FINAL CHECKS FOR TAKE-OFF

TRIMMERS	Neutral
THROTTLE & PITCH ...	Friction as desired
MIXTURE	Auto-rich
FUEL	Cock ON Check contents
BRAKES	Off

FINAL CHECKS FOR LANDING

BRAKES	Off
TRIMMERS	As required
MIXTURE	Auto-rich
FUEL	Check contents

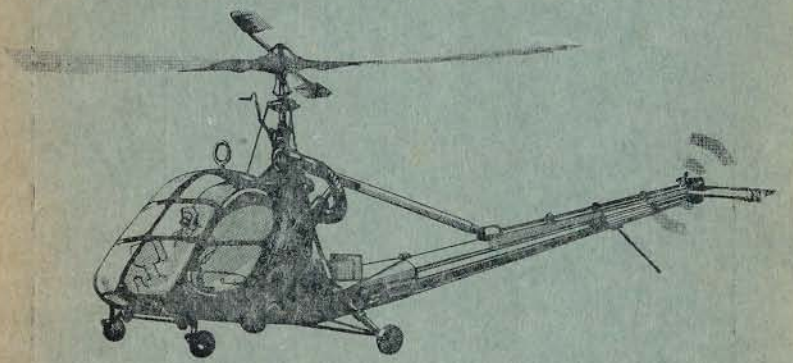
1st Edition
(Reprinted March, 1955)

A.P. 4534A.—P.N.

PILOT'S NOTES

HILLER H.T.

Mk. 1



Prepared by direction
of the
Minister of Supply

J. R. C. Helmore

Promulgated for
Information and guidance
of all concerned
by command of
Their Lordships

J. S. Laing

AMENDMENTS

Amendment lists will be issued as necessary and will be gummed for affixing to the inside back cover of these notes.

Each amendment list will, where applicable, be accompanied by gummed slips for sticking in the appropriate places in the text.

Incorporation of an amendment list must be certified by inserting date of incorporation and initials below.

A.L. NO.	INITIALS	DATE	A.L. NO.	INITIALS	DATE
1	INCORPORATED IN THIS REPRINT		7		
2			8		
3	[illegible]	7.10.59	9		
4			10		
5			11		
6			12		

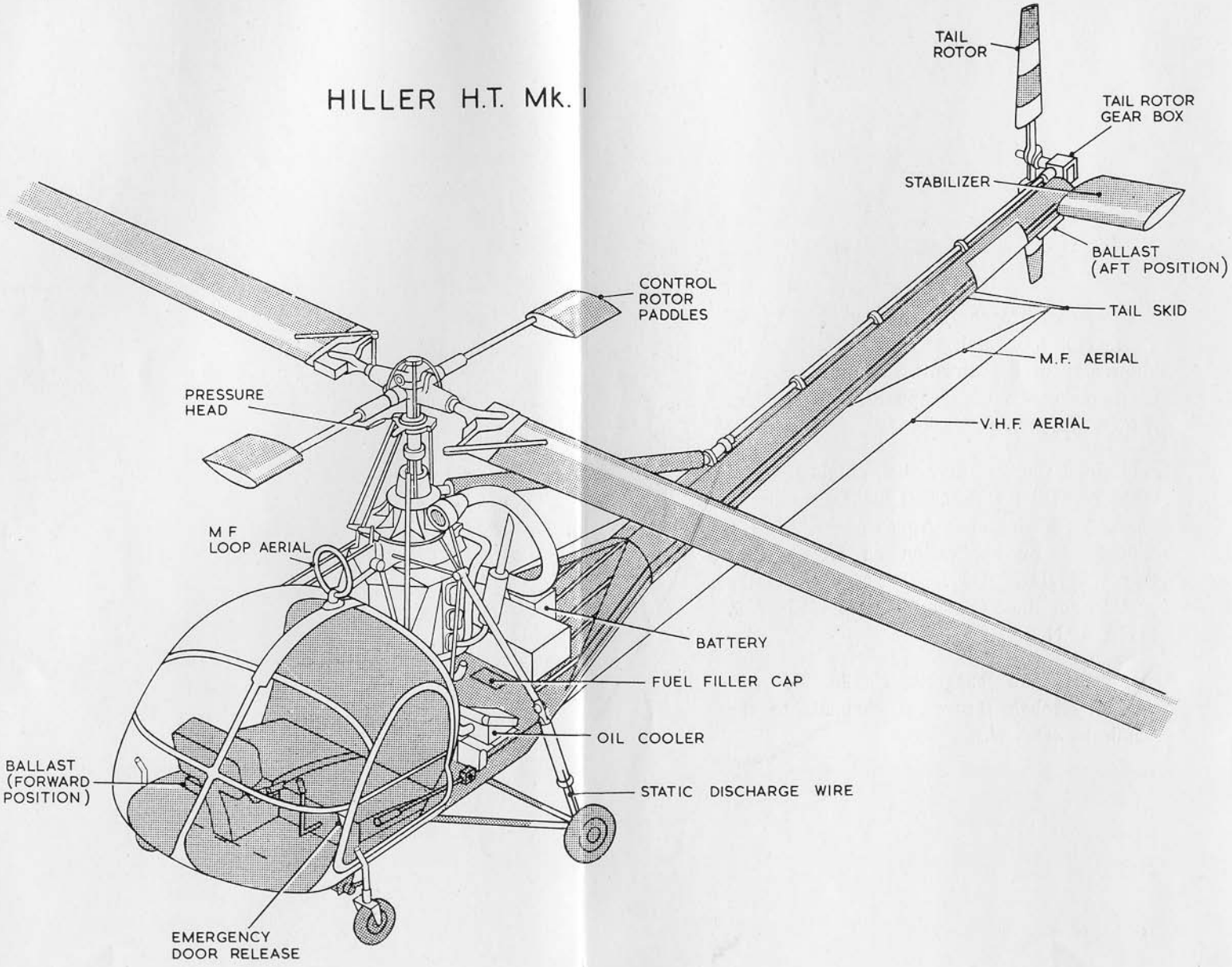
NOTES TO USERS

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.F.O. 3789/48).

Additional copies may be obtained from Head of Military Branch (Books), Admiralty Block C, Station Approach Buildings, Kidbrooke, by application on Royal Navy Forms S134D or D397. The number of the publication must be quoted in full—A.P. 4534A—P.N.

Comments and suggests should be forwarded through the usual channels to the Admiralty (D.A.W.).

