PART III
HANDLING

MANAGEMENT OF SYSTEMS

56. **Management of the fuel system**

(a) The L.P. and H.P. cocks must be ON and except for starting, and taxying after landing, the booster-pump switches should be ON (modified aircraft) or at AUTO or MANUAL (unmodified aircraft) at all times when the engine is running.

(b) *Modified aircraft*

Fuel is supplied to the engine from the front tanks by the booster-pumps. The front tanks are kept full with fuel transferred by air pressure from the drop tanks via the wing and centre tanks. With the booster-pump switches ON equal flow should be provided from both front tanks.

(c) *Unmodified aircraft*

(i) With booster-pump switches set to AUTO, fuel balancing is achieved by the fuel feeding alternately from the port and starboard tanks. The fuel gauges electrically monitor the output of the booster-pumps. The low-side gauge reduces the output from its booster-pump and only the high-side pump supplies fuel to the engine until the situation is reversed, because its higher output pressure prevents fuel flowing from the low-side. Thus fuel balancing will only function when the gauge readings begin to fall.

(ii) In aircraft with wing tank fuel ungauged all the fuel from one wing tank plus a small amount from the centre tank on the same side will be used before the

gauge senses that one side is low and causes that booster-pump to operate at reduced output. Fuel is then fed from the other side. The asymmetric flow is indicated by a gradual wing-low effect which, in power control, is hardly noticeable. (See para. 83 (c)).

(iii) When drop tanks are carried the booster-pumps switches should be set to MANL until the wing tank magnetic indicators show white; then set to AUTO. This is to avoid the out-of-trim effects which will occur due to the asymmetric fuel flow described in (ii) the effects of which in this case will be of a greater magnitude.

(d) *Unusable fuel*

(i) Provided slow forward throttle movements and small changes in attitude are made the engine will continue to run satisfactorily down to zero gauge readings, but at low fuel states steep climbs and/or sudden application of full power should be avoided, particularly when overshooting, as this will cause fuel in the tanks to move away from the booster-pumps resulting in a possible fuel starvation and flame extinction. Therefore at low fuel states minimum power consistent with safety should be used, steep attitudes avoided and a glide approach planned. If a flame-out occurs, a relight may be obtained by adopting a nose-down attitude and pressing the relight button.

(ii) The amount of unusable fuel increases with sudden forward acceleration and/or nose-up attitude: rig tests reveal the following:—

Angle between fuel surface and fuselage datum	Unusable fuel galls. per side
10°	16
20°	26
30°	30

In the normal unstick attitude, the angle between fuel surface and aircraft datum is approx. 23°, at which angle approx. 27 galls. (208 lb.) per side are unusable.

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(e) *Unequal tank emptying*

(i) Unequal emptying (to the extent of 100 lb. or more) will result from either balance control failure or booster pump failure. The contents gauges and booster-pump failure warning lights (when fitted) should be checked frequently to ensure that fuel balancing is being maintained. If a booster pump fails any resulting inequality in fuel levels cannot be corrected. Both pumps should therefore be turned off (see sub-para. (f) below).

(ii) To check for booster-pump or balance control failure in aircraft without booster-pump failure warning lights, switch off the pump on the low contents side; if the low pressure warning indicator then shows white the " high-side " booster-pump has failed, if it remains black automatic balancing has failed. If the latter occurs balancing must then be obtained by use of the individual booster-pump switches between the MANUAL and OFF positions (or ON and OFF positions in aircraft fitted with a flow proportioner) i.e. switching off the pump on the low contents side until the fuel contents are level, then switching both pumps to MANUAL (or ON in modified aircraft).

(iii) With the booster-pump failure warning lights fitted the operating pressure of the low pressure warning indicator is reduced to $3\frac{1}{2}$ lb./sq. in., it will not go white when both booster-pumps are off; in this case balance control failure is indicated by unequal emptying with the booster-pump failure lights out.

(f) *Booster-pump failure*

(i) If a booster-pump fails, reduce r.p.m. to approximately 6,500, switch OFF both pumps and accept the fuel feed provided by tank pressurization and gravity. Open the throttle until the minimum r.p.m. to maintain height is obtained or engine roughness is encountered, whichever occurs first. If necessary

reduce altitude and r.p.m. until a satisfactory combination is obtained and return to base. With both pumps OFF the engine will run satisfactorily provided there is fuel in both sides and maximum level flight conditions should be obtainable at sea level, but it is advisable to avoid using excessively high r.p.m. Since the engine will not run with one side of the fuel system empty unless the booster pump is operating on the side containing fuel it is important to land while both sides still contain fuel. If the fuel state permits, the serviceable booster-pump should be switched ON prior to landing.

NOTE.—In tropical climates leave the serviceable booster pump ON and land as soon as possible while there is still fuel in both sides.

(ii) With both booster-pumps OFF, fuel cavitation may occur in the engine pumps, causing engine roughness or loss of r.p.m. This is more likely to occur at high fuel flows, high fuel temperatures, high altitude, or in a climb and immediately afterwards.

(g) *Transfer failure*

(i) The fuel transfer indicators should remain black throughout the flight. If one or both show white, air pressure failure has occurred and steep dives should be avoided due to the possibility of collapsing the tanks. Should an indicator show white before transfer is complete, any fuel remaining in the rear and centre tanks will be unusable and the associated contents gauge will only indicate the fuel in the front tanks (770 lb. (100 gallons) max. per tank). In these circumstances if the gauge registers more than the total contents of a front tank a faulty gauge should be suspected and only the front tank fuel should be relied on as being available to the engine. The booster-pump on the side with air transfer failure should be switched OFF until the contents gauge of the other side indicates an equal amount; then reset the switch to AUTO (unmodified aircraft), or ON (modified aircraft).

(ii) A fuel transfer indicator may show white when the rear and wing tanks are empty or nearly empty. This is caused by the hymatic valve freezing. If it occurs only the fuel in the front tanks will be available to the engine. Since this only occurs when all or nearly all the fuel from the wing and rear tanks has been transferred it is not serious from a fuel point of view; however, rapid climbs and descents should be avoided otherwise the fuel tanks may collapse.

(*h*) *Gauge failure*

(i) *Aircraft with fuel proportioner*
Total or partial gauge failure will not affect fuel flow. Check that neither booster pump nor transfer failure has occurred, leave both pumps ON and return to base.

(ii) *Aircraft with fuel gauge monitored booster pumps*
Total or partial gauge failure will quickly result in an out c balance fuel state. Switch both pumps to MANL and retur to base.

