

SLINGSBY T67 M - 160



AIRFRAME

The airframe is a cantilever low wing monoplane with conventional low mounted tail-plane and elevator.

The fuselage is GRP of conventional frame and top-hat stringer construction with a stainless steel firewall between the cockpit and engine compartment.

The wing is single piece with no struts. It is a single spar structure, double skinned comprising a plain outer skin to which is bonded a corrugated inner skin. The wing uses conventional ribs in positions of load concentration.

Ailerons and elevator are operated by push rods. Rudder is operated by control cables.

ENGINE is Lycoming AEIO 360

"A" means Aerobatic (inverted oil)

"I" means Injected Fuel

WEIGHTS

MTOW	= 953 kg
BASIC WEIGHT	= 703 kg
HENCE FUEL + CREW	= 250 kg
FULL FUEL	= 53 kg
HENCE MAX CREW	= 197 kg

SPEEDS (photo 1)

Vs1 = 56 KTS

Vs0 = 49 KTS

Rotate = 56 kts flaps take-off. 64 kts flaps up

Vy = 70 kts flaps take-off, 80 kts flaps up

Va = 140 kts

Vfe = 88 kts

Vno = 140 kts

Vne = 180 kts

Max crosswind = 25 kts

LOAD FACTOR LIMITS (photo 2 & 3)

Structural temp < 50 °C

+6g, -3g Flaps up

+4.4g, -2g Flaps down

Structural temp ≥ 50°C

+4.4g, -2g Flaps up,

+2g, -1g Flaps down

Non resettable G meter on the rear panel. Check it before flight!

Structure Temp / OAT on instrument panel.

Aircraft Operating Guidance Notes

Canopy

Close canopy before engine start and do not open until after engine shutdown. This is because the canopy radius arms are prone to damage from vibration if left open with the engine running.

Do not let the canopy fall to the full open or closed position but lower gently. This will ensure the integrity of the fit and less chance of canopy problems in the air.

Aircraft ground handling (photo 4)

Use the tow bar. The only places available for pushing are the wing leading edge (to push back) and the wing root step (to push forward). The prop is a light-weight composite prop and cannot be use for pushing or pulling.

The control lock supplied will only lock the ailerons & elevator. The rudder can be locked in position by parking the aircraft with full right rudder (i.e. full right nose-wheel).

When parked outside the aircraft should be parked into wind with the control locks in and full right nose-wheel.

ENGINE HANDLING

Starting

It is very easy to over-prime the engine. Priming is only required if the engine is completely cold. If in doubt try a start without priming first.

The procedure for priming is:

Fuel On, Mixture Rich, Throttle Open & then Fuel Pump on until you have a Fuel Flow indicated on the Fuel Pressure gauge. Maximum of 3 seconds of fuel flow.

Other than this precaution the engine start is conventional for a fuel-injected engine. Follow the checklist and as the engine fires move the mixture smartly to rich. Idle RPM is 1000.

Warming up / Cooling down

Engine warm up and cool down is at 1000 rpm. The engine should be warm (i.e. Oil Temp & CHT in the green) before increasing engine RPM above 1000.

Rapid cooling in the air should be avoided. This is best accomplished by avoiding the combination of High IAS & Low Power (i.e. MP). When descending from altitude plan to keep a minimum of 15" of MP.

Rudder Pedals / Brakes (photo 5 & 6)

The seats are fixed and the Rudder Pedals adjust. There are three positions for the rudder pedals depending on pilot leg length. When checking for correct adjustment ensure the pilot's left knee is below the left throttle and hence will not impede full left stick (i.e. full left aileron).

The top of the foot-well is fairly low. There have been cases of people thinking they were applying the brakes when in fact they were only pushing on the top of the foot-well. A little practice and observance of foot position will avoid this possibility.

The rudder can only be checked for "full & free" when the aircraft moving and this should be done at a very slow walking pace.

PARK BRAKE (photo 7,8,& 9)

The park brake lever is a valve that will lock the applied pressure into the hydraulic brake system.

To set the park brake, apply pedal pressure, set park brake to ON, release pedal pressure.

To release the park brake simply put the park brake to OFF.

BEWARE!! The park brake pressure will bleed away over the course of an hour or so. Hence, when you go to the aircraft you cannot assume the brake pressure is still there just because the park brake is ON. You must reset the park brake when you commence your checks.

