Air Tractor Pilot Training Course

-Series 402, 502, 504, 602

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Revisions

Revision Date	Pages Affected

This course is intended to serve as a training aid to be accompanied by the Air Tractor Flight Manuals sold with each aircraft. All information contained herein should be verified against the approved AFM.

Objectives

1. Gain a basic understanding of Air Tractor systems
2. Become familiar with the aircraft's Normal and Emergency Procedures
3. Learn the performance limitations of the individual models

Course Outline

Introduction

Section 1: Aircraft Systems

Section 2: Normal Operations

Section 3: Emergency Procedures

Section 4: Operating Limitations/Performance

Introduction

Introduction

Due to the flexibility in the construction process of the Air Tractor there are several different variants of the airframes available, providing various sized hoppers for a variety of operations such as large vs. small fields. They have been produced for a few different roles, but aerial application for agriculture remains their primary mission. The 402 through 602 series aircraft share very similar design and construction characteristics, with the most different one being the 504 configured with a side by side 2 seat cockpit used for training purposes. For the purpose of this training program we will focus mainly on the single seat variants, but will cover the basic control setup of the 2 seat 504. We'll also touch on the differences between the models, but the main subject matter will be on the systems they have in common.

Following this program a pilot should be comfortable with describing and identifying the different functions and parts associated with the aircraft that are pertinent to his mission and understanding. To simplify the material, when talking about similarities, we'll just refer to them as "Air Tractors". We'll identify differences by specific model through descriptions and the use of graphs and charts.

Introduction

The Air Tractor

- All metal cantilever low wing monoplane designed especially for agricultural operations
- Extremely reliable Turbo Prop PT6
- Rugged conventional gear setup allowing superior ground maneuverability and unimproved strip operations

Introduction

The Air Tractor

- Fiberglass hopper

AIRCRAFT	NOMINAL HOPPER CAPACITY
AT-402	400 US Gallons / 3250 lbs
AT-502A/502B/504	500 US Gallons / 4100 lbs
AT-602	600 US Gallons / 6500 lbs

- Removable skin panels for ease of maintenance and cleaning
- Certified under a combination of FAR Part 23 and CAM 8: Restricted Category for Agricultural and Forest/Wildlife Conservation special purposes
- Certified gross weights:

AIRCRAFT	GW	CAM 8 Max Weight
402A	7000 lbs	7,860
402B	7000 lbs	9,170
502B	8000 lbs	9,400
502A	8000 lbs	10,480
504	8000 lbs	9,600
602	12500 lbs	N/A

402

602

502

504

Aircraft Systems

- Airframe construction
- Engine
- Propeller
- Fuel System
- Electrical
- Heating and Air Conditioning
- Flight Controls
- Dispersal Systems

Airframe Construction

Fuselage

- Primarily 4130N welded steel tubing bridging construction
- 2024-T3 Aluminum sheeting attached with camlocs
  - Allows for ease of cleaning, maintenance, and field repair
  - Mounted off of tubing frame to prevent trapped chemical leading to corrosion

Wings and Tail

- Full cantilever wing with a NACA 4415 airfoil
- 2024 T-3 Aluminum construction
- Tight rivet seams and heavy skin make for burst resistant construction in the event of a crash
- All parts treated with Alodine and zinc chromate

Airframe Construction

FUSELAGE WINGS & TAIL

Sealed rib bays make a wet wing fuel system

Conventional tail structure with braces on lower side

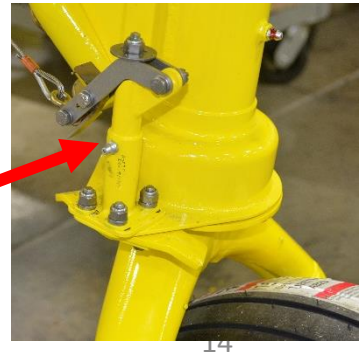
All fuselages are TIG welded by hand, primed, then coated with an epoxy paint

Airframe Construction

Landing Gear

- Spring type landing gear: low drag, min. maintenance, high energy absorption
  - Main tires: 50-52 psi with Cleveland wheels and brakes
  - Tail wheel: 60 psi
    - 360 swivel, centering lock located left side of cockpit

	Main Tire	T/W
AT-402A/B	29x11-10 (10 Ply)	5.00x5 (6 Ply)
AT-502B/504/502A	29x11-10 (10 Ply)	5.00x5 (6 Ply)
AT-602	29x11-10 (10 Ply)	17.5x6.25-6 (10 Ply)

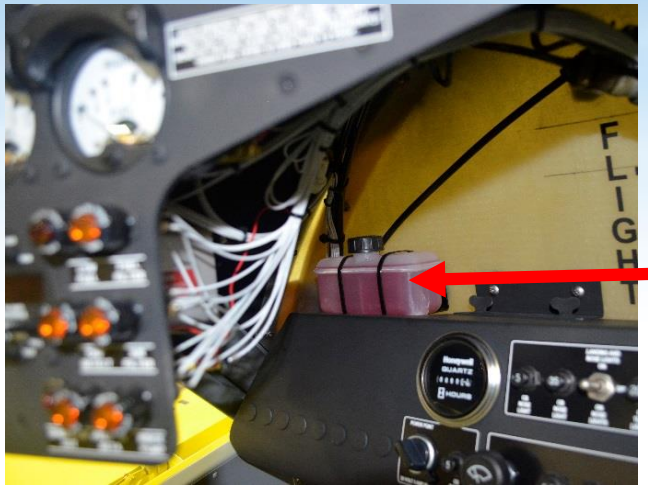


Tailwheel locking pin

- Brakes: Dual Cleveland, toe brakes, single reservoir (mounted on top of lower instrument panel) 5606A hydraulic fluid
  - Parking brake applied by holding brake pressure, pulling parking brake lever, and releasing pedal pressure. Released by applying pedal pressure.

Airframe Construction

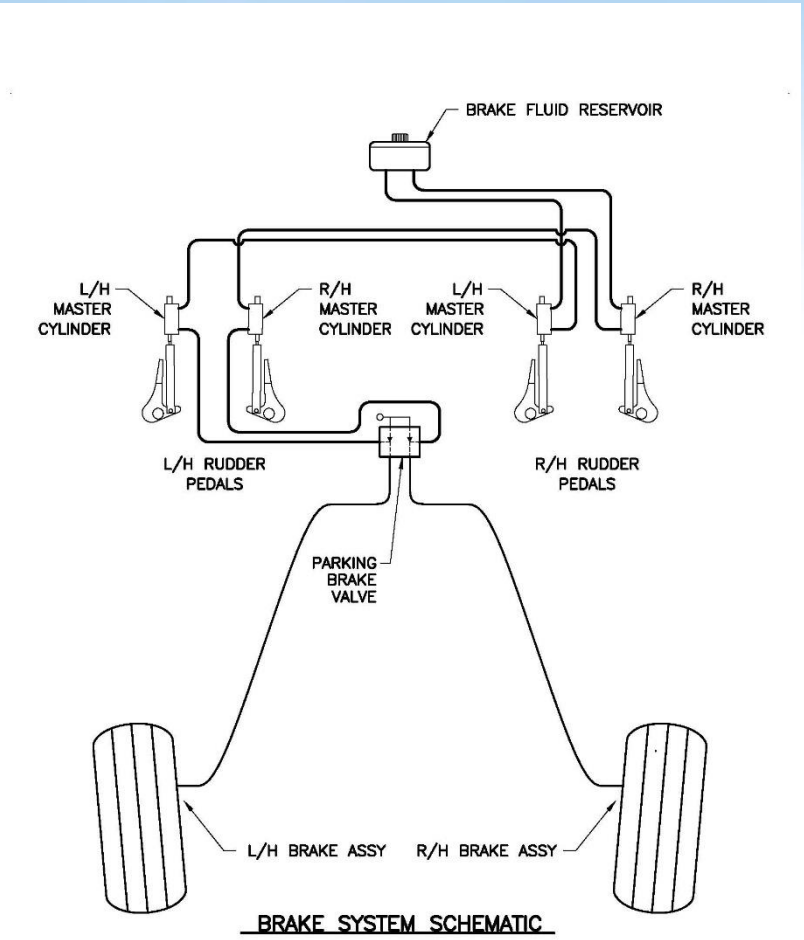
BRAKE SYSTEM



Brake Fluid Reservoir

Cleveland Disc Brakes

Brake System (504)



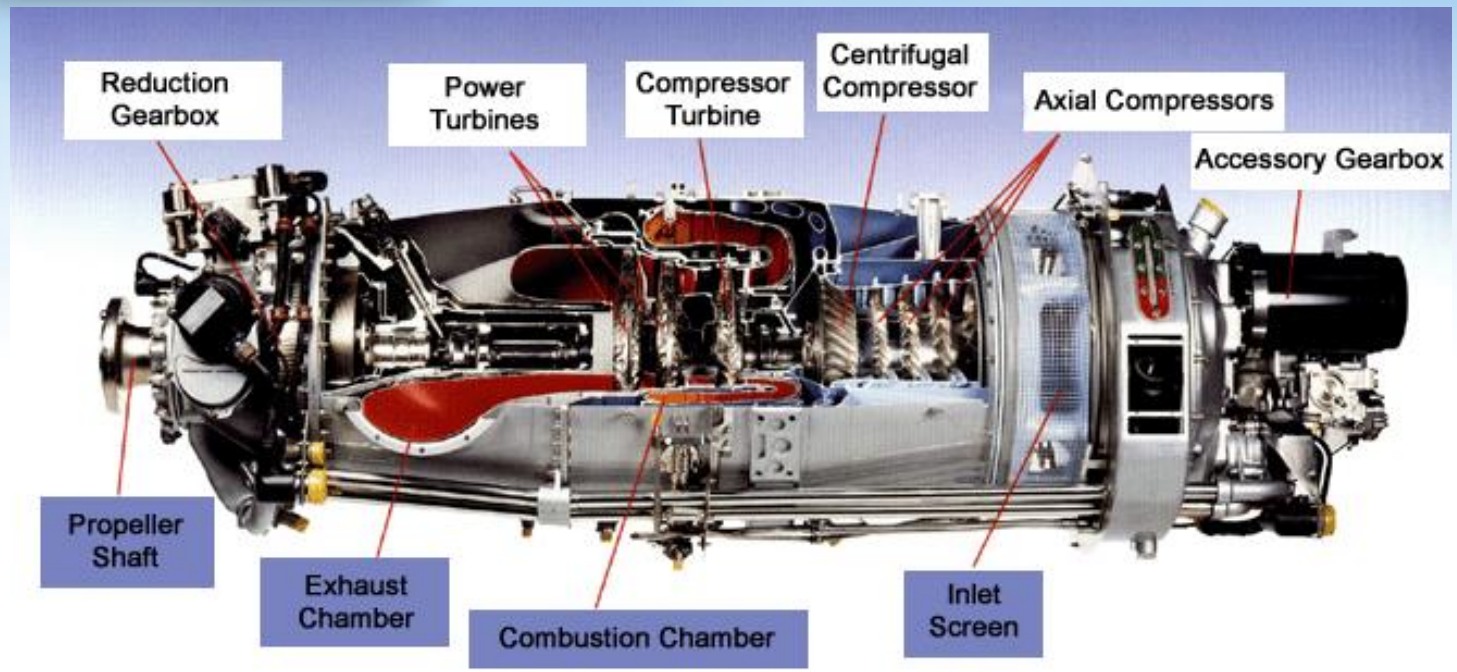
Before getting into the engine, just for clarification, various aircraft and engine manufacturers use different terms to identify the same thing. Sometimes even different models (from the same manufacturer) will use slightly different terminology when describing essentially the same thing.

Air Tractor AFM Term	Also used
“Start Control”	“Condition Lever”
“Run” position	“Ground Idle”, “Low Idle”
“Flight Idle”	“High Idle”

Engine

General PT6A Engine

- Pratt and Whitney PT6
- Reverse flow free turbine driving a gas generator and a reduction box
- Multi stage axial, single stage centrifugal compressor
- Engine options:



AIRCRAFT	ENGINE	HORSEPOWER (Takeoff)
AT-402A	-11AG,	550
AT-402B	-15AG/-34AG	680
AT-502B/-504	-34AG	750
AT-502A	-60AG/-65AG/-140AG*	1050/1100/867
AT-602	-60AG, -65AG	1050

**-Marketing name "502XP"*

Engine

General PT6A Engine

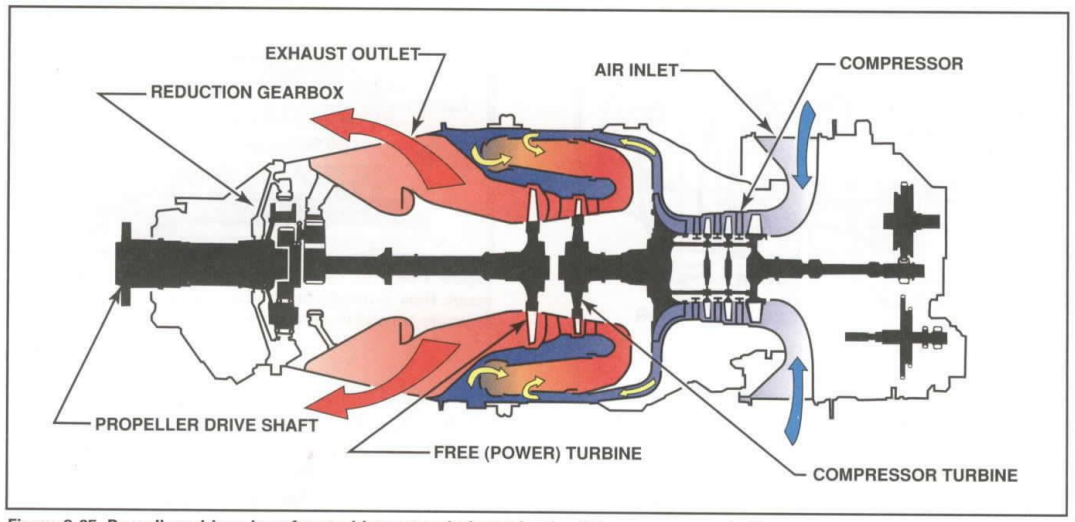
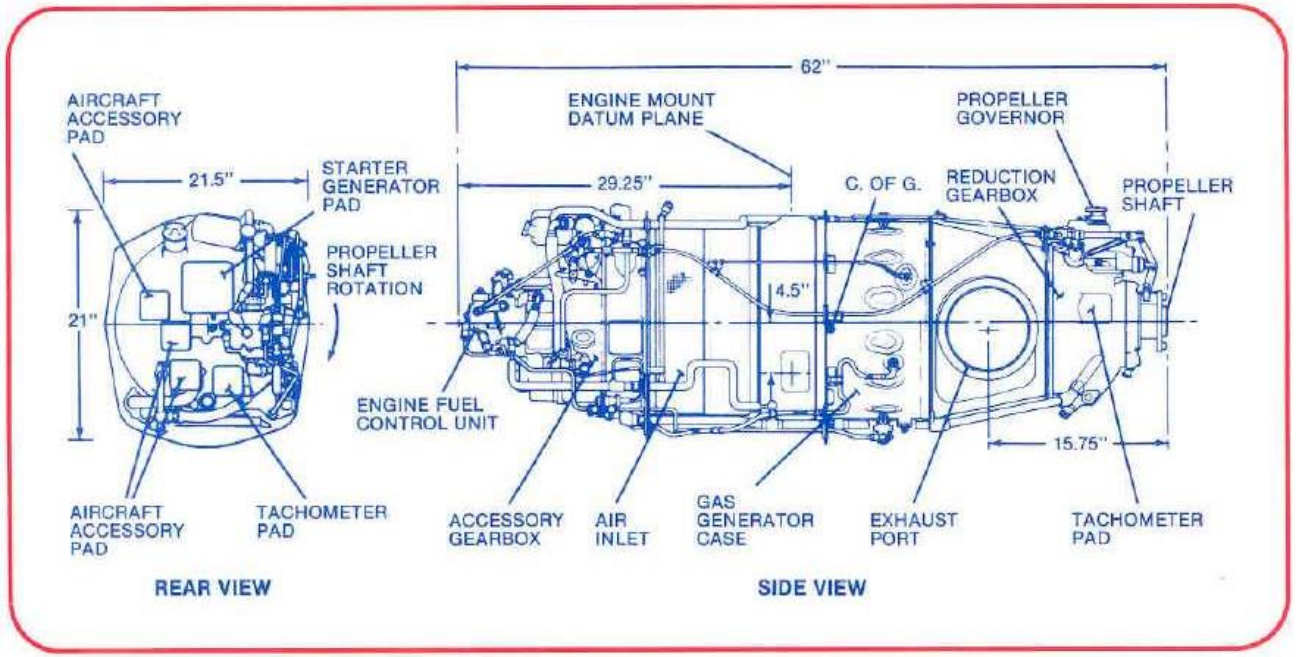


Figure 3-65. Propellers driven by a free turbine rotate independently of the compressor turbine.

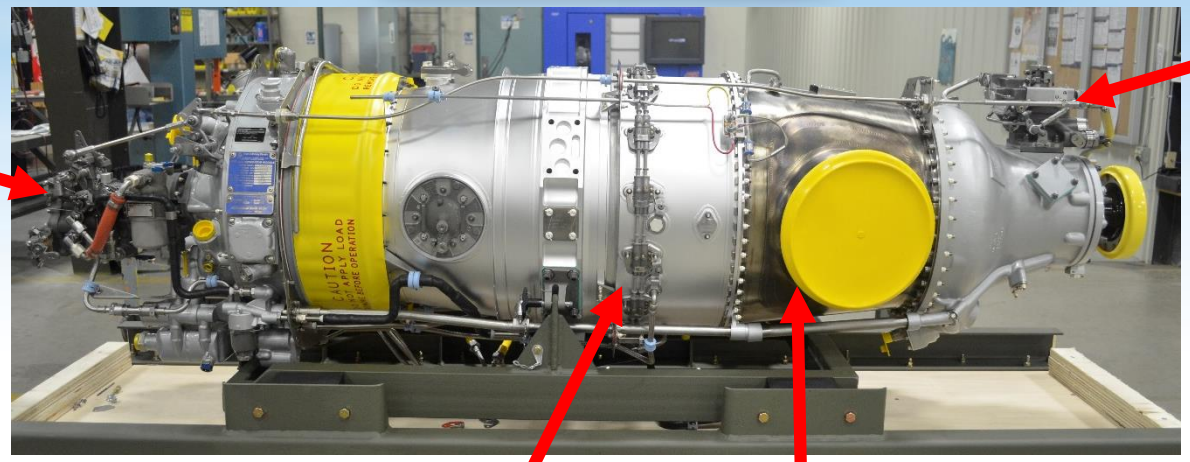


Engine

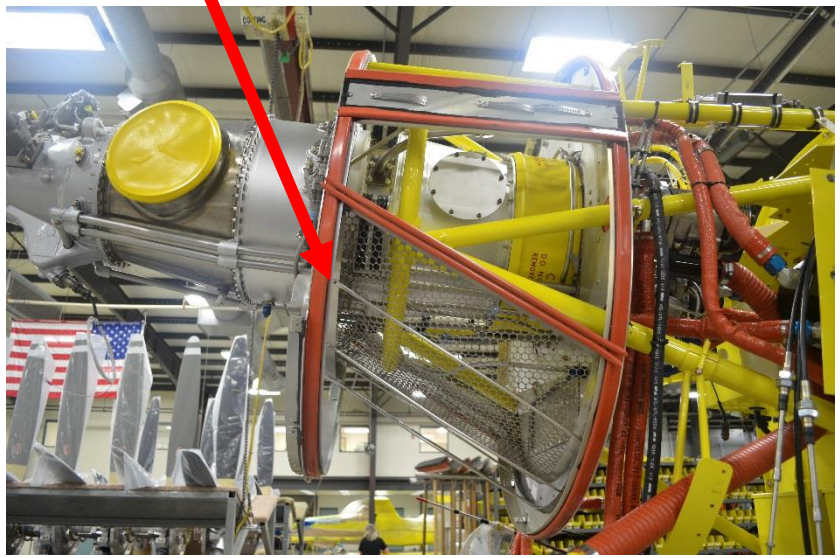
General PT6A Engine

Fuel Control Unit (FCU)

