

AIR TRACTOR, INC.
Olney, Texas



FAA APPROVED

AIRPLANE FLIGHT MANUAL
01-0055

FOR

AIR TRACTOR MODEL AT-602

RESTRICTED CATEGORY ONLY

THIS DOCUMENT MUST BE CARRIED IN THE
AIRPLANE AT ALL TIMES

SERIAL NO. _____

REGISTRATION NO. _____

FAA APPROVED: _____



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SECTION 1 – LIMITATIONS

1.1 GENERAL:

Operations in compliance with the limitations presented in this section are required by the Federal Aviation Regulations.

1.2 AIRSPEED LIMITATIONS:

<u>SPEED (MPH)</u>	<u>CAS</u>	<u>IAS</u>	<u>KNOTS IAS</u>	<u>REMARKS</u>
Maneuver (Va)	162	160	139	No full of abrupt control movements above this speed.
Maximum Flap Extended (Vfe)	130	128	111	Do not exceed with fully extended flaps.
Maximum Structural Cruising (Vno) Never Exceed (Vne)	162	160	139	Do not exceed in turbulent air.
9,200 lbs or less (4173 kg or less)	218	215	187	Do not exceed with spray system or clean airplane
Above 9,200 lbs (4173 kg)	162	160	139	Do not exceed with spray system or clean airplane
Maximum Windshield Wiper (Vww)	162	160	139	Do not operate windshield wiper
Maximum Spray Pump Operation	162	160	139	Do not operate spray pump
Maximum Landing Light (V _{LL})	162	160	139	Do not extend landing lights
Maximum with Dust Spreader	162	160	139	Do not exceed with dust spreader regardless of weight

1.3 AIRSPEED INDICATOR MARKINGS (MPH):

<u>MARKING</u>	<u>CAS VALUE OR RANGE</u>	<u>KNOTS CAS</u>	<u>SIGNIFICANCE</u>
White Arc	82 to 130	71 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)
Red Line	218	189	Maximum speed for all operations 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)

1.3 AIRSPEED INDICATOR MARKINGS (MPH):

<u>MARKING</u>	<u>CAS VALUE OR RANGE</u>	<u>KNOTS CAS</u>	<u>SIGNIFICANCE</u>
White Broken Arc	70 to 82	61 to 71	Full flap stall speed range. Lower limit is stall speed at 9,200 lbs. (4173 kg.) and upper limits is stall speed at 12,500 lbs. (5670 kg.)
Green Broken Arc	87 to 101	76 to 88	Flap retracted stall speed range. Lower limit is stall speed at 9,200 lbs. (4173 kg.) and upper limit is stall speed at 12,500 lbs. (5670 kg.)

1.4 POWERPLANT LIMITATIONS:

a. Engine - (one) PRATT & WHITNEY PT6A-45R, PT6A-45A, PT6A-45B, PT6A-60AG, PT6A-65AR, PT6A-65B, PT6A-65R, OR PT6A-65AG Turboprop Engine

b. Engine Operating Limits (PT6A-45R, PT6A-45A, PT6A-45B)

POWER SETTING (5)	SHP	TORQUE (4) LB.FT	NOMINAL ITT°C	MAXIMUM OBSERVED ITT°C	Ng RPM %	Np RPM	OIL PRESSURE PSIG (6)	OIL TEMPERATURE °C (10)(11)
Take-Off	1050	3245		800	104.0	1700	100* to 135	10 to 99
MAX. Continuous	1020	3150		800	104.0	1700	100* to 135	0 to 99
MAX Climb MAX Cruise	922	2848 3026 3228	740	765	104.0	1700 1600 1500	100* to 135	0 to 99
MIN. Idle				700 (9)	58.0 (Min.)		60 Min.	-40 to 99
Starting			800	1000 (7)			0 to 200	-40 to 99
Transient		5100 (8)		850 (8)	104.0	1870 (8)	60 Min	0 to 110 (14)
MAX. Reverse	900	1000		800		1650	100* to 135	0 to 99