FLAP OPERATION (photo 10)

Manual flaps with 3 positions; Up, Take-Off and Down.

A strong spring makes the flaps up operation heavy and the flaps down operation very light when on the ground.

The purpose of this spring is to make the flap control loads "normal" in the air when the airflow will be trying to blow the flaps up. So, BEWARE of flap operation on the ground.

A white ring on top of the flap lever shows when the flaps are locked in position.

Operate the flaps by:

Ease the flap lever forward a "mm". To reduce friction.

Push the flap knob in.

Move the flap lever out of the detent and release the flap knob. The white ring will not be visible.

Move the flap lever to the required position.

Observe the white ring to confirm the flaps are locked in position.

FUEL SYSTEM (photo 11 & 12)

Two tanks, capacity **160 liters**.

Three fuel drains but one is inside the cowling.

Two fuel tank vents under the wing. Like the Cessna they may leak fuel when the tank is filled to max.

Fuel tanks are below the engine (low wing aircraft), hence we have an electric fuel pump as a back-up to the normal engine driven mechanical pump. The electric pump should be on at all times below 1000ft.

Fuel cock is OFF. LEFT TANK, RIGHT TANK. No Both!

A safety feature is a metal post between OFF and LEFT TANK. You must pull the fuel cock to get over the post to switch the fuel OFF or ON. Do not pull it at other times!

Engine is fuel injected hence we have a "Fuel Pressure" indicator and there is no carb heat.

OPERATION OF FUEL SYSTEM

You must check for good fuel feed from both tanks before take-off. You achieve this by:

Select the LOWEST tank for engine start.

Taxi out to the holding point.

Switch to the other (highest) tanks for the power checks and take-off.

Above 1000ft switch the electric fuel pump off.

Every 20 minutes flying time switch tanks to maintain fuel balance.

BIG TIP!!!

When switching tanks or electric fuel pump off keep your hand in place for a few seconds and monitor the fuel pressure gauge. There should be no drop in the pressure. If it drops switch back immediately. You now only have half as much available fuel as you thought you had!

ENGINE MANAGEMENT (photo 13)

Engine management gauges consist of:

1. Manifold Pressure
2. RPM
3. Fuel Pressure

Engine control consists of:

1. Throttle (black)
2. Prop RPM (blue)
3. Mixture (red)

At high and medium power settings ($> 13''$ MP):

Throttle controls Manifold Pressure
Prop lever controls RPM

At low power settings ($< 13''$ MP):

Throttle controls RPM directly

Power set is defined by MP + RPM:

E.g. $23'' + 2300\text{rpm}$ is more power than $22'' + 2300\text{rpm}$

ENGINE MANAGEMENT RULES OF THUMB

- To increase power move from right to left:
Mixture richen, RPM increase, Throttle increase
- To reduce power move from left to right:
Throttle reduce (MP), RPM reduce, Mixture lean
- MP should not exceed RPM:
E.g. 22", 2300 is OK, 23", 2200 is NOT.

ENGINE POWER SETTINGS

	MP	RPM	Mixture	Comment
Take-off	Max	Max	Rich	Full power
Climb	25"	2500	Rich	Climb power
Cruise	23"	2300	1.8psi	Typical cruise power
Cruise	22"	2200	1.6psi	Lower cruise power
Climb	25"	2500	Rich	Now right to left!
Cruise	23"	2300	1.8psi	Left to right
Descent	15"	2300	Rich	Left to right
Level Off	23"	2300	1.8 psi	Right to left
Downwind	23"	2300	Rich	
Base Leg	<13"	1900	Rich	Pitch Full Fine
Finals	-	As required	Rich	

IMPORTANT CHECKS

Cowlings (photos 14 & 15)

Check the cowlings are located over the 4 locating pins.

Check all cowling screws are done up (two underneath).

Canopy Lock (photos 16 & 17)

Check the 2 red claws are located around the bar.

Check the canopy lever is above the line.

Brakes

Re-apply the park brake every time. Do not assume the pressure is still there.

Know where your feet need to be to apply the brakes (on the bar at the top of the pedal). (Photo 18).

Throttle

Throttle is very sensitive. Use 1/8" open for start.

STANDARD CIRCUIT

Take off: Flaps up, Trim just forward of "N"

Full power check: MP \approx 29"
RPM 2550 - 2700
FP \approx 4+ psi

At 45 kts raise nose wheel just off the runway and hold that attitude.

