

## PART III

# HANDLING

### 68. Management of the fuel system

(i) The fuel tanks should be used in the order:—

- (a) Drop tanks (if fitted).
- (b) Outer wing tanks.
- (c) Inner wing tanks.
- (d) Fuselage tanks.

The fuel level warning indicator comes on when the level in the fuselage tanks is lower than about 245 gallons. It also serves as a reminder that the tanks at present selected for transfer are empty, and that fuel is accordingly being used from the fuselage tanks. The next tanks should then be selected for transfer, when the level in the fuselage tanks should rise again above 250 gallons, and the indicator go black.

NOTE.—Under conditions of high fuel consumption, the rate of transfer from the *inner* wing tanks and drop tanks may not be sufficient to maintain the existing level in the fuselage tanks. The rate of transfer from the outer wing tanks, is, however, adequate.

(ii) The H.P. cock on the throttle quadrant must be selected fully open when starting and left open while the engine is running. It must always be moved through its full travel when it is opened or closed, otherwise the switches which it operates will not be actuated correctly. The exception to this is where, by *fully* opening the cock the release of the propeller brake may cause uncontrollable

windmilling. In cases where it is necessary to open the H.P. cock in high wind conditions (i.e., to check the operation of the booster pump or fine off the propeller preparatory to starting), the H.P. cock should be opened to just beyond the half-way position only. This will usually be sufficient to operate the feathering pump in the required direction, but the brake will remain on. It should, however, subsequently be moved through its full travel *both* ways immediately before starting-up to ensure correct functioning of the services which it controls. The propeller must not be allowed to windmill with the H.P. cock ON, otherwise the engine will be flooded with fuel with consequent risk of an explosive light-up when the ignition is switched on.

- (iii) If there is a fault in the transfer system, either of the wing tanks on one side may remain full until all the fuel from the corresponding tanks on the other side has been transferred. The aircraft will become progressively one wing heavy, and a careful watch should be kept on the amount of aileron trimmer required to maintain lateral trim. If this should exceed one-quarter of the total trimmer range at cruising speeds of about 225 knots, the transfer system is faulty. If the fault is due to an unserviceable booster pump in the outer wing tank, the rate of transfer from the tank with the faulty pump will depend on air pressure alone and will be very slow, but should be sufficient for engine requirements up to about 100 lb./sq. in. torque-meter pressure. It will not transfer until the tank with the serviceable booster pump is empty. Some aircraft have separate gauges for each outer wing tank, one of which replaces that for the inner wing tanks. Where practicable, transfer should be stopped if the difference in the outer wing tanks becomes greater than 40 gallons, otherwise lateral control may become difficult on a deck landing approach.
- (iv) The aircraft should be flown accurately in normal attitudes whenever the fuel level is below 50 gallons in the main tank, due to a chance of fuel starvation.
- (v) When AVTAG fuel is in use it will not be possible to maintain full power above 10,000 ft. with the booster pumps off.

- (vi) The fuel gauges in later aircraft are calibrated in mass units. The correct reading in pounds is obtained only if the aircraft has been refuelled with AVTUR. If heavier or lighter fuels are used, the appropriate correction must be applied to the gauge reading to obtain the actual weight of fuel in the tanks.

#### 69. Pilot's external checks

NOTE.—Check before starting up that the aircraft has been refuelled with the correct specific gravity fuel for which the engine is governed.

The outside of the aircraft should be systematically checked for obvious signs of damage, security of panels, cowlings, spinners, aerials, filler caps (internal filler caps if wings are folded), control surfaces and wing fold mechanism. The engine intake and jet pipe guards and the control and undercarriage locks must be removed. The engine intake must be free from debris, and the ground surrounding the propeller must be swept clear of small stones and other loose particles which might damage the engine. The propellers must show no signs of an oil leak. Check the position of the armament switches and plugs in the wheel wells. Open the rear fuselage access doors, and see that the gear in the fuselage is secure, and all circuit-breakers are set as required.

#### 70. Checks before starting

The starred (\*) items must be done before starting. The remaining checks are essential but can be done after starting if desired.

