PILOT'S NOTES

FOR

BEAUFIGHTER

MARK VI—TWO HERCULES VI ENGINES
MARKS TFX & XI—TWO HERCULES XVII ENGINES

AUTHORISED BY ORDER OF THE AIR COUNCIL

RESTRICTED

(FOR OFFICIAL USE ONLY)
NOTES TO USERS

This publication is divided into five parts: Descriptive, Handling, Operating Data, Emergencies, and Illustrations. Part I gives only a brief description of the controls with which the pilot should be acquainted.

These Notes are complementary to A.P.2095 Pilot's Notes General and assume a thorough knowledge of its contents. All pilots should be in possession of a copy of A.P. 2095 (see A.M.O. A93/43).

Words in capital letters indicate the actual markings on the controls concerned.

Additional copies may be obtained from A.P.F.S., Fulham Road, S.W.3, by application on R.A.F. Form 294A, in duplicate, quoting the number of this publication in full—A.P. 1721F, H & J.

Comments and suggestions should be forwarded through the usual channels to the Air Ministry (D.T.F.).
BEAUFIGHTER VI, TFX, & XI
PILOT’S NOTES
Second Edition. This edition supersedes all previous issues.

LIST OF CONTENTS

PART I—DESCRIPTIVE

INTRODUCTION

FUEL AND OIL SYSTEMS

<table>
<thead>
<tr>
<th>Description</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tanks</td>
<td>1</td>
</tr>
<tr>
<td>Fuel gauges and cocks</td>
<td>2</td>
</tr>
<tr>
<td>Oil system</td>
<td>3</td>
</tr>
<tr>
<td>Worth oil dilution system</td>
<td>4</td>
</tr>
</tbody>
</table>

MAIN SERVICES

<table>
<thead>
<tr>
<th>Description</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical services</td>
<td>5</td>
</tr>
<tr>
<td>Hydraulic system</td>
<td>9</td>
</tr>
<tr>
<td>Pneumatic system</td>
<td>7</td>
</tr>
</tbody>
</table>

AIRCRAFT CONTROLS

<table>
<thead>
<tr>
<th>Description</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary controls</td>
<td>8</td>
</tr>
<tr>
<td>Trimming tabs</td>
<td>9</td>
</tr>
<tr>
<td>Undercarriage control</td>
<td>10</td>
</tr>
<tr>
<td>Undercarriage safety locks</td>
<td>11</td>
</tr>
<tr>
<td>Undercarriage indicators and horn</td>
<td>12</td>
</tr>
<tr>
<td>Flaps control and position indicator</td>
<td>13</td>
</tr>
<tr>
<td>Dive brake control</td>
<td>14</td>
</tr>
<tr>
<td>Wheel brakes</td>
<td>15</td>
</tr>
</tbody>
</table>

ENGINE CONTROLS

<table>
<thead>
<tr>
<th>Description</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle and mixture controls</td>
<td>16</td>
</tr>
<tr>
<td>Propeller controls</td>
<td>17</td>
</tr>
<tr>
<td>Two-speed supercharger controls</td>
<td>18</td>
</tr>
<tr>
<td>Carburettor air-intake controls</td>
<td>19</td>
</tr>
<tr>
<td>Cowling gills controls</td>
<td>20</td>
</tr>
<tr>
<td>Carburettor cut-out controls</td>
<td>21</td>
</tr>
<tr>
<td>Starting magneto switches</td>
<td>22</td>
</tr>
<tr>
<td>Starter controls</td>
<td>23</td>
</tr>
</tbody>
</table>
**PART I—continued.**

**OTHER CONTROL**

<table>
<thead>
<tr>
<th>Control</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>De-icing controls</td>
<td>24</td>
</tr>
<tr>
<td>Oxygen system controls</td>
<td>25</td>
</tr>
</tbody>
</table>

**ARMAMENT CONTROLS** (on later aircraft)

<table>
<thead>
<tr>
<th>Control</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torpedo sight</td>
<td>26</td>
</tr>
<tr>
<td>Torpedo and bomb master switch</td>
<td>27</td>
</tr>
<tr>
<td>Torpedo depth-setting control</td>
<td>28</td>
</tr>
<tr>
<td>Torpedo and bomb selector and fusing switches</td>
<td>29</td>
</tr>
<tr>
<td>Under-wing load master switch and selector</td>
<td>30</td>
</tr>
<tr>
<td>Torpedo, bomb, and under-wing load release</td>
<td>31</td>
</tr>
<tr>
<td>Gun firing controls</td>
<td>32</td>
</tr>
<tr>
<td>Gun sight</td>
<td>33</td>
</tr>
</tbody>
</table>

**PART II—FLIGHT**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel system management</td>
<td>34</td>
</tr>
<tr>
<td>Preliminaries</td>
<td>35</td>
</tr>
<tr>
<td>Starting the engines and warming up</td>
<td>36</td>
</tr>
<tr>
<td>Testing engines and installations</td>
<td>37</td>
</tr>
<tr>
<td>Taxying out</td>
<td>38</td>
</tr>
<tr>
<td>Check list before take-off</td>
<td>39</td>
</tr>
<tr>
<td>Take-off</td>
<td>40</td>
</tr>
<tr>
<td>After take-off</td>
<td>41</td>
</tr>
<tr>
<td>Climbing</td>
<td>42</td>
</tr>
<tr>
<td>General flying</td>
<td>43</td>
</tr>
<tr>
<td>Stalling</td>
<td>44</td>
</tr>
<tr>
<td>Diving</td>
<td>45</td>
</tr>
<tr>
<td>Approach and landing</td>
<td>46</td>
</tr>
<tr>
<td>Mislanding</td>
<td>47</td>
</tr>
<tr>
<td>After landing</td>
<td>48</td>
</tr>
<tr>
<td>Oil dilution</td>
<td>49</td>
</tr>
<tr>
<td>Beam approach</td>
<td>50</td>
</tr>
</tbody>
</table>

**PART III—OPERATING DATA**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine data</td>
<td>51</td>
</tr>
<tr>
<td>Position error correction</td>
<td>52</td>
</tr>
<tr>
<td>Flying limitations</td>
<td>53</td>
</tr>
<tr>
<td>Maximum performance</td>
<td>54</td>
</tr>
<tr>
<td>Maximum range</td>
<td>55</td>
</tr>
<tr>
<td>Fuel capacities and consumptions</td>
<td>56</td>
</tr>
</tbody>
</table>
## PART IV. EMERGENCIES

<table>
<thead>
<tr>
<th>Issue</th>
<th>Para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine failure during take</td>
<td>57</td>
</tr>
<tr>
<td>Engine failure in flight</td>
<td>58</td>
</tr>
<tr>
<td>Feathering and unfeathering</td>
<td>59</td>
</tr>
<tr>
<td>Fuel jettisoning</td>
<td>60</td>
</tr>
<tr>
<td>Undercarriage and flaps emergency operation</td>
<td>61</td>
</tr>
<tr>
<td>Fire extinguishers</td>
<td>62</td>
</tr>
<tr>
<td>First-aid outfit</td>
<td>63</td>
</tr>
<tr>
<td>Bomb jettisoning</td>
<td>64</td>
</tr>
<tr>
<td>Emergency exits</td>
<td>65</td>
</tr>
<tr>
<td>Emergency signalling</td>
<td>66</td>
</tr>
<tr>
<td>Air/sea rescue equipment</td>
<td>67</td>
</tr>
<tr>
<td>Ditching</td>
<td>68</td>
</tr>
</tbody>
</table>

## PAF V—II ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Illustration</th>
<th>Fig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel system diagram</td>
<td>1</td>
</tr>
<tr>
<td>Cockpit—general view</td>
<td>2</td>
</tr>
<tr>
<td>Pilot's instrument panel</td>
<td>3</td>
</tr>
<tr>
<td>Cockpit—port side</td>
<td>4</td>
</tr>
<tr>
<td>Cockpit—starboard side</td>
<td>5</td>
</tr>
<tr>
<td>Emergency exits and equipment</td>
<td>6</td>
</tr>
</tbody>
</table>
INTRODUCTION

Unless otherwise specified the descriptive notes, handling recommendations and data in this publication apply to all three Marks.