*For PT6A-45R: 90 psig

GROUND START PROCEDURE:

1. Parking Brake - SET
2. Fuel Valve Lever - ON
3. Power Lever - IDLE STOP
4. Prop Lever "P" - FULL AFT AT FEATHER STOP "F"
5. Start Control Lever "S" - FULL AFT AT FUEL CUT-OFF "C"
6. Battery Switch (BATT) - ON (Must be 24V minimum)
7. Ignitor Switch - OFF (Note that this is the center position)
8. Generator Switch (GEN) - OFF
9. Prop (OVERSPEED) Switch - OFF
10. Caution Lights - PUSH TO TEST
11. Fuel Boost Pump Switch - ON, When Fuel Pressure Noted - OFF
12. CLEAR PROP
13. (START) Switch - Hold "ON" Until Engine is Running at Low Idle Speed (Approx. 56-58% Ng),
THEN RELEASE
14. Ignitor Switch - Move up to "START" position when 12% Ng is reached.

NOTE: Ignition is only provided while start switch is on except when switch is in down "Continuous" position. Starter is thermal limited to three aborted starts per hour.

15. After 12% Ng is reached, allow 5 seconds for Ng to stabilize above 18%.
16. Start Control Lever "S" - Move forward to "RUN" position.
17. Observe that the engine accelerates normally to Low Idle Speed (56-58% Ng) and that the maximum allowable Inter-Turbine Temperature (ITT) Starting Limit is not exceeded.

CAUTION: Whenever the gas generator fails to light up within 10 seconds after moving the Start Control Lever to the "RUN" position, shut off fuel (Pull Start Control Lever full aft to "C" stop) and release Start Switch. Allow a 30 second fuel draining period plus 5 minutes for starter cool down. Conduct a 15 second dry motoring run (See following section) and allow 10 minutes for starter cool down before attempting another start. If, for any reason, a starting attempt is discontinued, allow the engine to come to a complete stop and then accomplish a dry motoring run. Repeat the complete starting sequence, observing the starter limits.

18. Oil Pressure and Temperature - Check in GREEN range.
19. Prop Lever "P" - Move full forward to High RPM Position.
20. Generator Switch - ON ("GENERATOR OUT" Light - EXTINGUISHED)

NOTE: If Ng speed drops below 56% with generator on, advance Start Control Lever "S" until 56% is reached.

21. Start Control Lever - Advance to FLIGHT IDLE
22. 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 or possibility of a temporary fuel interruption exists.

DRY MOTORING RUN:

The following procedure is used to clear an engine at any time when 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, power 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

WARNING: Should the fire persist as indicated by sustained Inter-Turbine Temperature (ITT), close the fuel valve to the "OFF" position at this point and continue motoring.

6. Maintain starter operation for the desired duration. (Refer to limitations section for Starter Limits)
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. Release parking brake OFF (Depress Pedals).
2. Avoid sudden movement of Power Lever.
3. Normal taxi must be accomplished with Start Control Lever "S" in the FLIGHT IDLE position to avoid propeller RPM in yellow caution arc of prop tach. Use Beta range of power lever to slow taxi speed.
4. Whenever possible leave the tail wheel locked during taxi as this will minimize the need for brakes.
5. Small changes in direction can be made with the use of rudder and power. For sharp turns on the ground unlock the tail wheel and use a little brake along with power. Brake forces are light so do not ride brakes. Unlocking the tail wheel may be accomplished by moving the tail wheel lock lever aft on aircraft having the manual tail wheel lock system. For aircraft that do not have the manual tail wheel lock system, push the stick full forward to unlock the tail wheel.