Propeller Governor



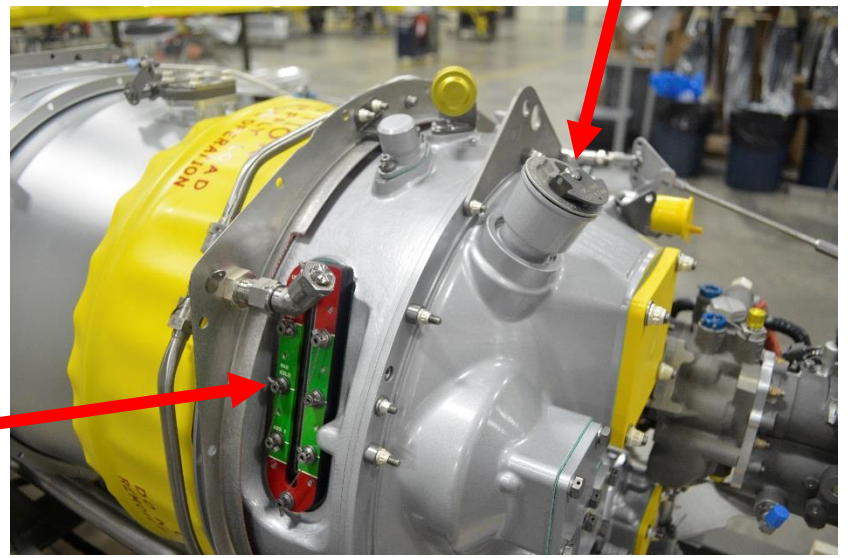
Air Intake (Plenum Cover removed)



Fuel Nozzles

Exhaust Port

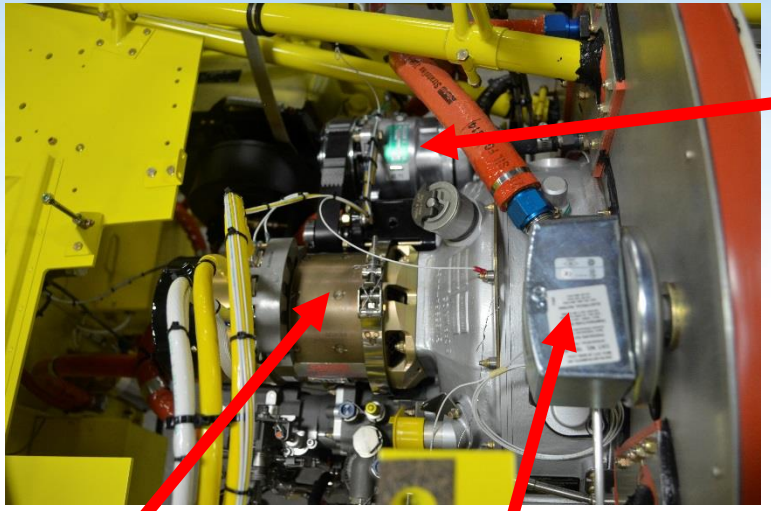
Oil fill and Dip Stick



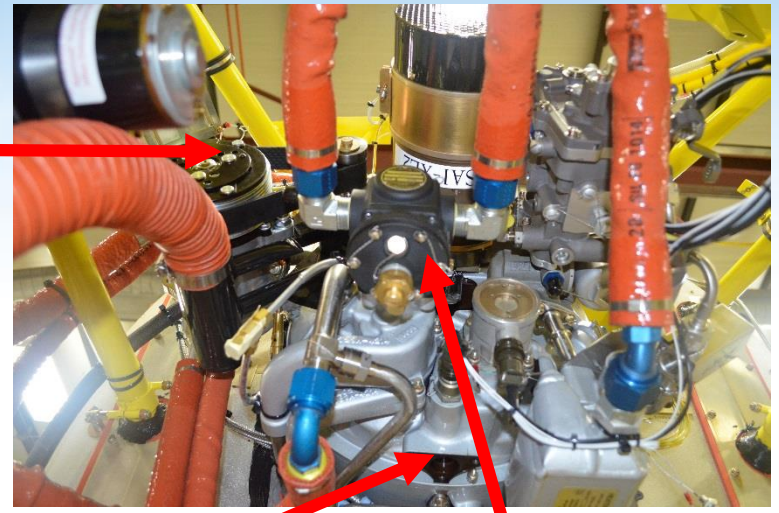
Oil Level Site window (only on some models)

Engine

Accessory Gearbox

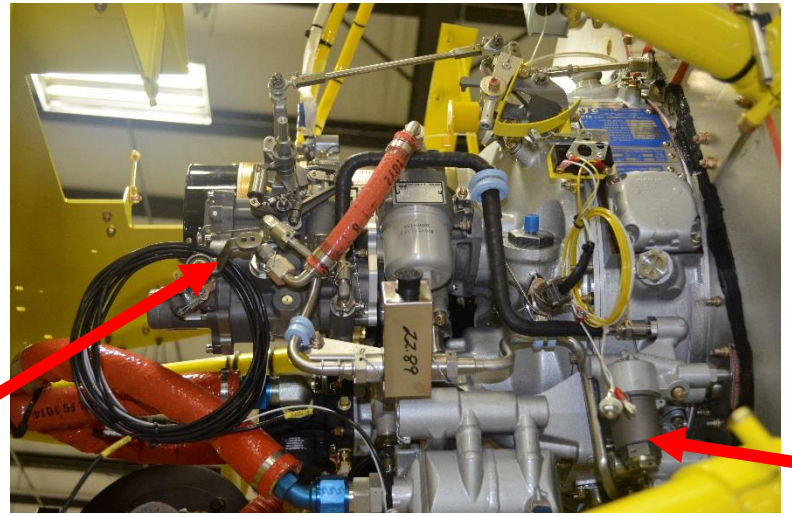


A/C Compressor, pulley system, and serpentine belt



Starter/ Generator

Induction Filter Pressure differential switch



Aft Chip detection sensor

Engine driven Fuel Pump (referred to as “airframe mounted”)

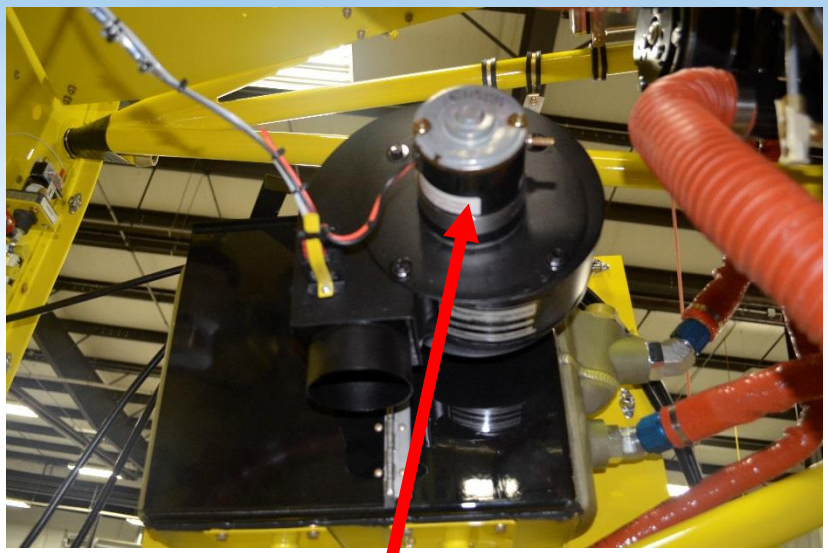
Fuel Control Unit: Contains its own internal fuel pump capable of providing fuel pressure to engine up to 10,000 ft (602 - 12,500 ft.)

P3 Filter (Compressor bleed air)

Engine

Oil System

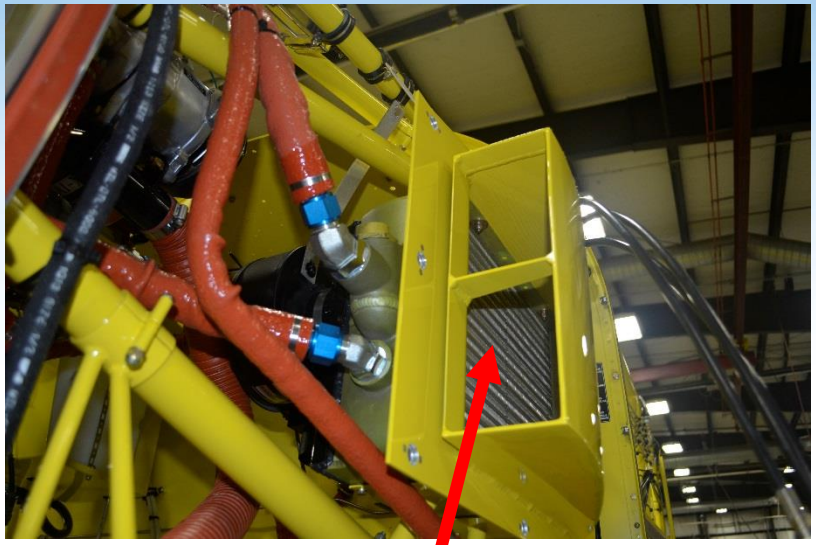
Blower fan installation on “large” PT-6 in the 502A and 602



Oil cooler blower motor: Provides cooling to engine oil cooler while engine is running with prop feathered on the ground.

Each PT-6 has it’s own characteristics of where it likes it’s oil level to be. Some operators find that it maintains a level between the 2 – 3 quart low mark rather than the 1. Overfilling will result in a severe mess in the engine compartment.

- All variants of the PT6 carries 10 quarts (9.2 on the smaller variants) of oil
- Only 6.0 qts usable
- Recommend filling the engine to 1 quart below maximum when hot.
- On the large PT6 there is a spring loaded check valve to prevent oil loss in the event the dipstick is not installed, because of this, make sure to add oil slowly to prevent overfill.



Oil Cooler air intake located on left side of engine cowling.

Many operators will only conduct a full oil change during the aircraft annual. This is due to the fact that unlike a piston engine, the turbine oil is only used to lubricate bearings, not metal to metal contact such as piston rings to a cylinder wall. This means the oil does not break down to the same degree as a piston engine.

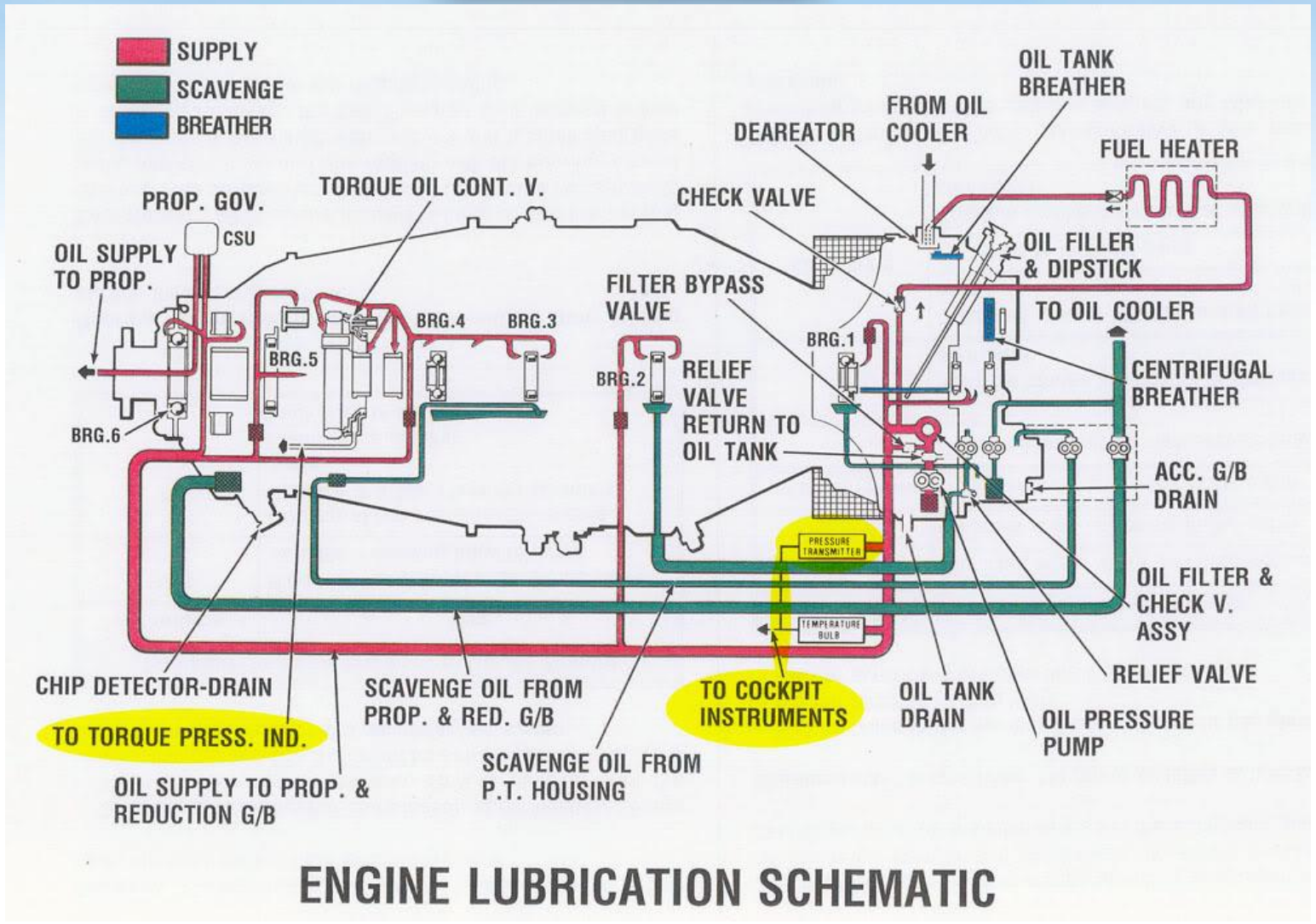
Engine

Venturi installation on “small” PT-6 in the 402, 502, 504

- The smaller PT6 installations of the 402, 502, 504 etc. use a Venturi style blower. It extracts compressor bleed air from outside the POV (at low power settings only) to drive the Venturi. At high power settings, the POV closes, and cooling air from outside is pushed across the cooler via the ram air scoop on the L/H side of the cowling.

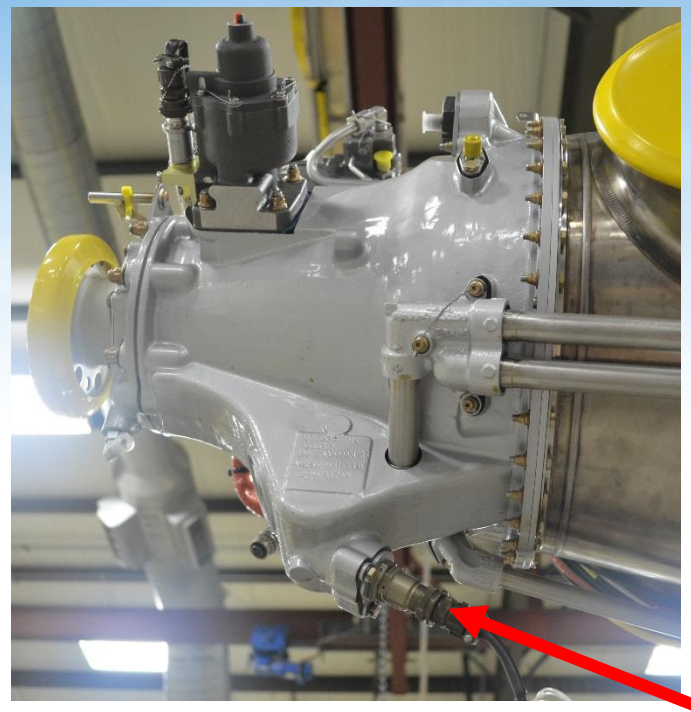
Engine

Oil System



Engine

Chip Detection



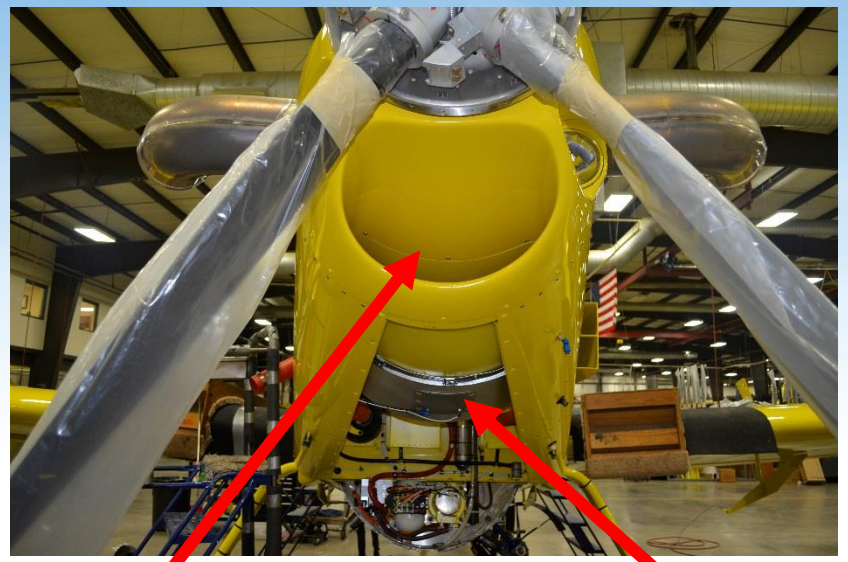
Forward Chip detect sensor (bottom of Propeller Gearbox)

Chip detection light

A Chip detect sensor is merely two small metal prongs spaced about 1/16 on an inch apart. When metallic debris passes between these it completes an electrical circuit that illuminates the Chip detect light. Early in an engine's life, under 500 hours, Chip lights may appear every now and then. This does not necessarily constitute an emergency. Most operators recommend just taking the plane home and notifying your mechanic. As the engine gains more time, then the light could become more serious. Continued operation is never recommended. (Not all Air Tractor's are equipped with dual Chip detectors, some don't have them on the accessory gearbox.)

Engine

Induction



Air intake

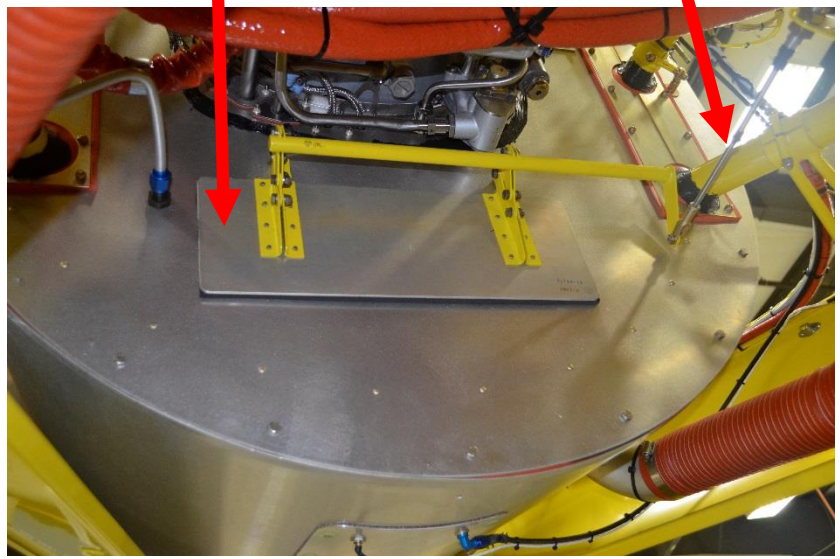
Intake Plenum with filter assembly

When flying through visible moisture always be aware of outside temperature. Induction icing is something the Air Tractor was not designed to handle and can result in an engine suffocating and flaming out. Some aircraft have alternate air source on the back of the intake plenum to help deal with an induction blockage.

If the alternate air source is used, realize that this is unfiltered, hot air being introduced into the engine. The higher heat will result in some loss of power and no air filter can result in blade and bearing erosion over a long period of time. Also, anytime the cowling is removed the alternate air door should be checked for a good seal around the edges to make sure warm air is not being introduced during normal operations.

Alternate air source (backside of plenum inside cowling)

Alternate air source control pushrod



Air Filter Light

The Air Filter light will illuminate when the pressure differential across the plenum assembly exceeds design limitation. This can happen sometimes during a high power takeoff if the conditions are right, this is normal. If the light illuminates during normal operations, the air filter may be developing a blockage and maintenance should be notified.