A/C will get airborne at about 63 kts but hold the attitude to accelerate in a gentle climb to 80kts, then set the climb attitude and maintain 80 kts. Sufficient right rudder for balanced flight.

A continuous right turn at 20° bank onto downwind.

At 800ft: Attitude
Power 20", 2300, Rich (22")
Trim

Base leg: Throttle to 1900 RPM
Pitch full fine
Flap half, 75 kts
Trim

Finals: Flap full, 70 kts

STALLING THE SLINGSBY

Low wing hence lots of aerodynamic buffet, which you do not get from the Cessna.

If you keep the aircraft in balance there is no real tendency to drop a wing.

Flaps up or down the stall characteristic is very similar except the pitch attitude with flap down is lower (almost level when stalling from level flight.

MAX RATE TURN

This is a steep level turn with max power while holding the aircraft on the pre-stall buffet. The RATE of turn is phenomenal! This is a very good exercise to practice for stall avoidance. The speed while in the max rate turn will depend on the "G" but will be approximately 90 to 100 kts in the pre-stall buffet!

Remember the flight manual speeds and the ASI markings are for 1G flight.

SPINNING THE SLINGSBY

Entry: Power idle and maintain S & L
When in buffet, full rudder, stick right back and hold both pro spin control inputs.
Ailerons neutral.

In the spin:

Speed will be 65 - 70 kts, stall warning beeping, the visual picture and turn coordinator showing direction of spin.

If you release the controls the aircraft will continue to spin with stick full over into the spin and the rudder pedals floating into the spin.

Recovery: Throttle closed
Flaps up
Full opposite rudder and hold!
Stick smoothly forward with ailerons neutral

Rotation stops: Centralise rudder
Ease out of dive and power on

Not recovering: Check rudder input is full & correct
Stick full back and smoothly forward

If stick is put forward BEFORE opposite rudder aircraft can enter a high rotation spin and will not recover. Apply the above. (Photo 19)

AEROBATICS

Slingsby has a fully inverted fuel & oil system and can fly inverted indefinitely subject only to the pilots endurance!

What maneuvers can be flown? Everything except tail slide and inverted spin. That is:

ROLLS: Aileron Roll
 Barrel Roll
 Slow Roll
 Hesitation Roll

LOOPS: Loop

COMBINATION: Roll off the top
 Half Cuban
 Reverse Half Cuban

STALL TURN:

FLICK ROLL: From level flight
 Avalanche (top of loop)
 Salmon Leap (from wingover)

UNUSUAL ATTITUDE AND USET RECOVERY TRAINING

ADVANCED STALL AND SPIN TRAINING

AOPA AEROBATICS COURSE AND CERTIFICATE

Why? There are many reasons and here are some of them.

To improve skills

To increase confidence

To understand the finer points of Aerodynamics

To pave the way to competition aerobatics, and not forgetting of course

For the sheer fun of it!

The course is based on a syllabus produced by AOPA and consists of a minimum 10 hours dual flight training and a minimum of 10 hours ground training. On completion of the course you will be required to undergo a flight to demonstrate your ability to perform an aerobatics sequence. You will then be awarded the AOPA Aerobatics Certificate.

Ground training

Long briefings covering the following topics

Aerodynamics

Airmanship and safety matters

Legal aspects and the Air Navigation Order

Aircraft Limitations - general and as specified in the Aircraft Flight Manual

PRE-FLIGHT BRIEFINGS

AIR EXERCISES

Begins with a revision of some of the exercises covered in the PPL syllabus and then works through the various maneuvers listed below and culminates in flying an aerobatics sequence.

Airmanship and preparation

Familiarisation with the T.67M - 160 aircraft

Limitations and procedures applicable to the aircraft type

Revision of general handling and max rate turns

Slow flight

Stalls, including inverted & accelerated stalls

Recovery from a spiral dive

Spin recovery from the incipient stage

Fully developed spins and precision recovery

Lazy 8's

Chandelle

Recovery from the vertical, near vertical and inverted attitude

We then move on to cover the following maneuvers:

Loop

Aileron Roll, Barrel Roll, Slow Roll

Stall Turn

Half Cuban 8

Reverse Half Cuban 8

Roll off the top of a Loop

The course is flexible and additional maneuvers can be taught.

On completion of the course there will be a competency check after which you can apply for the

AOPA AEROBATIC CERTIFICATE.

















