Cessna 310 R

Airplane & System Description

American Air Service
Joachim Walther
FAA Certified Flight Instructor
CFI-MEI-CFII
Kappenrainweg 6
D64720 Michelstadt
Phone +49-6061-705476
Fax +49-6061-7067477

Performance and Specifications

Weight:	Empty	3752 lbs	1702 kg			
	max. Takeoff	5500 lbs	2495 kg	SL Rate-of-Climb 2-Engines		1662 fpm
	max. Landing	5400 lbs	2450 kg	SL Rate-of-Climb 1-Engine		370 fpm
Speed:	max. Sea Level	207 KTAS	384 km/h	Service Ceiling 2-Engines		19750 ft
	75% at 7500 Feet	195 KTAS	361 km/h	Service Ceiling 1-Engine		7400 ft
Maximum Range 10000 Feet		1152 NM	2133 km			
Takeoff:	Ground Roll	1335 ft	407 m	over 50 ft Obstacle	1700 ft	518 m
Landing:	Ground Roll	640 ft	195 m	over 50 ft Obstacle	1790 ft	546 m
Fuel:	Main Tanks	100 Gal.	378 Ltrs.	Auxiliary	63 Gal.	238 Ltrs.
Dimensions:	Wing Span	36'11"	11,25 m	Length	31'11.5"	9,74 m
				max. Height	10'11,8"	3,35 m

Engines: Teledyne Continental IO 520 M 285 HP at 2700 RPM
Fuel injected, direct drive, air-cooled, horizontally opposed,
six cylinder, with 520 cubic-inch displacement

Propellers: McCauley, 3 Blade, Constant Speed, Full Feathering

Airspeed Limitations

Maneuvering Speed		148 KIAS	Air Minimum Control Speed	80 KIAS
Maximum Flap extended	15°	158 KIAS	Maximum Gear Extended	138 KIAS
	35°	138 KIAS	Never Exceed Speed	223 KIAS
Stall Speed	clean	79 KIAS	Maximum Structural	
	Gear and Flaps down	72 KIAS	Cruising Speed	181 KIAS

Maneuver Limits

This is a normal category airplane. Aerobatic maneuvers, including spins, are prohibited.

Flight Load Factor Limits

The design load factors are 150% of the following, and in all cases the structure exceeds design loads.

At Design Takeoff Weight of 5500 Pounds:	Gear and Flaps up	+3.8 G to -1.52 G
	Gear and full Flaps	+2.00 G

For calculation of actual aircraft performance refer to section 5 of Pilots Operation Handbook!

Multi-Engine Airspeeds:

Normal Takeoff (no Flaps)		92 KIAS
High Performance Takeoff (15 Deg. Flaps)		82 KIAS
Best Angle-Of-Climb		85 KIAS
Best Rate-Of-Climb		107 KIAS
Maneuvering Speed	Va	148 KIAS
Maximum Flap Extended Speed	Vfe 15 Deg	158 KIAS
	35 Deg	138 KIAS
Maximum Gear Operating Speed	Vlo + Vle	138 KIAS
Approach 35 Deg. Flaps		93 KIAS

Single-Engine Airspeeds:

Minimum Control Speed Vmc	80 KIAS
Safe Single Engine Speed	92 KIAS
Best Angle-Of-Climb	95 KIAS
Best Rate-OF-Climb	106 KIAS

Preflight Inspection

Pitot Cover REMOVE

1. Inside Cabin:

Parking Brake	SET	Oxygen	OFF
Alternate Static Source	CLOSED	Windows	CHECK for cracks
All Switches	OFF	Battery Switch	ON
All Circuit Breakers	IN	Fuel Gages	CHECK
Landing Gear Switch	DOWN	Tip Tank Transfer Pumps	LISTEN
Fuel Selectors	MAIN TANKS	Wing Flaps	DOWN
Trim Tabs	NEUTRAL	Pitot Heat	ON for 20 seconds
Oxygen	ON	All Navigation and Anti-Collision Lights	CHECK
Quantity, Masks and Hoses	CHECK	All Light Switches and Battery	OFF