Engine Controls

- Engine controls located on left side of cockpit
  - Power, Prop, Start (Fuel) control levers connected to a series of pushrods

  (CAUTION: Damage may occur to linkage if Power lever moved to reverse while engine is not running)
  - Power: Normal forward operation; Reverse- depress Thumb Latch and pull lever aft
  - Propeller: Forward= high RPM; Full Aft= Feather
  - Start: Full Aft= Cut-Off; Middle= Low Idle (Ground); Forward= High Idle (Taxi and Flight in order to avoid operating prop in yellow range)
- Starter, Generator, Igniter switches located on Lower Cockpit Panel, right hand side
  - Start switch spring loaded to OFF
  - Ignitor Switch: Up = ON (only when starter engaged)/ Center = OFF / Down = Continuous

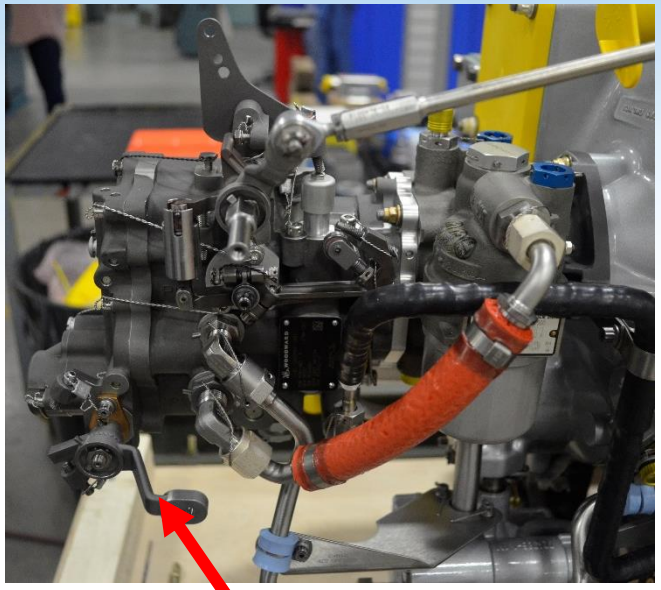
Starter Limitations:

- Motoring
  - Maximum duration of 30 seconds followed by 1 minute of cool down.
  - Can total 3 cycles, then must be allowed to cool for 30 minutes

- During engine start (per Air Tractor AFM)
  - If ITT fails to rise within 10 seconds after moving the Start Control lever to the “Run” position, shut off fuel (pull Start Control lever to “C” stop) and release Start switch. Allow 30 seconds for fuel to drain plus 5 minutes for starter cool down. Conduct a 15 sec dry motoring run and allow 10 minutes for starter cool down before attempting another start.

Engine

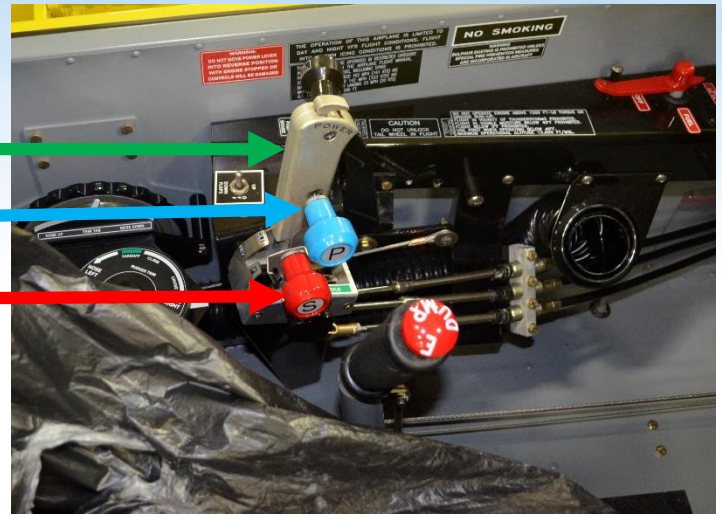
- FCU Manual Override
  - Red lever located on aft cockpit skin on pilot's left hand side
  - Used to modulate engine power if Fuel Control Pneumatic System malfunctions
  - Intended for Emergency use only and MUST BE OFF for normal operations
    - In case of emergency the Power lever must be in maximum forward thrust position to enable manual modulating of power via FCU manual override lever



FCU override lever

CAUTION
The fuel control manual override does not duplicate the normal fuel control functions and is not to be used as an optional means of controlling the engine. It is intended for emergency use only. Using the manual override lever results in overriding of all automatic control features associated with the normal usage of the power control lever.

Engine



POWER

PROPELLER

START

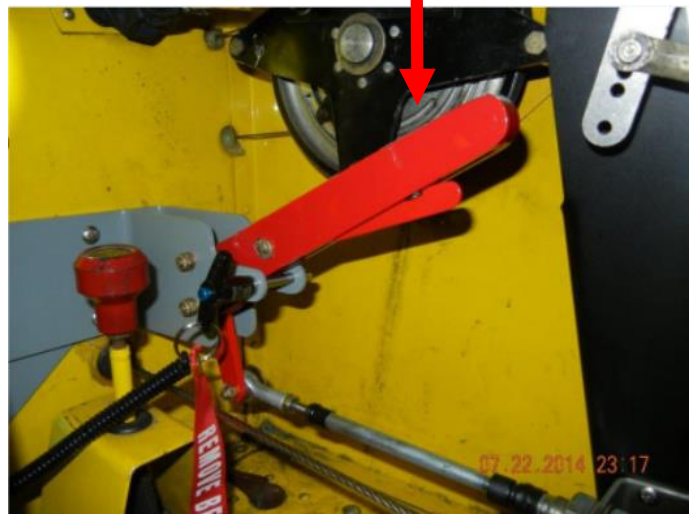
Start switch

Ignitor switch

Generator switch

Battery switch (MASTER)

FCU Override Lever



Propeller and Governor

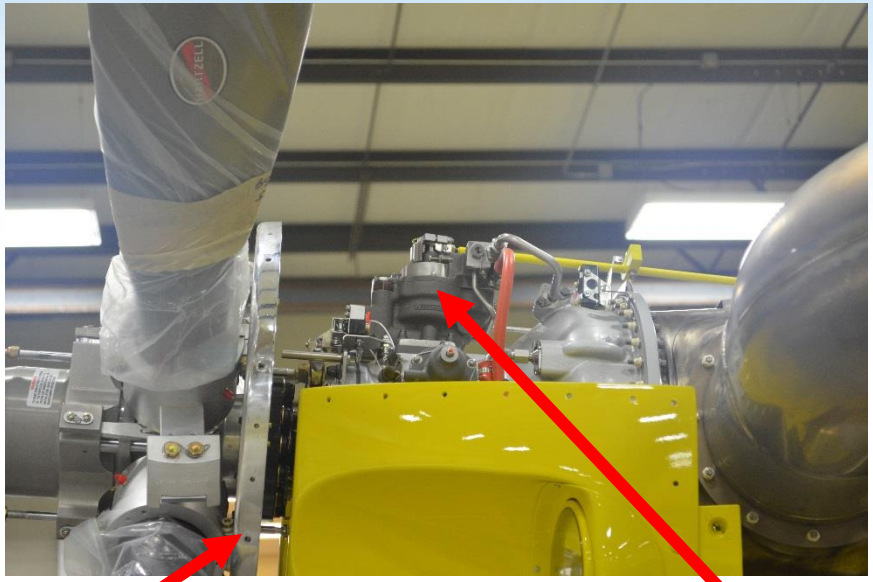
- Hartzell Constant Speed 3, 4, and 5 bladed propellers

AIRCRAFT	PROPELLER	DIAMETER (inches)
AT-402A/B/502B/504	3-blade, constant speed, hydraulic, reversible, feathering	102 – 106
AT-502A (-140AG powered)*	3-blade, constant speed, hydraulic, reversible, feathering	108-98
AT-502A (-60AG/-65AG powered)	3-blade, constant speed, hydraulic, reversible, feathering	102 – 106
AT-602	3-blade, constant speed, hydraulic, reversible, feathering	110.7-115.2

**-Marketing name "502XP"*

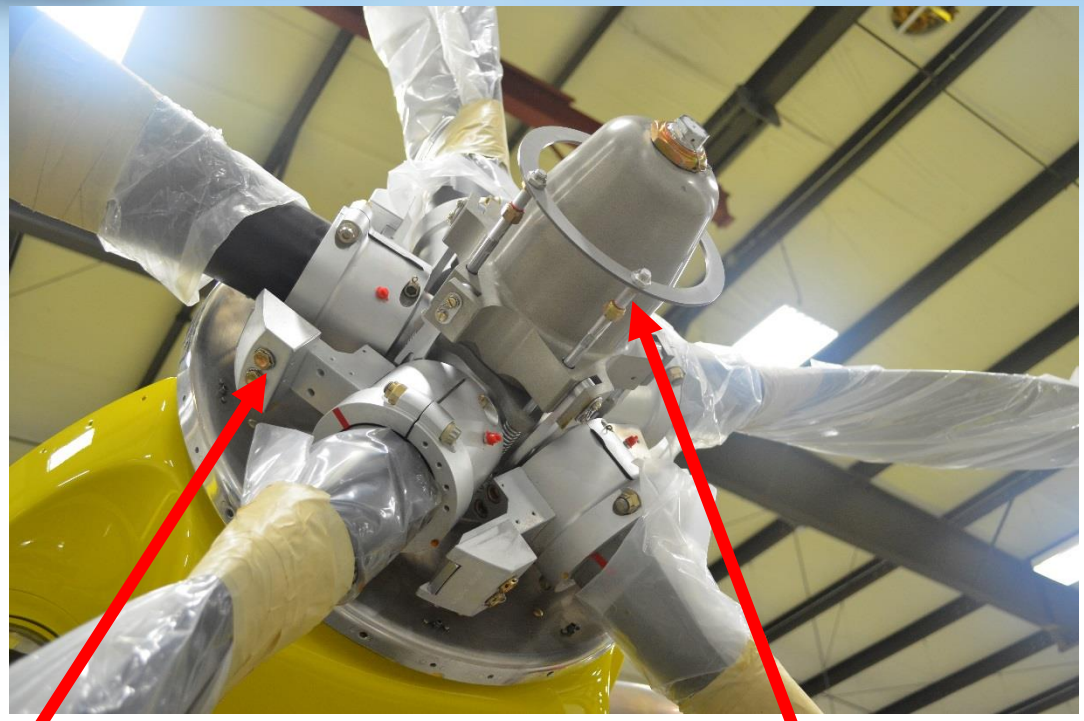
- Aluminum 102"-115.2" diameter depending on engine
- Constant Speed with Reverse and Full Feathering capability
- Woodward Over-speed Governor
  - Engages 4% over primary governor in the event of primary failure
  - Test function reduces rpm by 50 - 75 (+/- 60)

Propeller and Governor



Spinner back plate

Primary Propeller Governor



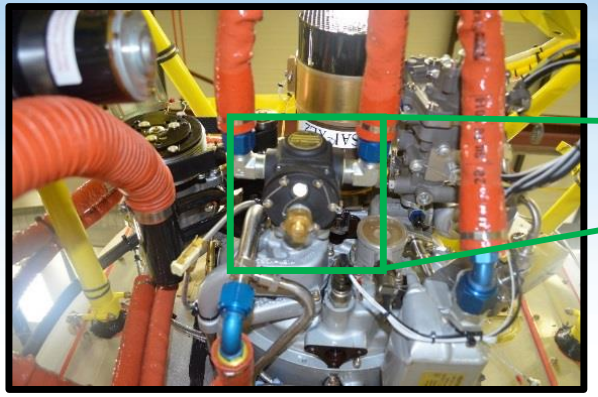
Centrifugal counterweights

Propeller low pitch stop

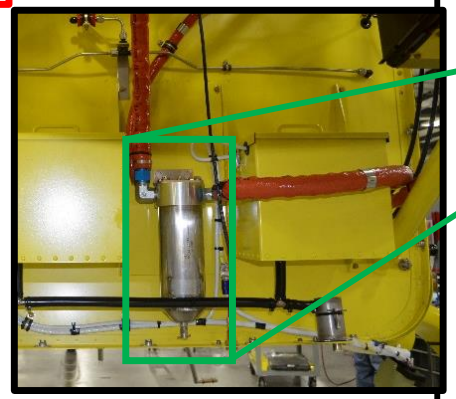
Fuel System

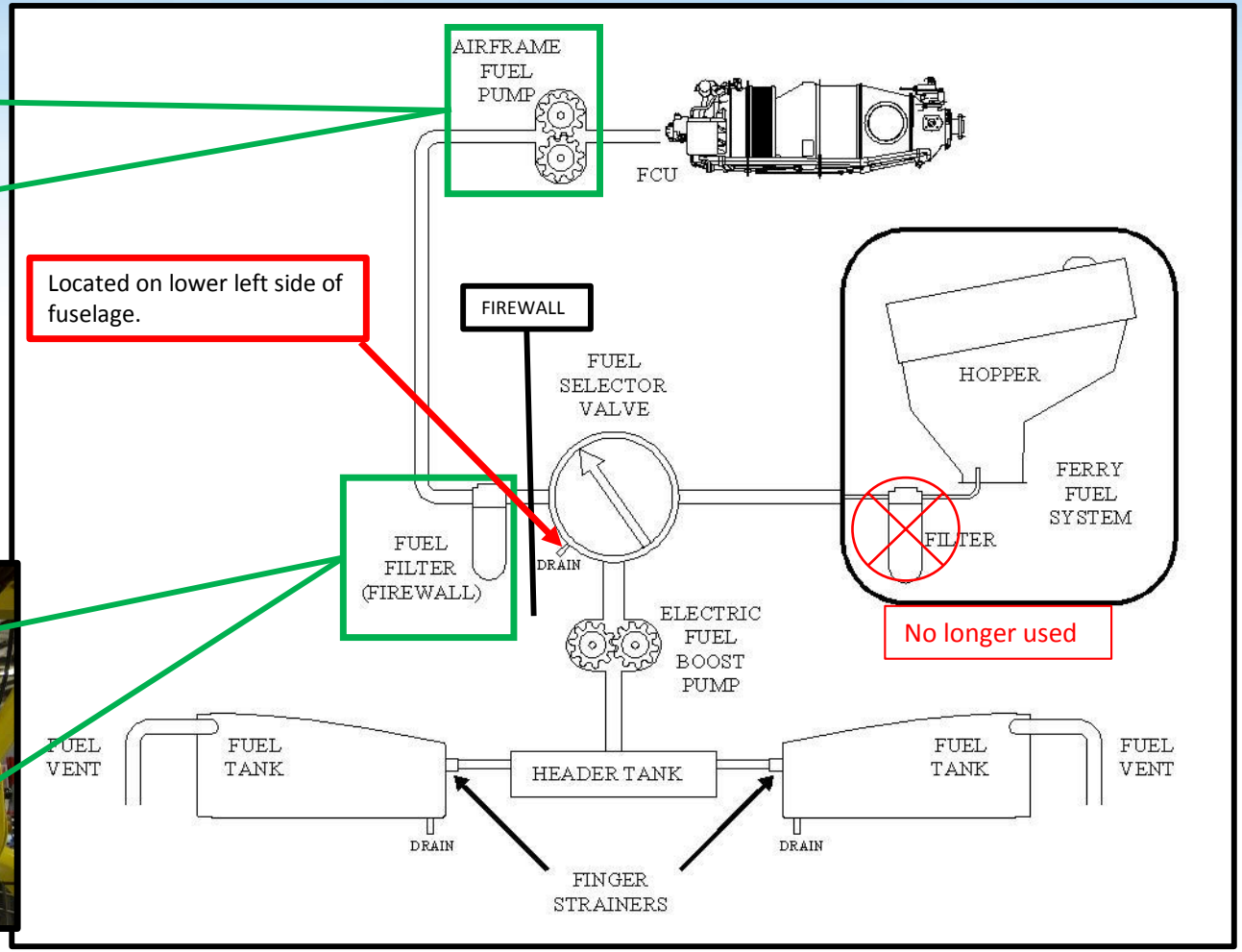
- 2 wet wing tanks: 120 -290 gallons depending on model and options
  - Optional additional wing tanks
- Both tanks feed into a common header tank
  - Fuel valve: MAIN and OFF on left side of cockpit forward of throttle quadrant (cannot select individual tanks)
- 2 Fuel gauges (If equipped with MVP-50, all indications are on the one digital screen along with fuel flow)
  - Note: Half a tank remaining is not half of the gauge
  - 4 Gallons in each wing tank ungaugeable
- Strainers in each tank, main fuel filter located forward side of firewall
  - Fuel Filter Warning light will illuminate in the event of a clogged firewall fuel filter (the is a bypass on this filter that will allow fuel to continue to the FCU, but if the FCU filter clogs, flameout can occur)
- Single electrical airframe mounted fuel pump and engine driven fuel pump both capable of delivering fuel to the fuel control pump at a minimum of 15 psi
  - The engine driven pump operates continuously while the electrical boost pump is only used to pressurize the lines prior to starting and as a back-up to the engine driven boost pump.
  - The Fuel Control Unit (FCU) has its own fuel pump as well that is capable of providing fuel to the engine with unrestricted operation up to 10,000 ft (402/502) and 12,500 ft (602) msl.
- Fueled via over wing fuel caps
  - Optional single point refueling common on a lot of aircraft. Relocates fueling port to lower left aft side of fuselage.

Fuel System



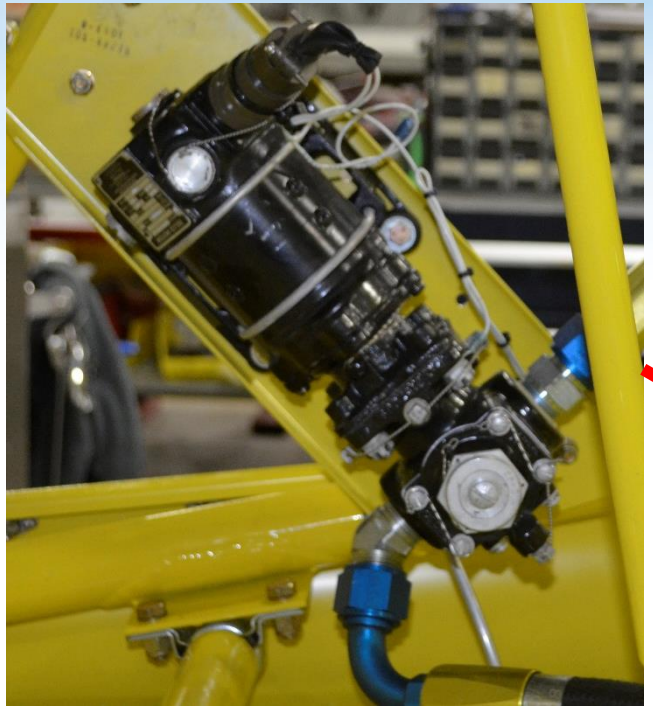
Fuel Filter Warning Light

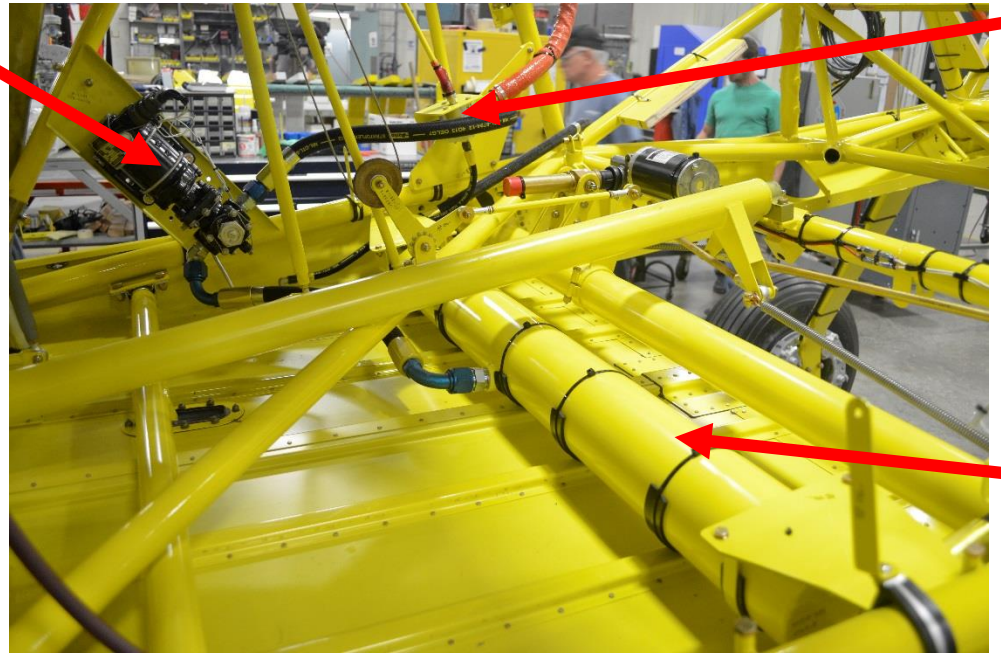


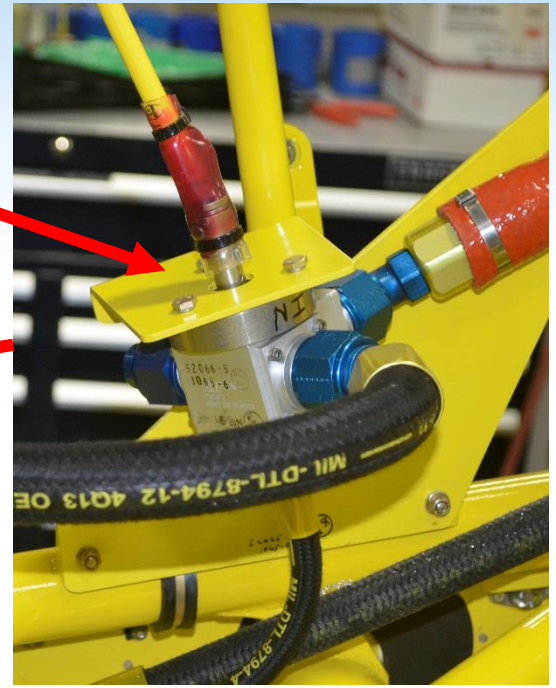


Fuel System

Fuel Selector Valve







Airframe mounted fuel boost pump (electrical)