HILLER H.T. Mk. I



PILOT'S EXTERNAL CHECK LIST

Start at the port cabin door and work clockwise round the aircraft. The outside should be checked for obvious damage, security of attachments, etc.; the undercarriage for tyre cuts and creep, equal extension of oleos, and alignment. In addition, the following specific checks should be made:—

Cabin doors	Emergency release pins installed
Pressure head	Cover removed
Engine	Oil and fuel leaks
	Fan and fan housing damage
Cyclic control linkage Mast and hub Main and control rotor blades	Damage
Main transmission	Oil leaks
Battery	Secure Plugged in
Aerial wires	Secure
Rudder controls	Excessive wear and fraying
Tail rotor drive and bearings	Damage
Ballast weight	Secure
Tail rotor gear box	Oil leaks
Tail rotor blades and pitch linkage	Secure. Damage
Horizontal stabiliser	Secure
Tail skid	Secure
Oil cooler	Visually for cleanliness
Oil dipstick	Adequate supply
Fuel tank	Security of filler cap and access door Fuel sump drained
Static discharge wire	Ground contact
Collective pitch control	Damage
Throttle control	Damage
Carburettor air screen	Cleanliness

Admiralty,
November, 1953
(Reprinted March, 1955)

A.P.4534A—P.N.
Pilot's Notes
1st edition

HILLER H.T. Mk. 1

LIST OF CONTENTS

COCKPIT EQUIPMENT

FLIGHT, NAVIGATION AND COMMUNICATION EQUIPMENT

EMERGENCY EQUIPMENT

PART II—LIMITATIONS

PART III—HANDLING

PART IV—EMERGENCY HANDLING

PART V—ILLUSTRATION

PART I
DESCRIPTIVE

NOTE.—Throughout this publication the following conventions apply:—

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

(b) The numbers quoted in brackets after items in the text refer to the illustration in Part V.

(c) Unless otherwise stated all airspeeds quoted are 'indicated'.

Page 7
Introduction
A.L.3

INTRODUCTION

The Hiller H.T. Mk. 1, American designation H.T.E.2, is a three-seat helicopter designed for basic training purposes. It is powered by a 200 h.p. Franklin model 0–335–6, six cylinder opposed, air-cooled engine, driving a single main rotor and an anti-torque tail rotor.

FUEL AND OIL SYSTEMS

1. **Fuel tank**

Fuel is carried internally in a tank installed beneath the engine deck. The tank holds ~~24~~ 22.5 imp. gallons of which 21 are available for use.

2. **Fuel contents gauge**

The fuel contents gauge (19) is on the lower right-hand side of the instrument panel, and is marked GAS. The

gauge is very inaccurate in flight, due to the attitude of the aircraft.

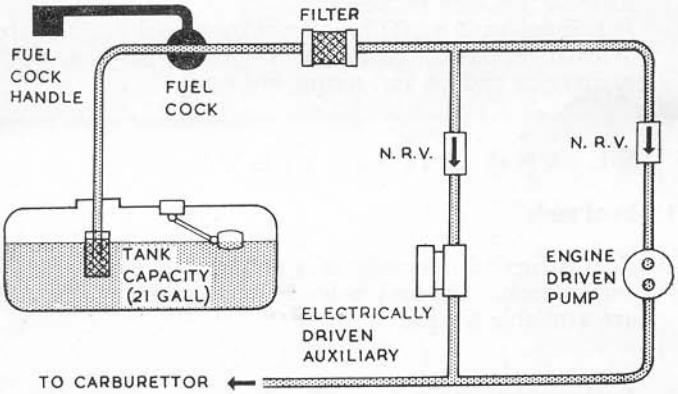
3. Fuel cock

The fuel cock control (28) is mounted on the right-hand side of the pedestal tunnel, and is rotated downwards and clockwise to turn FUEL OFF (red) to FUEL ON (black).

4. Fuel transfer

Fuel is transferred from the tank to the carburettor by an engine-driven pump, when the engine is running. For use in the event of failure of the engine-driven pump, or to assist in starting, an electrically-driven auxiliary pump may be switched on by the switch (26) on the instrument panel. The auxiliary pump will provide a pressure of 7 lb./sq. in., which is the normal output of the engine-driven pump at maximum r.p.m.

The fuel pressure is shown on the gauge (11) on the instrument panel.



Simplified Fuel System

5. **Oil system**

(i) The oil system has a capacity of 2.5 gallons. The engine-driven oil pump delivers oil to a by-pass plate near the top of the engine, where part of the oil enters the engine and the remainder is directed upwards to the transmission. A separate line supplies oil from the by-pass plate to the tail rotor drive gear mechanism in the upper transmission section. By gravity, oil from the transmission and engine returns to the engine oil sump.

(ii) Between the pump and the by-pass plate is a thermostatically controlled oil cooler. When the temperature of the oil reaches 71°C. it is passed through the cooler.

(iii) If the temperature of the oil within the transmission exceeds 117°C., a red warning light (6) on the instrument panel comes on.

Page 9
Para. 6
A.L.3

ENGINE CONTROLS

6. **Throttle control**

The throttle is used to control power and to prime the engine when starting. The twist grips (34) on the ends of the collective pitch levers are turned left to increase power and right to decrease power. The throttle is also interconnected with the collective pitch lever so that power is increased when the collective pitch lever is raised and decreased when the lever is lowered. At all times the twist-grips have overriding control of the throttle and if they are turned right (closed) and held hard against the stop, the collective pitch lever may be raised without power coming on. A friction ring (33) turned right to tighten is at the base of the twist-grip on the centre lever only.

7. **Mixture control**

The mixture control lever (29) is on the pedestal tunnel forward of the centre seat, and has two marked positions:

(i) Fully aft, in sector ICO—idle cut-off.

(ii) Fully forward, in sector AR—automatic rich.
The mixture is leaned progressively as the lever is moved back from AR to ICO. A catch prevents the lever from being moved inadvertently to ICO.

8. **Carburettor hot air control**

The carburettor hot air control (30) is on the pedestal tunnel and has two marked positions: COLD (fully forward) and HOT (fully aft). An intermediate degree of heat is obtained between the two extreme settings.
A carburettor air temperature gauge (9) is on the instrument panel, and an outside air temperature gauge (14) above the panel.

9. **Ignition**

The ignition switch (2) is on the lower left-hand side of the instrument panel.

10. **Engine starting**

The engine is started by an electric motor, operated by pushing down and forward the engine starter control (31) on the left of the pedestal tunnel.

11. **Engine instruments**

The following engine instruments are on the instrument panel:—

Combined engine and rotor r.p.m. indicator (12)
Manifold pressure gauge (10)
Combined engine oil inlet pressure, temperature and fuel pressure gauge (11)
Cylinder head temperature gauge (16).