57. **Engine handling**

(a) *Take-off and climb*
During the initial climb to 10,000 ft. at full power, r.p.m. may increase to 8,700, but above that height a negative creep device gradually reduces r.p.m. with height to maintain j.p.t. within limits. As a result full throttle r.p.m. at 40,000 ft. will be about 8,400/8,550 and at 50,000 ft. 8,300/8,450. However, when climbing at intermediate r.p.m. above 8,000, but not at full power, it may be necessary to *reduce* the throttle setting to maintain the selected r.p.m.

(b) *General*
The AFC is designed to give optimum engine acceleration at all altitudes. Rapid engine accelerations and decelerations may be made at all altitudes.

(c) *Approach conditions*
During the approach to land, if r.p.m. are maintained at 5,000, full thrust can be obtained within 5 seconds. If less r.p.m. are used the time to attain full thrust is considerably increased.

(d) *Flame-out*
If flame-out occurs, carry out the relighting drill (see para. 91). It must not be assumed that combustion has ceased unless r.p.m. fall below 3,000.

58. **Management of the flood flow system**

NOTE.—Pending modification action to improve the system, MANUAL flood control must not be selected below 15,000 ft. at r.p.m. exceeding 7,000. When Mods. 209, 291, 321, 322 are all incorporated, all restrictions on the use of the system are removed.

(a) For all normal conditions of flight the FLOOD AIR-FLOW CONTROL switch should be at AUTO. To prevent windscreen misting MANUAL should be selected:—

(i) When cruising for prolonged periods at high altitude and low engine r.p.m. e.g., more than 15 minutes above 30,000 ft. at 7,200 r.p.m. or less (see (b) below).

(ii) For descents using less than 7,000 r.p.m. after high altitude cruising until misting has cleared or misting danger has passed. (See (c) below and NOTE.)

(b) If misting occurs above 30,000 ft. when cruising at 7,200 r.p.m. or above, keep both the FLOOD AIR CONTROL and the CABIN TEMP. CONTROL switches at AUTO and select full heat on the CABIN TEMP. SELECTOR.

(c) If descending with r.p.m. above 7,000 keep the FLOOD AIR CONTROL switch at AUTO and select HOTTER on the CABIN TEMP. CONTROL.

STARTING, TAXYING AND TAKE-OFF

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59. External checks

The outside of the aircraft should be checked systematically for signs of damage and for security of panels, filler caps, doors and the like. The engine intakes and boundary layer ducts must be free from obstruction and the jet pipe free from distortion. The main and nosewheel oleos should be checked for extension, the tyres for cuts and creep, and the brake leads for security and leaks. The elevator accumulator gauge in the port side of the fin should read 1,575 lb./sq. in. and the ailerons accumulators gauge in the starboard wheel bay should read 1,575 lb./sq. in. (900 if Mod. 690 is embodied). Remove the pressure head cover.

60. Cockpit and pre-start checks

(a) On entering the cockpit and before strapping in, check that the drogue gun safety lock and emergency oxygen bottle pins are removed, that the flight instruments and radar supply circuit-breakers are in and the test switch is at NORMAL FLIGHT (see para. 16 (b)). Check that the hood rail locking indicators (15) have their pointers in line with the centres of the pins.

(b) Strap in, adjust rudder pedals, and connect radio, oxygen and anti-G suit; have the seat safety pin removed and stowed.

(c) Put on the battery master switch, ensure that the turn and slip indicator starts up, then check the cockpit from left to right:—

NOTE.—The starred items are directly connected with engine starting.

Item	*Check*
Undercarriage emergency air pressure gauge (9)	Pressure 1,800-2,000 lb./sq. in.
Flaps emergency air pressure gauge (10)	Pressure 1,800-2,000 lb./sq. in.
Wheel brakes accumulator air pressure gauge (11)	Minimum pressure 750 lb./sq. in. (1,550 lb./sq. in. on unmodified aircraft).
Tailplane actuator and hood motor circuit-breakers (6) (7)	In.
Radar test switch (8)	Switch to TEST. Check aurally that the stand-by inverter starts up, and that the gyro instruments start erecting. Switch to NORMAL.
Cockpit pressure warning test switch (5)	Switch to TEST check cockpit altimeter warning light comes on. Switch to NORMAL.
Cockpit pressurization switch (3)	ON (In conditions of high humidity, to avoid internal misting on take-off, leave OFF until 5,000 ft. is reached).
Cockpit temperature control (2)	Auto.
Cockpit temperature selector (1)	As required.
Flood flow control switch	AUTO.
*L.P. cock (13)	ON.
*H.P. cock (32)	Set ON and press relight button. (If serviceable a clicking sound is heard.) Set OFF.
Throttle damper (18)	Adjust as required.
*Throttle	Half-open.

Item	*Check*
Hood control switch and clutch selector (22)	Clutch FREE, check manual operation of hood. Clutch LOCKED. Switch as required.
Undercarriage emergency selector (25)	Ensure selector not pulled up.
Undercarriage position indicator (37) and selector buttons (39)	Day/Night switch. Bulb changeover switch. Three green lights. Undercarriage warning light out. Down button fully in
Flaps emergency selector (41)	Ensure selector not pulled out.
Hydraulic pressure warning light	On.
Power control switches (43)	Both OFF. (CENTRAL IF MOD A52 EMBODIED) A.L.1.
Hood jettison handle (34)	In.
Flight and engine instruments	Condition.
Generator failure warning lights (61)	On.
*Ignition switch (66)	ON (normally locked on).
Windscreen de-icing switch (51)	OFF.
Fire warning light (52)	Off. Pull out spring-loaded button to test, then reset. Do not allow button to spring back in. (If test switch fitted, use that in lieu of above check.)
Audio warning cut-out switch (59)	ON (Normally spring-loaded in the ON position).
Fuel pressure warning indicator	Black until engine master switch is on.
Cockpit altimeter (55)	Reading.

Oxygen (74)	Main and emergency supplies connected. Contents and delivery. Stopcock ON. 100% A.L.1 Air inlet ~~NORMAL~~ OXYGEN. Test for mask leaks. Blinker operation. Emergency switch central.
Fuel contents gauges (73)	Contents with ENG. ON/OFF switch at ENG. OFF. Fuel transfer indicators white (if pressure is still in the system these will be black and contents gauges will read full).
*Fuel booster-pump switches (78)	OFF.
Booster - pump failure warning lights (when fitted)	On.
*Fuel booster-pump and engine starter circuit-breakers (84) (85)	All in.
External light switches (70)	As required.
Oxygen emergency selector (69)	Down.
Anti-G control (80)	Switch ON. Check pressure 1,800-2,000 lb./sq. in. Test. Then as required.
Flying controls	Full and free movement. *
Brakes	On. Check pressure at each wheel. If brake accumulator pressure is between 750 and 1,500 lb./sq. in. each brake needle should read accordingly.