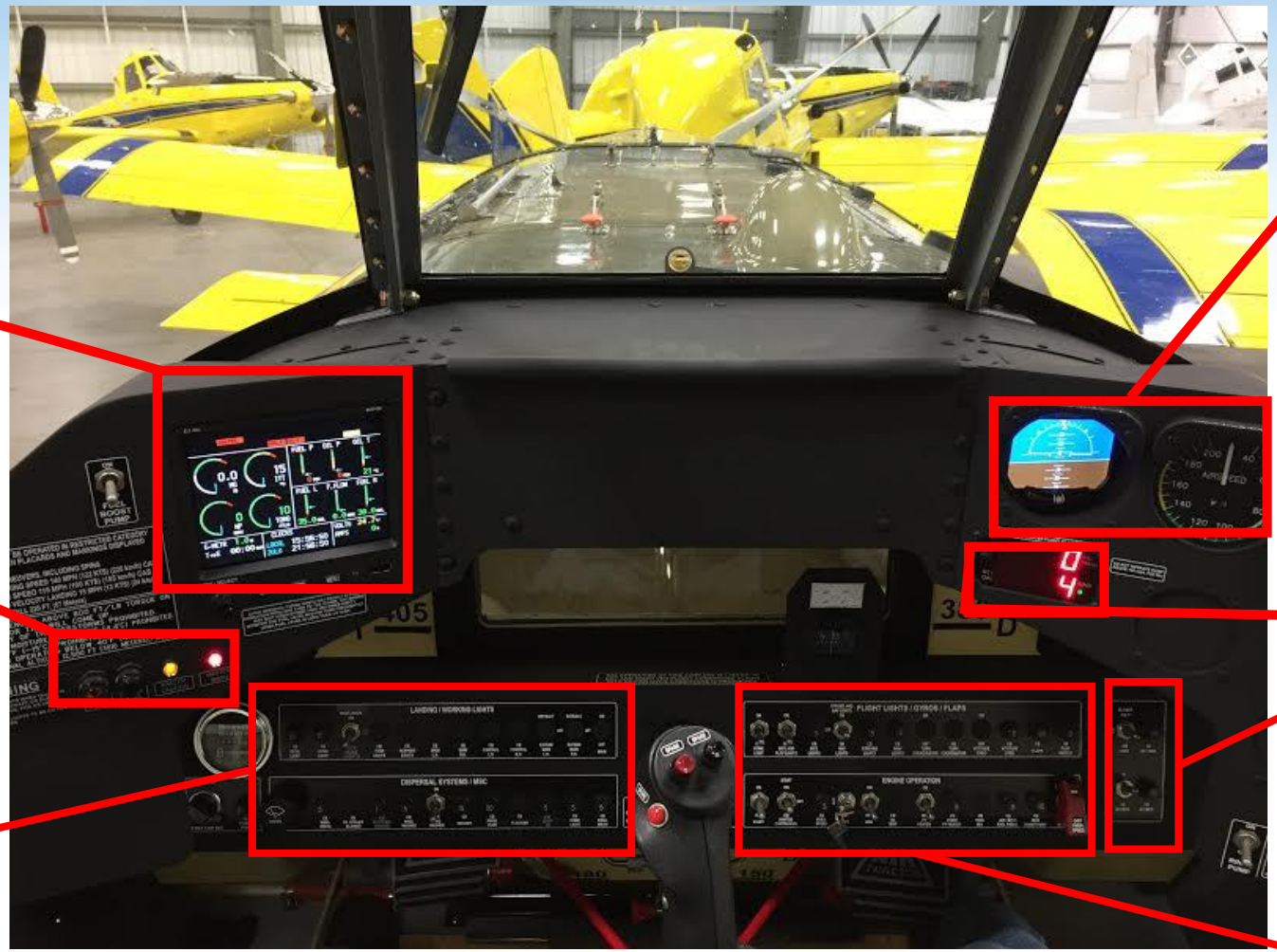
Header tank

Electrical

- 24 volt 250 amp system
  - Lucas 250-Amp 28-Volt starter generator (SG)
  - Generator Control Unit (GCU) - mounted R/H side below cockpit floor
  - Line Contractor Relay (LCR) – right side of firewall
  - Start Relay – right side of firewall
  - Start Switch – Lower instrument panel
  - Generator Switch – Lower instrument panel
  - Pilot's Panel Voltmeter – Lower instrument panel
  - Low Voltage Warning Light – Upper instrument panel
  - 15 amp GCU Circuit Breaker – Lower instrument panel

Electrical

Panel Layout will vary depending on model and owner preference



MVP 50 Engine Monitoring System

Fuel System monitoring and Caution/Warning Lights

Upper: Landing/ Working Lights
Lower: Dispersal System

Flight Instruments and Hopper Quantity Display

Dispersal Monitoring system: displays hopper quantity and boom pressure

AC and Blower Operation

Upper: Flight Lights/Gyros/Flaps (CBs)
Lower: Engine Operation

Electrical

MVP 50 Engine Monitoring System

Fuel System monitoring and Caution/Warning Lights

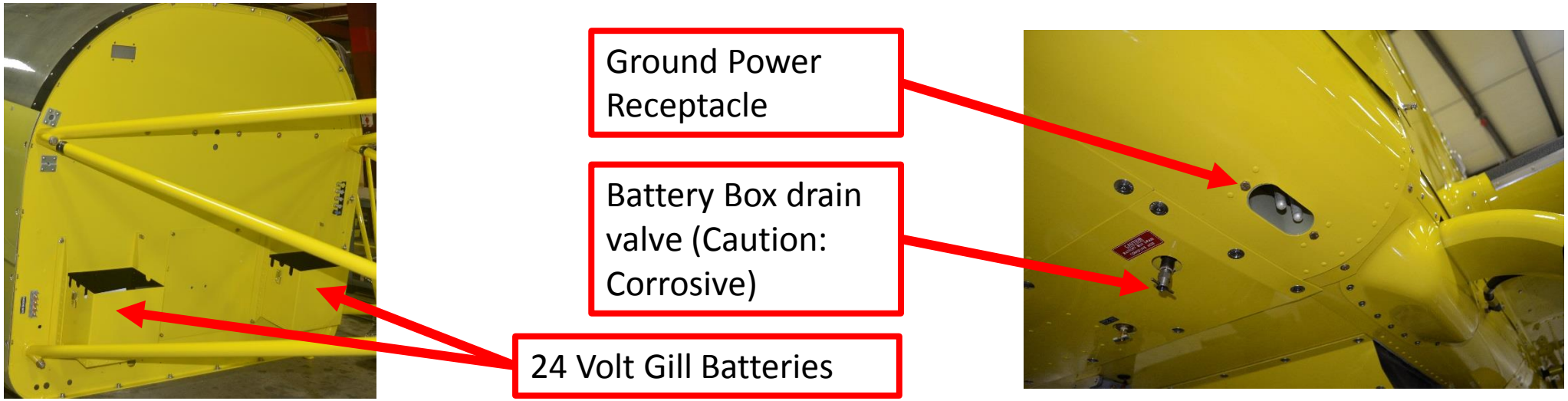
Flight Instruments and Hopper Quantity Display

Dispersal Monitoring system: displays hopper quantity and boom pressure

AC and Blower Operation

Electrical

- 2 Gill 24-volt batteries (63 amp-hrs) wired in parallel for high cranking power, mounted at the base of the firewall (502A -60AG/-65AG and 602 are 3 battery systems)
  - Ground start receptacle on lower left side of cowling
    - Should be used if less than 24 volts in the batteries to prevent a hot start



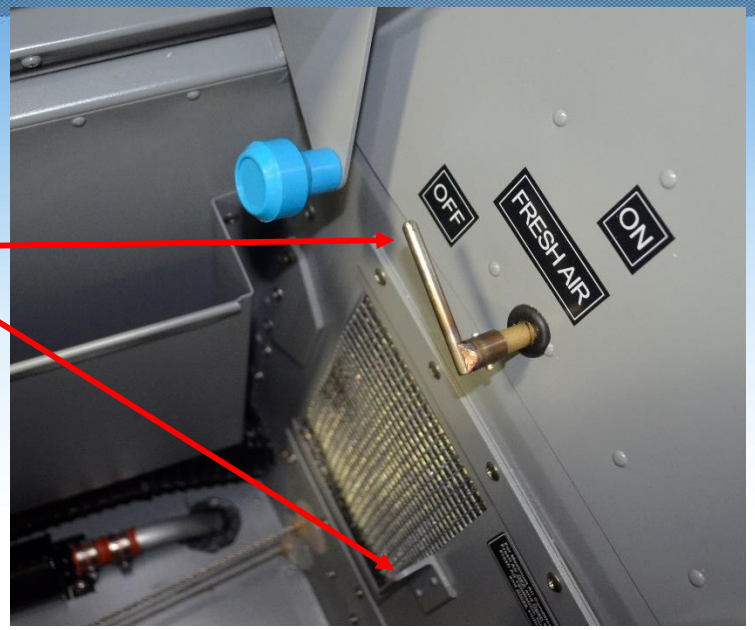
Air Conditioning

- Gas-cycle system allows for outside ram air, re-circulated cockpit air, or a combination
  - Ram-air lever: aft wall of cockpit, right side

- The air conditioner compressor is engine driven from a splined drive pad on the accessory gear box (AGB). A machined brass quill shaft (designed as a shear point in the event of compressor failure) connects the engine AGB to the compressor drive belt. The quill shaft will fail in torsion, preventing the failure loads from being transmitted into the engine AGB.

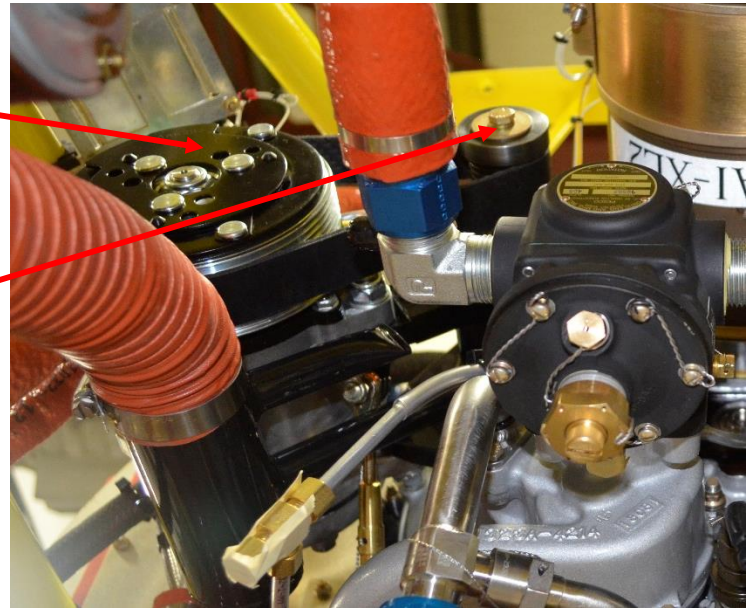
If while running the air conditioning for an extended period of time you start to notice the air temperature increasing, turn of the A/C because the evaporator coil has started to freeze up (often caused by the cockpit recirc door either not open, or blocked). Allow it to warm up and thaw out, then continue normal operation.

If running recirculating air; Fresh Air lever – OFF, Cockpit Air Door - OPEN



Air Conditioning Drive Pulley and Serpentine Belt

Machined brass quill shaft



Air Conditioning

- Air Conditioning master switch (BLOWER ONLY/OFF/AIR COND.): allows for blower forced air circulation without air conditioning
- Blower Switch (HIGH/MED/LOW): blower is ON anytime the A/C Switch is not OFF

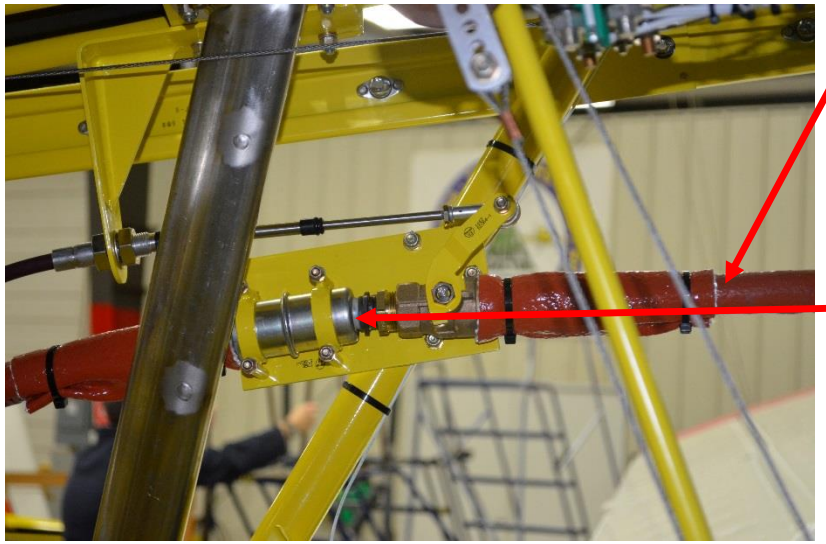
A/C Switch
UP – Blower Fan only (ambient air)
CENTER – OFF
DOWN – Air Condition (Cool air being supplied from compressor on engine accessory case)

Fan Operation:
Basic Low, Medium, and Hi speeds

Heating

- Bleed air off compressor section of the turbine routed to an ON-OFF valve on the left-hand side of the fuselage just forward of the cockpit.
- Actuated by pulling a cable on the left side of the pilot's seat.

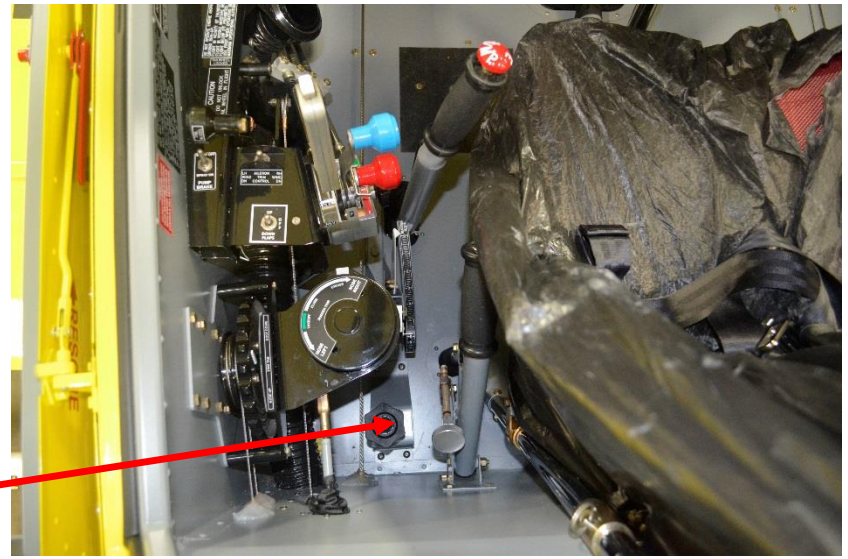
Be advised, the bleed air can get very hot in this aircraft if left unattended. It has been known to melt plastic parts when operated at full power.



Bleed Air off of compressor

Bleed Air muffler under left side of cockpit floorboards. Diffusor in cockpit floor.

Vernier type control knob



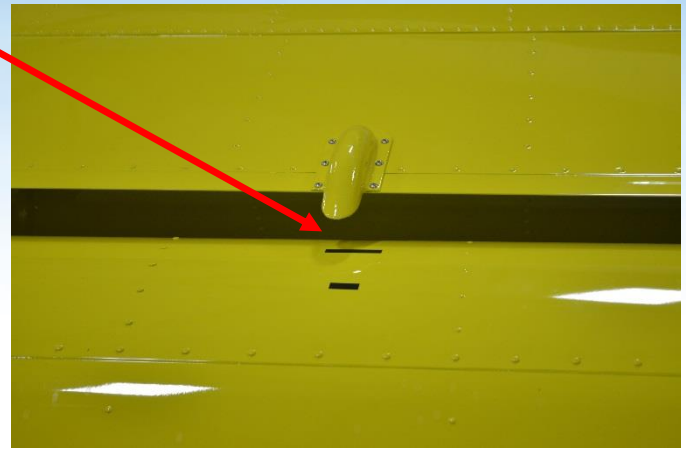
Flight Controls

- Ailerons and Elevator: push-pull tubes through bell cranks to the control surface
- Rudder: stainless steel cables
- Flaps: Fowler type electrically driven by jack screw to a torque tube
  - Can be stopped anywhere between 0 and 30 degrees of travel
  - Controlled by toggle switch mounted just aft of throttle quadrant
  - 10 deg increment markings on left wing appear as flaps are extended
  - On 402, 502, and 602 series, the ailerons droop with the flaps

The flap motor goes through a lot of heavy operation on Air Tractors. So be aware of when your flaps reach a fully retracted position and don't try to continue to operate them beyond that. A limit switch is installed to stop them at full up, but if this fails or is set slightly wrong can could be applying a high amount of increased stress on the flap torque tubes.

Flight Controls

Fowler style Flaps with increment marking on left flap. (small fiberglass fairing contains a light for night illumination)



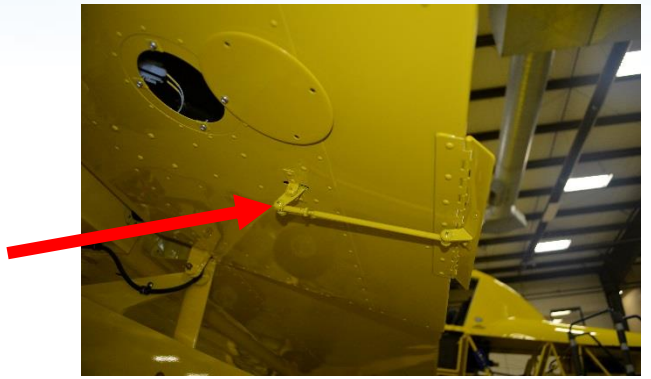
Conventional rudder and elevator controls

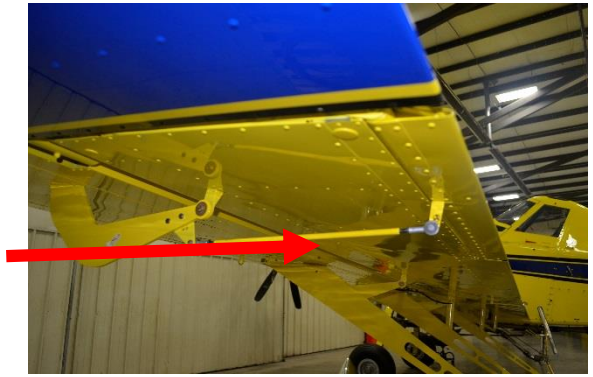
Large span ailerons with control assist servo tabs provide good roll control.

Flight Controls

Trim

	Pitch Trim	Roll Trim	Yaw Trim
AT-402A/B	Cockpit controlled lever	Ground adjustable – bendable tabs	Ground adjustable – hinged tab and pushrod
AT-502B & 504	Cockpit controlled lever	Ground adjustable – bendable tabs	Ground adjustable – hinged tab and pushrod
AT-502A, 502XP	Cockpit controlled lever	Ground adjustable – bendable tabs	Cockpit controlled - wheel
AT-602	Cockpit controlled lever	Cockpit controlled, electric servo tab (L/H) and bendable tab (R/H)	Cockpit controlled - wheel





Dispersal Systems

Rinse and Smoke

- Rinse System: 18 gallon tank mounted forward of the firewall on the top side of the engine mount. Used to rinse chemical out of the hopper after use. Controlled by spring loaded switch on lower left instrument panel.

- Smoke System: 2 gallon tank with electric pump motor on the box
  - Smoke oil tank located just aft of cockpit on left side. Fill port is on the left side of fuselage just aft of the door at the base of the cockpit canopy.
  - Total quantity is approximately 2 gallons and is pumped into the right exhaust stack
  - Activation is via a press and hold button on the control stick.