Page 10
Para. 12
A.L.3

12. **Transmission system**

(i) *General*

The transmission conveys power from the engine to the main and tail rotors. It consists of a single stage reduction gear (ratio 9.17 to 1), an automatic clutch, a free wheel (sprag clutch), the drive for the main rotor, the take-off drive for the tail rotor, and the tail rotor gearbox.

(ii) *Mercury clutch*

The automatic centrifugal mercury clutch is located on the engine flywheel assembly. Its primary function is to reduce loads imposed upon the engine during starting. Engagement of the clutch begins at 600 r.p.m. and at 1,450 r.p.m. it should be fully engaged.

13. Electrical system

(i) *Generator*

A 28-volt engine-driven D.C. generator supplies the electrical system, and charges the 24-volt battery. The voltage output of the generator is indicated on the voltmeter-ammeter (4) on the instrument panel. A generator failure warning light (5) on the instrument panel comes on when the generator output falls below the battery voltage.

(ii) *Battery*

A 24-volt battery is on the cockpit floor, starboard side forward. The battery master switch (25) on the instrument panel must be ON for starting; in this position current is supplied direct to the starter motor.

(iii) *External power socket*

An external power socket is situated just to the starboard of the battery. The battery master switch must be ON before the external current can be used.

(iv) *Circuit breakers*

Individual circuit breakers are on sub-panels (1) on the instrument panel: they will trip if the current in the respective circuits is excessive.

(v) *Fuses*

Fuses are provided in receptacles on the left and right-hand sides of the instrument panel.

(vi) *Static discharge*

Static electricity is discharged through a grounding wire attached to the strut of the left main landing gear.

FLYING CONTROLS

14. Rotors

(i) *Main rotor*

The main rotor assembly is of the two bladed teetering type and is controlled by a two-bladed variable pitch control rotor mounted horizontally at 90° to the main rotor. The function of the control rotor is to tilt the main rotor in order to establish various flight attitudes. Changing the angle of incidence of the control rotor creates an aerodynamic boost which tilts the main rotor about the mast.

(ii) *Tail rotor*

The tail rotor has two variable pitch blades and, besides counteracting the torque from the main rotor, gives directional control.

14A. Flying controls

The flying controls are: the collective pitch lever, the cyclic pitch control column, tail rotor pitch rudder pedals, and trimmers. All controls except the trimmers are duplicated.

15. Collective pitch control

The collective pitch lever (34) controls the lift from the main rotor by altering the pitch. The fully down position gives minimum blade angle, and the fully up position gives the maximum blade angle. As the lever is raised the throttle is opened to give approximately the correct power output for the pitch setting, the intention being to keep the rotor r.p.m. sensibly constant. Overriding control of the throttle is obtained by the twist-grip control. A friction nut for the collective pitch control linkage is on the back of the centre seat.

16. Cyclic pitch control column

The cyclic pitch control (23) changes the pitch of the main rotor cyclically so that thrust is produced in the direction of movement of the control. The control is not connected directly to the rotor blades, but alters the angle of attack of the control rotor paddles which have a servo action on the rotor blades.

When hovering, flight is produced in the horizontal plane in the same direction as the control movement; in for-

ward flight roll and pitch are produced in the conventional manner.

17. **Trimmers**

Trimming in the fore-and-aft and sidewards directions is achieved by movement of the four-position electric switch (22) mounted on the top of the central cyclic pitch control column.
There is no trim for the yawing plane.

18. **Rudder pedals**

The rudder pedals (3) give directional control in the normal sense by varying the pitch of the tail rotor blades. Engine torque is also counteracted by the use of these pedals.
The pedals are individually adjustable for leg length by pulling out the spring-loaded pin in the pedal sleeve and sliding the pedal backwards or forwards as desired.

19. **Wheel brakes**

A hydraulic brake system is fitted, and is intended for parking purposes only. At gross weight, the brakes will hold on a maximum slope of 15 degrees. The brakes are operated by the brake lever (32) on the left side of the pedestal tunnel.

COCKPIT EQUIPMENT

20. **Access to cockpit**

The aircraft is entered through doors on each side of the cockpit. Each door is jettisonable by pulling up the red handle just forward of the door hinge.

21. **Cockpit lighting**

All instruments are provided with individual lighting controlled by the rheostat switch (20). The portable map

light (13) is normally mounted just above the instrument panel, but may be located overhead on the canopy centre support tube; operation is controlled by a rheostat switch on the light assembly.

22. **Cockpit heating**

Heating of the cockpit and defrosting of the windshield is accomplished by a single system. Hot air from the engine cooling fan is brought through an opening in the upper rear portion of the cockpit and directed downward and across the windshield. The heat control is directly above the centre seat position, and is marked CABIN HEAT—ON (forward)—OFF (aft).
Cold air enters the cockpit by ventilating louvres in the cockpit doors.

Page 14
Para. 23
A.L.3

23. **Ballast**

A removable 15 lb. ballast weight (27) is provided and can be carried either at fus. stn. 318 on the tail-cone or at stn. 42 on the cockpit floor, starboard side (see para. 31A).

FLIGHT, NAVIGATION, AND COMMUNICATION EQUIPMENT

24. **Flight instruments**

Standard instruments are fitted, less a turn and slip indicator, rate of climb indicator, and artificial horizon.
An alternative source of static pressure (from the cockpit) is obtained by moving the switch (18) marked STATIC PRESSURE SELECTOR VALVE from STATIC TUBE to ALTERNATE SOURCE (down).

25. **Compass**

A magnetic, stand-by type compass (17) is mounted on the instrument panel.

26. **External lights**

(i) *Navigation lights.* The navigation lights are mounted on the fuselage sides and tail, and controlled by the switch (24) marked POSITION LIGHTS.

(ii) *Landing lights.* The landing lights are mounted at the forward end of the fuselage, and are controlled by a switch on the lower side of the central collective pitch lever.

WARNING.—The life of the landing lamps is extremely short, being 25 hours on a 5 min. On/5 min. Off basis and considerably less if the 5 min. Off period is not observed. Owing to its location, it is easy to knock on the lamps switch and it is therefore recommended that for normal operation the landing light circuit breaker (32) should be tripped.

27. Radio equipment

(i) The aircraft is fitted with ARC Type 12 (2T/2R) radio, which provides VHF-R/T transmission and reception, intercommunication, and M.F.-W/T and R/T reception. The M.F. can be used for homing, in conjunction with the loop aerial. The radio equipment is housed externally in a box aft of the engine. The microphone trigger switch on each cyclic pitch control column is pressed to transmit and released to receive.