**Beaufighter VI.** with Hercules VI or XVI engines. These notes supersede all previous issues which covered the Beaufighter I and VI. (A second edition of Pilots Notes for the Beaufighter I only—A.P. 1721A P.N. 2nd edition—is now published separately.)

**Beaufighter TF.X.** with Hercules XVII engines. This is similar to the Beaufighter VI, but is equipped for torpedo launching.

**Beaufighter XI C.** with Hercules XVII engines. This is a Coastal Command reconnaissance fighter similar to the Beaufighter VI C.

**NOTE.**—A few Beaufighter VI aircraft have been equipped for torpedo launching and are similar to the Beaufighter TF.X. except that they retain Hercules VI engines.

PART I

**DESCRIPTIVE**

**NOTE.**—The numbers quoted in brackets after items in the text refer to the key numbers of the illustrations in Part V.

FUEL AND OIL SYSTEMS

1. Fuel tanks

(i) There are two main tanks, inner and outer, on each side as shown in Fig. 1.

(ii) Later aircraft also have four long-range tanks—shown by dotted lines—which form, in effect, enlarged outer main tanks. The outer of these tanks displace the wing guns which are not fitted on aircraft so equipped. The tanks in each wing are inter-connected by a cross balance pipe controlled by a balance cock.
2. Fuel gauges and cocks

(i) Contents gauges (65) and (99) are fitted for all tanks. On later aircraft with long-range tanks the gauges for these (10) are on the top of junction Box No. 8 on the starboard side. A master switch (94) controls all these gauges.

(ii) Fuel pressure gauges (on later aircraft replaced by low pressure warning lights (27)) are on the instrument panel. They are controlled by the contents gauges master switch (on later aircraft by the undercarriage indicator switch).

(iii) The fuel cock controls are mounted on the port side aft of the engine controls. The large red handwheel (57) controls the port tanks cock and the small green handwheel (56) controls the starboard tanks cock. Each handwheel is marked TANKS OFF, OUTER TANK ON, and INNER TANK ON and they are turned clockwise from the TANKS OFF position to open the cocks. The appropriate marking is turned to the top (when a ball catch can be felt engaging) to obtain the required cock position. There is also a knob on each wheel which is at the top in the TANKS OFF position. The suction balance cock lever (54) is marked S and coloured black. The lever is moved down to open the cock.

3. Oil system.—There is one tank for each engine with an effective capacity of 18 gallons giving a total of 36 gallons. Later aircraft have larger tanks to allow for extra oil required when feathering propellers are fitted. Pressure (18) and temperature (29) gauges are on the instrument panel.

4. Worth oil dilution system.—This is fitted on later aircraft with operating switches at the engine nacelles.

MAIN SERVICES

5. Electrical services

(i) A 24-volt D.C. generator on the starboard engine in parallel with a battery supplies current for:—

   All lighting circuits
   Engine starters (and booster-coils when fitted)
   Propeller feathering (when fitted)
   Instruments
Cowling gilt motors
Guns, cameras, torpedo and bomb releases
Pressure-head heating
Fire-extinguishers
Dinghy release (on later aircraft)

(ii) Early aircraft have an ammeter on the observer's electrical panel; this is in the charging circuit and gives an indication should power fail. Later aircraft have a power failure warning light or, where this is not fitted, the voltmeter in the generator circuit, which normally reads about 29 volts, indicates that power has failed if the voltage falls to about 26. A generator field switch is fitted at the forward end of the fuse box. This should normally be ON.

(iii) An 80-volt A.C. generator on the port engine supplies current for the special radio equipment when fitted.

6. Hydraulic system

(i) There are two hydraulic pumps, one on each engine.

(ii) On the ground the hydraulic power lever (67) must always be ON.

(iii) In the air, when hydraulic services are not required, the hydraulic power lever must always be OFF. This opens a by-pass and prevents the pumps overheating and consequently failing.

(iv) A hand-pump is used:

(a) for ground operation when engines are not running or in the air in emergency—see Part IV (with hydraulic power lever ON).

(b) for emergency lowering of flaps and undercarriage through separate pipe lines, which are brought into operation by setting an emergency selector (68) ON. This selector must never be ON unless the hydraulic power lever is OFF and on some aircraft an interlock safeguards this. Until Mod. 853 is incorporated this system must not be used with the flap lever at neutral; it must be set either DOWN or UP when it is possible to lower flaps and undercarriage together only. With Mod. 853 the undercarriage can be lowered first with flap lever at neutral, and on some aircraft an interlock returns the flap lever from UP to neutral when the emergency selector lever is set ON.
7. **Pneumatic system**

(i) A compressor on the starboard engine charges two cylinders and supplies compressed air for operating:

- Guns
- Wheel brakes
- Fuel jettison valves
- Landing flare release (if fitted)

There is a gauge (on later aircraft two) near the equipment crate to port indicating cylinder pressure and a triple reading gauge (33) which shows the pressure in the brake circuit.

(ii) Two vacuum pumps, one on each engine, operate the flying instruments, and a change-over cock (34) enables either pump to be selected. On early aircraft only, there is a vacuum gauge.

**AIRCRAFT CONTROLS**

8. **Primary controls.**—These are conventional and the pedulum type rudder pedals are adjustable for reach by a handle below the instrument panel.

9. **Trimming tabs.**—The elevator tab control (85) with its indicator (82), rudder (84), and aileron (97) tab controls with integral indicators, operate in the natural sense.

10. **Undercarriage control.**—The lever at (69) is set UP to retract and DOWN to lower, the main and tail wheel units. The lever should be left in the DOWN position on the ground.

11. **Undercarriage safety locks**

(i) A spring-loaded pin locks the lever in the DOWN position while the aircraft is on the ground. The pin is withdrawn when the aircraft is airborne and, if required, the lock can be overridden by depressing the knob on the lever.

(ii) Locking pins, inserted by hand in the knuckle joints of the inboard radius rods, provide an additional safety measure. These pins, which have red flags attached to them, must be withdrawn before flight.
12. Undercarriage indicators and horn

Three indicators (13) show the position of each main wheel and the tail wheel. Indications are:

Wheel locked up . . . UP on red background
Wheel locked down . . DOWN on green background
Between locks or indicator off.

The indicator switch (31) is interlocked with the ignition switches. A warning horn sounds if the throttles are less than one-third open when any wheel is not locked down.

13. Flaps controls and position indicator.—The lever at (69) is set UP to raise and DOWN to lower the flaps. When an intermediate position is required the lever should be returned to neutral as soon as the desired setting is reached. The position indicator is to the left of the flap lever.

14. Dive brake controls.—When dive brakes (which consist of flaps above and below each wing operated by suction and pressure generated by venturi tubes) are fitted the operating lever (70), controlling the valves in the venturi tubes, is mounted on a box former by the engine controls. This lever is set back to OPEN the brakes and forward to CLOSE them; it must be operated smartly and no attempt must be made to set the brake flaps in an intermediate position. A balance pipe is fitted between the two venturi systems.

15. Wheel brakes.—The pneumatic brakes are operated by a lever (8) on the handwheel. For parking, a spring-loaded catch retains the lever in the ON position. When twin brakes are fitted by Mod. 802 a pressure of 85/90 lbs./sq. in. gives as much braking power as can safely be applied.

Note.—On certain aircraft there is a lock fitted to the tail wheel to hold it central while taking off and landing. The control for this is a push-pull handle to the right of the pilot’s seat. To free the wheel pull up. To lock, press the small knob on handle then push down.
ENGINE CONTROLS

16. Throttle and mixture controls

(i) The throttle levers are gated at CRUISING and climbing (RATED) positions. The mixture lever (Hercules VI only) is interlocked with the throttle levers so that it returns to NORMAL if either throttle is closed or opened beyond the cruising gate.

(ii) With Hercules XVI & XVII engines the mixture lever is not used; mixture regulation is automatic and an economical mixture strength is obtained at or below 1/2 lb./sq.in. boost. If the lever is fitted, it is locked by a warning plate. For weak mixture cruising the throttle lever should not be opened beyond the gate or white line.

