



AUSTRALIAN
LINCOLN MK. 30

PILOT'S COCKPIT

ISSUED BY
ENGINEERING DEPARTMENT
TECHNICAL PUBLICATIONS SECTION

This Technical Folder is a general guide to the location of controls and equipment in the pilot's cockpit, and also gives a brief description of the operation and function of the controls and main services.

FUEL SYSTEM:—Six fuel tanks, numbered 1, 2 and 3, on each side outboard from the fuselage are fitted in the main plane. Two auxiliary fuel tanks can also be fitted in the bomb bay for long range flights, in place of the bomb load. These tanks are connected so that they may be used to refuel either of, or both, the No. 1 tanks, delivery being controlled by two cocks behind the front spar. The pump switches and test push-buttons are on the flight engineer's panel.

The capacities of the fuel tanks are:—

No. 1 tanks, port, one stb'd., each 580 gall.	1,160 gall.
No. 2 tanks, port, one stb'd., each 545 gall.	1,090 gall.
No. 3 tanks, port, one stb'd., each 300 gall.	600 gall.

Total fuel (normal)	2,850 gall.
Fuselage auxiliary tank No. 1	400 gall.
Fuselage auxiliary tank No. 2	400 gall.

Total fuel (overload)	3,600 gall.

The fuel systems in the port and starboard planes are identical and entirely independent but are inter-connected by a cross-feed pipe and cock. The cross-feed cock is mounted on the floor just forward of the front spar, with the control handle visible through the front spar cover. No tank selector cocks are fitted, all the tanks on each side feeding into the fuel distributor tank (ground servicing cocks only are provided in the delivery lines). Master Engine fuel cocks, control the fuel supply to each engine, the pilot operating the four cocks from levers on either side of the control pedestal.

Two distributor tanks, one on the firewall of each inboard engine, are fed by gravity, from the main tanks. Fuel may be drawn from the distributor tanks by the engine pumps, or delivered to the engines under pressure by the Pulsometer electric pumps, which are mounted in the base of the distributor tanks.

The Pulsometer electric fuel pumps are controlled by switches on the flight engineer's panel. Push-buttons, mounted below the switches, are used for testing the pumps in conjunction with the ammeter on the panel. The switches should remain OFF during testing. The main purpose of the electric fuel pumps is to maintain pressure at altitude. The Pulsometer pumps must also be switched "ON" for take-off and landing, to prevent air being drawn into another engine, should one on the same side fail. The pumps on the delivery side must be ON when the cross-feed cock is opened to supply all the engines from one side. The following label appears on the flight-engineer's panel:—

"BOOSTER PUMPS MUST NEVER BE ON WITH THE MASTER ENGINE COCK OPEN AND ENGINE STATIONARY UNLESS SLOW-RUNNING CUT-OUT SWITCH IS IN IDLE CUT-OFF (DOWN) POSITION AND AIR SUPPLY NOT LESS THAN + 160 LBS. ON THE GAUGE."

NITROGEN SYSTEM:—Nitrogen is introduced into the tanks as the fuel is withdrawn, to minimise fire risk. The control cock is on the starboard side of the fuselage, approximately midway between the front and rear spars.

OIL SYSTEM:—Each engine has its own oil system, provided by a separate tank in each nacelle, containing 37½ gallons of oil and space for 4½ gallons of air. Two gallons of oil for the hydromatic propeller feathering unit are included in that 37½ gallons; the propeller feathering pump is fed from the base of the oil tank. Oil pressure gauges are mounted on the pilot's instrument board, but the oil temperature gauges are on the flight engineer's panel.

HYDRAULIC SYSTEM:—The general hydraulic system derives its power from two pumps, one on each inboard power plant auxiliaries gearbox and feeds the following services: Main undercarriage, flaps, bomb doors, and fuel jettison. Provision is made for emergency operation by compressed air of the first two circuits.

EMERGENCY AIR SYSTEM:—

(1) **Undercarriage emergency operation.**—If the hydraulic system fails the undercarriage can be lowered by compressed air from two special bottles, irrespective of the position of the undercarriage selector lever.