(ii) *V.H.F. transmitters.* Two V.H.F. transmitters provide R/T transmission on ten channels between 116 and 148 mcs., selected by a selector switch on the control panel (15). An on/off switch/volume control is fitted above the selector switch.

(iii) *V.H.F. receiver.* One V.H.F. tuneable receiver provides R/T reception between 118 and 148 mcs. The tuning control is above the channel selector switch on the V.H.F. control panel. A sensitivity switch marked LO and HI is concentric with the dial.

(iv) *M.F. receiver.* The range receiver provides W/T and R/T reception between 190 and 550 kcs. It is switched on by the switch/volume control on the V.H.F. control panel. The M.F. control panel (7) to the left of the instrument panel contains a volume control, a tuning control, and a ANT-LOOP switch, which is put to ANT for initial tuning, and to LOOP for homing. The loop aerial azimuth position indicator (8) is above the M.F. control panel.

(v) *Intercomm.* Intercommunication between crew members is provided by moving the V.H.F. channel selector control to the position marked INT. The trigger switch must be pressed to speak, and released to receive.

27A **Radio equipment** (Naval Service Mod. Hiller No. 3001)

(i) The aircraft is fitted with a transmitter-receiver T.R.1520 which provides V.H.F. R/T transmission and reception, intercomm. and M.F. W/T-R/T reception.

(ii) *V.H.F. transmitter*

The T.R. 1520 provides R/T transmission and reception on four channels between 115 and 145 mc/s., selected by a controller Type 295 mounted in the centre pedestal.

(iii) *M.F. receiver*

The receiver ARC type R11.A provides W/T and R/T reception on the M.F. band of 190 to 550 kc/s. Its controller (7) is mounted on the left of the instrument panel containing tuning control, on-off switch/volume control and ANT-loop switch, which is put to ANT for initial tuning, and to loop for homing D.F. The loop aerial azimuth position indicator (8) is above the M.F. controller (7).

Page 16 Paras. 27A (iv & v) 28 A.L.3

(iv) *Intercomm.* is available when the T.R. 1520 is switched on, but for speech, the press-to-speak switch, on the forward face of the cyclic control, must be pressed. Muting facilities are provided by means of the small red pushbutton on the cyclic pitch control column to the left of the trimmer push switch (22) and by a wandering pushbutton which is clipped to the left side of the observer's seat when not in use.

(v) *V.H.F.* aerial
The V.H.F. aerial is situated under the tail cone.

EMERGENCY EQUIPMENT

28. **Fire-extinguisher**

A hand-operated CO_2 fire-extinguisher (21) is mounted on the cockpit floor forward of the instrument panel. There is no engine fire-extinguishing equipment. When N.S. Mod. 3003 is embodied a British Type fire-extinguisher is carried on the front of the starboard seat in lieu of the extinguisher on the floor.

28A. **First-aid kit**

A first-aid kit is stowed on the cockpit floor, forward of the port seat.

PART II

LIMITATIONS

29. Engine limitations—Franklin Model 0–335–6

(i) The principal engine limitations are as follows:—

Power rating	Manifold Pressure (in Hg)	R.P.M. Engine/Rotor	Temperature °C.	
			Oil	Cyl Hd.
Take-off	30	3,100/350	110	225
Climb	27	3,100/350	110	225
Max. continuous	22–25	3,000/345	110	225

(ii) **Oil pressures**

Minimum	30 lb./sq. in.
Normal	40–60 lb./sq. in.
Maximum	75 lb./sq. in.

(iii) **Fuel pressure**

Normal	2–9 lb./sq. in.

(iv) **Oil temperature**

Minimum for take-off	40°C.

(v) **Cylinder head temperatures**

Minimum for take-off	100°C.
Maximum for stopping engine	Decrease from flight temperature

(vi) **Rotor R.P.M.**

Maximum (for auto-rotation)	360
Minimum	300

NOTE.—The minimum fuel octane for this engine is 91.

30. **Flying limitations**

(i) The following are prohibited:—

All aerobatic manoeuvres

Instrument flying

Night flying, except under visual contact flight conditions

Rearward flight for protracted periods, especially when the cabin doors are removed.

(ii) All movements of the controls must be smooth and co-ordinated to preclude the possibility of exceeding the limits of 2.8G and –0.5G. *Negative loading should never be imposed intentionally.*

(iii) Hovering flight and vertical ascents and descents should be avoided where possible between 10 and 325 ft. above the ground. The unsafe combinations of altitude and airspeed are shown in the chart opposite.

(iv) *Speed restrictions*

The maximum permissible forward speed at sea level is 73 knots. Decrease maximum speed 2.6 knots per 1,000 ft. altitude. At the maximum speed movement of the controls must be gentle or control may be lost. (See Para. 62.)

Page 18
Para. 30
(v) & (vi)
A.L.3

(v) *Weight and C.G. limitations*

(a) Maximum A.U.W. . . . 2,500 lb.

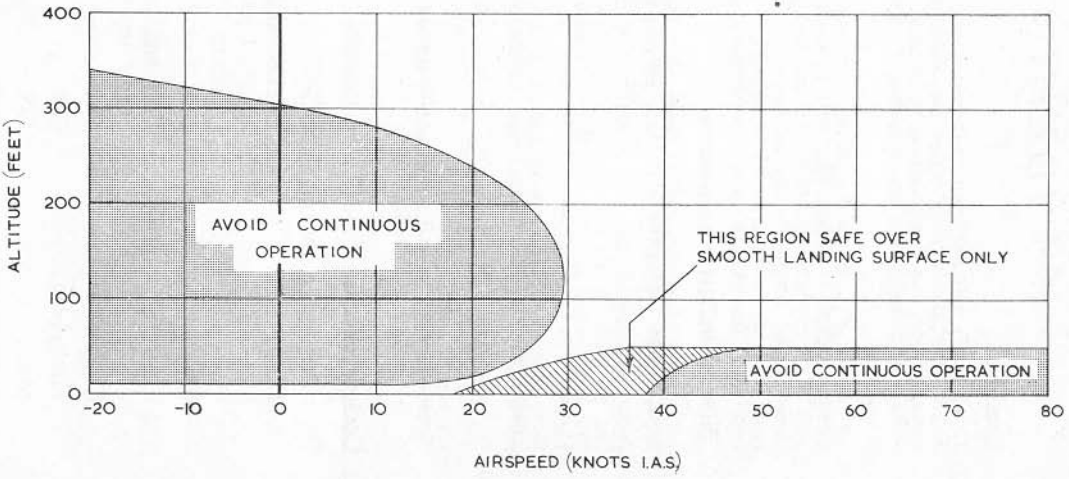
Above 2,350 lb. hovering outside the ground cushion is not possible in ISA conditions.