Before entering the cockpit, check:—

Ejection seat	Safety pin fitted in safety strap
	Check type of parachute fitted
Cockpit ventilation louvre (46)	Position. Locking catch up
Emergency oxygen	Pin removed
Main oxygen supply	Connected to pipe on ejection seat

Where an automatic seat is fitted, check the automatic parachute and harness release as follows:—

- (a) the drogue static line pin fitted in its bracket,
- (b) the time release gear static pin fitted in its bracket,
- (c) all apron clips in position.

Enter the cockpit and before switching on electric power, check:—

Undercarriage selector (30)	DOWN
Undercarriage emergency release (47)	Fully aft, locking wire in place
Armament switches (52) and controls, and jettison controls	SAFE or OFF
Flying controls	Full and correct movement
Control column	Lift cover and check automatic mechanism is locked
Hood	Security, operation External and internal jettison controls secure, locking wire in place
Windscreen wiper (if fitted)	OFF (Never use this on a dry windscreen)
Set Ground/Flight switch to	FLIGHT if external supply is not connected, and check:—
*Seat	Check harness, rudder pedals and seat height adjustment. Have safety pin removed and stowed
*All circuit-breakers	In
Then work from left to right:—	
Training switch (if fitted)	OFF, hook light out
Arrester hook	Lever UP. (The arrester hook warning light comes on whenever the hook is more than two-thirds down, thus it will not indicate on the ground)

Tailwheel lock	Unlocked
Hydraulic handpump	Fitted in position
Elevator trimmer control wheel (1)	Full movement, then neutral
Electrical rudder and aileron trimmers (4) (5)	Full movement, then neutral
*Throttle	Hard back against Ground Idle Gate
Flap lever (19)	UP
Undercarriage warning light	Out
*Propeller F.F.P.S. switch (3)	NORMAL
*Tank selector (14)	Select to OUTER WINGS Check functioning of wing tank booster pumps aurally. (If there is likely to be any delay before starting, conserve electric power by temporarily re-selecting to FUSELAGE. The selector should again be set to Outer Wings before Take-off in order to use these tanks first)
Airbrakes (16)	CLOSED
Flap emergency lever (20)	UP, locking wire in place
Bomb carrier and drop tanks release	Levers forward, safety catch in place
A.P.I. unit (17)	Setting
Ignition switch (24)	OFF, light out
*Brakes	ON, pressure sufficient
Chart board	Locked fully forward
*Power failure warning light (35)	On
Oxygen (43)	Contents and delivery
Engine and jet pipe fire warning lights (39) (40)	Out

Windscreen de-icing control (48)	OFF
Pressure head heater	As required
External and internal lighting (56) (59)	As required
G.G.S. retraction switch	Test
Emergency cockpit lights	Test
Signal pistol stowage (60)	Check
V.H.F. (50)	Set channels, OFF
Wing fold master control	Warning light and indicator position
*Wing spread control levers	Check wing pin warning lights on both mainplanes. Then NEUTRAL
*H.P. cock (8)	Immediately before starting, open to check operation of Mk. 4B compass and main tank booster pump. (Some aircraft have a fuel pressure warning light. This shows red whenever the pressure is less than 8 lb./sq. in. It goes out when the main tank booster pump is switched on by opening the H.P. cock)

### 71. Starting the engine (compressed air)

- (i) Have the compressed airline *securely* plugged in. Ensure that all ground crew keep clear of the air hose while air is being fed under pressure to the starter motor, and also clear of the jet pipes while the engine is running.
- (ii) Trip ON the ignition switch and check that the green ignition warning light comes on. Signal for the compressed air to be turned on, and when the propeller starts to move, open the H.P. cock fully. The starting cycle

only commences when the propellers begin to turn. Light up usually occurs between 1,100 and 1,400 r.p.m. When the engine speed has reached 2,500 r.p.m., signal to the ground crew to turn off the compressed air. Any delay will result in damage due to overspeeding the starter.

