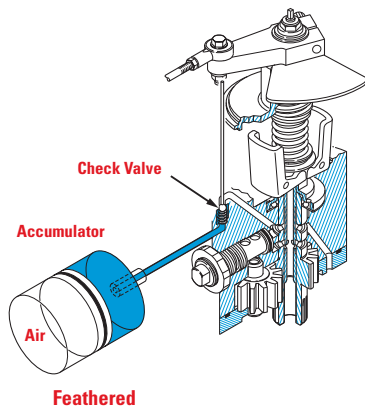
Unless the airplane is equipped with the unfeathering accumulator option, the pilot can “unfeather” the propeller by moving the propeller control to high RPM (low pitch) and engaging the engine starter. When the engine is turning over fast enough to develop sufficient oil pressure, the propeller blades will be forced out of feather.

The unfeathering accumulator option permits a feathered propeller to be unfeathered in flight for air-starting the engine. With this option, the governor is modified to provide an external high-pressure oil outlet through a check valve, as well as a device for unseating the check valve. The external outlet is connected to an accumulator. One side of the accumulator is filled with compressed nitrogen and the other

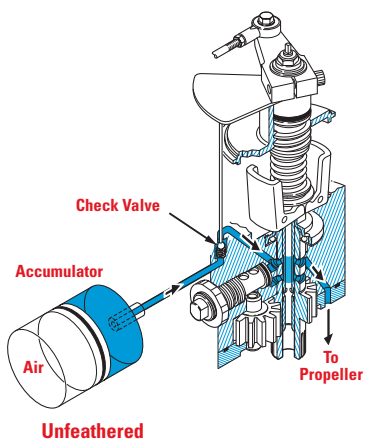
side with oil. This allows the oil to be stored under high pressure, as it is during normal flight. (Fig. 13) When the propeller is feathered, the check valve maintains oil pressure in the accumulator. (Fig. 14) When the propeller control is moved from feather to low pitch, the check valve is unseated, permitting the high-pressure oil in the accumulator to flow to the governor pilot valve. With the governor control lever and shaft in low pitch, the speeder spring forces the pilot valve down so that the oil flows to the propeller and moves the blades to low pitch. (Fig. 15)



**Fig. 13** Full-Feathering



**Fig. 14** Full-Feathering



**Fig. 15** Full-Feathering

## PERFORMANCE CONSIDERATIONS

### SHAPE OF PROPELLER TIPS

Propeller tips can be rounded, swept or square. Various tips are often used to meet blade vibration resonance or special design conditions. Tip shape is also a function of aesthetics, noise requirements, flight performance, repairability and ground clearance.

### PROPELLER DIAMETER

Propeller diameters are a function of engine and airframe limitations. Larger propeller diameters are preferred for low airspeed operation, while smaller diameters are best for high airspeeds. For example, the diameter of a fixed-pitch propeller is often large to favor low airspeed operation, while the blade size is small to favor higher airspeeds and faster turning at low airspeeds. The diameter and blade size of a constant-speed propeller is often larger (than a fixed-pitch), due to the variability of blade angles.

### ENGINE HORSEPOWER AND RPM

For fixed-pitch props, at a fixed throttle setting, propeller and engine RPM increases or decreases with the airspeed. At a constant airspeed, fixed-pitch propeller and engine RPM change if power is increased or decreased.

A constant-speed prop uses a governor to provide constant RPM at the selected throttle setting. The blade angle automatically increases or decreases as the RPM setting or engine power changes. With a fixed RPM and power setting, the blade angle automatically changes as air-speed increases or decreases.

# PROPELLER CARE

## PREVENTIVE MAINTENANCE

### VISUAL INSPECTIONS

Prop blades should be visually inspected regularly, preferably before each flight. Look for surface damage and irregularities such as dents, nicks or scratches. These imperfections should be dressed out by an A&P mechanic before cracks have a chance to develop.

Minor repairs should not impair propeller performance.