* ROTATE SPRING FEEL TRIM FULLY IN BOTH DIRECTIONS. CHECK STICK MOVES LATERALLY IN SAME SENSE, RETURN TO NEUTRAL.

61. **Starting the engine**

NOTE.—The maximum permitted j.p.t. during starting is 750° C. Should this temperature be exceeded the H.P. cock must be closed immediately.

(a) Starter master switch — ON. Check aurally that No. 1 inverter starts up, the gyro instruments erect and the fuel pressure warning indicator shows white. (If residual pressure remains in the system the indicator may remain black).

H.P. cock — ON.

Press the starter button without delay.

(b) The cartridge fires over a period of approximately 4 seconds during which time light-up should occur. The engine should accelerate to the idling r.p.m. $3{,}000^{+200}_{-0}$ in approximately 11 seconds. The throttle should be closed when engine speed is approaching 3,000 r.p.m. The starter button remains in for approximately 30 seconds after it was initially pressed.

NOTE.—If the engine lights up, as indicated by the j.p.t. registering, but r.p.m. then drop below 1,400, immediately close the H.P. cock.

(c) When r.p.m. have stabilized, check that the j.p.t. has returned to normal and the oil pressure is registering (off the stop).

(d) *Failure to start*

(i) If the cartridge does not fire, close the H.P. cock immediately. It must not be assumed that the breech is empty. In all cases allow one minute to elapse before attempting a further start. If the second cartridge fails to fire, have the defect investigated.

(ii) If the cartridge fires but the engine fails to light up, close the H.P. cock without delay. Always allow the engine to stop turning before making a further attempt to start.

(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 one minute must elapse before the button is again pressed.

(iv) If the safety disc bursts, as indicated by intermittent clouds of black or yellow smoke from the turbine exhaust and no r.p.m. indication, wait until the cartridge stops burning and have the fault rectified.

(v) The run of the time switch must not be shortened by the use of the master switch, otherwise overspeeding of the starter may occur in some circumstances.

62. **Checks after starting**

Fire warning light	Out.
Set 3,700 r.p.m. and check:—	
Generator warning lights	Out.
Fuel transfer	Indicators black.
Booster-pump switches	OFF check as below. With both switches off, the low pressure indicator should show white, then ensure that as each switch is set in turn to AUTO. and MANUAL (ON in aircraft fitted with flow proportioner) the low pressure indicator shows black, leave at AUTO (or ON). On aircraft fitted with booster-pump failure warning lights, switch ON each pump and check that the lights go out; the L.P. indicator should be black with booster-pumps On or Off.
Instruments	Correct functioning. Compare Mk. 4F compass with E.2 Switch on pressure head heater and G.45 camera if required. Erect artificial horizon.

Hydraulic pressure	3,000 ± 150 lb./sq. in. on both centre needle of triple pressure gauge and brake acc. gauge. Pressure at each wheel brake 1,500 lb./sq. in. (min.). Warning light out.
Elevator and ailerons	Select power control switches ON. Engage controls by moving the control column through its full traverse (using two hands if necessary) until free movement is felt. Indicators black.

If Mod. 452 is incorporated, hold the selector switch to POWER with the left hand and move the control column with the right hand, laterally when engaging ailerons and fore and aft when engaging elevator, until the corresponding magnetic indicator goes black. The switch can then be released. To engage aileron power more easily it is advisable to either:

(a) select POWER with the stick held hard over to starboard, then move it to port, or

(b) attempt the engagement immediately after lighting before hydraulic pressure builds up.

If Power has not been correctly engaged the controls will revert to Manual when the switch is released.

Flaps	Check operation.
Tailplane actuator	Test through full range on emergency lower cover then check on normal and set at 0°. The stick should move forward as nose-down trim is applied and vice versa.
Rudder and aileron trimmers	Check and set neutral. Lock engaged.
Airbrake	Check operation with test switch.
V.H.F.	Frequency selected. DME (if fitted) switch to STANDBY.

NOTE.—1. To check the correct functioning of the hydraulic failure warning light and audio warning, exercise the stick laterally several times and select full flap simultaneously to exhaust hydraulic pressure. The light should come on and the audio warning sound when pressure falls below 650 lb./sq. in. When pressure rebuilds check that the flying controls magnetic indicators are still black. If the flying controls revert to Manual during this check they should be re-engaged as appropriate.

2. When Mod. 457 is embodied, if a check on low geared Manual aileron is required, apply full lateral stick deflection and switch to Manual, observing a decrease in aileron angle. Re-switch to Power and check aileron reverts to its original position.

63. **Taxying**

(a) Taxying is normal for a nosewheel aircraft.

(b) Fuel consumption is about 2 gallons per minute whilst taxying.

(c) Whilst it is desirable to keep r.p.m. above 3,700 whenever possible to avoid discharging the batteries and to prevent No. 1 inverter cutting out with the subsequent loss of the Mk. 4F compass, Art. Hor. and oil pressure gauge, the aircraft should not be taxied at a speed which requires excessive use of the brakes as this causes overheating of the tyres and reduces their life.

64. **Checks before take-off**

Trim	Tailplane 0° (1° n.u. if carrying drop tanks). Rudder—neutral. Ailerons—neutral, lock on. Spring feel—neutral.
Fuel	Booster-pumps ON or AUTO (MANL if drop tanks carried). Warning lights (when fitted) out. Fuel pressure indicator black. H.P. cock ON and locked. L.P. cock ON. Transfer indicators black. Contents.
Flaps	Up (38° if carrying drop tanks).
Instruments	Check and set. Pressure head heater ON.
Oxygen	100% Oxygen. Emergency switch central. Blinkers operating.
Harness	Tight and locked.

Hood	SHUT (not OFF). Clutch LOCKED. Cockpit pressure ON (OFF in conditions of high humidity).
Hydraulics	Flying controls in power. At 4,500 r.p.m. apply full aileron and elevator and ensure that the magnetic indicators remain black. Warning light out.

65. **Take-off**

WARNING.—*A check that the power controls indicators are black must always be made immediately before take-off at not less than 4,500 r.p.m.* At any stage of a flight, if either automatic Manual reversion or any form of stick jamming occurs with Power selected ON, immediately switch Power OFF. Do not attempt to re-engage Power; return to base and land in Manual.

(a) Having aligned the aircraft apply the brakes, open the throttle smoothly. When the aircraft begins to creep forward at between 7,500 r.p.m. and full throttle, depending on brake condition, release the brakes and open up to full throttle. At full power, check that the oil pressure is at least 15 lb./sq. in. If the aircraft creeps forward before 7,000 r.p.m. is reached, the brakes should be considered unserviceable and the aircraft should not be flown. Settled r.p.m. on take-off may vary from 8,500 to 8,650. On rapid throttle opening there may be an overswing of 250 r.p.m. and an underswing of 200 r.p.m. which should damp out in three cycles.

