

# HUNTER Mk. 57

## FLIGHT TEST SCHEDULE

### PART 1

### GROUND CHECK

#### GENERAL

A brief external examination of the aircraft should be made for damage and security of panels, access doors, etc., and removal of control locks, engine guards, etc. Ensure that engine intakes and boundary layer ducts are free from obstructions, and visually check jet pipe for absence of distortion, and that braking parachute doors are fully closed.

Visually check main and nosewheel oleo extensions, tyres for cuts, creep and distortion, and brake leads for security.

Check 'Power' Controls hydraulic accumulators:—

Elevator Accumulator ( <i>port side of fin</i> )	..	1,575 p.s.i.
Aileron Accumulator ( <i>stbd. wheel bay</i> )	..	900 p.s.i.

#### PRE-STARTING

On entering cabin and with the battery master switch OFF the following points should be checked:—

##### 1. Ejection Seat

Ensure that the seat top latch is correctly engaged, with safety pin inserted, and that  $\frac{1}{4}$  in. of the ejection gun inner barrel protrudes through the seat top cross member.

Remove and stow the blind safety pins, remove and stow the safety pin from the secondary firing handle (*if handle fitted*). Fasten combined parachute and safety harness and check operation of the seat vertical adjustment lever. Operate harness release and check that the harness locks automatically in the rear position. Inspect the clipping and positioning of R/T and 'g' suit attachment tubes.

*See A.P.4288, Vol. 1, Part 2, for full details of Martin-Baker Mk. 3.H. Ejection Seat.*

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### 2. Sliding Hood, Windscreen and Rear View Mirror

Examine these items for their optical qualities and adjust rear view mirror. Check motor clutch lever, open and close the hood manually and assess freedom of movement. The hood should be capable of being opened and closed manually.

*It is recommended that the following items be checked in regular routine order round the cabin from left to right, followed by the central console.*

### 3. Instruments

See that all engine and flying instruments are correctly labelled, appear visually undamaged and that the E.S.I. calibration label is affixed. Set altimeter at 1,013 millibars for test readings and check datum against Control Tower master instrument.

**Note . . .**

*Figs. 6 and 7 show the Manufacturers' tolerances on the flight instruments.*

### 4. Switches, Circuit Breakers, Warning Lights, Ancillary and Emergency Controls, Fuel System Indicators, etc.

Ensure all these items are correctly labelled, positioned and undamaged, and check movement where possible. With battery master switch OFF all magnetic indicators will show *black* except the power controls indicators which will show *white*.

### 5. Engine Controls

Operate over the full travel, the L.P. cock and combined throttle, and the H.P. cock—assess their freedom of movement, also the effect of the throttle damper and the safety device which prevents the throttle lever from being inadvertently closed beyond the idling position.

### 6. Oxygen System

Inspect the clipping and positioning of the main and emergency oxygen leads. Check the aircraft to seat connections (*starboard side of the seat*). Check that the main oxygen contents gauge reads FULL and that there is no reading in the regulator pressure gauge. Turn the regulator valve 'ON' and check the pressure is 200—400 p.s.i. Connect the mask tube to the system and the doglead clip to the life jacket.

## 6. Oxygen System (*Contd.*)

With the mask in position operate the emergency toggle switch right and left and check that additional pressure is felt. Press the switch fully in and check that a considerable increase in pressure is felt. If flow occurs due to slight leaks from the mask or elsewhere it will be indicated on the magnetic indicator.

Turn the regulator switch 'OFF' and check that regulator pressure drops to zero after taking one or two breaths. With the air inlet switch at NORMAL there should be no resistance to breathing but it should not be possible to breathe with 100% oxygen selected.

This test (*with the regulator switch 'OFF'*), checks the whole low pressure circuit for leaks from demand valve to mask. Turn ON the regulator switch and check that the magnetic indicator alternates *white* whilst suction is applied by normal breathing. Connect the emergency oxygen tube.