- (iii) The green light should go out automatically as the engine accelerates to about 2,700 r.p.m.; if the engine does not accelerate beyond 2,700 r.p.m. the ignition switch must be manually tripped to OFF. Extra fuel will then be made available to allow acceleration to  $4,100 \pm 100$  r.p.m. No throttle movement must be made until this figure is reached.
- (iv) During the start a careful watch should be kept on the J.P.T. If it shows signs of exceeding  $700^{\circ}\text{C}$ ., or the warning bell rings, the start should be abandoned immediately by closing the H.P. cock and tripping OFF the ignition switch.
- (v) If the engine fails to start, it should be continued to be motored over by the compressed air starter, with the H.P. cock closed and ignition OFF, taking care not to exceed 2,500 r.p.m. This will dry out the engine. Fuel spilt on the wing roots from a "wet" start must be dried off to prevent the possibility of fire.
- (vi) If fire occurs in the jet pipe, the H.P. cock should be closed and the engine kept turning by compressed air up to the maximum r.p.m. of 2,500.

### 72. Starting the engine (cartridge starter)

- (i) Set the controls as for a compressed air start.
- (ii) Select and fire a cartridge. Pressing the firing button will also trip on the ignition at the same time.
- (iii) The engine should accelerate rapidly to the self-sustaining r.p.m. of 2,700.
- (iv) At 2,700 r.p.m. the ignition should trip off automatically. If the engine does not pull away after the cartridge is

fired, trip off the ignition manually. This must never be done unless engine r.p.m. are above 2,500 otherwise over-fuelling will occur.

- (v) Minimum self-sustaining r.p.m. should normally be achieved on a single cartridge. If they are not, close the H.P. cock, stop the engine and attempt a further start. A second cartridge must not be fired whilst the propeller is turning as starter overspeeding may occur.
- (vi) Before reloading set the Ground/Flight switch to GROUND.

### 73. Warming up

Check that the oil pressure is above 30 lb./sq. in. The recommended warm-up speed is 6,000 r.p.m.; the engine should not normally be allowed to exceed this speed until the oil temperature has reached 35°C.

### 74. Checks after starting

Aileron and rudder trim	Full and correct movement
Fire warning lights	Out
*Oxygen	Set to HIGH
Flaps	Operate, check movement against gauge
†Mk. 4B compass	Indicator black Synchronise compass Check stand-by compass
Oil temperature	90°C. max.
Engine speed at ground idle	4,100 ± 100 r.p.m.
J.P.T.	500°C.
Generator warning light	OUT
Radio	Test

\*Oxygen *must* be used at all times when the engine is running.

†If voltage is low, the indicator may show white, denoting that the standby inverter has cut in. In this case the H.P. cock should be closed and an external battery used as the source of electrical power while re-starting, and until the engine is running and charging the aircraft's battery.

### 75. Testing the engine and services

- (i) When the oil temperature has reached 35°C., the throttle may be slowly opened to the Flight Idle gate.
- (ii) Below 7,800 r.p.m. all throttle movements *must* be made slowly. Engine acceleration up to this speed is poor, and the greatest care must be taken not to stall the engine particularly in the initial stages of acceleration between the Ground Idle and the Flight Idle gate. On the ground, warning that the engine is stalling or is stalled is given by **ANY COMBINATION OF THE FOLLOWING:**
- Vibration and excessive noise in the jet pipe,
  - R.p.m. and/or torque not following the throttle movements,
  - ~~Engine~~ Rise in J.P.T. and ringing of the J.P.T. warning bell. (See para. 99.)
- (iii) If the jet pipe temperature shows signs of exceeding 700°C., the H.P. cock must be closed. Any delay will cause serious damage.
- (iv) With the throttle at the Flight Idle gate position, check that the engine speed is 7,100  $\pm 100$  r.p.m. The Flight Idle gate setting is critical, and small variations may affect elevator control characteristics on landings (except those which employ the "no cut" technique). The correct r.p.m. may not be achieved until the engine is thoroughly warm (i.e., oil 60°C.) and there will be an increase of 50 r.p.m. for every five knots of head wind.
- (v) Check the constant speeding r.p.m. of 7,800  $\pm 100$ . Constant speeding r.p.m. are likely to be up to 100 r.p.m. ~~HIGHER~~ ~~lower~~ than normal, unless the oil temperature has risen

to 60°C. For catapult take-offs, the oil temperature should be at least 60°C, and the P.C.U. well exercised. (The tailwheel should be lashed to the ground if engine power exceeding 100 lb./sq. in. torque is used on the run up).