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

(c) Ease the nosewheel off at about 120 knots and hold it just off the runway, taking care not to achieve an excessively nose-up attitude. At about 150 knots, depending on weight, apply gentle back pressure to unstick.

(d) Until experience is gained the lightness of the ailerons may lead to overcontrolling, resulting in lateral rocking as the aircraft leaves the ground.

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(e) When comfortably airborne apply the brakes and raise the undercarriage. There is no noticeable change of trim, but the nosewheel locks up with a distinct thud. *Retraction must be complete before 230 knots may be exceeded.*
To ensure that the wheels do not rotate in their bays when the undercarriage is locked up, keep the brakes on until the red lights go out.

(f) As the aircraft accelerates to climbing speed it will be necessary to trim out the increasing nose-up change of trim.

(g) *Use of flap for take-off*
Only a short reduction in take-off distance is achieved by using 38° flap, but the distance to 50 ft. is appreciably decreased. In this configuration lateral rocking is more pronounced; a strong nose-up change of trim and a small amount of sink occur when the flaps are raised. It is recommended that flaps should not be used during formation take-offs.

(h) *When carrying stores*
Using 4 notches of flap (38°) and 1½° nose-up trim the nosewheel can be eased off at 125 knots and the aircraft flown off at 145–150 knots, the unstick distance being approx. 1,550 yards. When safely airborne immediately raise the undercarriage and then the flaps one notch at a time retrimming after each selection; delay in raising the flaps will result in an increasing nose-down change of trim as speed increases.

(j) *Manual reversion*
(i) Should Manual reversion occur on take-off it is safe to continue the take-off, circuit and landing. Using the recommended trim settings, a strong pull force is required to raise the nosewheel but the aircraft will be in trim at 160 knots.
(ii) It is recommended that, because of there being a possible hydraulic failure, undercarriage and flaps (if the latter have been used for take-off) are left down, care being taken not to exceed the maximum permissible speed.

HANDLING IN FLIGHT

66. **Climbing**

NOTE.—If cockpit pressure has been set to OFF for take-off, switch it ON at about 5,000 ft.

(a) (i) *Best rate of climb*
Climb at maximum power within the j.p.t. and r.p.m. limits at 430 knots until 0.87M. is reached. Thereafter maintain 0.87 M.

(ii) For the best rate of climb, it is important to keep to the recommended speed especially at high altitudes. Above 30,000 ft. the rate of climb will fall off

quickly if the airspeed is reduced to below that recommended, and it will take a long time to regain speed without losing height.

(b) *Normal climb*

If maximum rate of climb is not essential set 8,400 r.p.m. using the same airspeeds as above. It may be necessary to adjust the throttle as height is gained to maintain the selected r.p.m.

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67. General flying

(a) *Flying controls*

(i) *Ailerons* (*in power*). The ailerons are light throughout the speed and mach number range, giving a high rate of roll. (See para. 71.) The aileron spring feel trim should normally be used to counteract any out-of-trim forces which may occur in Power. It should not normally be used when flying in Manual.

(ii) *Power-assisted elevator* (*in power*). The control is light and effective up to 450–500 knots, but at higher speeds it becomes heavy and loses some of its effectiveness. Above 0.92M there is a marked decrease in control effectiveness and a substantial heavying up.

(iii) *Full-power elevator* (*in power*)

The force required for any manœuvre depends on the distance the control column is displaced from the " zero-load " position. It follows therefore that when large elevator deflections are required, e.g. at low airspeeds and very high mach numbers, the stick forces are relatively heavy; at high airspeeds, however, since only small deflections are usually required, the stick forces are light. The control is light, effective and should be used cautiously especially at high I.A.S. until its characteristics are known and its effectiveness appreciated. However, elevator effectiveness is somewhat limited by jack stalling, which occurs when the air load on the elevator equals the jack output force and restricts movement of the control column rearwards. When manœuvring, jack stalling may occur above 0.93M depending on tailplane angle and C. of G. and if it occurs, the tailplane must be resorted to for control.

(iv) *Rudder*. The rudder is light at low I.A.S. but becomes progressively heavier as speed increases. The application of rudder produces a strong rolling tendency.

(b) *Trimmers and tailplane*

NOTE.—Do not fly with the thumb on the tailplane control switch as this may cause intermittent making and breaking of the contacts which may damage the switch. Care must also be taken not to operate the switch inadvertently during manœuvres, as this may result in excessive G being applied. If the normal trimmer fails, the standby control should be used; this operates at about one-third the speed of the normal control. The aileron trimmer must not be used whilst the controls are in power, and it should be locked in the neutral position.

(i) *With power-assisted elevator fitted*

For general sustained flight the tailplane trimmer should be used in the normal manner. When manœuvring at high speeds the tailplane trimmer may be used to supplement the elevator pull force, *but this force must never be completely trimmed out.* (*See para. 72.*) Should both trimmers fail, the aircraft can be controlled throughout the speed range in power with the tailplane at the fully nose-down position. With the tailplane at the fully nose-up position, the push force required becomes excessive above 250 knots or 0.87M. The aircraft can be landed in power with the tailplane at either extreme, without undue difficulty. Normally with the controls in power the tailplane angle will be between $\frac{1}{2}°$ and 1° nose-down. The full traverse will, however, be required with the controls in manual.

(ii) *With full-power elevator fitted*

The tailplane trimmer should be used in the normal manner, the angle is usually between 1° and fully nose-down. When manœuvring at high airspeed the stick forces are light and little use of the trimmer is required. The full-power elevator tends to mask any out-of-trim forces which may be present, but the forces should always be trimmed out except when manœuvring (see para. 72 WARNING); otherwise the force may be too heavy for the pilot to hold if Manual reversion occurs inadvertently.

If both elevator trimmers fail, the aircraft can be flown throughout its speed range with the trim at full nose-down, but at full nose-up the elevator is not

sufficiently powerful to stop the nose rising at speeds in excess of approximately 420 knots. The aircraft can be landed in Power with the tailplane at either extreme without undue difficulty.

(c) *Airbrake*

(i) The airbrake may be used throughout the speed range, with undercarriage up. The trim changes are as follows.

(ii) Selection of airbrake causes moderate buffeting and a momentary nose-down change of trim which reverts to a moderate nose-up trim change when fully extended. Correcting the out-of-trim forces at high I.A.S. may lead to over-controlling.

(d) *Flaps*

(i) *At high mach number*

As speed is increased from 0.9M to 0.93M a marked nose-down trim change occurs; lowering flap also produces a marked nose-down change of trim, the degree of out of trim increasing with the amount of flap selected and with speed. At speeds above 0.92M elevator and tailplane effectiveness decreases. Pilots will realize therefore that if 0.9M is exceeded with flap lowered, or flap is lowered inadvertently at speeds in excess of 0.9M, longitudinal control will be very substantially reduced and in the worst condition may be lost completely. If control is lost with any degree of flap lowered the flap should be raised immediately.