## 7. Anti 'g' Installation

An 'ON—OFF' cock, test button and pressure gauge are fitted on the starboard side of the cabin. When the cock is selected 'ON' the gauge should read 1,800—2,000 p.s.i. Air is fed to the suit through a valve which reduces pressure to 20 p.s.i. and an anti 'g' valve which automatically meters from a commencing figure of 1 p.s.i. at  $2\frac{1}{4}$  'g'.

Operate the test button to check inflation of the suit.

## 8. Brakes

Check the brake lever for correct operation and slackness in the cable, and note that the triple pressure gauge (*forward port side of cabin*) shows 1,500—1,650 p.s.i. on each wheel with the parking catch applied. Full brake and differential rudder should not increase this pressure by more than 100 p.s.i. Check that each brake completely exhausts with full opposite rudder applied.

Until the engine is started, pressure in the brake system is dependent on there being pressure in the brake accumulator. This will be shown on the gauge (*rear port side of cabin*), and should build up to 3,000 p.s.i. (*approx.*) after the engine is started.

*Below 750 p.s.i. no brakes are available.*

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### 9. Braking Parachute

The braking parachute is contained in a fairing over the jet pipe nozzle. On pre-flight inspection ensure that the doors are closed. The parachute is streamed by operating the two position selector switch in the cabin.

The correct functioning of the braking parachute installation should be checked at least once during the Schedule.

### 10. Flying Controls

Check the range and freedom of movement of the rudder pedals and control column and visually check the response of the various control surfaces. Check operation of the rudder pedal adjustment lever mounted above the starting console. The force required for full aileron deflection should be approximately 9 lb. in each direction and the elevator spring feel unit should require approximately 17 lb. forward and 28 lb. aft (*with tailplane set at 'Zero'*).

With 'by-pass' boosters fitted the aileron and elevator controls feel very sticky in 'Manual' but this heaviness disappears when the engine is started and the controls revert to 'Power'. Self centring of the elevator control is adequate in 'Manual' but there is virtually no self centring of the ailerons.

### 11. Inverter Checks

Before start up check STANDBY inverter and indicator by switching battery and engine master switches ON.

After starting the engine, the MAIN inverter should cut in before idling r.p.m. is reached. The manual change-over from MAIN to STANDBY may then be checked by operating inverter selector switch (*port console*) to STANDBY position, afterwards re-setting to MAIN; check the operation of the magnetic indicator while making this test.

The STANDBY inverter will again cut in as the generator lights come on when the H.P. cock is closed to stop the engine.

### 12. Engine Starting

Prior to starting, the relight circuit must be tested as follows:—

- (a) Switch battery master ON.
- (b) Hold relight switch ON for two seconds and check (*audibly*) that circuit is operating.
- (c) Cancel by switching battery master OFF.

**12. Engine Starting (Contd.)**

Start the engine in accordance with the latest instructions for the applicable Rolls Royce Avon Engine.

**Note . . .**

*Lifting master flight bar also switches on the pitôt heater and camera master switches.*

**13. Engine Checks**

During start-up, check that the acceleration to idling r.p.m. is 30 seconds (*approximately*) and for excessive J.P.T. Idling r.p.m. should be 2,500 (*plus 200 minus 0*).

At this figure check the J.P.T. does not exceed the limitations, the oil pressure is registering (*off stop*), and generator warning lights are 'Out'.

**14. Hood**

Check the electrical operation each way for smoothness and check inflation of the hood seal.

**15. Emergency Air Bottles**

Gauges for emergency accumulators for flaps and under-carriage are mounted on the port side of the cabin console. The pressure in the bottles (*which are ground charged*), should not be less than 1,800 p.s.i.

**16. Cabin Pressurisation and Conditioning**

Select cabin pressure switch-bar ON, then select desired position on thermostatic control with cabin temperature selector in AUTO. With engine running at moderate r.p.m. the flood air switch should be moved from AUTO to MANUAL. An increased air flow at a warmer temperature should be noticeable.