NOTE:—The flap selector must be in the neutral position before using the undercarriage emergency air system.

The control of the emergency air system is just forward of the flight engineer's panel. The undercarriage cannot be raised again by this method. Although the undercarriage will lower by this method, irrespective of the position of the undercarriage selector lever, except when the undercarriage selector cannot be moved through mechanical defect, the lever must be set to **DOWN** for landing before operating the emergency air system, and left in the **DOWN** position after landing; otherwise any leakage of air pressure might cause the undercarriage locks to be released and the undercarriage to collapse.

(2) **Flaps emergency operation.**—After lowering the undercarriage by turning on the emergency air control, the flaps may be lowered by means of the normal flap selector, which then admits the air pressure to the flaps system. The flaps can be raised again, but there may not be sufficient air pressure to lower them a second time; furthermore, raising the flaps may cause the header tank to burst. If it is absolutely necessary to raise the flaps by the emergency method, extreme care must be taken to raise them slowly by stages. When the flaps have been lowered by the emergency method, the selector lever must be left in the down position after landing.

PNEUMATIC SYSTEM:—This system operates: Wheel brakes, radiator shutters, supercharger change speed, slow-running cut-outs, hot and cold air intakes, and the air cleaner. A Heywood compressor is fitted on the starboard inboard auxiliaries gearbox and charges an air bottle, mounted in the roof of the fuselage nose. The wheel brakes are controlled by a lever (with a parking catch) on the handwheel. Differential control is provided by the rudder pedals and a triple pressure gauge is fitted on the left hand side of the instrument panel. A pressure maintaining valve in the supply line, from the air bottle, allows pressure to be supplied to the power plant services only if the pressure in the air bottle is at least 160 lb. per sq. in.—this is to ensure sufficient pressure for the brakes. Before attempting to operate the power plant services, therefore, it is necessary to check on the triple pressure gauge that the pressure in the air bottle is at least 160 lb. per sq. in.