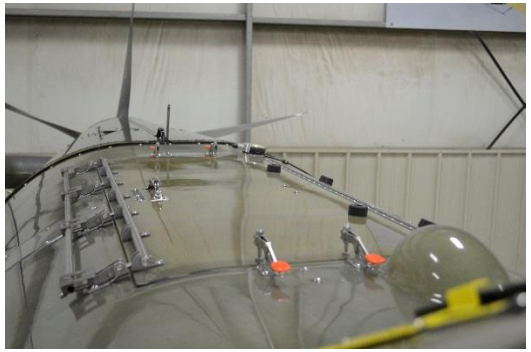
Dispersal Systems

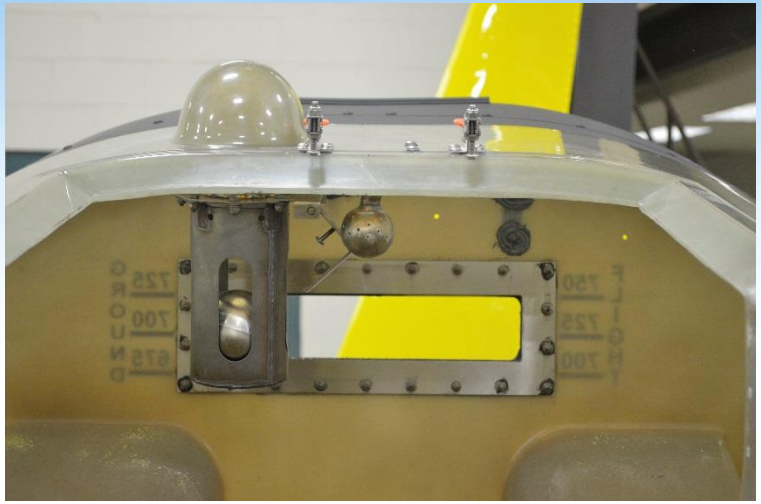
Agricultural

400 – 600 Gallon single piece fiberglass hopper depending on model

Hopper quantity gauge

Air tight lid with over-center latches





- Components
  - 2.5 in. stainless or aluminum plumbing and streamlined extruded stainless or aluminum booms
  - 48 nozzles (drilled and tapped for an additional 48 if desired)
  - Spray Pump; Agrinuatics 3 in. capacity
  - Fan: Lane Electric Brake (Weath-Aero, a less common option)
  - Control Valve
  - Strainer
  - Gate Box
  - Hopper Vent
  - Flow Meter

Dispersal Systems

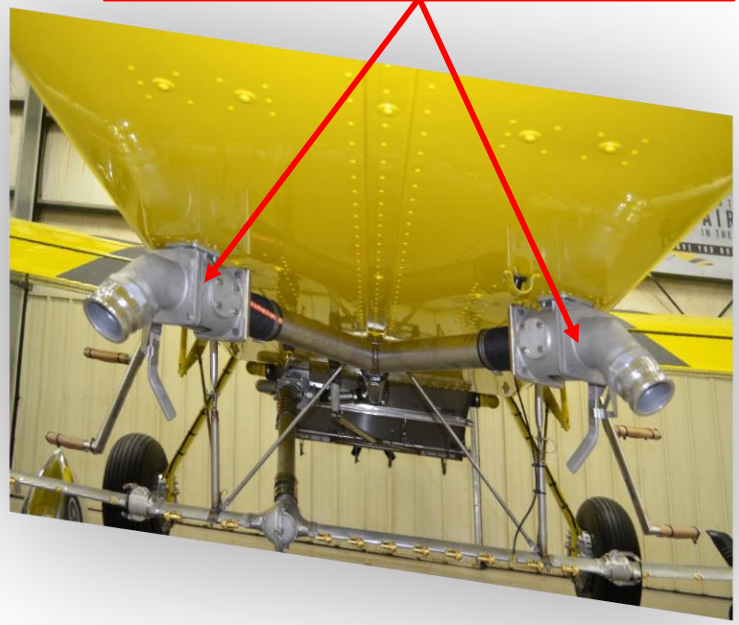
Agricultural

Hopper Vent
(Open end points aft for wet chemical, forward for dry)

Spray Pump

Hopper Gate Box

Dual filler ports (optional, common setup is just one)

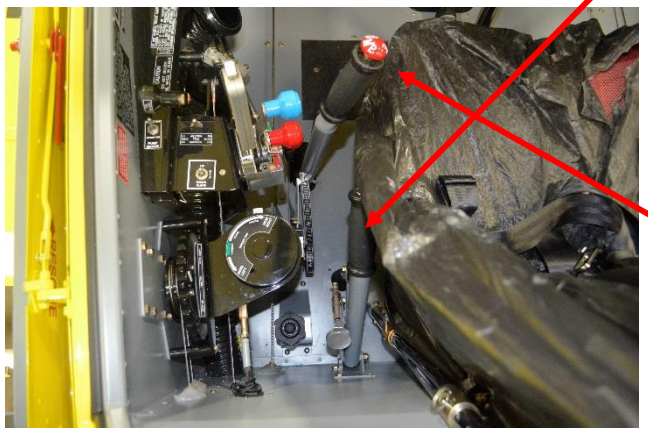


Spray Nozzle

Dispersal Systems

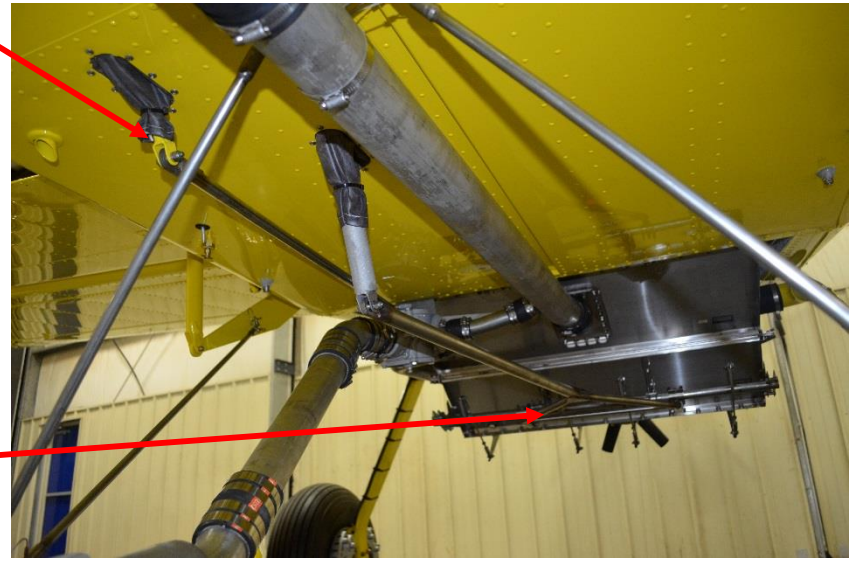
Agricultural

Lane Elect Pump Brake and Fan



Control Valve and spray handle (“money handle”) for normal spray operation

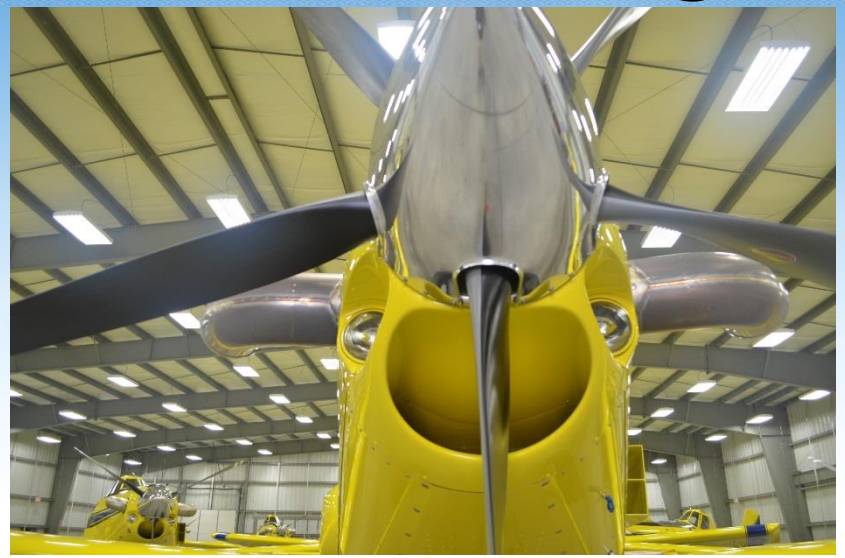
Emergency Dump Gate



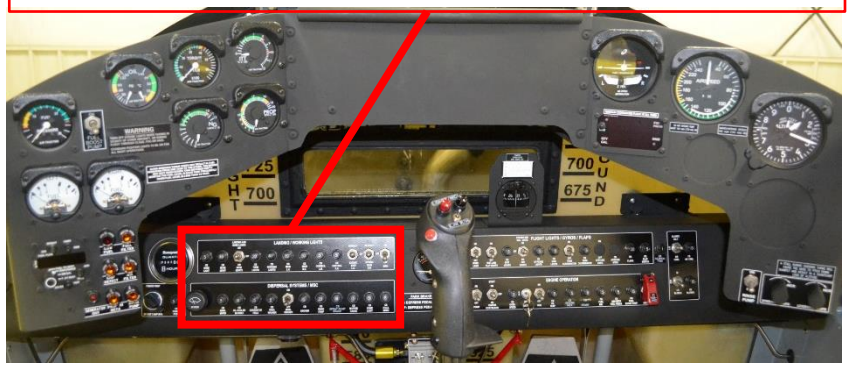
- Switching from liquid to dry material
  - Remove only the pump and booms
    - For extended fertilizer use, the center boom assembly and control valve should be removed to prevent fertilizer from getting into the valve assembly
      - Can be accomplished in a few minutes by removing stainless T-pins that support the center boom assembly and removing the bolts that attach the valve to the stainless bracket
  - The hopper vent tube is welded 3” stainless steel tubing inside the hopper.
    - The vent tube protruding from the side of the adapter box is aluminum and points backwards when liquid material is being used, the slight negative pressure prevents fumes from escaping around the lid. It must be rotated forward to provide positive pressure inside the hopper when dry material is used. This allows for a smaller gate opening for a given poundage which reduces the blockage effects of the door opening into the slipstream.
  - Various optional spreaders and gateboxes are available

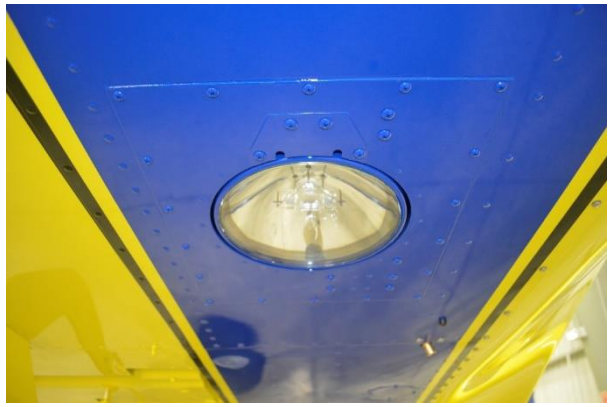
Lighting

- Exterior Lights
  - Dual taxi/nose lights on engine cowling, Nav and Anti Collision lights on wingtips
  - Retractable forward facing landing lights
- Work Lights
  - Detachable turn lights (must be attached/detached prior to flight)



Upper: Landing/ Working Lights
Lower: Dispersal System
(May also be attached to a small toggle switch on the control stick)





Aircraft Systems

- Airframe construction
- Engine
- Propeller
- Fuel System
- Electrical
- Heating and Air Conditioning
- Flight Controls
- Dispersal Systems
- Lighting

NORMAL OPERATIONS

- Preflight Inspection
- Before Engine Starting
- Engine Start (Battery)
- Before Taxi
- Before Takeoff (Runup)
- Takeoff
- Climb
- Cruise
- Descent
- Before Landing
- Approach
- Balked Landing
- Shutdown and Securing

Preflight Inspection

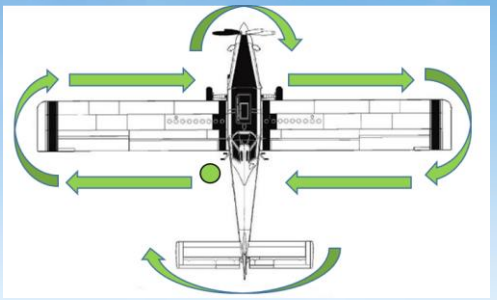
Cockpit Check

1) Control Lock - STOW
2) Parking Brake – OFF (Take terrain into account)
3) Battery – ON
4) Voltmeter – 24 Volts min for battery start
5) Fuel Quantity Gauges – Check
6) Flaps – EXTEND
7) Battery – OFF
8) Power, Prop, Start Levers - AFT

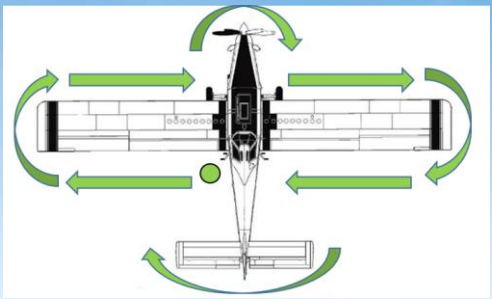
Preflight Inspection

Exterior Check

1) Baggage Door – CLOSED and FASTENED
2) Booms, Spray Nozzles, and Fittings – CHECK for leaks and secure
3) Flaps – CHECK secure
4) Aileron – CHECK secure, no slop, servo arm moves opposite of aileron, and trim tab secure
5) Wing Tip – NO Damage, NAV/Anti Collision lights secure, turning light fully stowed
6) Fuel Vent Tube – Clear no obstructions
7) Pitot Tube – Lift cover and check clear
8) L/H Fuel Cap – Visually check secure
9) Left Wing Fuel Sump – Drain and check for debris/water
10) Header Tank Sump – Drain and check for debris/water



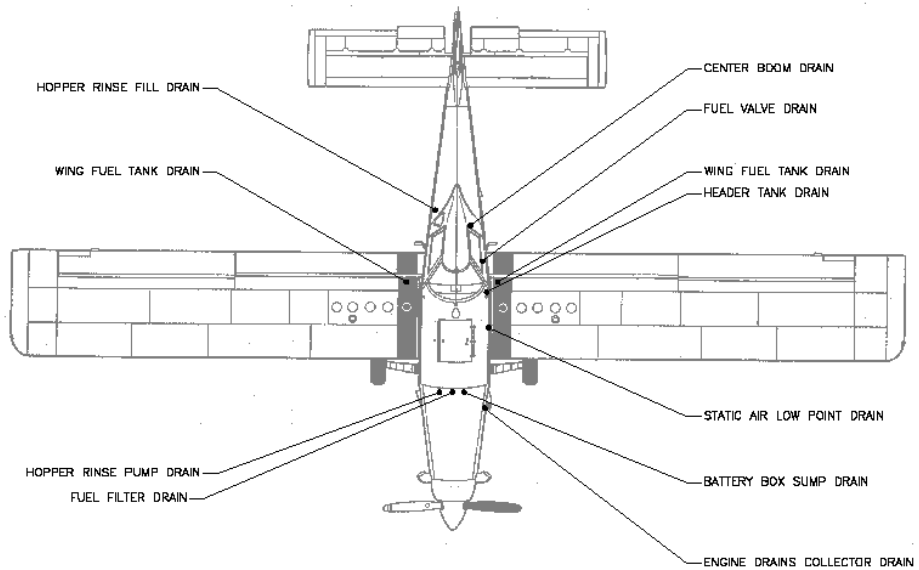
Preflight Inspection



Exterior Check (Drain locations 402)

1 OK TO USE PARTS MADE		4 NOW SHOP PRACTICE	
2 PARTS MAY BE REWORKED		5 SCRAP EXISTING PARTS	
3 RECORD CHANGE		NOTED	

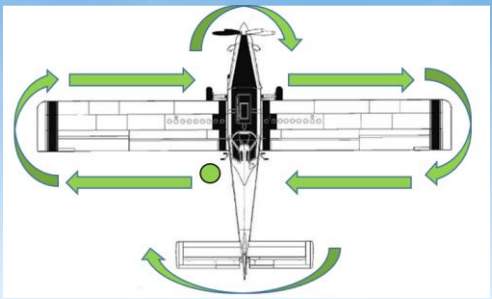
LETTER	EFFECTIVITY	CHANGE	REF	DATE	BY	CHK
			☐			



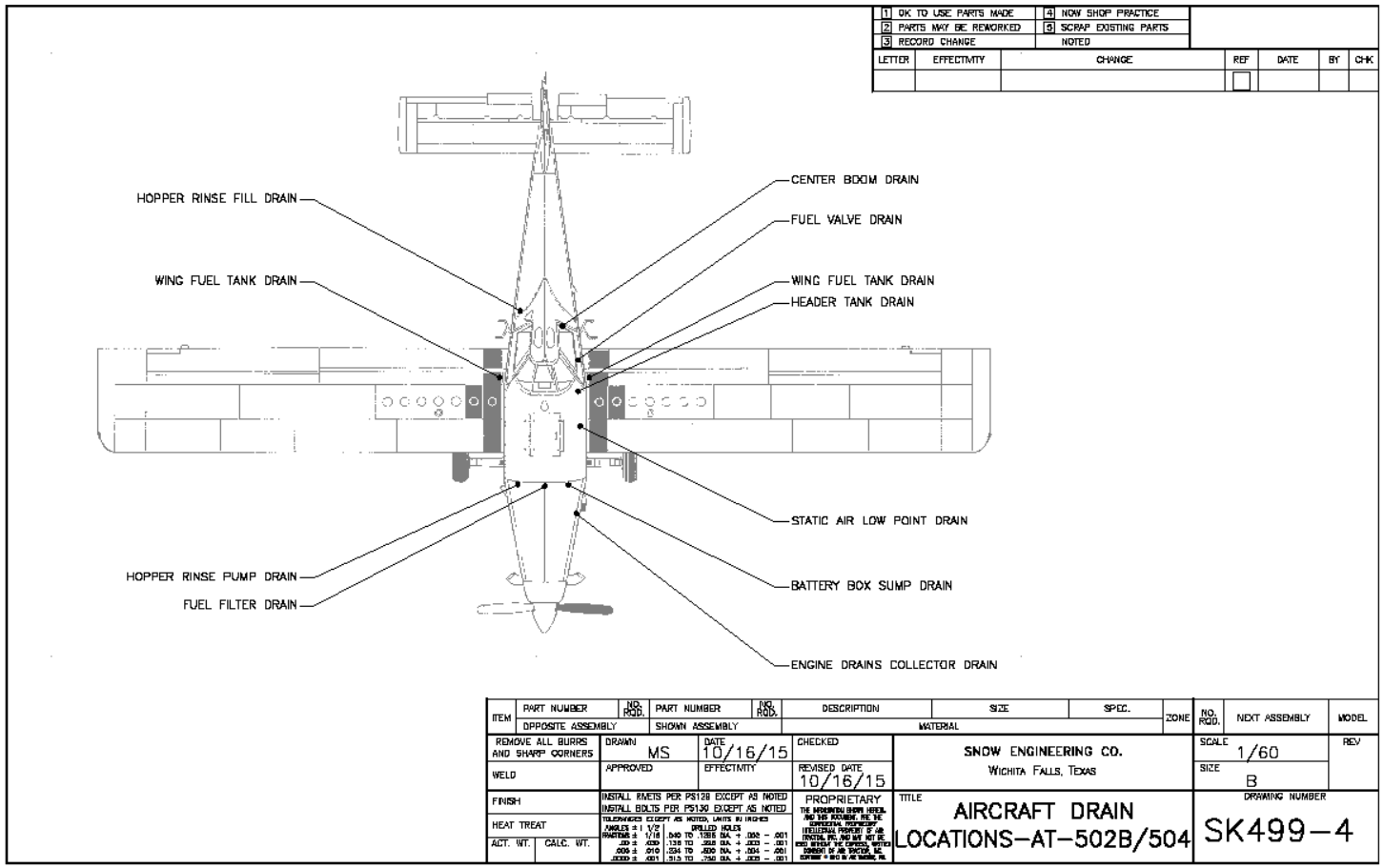
ITEM	PART NUMBER	NO. REQD.	PART NUMBER	NO. REQD.	DESCRIPTION	SIZE	SPEC.	ZONE	NO. REQD.	NEXT ASSEMBLY	MODEL
	OPPOSITE ASSEMBLY		SHOWN ASSEMBLY		MATERIAL						

REMOVE ALL BURRS AND SHARP CORNERS	DRAWN MS	DATE 10/16/15	CHECKED	SNOW ENGINEERING CO. Wichita Falls, Texas	SCALE 1/60 REV
WELD	APPROVED	EFFECTIVITY	REVISED DATE 10/16/15		SIZE B
FINISH	INSTALL RIVETS PER PS130 EXCEPT AS NOTED INSTALL BOLTS PER PS130 EXCEPT AS NOTED		PROPRIETARY	TITLE AIRCRAFT DRAIN LOCATIONS–AT–402	DRAWING NUMBER SK499–5
HEAT TREAT	TOLERANCES EXCEPT AS NOTED, LIMITS IN INCHES ANGLES ± 1° V'S DRILLED HOLES FRACTIONS ± 1/16 .040 TO .1285 DIA. +.002 −.001 .XX ± .020 .128 TO .250 DIA. +.003 −.001 .XXX ± .010 .234 TO .500 DIA. +.004 −.001 .XXXX ± .001 .515 TO .750 DIA. +.005 −.001				
ACT. WT. CALC. WT.					