**17. D.M.E. Control Box****Note . . .**

*Test pilots should be conversant with the operation of Rebecca Mk. 8 equipment.*

The test procedure to be adopted is as follows:—

- (i) Switch main function and range switch to S.B. (*time to warm up is one minute minimum*).
- (ii) Select aerial selector to O/R.

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### 17. D.M.E. Control Box (*Contd.*)

- (iii) TX to beacon receiving frequency.
- (iv) RX to beacon transmitting frequency.
- (v) Select 200 n.m. or 20 n.m. range.
- (vi) Code switch ON—identify beacon and switch OFF.

**Note . . .**

*Should an incorrect beacon be identified, press the strobe button, and check that searching is recommenced.*

- (vii) Switch aerial selector to H., and check directional pointer.
- (viii) The B.A.H. and B.A.T. positions on the main function switch may only be checked if the appropriate ground equipment is available.

### 18. Sub-Min. Radio Compass

Check the radio compass controls at a convenient period during the flight tests.

### 19. I.F.F. Mk. 10

Check the I.F.F. installation controls and all facilities at a convenient period during the flight tests.

### 20. Electric Trimmers

The aileron, rudder and tailplane trimmers should be operated over full travel and the indicators checked. The standby tailplane trimmer should also be checked, ensuring at the same time that the main trimmer has automatically been rendered inoperative. The times of operation of the main and standby tailplane actuators should be respectively 6–10 seconds and 16–22 seconds.

*Before first flights on new aircraft* the range of movement on the aileron and rudder trim indicator needles should be equidistant each side of 'Zero'. Any diversion from this range on subsequent flights is an indication of the amount of pre-set bias that has been applied to the tab, so that the aircraft is in trim on initial climb with cabin indicators at 'Zero'.

**Note . . .**

*At least half the angular movement of the tabs must remain for use in flight after the necessary pre-set bias has been applied.*

**21. Braking Parachute Switch**

Check that the Stream/Jettison switch is in the OFF position.

**22. Gunsight and Associated Controls**

A Mk. 8 (*fixed*) gyro gunsight is fitted. Check ring masking, sun-screen and wing span setting controls.

**Note . . .**

*If target aircraft available, switch radar presentation 'ON' and check operation of radar ranging in the air.*

**23. Undercarriage Indicator**

The operation of the alternative filaments and night shade should be checked.

**24. Flaps**

The flaps should be operated to the fully down position via all the intermediate positions, and the indicator checked. The last position on the quadrant is inoperative and the flaps move a double increment when the indicator is moved from position 6 to 7 (*or vice versa*).

**25. Electric Flying ('Follow up') Tail**

After engaging elevator 'Power' ON select tailplane inter-connection in and operate the control column fore and aft, checking that the tailplane follows up the correct sense. Set tailplane trim at 'Neutral' and switch electric flying tail OFF.

Re-trim the tailplane manually to at least 1 deg. nose up or nose down and re-select electric flying tail in. This should not bring about a difference in the tailplane setting.

**Note . . .**

*Full functioning of the electric flying tail is covered by Addendum 5 to the 'Hunter Power Controls—Notes for Pilots'.*

**26. Hydraulic Aileron and Elevator Controls**

This aircraft is fitted with 'by-pass' boosters on the ailerons and elevator which gives immediate and positive application of 'Power' on selection under all conditions. Both aileron and elevator controls are fully powered and a spring unit is incorporated into each circuit to provide artificial 'feel'.

In 'Power', on the ground and in flight, the control forces are only those required to overcome the resistance of the springs, but in 'Manual' on the ground the controls are heavy due to the 'by-pass' booster piston rods remaining anchored to the structure and manual force being required to pump hydraulic fluid from one side of the ram piston to the other

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### 26. Hydraulic Aileron and Elevator Controls (*Contd.*)

in addition to the normal spring resistance.