If you have a spinner, check external surfaces for damage and the attachment parts for normal tightness. If no spinner is installed, visually examine the front and back surfaces of the propeller hub and its attachment onto the engine shaft for normal tightness.

At least once a year (for one-piece, fixed-pitch propellers) or every 100 flight hours (for all other types of props), inspect every inch of the prop in the best possible light, looking for any evidence of damage. Have an approved, FAA-licensed A&P mechanic remove the spinner (if installed) and have the propeller installation bolts checked for tightness with a torque wrench.

### PREVENTING DAMAGE

High-speed operation of the propeller when standing or taxiing over dirt, gravel or loose stone can cause nicks and other damage to blades.

Never use prop blades as handles to maneuver a plane on the ground. Either use a tow bar on your plane's steerable nose wheel, or use the areas of the airframe designated by the manufacturer as safe for push/pull pressure. Pulling or pushing with the propeller could severely damage actuating components inside the hub.

### CLEANING THE PROP

Use a clean cloth dampened with light oil to wipe the prop after each flight, or as regularly as possible, especially if you operate near salt water or fly a sea plane. The oil removes and repels substances that cause corrosion and helps prevent water erosion. Never scrape the blades, use abrasive cleaners or use water to clean the propeller or hub. Forcing water into the hub can lead to corrosion or lubricant breakdown. If waxing the blade camber side, wipe first with a non-oil base solvent.

### REPAINTING PROP BLADES

If repainting is required, use non-reflective black for the side of the blades which face the pilot, so that the spinning propeller is not seen as a shiny, hypnotic disc. Paint blade tips on the opposite side (face side) with bright colors so that the spinning propeller can be more easily seen by people walking near it on the ground.

## **CHECKING BLADE TRACK**

Blade track is the ability of one blade to follow the other in the same plane of rotation. Track is held to reasonable limits to prevent roughness. To check track, place a smooth board just under the tip of the lower blade. On controllable props, move the tip fore and aft carefully through its small range of motion, making small pencil marks at each position. Center the blade between these marks and draw a line the full width of the blade. Repeat this procedure with another blade tip. The lines should be separated by not more than 1/16 inch. Differences greater than 1/16 inch may be an indication of bent blades, improper installation or foreign particles between the hub and crankshaft mounting faces.



## **ROUGHNESS**

All props vibrate to some extent during operation. Assuming that the engine itself is not at fault, propeller roughness may be caused by bent blades, blades out of track due to improper mounting of the prop on the engine shaft, imbalance, a propeller loosely mounted on engine shaft, blade angles between blades out of tolerance with respect to each other and spinner imbalance due to improper mounting or to dirt, snow or ice inside the shell.

## **SERVICING YOUR PROPELLER**

### **LOCATING QUALIFIED PROPELLER SERVICE TECHNICIANS**

All service on your propeller should be performed by an approved propeller repair station that is certified by the Federal Aviation Agency to service, recondition, repair or overhaul propellers in accordance with the requirements established by the propeller manufacturer or the FAA. Approved repair stations have demonstrated that they have the equipment, technical information and skills to perform this work. They are licensed and limited to working only on specified propeller models, which are listed by manufacturer and model on their authorization.

Know where your “home base” prop repair station is located, as well as other stations in areas where you fly and land frequently. If you are repairing or overhauling your propeller, upgrading your aircraft or simply replacing one propeller with another just like it, contact us for a list of McCauley Authorized Propeller Sales and Service Centers. FAR’s require that you maintain a separate log for the propeller so that you have a permanent record of prop maintenance and overhaul.

## **OVERHAULING OR RECONDITIONING YOUR PROPELLER**

Blade reconditioning covers major or minor blade damage from accident or other causes and includes balancing of the prop. Blades should also be reconditioned if they have been damaged and filed often. This work is performed on an “as required” basis by an FAA-approved propeller repair station. For a one-piece, fixed-pitch prop, reconditioning is equivalent to an overhaul. For other types of props, if damage is major but repairable, an overhaul may be included with the reconditioning.