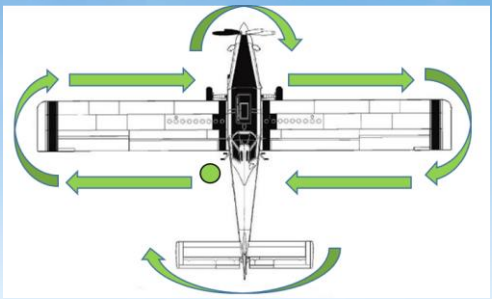
Preflight Inspection



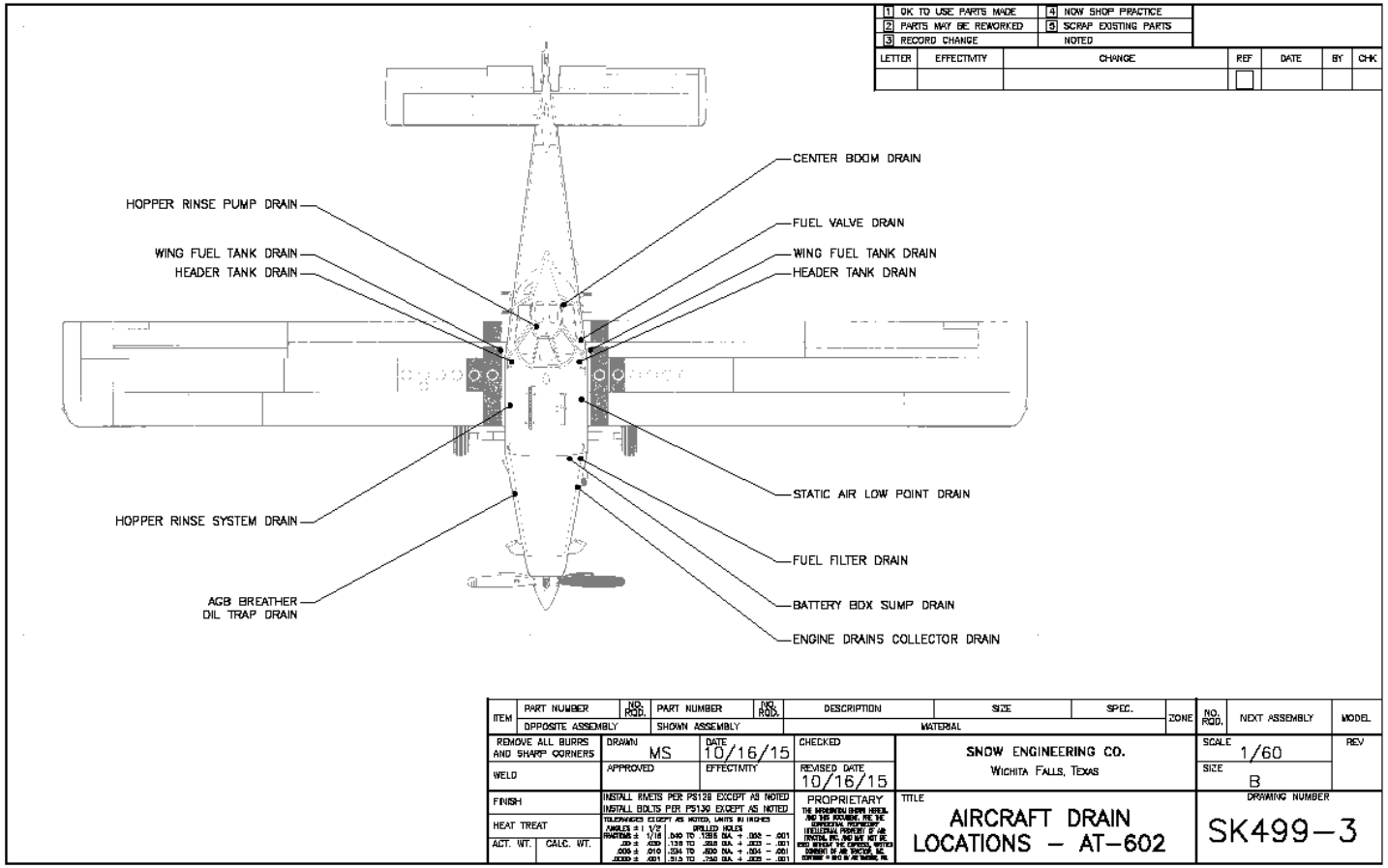
Exterior Check (Drain locations 502)



Preflight Inspection



Exterior Check (Drain locations 602)



Preflight Inspection

Exterior Check

11) Spray Plumbing – Check for leaks and loose connections
12) Left Hand Gear Leg - Inspect for cracks, damage, stress marks

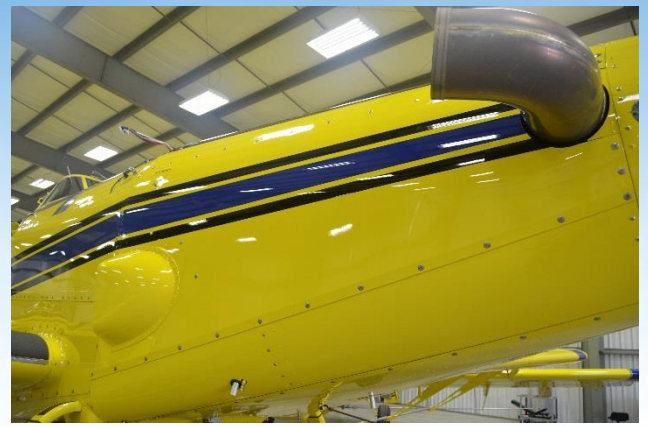
    - Optional Wire cutters may be installed on leading edge of gear leg check secure

13) Left Wheel and Brake assembly – Check no chords showing on tire, inflated to 62 PSI, brake pads are free to move slightly
14) Oil Service Door on top Cowl – Check oil level not more than 2 quarts below “Full” mark. Cap secure.
15) Prop – Remove tether and rotate briskly while listening for unusual rubbing or metallic noise

Preflight Inspection

Exterior Check

16) Cowling – Check for any unfastened Camlocs
17) Air Intake – Check for foreign objects
18) Exhaust Stacks – Remove covers
19) Right Hand Gear Leg - Inspect for cracks, damage, stress marks
    - Optional Wire cutters may be installed on leading edge of gear leg – check secure
20) Right Wheel and Brake assembly – Check no chords showing on tire, inflated to 62 PSI, brake pads are free to move slightly
21) Right Wing Fuel Sump – Drain and check for debri/water
22) R/H Fuel Cap – Visually check secure
23) Fuel Vent Tube – Clear no obstructions
24) Wing Tip – NO Damage, NAV/Anti Collision lights secure, turning light fully stowed



Preflight Inspection

Exterior Check

25) Aileron – CHECK secure, no slop, servo arm moves opposite of aileron.
26) Flaps – CHECK secure
27) Booms, Spray Nozzles, and Fittings – CHECK for leaks and secure
28) Right Hand Side of Fuselage – Check skins for unfastened Camlocs
29) Static Port – Clear of obstructions
30) Right Hand Stabilizer and Strut – Check secure, should be no play in any direction
31) Right Hand Elevator – Check hinge bolts, move up and down, check for security
32) Trim Tabs – Check for security, inspect linkage

Preflight Inspection

Exterior Check

33) Rudder – Start from top down, inspect hinge bolts, move from stop to stop to check security, inspect rudder cables and connections

34) Tail Wheel Assembly – Check attach points to fuselage
    1) Inspect Tailwheel Fork
    2) Check for broken centering springs
    3) Check tailwheel lock by lifting plunger by hand
    4) Tire inflation to 60 PSI

35) Left Hand Elevator – Check hinge bolts, move up and down, check for security

36) Left Hand Stabilizer and Strut – Check secure, should be no play in any direction

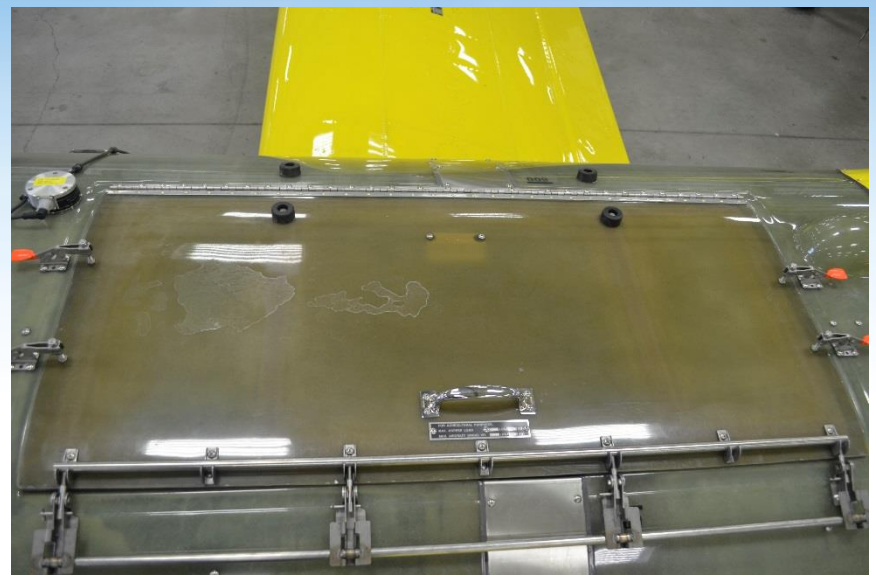
37) Static Port – Clear of obstructions

38) Left Hand Side of Fuselage – Check skins for unfastened Camlocs

Preflight Inspection

Exterior Check

39) Tie down Ropes – All removed and wheel chocks out
40) Hopper Lid – Closed, latches secure
41) Front Wind Screen – Clear and wiper secure



Before Start

1) Fire Extinguisher – Secure
2) Cockpit – No loose items
3) Seat Belts and Harness – FASTEN and Secure
4) Brakes – Test and set parking brake ON (Depress pedals and pull lever)
5) Trim – Elevator and Rudder set to Green Arc
6) Altimeter – SET
7) Rudder Pedals – SET (Make sure able to achieve full deflection)
8) Flight Controls – CHECK FREE and CLEAR
9) Circuit Breakers – Check all IN
10) Battery Switch – ON
11) Fuel Selector Valve – ON
12) Fuel Boost Pump - ON (Until 5 psi min. fuel pressure noted) OFF
13) Flaps – RETRACT (can be delayed till after start to avoid battery drain)

Before Start

14) Fuel Flow Meter – SET
15) Warning / Caution Lights – Push to TEST
16) Voltmeter – CHECK 24 volts min.
17) FCU Over-ride – Check Secure (if installed)

Engine Start (Battery)

Starting

1) Power lever – IDLE STOP
2) Prop Lever – FULL AFT to Feather Stop (F)
3) Start Control Lever (Condition) – FULL AFT to Fuel Cut-Off
4) Battery Switch – ON
5) Ignition Switch – OFF (Center Positon)
6) Generator Switch – OFF
7) Prop Overspeed Switch – OFF
8) Prop Area – CLEAR
9) Start Switch – Hold “ON” (monitor Ng rise)
10) Ignition Switch – START when 12% Ng is reached

> Note: Ignition only provided while switch is held in START position, except when down in CONTINUOUS

11) Start Control Lever – GROUND IDLE (wait until stabilized at 15% NG)

Engine Start (Battery)

Starting (Continued)

12) ITT – Monitor (Various start limits for the different engines, refer to AFM for numbers)

Observe engine accelerates to Lo Idle speed (51-53% Ng Small PT6; 58-60% Large PT6, 54-56% -140AG) and that maximum allowable Inter-Turbine Temperature (ITT) is never exceeded.

CAUTION : Whenever the Gas Generator fails to light within 10 seconds after moving the Start Control Lever to “RUN”, shut off fuel (Pull Start Control Lever full aft to “C” stop) and release start switch. Allow 30 seconds for fuel to drain followed by 5 minutes of cool down for the starter.

13) START SWITCH – RELEASE when ground idle achieved

14) OIL PRESSURE and TEMPERATURE – CHECK in Green range

15) PROP LEVER “P” – Move forward to high rpm position

16) GENERATOR SWITCH – ON (Generator Out Light – Extinguished)

NOTE: If Ng speed drops below ground idle with generator on, advance Start Lever “S” until 51% is reached.

Engine Start (Battery)

Starting (Continued)

16) START LEVER – Advance to Flight (Hi Idle)

17) IGNITOR SWITCH – Leave in “Start” position (Ignition is only provided when Start switch is “On”)

    Note: “Continuous” position for Ignitor switch is used only when flying in extreme turbulence and possibility of temporary fuel interruption exists.

Engine Start (Battery)

DRY MOTORING RUN

The following procedure is used to clear an engine any time it is deemed necessary to remove internally trapped fuel and vapor, or if there is evidence of a fire within the engine. Air passing through the engine serves to purge fuel, vapor or fire, from the combustion section, gas generator turbine, and exhaust system.

1) START CONTROL LEVER “S” – Full aft at fuel cut-off “C”
2) IGNITOR SWITCH – OFF
3) BATTERY SWITCH (BATT) – ON
4) FUEL VALVE LEVER – ON
5) START SWITCH – ON
6) MAINTAIN STARTER OPERATION FOR THE DESIRED DURATION. (Refer to Limitations section for duty cycles)
7) START SWITCH – OFF
8) FUEL VALVE LEVER – OFF (CLOSED)
9) BATTERY SWITCH (BATT) – OFF
10) ALLOW A FIVE MINUTE COOLING PERIOD FOR THE STARTER BEFORE ANY FURTHER STARTING OPERATION IS ATTEMPTED

TAXI

1) PARKING BRAKE – OFF (Depress pedals to release)
2) Avoid sudden aggressive movements of the Power Lever allowing for spool-up time of the turbine
3) Normal taxi must be accomplished with Start Control Lever “S” in FLIGHT position to avoid propeller rpm in the yellow arc region of prop tach. Use Beta range of Power Lever to slow taxi speed.
4) Whenever possible leave the tailwheel locked during taxi in order to minimize the need for brakes

CAUTION

Continuous application of the brakes can cause the brake fluid to boil/vaporize in the lines, resulting in total loss of braking and steering action

TAXI (CONTINUED)

5) Small changes in direction can be made with the use of rudder and power. For sharp turns on the ground unlock the tailwheel and use a little brake along with power. Brake forces are light, so do not ride the brakes. Unlocking the tailwheel may be accomplished by moving the tailwheel lock lever aft.

*Aircraft may be equipped with one of two optional tailwheel lock systems:

1. Manual System – A lever next to the engine controls console: FWD is locked, AFT is unlocked. (Most common on current production aircraft)
2. Control Stick System – Built into the pitch control system. Control stick full FWD is unlocked. (Standard installation on 504)

BEFORE TAKEOFF

1) TAILWHEEL LOCK LEVER – Forward to locked position (Taxi forward slightly to ensure tailwheel is locked into position)
2) PARKING BRAKE – SET (Apply pedal pressure and brake lever. Release pedal pressure and brake lever should stay)
3) FLIGHT CONTROLS – Check free and clear
4) FAN BRAKE CONTROL – "SPRAY OFF" (For aircraft with spray equipment)
5) TRIM – SET
    1) Rudder Trim – Green Band (if equipped)
    2) Pitch Trim – Light, Green Band; Heavy, slightly aft of Green Band
6) FLAPS – SET
    1) 10 deg recommended if taking off close to gross weight
7) CANOPY DOORS – Closed and latched
8) ENGINE INSTRUMENTS – Check
9) FUEL QUANTITY – Check

BEFORE TAKEOFF

10) POWER LEVER - IDLE
11) PURGE PROPELLER CONTROL SYSTEM – Cycle the prop level full forward to full aft once or twice, slowly, to ensure proper function and that entire oil system is up to normal operating temperature.
12) START CONTROL LEVER “S”- FLIGHT
13) CONTROL STICK – Full Aft
14) POWER LEVER – Set 1500 Lbs –FT Torque
15) PROPELLER LEVER – Cycle aft and return Forward checking for RPM decrease

Before Takeoff (Runup)

BEFORE TAKEOFF (continued)

Propeller Overspeed Governor Check

(Usually accomplished on first flight of the day)

16) PROPELLER LEVER "P" – MAX (Full Forward)
17) PROPELLER OVERSPEED Test Switch – ON
18) POWER LEVER – ADVANCE to MAX RPM
19) POWER LEVER – Reduce to below yellow arc RPM Np
20) PROPELLER OVERSPEED Test Switch – OFF and GUARDED
21) POWER LEVER – ADVANCE (MAX RPM Np should be available)
22) POWER LEVER - IDLE

Overspeed Governor Check Complete

23) AIR CONDITIONING – OFF for takeoff
24) AILERON TRIM TAB (Left Wing) – Check NEUTRAL (if installed)

Due to different engine limitations of the different aircraft, numbers were left out to simplify this checklist, instead just reference the engine instrument markings. However, all pilots should review the Air Tractor AFM for exact limitations of their aircraft!

TAKE-OFF (Full load / Gross Weight)

1) FLAPS – 10 deg. (First mark on left wing flap indicator)
2) ELEVATOR TRIM – Slightly nose up from normal flaps up take-off position
3) Line up on center line of runway and set Tailwheel Lock lever to “LOCK” (forward) position
4) BRAKES - Apply
5) POWER LEVER – 600 Ft-Lbs (402/502); 1500 Lb-Ft (602)Torque
6) Release brakes and as aircraft starts to roll forward advance power lever to provide a smooth and continuous acceleration to maximum take-off power.

   NOTE: Doing a full power static runup can result in propeller blade damage due to debris being blown up off the runway.

7) As Power Lever is advanced confirm that temperature and torque limits are not exceeded.

CAUTION: Both temperature and torque limits can be exceeded resulting in possible damage to the engine if the Power Lever is advanced to it’s full forward position on the ground.

TAKE-OFF (Full load / Gross Weight)

8) Allow tail to come up to desired take-off attitude. Just maintaining a control stick position slightly aft of neutral will allow the tail to rise slightly and then the aircraft gently become airborne.

9) After breaking ground, do not retract flaps until at least 105 mph IAS

10) Best rate of climb speed at (402- 90mph / 502- 111mph / 602- 100mph) IAS

11) Adjust Trim for climb

12) ENGINE TEMPERATURE and TORQUE – Check within limits

13) PROPELLER LEVER – RETARD to 2100 (402/502) or 1550 (602) rpm Np for climb if desired.

Note: Ensure clear of applicable obstacles before reducing rpm since climb rate will decrease slightly

CAUTION: Reduction of propeller RPM will increase torque and can cause torque limit to be exceeded when already operating at max torque.

Cruise

1) PROPELLER LEVER – Retard propeller RPM (Np) to 1800 (402/502) or 1425 (602). Use higher RPM as required for heavier loads (2000 for 402/502; 1700 for 602 rpm may be required for a full hopper load)

2) POWER LEVER – Reduce torque to comfortable setting and check ITT limit does not exceed nominal (700 deg C)

   (Refer to AFM for more precise numbers on individual engines)

3) ENGINE CONTROL QUADRANT FRICTION KNOB – Adjust to prevent levers from creeping

4) If severe turbulence is encountered, the Ignitor switch should be placed in the “Continuous” position to preclude a possible flame-out from a temporary fuel interruption

Before Landing

1) PROP LEVER “P” – Full Forward (reduce power lever first if required so as not to overspeed prop (Np))
2) START LEVER “S” – Full Forward to “Flight” position (68 – 70% Ng)
3) POWER LEVER – Adjust to provide required rate of descent. Make sure to not move Power Lever below the idle stop position. Check Beta Light – Out

CAUTION: If the Control Quadrant Friction knob is too loose it is possible to pull the Power Lever into Beta range without depressing the button on top of the lever.