17. Propeller controls

(i) Speed controls.—With 20" propellers the extreme aft position of the levers (66) gives positive coarse pitch. On a few Hydromatic constant-speed propeller installations the aft position of the levers also selects positive coarse pitch. On most hydromatic installations, however, the aft position gives about 800 r.p.m. under governor control for use to reduce drag with a failed engine. With both Hydromatic types the throttle should be closed before the propeller lever is pulled right back.

(ii) Later aircraft have fully feathering propellers with shielded feathering push switches fitted aft of the cowling gill controls. Unless large capacity oil tanks are installed, a warning plate is fitted stating that except in emergency feathering should only be carried out during the first four hours of any flight, as after this there may be insufficient oil left to enable the propeller to be unfeathered subsequently. With fully feathering propellers the aft position of the lever does not lock the propeller in P.C.P.

18. Two-speed supercharger controls.—The two-speed supercharger (BLOWER) controls (76) and (78) are mounted aft of the throttle and mixture controls. There are two positions only to which the levers should be moved, forward to fully supercharged marked S and back to
medium supercharged marked M. On some aircraft S
gear is locked out of operation at the engine end; the
lever is left disconnected and can be moved freely. When
not locked, S gear should be exercised periodically,
whether used or not.

19. **Carburettor air-intake controls.**—The air-intake shutter
levers (74) are outboard of the two-speed supercharger
controls. The levers have red and green knobs for port
and starboard engines respectively. The levers are set
forward for cold air and back for hot air.

20. **Cowling gills controls.**—The two cowling gill motor
switches (79) are aft of the supercharger controls. They
have three positions marked OPEN, OFF, and CLOSED.
The knobs must be depressed when setting the switches
to OPEN or CLOSED: when the required gill setting
is obtained the switch should be returned to OFF and the
knob pulled out. Red warning lights by the switches
indicate when the motors are in operation. On later
aircraft a visual gill position indicator is fitted on the
port sill tube.

21. **Carburettor cut-out controls.**—The carburettor cut-out
controls (51) are in a box with a spring-loaded hinged
cover fitted to the top of the front spar on the port side.
The controls are red and green for port and starboard
respectively.

22. **Starting magneto switches.**—These are mounted on the
engine nacelle structure. On later aircraft booster-coils
are fitted instead of starting magnetos; they are brought
into operation by the engine starter buttons.

23. **Starter controls.**—The pushbuttons (22) are on the
instrument panel and on aircraft with engine starting
master switches (24) fitted, these must be ON before the
pushbuttons will operate the starters. When these
switches are OFF the pushbuttons operate the booster-
coils only, for hand starting.
OTHER CONTROLS

24. De-icing controls

(i) Propeller de-icing.—On early aircraft only, the control is mounted on the starboard sill tube and is marked OFF and ON. When the knob of the control is rotated in a clockwise direction the speed of the electric-driven ejector-pumps is increased.

(ii) Windscreen de-icing.—A hand-pump (83) is fitted on the starboard side under the instrument panel. On later aircraft the pump is near the rudder trim tab control.

(iii) Pressure-head heating.—The switch is on the right-hand side of the switch block above the compass.

(iv) Dive-brake venturi de-icing.—A hand-pump (101) fitted to the right of the pilot’s seat, with a cock (102) marked OFF, PORT, STB’D, PORT AND STB’D, is used for spraying de-icing fluid into either venturi or into both simultaneously. In icing conditions, five strokes of the hand-pump, every minute, are required for each venturi, to prevent icing up.

25. Oxygen system controls.—Two (on later aircraft three) cylinders supply oxygen to a standard regulator (63) with a bayonet socket on the starboard side. On later aircraft an economiser is fitted. Similar equipment is installed at the observer’s station.

ARMAMENT CONTROLS (on later aircraft)

26. Torpedo sight (on torpedo version only).

The manual sight control (16) is on the instrument panel to port with a switch and dimmer control (6) to starboard above the instrument panel.

27. Torpedo and bomb master switch.—(90) controlling both bomb and torpedo circuits is on the starboard sill tube. For torpedo launching the F.46 and bantam cameras are preselected by the camera master switch.

28. Torpedo depth setting control (on torpedo version only).

The control handle with integral depth indicator is under a hinged cover on the floor forward of the observer’s seat.
29. Torpedo and bomb selector and fuzing switches

(i) A two-way switch (91) on the starboard fuselage side selects either port and/or starboard bombs. On torpedo version aircraft the port switch which is painted red also selects the torpedo releasing circuit. A red warning lamp lights to indicate when the armament has been selected and goes out after release. After the bomb release button has been pressed, check that the bombs have both been released by switching OFF the distributor. If the red warning lamp remains on either or both bombs have failed to release.

(ii) NOSE and TAIL bomb fuzing switches, at (87), are fitted.

30. Under-wing load master switch and selector

The master switch (62) is on the fuselage side aft of the engine controls. The selector (2), PAIR or SALVO, is to port on the central windscreen frame. When the under-wing loads are carried the landing lamps are covered in and their switch is shielded to prevent its use. The port wing camera gun is preselected by the master switch on the starboard shelf below the aileron trim control.

31. Torpedo, bomb and under-wing load release.—The button (73) on the starboard engine throttle lever releases the armament selected; it also operates the F.46 and bantam cameras automatically when these have been preselected (see Para. 27).

32. Gun firing controls.—On early aircraft a button on the control wheel fires all guns together; on later aircraft the button fires the wing guns (when fitted) and a trigger on the same mounting (7) fires the 20 mm. guns. The G.45 cine camera is operated automatically by either the gun button or trigger, or independently by the button (5) which is also on the wheel.

33. Gun sight.—The reflector gun-sight (3) is above the instrument panel, the illumination socket and dimmer switch (1) being below the windscreen to port.
PART II

HANDLING

34. Fuel system management
   (i) Take-off and climb on inner tanks.
   (ii) In level flight the outer tanks may be used first.
   (iii) At a safe height tanks may be used until exhausted but, particularly when flying low, it is preferable to change-over when the gauge of the emptying tank shows 20 gallons.
   (iv) The approach to land should, if possible, not be made on tanks containing less than 20 gallons.
   (v) The aircraft should normally be flown with balance cock OFF except:
       (a) If all fuel on one side has been exhausted or lost.
       (b) In the event of engine failure (see paras. 57 and 58).

35. Preliminaries

   NOTE. - On torpedo fighter aircraft the underbody hatches cannot be used for entrance with the torpedo in place; the pilot's roof hatch and observer's hood should therefore be used. Later aircraft have external latch levers, but when these are not fitted the hatches must be unfastened from inside before the torpedo is slung.

   On entering the cockpit set or check the following:
   (i) Hydraulic power lever  . .  ON
   (ii) Undercarriage lever . .  DOWN—Lever locking pin engaged
   (iii) Switch on the indicator and check DOWN
   (iv) Check brake pressure . .  Minimum 100 lb./sq.in.
   (v) Brakes . .  On (after testing rudder control)
   (vi) Switch on fuel gauges and check contents of tanks.
36. **Starting the engines and warming up**

(i) Set the controls as follows:

- **Balance cock**  ...  **OFF**
- **Fuel cocks**  ...  **INNER TANKS ON**
- **Throttles**  ...  ½ inch open. Do not pump the throttle levers as this will cause too rich a mixture
- **Mixture**  ...  **NORMAL (if operative)**
- **Propeller**
  - **Hydromatic**  ...  Fully forward
  - **de Havilland 20°**  ...  Fully back
  - **Supercharger**  ...  M ratio
- **Air intake**  ...  **COLD**
- **Gifs**  ...  Open

(ii) It is not necessary to prime the carburettor unless the aircraft has been standing for a week or more. If necessary, this must be done by the ground crew.

(iii) Have each engine turned by hand for at least two revolutions of the propeller in order to ensure that oil will not cause a hydraulic lock of pistons or sleeves.

(iv) High volatility fuel (Stores ref. 34A/111) should be used, if an external priming connection is fitted, for priming at air temperatures below freezing. Instruct the ground crew to work the priming pump for the induction system until the suction and delivery pipes are primed. This may be judged by a sudden increase in resistance to the plunger.