BEFORE TAKEOFF:

1. Re-check free and correct movement of flight controls.
2. If Spray equipment is installed, fan brake control should be "ON".
3. Check elevator trim lever for proper position. With empty hopper trim lever should be in green band. With a full hopper load the trim lever should be slightly aft of the green band.
4. Flaps should be retracted for take-offs below 9,200 lbs. (4173 kg.) and set 10° for take-offs above 9,200 lbs.(4173 kg.).
5. Prop lever should be full forward.
6. Check canopy door and check latches. If crew member is being carried in optional loader seat, check crew and see that crew door is still shut.

BEFORE TAKE-OFF (Continued):

7. Re-check engine instruments and fuel quantity gauge.
8. Before proceeding with ground run-up, ensure that the propeller control system is purged by feathering the propeller once or twice with the power lever in the Idle position.
9. For aircraft having the manual tail wheel lock system installed, move the tail wheel lock lever forward to the locked position and taxi forward until tail wheel lock pin is felt to engage. For aircraft that do not have the manual tail wheel lock system, taxi forward with the stick back until tail wheel lock pin is felt to engage. Aircraft should be lined up with runway centerline.
10. Re-check Start Control Lever "S" - Position forward to FLIGHT IDLE.
11. Re-check parking brake lever - Full Forward (OFF).
12. Hold brakes and set power at 1500 Lb.-Ft. torque. (Stick full back).
13. Move Prop Lever "P" aft to check propeller RPM decrease. Return to flight position (Full forward).
14. Check that engine control quadrant friction knob is tight enough for proper control function without uncommanded creep of engine controls.
15. Turn Air Conditioning OFF.
16. Check position of aileron trim tab on L/H wing - NEUTRAL.

TAKEOFF: (NORMAL-UP TO 9,200 POUNDS (4173 KG.) GROSS WEIGHT)

1. With power still approximately 1500 Lb.-Ft. torque, Check Np at 1700 RPM, release brakes and as aircraft moves forward gradually advance power lever to provide a smooth and continuous acceleration of the engine to maximum take-off power.
2. As Power lever is advanced make sure temperature and torque limits are not exceeded.
3. Allow the tail to come up to the desired take-off attitude.
4. Best rate of Climb speed at 9,200 lbs. (4173 kg.) take-off weight is 100 mph. (87 kts.) (IAS).
5. Adjust trim wheel for climb and check temperature and torque limits. If desired reduce propeller RPM to approx. 1550 RPM for climb.

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

TAKEOFF (FULL HOPPER LOAD OR ABOVE 9,200 POUNDS (4173 KG.) GROSS WEIGHT)

Use the same procedure as for normal take-off except as follows:

1. Lower flaps to 10° position (First Mark).
2. Position elevator trim lever slightly nose down from normal flaps up take-off position.
3. After breaking ground do not retract the flaps until at least 105 mph (91 kts.)(IAS) is reached.
4. Best rate of climb speed at 12,500 lbs. (5670 kg.) take-off weight is 115 mph (100 kts.) (IAS).

FUEL MANAGEMENT

Pay attention to the rudder trim in cruise. The ball in the slip indicator should be centered, otherwise fuel will transfer from one tank to another. Fuel migrates in the same direction that the ball indicates in the slip indicator. For instance, if the ball in the slip indicator is to the right of center that means the fuel is transferring to the right tank.

FUEL MANAGEMENT (Continued):

It's important to keep the fuel equalized in each tank especially when the quantity gets down to one-half and below. Fuel has a tendency to migrate to the right tank due to torque effects so if you want to transfer fuel back to the left tank to equalize the tanks, then use the rudder trim so that the ball in the slip indicator is to the left of the center position. Fuel should transfer from the right tank to the left tank.

Once you have the tanks equalized, then retrim the rudder such that the ball is centered. **If you run either tank completely dry the engine can flame out even if you have a substantial amount of fuel in the other tank.** This is because the header tank is out of fuel and the engine is starting to ingest air. For more information, read Service Letters 178 and 178A.