2. Walk Around

Baggage Door	SECURE		
Static Port	CLEAR	Nose Gear, Tires, Wheel Well, Doors	CHECK
Deice Boots	CHECK	Lower Fuselage	CHECK
Control Surface Lock(s)	REMOVE	Pitot Tube	CLEAR and WARM
Elevator	CHECK	Heater Inlet	CLEAR
Tie Down	REMOVE	Leading Edge Air Intake	CLEAR
Rudder	CHECK	Crossfeed Lines	DRAIN
Deice Boots	CHECK	Main Gear, Tires, Wheel Well, Doors	CHECK
Static Port	CLEAR	Oil Level	CHECK min. 9 Qts.
Wing Locker Baggage Door	SECURE	Engine Compartment	CHECK
Battery Compartment Cover	SECURE	Propeller	EXAMINE
Wing Flap	CHECK	Auxiliary Tank Fuel Quantity	CHECK
Wing Bottom	CHECK	Fuel Strainer	DRAIN
Control Surface Lock(s)	REMOVE	Wing Tie Down	REMOVE
Aileron	CHECK	Deice Boot(s)	CHECK
Main Tank Vents	CLEAR	Main Tank Fuel Quantity	CHECK
Navigation and anti-collision lights	CHECK	Navigation and Anti-Collision Lights	CHECK
Landing Light	CHECK	Fuel Vent and Sniffle Valve	CLEAR
Main Tank Fuel Sump	DRAIN	Main Tank Fuel Sump	DRAIN
Fuel Vent and Sniffle Valve	CLEAR	Main Tank Vents	CLEAR
Main Tank Fuel Quantity	CHECK	Landing Light	CHECK
Deice Boot(s)	CHECK	Control Surface Lock(s)	REMOVE
Stall Warning Vane	CHECK	Aileron	CHECK
Wing Tie Down	REMOVE	Wing Bottom	CHECK
Auxiliary Tank Fuel Quantity	CHECK	Wing Flap	CHECK
Fuel Strainer	DRAIN	Wing Locker Baggage Door	SECURE
Oil Level	CHECK min. 9 Qts.		
Engine Compartment	CHECK		
Propeller	EXAMINE		
Leading Edge Air Intake	CLEAR		
Main Gear, Tires, Wheel Well, Doors	CHECK		

Before Starting Engines

Preflight	COMPLETE	Landing Gear Switch	DOWN
Cabin Door	LATCHED	Mixtures, Propellers and Throttles	SET
Door Seal	INFLATE	All Switches and Circuit Breakers	SET
Control Locks	REMOVED	Battery and Alternators	ON
Seat and Seat Belts	ADJUST and SECURE	Landing Gear Position Lights	3 GREEN
Intercom	ON and SET	All Warning Lights	PRESS TO TEST
Fuel Selectors	MAIN TANKS	Lights	AS REQUIRED

Starting Engines

Propellers	CLEAR	Auxiliary Fuel Pumps	LOW
Magneto Switches	ON	Engine Instruments	CHECK
Engines	START		

Before Taxiing

Avionics	ON and SET	Wing Flaps	UP

Taxiing

Brakes	CHECK	Flight Instruments	CHECK

Before Takeoff

Engine Runup	COMPLETE	Lights	AS REQUIRED
Fuel Quantity	CHECK	All Cabin Doors and Windows	CLOSED
Fuel Selectors	MAIN TANKS	All Warning Lights	CLEAR
Cowl Flaps	LOCKED FULL OPEN	Flight Controls	CHECK
Trim Tabs	SET	Auxiliary Fuel Pumps	ON
Wing Flaps	UP	Ice Protection	AS REQUIRED
Flight Instruments and Avionics	SET	Syncrophaser	OFF
Auto Pilot Disconnect	CHECK	Seat Belts	Secure

Takeoff

Power	SET	Air Minimum Control Speed	80 KIAS
Engine Instruments	CHECK	Take Off and Climb to 50 Feet	92 KIAS at GW
		Refer to section 5 for speeds at reduced weights.	

After Takeoff

Brakes	APPLY	Best Angle-of-Climb Speed ME	85 KIAS at SL
Landing Gear	RETRACT	Best Rate-of-Climb Speed ME	107 KIAS at SL+GW
		Refer to section 5 for speeds at altitude and at reduced weight.	