(ii) *At high airspeed*

If speed is increased inadvertently beyond 350 knots with flaps extended, the increasing airloads decrease the flap angle which results in a nose-up change of trim.

(e) *Changes of trim*

Increase of power	Nil.
Operation of undercarriage	Negligible except when ailerons are in manual (see para. 84).
Flap down	Strong nose-down above 200 knots.
Airbrake	*High* I.A.S. slight transient nose-down, then slight nose-up. Above 0.98M slight nose-up. *At low* I.A.S. negligible.

(f) *Flying at forward C. of G.*

In the forward C. of G. condition (i.e. when ammunition is carried) the nosewheel and aircraft unstick speeds are increased from approx. 120 knots to 125 knots and 150 knots to 155 knots respectively. The stick forces required to manœuvre the aircraft in the pitching plane are slightly increased at forward C. of G. because slightly larger elevator deflections are required. At very high I.A.S. and mach no. when jack stalling occurs the amount of G it is possible to obtain is reduced.

(g) *Flying in turbulent conditions*

The recommended speeds for flight in turbulent conditions are as follows:—

Condition	*Altitude*	*Speed*
Climbing or level flight	Above 25,000 ft.	0.83M
	Below 25,000 ft.	350 knots
Descending (airbrake out, flap 20°)	Above 35,000 ft.	0.83M
	Below 35,000 ft.	280 knots

(h) *Flying with drop tanks on inboard pylons*

(i) At speeds below the permitted maximum the handling characteristics are similar to those for the clean aircraft. During combat manœuvres with fuel in the tanks it is recommended that aileron movement is restricted to half of full movement to avoid an excessive rate of roll.

(ii) *Practice Manual flying*

Practice selection of flying controls to Manual should not be made when carrying drop tanks, because the presence of such stores increases the difficulty of re-selecting Power.

(j) *Flying for endurance*

The recommended speed is 180 knots.

68. Flying at reduced speed

(a) Fly at 180–200 knots using 23° flap (2 notches down).

(b) The hood may be opened fully below 200 knots but at about 150 knots excessive vibration sets in. This vibration is reduced if the hood is closed to the halfway position, i.e. about level with the pilot's shoulders. In this position the noise level is high and rather distracting but landings can be made without undue inconvenience.

(c) Lateral rocking may occur between 200–250 knots with the flaps fully down. If the rocking becomes excessive the flaps should be raised. Any lateral rocking which occurs below 200 knots is easily controlled with the ailerons.

69. Stalling

NOTE.—Because the rate of descent is very high and because it is possible to induce an inadvertent spin when the aircraft is fully stalled, stalling practice is not to be continued beyond the buffet stage nor below 25,000 ft. R.p.m. should not be allowed to fall below 5,000.

(a) Buffet speeds at 25,000 ft., throttle fully closed, are:—

(i) *Full ammunition and 260 gallons fuel remaining*

(*Max. landing weight approx.*)

Undercarriage and flap up	... ...	140 knots
Undercarriage down and flap up	...	140 knots
Undercarriage down and full flap	...	130 knots

(ii) *No ammunition and 100 gallons fuel*

(*Normal landing weight*)

Undercarriage and flap up	... ...	135 knots
Undercarriage down and flap up	...	135 knots
Undercarriage and full flap	... ...	125 knots

(b) Above 30,000 ft. buffet occurs at approximately 140–145 knots, with the throttle fully closed, undercarriage and flap up.

(c) Use of the airbrake increases the buffet but does not affect the stalling speeds or other characteristics.

(d) Under typical approach conditions, the buffet speeds quoted above are not appreciably affected, but the height lost during recovery is reduced.

(e) (i) Although the aircraft must not be deliberately fully stalled in flight, the characteristics are described here to assist pilots who inadvertently enter the fully stalled condition.

(ii) If the control column is held back after the buffet stage is reached, a nose-up change of trim will occur, and though it will vary in degree from aircraft to aircraft, to counteract it may require full forward stick movement. Either wing way tend to drop but can be controlled by the ailerons. Relaxation of the forward pressure on the control column at this point will lead to a further reduction in forward speed accompanied by a very high rate of descent. In this condition the elevator is relatively ineffective and response is slow.

(iii) A spin or spiral may develop, and in any case considerable height will be lost. Large deflections of the ailerons near the stall will cause the aircraft to yaw in the direction of the downgoing aileron and will increase the possibility of a spin or spiral developing.

70. **High speed stalling**

(a) (i) High speed stalling is subject to the overriding restriction of para. 55 (c) whereby pilots must not exceed +7G.

(ii) At airspeeds above 0.9M between 10,000 and 30,000 feet an accelerometer reading of +4G must not be exceeded. At airspeeds below 0.9M in that height band, G must not be applied beyond the buffet stage.

(b) *Pitch-up*

(i) During turns and pull-outs adequate stall warning is given by buffeting at all heights. If the backward pressure is continued inadvertently after the stall warning, a momentary pitch-up and sudden increase in G may occur.

(ii) Below 10,000 ft. the maximum allowable acceleration of +7G accelerometer reading may be applied at the higher Mach numbers without G stalling the aircraft; no pitch-up is therefore experienced.

(iii) Between 10,000 and 30,000 ft. above 0.9M the pitch-up, if experienced, may be co-incident with the buffeting and be severe enough to exceed +7G, and it is for this reason that the restriction of +4G accelerometer reading is imposed.

(iv) Above 30,000 ft. it is not possible to achieve high accelerometer readings.

(c) *With full-power elevator*

NOTE.—The information contained in (a) and (b) above also applies to aircraft fitted with full power elevator, and the following information should be regarded as supplementary.

Buffeting and/or limiting G can be obtained with very little effort, particularly when ammunition is not carried, but if jack stalling occurs it limits the amount of G it is possible to obtain. If the stick is held hard on the restriction stop an increase in G must be anticipated if speed is reduced, because the jack unstalls and further stick movement becomes possible as speed decreases. The increase in G will be sudden if the jack unstalling is coincidental with the nose-up change of trim as speed falls through 0.95M. When manœuvring at high I.A.S. near the ground, sufficient height must be allowed for a recovery to be effected in the jack-stalled condition using the V.I. tailplane. Care should be taken when manœuvring at high mach numbers, as it is easy to pull into the pitch-up inadvertently due to the light stick force.