#### 76. Checks before taxiing

Tailwheel	Unlocked
Artificial horizon	Serviceability
Wheel brakes pressure	150 lb./sq. in. (max.) to each wheel

#### 77. Taxiing

- (i) Check that there is equal braking on each wheel. Idling thrust is fairly high, and once the aircraft is moving it is generally possible to taxi with the throttle in the Ground Idle position. The rudder is ineffective and use of the brakes is necessary to control direction. Throttle movements should be made slowly, and during prolonged periods of taxiing, especially in high winds, careful watch should be kept on engine temperatures. Full use should be made of the tailwheel lock when taxiing straight in strong crosswinds. After selecting UNLOCK, the tailwheel must be relieved of side loads before the lock will withdraw. When stationary for long periods, 6,000 r.p.m. should be selected to ensure even cooling of the engine.
- (ii) When taxiing on the flight deck in strong wind conditions, considerable throttle is required. Power should be applied slowly and smoothly until 7,800 r.p.m. are attained, otherwise there may be a rapid surge of thrust at the moment the propellers coarsen pitch at 7,800 r.p.m.

#### 78. Checks before take-off

Trimmers	All neutral
Throttle	Friction tight (catapult only)
Airbrakes	CLOSED

Fuel	H.P. cock fully ON Tank selector Outer Wings Pressure warning light out
Flaps	TAKE-OFF
Wings	Spread and locked Master control lever fully forward All warning lights out and indicators flush with wings Check full aileron movement
Instruments	Set (Inverters ON if separate switches are fitted) Inverters indicator black
Oxygen	HIGH
Chart board	Locked (catapult)
Hood	Locked as required
Harness	Tight and locked in rear position
Tailwheel	Locked

#### 79. Take-off

- (i) Taxi forward a few yards to straighten the tailwheel and engage the tailwheel lock.
- (ii) Apply the brakes and slowly increase engine r.p.m. to 7,800 and at a torquemeter reading of 100 lb./sq. in. check all engine instruments.
- (iii) Release the brakes and open up the throttle smoothly to take-off power. Momentary overspeeding or under-speeding may occur as the throttle is moved, but this should not normally exceed 200 r.p.m. either way. There is no tendency for the aircraft to swing, but when taking off in strong crosswinds the tailwheel should be kept on the ground until full rudder control becomes available.
- (iv) When airborne retract the undercarriage, and then the flaps, retrimming as necessary. The tailwheel light may show unlocked until the flaps are fully up.

- (v) When the undercarriage is up, check jet pipe and oil temperatures and throttle back to the climb gate, or as required. Check that the r.p.m. swing is not excessive when throttling back.

### 80. Climbing

- (i) The recommended climb speed is 165 knots from sea level to 10,000 ft., thereafter reducing speed by two knots per 1,000 ft.
- (ii) If on a prolonged climb it appears that the jet pipe temperature limitations may be exceeded, power should be reduced or speed increased. Above 20,000 ft., a close watch must be kept on the oil pressure. If it is lower than the minimum of 50 lb./sq. in., height must be reduced until pressure is normal.

### 81. Engine handling

- (i) In the air the throttle must not be closed beyond the Flight Idle gate position, except when restarting the engine.
- (ii) The ignition switch must not be operated while the engine is running as this cuts off fuel supply to the main burners with consequent risk of ~~engine stall~~ or flame out.
- (iii) While the engine is constant speeding in the air (i.e., 7,800 or 8,000 r.p.m.) normal but smooth throttle movements may be made between the Flight Idle gate and Take-off positions. Such throttle movements should take from 2-3 secs. (min.). If the r.p.m. consistently under-swings or over-swings the set constant speeding r.p.m. by more than 200 r.p.m. as the throttle is moved, it is likely that the anticipator/P.C.U. requires adjustment.
- (iv) Constant speed conditions of 7,800 r.p.m. apply under all normal conditions of flight. The r.p.m. should not normally fall below this figure, but should they do so, the propeller will have fined off sufficiently to be resting

against the F.F.P.S. Should this happen, the stop should be disengaged; otherwise the propeller will behave as though it were of fixed pitch, i.e., any further reduction of power or airspeed will lead to a reduction in r.p.m., and any rapid opening of the throttle may then result in the engine stalling. (See para. 100).