(v) Switch ON the ignition and instruct the ground crew to switch ON the starting magnetos (if fitted).

(vi) Switch ON starter master switches (if fitted) and press the starter button for each engine in turn, for periods of not more than 20 seconds, with a 30-second wait between each. The ground crew will prime the induction system of each engine while it is being turned, and the engine should start after the following number of strokes if cold: if K. 40 (40 c.c. effective) pumps are fitted, divide by four, giving an incomplete stroke where necessary.

- **Air temperature °C**  +30  +20  +10  0  -10  -20
- **Normal**  3  4  7  12
- **High volatile fuel**  4  8  18
PART II—HANDLING

(vii) It will probably be necessary for the ground crew to continue priming after the engine has fired and until it picks up on the carburettor.

(viii) The ground crew will switch off the starting magnetos, if fitted, and screw down the priming pumps.

(ix) Run each engine as slowly as possible for the first half-minute, then warm up at about 1,000 r.p.m. If oil has been diluted after previous run, it is of particular importance that oil pressure be watched during initial warming up, as no hot-pots are fitted in the oil tanks.

(x) De Havilland 20° propeller.—When the engines have been running for about a minute, move the propeller speed controls slowly fully forward.

Note.—On aircraft fitted with 20° propellers: When the engines are being kept warm in readiness for immediate take-off, the propeller controls should be kept fully forward.

37. Testing engines and installations

During warming up:

(i) Check the hydraulic pressure on both engines (if gauges are fitted).

(ii) Check suction of vacuum pumps, if gauge is fitted.

After warming up, for each engine in turn:

Note.—The following comprehensive checks should be carried out after repair, inspection (other than daily) or otherwise at the pilots discretion. Normally they may be reduced in accordance with local instructions.

(iii) Open up to not more than 1,500 r.p.m. and check operation of the two-speed supercharger (unless locked): oil pressure should drop momentarily at each change.

(iv) Open up to weak mixture cruising boost and test operation of constant-speed propeller and exercise if sluggish.

(v) Open the throttle fully and check take-off boost and static r.p.m. (2,800).

(vi) With propeller control fully forward, throttle back to rich mixture cruising boost. If propeller is constant speed at this boost, close throttles until r.p.m. drop slightly and test each magneto in turn. The drop should not exceed 50 r.p.m.
38. Taxying out
(i) Before taxying, see that the ground crew remove and hold up the undercarriage safety links and stow them in the aircraft.
(ii) Instruct the ground crew to make certain that both EMERGENCY escape HATCHES are correctly fastened.
(iii) Brake pressure must not fall below 100 lb./sq.in.

39. Check list before take-off
H—Hydraulic power lever ON.
T—Trimming tabs:
   Elevator  One inch nose down (slightly more with torpedo slung) on indicator.
   Aileron and Rudder NEUTRAL
M—Mixture NORMAL.
P—Propeller controls Fully forward.
F—Fuel Check contents of tanks and cock settings to INNER TANKS ON.
F—Flaps Up or 15° down, selector neutral.
   Supercharger M ratio.
   Gills One-third open.
   Tail wheel lock Locked (after turning into wind).

Note.—(a) Under normal conditions the use of flaps for take-off is unnecessary, but 15° may be used for taking off from restricted spaces. With torpedo slung 15° flaps is recommended.
(b) If a torpedo is carried, set master and selection switches for release; the torpedo can then be jettisoned quickly in emergency during, or shortly after, take-off.

40. Take-off
(i) Taxi forward a few yards into wind to straighten the tail wheel.
(ii) To ensure that both engines are responding evenly, open up slowly to about 2,000 r.p.m. and then open up fairly quickly to the TAKE-OFF position.
(iii) Any slight tendency to swing to starboard can be easily checked by leading slightly with the starboard throttle until the rudder becomes effective.

(iv) Raise the tail early to lessen the tendency to swing (and on rough ground to "bucket"). Hold the nose in a constant attitude and let the aircraft fly itself off.

41. After take-off

(i) Safety speed is 160 m.p.h. (140 knots) I.A.S.

(ii) Raise the undercarriage as soon as safely airborne, the thumb catch on the operating lever should not be disengaged; it does not lock the lever unless the wheels are on the ground.

(iii) If down, raise flaps at a safe height. With a torpedo slung leave the flaps at take-off setting until a speed of 160 m.p.h. (140 knots) I.A.S. is reached.

NOTE.—This must not be taken to imply that flaps may be lowered at speeds in excess of 150 m.p.h. (130 knots) I.A.S.

(iv) Set hydraulic power lever OFF. (This is important to prevent overheating of pumps.)

(v) If a torpedo is carried, switches should be returned to "safe" at 1,000 feet.

42. Climbing

(i) The recommended climbing speed is 160 m.p.h. (140 knots) I.A.S.

(ii) For ease of control, especially at high take-off weights in conditions of poor visibility, a higher speed such as 170 m.p.h. (150 knots) I.A.S.—180 m.p.h. (157 knots) I.A.S. on mark X at 25,500 lb. take-off weight—will be found desirable.

43. General flying

(i) Elevator control.—The trimming tab is very powerful and while it should be used to assist manoeuvres it should be applied slowly and carefully to avoid imposing excessive stresses in the structure.

(ii) Stability.—Directional and lateral stability are satisfactory. Fore and aft stability—at high speed the aircraft is comfortably stable and at cruising speed it is just stable. At the slower speeds, e.g., on the climb and
approach, it is slightly unstable. However, gliding with engine off (wheels and flaps both up and down) it is just stable. Although stable in level flight, cloud or night flying is not advisable as handling becomes difficult below 180 m.p.h. (157 knots) I.A.S.

NOTE.—There are a number of aircraft which have not yet been fitted with a dihedral tailplane. These aircraft will be found to be considerably unstable fore and aft under all conditions of flight and particular care must be taken at the lower speeds and at heavy loads.

(iii) Change of trim:
- Flaps down... Nose goes down.
- Undercarriage down... Nose goes down slightly.
- Gills open... Nose goes down.
- Dive brakes opening... Tail goes down slightly.
- Launching torpedo... No change of trim.

(iv) Manoeuvrability.—With a torpedo slung, manoeuvrability is slightly impaired under all conditions of flight.

(v) Handling in turns.—Going into a steep turn from level flight at 230 m.p.h. (200 knots) I.A.S. requires considerable force on the control column, but, as the turn tightens and speed falls off, the aircraft tends to tighten in the turn; a slight forward pressure should be applied to the control column to counteract this. During the earlier part of the turn, slight buffeting of the elevators occurs which dies away as the turn tends to tighten. There is ample warning of the stall, which is preceded by "snatch" of the ailerons, but a slight forward movement of the control column is sufficient to decrease the rate of turn.

(vi) Flying at low airspeeds.
(a) When flying in conditions of bad visibility, near the ground, open the cockpit side windows.
(b) Do not lower the undercarriage unless to make a precautionary landing on safe ground.
(c) To maintain manoeuvrability a speed of 150 m.p.h. (130 knots) I.A.S. should, if possible, be maintained. If necessary, speed may be reduced to 130 m.p.h. (112 knots) I.A.S. (or to 120 m.p.h. (103 knots) I.A.S. with flaps lowered to about 15°-20° as an absolute minimum).
PART II—HANDLING

(d) Engine speed should be maintained at max. cruising r.p.m. so that ample power is available if the throttles are opened suddenly in an emergency.

(vii) Warm and cold air intakes.—Warm air should be used only in icing conditions. (See Pilot’s Notes General, A.P. 2095, 2nd Edition, Part II, Note C.)

(viii) Flying on compass course.—Firing the 20-mm. guns, in combat or otherwise, causes disturbance of the $P_4$ compass deviation. The deviation may be restored to the values given on the compass card by firing a one-second burst (about 10 rounds per gun) while flying level on compass North. This should be done at the first opportunity, and in any case before landing; in the meantime the observer’s compass, which is not affected, should be used.