4) FLAPS – As desired
5) TAILWHEEL LOCK LEVER – Forward to “locked” position

Before Landing (continued)

6) AIR CONDITIONER – OFF
7) Recommended approach speeds:
    1) 402/502: 85 – 90 mph; 80 min. IAS
    2) 602: 95 – 115 mph (115 at gross weight) IAS

Maximum demonstrated crosswind during landing, 20 mph. (17 kts)

Balked Landing/Go-Around

1) POWER LEVER – ADVANCE Takeoff power
2) Attitude – Set Pitch to approximately 7 degrees nose up
3) FLAPS – Retract to 20 deg.
4) Climb Speed – 90 - 100 mph until obstacles cleared
5) FLAPS – Retract after reaching a safe altitude and 105 mph climb speed

After Landing

1) POWER LEVER – As desired during landing roll. If reverse thrust is necessary, the thumb latch on top of the power lever must be pushed forward and power lever moved slowly aft until the Beta Light is observed ON. Reverse thrust may be selected as necessary by continued aft movement of the power lever (Keep control stick full aft). Ensure Torque and/or ITT limits are not exceeded.

2) START CONTROL LEVER “S” – leave in FLIGHT position for taxing to keep prop rpm in the green arc.

Shutdown and Securing

Engine Shut-down:

1) PARKING BRAKE – SET
2) POWER LEVER – Idle
3) PROPELLER LEVER – Pull aft to Feather Stop “F”
4) Allow engine to stabilize for a minimum of one minute at minimum obtainable ITT. (Start Control Lever in RUN (Ground Idle) Position).
5) START CONTROL LEVER – Pull Aft to fuel cut-off “C”
6) All Switches – OFF
7) CONTROL LOCK - Install
8) Tether prop to prevent windmilling with zero oil pressure.
9) Once exhaust pipes are cool, install covers.

EMERGENCY PROCEDURES

- Ground Engine Fire
- In-Flight Engine Fire
- Electrical Fire In-Flight
- Engine Failure
- Engine Flame-Out
- Air Start
- Immediate Re-Light
- Aborted Takeoff (Sufficient Runway Remaining)
- Aborted Takeoff (Insufficient Runway Remaining)
- Forced Landing (With Engine Power)
- Forced Landing (Without Engine Power)
- Airframe Mounted Boost Pump failure
- Illumination of Caution Lights (Amber)
- Illumination of Warning Lights (Red)
- Emergency Fuel Control Override (If installed)
- Spins
- Runaway Aileron Trim Tab
- Cockpit Door Opens in Flight

EMERGENCY PROCEDURES

When dealing with any emergency don't forget the very basic priorities of flying: Aviate, Navigate, Communicate. For anything happening outside the normal routine and/or falling into the Emergency Procedures section, breakdown the "Aviate" into sub categories of:

- **MAINTAIN AIRCRAFT CONTROL**
- **ANALYZE THE SITUATION**
- **TAKE PROPER ACTION**
- **LAND AS SOON AS CONDITIONS PERMIT.**

Often times for the type of flying you will be doing in these aircraft the very first step of any emergency, although not listed, is GET AWAY FROM THE GROUND!

Always try to give consideration to where you're dumping your hopper load, some chemical damage can have far worse consequences than damage to the aircraft. Life and safety are always the priority.

EMERGENCY PROCEDURES

In this section you will continue seeing the “NOTES”, “WARNINGS”, and “CAUTIONS” just like listed in the previous sections. These remain unchanged from what they say in the FAA approved Air Tractor Airplane Flight Manual. Additionally there will be green shaded containers that contain tips and techniques gathered from pilots in and out of this industry. They are to be used simply as guidance and offered as techniques. The checklists are very similar to the AFM, but have been adjusted to follow more of a standard checklist layout and flow. Some steps have been moved around to facilitate a possible better way of doing things. All checklists have been coordinated with the Flight Test Division of Air Tractor and meet their approval of safe practice.

CAUTION (AMBER)	ACTION
Prop in Beta Range	Indicates propeller blade pitch angle is at or below the minimum fine pitch that is safe for continued in-flight control. During ground operations it indicates that propeller is properly positioned for application of reverse thrusting power.
Air Filter	Indicates that the normal air flow to the engine inlet is being restricted from flow through the air filter, check for possible icing or foreign object blockage. Open engine alternate air door if installed and monitor available power and ITT indications. Service air filter system and close alternate air door.
Chip Detector	Indicates that a metal particle is in contact with the detector terminals and there is the possibility of other metal particles in the engine oil. Service chip detector.
Fuel Filter	Indicates that the fuel filter is partially blocked and the electric fuel boost pump should be turned ON. Service fuel filter.
Low Oil Pressure (if installed)	Indicates oil pressure has dropped to 60 psig and further flight should be at reduced power not exceeding 1000 (402/502); 2000 (602)lb/ft torque. Service engine oil system.

WARNING (RED)	ACTION
Generator Out	Indicates generator is not charging normally. Monitor Volt Meter and check charging system
Low Fuel (if equipped)	Indicates a low fuel condition in either or both tanks. Fly straight and level and monitor fuel gauges. If necessary allow fuel to transfer from tank that has the greater quantity, or ***land as soon as possible***.

DRY MOTORING RUN

The following procedure is used to clear an engine anytime it is deemed necessary to remove internally trapped fuel and vapor, or if there is evidence of a fire within the engine. Air passing through the engine serves to purge fuel, vapor or fire, from the combustion section, gas generator turbine, and exhaust system. This may not necessarily be considered an emergency.

1) START CONTROL LEVER "S" – Full aft at fuel cut-off "C"
2) IGNITOR SWITCH – OFF
3) BATTERY SWITCH (BATT) – ON
4) FUEL VALVE LEVER – ON
5) START SWITCH – ON
6) MAINTAIN STARTER OPERATION FOR THE DESIRED DURATION. (Refer to Limitations section for duty cycles)
7) START SWITCH – OFF
8) FUEL VALVE LEVER – OFF (CLOSED)
9) BATTERY SWITCH (BATT) – OFF
10) ALLOW A FIVE MINUTE COOLING PERIOD FOR THE STARTER BEFORE ANY FURTHER STARTING OPERATION IS ATTEMPTED

WARNING

SHOULD THE FIRE PERSIST AS INDICATED BY SUSTAINED ITT, CLOSE THE FUEL VALVE TO THE "OFF" POSITION AND CONTINUE MOTORING

In-Flight Engine Fire

1) POWER LEVER – Reduce to minimum level to sustain flight
2) HOPPER – Consider Emergency Dump
3) Look for suitable landing spot
4) ITT and TORQUE – Monitor to see if engine stabilizes at reduced power setting
5) Determine source of fire and if it is minor or major in proportion

Technique for determining if an engine fire exists-

F.E.V.E.R Check

Fluctuating fuel flow
Erratic engine operation
Visual indications (flames, smoke)
Excessive ITT
Roughness

In-Flight Engine Fire

IF FIRE IS STILL MINOR….

Find suitable field to land while power is still available. Stop as soon as possible and before shutting down swing tail of aircraft into the wind. This will allow a growing fire to blow away from the cockpit providing more safety to exit the aircraft as well as by time to try to extinguish the fire before it spreads to the rest of the plane. ***Once the aircraft is stopped*** proceed as follows:

1) POWER LEVER – Idle position
2) PROPELLER LEVER “P” - Pull aft to feather stop “F”
3) START CONTROL LEVER “S” – Pull aft to fuel cut-off “C”
4) ITT – Monitor for fire indications inside engine (Usually indicated by a high ITT out of limits after fuel cut-off). If ITT remains out of limits proceed with “DRY MOTORING RUN”, but leave fuel off.
5) IF ITT is falling – All switches OFF. Use screwdriver to remove R/H side of cowling and use fire extinguish to put out remaining fire.

In-Flight Engine Fire

IF FIRE IS MAJOR….

1) FUEL VALVE LEVER - OFF
2) PROPELLER LEVER “P” - Pull aft to feather stop “F”
3) START CONTROL LEVER “S” – Pull aft to fuel cut-off “C”
4) POWER LEVER – Idle
5) All Switches – OFF
6) Prepare for forced landing. Secure seat harness. If going into rough terrain turn Battery Switch ON, extend flaps, and turn Battery OFF.
7) Side slip aircraft to prevent flames from reaching cockpit.

Electrical Fire In-Flight

Electrical Fire In-Flight

1) BATTERY and GENERATOR – OFF
2) Cockpit Air Vents – OPEN to ventilate any smoke as required
3) All remaining electrical switches – OFF
4) CIRCUIT BREAKERS – Check to identify faulty circuit if possible
5) Land as soon as possible

NOTE: Do not use fire extinguisher in-flight because the discharge of white irritable powder may cause temporary blindness and difficulty breathing if inhaled.

Remember, with Electrical Fire, and/or Smoke and Fumes in the cockpit, take care of yourself then take care of the problem. You can cut the power to the system completely and quickly by shutting off the battery and generator at the first sign of smoke. Then ventilate the cockpit so as to avoid any type of incapacitation or inhalation of toxic fumes. After this is achieved you can turn all other systems off then turn the battery and generator back on only if required for further flight. Any additional systems required should be turned on one at a time and at the first sign of smoke, turn that system off.

Engine Failure

An engine failure has different symptoms than an engine flame-out. Engine failure symptoms contain the failure indications:

- Loud noises followed by heavy vibrations and loss of power
- Rapid loss of power with unusual noises, vibrations, or sudden increases in ITT.
- Loss of power following a drop in oil pressure below redline or an increase in oil temperature above redline or both.
- Loss of power following overspeed of gas generator (Ng).
- Engine explosion.

Engine Failure Checklist

1) PROPELLER LEVER "P" – Pull aft to feather stop
2) START CONTROL LEVER "S" – Pull aft to fuel cut-off "C"
3) POWER LEVER – Idle
4) Fuel Valve Lever – OFF
5) BATTERY and GENERATOR – OFF
6) All remaining switches – OFF
7) Prepare for forced landing

NOTE: If landing in rough terrain consider lowering flaps before turning battery off.

WARNING: Caution is mandatory during a suspected engine failure on take-off or landing in order to avoid shutting down the engine un-necessarily. Do not attempt to restart an engine which is definitely known to have failed

Engine Flame-Out

- The symptoms of an engine flame-out will be the same as those of an engine failure only in regard to the drop in ITT, Torque, and Ng speed. The flame-out may result from the engine running out of fuel, or possibly may be caused by unstable engine operation. Severe turbulence can cause a flame-out by creating a temporary fuel interruption. Once the fuel supply has been restored to the engine, or the cause of unstable operations has been eliminated, the engine may be restarted in the manner described under AIR STARTS.

CAUTION: Do not attempt a re-light if the Ng tachometer indicates zero rpm.

- Remember that turbine engines seldom fail so long as fuel is provided. An important procedure in this respect is to know the location of the fuel boost pump switch and the CONTINUOUS position for the ignitor switch.

Anytime an indication of power loss exists:

1) IGNITOR – CONTINUOUS
2) FUEL BOOST PUMP Switch - ON

- At the same time you should be pushing the stick forward to get the nose down to make sure the airplane doesn't stall while you are troubleshooting.

Air Start

The best air-start technique is to initiate the re-light procedure immediately after a flame-out occurs, providing the pilot is certain that the flame-out was not the result of some malfunction which might make it dangerous to attempt a re-light.

Air Starts are to be conducted in a similar manner to Ground Starts.

A successful air start may be achieved at any altitude and airspeed normally flown. However, with the gas generator rpm (Ng) below 10%, starting temperatures tend to be higher and caution is required.

Air Start

1) FUEL BOOST PUMP – ON 5 psi min.
2) START Switch – HOLD ON (must achieve 10% minimum)
3) IGNITOR Switch – CONTINUOUS
4) START CONTROL LEVER – CONFIRM RUN
5) Observe engine acceleration to low idle, don't exceed AFM limits
6) START Switch – Release
7) IGNITOR Switch – ON
8) FUEL BOOST PUMP - OFF

Immediate Re-Light

There is always the chance that the engine may light up successfully just as soon as the Ignitor switch is turned ON. In an emergency, turn ON the Ignitor (Move switch to "CONTINUOUS" position) as soon as possible after flameout, provided the generator speed (Ng) has not dropped below 50%. Under these conditions it is not necessary to shut off the fuel or feather the prop. The Power Lever should be retarded to the Idle position, and the fuel boost pump turned ON.

NOTE: Propeller feathering is dependent on circumstances and is at the discretion of the pilot. However, a minimum engine oil pressure of 15 psi should be registered if propeller is windmilling.

Immediate Re-Light

1) GAS GENERATOR (Ng) – Confirm above 50%
2) IGNITOR Switch – CONTINUOUS
3) POWER LEVER – Idle
4) FUEL BOOST PUMP – ON

Following successful re-light..

5) GAS GENERATOR (Ng) – CONFIRM stable at or above Ground Idle and ITT stable within limits
6) POWER LEVER – As required
7) IGNITOR Switch – ON
8) FUEL BOOST PUMP - OFF

Aborted Takeoff (Sufficient Runway Remaining)

1) POWER CONTROL LEVER – Idle or Reverse as necessary
2) WHEEL BRAKES – Apply as permitted by aircraft attitude and directional control.
3) Hopper Load – Consider dumping hopper if necessary to shorten braking roll. Push the stick forward as necessary to prevent nose pitch-up during hopper dump.

WARNING: Use extra caution if dumping hopper above 50 mph (44kts) IAS or aircraft may become airborne. Dumping hopper load may reduce braking.

Care should be exercised with brake application during an abort. The higher gross weight will give the aircraft much more momentum which will translate directly to overheating the brakes and possibly melting the lines which will result in total brake failure.

During a high speed abort, if the hopper is dumped immediately the sudden decrease in gross weight may put the aircraft into a flying speed range in which case if the stick is not pushed forward, the aircraft could pop off the ground with a fairly aggressive pitch-up.

Aborted Takeoff (Insufficient Runway Remaining)

1) POWER LEVER – Full Reverse
2) WHEEL BRAKES – Apply full braking
3) Hopper Load – Consider dumping hopper as speed slows below 50 mph (40 kts) to reduce weight and improve braking.

WARNING: Use caution if dumping hopper above 50 mph (44kts) IAS or aircraft may become airborne.

Forced Landing (With engine power remaining)

1) Maintain 90 - 100 mph (78 to 87 kts) airspeed with approximately 10 deg. of flaps.
2) Select a safe dump area if possible
3) Dump the hopper load while moving the control stick forward as the dump is made to control nose pitch-up.

Anytime a forced landing is imminent whether you have partial power or none at all, be sure to identify a landing area as quickly as possible. Don't waste valuable altitude in frugal attempts to relight a dead engine without consideration of where to set down.

Always try to give consideration to where you're dumping your hopper load, some chemical damage can have far worse consequences then damage to the aircraft. Life and safety are always the priority.

When choosing a landing site try to give consideration to the wind and always land into the wind when possible. If landing on a narrow road or path with a strong crosswind, keeping the flaps retracted more than normal may allow for better directional control on approach and through the flare.

Forced Landing (No engine power remaining)

1) Hopper – Consider dump
2) PROPELLER LEVER – Full aft to Feather
3) Airspeed – Maintain 90-100 mph (78-87 kts) IAS
4) Identify suitable landing area
5) Seat belt and harness – Secure
6) FLAPS – as required to maintain a minimum of 80 mph (70 kts) IAS until flare

   (*after landing*)

7) FUEL VALVE – OFF
8) START CONTROL LEVER “S” – to Fuel Cut-Off “C”
9) All Switches – OFF
10) Canopy Doors – Open during approach

Airframe Mounted Boost Pump Failure (Engine driven)

If the airframe fuel boost pump becomes inoperative, the electric fuel boost pump should be switched ON.

If the electric fuel boost pump should also fail, the fuel control pump is adequate for unrestricted engine operations up to the maximum altitude of 12,500 ft. Continued flight should be below this altitude.

1) Confirm loss of fuel pressure (fuel gauge reads zero)
2) ELECTRIC FUEL BOOST PUMP - ON

Be advised, there will be little indication of an airframe fuel boost pump failure. The only indication would be a small loss of fuel pressure on the gauge.

Spins

The spinning characteristics of this aircraft have not been fully investigated and spin recovery techniques have not been established. In the event of an inadvertent spin the following procedure is suggested.

1) POWER – *Idle.* : The torque of an engine producing power will make spin recovery more difficult.
2) AILERONS – *Neutral*. : Attempting to level the wings with aileron input can actually make the spin worse.
3) RUDDER – *Apply full opposite direction of spin*. : If you have trouble determining which way the airplane is spinning, look at your turn coordinator, or turn needle, it will show you the direction.
4) ELEVATOR – *Forward to break stall*. : Immediately after applying opposite rudder, apply a quick forward motion on the control stick and hold anti-spin controls until the aircraft starts to recover.
5) RECOVER *from dive*. : Once you have completed the four previous steps, and the rotation stops, recover form the dive. The descent rate may be high and the airspeed can rapidly exceed redline. Remember to neutralize the rudder after the rotation stops.

Runaway Aileron Trim (602 only)

1) Airspeed – Reduce to 140 mph (122 kts) or less
2) Land as soon as practical

Cockpit Door Opens In-Flight

1) Do not attempt to close the door.
2) Gently maneuver the aircraft avoiding abrupt control inputs, stall speed may have increased.
3) For firefighting mission – dump hopper over suitable location

   For agricultural mission – land at a safe location or dump hopper over a suitable location.
4) Land as soon as practical

(The aircraft flies just fine with the door open, it's just loud)

QUICK REFERANCE NORMAL OPERATIONS N_____

Before Start

1) **Fire Extinguisher** – Secure
2) **Cockpit** – No loose items
3) **Seat Belts and Harness** – FASTEN and Secure
4) **Brakes** – Test and set parking brake ON
5) **Trim** – Elevator and Rudder set to Green Arc
6) **Altimeter** – SET
7) **Rudder Pedals** – SET
8) **Flight Controls** – CHECK FREE and CLEAR
9) **Circuit Breakers** – Check all IN
10) **Battery Switch** – ON
11) **Fuel Control Lever** – MAIN
12) **Fuel Boost Pump** - ON (Until 5 psi min. fuel pressure noted) OFF
13) **Flaps** – RETRACT (can be delayed till after start to avoid battery drain)
14) **Fuel Flow Meter** – SET
15) **Warning** / Caution Lights – Push to TEST
16) **Voltmeter** – CHECK 24 volts min.
17) **FCU Over-ride** – Check Secure (if installed)

Starting

1) **Power lever** – IDLE STOP
2) **Prop Lever** – FULL AFT to Feather Stop (F)
3) **Start Control Lever (Condition)** – FULL AFT to Fuel Cut-Off
4) **Battery Switch** – ON
5) **Ignition Switch** – OFF (Center Positon)
6) **Generator Switch** – OFF
7) **Prop Overspeed Switch** – OFF
8) **Prop Area** – CLEAR
9) **Start Switch** – Hold "ON" (monitor Ng rise)
10) **Ignition Switch** – START when 12% Ng is reached
11) **Start Control Lever** – after 18% Ng GROUND IDLE ("RUN" Position)
12) **ITT** – Monitor (1000 deg MAX instantaneous)
    Observe engine accelerates to Lo Idle speed (56-58% Ng)
13) **START SWITCH** – RELEASE no earlier than 56% Ng
14) **OIL PRESSURE and TEMPERATURE** – CHECK in Green range
15) **PROP LEVER "P**" – Move forward to high rpm position
16) **GENERATOR SWITCH** – ON (Generator Out Light – Extinguished)
    NOTE: If Ng speed drops below 56% with generator on, advance Start Lever "S" until 56% is reached.
16) **START LEVER** – Advance to Flight (Hi Idle)
17) **IGNITOR SWITCH** – Leave in "Start" position

BEFORE TAKEOFF

1) **TAILWHEEL LOCK LEVER** – Forward to locked position
2) **PARKING BRAKE** – SET
3) **FLIGHT CONTROLS** – Check free and clear
4) **FAN BRAKE CONTROL** – "ON" (For aircraft with spray equipment)
5) **TRIM** – SET
    1) Rudder Trim – Green Band
    2) Pitch Trim – Empty, Green Band; Full, slightly aft of Green Band
6) **FLAPS** – SET
7) **CANOPY DOOR** – Closed and latched
8) **ENGINE INTRUMENTS** – Check
9) **FUEL QUANTITY** – Check
10) **POWER LEVER** - IDLE
11) **PURGE PROPELLER CONTROL SYSTEM** – Cycle prop lever forward to aft to forward
12) **START CONTROL LEVER "S**"- FLIGHT
13) **CONTROL STICK** – Full Aft
14) **POWER LEVER** – Set 1500 Lbs –FT Torque
15) **PROPELLER LEVER** – Cycle aft and forward checking for RPM decrease
    Propeller Overspeed Governor Check
16) **PROPELLER LEVER "P"** – MAX (Full Forward)
17) **PROPELLER OVERSPEED Test Switch** – ON
18) **POWER LEVER** – ADVANCE
Np should not exceed green arc
19) **POWER LEVER** – Reduce
20) **PROPELLER OVERSPEED Test Switch** – OFF and GUARDED
21) **POWER LEVER** – ADVANCE (Max Np should be available)
22) **POWER LEVER** - IDLE
    Overspeed Governor Check Complete
23) **AIR CONDITIONING** – OFF for takeoff
24) **AILERON TRIM TAB** (Left Wing) – Check NEUTRAL

QUICK REFERANCE EMERGENCY PROCEDURES

In-Flight Engine Fire

1) **FUEL VALVE LEVER** - OFF
2) **PROPELLER LEVER "P"** - Pull aft to feather stop "F"
3) **START CONTROL LEVER "S"** – Pull aft to fuel cut-off "C"
4) **POWER LEVER** – Idle
5) **All Switches** – OFF
6) Prepare for forced landing. Secure seat harness. If going into rough terrain turn Battery Switch ON, extend flaps, and turn Battery OFF.
7) Side slip aircraft to prevent flames from reaching cockpit.