- (v) Normal constant speeding r.p.m. can be ensured by maintaining:—
- (a) airspeeds above 170 knots, or
- (b) power settings above 120 lb./sq. in. torque, or
- (c) a suitable combination of (a) and (b), e.g., a minimum of 60 lb./sq. in. torque and a minimum of 135 knots.
- (vi) When it is not practicable to meet the conditions in (v) above, such as in aircraft stalling practice, the F.F.P.S. should first be manually withdrawn (or the undercarriage lowered). Before withdrawing the stop by either of the above methods, see that one at least of the conditions of (v) above is maintained; otherwise the propeller will fine-off rapidly, and the consequent variations in propeller drag may cause large and unpleasant changes in longitudinal trim.
- (vii) Aircraft fitted with the unmodified P.C.U. (C.U.15-pre VZ 778) have poor throttle response under landing approach conditions, and early and smooth throttle movements must be made.
- (viii) The torque-meter needle may fluctuate, especially at high power settings.
- (ix) In aircraft fitted with the unmodified P.C.U. (C.U. 15), there will be a momentary drop in oil pressure as the stop withdraws, but in aircraft with P.C.U. (C.U. 24) there is no indication, other than that mentioned in (vi) above that the F.F.P.S. has disengaged.

### 82. General flying

- (i) The aircraft is easy and pleasant to fly and stability about all axes is excellent. The flying controls are well harmonized, but at high speeds the rudder becomes

heavy. Fairly large stick forces are required to manoeuvre above about 300 knots.

- (ii) At speeds below 120 knots, the ailerons tend to upfloat and their movement is restricted; lateral control however, is adequate.
- (iii) Trimming controls are very effective within the speed range. The electrically-operated aileron and rudder tabs are powerful, and their effect increases with speed. Should they lock fully over, due to a fault in the actuating gear, speed should be reduced to a safe minimum.
- (iv) *Changes of trim*

(a) *Longitudinal trim*

Undercarriage DOWN	Slight nose-down
Lowering flaps to MANOEUVRE	Negligible
to TAKE-OFF	Slight nose-down
to LAND	Slight nose-down

(b) *Lateral trim*

Changes of lateral trim may occur in flight due to the uneven transfer of fuel from the wing tanks. The amount of trim required for a given condition varies considerably with airspeed. (See para. 68.)

(c) *Directional trim*

A small amount of rudder trim may be required to prevent yaw as maximum speeds are approached. There should be no directional change of trim with alteration of power.

### 83. Use of airbrakes

In aircraft not fitted with Mod. 258 (modified airbrakes), extending the airbrakes produces a moderate but immediate, nose-down trim change, which can be easily held up to the limiting speed (300 knots). There is moderate buffet, particularly at the lower airspeeds

and, due to uneven opening, there may be small lateral trim changes during operation. Use of the unmodified airbrakes below 3,000 ft. is not recommended until experience is gained. They must not be used if the outer flaps are down, and vice versa.

### 84. Manoeuvrability

Manoeuvrability is good, but wing loading is high, and the radius of the turning circle is therefore large, particularly at altitudes above 10,000 ft. For maximum rate of turn the airspeed should be kept as high as possible above 250 knots. If flaps are used, there is a decrease in the radius of the turning circle, but no increase in the maximum rate of turn.

### 85. Flying at reduced airspeed

Reduce speed to 170 knots and lower the flaps to the take-off position. Speed may then be reduced to 150 knots.

### 86. Flying in conditions of severe turbulence

The recommended speed is 250 knots.

### 87. Stalling

- (i) The approximate stalling speeds in knots (F.F.P.S. disengaged) are as follows:—

	Max. D.L. weight 18,500 lb. approx. (i.e. 30% to 50% in- ternal fuel)	19,400 lb. approx. (i.e. 80% to 95% in- ternal fuel)	21,200 lb. approx.
<i>Power off</i>			
Flaps and u/c UP	105	110	115
Flaps and u/c DOWN	90	95	105
<i>Power on</i>			
Under typical "mirror" landing approach condi- tions	85	90	95