With the engine running, select the switches to 'Power'. The controls should select at once and the two magnetic indicators change from *white* to *black*. Visually observe the operation of the control surfaces and check for any backlash in the control circuits. The operation of the boosters will be accompanied by slight fluctuations of the main hydraulic pressure indicator. Check that the aileron spring feel unit centralises the control column after lateral displacement. Normally the stick will slightly overshoot the mid position on release from full displacement and will then slowly return to centre. (*It is normal for the return from port to be better than from starboard.*)

#### **Note . . .**

*Full functioning of the 'by-pass' boosters is covered by Addendum 6 to the 'Hunter Power Controls—Notes for Pilots'.*

### 27. Hydraulic Pressure Warning

Indication that failure of the hydraulic system has occurred is given by the main needle of the triple pressure gauge. When the pressure falls below 600 p.s.i. the red light on the port side of the instrument panel will come ON and the audio warning will operate.

#### **Note . . .**

*These two warnings may be checked by leaving the radio ON during shut down, and the audio warning cut-out operated to test functioning.*

### 28. Hydraulic Pressure Gauge

The main hydraulic pressure should be 2,800—3,050 p.s.i. and is indicated by the top needle of the triple pressure gauge. This gauge should be observed during the functioning of all hydraulic services. Pressure will drop during the operation of services but should not cause the hydraulic warning to operate under normal conditions.

### 29. Air Brake

Operate the air brake test switch (*port cabin wall*) and visually observe the operation of the magnetic indicator. The test switch will extend the air brake momentarily (*to approx. 15 deg.*) and retract it again. The indicator will show *white* with the brake extended and *black* when retracted.

#### **Note . . .**

*With the undercarriage down the main air brake switch (on the throttle) should be inoperative.*

**30. G.4.F. Compass**

The compass should be aligned with the annunciator, and the course setting control checked.

Check also that the G.4.F. and the E.2 compass are approximately in agreement.

**31. Blind Flying Panel**

The OFF indication on the turn and bank should disappear when the battery master is switched ON. Check that the emergency switch is wired in the NORMAL position.

When the engine is running, the artificial horizon must be erected by pressing the button marked 'FAST ERECTION PRESS—LEVEL FLIGHT ONLY'. The rate of erection should not be less than 2 degrees per second.

**32. Engine Anti-Icing**

Check the coloured indicator by operating switch (*starboard cabin wall*) to ON and OFF.

**33. Fire Warning Light**

The fire warning circuit and lamp may be checked by operating the switch marked 'FIRE WARNING TEST' (*starboard console*).

**34. Cabin Altimeter and Pressure Warning Light**

These items do not normally indicate below 10,000 feet, but the pressure warning light filament may be checked on the ground by operation of a switch marked CABIN PRESSURE TEST/NORMAL mounted aft of the cabin pressure switch (*port side of cabin*). Operation of this switch also causes the three-position cabin pressure cock to go to 'Flood', and with the engine running at high r.p.m., an inrush of air may be noticed.

**35. Fuel Warning Lights**

A low pressure fuel warning light (*starboard instrument panel*) indicates when the fuel pressure at the engine falls below  $3\frac{1}{2}$  p.s.i. The light is in series with the engine master switch and may be checked by switching the battery and engine master switches ON with the L.P. cock OFF and the H.P. cock ON. With tanks full it normally goes out as soon as the L.P. cock is turned ON and should not illuminate if either booster pump is switched ON.

Two warning lights labelled FUEL LEVEL 650 LB. (*above centre instrument panel*) will illuminate when the front tanks are each reduced to this level whether or not fuel has been transferred satisfactorily. The warning lights are operated by float switches and should illuminate between 650 lb. and 700 lb.

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### 36. Fuel Contents Gauges and Transfer Indicators

Two fuel gauges are fitted giving the total fuel contents (*in weight*) contained in the port and starboard sides of the fuel system respectively. Transfer magnetic indicators set at  $2\frac{1}{2}$  p.s.i. for each side of the system will show cross-line if transfer pressure fails.