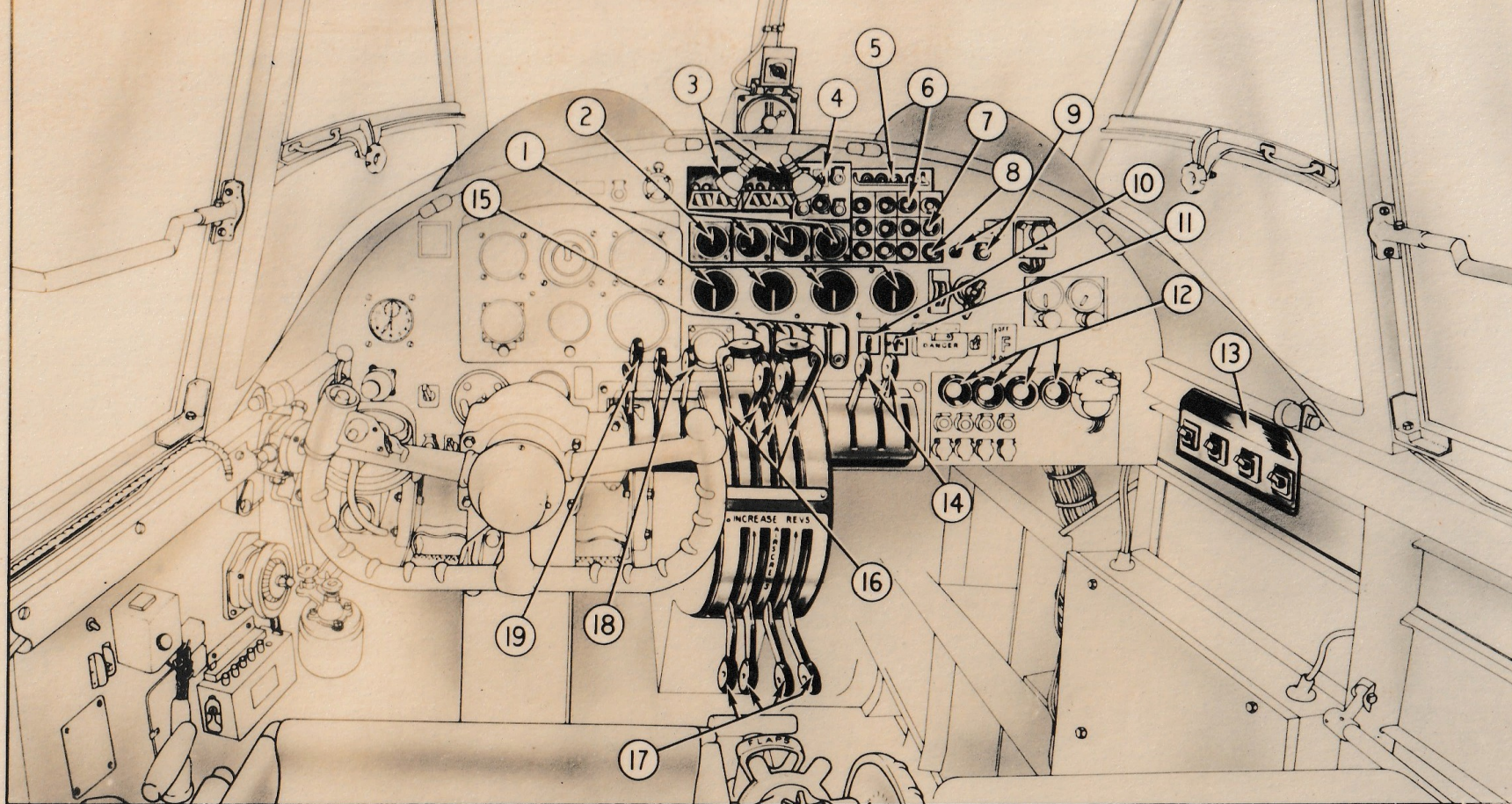
ELECTRICAL SYSTEM:—A 24-volt, 6 kw. generator is fitted on each engine auxiliaries gearbox. As the generators are connected in parallel the failure of any one does not involve the failure of any particular service. A voltmeter, four "push-to-break" switches (for testing), four generator switches and one emergency master switch are mounted on a panel, on the starboard side, forward of the front spar. The cut-outs, voltage regulators and circuit breakers are on two panels on the port and starboard sides of the fuselage, respectively, between the spars. The external supply socket is on the starboard side, above the rear end of the bomb door and the Ground/Flight switch is mounted on panel 3P. Current for the radio installation is supplied by two 2,000 watts type 4, motor driven alternators.

VACUUM SYSTEM:—Three suction pumps are fitted, two connected to one pipe line on the auxiliaries gearbox, driven by the port inboard engine and one on the auxiliaries gearbox driven by the starboard inboard engine. The two supply lines are controlled by a vacuum change-over cock, situated on the right side of the instrument panel. At **NORMAL**, the single pump is connected to the instrument panel and the two pumps to the Mk. XIV bombsight and computer, with a branch to other special equipment when fitted. At **EMERGENCY** these connections are reversed. The vacuum gauge is connected to the pipe line from the instrument-flying panel.

OXYGEN SYSTEM:—The pilot's flexible oxygen pipe is secured by spring clips to the port cockpit rail. The economiser is located below the rear end of the pilot's floor, together with the second pilot's economiser. A regulator, which controls the supply throughout the aircraft, is fitted on the right of the instrument panel. A portable oxygen bottle for the pilot is mounted on the back of the seat.

April, 1946.

(Illustrations are for reference only and in no way are meant to take the place of official drawings).



ENGINE CONTROLS AND INSTRUMENTS

Starting, running and stopping

Engine speed indicators (4)	1
Boost gauges (4)	2
Ignition switches (8)	3

Two sets of 4, switches of each set operate independently, or in unison by using bridge plate.