Cruise Climb

Power	SET (24.5"/2500 RPM)	Mixtures	AS REQUIRED
Auxiliary Fuel Pumps	OFF	Cowl Flaps	AS REQUIRED

Descent

Power	AS REQUIRED	Cowl Flaps	AS REQUIRED
Mixtures	ADJUST	Altimeter	SET

Before Landing

Seat Belts	SECURE	Landing Gear	DOWN
Syncrophaser	OFF	Mixtures	ADJUST
Fuel Selectors	MAIN TANKS	Propellers	FULL FORWARD
Auxiliary Pumps	ON	Approach Speed	93 KIAS
Wing Flaps	AS REQUIRED	Air Minimum Control Speed	80 KIAS

After Landing

Auxiliary Fuel Pumps	LOW	Wing Flaps	UP
Cowl Flaps	OPEN and LOCK	Cabin Heater (if used)	SWITCH to FAN

Shut Down

Parking Brake	SET	Engines	SHUT DOWN
Accessory Switches	OFF	Batteries, Alternators, Magnetos	OFF
Auxiliary Fuel Pumps	OFF	Intercom	OFF
		Door Seal	DEFLATE

Emergency Procedures

(Bold Print Items should be committed to Memory)

Engine Securing Procedures

		Fuel Selector	OFF
Throttle	**CLOSE**	Auxiliary Fuel Pump	OFF
Mixture	**IDLE CUT OFF**	Magneto Switches	OFF
Propeller	**FEATHER**	Propeller Syncrophaser	OFF
		Alternator	OFF
		Cowl Flap	CLOSE

Engine Failure during Takeoff (Speed below 92 KIAS)

Throttles	**CLOSE IMMEDIATELY**	**Brakes**	**AS REQUIRED**

Engine Failure after Takeoff (Speed Above 92 KIAS With Gear Up or in Transit)

Mixtures	**AS REQUIRED**	Establish Bank	MAX. 5° TOWARD GOOD ENGINE
Propellers	**FULL FORWARD**		
Throttles	**FULL FORWARD**	Wing Flaps	UP in small increments
Landing Gear	**CHECK UP**	Climb to Clear Obstacle	92 KIAS
Inoperative Engine	**THROTTLE CLOSE**	Climb best SE-Rate-of-Climb-Speed	106 KIAS at SL
	MIXTURE IDLE CUT OFF	Trim Tabs	ADJUST
	PROPELLER FEATHER	Inoperative Engine	SECURE

Engine Failure during Flight

Inoperative Engine	**DETERMINE**	Operative Engine	ADJUST
Operative Engine	**ADJUST as required**	Power	AS REQUIRED
Before Securing dead Engine:		Mixture	AS REQUIRED
Fuel Flow	**CHECK, if deficient AUX. FUEL PUMP ON**	Fuel Selector	AS REQUIRED Note: Auxiliary fuel on side of dead engine is unusable
Fuel Selectors	**MAIN TANKS**		
Fuel Quantity	**CHECK**		
Oil Pressure and Temperature	**CHECK**	Auxiliary Fuel_ Pump	ON
Magneto Switches	**CHECK ON**	Cowl Flap	AS REQUIRED
Mixture	**ADJUST TILL ENGINE IS FIRING, ADJUST FOR SMOOTH OPERATION**	Trim Tabs	ADJUST
		Electrical Load	DECREASE
If Engine does not start	**SECURE**	**WATCH TEMPERATURES OF GOOD ENGINE!**	

Engine Inoperative Landing

Fuel Selector	MAIN TANK	Landing Gear	DOWN within gliding distance of field
Auxiliary Fuel Pump	ON (operative engine)		
Alternate Air Control	IN	Wing Flaps	DOWN when landing is assured
Mixture	AS REQUIRED		
Propeller Syncrophaser	OFF	Speed	DECREASE below 93 KIAS only if landing is assured
Propeller	FULL FORWARD		
Approach	106 KIAS with excessive Altitude	Air Minimum Control Speed	80 KIAS

Engine Inoperative Go-Around

WARNING: **Level flight may not be possible for certain combinations of weight, temperature and altitude.**
In any event, do not attempt an engine inoperative go-around after wing flaps have been extended beyond 15°!