Electrical Fire In-Flight

1) **BATTERY and GENERATOR** – OFF
2) **Cockpit Air Vents** – OPEN to ventilate any smoke as required
3) **All remaining electrical switches** – OFF
4) **CIRCUIT BREAKERS** – Check to identify faulty circuit if possible
5) **Land as soon as possible**

Engine Failure Checklist

1) **PROPELLER LEVER "P"** – Pull aft to feather stop
2) **START CONTROL LEVER "S"** – Pull aft to fuel cut-off "C"
3) **POWER LEVER** – Idle
4) **Fuel Valve Lever** – OFF
5) **BATTERY and GENERATOR** – OFF
6) **All remaining switches** – OFF
7) Prepare for forced landing

Air Start

1) **FUEL BOOST PUMP** – ON 5 psi min.
2) **START Switch** – HOLD ON (must achieve 10% minimum)
3) **IGNITOR Switch** – CONTINUOUS
4) **START CONTROL LEVER** – CONFIRM FLIGHT Idle
5) Observe engine acceleration to low idle (56-58% Ng)
6) **START Switch** – Release
7) **IGNITOR Switch** – OFF
8) **FUEL BOOST PUMP** - OFF

Immediate Re-Light

1) **GENERATOR SPEED (Ng)** – Confirm above 50%
2) **IGNITOR Switch** – CONTINUOUS
3) **POWER LEVER** – Idle
4) **FUEL BOOST PUMP** – ON

Following successful re-light..

5) **GENERATOR SPEED (Ng)** – CONFIRM stable above 56% and ITT stable within limits
6) **POWER LEVER** – As required
7) **IGNITOR Switch** – OFF
8) **FUEL BOOST PUMP** - OFF

FORCED LANDING *If carrying liquids in hopper:*

1) **Hopper** – Dump
2) **PROPELLER LEVER** – Full aft to Feather
3) **Airspeed** – Maintain **90-100 mph (78-87 kts**) IAS
4) **Identify suitable landing area**
5) **Seat belt and harness** – Secure
6) **FLAPS** – as required to maintain a minimum of **80 mph (70 kts**) IAS until flare
7) **FUEL VALVE** – OFF
8) **START CONTROL LEVER "S"** – After to Fuel Cut-Off "C"
9) **All Switches** – OFF
10) **Canopy Doors** – Open during approach

FORCED LANDING *If carrying solids in hopper:*

1) **Hopper** – Drop as much as possible
2) **PROPELLER LEVER** – Full aft to Feather
3) **FLAPS** – Lower to approx. 15 deg
4) **Airspeed** – maintain 11**0 mph (96kts**) IAS
5) **Seat belt and harness** – Secure
6) **All switches** – OFF, except Battery (for Flaps)
7) **Canopy Doors** – OPEN during approach
8) **FLAPS** – FULL during flare for landing

Forced Landing (With engine power remaining)

1) Maintain 90 **to 100 mph (78 to 87** kts) airspeed with approximately 10 deg. of flaps.
2) Select a safe dump area if possible
3) Dump the hopper load while moving the control stick forward as the dump is made to control nose pitch-up.

Any indication of power loss exists:

1) **IGNITOR** – CONTINUOUS
2) **FUEL BOOST PUMP** Switch - ON

DRY MOTORING

1) **START CONTROL LEVER "S"** – Full aft at fuel cut-off "C"
2) **IGNITOR SWITCH** – OFF
3) **BATTERY SWITCH (BATT**) – ON
4) **FUEL VALVE LEVER** – ON
5) **START SWITCH** – ON
6) **MAINTAIN STARTER OPERATION FOR THE DESIRED DURATION**. (Refer to Limitations section for duty cycles)
7) **START SWITCH** – OFF
8) **FUEL VALVE LEVER** – OFF (CLOSED)
9) **BATTERY SWITCH (BATT)** – OFF
10) **ALLOW A FIVE MINUTE COOLING PERIOD FOR THE STARTER BEFORE ANY FURTHER STARTING OPERATION IS ATTEMPTED**

PERFORMANCE and LIMITATIONS

- Airspeed Limitations
- Powerplant Limitations
- Airframe Weight Limits
- Stall Speeds

Airspeed Limitations (402, 502, 504)

SPEED	CAS	IAS	KNOTS IAS	REMARKS
Maneuver (Va)	140	137/138	119/120	No full or abrupt control movements above this speed
Maximum Flap Extended (Vfe)	115	121/118	105/102	Do not exceed with fully extended flaps
Maximum Structural Cruising (Vno)	140	137/138	119/120	Do not exceed in turbulent air
Never Exceed (Vne)-(9,200 or less)	140/155	137/153	119/133	Do not exceed with spray system or clean airplane

Airspeed Limitations (602)

SPEED	CAS	IAS	KNOTS IAS	REMARKS
Maneuver (Va)	162	160	139	No full or abrupt control movements above this speed
Maximum Flap Extended (Vfe)	130	128	111	Do not exceed with fully extended flaps
Maximum Structural Cruising (Vno)	162	160	139	Do not exceed in turbulent air
Never Exceed (Vne)-(9,200 or less)	218	215	187	Do not exceed with spray system or clean airplane
(9,200 or more)	162	160	139	Do not exceed with spray system or clean airplane
Maximum Windshield Wiper (Vww)	162	160	139	Do not operate windshield wiper above this speed
Maximum Spray Pump Operation	162	160	139	Do not operate spray pump above this speed
Maximum Landing Light (Vll)	162	160	139	Do not extend landing lights above this speed
Maximum with Dust Spreader	162	160	139	Do not exceed with dust spreader

Airspeed Indicator Markings (402)

MARKING	IAS VALUE OR RANGE	KNOTS IAS	SIGNIFICANCE
White ARC	64 to 121	56 to 105	Full flap operating range. Lower limit is maximum weight stalling speed and upper limit maximum permissible (with flaps extended)
Green ARC	71 to 137	62 to 119	Normal Operating Range. Lower limit is maximum weight stalling speed and upper limit is maximum structural cruising (with flaps retracted)
Red LINE	137	119	Maximum speed for all operations

An older, alternate prop may limit the Vne

Airspeed Indicator Markings (502)

MARKING	IAS VALUE OR RANGE	KNOTS IAS	SIGNIFICANCE
White ARC	70 to 118	62 to 102	Full flap operating range. Lower limit is maximum weight stalling speed and upper limit maximum permissible (with flaps extended)
Green ARC	82 to 138	71 to 120	Normal Operating Range. Lower limit is maximum weight stalling speed and upper limit is maximum structural cruising (with flaps retracted)
Yellow ARC	138 to 153	120 to 133	Operations must be conducted with caution and only in smooth air at weight below 9,200 lbs. (4173 kg.)
Red LINE	153	133	Maximum speed for all operations at weight below 9,200 lbs. (4173 kg.)

Airspeed Indicator Markings (602)

MARKING	IAS VALUE OR RANGE	KNOTS IAS	SIGNIFICANCE
White ARC	81 to 130	70 to 113	Full flap operating range. Lower limit is maximum weight stalling speed and upper limit maximum permissible (with flaps extended)
Green ARC	101 to 162	88 to 141	Normal Operating Range. Lower limit is maximum weight stalling speed and upper limit is maximum structural cruising (with flaps retracted)
Yellow ARC	162 to 218	141 to 189	Operations must be conducted with caution and only in smooth air at weight below 9,200 lbs. (4173 kg.)
Yellow LINE	162	141	Maximum speed for all operations at weight above 9,200 lbs. (4173 kg.)
Red LINE	218	189	Maximum speed for all operations at weight below 9,200 lbs. (4173 kg.)

Powerplant Limitations: PT6A-15AG (402)

Power Setting	SHP	Torque(4) LB/Ft	Max Observed ITT C	Ng RPM%	Np RPM	Oil Pressure PSIG (9)	Oil Temperature C (8)
Take-off	680	1628	725	101.5	2200	80 – 100	80 – 100
MAX Cont. (1)	680	1628	725	101.5	2200	80 – 100	80 – 100
MIN Idle (Run) (2) MIN Idle (Flt)			(3) 660	51-53 68-70		80 - 100 40 min	80 - 100 -40 – 99
Starting			(4) 1090				-40 min.
Transient (5)		2100	825	102.6	2420	80 – 100	0 – 99
Max Reverse (6)	620	1554	725	95.5	2100	80 – 100	0 – 99

Powerplant Limitations: PT6A-34AG (402/502/504)

Power Setting	SHP	Torque(4) LB/Ft	Max Observed ITT C	Ng RPM%	Np RPM	Oil Pressure PSIG (9)	Oil Temperature (C) (8)
Takeoff	750	1795	790	101.5	2200	85 - 105	10 – 99
MAX Cont. (10)	750	1795	790	101.5	2200	85 – 105	10 – 99
MIN Idle (Run) (2) MIN Idle (Flt)			685 (3)	51 – 53 68 – 70		40 Min. 85 – 105	-40 - 99 0 – 99
Starting			1090 (4)				-40 min
Transient (5)		2100	850	102.6	2420	85 – 105	0 – 99
Max Reverse (6)	750	1795	790	95.5	2100	85 – 105	0 – 99

Powerplant Limitations (-15AG, -34AG)

(1) 620 SHP and 695 C is recommended for increased engine life.

(2) Maximum acceleration time from Lo Idle to 95% take-off power should not exceed 5 seconds.

(3) Increase Ng if required to keep within ITT.

(4) ITT limit shown is time-limited to two seconds. Starting temperatures above 850 C should be investigated for cause.

(5) These values are time limited to 2 seconds.

(6) If maximum torque is used, Np must be set so as not to exceed power limitations. Reverse power operation is limited to 1 minute.

Powerplant Limitations (Continued)

7) Normal oil pressure is 80 to 100 psig at gas generator speeds above 72% or more with oil temperature between 60 and 71 C. Oil pressures below 80 psig are undesirable and should be tolerated only for the completion of the flight, at reduced power settings. Oil pressure below 40 psig is unsafe and a landing should be made as soon as possible, using minimum power required to sustain flight.

8) For increased oil service life, an oil temperature between 166 F and 176 F is recommended. A minimum oil temperature of 131 F is recommended for fuel heater operation at take-off power.

9) Normal oil pressure is 85 to 105 psig at gas generator speeds above 72% or more with oil temperature between 60 and 71 C. Oil pressures below 85 psig are undesirable and should be tolerated only for the completion of the flight, at reduced power settings. Oil pressure below 40 psig is unsafe and a landing should be made as soon as possible, using minimum power required to sustain flight.

10) 620 SHP and 740 deg is recommended for increased engine life.

Powerplant Limitations (-15, -34AG)

STARTER – Thermally limited to three (3) starts per hour

FUEL – ASTM D1655-70, Jet A, Jet A1 (NATO Code F34, F35)
Jet B (NATO Code F40)
MIL-T-5624, JP-4 (NATO Code F40), JP-5 (NATO Code F42, F44)
No. 3 Jet Fuel (GB6537-94)
Aeromatic Fuels prohibited

Automotive Diesel Fuel, VV-F-800, DF-1 and DF-2 may be used. DF-1 should not be used below 25 F (-4 C), and DF-2 should not be used below 40 F (4.5 C).

If jet fuel or the above Automotive diesel fuels are not available, Aviation gasoline MIL-G-5572, all grades, may be used for maximum of 150 hours between overhauls.

Powerplant Limitations: PT6A-60AG (602)

Power Setting	SHP	Torque(4) LB/Ft	Nominal ITT C	Max Observed ITT C	Ng RPM%	Np RPM	Oil Pressure PSIG (6)	Oil Temperature C (10)(11)
Takeoff	1050	3245		(13) 820	104	1700	90 - 135	10 – 99
MAX Continuous	1020	3150		775	104	1700	90 - 135	10 – 99
Recommended climb/cruise	1000	3090 3280 3500	750	775	104	1700 1600 1500	90 – 135	10 – 99
MIN Idle (Run) MIN Idle (Flt)				(9) 750	58 68		60 min	-40 – 99
Starting			800	(7) 1000			0 – 200	-40 – 99
Transient		(8) 5100		(8) 850	104	1870	40 – 200	0 – 110
Max Reverse	900			760		1650	90 – 135	10 - 99

Powerplant Limitations: PT6A-65AG (602)

Power Setting	SHP	Torque(4) LB/Ft	Nominal ITT C	Max Observed ITT C	Ng RPM%	Np RPM	Oil Pressure PSIG (6)	Oil Temperature C (10)(11)
Takeoff	1050	3245		820	104	1700	90 - 135	10 – 99
MAX Continuous	1050	3245		810	104	1700	90 - 135	10 – 99
Recommended climb/cruise	956	3090 3280 3500	700	750	104	1700 1600 1500	90 – 135	10 – 99
MIN Idle (Run) MIN Idle (Flt)				(9) 715	58 68		60 min	-40 – 99
Starting				(7) 1000			0 – 200	-40 – 99
Transient		(8) 5100		(8) 870	104	1870	40 – 200	-40 – 110
Max Reverse	900			760		1650	90 – 135	0 – 99

Powerplant Limitations (-60AG, -65AG)

(1) Refer to Engine Service Bulletin No. 3032845-72-1 (P&WC SB13001) for listing of approved oils.

(3) If fuels conforming to bulletin information are not available, Aviation Gasoline MIL-G-5572, all grades, may be used for a maximum of 150 hours between overhaul periods. Operating time on Avgas is computed on the basis of quantity used and average consumption.

(4) Torque limit applies within a range of 1000 to 1700 rpm propeller shaft; below 1400 rpm, torque is limited to 2000 lb. ft.

(5) Engine inlet condition limits for engine operation: Altitude: Sea Level – 12,500 ft MSL

(6) Normal oil pressure is 90 to 135 psig at gas generator speeds above 72%. With engine torque below 3000 lb. ft., minimum oil pressure is 85 psig at normal oil temperatures (60-70 C). Oil pressures under 90 psig are undesirable. Under emergency conditions, to complete a flight, a lower oil pressure limit of 60 psig is permissible at reduced power levels not to exceed 2000 lb. ft. torque. Oil pressures below 60 psig are unsafe and require that either the engine be shut down or a landing be made as soon as possible using the minimum power required to sustain flight.

Powerplant Limitations (Continued)

7) These values are time limited to 5 seconds

8) These values are time limited to 20 seconds

9) Applies over speed range 56% - 68% Ng

10) For increased service life of engine oil, an oil temperature of between 74 and 80 C (165 to 176 F) is recommended

11) Oil temperature limits are -40 C (-40 F) to 99 C (210 F)

12) 100% gas generator speed corresponds to 37,468 rpm

13) Limit to 5 minutes operation

Approved Fuels:

JET A, JET A1, JET B, MIL-T-5624, JP-4, JP-8

If jet fuel is not available, Aviation gasoline MIL-G-5572, all grades, may be used for maximum of 150 hrs between overhauls.

Approved Oils:

MIL-L-7808 (NATO Spec 0-148)

MIL-L-23699 (NATO Spec 0-156)

Do not mix types or brands. Unless otherwise specified by the production order aircraft delivered with BP 2380 Oil. Use flushing procedures to drain cooler and all engine points if brand or type is changed.

402

Weight Limits:

Maximum: 7,000 lbs (3175 kg.)

Baggage Compartment: 60 lbs (27.2 kg)

Maximum Hopper Load: 3,250 lbs (1474 kg.) (400 US Gallons / 1514 Liters)

Flight Load Factor limits:

	Flaps Retracted	Flaps Extended
MAXIMUM POSITIVE	3.8 G	1.9 G
MAXIMUM NEGATIVE	-1.9 G	0.0 G

502/504

Weight Limits:

Maximum: 8,000 lbs (3629 kg.)

Baggage Compartment: 60 lbs (27.2 kg)

Maximum Hopper Load: 4,100 lbs (1,860 kg.) (500 US Gallons / 1,893 Liters)

Flight Load Factor limits:

	Flaps Retracted	Flaps Extended
MAXIMUM POSITIVE	3.8 G	1.9 G
MAXIMUM NEGATIVE	-1.9 G	0.0 G

602

Weight Limits:

Maximum: 12,500 lbs (5670 kg.)

Baggage Compartment: 60 lbs (27.2 kg)

Maximum Hopper Load: 6,500 lbs (2948 kg.) (630 US Gallons / 2385 Liters)

Flight Load Factor limits:

	Flaps Retracted	Flaps Extended
MAXIMUM POSITIVE (9,200 lbs. / 4173 kg.)	3.8 G	2.0 G
(12,500 lbs. / 5670 kg.)	2.8 G	1.5 G
MAXIMUM NEGATIVE (9,200 lbs. / 4173 kg.)	-1.9 G	0.0 G
(12,500 lbs. / 5670 kg.)	-1.4 G	0.0 G

Performance Chart Assumptions

REFER TO AIR TRACTOR AFM FOR ACTUAL CHARTS

Takeoff & Climb Performance Assumptions

- Gross weight
- Dry, smooth, hard runway

Climb Performance assures 300 feet per minute, or 2.5 % climb gradient whichever is greater, assuming the following:

- Max continuous power
- Flaps 10 deg.
- Best rate IAS climb speed

Definitions

- Indicated Airspeed (IAS) – airspeed actually read from the airspeed indicator with zero instrument error.
- Calibrated Airspeed (CAS) – airspeed corrected for pressure input errors (position error)

Power Available Equation

SHP= (Propeller RPM X TORQUE FT.-LBS)/5252

Stall Speeds

402

Stall Speeds at 7,000 lbs. (3175 kg) gross weight, power idle:					
ANGLE OF BANK (Degrees)	0	15	30	45	60
Stall Speed (MPH – CAS) Flaps Up	73	74	78	87	103
Stall Speed (KNOTS – CAS) Flaps Up	63	64	68	75	89
Stall Speed (MPH – CAS) Flaps Down	63	64	68	76	89
Stall Speed (KNOTS – CAS) Flaps Down	55	56	59	65	77

Maximum altitude lost in the wings level stall recovery is 220 ft.

Stall Speeds

502

Stall Speeds at 8,000 lbs. (3629 kg) gross weight, power idle:					
ANGLE OF BANK (Degrees)	0	15	30	45	60
Stall Speed (MPH – CAS) Flaps Up	82	83	88	98	115
Stall Speed (KNOTS – CAS) Flaps Up	71	72	76	85	100
Stall Speed (MPH – CAS) Flaps Down	69	71	75	83	99
Stall Speed (KNOTS – CAS) Flaps Down	60	62	65	72	86

Maximum altitude lost in the wings level stall recovery is 220 ft.

Stall Speeds

602

Stall Speeds at 9,200 lbs. (4173 kg) gross weight, power idle:					
ANGLE OF BANK (Degrees)	0	15	30	45	60
Stall Speed (MPH – CAS) Flaps Up	87	89	93	103	123
Stall Speed (KNOTS – CAS) Flaps Up	76	77	81	90	107
Stall Speed (MPH – CAS) Flaps Down	70	71	75	83	99
Stall Speed (KNOTS – CAS) Flaps Down	61	62	65	72	76

Stall Speeds at 12,500 lbs (5670 kg) gross weight, power idle:					
ANGLE OF BANK (Degrees)	0	15	30	45	60
Stall Speed (MPH – CAS) Flaps Up	101	103	109	120	143
Stall Speed (KNOTS – CAS) Flaps Up	88	90	95	104	124
Stall Speed (MPH – CAS) Flaps Down	81	82	87	96	115
Stall Speed (KNOTS – CAS) Flaps Down	70	71	76	83	100

Maximum altitude lost in the wings level stall recovery is 300 ft.

Review

1. Introduction
2. Aircraft Systems
3. Normal Operations
4. Emergency Procedures
5. Operating Limitations/Performance


AIR TRACTOR
THANK YOU