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- (ii) There is little stall warning, but slight airframe buffeting may commence some 5 knots above and continue to the stall. Approximately 2 to 3 knots above the stall the starboard wing tends to drop but lateral level may be maintained with aileron. At the stall, either wing may drop with mild aileron snatch and the nose falling gently away. The amount of wing-drop is usually small, but depends how long it has been delayed by the use of aileron. Normal recovery action is immediately effective. The stick should not be pulled right back when carrying out stalling practice as this may lead to a spin.
- (iii) Warning of the stall when G is applied is given by mild airframe buffeting and a tendency for either wing, usually the starboard, to heavy-up, with slight aileron snatch. At the stall either wing may drop, but usually the starboard. Releasing the stick effects immediate recovery.
- (iv) The stalling characteristics are the same when symmetrically loaded external stores are carried. The stalling speeds increase as might be expected in accordance with the increased A.U.W.
- (v) Isolated cases have occurred where the stalling speeds of some aircraft at identical configurations of altitude, A.U.W., flap settings and power, are higher than those set out above. If the stall speeds are consistently greater by more than 5 knots, the fact should be reported in Form 700 on landing.

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(vi) *Spinning*

Intentional spinning is prohibited. Should an inadvertent spin occur, normal recovery action is known to be effective.

88. **Diving**

- (i) In calm air the aircraft is very steady in the dive to the limiting speed. The elevator control forces should be trimmed out during the dive, otherwise excessive G may result on the pull-out. In some aircraft rudder trim may be required to prevent yaw as the higher speeds are reached.
- (ii) Acceleration in the dive is very rapid, and care must be taken not to exceed the limiting speed or mach number.

89. **Checks before landing**

Brakes	OFF Sufficient pressure
Airbrakes	CLOSED
Undercarriage	DOWN and locked Green lights ON Tailwheel LOCKED (UN- LOCKED for deck land- ing)
Propeller	F.F.P.S. switch NORMAL
Flaps	TAKE-OFF FULLY DOWN on final approach
Fuel	Contents
Harness	Tight
Hood	Locked as required

NOTE.—It is difficult to open the hood above a speed of 160 knots.

90. **Approach and landing**

- (i) The circuit should be made at 140-150 knots. The turn on to the final approach should be made at 120-130 knots, and the airfield boundary crossed at 105-110 knots. Care should be taken that the apparent nose-down attitude does not encourage approach speeds below those recommended.
- (ii) With the unmodified P.C.U. (C.U.15), engine response is poor on the approach, and early corrective action must be taken if undershooting. The pilot has little or no immediate impression of increase of power and reference should be made to the torquemeter. Thrust response with the modified P.C.U. (C.U.24) is good.
- (iii) To ensure maximum response to throttle-opening if undershooting, or having to go round again, it is advisable to maintain a torquemeter reading of above 40 lb./sq. in. on the approach.

- (iv) Closing the throttle to the Flight Idle gate position for landing produces a very marked nose-down change of trim which varies according to the throttle position just before the cut and the speed with which the throttle is moved. The greater the movement of the throttle and the greater the speed with which it is moved, the greater will be the resultant nose-down change of trim. At forward C.G. (i.e., less than 200 gallons of fuel remaining), the nose-down change of trim cannot always be held by full elevator movement, and it may be difficult to land the aircraft on three points if the throttle is closed to the Flight Idle gate too soon. It is recommended that the throttle is not closed to this position until the aircraft is over the runway and about to touch down. In a stop-engaged landing, there is no nose-down trim change or sink at the cut and the aircraft may float for some distance. See sub-para. (x) below.
- (v) The throttle must not be closed beyond the Flight Idle gate until the aircraft has actually touched down and is firmly on three points.
- (vi) If after touchdown the throttle is left at the Flight Idle gate, deceleration of the aircraft is poor owing to the high residual thrust. Unless landing on long runways, there should be no undue delay in closing the throttle to the Ground Idle position.
- (vii) Rapid closing of the throttle to the Ground Idle position will cause an equally rapid fining-off of the propeller, with consequent high drag. Whilst this is useful for the rapid deceleration of the aircraft in the initial stages of the landing run, it has the effect of blanketing the rudder and elevator, rendering them ineffective. Thus the effects of any drift at touchdown will be greatly accentuated, and a swing may easily develop requiring early and careful use of the brakes. The throttle should therefore be closed slowly and smoothly to the Ground Idle gate. Power must not be used to check a swing.
- (viii) During the landing run, once the throttle has been closed to the Ground Idle position, the reverse torque light (if operative) may blink on and off. This ceases as the aircraft slows down.