44. Stalling

Stalling speeds I.A.S. are:

<table>
<thead>
<tr>
<th>A.S.I. connected in Pitot head</th>
<th>Flaps and Undercarriage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up</td>
</tr>
<tr>
<td></td>
<td>At 19,500 lb. m.p.h.</td>
</tr>
<tr>
<td></td>
<td>knots</td>
</tr>
<tr>
<td>102</td>
<td>88</td>
</tr>
<tr>
<td>106</td>
<td>92</td>
</tr>
<tr>
<td>A.S.I. connected to Static vent</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

There is slight buffeting immediately before the stall in all cases. At 25,500 lb. as the speed drops below 120 m.p.h. (105 knots) I.A.S. there is a tendency for the control column to come back and it will be necessary to trim forward. Aileron control is lost at about 115 m.p.h. (100 knots) I.A.S., although complete stall should not occur above about 110 m.p.h. (95 knots) I.A.S. The stall is straight except with a torpedo or under-wing stores slung, when, especially with flaps and undercarriage down, the right wing drops at the stall.
PART II—HANDLING

45. Diving

(i) Leave the propeller speed control set to give cruising r.p.m.
(ii) The aircraft should be trimmed into, and out of, the dive; on recovery, which should be as gradual as possible—especially at high weights, the elevator trim control must be used slowly—see para. 43(i). With a torpedo slung, rudder loads are heavy and there is a tendency for a wing to drop in the direction of yaw.

(iii) Use of dive brakes:

(a) Low attack.—If approach speed is too high for releasing torpedo, apply the dive brakes, throttle back and when "release" speed is reached, open throttle to hold this speed constant. For "getaway" knock the brake control forward to CLOSE, propeller controls fully forward (if not already set) and open throttles fully for maximum performance.

(b) Dive attack from altitude.—Apply brakes immediately before wheeling into attack dive. Close throttles if a short run in is required. Pull out should be commenced about 300–400 ft. above "dropping" height, as coarse use of elevator may result in excessive 'sink'. Open throttles when "release" speed is reached and proceed as for low attack.

(c) General.—With the dive brakes OPEN some vibration may be felt on the ailerons. Apart from deceleration, change of trim is slight. The aircraft is easy to handle both in the dive and in level flight with the brakes applied, and avoiding action, even of a violent nature, is possible. Manœuvring low over the water is safe and easy. There is no appreciable sink when the dive brakes are CLOSED, provided the I.A.S. is over 140 knots.

NOTE.—Under certain conditions, generally when the brakes are applied in a steeply banked turn, one brake tends to open before the other, causing the aircraft to yaw and bank alarmingly. This effect is not serious, however, at speeds in excess of 140 knots and can be counteracted effectively by the use of aileron and rudder. Dive brakes should be operated smartly and released suddenly: no attempt must be made to obtain intermediate settings.
46. Approach and landing

(i) Stability.—The stability differs markedly according to whether the aircraft has or has not been modified (see para. 43(ii). On unmodified aircraft the instability on the glide is increased when the flaps are lowered, and it is recommended that they should be lowered 20° in the circuit or across wind prior to the last turn into wind, and full flap should be used after last turn, especially at night.

(ii) Preliminary approach.—Undercarriage lowering may be begun at 170 m.p.h. (150 knots) I.A.S. and flap lowering at 150 m.p.h. (130 knots) I.A.S. Speed must be reduced to 135 m.p.h. (116 knots) I.A.S. as soon as possible after the undercarriage is fully down and before the flaps are fully down.

(iii) Checks before landing

<table>
<thead>
<tr>
<th>Brakes</th>
<th>Check pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(100 lb./sq.in. min.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Superchargers</th>
<th>M ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>H—Hydraulic power lever</td>
<td>ON</td>
</tr>
<tr>
<td>U—Undercarriage</td>
<td>DOWN</td>
</tr>
<tr>
<td>M—Mixture</td>
<td>NORMAL</td>
</tr>
<tr>
<td>P—Propeller</td>
<td>Speed controls fully forward</td>
</tr>
<tr>
<td>F—Fuel</td>
<td>Tank contents and cock settings</td>
</tr>
<tr>
<td>F—Flaps</td>
<td>20° (fully DOWN after final turn into wind)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tail wheel lock</th>
<th>Locked</th>
</tr>
</thead>
<tbody>
<tr>
<td>(if fitted)</td>
<td></td>
</tr>
</tbody>
</table>

(iv) Recommended I.A.S. for final approach at 21,000 lb. are:—

<table>
<thead>
<tr>
<th>Engine assisted</th>
<th>100 (87 knots) 120 (95 knots)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With torpedo slung</td>
<td>110 (95 knots) plus</td>
</tr>
<tr>
<td>Glide</td>
<td>115 (100 knots) 135 (118 knots)</td>
</tr>
</tbody>
</table>

Note.—(i) Turns during gliding approach should be executed at 5 to 10 m.p.h. above these speeds and turns with steep bank, or near the ground, should not be attempted.

(ii) With the A.S.I. connected to static vents add about 20 m.p.h. (17 knots).
(v) Landing with torpedo slung
   (a) Concentrate on airspeed during final approach.
   (b) The aircraft should not be landed at more than 22,100 lb. If necessary, jettison all but 200 gallons of fuel.
   (vi) During the landing run with twin brakes they should be applied progressively. A pressure of 85/90 lb./sq.in. will give as much braking power as can safely be applied.

47. Mislanding
   (i) The aircraft will climb easily at climbing power with flaps and undercarriage down.
   (ii) Raise undercarriage immediately.
   (iii) Climb at 120 m.p.h. (105 knots) I.A.S. (if torpedo is slung 132 m.p.h. (115 knots) I.A.S.) and raise flaps at not less than 300 to 400 ft. The flaps come up slowly and there is a slight tendency to sink, but only as they rise from the 20° down to the fully up positions, with slight change of trim to nose up.

48. After landing
   (i) Open gills, raise flaps, and if a tail wheel lock is fitted—unlock—before taxying.
   (ii) With D.H. 20° propellers set speed controls fully back and open up engines sufficiently to change pitch to coarse.
   (iii) Leave hydraulic power lever—ON.
   (iv) Run engines for two minutes at 800 to 900 r.p.m. and then stop them by pulling the carburettor cut-outs; and shut throttles. After engines have stopped, switch off ignition and all electrical services and close fuel cocks. Carburettor cut-outs should be allowed to spring back smartly, as there is a tendency to stick out.
   (v) See that the undercarriage safety locking pins are replaced.

49. Oil Dilution

   See A.P.2095, and note, the correct period is 1 minute during which the engines should be run at 900 to 1,000 r.p.m. (See also para. 36 (ix).)
PART II—HANDLING

50. Beam approach

<table>
<thead>
<tr>
<th>Stage</th>
<th>Indicated height ft.*</th>
<th>I.A.S. knots.</th>
<th>R.P.M.</th>
<th>Approx. Boost</th>
<th>Actions</th>
<th>Change of trim and remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRELIMINARY APPROACH</td>
<td>1,500</td>
<td>140</td>
<td>2,400</td>
<td>$-1 \frac{1}{2}$</td>
<td>Set—Gills $\frac{1}{2}$ open Flaps—20 Lower u. c. when on Q.D.R. over airfield</td>
<td>Slightly nose down Nose down</td>
</tr>
<tr>
<td>AT OUTER MARKER</td>
<td>600–700</td>
<td>95</td>
<td></td>
<td>$-3$ to $-4$</td>
<td>Set—Flaps fully down</td>
<td>Should give level flight in this condition at 21,000 ft.</td>
</tr>
<tr>
<td>AT INNER MARKER</td>
<td>100</td>
<td>90–95</td>
<td></td>
<td></td>
<td>Retrim and raise u.c. Flaps to 20 Flaps up and rettrim Adjust boost and r.p.m. at 1,000 ft.</td>
<td>Nose up No change of trim Slightly nose up</td>
</tr>
<tr>
<td>OVERSHOOT</td>
<td>Up to 400</td>
<td>105–110</td>
<td></td>
<td>$-6$</td>
<td>Retrim and raise u.c. Flaps to 20 Flaps up and rettrim Adjust boost and r.p.m. at 1,000 ft.</td>
<td>Nose up No change of trim Slightly nose up</td>
</tr>
</tbody>
</table>

* After adjusting altimeter for Q.F.E. and touch-down error as follows:—
  At touch-down with 20° or full flap, altimeter reads minus 80 ft., so add 2.6 millibars to Q.F.E. to give zero reading at touch-down.