(b) The limits of the C.G. are 80.1 ins. to 84.6 ins. aft of datum (see Weight & Balance Data Handbook AN–01–1B–40).

(c) Any asymmetric lateral loading must be to port.

HILLER H.T Mk. 1

AIRSPEED – ALTITUDE FOR SAFE AUTOROTATIVE LANDING



PART III

HANDLING

31. Loading

(i) The aircraft may be flown in the open or closed configuration and with floats in lieu of wheels (see Weight and Balance Data Handbook AN–01–1B–40).

(ii) For each aircraft the operating weight and C.G. position (less crew or other cockpit loading) is entered in the current Form A.700. This basic C.G. position varies with individual aircraft, but in the closed configuration and with N.S. Mods. 3001 and 3003 embodied, is usually within the range 86.4–87.2 ins. aft of datum.

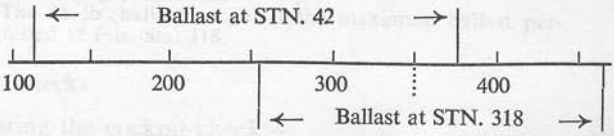
(iii) The C.G. moves forward as the cockpit loading is increased but can be maintained within limits by use of the 15 lb. ballast weight. The use of fuel has negligible effect on the C.G. position.

31A. Use of ballast

(i) Providing the basic C.G. position is within the limits referred to in para. 31 (ii), ballast may be used (see chart) as follows:—

(a) *Cockpit ballast (station 42)*
For cockpit loadings between 110 and 380 lb.

(b) *Tail ballast (station 318)*
For cockpit loadings between 260 and 460 lb.



(ii) It is recommended that the ballast should remain at station 42 unless a cockpit load of 350 lb. is exceeded.

32. Cockpit checks

On entering the cockpit check:—

Doors	Locked and secure Internal jettison controls secure
Flying controls	Full and correct movement
Trimmer controls	Full and correct movement Set in neutral position
Collective pitch	Fully down
Fuel cock	ON
Master switch	ON
Ignition switch	OFF
Transmission oil light	On

Generator warning light	ON
External and internal lighting	As required
V.H.F.	OFF
Safety harness	Check operation and security
Circuit breakers	In

33. **Management of the fuel system**

(i) Fuel is used from the sole tank and is controlled from the ON/OFF cock. This tank is situated directly under the main rotor mast, and therefore the C. of G. movement due to fuel consumption is negligible.

(ii) The auxiliary fuel pump is only used for priming the carburettor before starting and in the event of a drop of pressure in the normal fuel system.

34. **Starting the engine**

(i) The engine can be started either by the internal supply or by a ground starter battery of 24-volts. In either case set the battery master switch ON.

(ii) Then proceed as follows:—

(a) Set fuel cock ON.

(b) Set mixture control to RICH.

(c) Set carburettor air heat to COLD.

(d) Set collective pitch fully down.

(e) Prime engine as necessary by opening and closing the throttle with the auxiliary fuel pump on or off as desired.

(f) Open throttle slightly and switch on ignition switches.

(g) Start the engine by depressing the electric starter lever. Release the starter lever immediately the engine fires.

(h) Check oil pressure. If oil pressure fails to build up to 30 lb./sq. in. within 30 seconds, the engine should be stopped immediately.
(i) The engine-driven fuel pump should maintain a pressure 2-9 lb./sq. in.
(j) Have external power source disconnected.

35. **Rotor engagement and warming up**

The rotor will begin to engage automatically at approximately 600 r.p.m., with positive engagement at approximately 1,450 r.p.m. The engagement becomes apparent when the r.p.m. needles are synchronised. 1750 r.p.m. must not be exceeded until the oil temperature has reached 40°C.

36. **Exercising and testing**

(i) Ensure that the aircraft is facing into wind, and that all ground crew are clear.

(ii) Hold the cyclic pitch control in the neutral position and the collective pitch lever fully down, then open the throttle to give 2,700 engine r.p.m. Throttle back quickly to allow the free-wheel mechanism to operate. Carry this out three or four times.

(iii) Open the throttle and check maximum r.p.m. of 3,100 are obtainable. Throttle back to 2,700 r.p.m. and test each magneto. A single ignition drop should not exceed 200 engine r.p.m.

(iv) At the same r.p.m. check that the generator is charging and that all temperatures and pressures are normal.

(v) Throttle back fully fairly quickly to check free wheeling of the rotor, and also slow running of the engine, then set to idle at 2,000 R.P.M.

37. **Taxying**

(i) To taxy, release the wheel brakes and open the throttle to give 3,100 r.p.m. Increase the collective pitch to give

18 in. manifold pressure, then ease the cyclic pitch control forward. The aircraft is steered by application of the rudder pedals.

(ii) Ground speed is controlled by the application of the cyclic pitch control.

WARNING.—(a) Never taxy at speeds in excess of 10 knots, especially over rough ground or in congested areas.

(b) When taxying cross-wind apply the cyclic pitch control slightly in the direction from which the wind is blowing, to maintain safest and maximum control of the helicopter.

(c) Considerable care should be taken in high or gusty winds.

(d) Never use the parking brake to aid taxying, except in an emergency.

38. **Checks before take-off**

Trimmers	Neutral
Throttle and pitch	Friction as desired
Mixture	Auto-rich
Fuel	Cock ON Check contents
Brakes	Off

39. **Normal (vertical) take-off**

(i) The take-off should be made into wind.

(ii) Open the throttle smoothly to give 3,100 r.p.m. and raise the collective pitch lever to the power required for take-off. As the collective pitch lever is raised it will be necessary to close the throttle slightly to avoid exceeding maximum engine r.p.m. Left rudder is necessary in order

to keep straight, and the aircraft takes off in a slightly left wing low attitude.

(iii) Hover at about 4-10 feet, and check control functioning. Trim the aircraft by actuating the trim switch.

(iv) From this height, transfer to forward flight by increasing power and collective pitch and easing the cyclic control forward. It will be necessary to open the throttle slightly to maintain 3,100 r.p.m. as forward speed is gained. When possible, build up the speed to 35-40 knots before starting to climb, and maintain this speed up to 325 feet.

40. **Running take-off**

(i) Under normal take-off conditions it will never be necessary to resort to a running take-off.