Supercharger M.S.-AUTO switch, warning lamps (4) and test push-button

Electro-pneumatically controlled not operative if air pressure is below 160 lb. per sq. in. Switch up—M.S.

Switch down—AUTO (F.S. gear automatically engaged by altitude switch at pre-determined height)

Warning lamp—red when F.S. gear engaged.

Test push-button—press to short altitude switch for ground testing.

Slow-running cut-off switches (4) protected by guard rail

Not operative if air pressure is below 160 lb. per sq. in. Switch down—IDLE CUT-OFF—for starting, stopping and parking.

Switch up—ENGINE ON—when engines running smoothly.

Fuel

Engine priming push-buttons (4)	8
Carburetors primed by switching on electric fuel pumps.	

Priming master switch and warning lamp

Master fuel cocks, starboard (2)	14
Lever up—ON.	
Lever down—OFF.	

Master fuel cocks, port (2)	18
Lever up—ON.	
Lever down—OFF.	

Starting push-buttons (4)

Booster coil push-buttons (4)	7
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Oil pressure gauges (4)	15
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Throttle control levers (4)

Stop provided in each gate, full movement gives maximum boost.

Friction adjuster on R.H. side of quadrant.

Boost cut-out control	19
Inoperative on Lincoln Mk. 30 aircraft.	

Propellers

Feathering push-buttons (4)	12
Propeller control levers (4)	17

Levers up—INCREASE REVS.

Levers down—DECREASE REVS.

Friction adjuster on L.H. side of quadrant.

Miscellaneous

Air cleaner switch	10
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Not operative if air pressure is below 160 lb. per sq. in. Not operative unless undercarriage retracted. Switch up—Cleaners held "in" by spring-return pneumatic jacks. Switch down—Cleaners pushed "out".