Throttle	**FULL FORWARD**	Cowl Flap	OPEN
Mixture	**AS REQUIRED**	Climb best SE Rate-of-Climb speed	106 KIAS at SL
Positive Rate-of-Climb	**ESTABLISH**		94 KIAS at 10000 ft
Landing Gear	**UP**	Trim Tabs	ADJUST max 5° bank
Wing Flaps	**UP**		toward good engine

Airstart

Auxiliary Fuel Pump	CHECK OFF. If ON or LOW turn OFF, mixture to IDLE-CUT-OFF, Full Throttle, magnetos OFF, rotate engine 15 revolutions with starter	Starter Button Primer Switch Starter and Primer Switch Auxiliary Fuel Pump	PRESS ACTIVATE RELEASE when Engine fires LOW
Magneto Switches	ON	Mixture	AS REQUIRED
Fuel Selector	MAIN TANK	Power	INCREASE after cylinder head temp. reaches 200° F
Throttle	one inch FORWARD		
Mixture	AS REQUIRED		
Propeller	FORWARD of detent	Alternator	ON

Engine-Driven Fuel Pump Failure

Fuel Selector	MAIN TANK	Mixture	ADJUST for smooth engine operation
Auxiliary Fuel Pump	ON		
Cowl Flap	OPEN	As Soon As Practical	LAND

Fuel in the auxiliary and opposite main tank is unusable!

Alternator Failure (Single)

Electrical Load	REDUCE	If Circuit Breaker does not trip:	Select affected alternator on VA-meter and monitor output. If output is normal +failure light remains on, disregard fail indication and have indicator checked. If output is insufficient, turn off alternator and reduce load to one alternator capacity If complete loss of output occurs, check field fuse and replace if necessary. If an intermittent light indication accompanied by voltammeter fluctuation is observed, turn off alternator and reduce load to on alternator capacity.
If Circuit Breaker is tripped:	Turn off affected alternator Reset circuit breaker Turn on affected alternator If circuit breaker reopens, turn off alternator.		

Alternator Failure (dual)

Electrical Load	REDUCE	If Breakers have not tripped:		Turn off alternators Check field fuses and replace as required.
If Circuit Breakers are tripped:	Turn off affected alternators Reset circuit breakers Turn on left alternator and monitor output on voltammeter. If alternator is charging, leave it on, disregard failure light. If still inoperative, turn off. Repeat above steps for right alternator. If circuit breakers reopen, prepare to terminate flight.		*	Turn on left alternator and monitor output. If Alternator is charging, leave it on, disregard failure light if still illuminated. If still inoperative, turn off alternator. Repeat above steps for right alternator. If both still inoperative, turn off alternators and turn on emergency alternator field switch. Repeat marked steps for each alternator. If still inoperative, turn off alternators, nonessential electrical items and prepare to terminate flight.

Landing Gear will not extend electrically

Landing Gear Motor Circuit Breaker	CHECK IN with gear switch down If gear does not extend PULL breaker.
Landing Gear Switch	NEUTRAL (Center)
Pilot's Seat	ADJUST as required
Handcrank	EXTEND AND LOCK ROTATE clockwise FOUR turns past gear down lights are on (~ 52 turns)
Gear Down Lights ON	Unlocked Light OFF
Gear Warning Horn	CHECK (retard throttle)
Handcrank	PUSH BUTTON and STOW

Landing Gear will not retract electrically - DO NOT TRY TO RETRACT MANUALLY

Landing Gear Switch	DOWN
Gear Down Lights ON	Unlocked Light OFF
Gear Warning Horn	CHECK

Airframe

The Cessna 310 is a 6-place. all metal, low-wing airplane. The wing uses 2 main spars which attach to the carry-thru spars. The retractable landing gear is a tricycle design using air-over-oil shock struts.

Flight Control System

The flight controls consist of the ailerons, elevators and rudder and their respective trim systems. All of these surfaces are constructed of aluminum and are statically mass balanced. All control surfaces are actuated by cables attached to the pilot's control wheel respective rudder pedals. Also the trim tabs on the control surfaces are actuated by cables attached to trim wheels on the control pedestal.

Nosewheel Steering System

The nosewheel is controlled by the rudder pedals which are connected to the nose wheel steering system via cables and a bungee spring assembly. This system provides positive control up to 18° left or right, and free turning from 18° to 55° for sharp turns during taxiing.

Wing Flaps System

The wing flaps are of split flap design. Each wing flap (two on each side) is actuated by two push-_pull rods attached to bell cranks in the wing. The bell cranks in each wing are ganged together with push-pull rods. Each inboard rod is attached to a cable which is actuated by a electric motor in the fuselage. The maximum extension is 35°.