(ii) Make the take-off into wind.

(iii) Open the throttle to give 3,100 r.p.m. and raise the collective pitch lever to about 20-22 in. boost.

(iv) Ease the cyclic pitch control forward, and keep straight with the rudder.

(v) At approximately 15 knots ease the cyclic pitch control back and let the aircraft fly off, which it does in a nose-down attitude.

(vi) Increase power as necessary, as the aircraft leaves the ground.

41. **Climbing**

To climb the aircraft, set the engine controls to give 3,100 r.p.m. and 27 in. manifold pressure, and climb at 40 knots.

42. **General flying**

(i) *Controls.* All controls in this aircraft are very sensitive, and care should be taken to avoid harsh movements and

Page 25
Para. 42
A.L.3

over-correcting. The rudder is very light and effective, and should be used with care.
The force required to move the controls varies appreciably with speed; the controls become more sensitive at high speed.
Laterally and longitudinally, this helicopter is stable, and after trimming can be flown hands-off.

(ii) *Changes of trim*

	Yaw	*Roll*
Increase in power	Right	Right
Decrease in power	Left	Left

There is a slight change of longitudinal trim with changes of speed and power.

(iii) When Mod. 510 (9–12° rotor hub) is embodied the cyclic control becomes lighter, the vibration level is changed and a build up of cyclic motion in the stick may occur. This usually takes place on the ground when the cyclic control stick is moved, with the collective pitch lever down, but may occur in the air with rapid displacement of the stick. Any tendency to overcontrol, when correcting this motion, should be avoided.

43. **Autorotation**

(i) When the pitch angle of the blades is reduced to the minimum the rotor will rotate of its own accord, power off, thus permitting controlled descending flight. The rate of descent will vary with the forward speed. For minimum rate of descent, use 30-40 knots.

(ii) To assume autorotative flight, move the collective pitch lever smoothly and quickly to the fully down position, and maintain a forward speed of 40 knots by use of the cyclic pitch control.

(iii) Use the collective pitch lever to maintain between 330 and 350 rotor r.p.m.

(iv) From slow or hovering flight a minimum height of 325 feet is desirable to produce effective autorotation.

44. **Hovering**

(i) Hovering should be avoided where possible between 10 and 325 feet. (See diagram on page 19.)

(ii) To commence hovering from forward flight, simultaneously ease the control column back and the collective pitch lever down, together, adjusting the engine r.p.m. with the throttle.

(iii) As the aircraft slows down, increase power as required to prevent sinking.

(iv) If possible, the aircraft should be heading into wind when hovering, and in any case no attempt should be made to hover across or down a wind of more than 15 knots, as it is very easy to run out of control.

(v) When turning over a spot, application of right rudder will require a reduction in power to maintain a constant height, while application of left rudder will necessitate an increase in power.

45. **Backwards flight**

(i) The maximum speed in backwards flight is 20 knots, but it is recommended that an estimated speed of 10 knots should not be exceeded.

(ii) From hovering flight, ease the cyclic pitch control back and increase power as necessary to maintain the desired height.

(iii) The rudder is more sensitive in backward than in forward flight.

46. **Sideways flight**

(i) From hovering flight, ease the cyclic pitch control sideways in the desired direction.

(ii) The aircraft tends to weather-cock in the direction of the sideways motion, and this must be held by applying opposite rudder. Hence, sideways flight to the right requires more power than sideways flight to the left.

47. **Turning**

Co-ordination of all three controls is necessary when making turns.

48. **Cruising**

(i) The recommended cruising altitude is 1,000 feet. From this height a safe landing can be made regardless of forward speed in the event of power failure.

(ii) Recommended power settings for cruising flight are 24 in. Hg. and 3,000 r.p.m. This will give a safe endurance of 1 hr. 30 min.

49. **Pressure error corrections**

The corrections (in knots) to be applied to the A.S.I. reading to obtain R.A.S. are:—

IAS	20	30	40	50	60	70	80
Subtract	2	5				0	1
Add			2	2	1	0	

50. **Vertical descent**

Partial power vertical descents should not be made unnecessarily between 325 and 10 feet, and must not be performed at airspeeds of less than 5 knots.
In the event of zero airspeed being attained, pilots should be prepared for a rapid increase in the rate of descent. This is due to a vortex ring developing, and recovery should be made by acquiring forward speed.

51. **Checks before landing**

Brakes	Off
Trimmers	As required
Mixture	Auto-rich
Fuel	Check contents

52. **Approach and landing**

(i) Maintain 3,100 engine r.p.m. and a speed of 40 knots during the approach.

(ii) Transfer to hovering flight at about 10 feet from the ground.

(iii) Steadily lower the collective pitch lever, maintaining 3,100 r.p.m., and descend vertically on to the ground. The landing should be made with the aircraft heading into wind. Care should be taken to avoid any sideways motion.

(iv) As soon as the wheels touch, decrease the collective pitch and close the throttle simultaneously, applying rudder to keep straight.

(v) A running landing may be made up to an approximate speed of 20 knots.

(vi) To go round again before landing, increase power as required and climb away at 40 knots.

53. **Running down and stopping the engine and rotor**

(i) Apply the parking brakes.

(ii) If the serviceability of the engine is in doubt, such items of the run-up as may be considered necessary should be checked.

(iii) With the collective pitch lever in its fully down position, idle the engine at approximately 1,500 r.p.m., and test the magnetos for a dead cut.

(iv) When the cylinder head temperature gauge shows a definite decrease in engine temperature, stop the engine by pulling the mixture control lever through to ICO.

(v) When the engine stops, turn the ignition switch off.

(vi) Turn the fuel off. Switch off all electrics.

(vii) The rotor may be slowed down by partially raising the collective pitch lever. On no account allow the main rotor to strike the mast.

PART IV
EMERGENCY HANDLING

54. **Engine failure**

(i) *Below 10 feet*

If the engine failure occurs below 10 feet, immediately apply collective pitch to provide cushioning effect before contact is made with the ground.

(ii) *Between 10 feet and 325 feet*

If the engine fails between 10 and 325 feet at an I.A.S. of below 30 knots, build up as much forward speed and main rotor r.p.m. as possible with the cyclic and collective pitch controls. Apply the controls as required so that the helicopter is in a level attitude at least 10 feet above the landing surface, at which altitude use collective pitch to ease the landing impact.