Note.—(i) For take-off with 20° flap or no flap, the altimeter will read minus 50 ft. at unstick, if set to zero before take-off.
(ii) The above corrections do not apply with instruments connected to static vents.
PART III

OPERATING DATA

51. Engine data

(a) Fuel: 100 octane.

(b) Engine limitations for Hercules VI, XVI or XVII.

<table>
<thead>
<tr>
<th>Capability</th>
<th>R.p.m.</th>
<th>Boost lb./sq.in.</th>
<th>Temp. °C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX. TAKE-OFF TO 1,000 FEET</td>
<td>M 2,900</td>
<td>+8½ (+10) *</td>
<td></td>
</tr>
<tr>
<td>MAX. CLIMBING ONE HOUR LIMIT</td>
<td>M 2,400</td>
<td>+6</td>
<td>270 (290) 90</td>
</tr>
<tr>
<td>MAX. RICH CONTINUOUS</td>
<td>M 2,400</td>
<td>+6</td>
<td>270 (290) 80</td>
</tr>
<tr>
<td>MAX. WEAK CONTINUOUS</td>
<td>M 2,400</td>
<td>+2</td>
<td>270 (290) 80</td>
</tr>
<tr>
<td>COMBAT 5 MINS. LIMIT</td>
<td>M 2,900</td>
<td>+8½ (+10) *</td>
<td>280 (300) 100</td>
</tr>
</tbody>
</table>

* +10 lb./sq.in. is obtainable on the Hercules XVII with ram effect only; normally static boost will not exceed 8½ lb./sq.in. at full throttle.

† Hercules VI and XVI only.

Use of the higher cylinder temperatures in brackets is permitted if operational conditions make observance of the lower temperatures impracticable.

OIL PRESSURE:

NORMAL ... 80 to 90 lb./sq.in.
EMERGENCY MINM. (5 MINS.) ... 70 lb./sq.in.
MINM. TEMP. FOR TAKE-OFF ... OIL 5°C.

DIVING:

MAXIMUM BOOST ... 8½ lb./sq.in.
MAXIMUM R.P.M. ... 3,050

3,000 r.p.m. may be exceeded only for 20 seconds, with throttles not less than one third open and in M gear only.
PART III--OPERATING DATA

52. Position error correction

At 19,500 lb. the A.S.I. corrections are as follows:

<table>
<thead>
<tr>
<th>FROM</th>
<th>120</th>
<th>145</th>
<th>175</th>
<th>205</th>
<th>235</th>
<th>265</th>
<th>265</th>
<th>m.p.h.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO...</td>
<td>145</td>
<td>175</td>
<td>205</td>
<td>235</td>
<td>265</td>
<td>300</td>
<td></td>
<td>I.A.S.</td>
</tr>
<tr>
<td>Add</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td></td>
<td>m.p.h.</td>
</tr>
<tr>
<td>Subtract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>or knots</td>
</tr>
<tr>
<td>FROM</td>
<td>105</td>
<td>125</td>
<td>150</td>
<td>175</td>
<td>205</td>
<td>230</td>
<td>260</td>
<td>knots</td>
</tr>
<tr>
<td>TO...</td>
<td>125</td>
<td>150</td>
<td>175</td>
<td>205</td>
<td>230</td>
<td></td>
<td></td>
<td>I.A.S.</td>
</tr>
</tbody>
</table>

Note.—With A.S.I. connected to static vent, the position error may be neglected.

53. Flying limitations

(i) This aircraft is designed for the duties of a long-range reconnaissance fighter and intentional spinning and aerobatics are not permitted.

(ii) Maximum I.A.S. (speeds in brackets are in knots):

- Diving .................. 400 (345) (with torpedo slung, 300 (260))
- Lowering flaps ........ 150 (130)
- Flaps fully down .... 135 (116)
- Undercarriage down .... 150 (130)
- Dive brakes (if fitted) opening or on .... 280 (240)

(iii) Recommended minimum speed with dive brakes on—

140 m.p.h. (120) I.A.S.
PART III—OPERATING DATA

(iv) Maximum weights:

<table>
<thead>
<tr>
<th>Take-off and straight flying</th>
<th>Mods. Nos. 773, 792, 878, 879 and 914</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorpor&lt;sup&gt;†&lt;/sup&gt;</td>
<td>24,000 lb.*</td>
</tr>
<tr>
<td></td>
<td>(25,500 lb. on Mark X)</td>
</tr>
<tr>
<td>Landing and all other forms</td>
<td>Not incorporated</td>
</tr>
<tr>
<td>of flying</td>
<td>21,000 lb.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Gentle turns and dives are permitted at this weight, but recovery must be gradual and any violent use of the controls must be avoided until the weight of the aircraft has been reduced to 22,100 lb.

† If necessary, jettison all but 200 gallons of fuel for landing.

Note.—Pilots undergoing training, unless experienced and competent, should not fly the aircraft at weights in excess of 21,000 lb.

54. Maximum performance

(i) Climbing:

(a) The speeds for maximum rate of climb are as follows:

<table>
<thead>
<tr>
<th>Speed</th>
<th>Description</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 m.p.h.</td>
<td>(130 knots) I.A.S.</td>
<td>from sea level to 12,000 feet</td>
</tr>
<tr>
<td>145 m.p.h.</td>
<td>(126 knots) I.A.S.</td>
<td>from 12,000 feet to 16,000 ft.</td>
</tr>
<tr>
<td>140 m.p.h.</td>
<td>(122 knots) I.A.S.</td>
<td>from 16,000 feet to 20,000 ft.</td>
</tr>
<tr>
<td>135 m.p.h.</td>
<td>(117 knots) I.A.S.</td>
<td>above 20,000 feet.</td>
</tr>
</tbody>
</table>

Note.—Subject to satisfactory cooling in tropical conditions.

(b) Above full throttle height, as boost begins to fall off, follow it back with the throttle lever.

(c) Change to S gear (unless locked) when the boost has dropped to +3\(\frac{1}{2}\) lb./sq.in. in M gear.

(ii) Combat:

Change to S gear if the following boosts cannot be obtained in M gear:

- **Hercules VI**
- or **XVI**
- +5\(\frac{1}{2}\) lb./sq.in.

- **Hercules XVII**
- +7 lb./sq.in.

Above about

- 12,000 feet without tropical filters
- 9,000 feet with tropical filters
- 6,000 feet without tropical filters
- 3,000 feet with tropical filters

28
PART III: OPERATING DATA

55. Maximum range (see Curves, pages 31 and 32).
   (i) Climbing: As for maximum performance.
   (ii) Cruising:
   
   (a) The recommended speeds are as follows:
       200 m.p.h. (174 knots) I.A.S. up to 15,000 feet.
       190 " (165 knots) " between 15,000 feet and 20,000 feet.
       180 " (157 knots) " between 20,000 feet and 25,000 feet.

   (b) Set engine controls as follows:
       Mixture (if non-automatic) .... WEAK.
       Throttles ....
       With non-auto mixture .... To max. weak boost
       (+2 lb./sq.in.)
       With auto mixture To white line.
       Propellers Adjust r.p.m. to give the recommended I.A.S. (but not to less than 1,900 on account of rough running). At low altitudes maintain 1,900 r.p.m. and do not reduce boost even if the recommended I.A.S. is exceeded.
       Superchargers M gear, unless recommended I.A.S. cannot be maintained at 2,400 r.p.m.; in which case change to S gear (unless locked).

