

## PART 3

### Chapter 1 — STARTING, TAXYING AND TAKE-OFF

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#### 1 Preparation for flight

Carry out the 'External', 'Cockpit', 'Left to Right' and 'Starting' checks.

#### 2 Starting the engine

(a) Press and release the starter button.

(b) When the starter fires, the engine speed should build up rapidly to 1500 RPM. As the engine lights up, the RPM increase to idling  $3000 \pm 200$ . The sequence should take about 30 seconds. The JPT may momentarily exceed the idling limit. During the start, check that the fire warning light remains out.

(c) When RPM have stabilised, check that the JPT has returned to normal and the oil pressure is not less than 10 PSI at 3500 RPM.

(d) *Failure to start*

(i) If the cartridge does not fire, close the HP cock immediately. It must not be assumed that the breech is empty and the time switch should be allowed to run out (30 seconds) before attempting a further start. If the second and third cartridges fail to fire, have the defect investigated.

(ii) If the cartridge fires, but the engine fails to light up, close the HP cock without delay. If it is suspected that an excess of fuel has collected in the engine a second cartridge should be fired with the ignition switch and the HP cock off. This procedure entails a 30 second delay whilst the time switch runs out. A third attempt may be made after an interval of at least 30 seconds as controlled by the time switch, provided the engine has stopped.

(iii) If, due to a circuit fault, the starter button does not hold in, irrespective of whether a cartridge is fired or not, a period of at least 30 seconds must elapse before the button is again pressed.

(iv) If the pressure relief valve sticks open as indicated by intermittent clouds of black or yellow smoke from the starter exhaust without RPM indication, wait at least until the time switch runs out (30 seconds) and then fire a second cartridge.

(v) The run of the time switch must not be shortened by use of the engine master switch, otherwise over-speeding of the starter may occur.

(e) Carry out the '**After Starting**' checks.

### 3 Taxying

(a) Taxying is normal for a nosewheel type aircraft. Fuel consumption at idling RPM is about 15 lb per minute.

(b) The aircraft should not be taxied at a speed which requires excessive use of the brakes as this causes over-heating of the tyres and reduces their life. When full drop tanks are carried, special care should be taken to avoid overstressing the landing gear.

(c) To avoid discharging the batteries, engine RPM are to be kept above 3700 during waiting periods before take-off and after landing.

(d) Carry out the '**Take-off**' checks.

### 4 Take-off

(a) A check that the power control indicators are black must always be made immediately before take-off at not less than 4500 RPM.

(b) Align the aircraft and roll forward a few yards to straighten the nosewheel. Apply the brakes with the rudder bar central and open the throttle smoothly. If the brakes do not hold at 7200 RPM they should be considered unserviceable and the aircraft should not be flown.

Check oil pressure at 7200 RPM is at least 14 PSI. Release the brakes and open the throttle fully, checking the engine operation (see para 5).

(c) In crosswind conditions, gentle braking is necessary to keep straight until the rudder becomes effective at 90 knots.

(d) Ideally, the nosewheel should be eased off the ground between 115 and 135 knots depending on configuration. However, on some aircraft, when carrying 4 × 100 gallon drop tanks, it may prove impossible to lift the nosewheel within this speed band. Under the worst conditions of CG and rigging tolerances it may be necessary to attain 150 knots before the nosewheel can be lifted.

(e) Coarse rearward stick movement may result in the tail cone touching the runway when the nosewheel is raised; the follow-up tail-plane increases this possibility and must not be used for take-off. Depending upon weight and attitude, the aircraft unsticks between 130 knots (clean) and about 155 knots (4 × 100 gallon drop tanks).

(f) When comfortably airborne apply the brakes fully and raise the landing gear. Carry out the '**Checks after take-off**'. There is no noticeable change of trim as the landing gear retracts. Retraction takes 6-8 seconds and must be complete before 250 knots is reached.

(g) Until experience is gained the lightness of the flying controls may lead to over-controlling in both pitch and roll.

(h) *When carrying drop tanks*

Use 38° flap. When safely airborne immediately raise the landing gear and then the flaps, trimming nose-down as the flaps come up; delay in raising the flaps results in a marked nose-up change of trim when they are raised.

(i) *Manual reversion*

(i) Should manual reversion occur on take-off it is safe to continue the take-off. Using the recommended trim setting, a strong pull force is required to raise the nosewheel but the aircraft will be in trim at 160 knots.

(ii) In case hydraulic failure has occurred, it is recommended that the landing gear and flaps (if the latter have been used for take-off) are left down, care being taken not to exceed the maximum permissible speed.

## 5 Engine handling at take-off

(a) The RPM are governed at 8100 at which maximum thrust is obtained, but at full throttle this figure varies with OAT whilst still maintaining maximum thrust. The relevant figures are:

+ 15°C	8100 RPM
0°C	8085 RPM
- 10°C	8075 RPM
- 20°C	8045 RPM

RPM at take-off should not be lower than the above figures allowing a tolerance of 50 RPM

(b) Malfunctioning of the guide vane system allows the engine to reach maximum RPM without producing maximum thrust and the aircraft accelerates very slowly. Therefore to verify that maximum thrust is being obtained the following checks should be carried out:

- (i) Maximum RPM are not obtained except at full throttle.
- (ii) The rate of acceleration is normal when the brakes are released.
- (iii) The JPT is more than 580°C.

## 6 Abandoning take-off

If, at 21000 lb, the take-off is abandoned at a speed of 100 knots the aircraft should take the following distances to stop, depending on whether the brake parachute is used and the state of the runway; in all cases it is assumed that the brakes are applied fully within 3 seconds of abandoning take-off and that the HP cock is closed. Full flap should be lowered as soon as possible; the drop tanks may be jettisoned to reduce stopping distance but it should be done before streaming the brake parachute. If there is any possibility of not stopping before the end of the runway on runways fitted with arrester wires, the arrester hook (if fitted) should be lowered. (See Part 4, Chapter 3, para 8 for use of the arrester hook and Part 4, Chapter 3, para 9 for engagement of runway arrester barrier.

<i>Brake parachute</i>	<i>Wet runway</i>	<i>Dry runway</i>
Not used	1000 yds	800 yds
Used	900 yds	720 yds

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