(iii) *Above 325 feet*

If the engine fails during flight above 325 feet, decrease collective pitch as necessary to maintain a main rotor speed of 330 r.p.m., and apply forward cyclic stick to obtain a glide speed of 40 knots. At approximately 75 feet above the ground, pull the cyclic stick steadily back; this reduces the rate of descent and increases the main rotor r.p.m. When 10-15 feet above the landing surface, level the helicopter with forward cyclic stick and then apply collective pitch, as necessary, to cushion the landing impact.

(iv) Immediately on making contact with the ground from an autorotative landing, reduce the collective pitch to the minimum.

55. **Engine fire in the air**

(i) Move the collective pitch lever to the fully down position, and close the throttle.

(ii) Move the mixture control to ICO.

(iii) Turn fuel off.

(iv) Turn ignition switch off.

(v) Switch battery master and all electrical switches off.

(vi) Carry out autorotative landing.

56. **Main gearbox failure**

(i) Decrease pitch to autorotative.

(ii) Stop engine.

57. **Tail rotor failure**

In the event of the failure of the tail rotor, its drive shaft, or any component part of the tail rotor system, proceed as follows:—

(i) Immediately reduce throttle to maintain directional control.

(ii) Maintain an I.A.S. of at least 40 knots.

(iii) Correct torque effect of main rotor by applying cyclic control slightly away from the direction in which helicopter tends to turn.

(iv) Make a normal autorotative landing into wind, and, if practical, on a straight flight path.

(v) When making an autorotative landing resulting from tail rotor failure, forward speed at the time of ground contact is desirable, provided landing surface is sufficiently smooth.

WARNING.—Never apply power during the actual landing operation.

58. **Cabin door jettisoning**

Either door may be jettisoned from inside by pulling up the jettison handle and pushing the door outwards. It

should be noted, however, that in autorotation there is the possibility of a jettisoned door striking the main rotor.

59. **Abandoning the aircraft**

(i) If conditions permit, set flight controls to maintain level flight.

(ii) Jettison nearest cabin door.

(iii) Release safety belt.

(iv) Dive out as far as possible to clear helicopter.

60. **Ditching**

(a) *With power*

(i) Descend to within 15 ft. of the water.

(ii) Turn all electrical switches off, except the ignition switch.

(iii) Maintain a level attitude and make a normal landing.

(iv) Immediately upon contact with the water, turn the ignition switch off.

(v) Stop rotation of rotor blades by rolling helicopter on its side far enough to allow rotor blades to strike the water.

(vi) Jettison door on highest side of cabin.

(vii) Release safety belt.

(viii) Climb out and clear helicopter immediately, as it will begin to submerge very quickly.

(b) *Without power*

(i) Turn all electrical switches and fuel off.

(ii) Maintain approximately 40 knots autorotative glide into wind.

(iii) Just before contact with the water, execute an abrupt flare, or levelling out.

(iv) Spill flare as required to obtain a tail-down attitude upon landing.

(v) Utilise all available collective pitch to ease landing impact.

(vi) As soon as tail contacts the water, bring helicopter to a level attitude.

(vii) Roll helicopter on its side, so that the main rotor blades will strike the water and stop the main rotor.

(viii) Jettison door on highest side of cabin.

(ix) Release safety belt.

(x) Climb out and clear helicopter immediately.

61. **Sprag clutch slip**

(i) On take-off or in early stages of the climb, sprag clutch slip may be experienced in unmodified clutches, the symptoms being sudden engine overspeeding and loss of rotor R.P.M. with a yaw to starboard.

(ii) If in a hover below 10 ft. close the throttle rapidly and land. In forward flight carry out normal autorotation.

(iii) The engine should be switched off and no attempt made to fly the aircraft until an examination of the clutch has been made.

Page 33
Para. 62
A.L.3

62. **Loss of cyclic control**

(i) In very turbulent conditions or when harsh movement of the cyclic control stick is made, it is possible for the rotor hub to foul the transmission shaft. The symptoms are severe vibration followed by a rolling and pitching movement of the aircraft. This is due to action of the gyroscopic forces. The possibility of hitting the shaft is increased if the aircraft is flown near or beyond the C.G. limits.

(ii) Recovery is almost immediate if the cyclic control stick is centralised and then held firmly in that position. Rotor r.p.m. should be maintained in order to keep maximum disc stability and no attempt to enter into autorotation should be made, as this may adversely effect stability.

Page 34
Para. 63
A.L.3

(iii) When Mod. 510 (9–12° rotor hub) is embodied, it is still possible for the rotor hub to foul the main shaft; severe vibration is the only symptom. Recovery action should be taken as in sub para. (ii) above.