56. Fuel capacities and consumptions (see Curves, pages 31 and 32).
   (i) Fuel capacity in gallons:
       Main tanks inner .... 376
       Main tanks outer .... 174
       Long-range tanks .... 132
       Total all tanks .... 682
PART III—OPERATING DATA

(ii) Approximate fuel consumptions for the aircraft in gallons per hour are:

(a) In rich mixture:

<table>
<thead>
<tr>
<th>Boost (lb./sq.in.)</th>
<th>R.P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+6</td>
<td>2,800</td>
</tr>
<tr>
<td></td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>240</td>
</tr>
</tbody>
</table>

(b) In weak mixture:

Hercules VI or XVI

<table>
<thead>
<tr>
<th>Boost (lb./sq.in.)</th>
<th>M gear at 5,000 ft.</th>
<th>S gear at 15,000 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,400</td>
<td>2,200</td>
</tr>
<tr>
<td>+2</td>
<td>119</td>
<td>110</td>
</tr>
<tr>
<td>0</td>
<td>106</td>
<td>98</td>
</tr>
<tr>
<td>-2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>-4</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Add or subtract for each 1,000 ft. above or below the above heights.

M gear \(\ldots\) \(\ldots\) 1 gallon per 2,000 feet.
S gear \(\ldots\) \(\ldots\) 1 gallon per 1,000 feet.

Hercules XVII—At 2,000 feet.

<table>
<thead>
<tr>
<th>Boost (lb./sq.in.)</th>
<th>R.P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,400</td>
</tr>
<tr>
<td>+2</td>
<td>127</td>
</tr>
<tr>
<td>0</td>
<td>112</td>
</tr>
<tr>
<td>-2</td>
<td>—</td>
</tr>
<tr>
<td>-3</td>
<td>—</td>
</tr>
</tbody>
</table>
**BEAUFIGHTER VI**

--- CLIMB ---

DISTANCE - FUEL USED

The figures for fuel consumed on climb, include an allowance of 20 gallons for run-up and take-off.

--- CRUISING ---

AIR MILES PER GALLOON

At 10,000 ft., 268 m.p.h.
At 25,000 ft., 5,000 ft. or more
At 5,000 ft. or more

m.p.h. I.A.S.
BEAUFIGHTER TF X & XI

— CRUISING —

RANGE AT 5,000 FEET

SEA-MILES PER GALLON

KNOTS I.A.S.
PART IV

EMERGENCIES

57. Engine failure during take-off

(i) If safety speed—160 m.p.h. (140 knots) I.A.S.—has not been attained, close both throttles and make best landing possible.

(ii) If it is necessary to raise the undercarriage while still on the ground, the thumb catch on the undercarriage operating lever must first be released.

(iii) If safety speed has been attained, throttle back to the RATED gate and then climb at not less than 140 m.p.h. (120 knots) I.A.S. If engine failure occurs on take-off with torpedo loads, 160 m.p.h. (138 knots) and full power should be maintained until the torpedo has been jettisoned.

(iv) If fuel failure is suspected, climb to a safe height (say, 3,000 ft.) before attempting to rectify this by opening the balance cock—see para. 58 (vi).

58. Failure of one engine in flight

(i) Maintain at least 150 m.p.h. (130 knots) I.A.S. At this speed the rudder can be trimmed for no foot load. The throttle should never be so far opened that full rudder is required to keep the aircraft straight.

(ii) Set propeller speed lever of failed engine fully back (with feathering propellers the propeller should be feathered).

(iii) If flying by instruments it is advisable first to close both throttles and then open the live engine up slowly.

(iv) At any normal flying weight (without torpedo or under-wing loads) height can be maintained at climbing power below about 5,500 feet.

(v) Torpedo and/or under wing loads should be jettisoned unless:

(a) It is known from experience that height can be maintained with the remaining quantity of fuel, or this can be ascertained before a dangerously low height is reached.

or

(b) Height is sufficient to allow fuel to be jettisoned, a little at a time (see para. 60) in order to reduce weight enough to enable the torpedo to be brought home.
vi) When investigating the cause of failure try the dead engine on its own alternative tank. If this does not succeed, try setting balance cock on with all tanks on failed engine side off; if the live engine then shows signs of lack of fuel, turn off the balance cock immediately. The balance cock should only be left on if this proves to be the only means of getting the dead engine to run.

59. Feathering and unfeathering

(i) Feathering:

(a) Press feathering button and let go.
(b) Close throttle immediately.
(c) If engine is to be out of action for any length of time, switch off, and turn off fuel cock, but only after propeller has stopped rotating.

(ii) Unfeathering:

(a) Set propeller speed control fully back and throttle closed or slightly open.
(b) Turn on ignition and fuel cock (if off).
(c) Press feathering button and hold until r.p.m. reach 1,000 to 1,300. If the propeller does not return to normal constant speed, open throttle slightly.

WARNING.—Unless increased capacity oil tanks are fitted, practice feathering should not be carried out after the first four hours of any flight, as if feathered after this there may be insufficient oil to enable the propeller to be unfeathered, subsequently. Practice feathering of the starboard propeller should be restricted to a minimum as this engine drives the generator.

60. Fuel jettisoning

By pulling up the red lever (32) on the instrument panel just above the main magneto switches, the fuel in the four main tanks can be jettisoned. The lever controls a pneumatically operated jettison valve on each tank. A later modification introduces selective jettisoning enabling the contents of port or starboard tanks to be jettisoned independently. The lever (32) is replaced by two similar levers marked PORT and STARBOARD.
PART IV—EMERGENCIES

Note.—With full tanks, the main bulk of fuel can be jettisoned from the inner and outer main tanks in about one minute. To jettison progressively pull the lever (or levers on aircraft with selective controls) for a few seconds at a time, checking contents gauges between each operation, until gauges indicate that not more than the desired quantity remains in all tanks.

61. Undercarriage and flaps emergency operation

(i) Never use the emergency system unless the normal engine pump system has failed, then use the hand-pump emergency system as follows:

(a) Set hydraulic power lever . . . OFF.
    Set emergency selector . . . ON.
    Then pump.

Note.—The undercarriage and flaps will come down together if the flaps and undercarriage levers remain either UP or DOWN (if mod. 853 has not been incorporated the flap lever must be left UP or set DOWN). They cannot be raised by means of the emergency system.

(b) After incorporation of mod. 853—to lower the undercarriage only, set flap lever—neutral. (On later aircraft an interlock does this when the emergency selector is set to ON.) The flaps can be lowered subsequently by setting the flap lever—DOWN.

(ii) Should the emergency system fail try the hand-pump through the normal system as follows:

    Set emergency selector . . . OFF.
    Set hydraulic power lever . . ON.
    Set flap and undercarriage levers as required.

Flaps and undercarriage can be raised as well as lowered by this means.

Note.—Pumping, through either the normal or emergency pipe lines, at about one full double stroke per second, the flaps and undercarriage take not less than three minutes to reach the fully down position and may take longer.
62. Fire extinguishers

(i) The Graviner engine extinguishers are automatically operated by a combined gravity and impact switch in each nacelle. (The gravity part is inoperative when the undercarriage is retracted.) Two shielded pushbuttons (15), one for each engine, provide manual control.

(ii) Two hand fire-extinguishers are stowed as shown in Fig. 6.

(iii) For action in the event of fire in an engine in flight—see A.P. 2095 Pilot's Notes General.

63. First-aid outfit

A first-aid outfit is stowed on the starboard side of the rear fuselage forward of the rear spar.

64. Bomb jettisoning.—On later aircraft a bomb jettison switch (89), is forward of the torpedo and bomb master switch (90) and a small bomb-container jettison switch (92) aft of it. With a mixed load the containers must be jettisoned before the bombs, and the master switch must be ON before bombs can be jettisoned.

65. Emergency exits

(i) (a) The pilot's and observer's entrance hatches are also used as parachute exits. To open, pull the bottom catch release lanyard smartly, when the air stream will open the hatch and force it into the top catch. When the front hatch opens there may be some change of trim to tail heavy, but this can be easily held.

(b) When testing operation of escape hatches in flight, which should be carried out after every minor inspection, this should be done at about 140 miles per hour (120 knots), just before landing, but at a safe height.