(ix) *Landing in crosswinds*

A touchdown on three points should always be made and the tailwheel kept firmly on the runway if an initial swing into wind is to be avoided. The aircraft should not be "wheeled" on.

(x) *"Stop Engaged" landing*

Immediately on touching down, close the H.P. cock or disengage F.F.P.S. manually. This is particularly important in the case of a "stop engaged" deck landing where engine stalling will occur immediately following an arrested landing. If due to lack of oil pressure, or electrical failure, it is unlikely that the stop will disengage, the H.P. cock must always be closed on touchdown.

91. *Deck landing*

- (i) The recommended speed by day *at all weights* up to 18,500 lb. on the final approach, using the mirror aid, is 100 knots. (This corresponds to a power setting of 80-100 lb./sq. in. torquemeter pressure.) This speed may also be used in ADDL'S at all weights up to the maximum permitted ADDL weight of 20,700 lb. When carrying out ADDL'S at weights above the deck landing limit, it should be borne in mind that the speed of 100 knots is then closer to the stalling speed of the aircraft; more power is required, particularly on the turn-in, and turns steeper than rate  $1\frac{1}{2}$  should be avoided.
- (ii) Deck landing in emergency may be carried out at weights up to 21,000 lb. provided the arrestor gear has been re-set to take the increased weight. The approach speed must still be restricted to 100 knots, unless the wind speed over the deck is increased by a corresponding figure over the minimum. The approach speed may then be increased to a maximum of 105 knots, but this increased speed should only be used if the A.U.W. is above the normal D.L. weight of 18,500 lb. Off-centre landings must be avoided in these circumstances to minimise the chances of hook damage.

## 92. Landing with asymmetric load

Lateral control is quite adequate, and normal approach speeds should be used when up to 4 rocket hang-ups occur on one side, or up to 40 gallons difference in reading on the outer wing tank gauges. If a landing is necessary under the *worst* condition of one-wing heaviness, a straight final approach should be made at an airspeed of not below 125 knots.

## 93. Simulated forced landing practice

A guide to the gliding characteristics which might be experienced *were the propeller to be feathered*, may be obtained by setting the throttle to the Flight Idle gate; and at a steady airspeed of 160 knots, adjust the throttle so that the torque-meter needle just begins to move from its minimum position. As speed and altitude are reduced, it may be necessary to make very slight adjustments to the throttle to keep the torque-meter needle in this position. The F.F.P.S. must be WITHDRAWN.

## 94. Instrument approach

The following speeds, flap settings and approximate power settings are recommended for use during instrument approaches with the undercarriage lowered:—

	Torque-meter pressure	Flaps	Airspeed (knots)
Pattern	120	Manoeuvre	150
Final	120	Take-off	140
Glide path	120	Down	120

## 95. Going round again

- (i) Should the decision to go round again be made on the ground once the throttle has been moved to the Ground Idle gate position, the throttle must be opened *slowly* until 7,800 r.p.m. are attained, to avoid stalling the

engine. Thrust response on opening the throttle is good once the engine is at constant speeding r.p.m. If the throttle has been closed *only* to the Flight Idle gate, the throttle must still be opened slowly until 7,800 r.p.m. are reached, but after this, normal throttle movements can be made.

- (ii) On going round again from the approach, the throttle should be opened smoothly to the Take-off position, and as a safety precaution, the F.F.P.S. engaged if the undercarriage is left down. Care should be taken that the switch is reset to NORMAL on a subsequent landing.
- (iii) The climb-away should be made at 120 knots and the flaps should be raised to the Take-off position and undercarriage retracted if required.
- (iv) There is a moderate nose-up change of trim on raising the flaps, and retrimming is necessary.

## 96. Checks after landing

Brake pressure	Sufficient for taxiing
Flaps	UP
J.P.T.	Normal

## 97. Stopping the engine

- (i) Run the engine at 6,000 r.p.m. for about 30 seconds to ensure even cooling of the engine.
- (ii) Close the throttle to the Ground Idle position and stop the engine by fully closing the H.P. cock.
- (iii) If required, press the starting pitch button until the propellers are fully feathered. The propeller brake will then be automatically applied.

(iv) When the propellers have ceased turning, check:—

Electrical services	OFF
Chocks	In position
Wheel brakes	OFF
Ejection seat	Secure safety strap with safety pin
Engine intake guards	In position



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