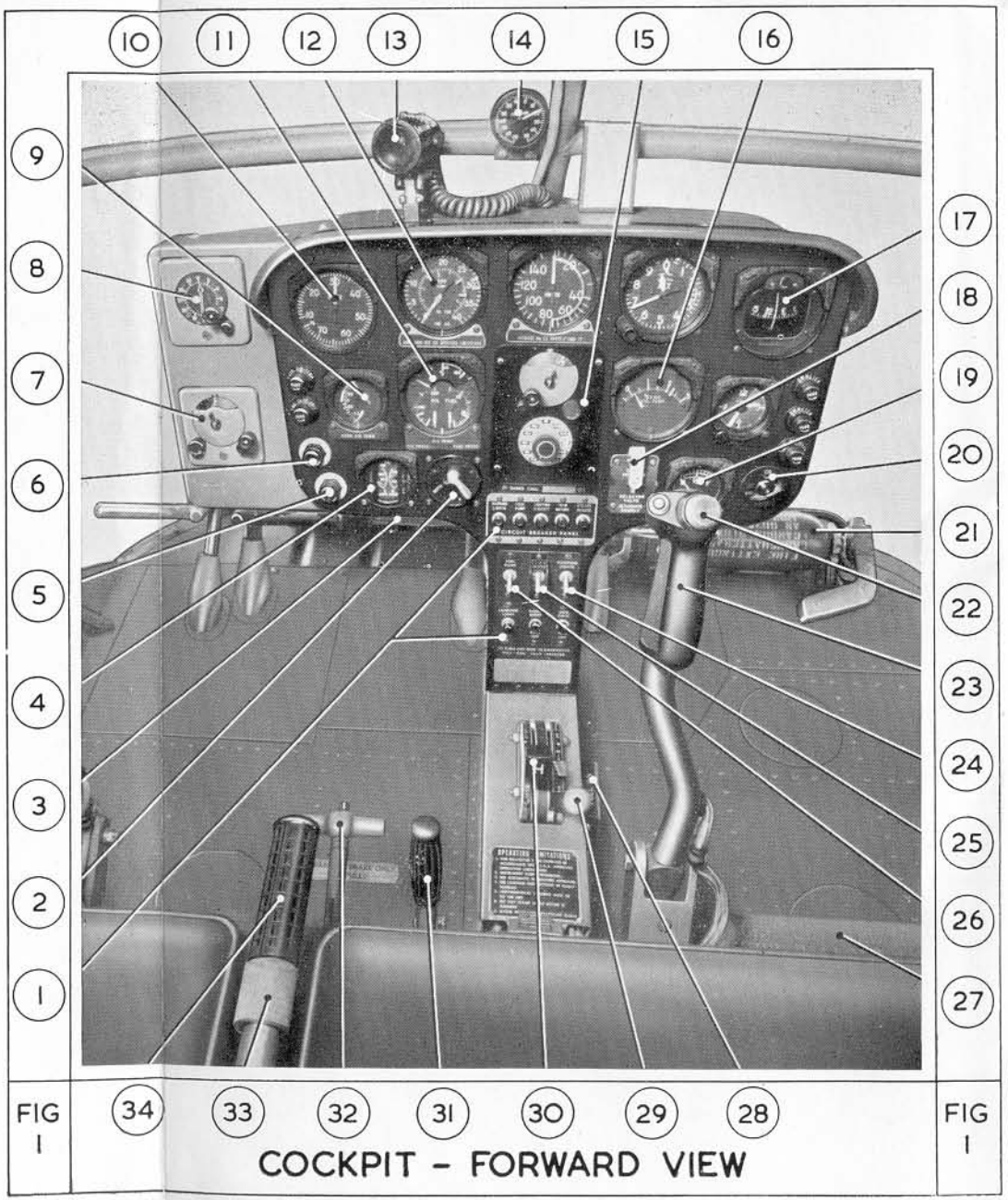
PART V

ILLUSTRATION

Figure 1 ... ... Cockpit—forward view

Key to Fig. 1—Cockpit forward view

1. Circuit breaker panel.
2. Ignition switches.
3. Rudder pedals.
4. Voltmeter—ammeter.
5. Generator failure warning light.
6. Transmission oil temperature warning light.
7. ARC Type 12 MF control panel.
8. Azimuth control for radio loop.
9. Carburettor air temperature gauge.
10. Manifold pressure gauge.
11. Combined oil temperature and pressure, and fuel pressure gauge.
12. Combined engine and rotor r.p.m. indicator.
13. Portable map light.
14. Free air temperature gauge.
15. ARC Type 12 VHF control panel.
16. Cylinder head temperature gauge.
17. Magnetic compass.
18. Static pressure selector valve switch.
19. Fuel contents gauge.
20. Instrument panel lights rheostat switch.
21. Fire-extinguisher.
22. Trimmer.
23. Cyclic pitch control column.
24. Navigation lights switch.
25. Battery master switch.
26. Auxiliary fuel pump switch.
27. Ballast.
28. Fuel cock control.
29. Mixture control.
30. Carburettor heat control.
31. Engine starter control.
32. Parking brake.
33. Throttle friction control.
34. Twist grip throttle and collective pitch lever.



ADMIRALTY
November, 1958

Amendment List No. 3
to A.P.4534A—P.N.
Pilot's Notes

HILLER H.T. MK. 1

NOTE.—1. This Amendment List also covers the following Special Flying Instruction and Modifications:—

(a) S.F.I. RN23/58

(b) Mod. 510 N.S.M3003

2. When a manuscript amendment is made, *endorse* the adjacent margin "A.L.3".

3. When the Amendment List is fully incorporated:—

(a) *Affix* this sheet to the inside front cover of the Notes.

(b) *Certify* its incorporation on Page 1 of the Notes.

PAGE	PARA.	AMENDMENT
4	List of Contents (FLYING CONTROLS)	*Insert* "Rotors 14". *Amend* "Flying controls 14" to read "14A".
5	List of Contents (EMERGENCY EQUIPMENT)	*Add* "First-aid kit 28A"
5	List of Contents	*Amend* para. 31A to read "Use of ballast"
6	List of Contents	*Amend* para. 62 to read "Loss of control", *delete* para. 63.
7	INTRODUCTION	*Amend* by slip herewith
7	1	*Amend* "24" to read "22.5"
9	6	*Amend* by slip herewith
10	12	*Amend* by slip herewith
11–12	—	*Amend* by two pages herewith
14	23	*Amend* by slip herewith
15	26 (ii)	*Amend* by slip herewith
16	27A (iv and v) and 28	*Amend* by slip herewith
17	—	*Amend* by page herewith
18	30 (v and vi)	*Amend* by slip herewith
20	—	*Amend* by page herewith
22	35 last line	*Amend* "45°C." to read "40°C".
22	36 (ii)	*Amend* "2,000" to read "2,700"
22	36 (iii)	*Amend* "3,000" to read "2,700"
25	42 (contd.)	*Amend* by slip herewith
33	62	*Amend* by slip herewith
34	63	*Amend* by slip herewith

FINAL CHECKS FOR TAKE-OFF

TRIMMERS	Neutral
THROTTLE & PITCH	Friction as desired
MIXTURE	Auto-rich
FUEL	Cock ON Check contents
BRAKES	Off

FINAL CHECKS FOR LANDING

BRAKES	Off
TRIMMERS	As required
MIXTURE	Auto-rich
FUEL	Check contents

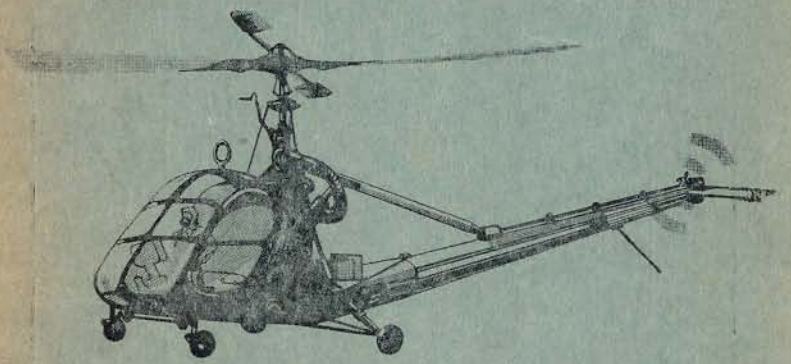
1st Edition
(Reprinted March, 1955)

A.P. 4534A.—P.N.

PILOT'S NOTES

HILLER H.T.

Mk. 1



Prepared by direction
of the
Minister of Supply

J. R. C. Helmore

Promulgated for
Information and guidance
of all concerned
by command of
Their Lordships

E. E. Long