All props require periodic overhaul to increase safety, prolong propeller life and improve function or operation. The overhaul interval is generally based on hours of service (operating time) as well as a calendar limit. During overhaul, the propeller is disassembled and inspected for wear, cracks, corrosion and other abnormal conditions. Parts may be replaced or reconditioned and refinished. The propeller is then re-assembled and balanced.

## **SERVICE BULLETINS**

The service bulletin is the strongest document a manufacturer can write. When any of our products in the field require a modification, we issue a service bulletin to alert owners and operators. These service bulletins contain important information related to flight safety and aircraft performance. For your own safety, please read all service bulletins carefully.

## **CHANGING YOUR PROPELLER**

A propeller is designed to be compatible with a specific engine, in order to achieve maximum thrust or efficiency and reliability from the aircraft. Even though the propeller might fit another engine shaft, only the propeller manufacturer can determine whether it is suitable for use on a particular aircraft. Installation requirements are available for all McCauley props.



Propellers are generally changed either to upgrade performance or to restore original performance compromised by wear and tear. Whatever the reason, changing propellers deserves careful consideration. The propeller is intimately linked to aircraft performance and operates in partnership with all other components. Many factors can enhance or impair performance.

### **FOUR WAYS TO CHANGE PROPELLERS:**

1. OEM Type Certificate
2. One-Time Field Approval
3. Supplemental Type Certificate

## **OEM TYPE CERTIFICATE**

Any propeller that appears on the Original Equipment Manufacturer's (OEM) approved equipment list, on the Aircraft Type Certificate Data Sheet, is automatically approved for that application. No further paperwork is required.

## **ONE-TIME FIELD APPROVAL**

More subjective in nature, the One-time Field Approval changes for every situation and is heavily dependent on the personality and experience of the FAA representative. In general, the more reasonable the request, the more likely it is to be granted. There are only two things for certain about the One-time Field Approval:

- It requires the endorsement of the FAA
- It has to have some degree of technical justification

## **SUPPLEMENTAL TYPE CERTIFICATE (STC)**

The FAA issues an STC for propellers that have passed rigorous and extensive testing but which are not listed on the OEM's approved equipment list for a particular aircraft. The STC is the easiest way to modify an existing airplane in the field. Most owners, operators and mechanics who wish to upgrade propeller

performance will use STCs.

Single-component STCs involve a specific propeller that has been approved for a specific aircraft. For example, the single-component STC is commonly used to upgrade an aircraft from a two-bladed to a three-bladed propeller. It may also be used by owners or operators who are not satisfied with the performance of their original propeller.

The combination STC involves multiple components, such as a propeller and an engine upgrade. Although less common than single-component STCs, the combination STC is gaining popularity because of the integral relationship between propeller and engine.

The STC holder may be the original propeller manufacturer, the original aircraft manufacturer or an individual. To obtain an STC, the STC applicant often works with the FAA and the OEM, tests and evaluates the propeller, and pays for flight performance testing and stress surveys. Developing the STC for a simple, one-propeller changeover for a particular aircraft can be a significant expense.

When someone other than McCauley obtains an STC with a McCauley product, the prop is usually sold directly to the STC holder for delivery to the end user. However:

- STC holders do not always work with the original propeller manufacturer prior to obtaining STC approval from the FAA. STC holders who have not worked with McCauley may not fully understand our

products, their applications and how they are likely to perform on specific aircraft.

- The FAA usually does not notify the original propeller manufacturer when it grants an STC to someone other than the OEM. As a result, we have no way of knowing about all STCs approved for our propellers by the FAA.
- STC holders who do not work with McCauley while obtaining an STC for our products often neglect to inform us when the STC is granted.