Landing Gear System

The landing gear is a fully retractable tricycle landing gear consisting of a main gear located in each wing and a nose gear in the forward fuselage. Each landing gear is connected to a single gear box located aft of the pilots seat. The gear box is driven by a electric motor attached to the box. During ground operation, accidental gear retraction is prevented by a safety switch located on the left gear strut preventing retraction as long as the strut is compressed by the weight of the aircraft. The gear doors are mechanically linked to their respective landing gears.
Below the landing gear actuating knob are 4 position indicator lights. Three of them are green and will illuminate when the gear is down and locked. The other light is red and will illuminate when any or all of the gears are unlocked. When no light is illuminated the gear is in the UP and locked position.
The landing gear warning horn is controlled by the throttles and the wing flap position. The horn will sound when the throttles are retarded below approximately 12" MAP or the flaps are lowered past the 15° position with gear retracted.
The horn will also sound when the airplane is on ground with the gear switch in the UP position.
The landing gear can be manually lowered by a handcrank located below the right front edge of the pilot's seat.
To use the crank, tilt pilot's seat aft, pull the crank out of its storage clip and unfold it until it locks in the operating position. The procedure to lower the gear manually is given in the emergency checklist (section 3 Pilots operating handbook). To stow the crank, push the lock release button on the crank handle, fold the handle and insert it in the storage clip. When the handle is not stored, the gear will not operate electrically.

Fuel System

The fuel system consists of two main tanks, two auxiliary tanks, fuel selectors for selection of main, auxiliary or crossfeed fuel, two auxiliary fuel pumps and two engine driven pumps.
The main tanks are aluminum tanks mounted on the wing tips. Each tank contains an auxiliary fuel pump and transfer pump. The auxiliary pump provides fuel pressure for starting the engines and supplies fuel in an emergency. The transfer pump transfers fuel from the nose section of the tank to the center sump, where it is picked up and routed to the engine. The transfer pump allows steep descents with low fuel quantity and are operating continuously when the battery switch is on.
The auxiliary tanks are bladder type cells located in the outboard wings. These tanks provide fuel supply during cruise operation. the auxiliary tanks are vented to the main tanks.
Two fuel selectors, one for each engine, are located on the floor between the pilot's and copilot's seat. The selectors allow selection of main fuel, auxiliary fuel, crossfeed and shut off.
Quick drain valves are provided for each fuel tank, fuel selector and crossfeed line.
Each engine is equipped with a mechanically driven fuel pump which provides fuel to the metering unit. Each pump also contains a bypass which returns excess fuel and vapor back to the main tanks all the times.
Each auxiliary fuel pump on the main tank is operated by a 3-position switch. In the LOW position, the pump operates at low speed, providing adequate fuel flow for purging. The ON position runs the auxiliary pump at low

speed as long as the engine driven pump is operating. With an engine driven pump failure the auxiliary pump will then automatically switch to high speed, providing sufficient fuel for all partial power operations.
The dual indicating fuel quantity gage is calibrated in pounds and will accurately indicate the weight of fuel contained in the tanks, regardless of temperature. A gallons scale is provided in blue on the indicator allowing the pilot to determine the approximate volume of fuel on board.
The fuel gage shows remaining fuel in the tank selected on the fuel selector. When one fuel selector is switched to the auxiliary tank, the gage will show remaining fuel in this tank and a yellow auxiliary tank indication light will illuminate. With a 3-position switch, adjacent to the auxiliary tank indicator lights the fuel gauge can be switched to each tank regardless of the position of the fuel selectors.
Additionally to the fuel gages two low fuel indicator lights will provide a warning when the left/right main tank contains less then approximately 60 pounds of fuel. These lights are operating independently from the other fuel gages.

Brake System

The airplane is provided with an independent hydraulically actuated brake system for each main wheel. A hydraulic master cylinder is attached to each pilots rudder pedal. The brakes can be operated from each pilots seat.
The parking brake is set with depressing the brake pedals and pulling the parking brake knob. To release the parking brake push the parking brake handle in.