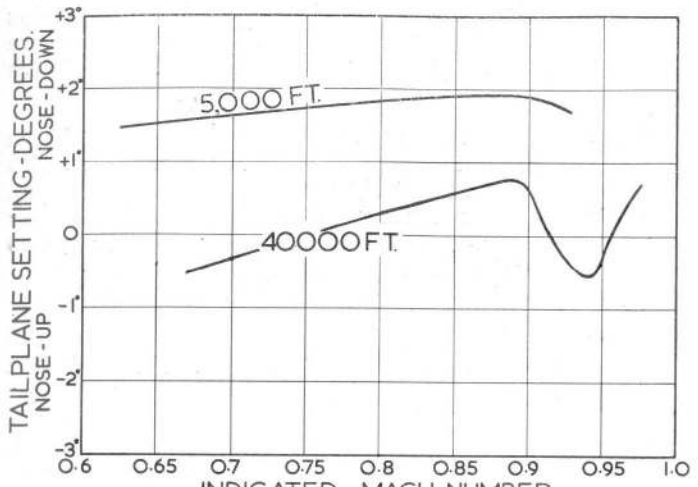
71. **Flying at high I.A.S.**

(a) When flying at high indicated airspeed all control movements must be smooth and progressive, particularly when flying at aft C.G. and/or in turbulent air. The tailplane trimmer must be used very carefully at high I.A.S.

(b) The maximum rate of roll increases with I.A.S. up to 420 knots; at higher speeds however the rate of roll progressively decreases due to jack-stalling. Normally maximum rate of roll is not required.

72. **Flying at high mach number (with power-assisted elevator)**

(a) *General.* The maximum speed in level flight at full throttle is 0.93 to 0.95M. From 40,000 feet and above the aircraft will exceed sonic speed in a 30° to 40° dive at full throttle. Transonic dives must not be started below 25,000 feet.



TYPICAL TAILPLANE ANGLES TO TRIM.
(AT FORWARD C.G.)

NOTE.—Tailplane settings are in degrees nose-down.

(b) *Trim changes.* From the diagram it can be seen that as speed increases to about 0.90M there is a progressive nose-up change of trim. Between 0.90M and 0.96M a nose-down trim change followed by a nose-up trim change occurs, the aircraft being almost back in trim again by 0.96M. At higher speeds as the aircraft becomes supersonic the trim again changes to slight nose-down.

(c) *Changes in stick force, and tailplane and elevator effectiveness*

(i) As the Mach No. is increased beyond 0.92 the tailplane and elevator become less effective. This is particularly evident at transonic speeds when even large elevator deflections have a delayed and reduced response. The tailplane may be used to assist recovery from high speed dives but the elevator pull force must never be completely trimmed out. (See para. (f) and warning.)

(ii) Since the effectiveness of the elevator decreases as mach number increases, greater deflections are required to manœuvre; consequently the stick forces increase.

(d) *Transonic flights.* Practice transonic flights should be made by putting the aircraft into a 30° to 40° dive with the tailplane trim set at 1½° nose-down. At 0.98M as the aircraft becomes supersonic the control column may move forward about one to two inches, there may also be some rudder movement, but this does not affect directional trim.

(e) *Recovery.* To recover, close the throttle, pull maximum elevator force and retrim to ½° nose-down. The aircraft will recover from the dive slowly, and as the nose comes up to the horizon retrim the tailplane to 1° nose-down. Recoveries can be made without using tailplane trimmer, but if the dive has been entered with full nose-down trim set, it will be necessary to retrim. Recovery must not be effected by use of the tailplane trimmer alone. The airbrake may be used during recovery; its extension causes moderate buffeting and a slight nose-up change of trim above 1.0M. It is not very effective in reducing speed.

(f) *Cumulative effect of changes in trim, tailplane and elevator effectiveness, and stick forces.* As speed becomes subsonic and falls to 0.97M, it is necessary to ease forward on the control column to avoid an increase in G. This is because of the trim changing to nose-up, the tailplane and elevator effectiveness increasing and the stick forces decreasing quite suddenly. This is also the case as speed falls through 0.9M, where the change of trim is more marked.

WARNING.—It is for the reasons given in sub. para. (f) that, when G is being applied at high mach numbers during turns and dive recoveries, great care must be taken to ensure that the stick force is never completely trimmed-out, otherwise an unexpected increase in G may result before retrimming can be effected. *This is particularly important below 10,000 feet when manoeuvring near limiting G and/or "blackout threshold."*

73. **Flying at high mach number (with full-power elevator)**

(a) All the information and recommendations given in para. 72 except the reference to stick forces also apply to aircraft with the full-power elevator. The following information should be regarded as supplementary.

(b) As the aircraft becomes supersonic there is no forward movement of the control column. Recovery from transonic dives can be made without using the tailplane trim. When jack stalling occurs, retrimming nose-up will decrease the angle between the elevator and tailplane and unstall the jack, enabling further stick movement to be applied. Normally the tailplane should not be trimmed back beyond ½° nose-down: this is to prevent a sudden increase in G caused by the nose-up trim change and the increasing effectiveness of the tailplane and elevator.

(c) *When carrying stores*

The handling characteristics differ very little from a clean aircraft. The rate of acceleration in level flight is decreased and at high mach number the aileron jack may stall, restricting stick movement and manœuvre in the rolling plane; the restriction disappears as soon as mach number is decreased.

74. **Aerobatics**

(a) Until experience is gained, the following speeds, in knots, are recommended:—

Roll	350
Loop	425
Roll off	450
Vertical roll	500

(b) It is recommended that until experience is gained, loops are started in the height band 10,000 ft. to 15,000 ft.

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75. **Spinning**

NOTE.—1. No inverted spinning tests have been carried out; information in this paragraph about inverted spinning is based on experience with similar types of aircraft.

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NOTE.—2. If a spin occurs with undercarriage and flaps down raise them immediately. If normal recovery action fails, jettison external stores, if carried, before emergency recovery is attempted. Because of the cranked stick pilots should familiarise themselves with its position corresponding to neutral aileron. The control column when aligned with a white circle on the instrument panel adjacent to the A.S.I. indicates the neutral aileron position.

(a) Intentional spinning is prohibited. The following information applies to aircraft with or without extended wing leading edges and is provided to acquaint pilots with the spin characteristics and recovery actions in case the aircraft is spun inadvertently. Spins may be entered inadvertently from harshly executed manœuvres if aileron and/or rudder are applied in the presence of buffet. A normal spin will usually result. An inverted spin is only likely to result from manœuvres such as a loop or roll off the top when the speed on the top has become too low; thus the likelihood increases at high altitude. It is recommended that the above spin-prone conditions be avoided.