In the event of a *total* transfer pressure failure, the contents gauge transmitters in the wing and rear tanks will become inoperative and the fuel gauges will indicate the contents of the front tanks—this being the only fuel available to the engine.

In the event of *partial* transfer pressure failure (*wing and rear tanks have separate failure transmitters*), the failure is indicated thus: if pressure failure is in *rear* only, the gauges will indicate *wing and front* when cock is selected to *wing*.

### 37. Fuel Booster Pumps

The booster pumps (*one in each front tank*) are controlled by two ON/OFF switches (*starboard shelf*) and are protected by two circuit breakers. The pumps are designed for two speed operation; normally they run continuously at 'low' speed, but each at 'high' speed is capable of supplying the maximum fuel demand to the engine as well as filling the fuel recuperators. A circuit breaker for each pump is located on the starboard shelf.

'High' or 'low' speed operation is automatically controlled by pressure switches. If pressure falls below 8 p.s.i. (*this is also the setting for the booster failure light*) the pumps are switched to 'high' speed, and when pressure rises to above 12 p.s.i. the pumps are switched back to 'low' speed.

*If one pump fails* an adjacent amber warning light comes 'On' and the other pump is switched to 'high' speed. At high engine power with both pumps OFF the low pressure warning light (*starboard quarter panel*) will come 'On' and the fuel recuperators discharge their contents. *In these circumstances no negative 'g' manoeuvres should be carried out.*

A selector switch and an ammeter test socket (*aft of starboard shelf*) are provided for servicing purposes.

### 38. Fuel Flow Proportioner

From the booster pumps fuel passes to the flow proportioner, which ensures a balanced flow from both sides of the fuel system under normal conditions.

Unequal feeding is only likely to occur if inlet pressures to the proportioner differ by more than 2 p.s.i., the greater the pressure differential the greater the amount of unequal feeding.

**39. Radio Services**

Check the U.H.F. or V.H.F. controllers and their illuminated indicators. Ground check with Control Tower. *With U.H.F. fitted*, a selector switch enables main, standby, or 'standby on standby battery' to be selected; *with V.H.F. fitted*, a two position switch enables either set to be selected.

**Note . . .**

*With V.H.F. fitted, both sets should warm up ready for use irrespective of the position of the selector switch. With U.H.F. fitted time must be allowed for the set to warm up when switching to 'standby on standby battery'.*

**40. Generator Warning Lights**

Two generator warning lights are fitted near the starter push button. These should go OUT when the throttle is advanced from idling after starting the engine, and will not normally come ON again until the H.P. cock is closed on stopping the engine.

The r.p.m. at which the lights operate varies with battery state and services in use, and the lights should be checked before and after flight.

**41. General Cabin Lights**

To avoid excessive ground running, it is recommended that the cabin lighting, etc., be checked in flight, or after landing.

**TAXYING**

The following checks should be carried out while taxiing :—

**42. Brakes**

- (i) Differential action.
- (ii) There should be no excessive judder when braking hard, either singly or together.
- (iii) The brakes should hold the aircraft to 6,800 r.p.m. under I.C.A.N. conditions.
- (iv) With the rudder pedals central the aircraft should pull up straight when the brakes are applied.
- (v) After several flights the brakes will 'bed-in' and normally hold to higher r.p.m.

**Note . . .**

*In conditions of low ambient temperature the higher thrust developed by the engine may cause the aircraft to move against*

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### 42. Brakes (*Contd.*)

*the brakes at less than 6,800 r.p.m. An allowance should be made for this.*

*Example—at minus 15 deg. C., 6,450 r.p.m. will give the same static thrust as 6,800 r.p.m. under I.C.A.N. conditions.*

### 43. Undercarriage Check

The general feel and riding qualities of the undercarriage should be checked, together with the nose wheel castoring.



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