(c) Should the escape hatches open unintentionally in flight, an attempt may be made to close them as follows: Rear hatch at 200 m.p.h. (175 knots) I.A.S. or less. Front hatch at 120 m.p.h. (100 knots) I.A.S. with flaps at 20° and undercarriage down.
PART IV—EMERGENCIES:

Warning.—On torpedo-launching aircraft with the torpedo slung the underbody hatches cannot be used, and the release lanyards or mechanism must not be touched, until the torpedo has been dropped. If it is not possible to drop the torpedo the alternative exits must be used. Whenever possible, the underbody hatches should be used as parachute exits in preference to the alternative.

(ii) A further emergency exit is provided on the starboard side of the cockpit by a special window which can be jettisoned. The window is held shut by plunger bolts in catch brackets at each end and is jettisoned by pulling the lever (98) in the centre aft and pushing the window outwards.

(iii) A hatch in the cockpit roof also provides exit. It is hinged on the starboard side and opens outwards. The hatch is held shut by plunger bolts, in catch brackets at each end on the port side, and may be opened by first releasing the locking arrangement and then pulling down the handle in the centre. A wire cable is attached to the rear end of the hatch to prevent it from opening too far. On fighter command aircraft this hatch has a sliding observation panel. To open, pull lever down and back. To lock closed, push lever forward and up. The observer's hood can also be used and opens in a similar manner.

66. Emergency signalling

The emergency signalling (on early aircraft only) is used only when abandoning the aircraft and is an entirely independent circuit. There is a switch and a shielded pushbutton (23) for signalling to the observer. The pushbutton is to warn the observer to prepare to abandon the aircraft and the switch to give the final order to abandon. The switch should not be depressed until the warning lamp (23) on the instrument panel lights up informing the pilot that the observer is ready to abandon the aircraft.
PART IV—EMERGENCIES

67. Air/sea rescue equipment

Dinghy equipment and releases.—A multi-seat dinghy is provided in a blow-out stowage built into the trailing edge of the port wing. The dinghy is secured to the interior of the stowage structure by a painter cord of low breaking strength; a pack containing rations, drinking liquid, paddles and recognition devices is provided in the dinghy compartment, connected to the dinghy lifeline by the lanyard provided on the pack. There are three variations of the Beaufighter dinghy installation:

(i) With dinghy type “H” and operating head type “G” provision is made for manual operation only by means of a handle on the dinghy stowage cover.

(ii) With dinghy type “H” and operating head type “H” there are, in addition to an immersion switch for automatic electrical operation of the type “H” operating head, three manual pull-offs:

(a) Internally on the port side immediately aft of the pilot’s shoulder.

(b) Internally on the port side, below the observer’s hood.

(c) Externally forward of the leading edge of fin.

(iii) With dinghy type “L” operated manually and automatically as for (ii).

In addition to the multi-seat dinghy, the following are provided as personal issue. For pilot: “K” type dinghy in “A” type pack. For observer: “K” type dinghy in “C” type pack.

68. Ditching

See A.P. 2095, and note:

(i) Flaps should be set 30° down.

(ii) Should the undercarriage be down, an attempt should be made to raise it (if there is time) or in any case to unlock it, if necessary with the hand-pump through the normal pipe lines, i.e. emergency selector—OFF, power lever—ON, undercarriage selector—UP.

(iii) The deceleration is likely to be severe and much water may come over the nose and into the cockpit. The aircraft may swerve.
FUEL SYSTEM DIAGRAM

MAIN TANKS INNER: 376 gallons
MAIN TANKS OUTER: 174 gallons
MAIN TANKS TOTAL: 550 gallons
L.R. TANKS: 132 gallons
TOTAL ALL TANKS: 682 gallons

FUEL JETTISON

The jettison control opens jettison valves on the four main tanks. Fuel will also drain from No. 3 L.R. tanks through the outer jettison valves—bit slowly. Aircraft with M.C. 969/T.91 fitted have port and starboard controls for selective jettisoning.

NOTE: Fuel in No. 1 tanks is NOT JETTISONABLE.
KEY TO FIG. 2

COCKPIT-
GENERAL VIEW

1. Reflectorsight
   socket T dimmer
   switch.
2. Underwing load
   selector switch.
3. Reflectorgunsight.
4. Direct vision
   windows.
5. Wing camera gun
   button (independent).
6. Torpedosight
   switch and dimmer.
7. Gun firing and
   camera gun trigger
   and button.
8. Wheelbrakes lever.
9. Parachute flares
   switches (not in
   use).
10. Fuel tank gages
    (long-range).
KEY TO Fig. 3
PILOT'S INSTRUMENT PANEL

13. Undercarriage position indicators.
14. Floodlight switch.
15. Fire-extinguisher buttons.
16. Torpedo sight control.
17. Instrument flying panel.
18. Oil pressure gauges.
20. Floodlight switch.
22. Engine-starter push buttons.
23. Inter. comm. signalling lamp and button.
25. Air temperature gauge.
27. Low pressure warning lights (fuel).
28. Cylinder temperature gauges.
29. Oil temperature gauges.
30. Main magneto switches.
31. Undercarriage indicator switch.
32. Fuel jettison levers.
33. Triple pressure gauge.
34. Change-over cock for suction pumps.
KEY TO Fig. 4

COCKPIT PORT SIDE

53. Destruction switches A.R.I. 5025
54. Fuel suction balance cock lever
55. Carburettor cut-out controls (port and starboard).
56. Fuel tank cocks hand-wheel (starboard-lever).
57. Fuel tank cocks hand-wheel (port-lever).
58. Dinghy emergency release handle
59. Cockpit heating control.
60. Beam approach switch.
61. Electric controller (radio).
62. Underwing load master switch
63. Oxygen regulator.
64. Dimmer switch (D.F. loop indicator).
65. Fuel tank gauges (port).
66. Propeller speed controls.
67. Hydraulic power lever.
68. Hydraulic emergency selector lever.
69. Flaps and undercarriage control levers.
70. Dive brakes control.
71. Map case.
72. Engine limitations data.
73. Torpedo, bomb, and under-wing load release button.
74. Air intake controls (port and starboard).
75. Landing lamp control.
76. Supercharger control (starboard).
77. Landing lamp switch.
78. Supercharger control (port).
79. Cowling gills controls and indicator lamps.
80. A.S.I. correction card holder.
81. Distress switch and master switch.
KEY TO Fig. 5

STARBOARD SIDE OF COCKPIT

82. Elevator trim-tab indicator.
83. Windscreen de-icing.
84. Rudder trim tab control.
85. Elevator trim tabs hand-wheel.
86. Compass.
87. Resin lamps and bomb selector fuze-switches (NOSE/TAIL).
88. Signalling switchbox (identification lamps).
89. Jettison switch (bombs).
90. Torpedo and bomb master switch.
91. Torpedo and bombs selector (port and starboard).
93. Navigation lamps, oil temperature and pressure-head heater switches.
94. Fuel gauges switch.
95. Signalling switchbox (not in use).
96. Nose and bantam cameras switch.
97. Aileron trim tab control.
98. Release handle — knock-out panel.
99. Fuel tank gauges (starboard).
100. Sanitary bottle.
101. Venturi de-icing pump handle.
102. Venturi selector cock.

FIG. 5

STARBOARD SIDE OF COCKPIT.
Emergency Exits and Equipment

- Observer's hood hinged on starboard side
- Latch release lever for interior operation on port side
- Dinghy release port side
- External dinghy release
- Locking handles port side
- Incendiary bomb, starboard hand fire extinguisher starboard side
- Pilot's hood hinged on starboard side
- Hard fire extinguisher port side
- Lanyard to hatchi release lever on port side
- Knock-out panel starboard only
- Release handle for knock-out panel
- Incendiary bomb
- Fire extinguisher buttons on pilot's instrument panel
- Fuel jettison
- Pilot's seat release lever
- Dinghy release port side
- *Parachute exit
  - Rear entry and exit hatch
  - Or exterior operation
  - Dinghy release port center plane (pre mod. T.45)
- *Note: Except when torpedo is in place
- *Parachute exit
  - First aid box, starboard side
  - Front exit hatch
  - Axe for emergency use
  - Handle for exterior operation
- Note: Pack & dinghy also issued individually on later aircraft

Fig 6