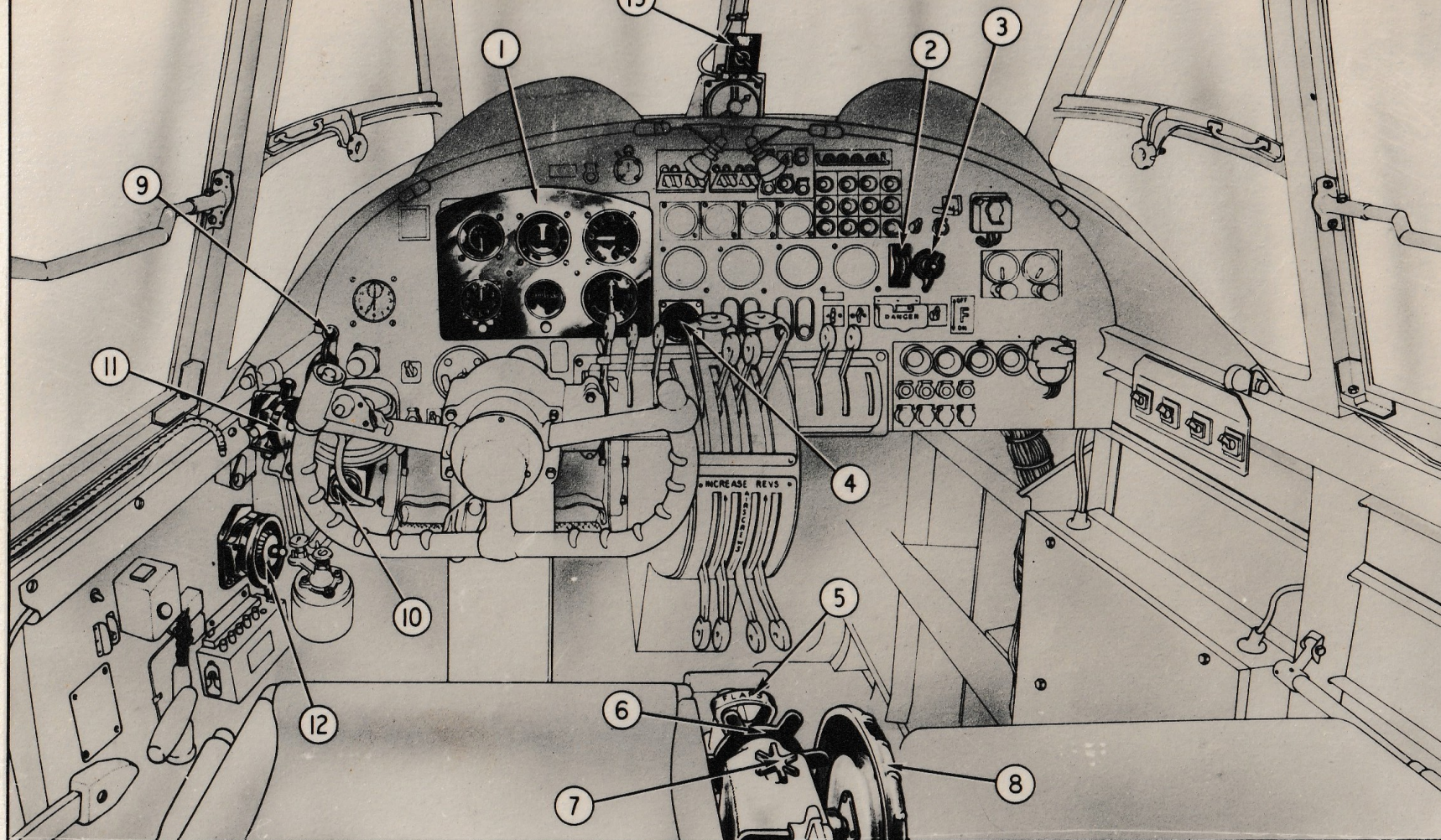
Hot and cold air-intake switch

Not operative if air pressure is below 160 lb. per sq. in. Electro-pneumatically controlled.

Radiator shutter control over-ride switches (4)

Switches up—AUTOMATIC—for starting engines and for take-off.

Switches down—OPEN—for taxiing only. Not operative if air pressure is below 160 lb. per sq. in.



FLYING CONTROLS AND INSTRUMENTS

Flying controls

- Aileron trimming tab control handwheel** 6
Operate in natural sense. Nearby indicator shows tab position.
- Rudder trimming tab control handwheel** 7
Operate in natural sense. Nearby indicator shows tab position.
- Elevator trimming tab control handwheel** 8
Operate in natural sense. Nearby indicator shows tab position.