Electrical System

Electrical Energy is supplied by a 28-volt, negative ground, direct current system powered by an 100 ampere alternator on each engine. The electrical system has independent circuits for each side with each alternator having its own regulator and overvoltage protection relay. the voltage regulators are connected to provide proper load sharing.
A 24-volt battery is located in the left wing outboard of the engine nacelle.
Separate battery and alternator switches are provided as a means of checking for a malfunctioning alternator circuit and to permit such a circuit to be turned off.
An emergency alternator field switch is located on the right side of the switch and circuit breaker panel. The switch is used when the alternators will not self-excite. Placing the switch in the on position provides excitation from the battery even though the battery is considered to have failed.
Two overvoltage relays constantly monitor their respective alternator output. Should an alternator exceed the normal operating voltage, the relay will trip, taking the alternator off the line. The overvoltage relay can be reset by cycling the applicable alternator switch.
A voltammeter on the instrument panel is provided to monitor alternator current output, battery charge and bus voltage.
A low voltage light will illuminate when the bus voltage decreases below 25 volts.

Pitot Static System and associated Flight Instruments

A heated pitot tube is located on the left side of fuselage nose cap. Static pressure ports are on both sides of the fuselage behind the cabin. An alternate static source, installed in the static system below the parking brake handle, supplies an alternate static source should the external static source malfunction. When open, this valve vents to the pressure in the cabin. Since this pressure is relatively low, the airspeed indicator and the altimeter will show slightly higher readings than normal. Refer to section 5 of the pilots operating handbook for airspeed and altimeter corrections.
The pitot static system is connected as in any other light airplane: Static pressure is connected to altimeter, vertical speed and airspeed indicator, the pitot tube is connected to the airspeed indicator.

Vacuum System

The vacuum system is powered by two engine driven vacuum pumps. The suction gage incorporates two red source indicator buttons, which during normal operation are retracted from view. Should a vacuum pump fail the respective indicator button will be visible. The malfunctioning vacuum pumps is automatically isolated from the system, the second pump will provide enough suction to operate the system.
The vacuum powered flight instruments are the horizontal situation indicator and the attitude indicator.

Stall Warning System

A stall warning system is required equipment which consists of a stall warning transmitter vane located in the outboard wing leading edge, a cockpit warning horn and the necessary wiring to complete the system. The stall warning horn will sound about 4 to 9 KCAS above the actual stall in all flight configurations.

Engines

The airplane is equipped with two, 6-cylinder, fuel-injected engines. Each engine is rated at 285 horsepower at 2700 RPM. The control pedestal contains all engine controls. The three primary engine controls are in groups of two at the top of the pedestal, they are throttles, propeller controls and mixtures. A quadrant friction lock is provided to prevent the three primary engine controls from creeping once they have been set. The locking knob is located on the right side of the pedestal. Two cowl flap controls are locate just below the rudder trim tab wheel; one for each engine. These controls are used to set the cowl flaps in any desired position. An alternate air control is provided for each engine. These mechanically actuated controls are located an the right side of the control pedestal. Normally the controls are pushed in, providing cold filtered ram air to the engines. When the controls are pulled out, warm unfiltered air from inside the cowling is provided to the engines. Each engine is equipped with a dual ignition system. Fuel is supplied to the engine using a low pressure injection system. The fuel is injected into the cylinder heads adjacent to the intake valve on all cylinders. Manual mixture controls, fuel flow gages and exhaust gas temperature gages are provided for precise leaning.

Propellers

The airplane is equipped with all-metal, three-bladed, constant speed, full feathering, single-acting, governor regulated propellers. Each propeller utilizes oil pressure which opposes the force of springs and counterweights to obtain correct pitch for engine load. Oil pressure from the governor drives the blade angle toward low pitch (increasing RPM) while the springs and counterweights drive blades toward high pitch (decreasing RPM) and the feather position. The propeller blades are continuously adjusted by the governor, which boosts the engine oil pressure by the governor gear pump to the level needed to control blade angle. The props are fail safe toward feather, and loss of oil pressure will cause them to feather. This would also cause them to feather on engine shut down on the ground, which would cause excessive stress and vibration during engine start. To prevent this, the propeller hubs incorporate centrifugal latch pins, which at an RPM below 700 engage the hub mechanism and prevent feathering. Above 700 RPM the latch pins are retracted by centrifugal force. The latches will not prevent feathering after an engine failure in flight, because airflow through the propeller will keep its RPM well above 700. To feather the propeller blades, the propeller control levers on the control pedestal must be placed in the feather position (full aft).
The syncrophaser system is designed to match propeller RPM and propeller phase angle of the two engines. The propeller RPM and phase angle of the slaved (left) engine will follow changes in RPM and phase angle of the master (right) engine over a limited range. This limited range will prevents the left engine from loosing more than 50 RPM should the right engine be feathered with the syncrophaser on. To set the synchrophaser system the propellers must first be synchronized manually. Then the synchrophaser is switched to SYNC, in this mode it is maintaining the RPM of both propellers the same. In the phase mode, the phase angle between the propeller blades of the left and right engine can be adjusted by using the rheostat. The phase position should only be used in level cruising flight in smooth air. The synchrophaser light is illuminated all the time when the propellers are synchronized. If the difference of both engines exceeds 50 RPM the light starts flashing.