(b) (i) When a normal spin occurs the nose may rise and the aircraft may roll on to its side or back, hesitating before entering the spin. Generally a spin to port gives a regular rotation in a 60° nose-down attitude, whereas a spin to starboard is erratic with hesitant and irregular rolling, pitching and yawing. When spinning in either direction the ailerons should be held neutral as out-spin aileron may make recovery impossible. Note that there is an instinctive tendency to oppose the spin with aileron unless a conscious effort is made to hold the aileron neutral.

(ii) When an inverted spin occurs, the aircraft rolls in the opposite direction to the turn.

(c) Bear in mind the manœuvre from which the spin has been entered, and *always* refer to the turn indicator to decide the direction of spin and not to external references. Carry out the following recovery actions:—

(d) *Normal spin*

(i) *Normal recovery*

1. Apply *full rudder* opposing the direction of the turn.
2. Move the control column *fully forward*, making sure the ailerons are neutral.
3. Maintain recovery action.
4. Centralise the rudder immediately rotation ceases.
5. Ease out of the ensuing dive.

(ii) *Emergency recovery*

If *after two turns* recovery action is unsuccessful, the following method is recommended.

1. *Maintain* full rudder opposing the turn and control column fully forward.
2. Move the control column in the same direction as the turn needle.
3. Maintain recovery action and be ready to centralise rudder and ailerons immediately the spin ceases in order to prevent an inadvertent spin in the opposite direction.
4. Ease out of the ensuing dive.
5. If recovery has not been effected by 10,000 feet, jettison the hood and prepare to abandon the aircraft if the spin persists.

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(e) *Inverted spin*

(i) *Normal recovery*

1. Apply *full rudder* opposing the direction of the turn.
2. Move the control column *fully back* making sure the ailerons are neutral.
3. Maintain recovery action.
4. Centralise the rudder immediately rotation ceases.
5. Ease out of the ensuing dive.

(ii) *Emergency recovery*

If, *after two turns*, recovery is unsuccessful the following method is recommended.

1. *Maintain* full rudder opposing the turn and control column back.
2. Move the control column in the opposite direction to the turn needle.
3. Maintain recovery action and be ready to centralise the rudder and ailerons immediately the spin ceases in order to prevent an inadvertent spin in the opposite direction.
4. Ease out of the ensuing dive.
5. If recovery has not been effected by 10,000 feet, jettison the hood and prepare to abandon the aircraft if the spin persists.

CIRCUIT PROCEDURE AND LANDING

76. Circuit procedure

NOTE.—460 lb. (60 gallons) of fuel should be allowed for the circuit and landing. (But see para. 56 (d).)

(a) *Circuit speed*

7,000 r.p.m. and 38° flap (4 notches) give a comfortable speed of 170/180 knots. To reduce speed for joining the circuit, flap, within the limitations, can be used successfully to augment the airbrake. Do not select more than one hydraulic service at a time and allow the cycle of each hydraulic operation to be completed before the next service is operated. The undercarriage should only be selected down when the wings are laterally level.

(b) *Checks before landing*

Airbrake	IN, indicator black
Undercarriage	DOWN below 230 knots Three green lights
Brakes	Pressure, operation, OFF Main supply 2,850 ±150 lb./sq. in. At each wheel 1,500 lb./sq. in.
Flaps	As required Fully down on finals
Fuel	Contents Booster-pumps ON (AUTO or MANL on unmodified aircraft)
Harness	Tight and locked

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NOTE.—The brake lever should be held on for 2–3 seconds. If the system is serviceable both brake needles should remain at maximum pressure. If a hydraulic pipe is fractured a lower than normal pressure will be indicated initially and this will decrease at a rate depending on the size of the fracture. The check should not be repeated because at each operation hydraulic oil will be lost.

(c) *Final approach*

(i) Turn across wind at 160 knots aiming to lower full flap on the final stages. Steep approaches are not recommended.

(ii) To ensure immediate engine response maintain at least 5,000 r.p.m. until finally committed to a landing. Under conditions of high wind or gustiness it is more comfortable if the speeds below are increased by 5 knots.

(iii) The recommended speeds, in knots, at the runway threshold:—

At normal landing weight

No ammunition, 800 lb. (105 gallons) or less fuel remaining 130

At maximum landing weight

No ammunition, 2,300 lb. (300 gallons) fuel remaining 135
Full ammunition, 1,600 lb. (210 gallons) fuel remaining 135

77. Landing

(a) As the touch-down point is approached the rate of descent should be checked and the aircraft flown gently on to the ground at about 5–10 knots less than the runway threshold speeds. Holding off may result in an excessive nose-up attitude with the subsequent danger of touching the tail cone and/or dropping a wing. If the latter occurs, corrective aileron may be effective in raising the wing, but will cause the aircraft to yaw markedly in the direction of the down-going wing. The nosewheel can be held off at speeds down to 70 knots, but the shortest run is achieved by putting the nosewheel firmly on to the runway and applying the brakes.

(b) *When carrying stores*

Enter the threshold at 140 knots and fly the aircraft on to the ground at 130 knots.

(c) *Braking*

NOTE.—The effectiveness of the braking system is greatly decreased on very wet or icy runways. If wind conditions are favourable it may be advantageous to use aerodynamic braking.

When the nosewheel has been lowered on to the runway the brakes can be used continuously and the maxaret units will prevent wheel locking; however, to prolong the efficiency and life of the brakes, braking should be judicious according to length of landing run available. The landing can be cut to less than half normal by using continuous full brake once the aircraft is firmly on the ground, but this procedure causes rapid brake and tyre

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wear and should not normally be used. The aircraft must be firmly on the ground before applying the brakes. If it is allowed to touch down with the brakes on, the maxaret units will not operate and the wheels will lock; however, if once having started turning, the wheels should stop because of a skid or bounce, they will not lock unless the skid or bounce continues for more than 4 seconds. After a landing involving heavy braking, ten minutes should elapse before the next landing. If the intervening period of taxying has also required prolonged use of the brakes, twenty minutes should elapse before the next landing. Observe the same precautions in brake tests.

(d) *Crosswind landing*

For cross-wind landings the "crab" technique should be used. In light winds no difficulty should be experienced in touching down, but in strong crosswinds full rudder may be required to correct the crabbing. The rudder has a delayed reaction which will require anticipation. The effect of full rudder is to produce a marked roll which must be counteracted with aileron. When the crabbing has been corrected the aircraft should be flown gently on to the ground and the nosewheel lowered on immediately to decrease the angle of attack of the wings and thus reduce the tendency for the cross-wind to lift the into-wind wing. Care should be taken to centralize the rudder before applying the brake. If the crosswind is gusting strongly the approach speed should be increased by 5 knots.

78. Instrument approach

The following are the recommended airspeed, power and flap settings for an instrument approach with the undercarriage lowered:—

	R.P.M.	Flaps	Airspeed (knots)
Down-wind	7,000	40°	170/180
Base leg	7,000	40°	170/180
Glide path	7,000	Full	150/160

79. Going round again

Open the throttle smoothly to the power required, raise the undercarriage, and at a safe height raise the flaps and retrim as necessary.