Automatic pilot, Mk. VIII

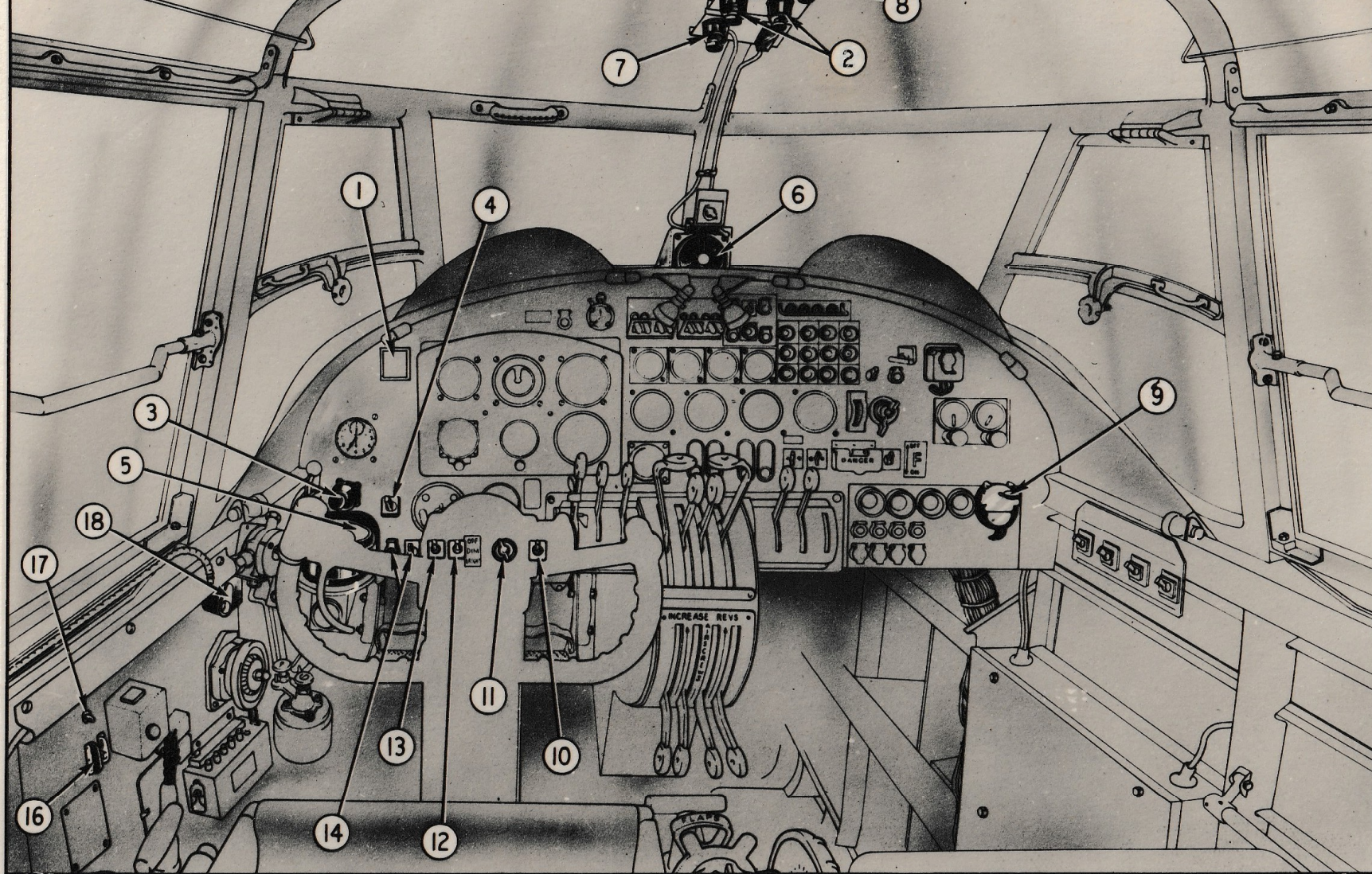
- Clutch lever** 9
- Air pressure and trim gauge** 10
- Cock** 11
A stop prevents movement of cock control to OUT—with this installation gyro unit is always on.
- Azimuth control** 12
- Selector switch** 13
Lever to left—JINK.
Lever vertical—OFF.
Lever to right—COURSE.

Flaps

- Flaps position indicator** 4
- Flaps control handle** 5
Operate in natural sense. A spring-loaded catch indicates neutral position, to which handle must be returned as soon as position indicator shows desired setting. No indicator switch.

Miscellaneous

- Instrument-flying panel** 1
- Suction gauge** 2
- Vacuum change-over switch** 3
NORMAL—Single pump connected to instrument-flying panel, other two pumps to bomb sight and computer, with branch to special equipment when fitted.
EMERGENCY—Connections reversed.