CRUISE:

1. Reduce propeller RPM to approximately 1425 RPM. Use higher RPM with heavy loads (Such as 1700 RPM with full hopper).
2. Reduce torque to comfortable setting and check ITT limit does not exceed nominal. Nominal is 740°C for PT6A-45R, 750°C for PT6A-60AG, 700°C for PT6A-65 series.
3. Check that the engine Control Quadrant friction knob is tight enough to prevent creep of Prop and Start Control levers during Power Lever movements.
4. If severe turbulence is encountered, the igniter switch should be placed in the "Continuous" position to preclude a possible flame-out from a temporary fuel interruption.

GLIDE AND APPROACH (Before Landing):

1. Prop Lever "P" - Full forward (Reduce power a little first).
2. Start Lever "S" - Flight Idle position (68 to 70% Ng).
3. Engine control quadrant friction knob - check friction is tight enough for proper control function without uncommanded creep of engine controls.
4. Power Lever - Adjust to provide required rate of descent. Do not move power lever below the idle stop position. Check Beta light - OUT.
5. Flaps - As desired.
6. For aircraft having the manual tail wheel lock system check lock lever position - TAIL WHEEL LOCKED.
7. Turn Air Conditioner OFF.
8. Final Approach –
Recommend 95 mph (83 kts.) IAS for full flaps at 9,200 pounds (4173 kg.) gross weight.
Recommend 115 mph (100 kts.) IAS for full flaps at 12,000 pounds (5443 kg.) gross weight.
9. Maximum demonstrated crosswind velocity during landing 20 MPH. (17 Kts.)

AFTER LANDING:

1. Power Control Lever - As desired during landing roll. If reverse thrusting is necessary, the thumb latch on top of the power lever must be pushed forward and the 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 fully aft). Ensure Torque and/or ITT limits are not exceeded
2. Start Control Lever – Leave in FLIGHT IDLE position for taxiing to keep prop RPM in the green.

ENGINE SHUT-DOWN PROCEDURE:

1. Power Lever - Idle position.
2. Prop Control Lever "P" - Pull aft to Feather stop "F".
3. Allow the engine to stabilize for a minimum of one minute at minimum obtainable ITT. (Start Control Lever "S" in RUN Position).
4. Start Control Lever "S" - Pull aft to fuel cut-off "C".
5. All switches - OFF

NOTE: During the shutdown ensure that the compressor decelerates freely. Keep record of coast-down time (seconds).

WARNING: If there is any evidence of fire within the engine after shut-down, proceed immediately as described under "DRY MOTORING RUN".

6. Tether prop to prevent windmilling with zero oil pressure.
7. When exhaust pipes are cool, install covers.

NIGHT OPERATING PROCEDURES:

1. Instrument and Nav lights - ON.
2. Strobe lights - ON.
3. Use dome light as required.
4. Set Rheostat for instrument lights and dome light as desired.
5. For taxi and landing extend wing landing light. Nose and landing lights - ON.

PROPELLER OVERSPEED CHECK PROCEDURE:

The overspeed governor check should be accomplished before the first flight of the day and after maintenance to assure that the overspeed governor is operative.

The procedure is as follows:

1. Prop Control Lever "P" - Full forward for 1700 RPM.
2. Prop Overspeed Test Switch - ON.
3. Power Lever – ADVANCE.
4. Ensure that Np stabilizes at 1550 ± 50 RPM.
5. Power Lever – REDUCE to less than 1500 RPM.
6. Prop Overspeed test Switch – OFF and GUARDED.
7. Power Lever – ADVANCE (ensure 1700 RPM is available), then IDLE.

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STALL SPEEDS

Stall Speeds at 9,200 lbs. (4173 kg.)gross weight, power idle are as follows:

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. (5670kg.)gross weight, power idle are as follows:

Angle of Bank (Degrees)	0	15	30	45	60
Stall Speed (MPH-CAS) Flaps Up	101	103	109	120	143
Stall Seed (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

ALTITUDE LOSS DURING STALL RECOVERY:

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