80. **Checks after landing**

Brake pressure	Sufficient
Flaps	Up
Cockpit pressure	Off
Camera master switch	Off
Pressure head heater	Off
Both booster-pumps	OFF

81. **Stopping the engine**

Set the tailplane to 0°. Close the throttle.
When the r.p.m. have stabilized at 3,000 to 3,200, turn off the H.P. cock, then check:—

All electrics	Off
Battery master switch	Switch off
Hood clutch selector	FREE
L.P. cock	~~OFF when engine stops rotating~~ LEAVE ON A.L.I.
Ejection seat	Replace the safety pin before leaving the cockpit.

FLYING IN MANUAL

82. **Selecting Manual**

(a) (i) It is structurally safe to fly in Manual within the speed limitations of para. 55(b) and in emergency, Manual could be selected at any altitude and airspeed. However, until experience is gained, it is recommended that selection of Manual and subsequent practice flying in Manual should be carried out above 10,000 feet. This is because of the out of trim forces which may be present when Manual is selected and the extreme heaviness of the controls and lack of manoeuvrability when in Manual.

(ii) Before selecting Manual, ensure:—

Airspeed	250 knots or 0.80M if above 40,000 ft.
Tailplane	In trim
Aileron and rudder trim indicators	Neutral
Aileron trim lock	Disengaged

(b) *With full-power elevator*

The elevator forces are slightly higher on aircraft fitted with the full-power elevator because of the additional force required to overcome the feel spring. Provided that the aircraft is in trim in Power, the trim changes on selection of Manual are usually slight. If the tailplane and elevator are incorrectly rigged, however, these changes may be large. Because of this possibility, when practice flying in Manual is to be carried out, the first selection to Manual should be made above 10,000 feet and at a low airspeed.

83. **Flying in Manual**

(a) The elevator forces are high but tolerable and no difficulty should be experienced with longitudinal control. The ailerons are heavy and require considerable effort to produce only small deflections. Reaction of the aircraft to aileron deflection is slow and delayed, therefore all necessary aileron movements must be anticipated. The rudder, the further effect of which is marked, can be used to assist control in the rolling plane but should be used with care at low airspeeds.

(b) *When carrying stores*

Because of the increased inertia, lateral control is less effective; this is particularly noticeable on the approach when lateral rocking due to either turbulence or overcontrolling is difficult to damp out. In gusty or severe crosswind conditions consideration should be given to jettisoning the stores before attempting to land. Due to the increased turbulence below the wing and the tendency of the ailerons to up-float the likelihood of obtaining a false anchorage when reverting from Manual to Power is increased. SHOULD EITHER INBOARD TANK FAIL TO FEED, THE TANKS MUST BE JETTISONED IF A MANUAL LANDING IS TO BE MADE. A.L.I.

(c) *Effect of asymmetric fuel flow*

(i) If Manual control is selected at 250 knots when one wing tank is empty and the other full, a maximum single-handed force will be required to restrain the wing-low tendency. The amount of trim to counteract this tendency varies with I.A.S., little being needed at high speed but maximum at approx. 190 knots. If speed is gradually reduced below 190 knots

an increasing stick force, up to a maximum of 8 lb. is required to maintain wings level. This asymmetric load condition is likely to cause false anchorages on reversion to Power. Before reselecting Power the aircraft should be trimmed hands off at 250 knots. When a correct reversion to Power is achieved the aileron trim should be set to neutral, otherwise, if an inadvertent reversion to Manual occurs, or if Manual is again selected at a later stage of the flight when the second wing tank has emptied, the previously applied trim will produce a wing-low tendency, the severity depending on the amount of trim applied and the I.A.S.

(ii) With one empty and one full drop tank, i.e., one tank fails to transfer, control in Manual on the approach is not possible. In these circumstances both tanks should be jettisoned (airspeed 250–300 knots).

(d) *Trim changes*

Increase and decrease power	Nil.
Operation of undercarriage	Roll in either direction (depending on which main leg lowers first) see para. 84.
Flaps down	Strong nose–down especially above 200 knots.
Flaps up	Strong nose–up especially above 200 knots.

84. Landing in Manual

(a) Until pilots have considerable experience of flying in Manual control, practice landings should be made only in ideal conditions, i.e. a steady wind down the runway. Because any asymmetric lowering of the undercarriage is liable to cause lateral control difficulties, the undercarriage must be lowered at a safe height. A wider than normal circuit should be made, followed by a long straight powered approach. When the airspeed is below 150 knots with undercarriage and full flap down, appreciable aileron buffet can be felt on the control column. If an overshoot has to be made, the undercarriage should not be raised until a safe height is reached. Flaps must only be selected up to a mid-position because of a nose-up change of trim, full retraction being deferred to a safe height.

(b) *With external stores* (See also para. 83 (b))
If the drop tanks are full or partly full they must be jettisoned before landing. Landing with any asymmetric loading other than one empty inboard drop tank must not be attempted. Trials have shown that with a nominal 1,000 lb. weight on an inboard pylon the wings cannot be held laterally level at speeds below 180 knots.

85. Reselecting Power

Before reselecting aileron and/or elevator power, the aircraft must be trimmed, laterally and longitudinally, in straight and level flight at the same airspeed and approximate altitude as when Manual was selected. Immediate re-engagement is more likely on the elevator than on the ailerons; it is therefore preferable to reselect elevator before ailerons. After reselection check that the appropriate magnetic indicators are black.

86. Clearing false anchorages (ailerons)

(a) If power is reselected below 10,000 ft. and a false anchorage occurs, *immediately* switch Power OFF and either

(i) Return to base and land in Manual, or

(ii) Climb above 10,000 ft. before making any further attempt to re-engage Power.

(b) If Power is reselected above 10,000 ft. and a false anchorage occurs, it may be cleared as follows:—

(i) *One-way restriction*

The control column should be moved rapidly over its full movement in the direction of unrestricted travel. If the airspeed is below 250 knots, this can be done without producing excessive aircraft roll.

(ii) *Both-ways restriction*

Lower full flap at an airspeed of 250 knots, and select aileron Power ON (or hold switch in Power if Mod. 452 is incorporated). The aileron buffet which occurs in this configuration will probably be sufficient to enable the pawls to engage in the slots, but if necessary move the control column laterally until the magnetic indicator turns black.

WARNING.—1. If it is not possible to clear a false anchorage, select Power OFF. Return to base and land in Manual.

2. If, when Manual is selected following a false anchorage, the controls remain jammed (indicating that Manual reselection is impossible) the aircraft must be abandoned.