Therefore, always contact the manufacturer of the STC propeller you plan to install, and ask if the OEM is aware of the STC or of any potential problems. Also, contact the STC holder directly to discuss the performance changes you should expect. Request a list of owners who have performed similar installations.

Make sure everything is working properly under usual operating conditions before installing any STC conversion. To determine whether or not a problem is propeller related, use the process of elimination, changing one variable at a time. For example, a recently overhauled engine may cause vibration, which could be mistakenly blamed on a new propeller installed at the same time. If you converted from a two-bladed propeller to a three-bladed propeller immediately after an engine overhaul, try out the overhauled engine using the two-bladed propeller. If you experience vibration that was not apparent before the



overhaul, you will know that it is an engine problem, not a propeller problem.

The warranty that comes with the STC conversion covers the propeller assembly. Technically, the original propeller manufacturer is responsible only if the propeller is defective. The STC holder is responsible for problems with installation adjustments. However, owners and operators may have adjustment or performance trouble that is not propeller-related, including problems with the engine, engine mounts, cowling configuration or airframe. As a result, performance varies by individual aircraft.

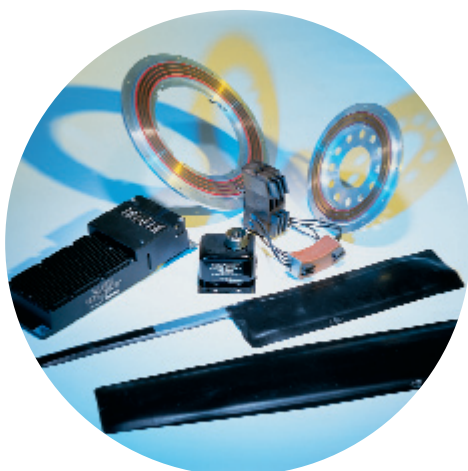


# PROPELLER OPTIONS

## DE-ICE SYSTEM

After ice has formed, a de-ice system applies electric heat to the blade, melting the ice near the surface of the blade so the ice will be removed by centrifugal force as the prop spins. A de-ice system typically consists of boots, slip rings and brushes.

Older technology, anti-ice equipment, prevents the formation of ice by allowing alcohol to flow over the propeller blades.



## SYNCHRONIZING AND SYNCHROPHASING SYSTEMS

On twin-engine applications, the benefits of synchronizing and synchrophasing systems are the reduction of noise beats produced by the interaction of the prop and the fuselage.

The governing system provides the means for synchronizing and synchrophasing the two propellers on twin-engine aircraft. The synchronizing option adjusts propeller RPM so that both props are turning at the same speed. McCauley installs a pick-up disc on each governor drive shaft, along with a transducer that sends a frequency signal to an electronic control. This control compares the signals from both governors and adjusts one of them to bring it into “synch” with the other.

Once the props are synchronized, the synchrophaser option allows the pilot to adjust the position of the blades on one propeller with respect to the position of the blades on the second prop for reduced noise and vibration. McCauley synchrophasers are solid-state units that automatically synchronize prop speed combined with a phasing control operated by the pilot. This phasing control allows the pilot to manually adjust the difference between the two propellers to minimize the “beat” of the props.

# About McCauley

McCauley is the world's largest full-line manufacturer of propellers for the regional airline, corporate and personal aviation markets. With over 60 years of design and manufacturing experience, McCauley continues to be a pioneer in the general aviation industry. McCauley propellers are standard equipment on aircraft worldwide such as: British Aerospace, Cessna, Commander, Fairchild, Maule, Mooney, Piper, Raytheon and others, as well as aircraft kit manufacturers. Make McCauley your choice as well.

While this booklet was meant to provide only a small overview of McCauley propellers and propeller components – their operation, performance and proper maintenance, we hope you have found it both helpful and informative. If you have further questions or concerns, please feel free to contact our Sales or Product Support Department at **1-800-621-7767 (PROP)** or visit our web site: **[www.mccauley.textron.com](http://www.mccauley.textron.com)**.





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