Propeller Deice System

The propeller deice system consists of electrically heated boots on the propeller blades. Each boot consists of an inner and outer heating element, which receives its electrical power through a deice timer, to reduce the power drain and maintain propeller balance. A reading below the green arc on the propeller deice ammeter indicates that the blades are not being deiced uniformly. The system then has to be turned OFF, since uneven deicing results in propeller unbalance and can cause an engine failure. Energizing the propeller anti-ice before entering icing conditions will prevent ice build up which will be thrown off and can chip the fuselage.

Deice Boot System

This system is designed to remove ice after accumulation. The system consists of pneumatically operated boots, engine-driven pneumatic pumps, push switches with annunciator light and necessary hardware to complete system.
The deice boots are attached to the leading edges of the wing and horizontal stabilizers. The boots expand and retract, using pressure and vacuum from the engine-driven vacuum pumps. Normally, vacuum is applied to all boots to hold them against the leading edge surfaces. When a deicing cycle is initiated, the vacuum is removed and a pressure is applied to "blow up" the boots. This change in contour will break the ice accumulation on the leading edges. Ice formation aft of this area will then be removed by normal air forces. At least 1/4 inch (6 mm) of ice accumulation is necessary for good deicing results. If used to early the ice is shaped to the contour of the inflated boots and deicing will become impossible. To activate the system just press the "PUSH ON" switch, the system will then execute one deice cycle. If the boots fail to deflate automatically press the deflate switch.
Despite the heated propellers and the deice boots this aircraft is not certified for flight into known icing.

Oxygen System

The oxygen system provides oxygen for each occupant individually up to an altitude of 30,000 feet. The oxygen is stored in a 76 cubic foot bottle located in the nose compartment. The system is activated by pulling the oxygen control knob to the ON position, allowing oxygen to flow from the regulator to all cabin outlets. The valve in the outlets is normally closed it is opened by inserting the connector of the mask. Permit no smoking when using oxygen. Oil grease, soap, lipstick, lip balm or any other fatty material constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oilfree before handling oxygen equipment. Be sure the oxygen control knob is not left in an intermediate position between ON and OFF, it may allow oxygen to bleed through the regulator into the nose compartment of the airplane.

400B Integrated Flight Control System (Autopilot)

The Cessna 400B Integrated Flight Control System (IFCS) provides a capability of automatic flight control or manual control with precision flight direction provided by computed command information. The complete presentation for the system is displayed an the flight director indicator (FDI), the mode selector and the horizontal situation indicator (HSI). Operation of the manual and automatic system is basically the same. the difference is whether the pilot follows the flight director commands or allows the autopilot to fly the airplane.
Precision flight direction information for manual control is provided on the FDI. The pilot flies the airplane to satisfy the two command bars, thus following the calculated flight path determined by the computer.
The HSI displays a pictorial presentation of the airplane's position relative to VOR radials, localizer and glide slope beams. The HSI also gives heading reference with respect to magnetic north and provides selection of the desired heading, VOR radials and LOC runway heading.
The autopilot is activated with the ON/OFF switch on the autopilot control head. Pitch and roll manual command controls are also located on these control head. All other normal modes of flight are controlled from the mode selector on the left side in the instrument panel.
An automatic autopilot disengage function is provided to disengage the autopilot any time the airplane pitches up or down more than a normal amount from level flight attitude. The operational capability should be tested by pressing the autopilot disconnect test button before takeoff. Do not press this button in flight, the airplane will pitch up sharply and the autopilot will disconnect.
The autopilot off (A/P OFF) light located adjacent to the FDI, will illuminate when the autopilot is disengaged by any means other than the control wheel disengage switch. Whenever the autopilot disengages the autopilot warning horn will sound. The A/P OFF light will remain on until it is cancelled by pressing the control wheel autopilot disengage switch.