NAVIGATIONAL, SIGNALLING AND LIGHTING EQUIPMENT

Navigational

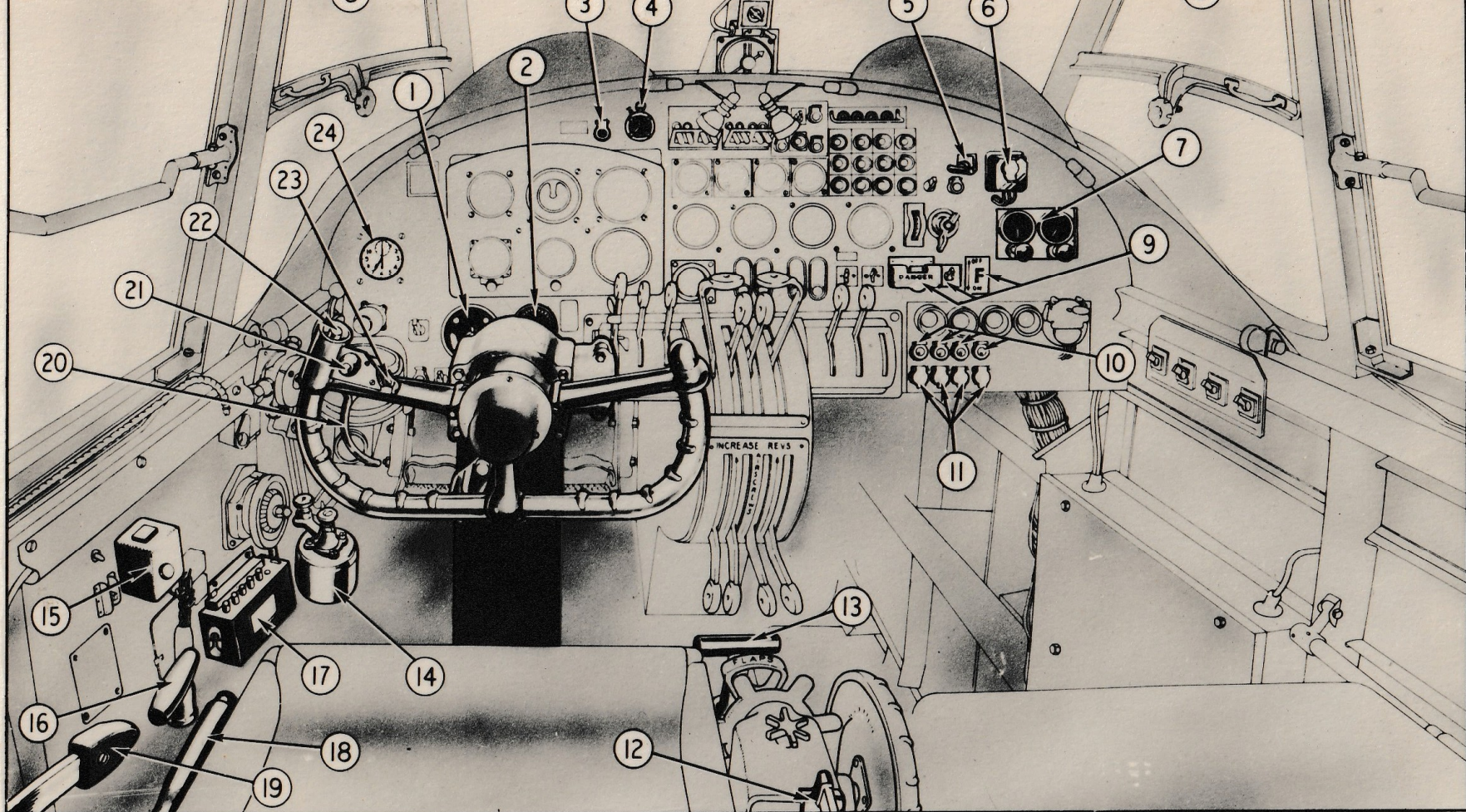
A.S.I. correction card holder	1
Magnetic compass lamp switch	3
Magnetic compass	5
D.R. compass repeater	6
Navigation lamps switch	12
Up—OFF. Middle—DIM. Down—BRIGHT.	
Master switch (14) must be ON.	
Isolation switch for navigator's telephone	17

Signalling

Downward identification lamp colour selection switch	4
Up—RED Middle—GREEN. Down—AMBER.	
Signalling switchbox	9
R.H. switch not connected.	
Resin lamps OFF-ON switch	13
Master switch (14) must be ON. Colour selection switch on panel on starboard side forward of front spar.	
Distress switch	16
Call lamp and push-button	18

Lighting

U.V. Lighting, switches	2
Repeater compass lamp switch	7
Cockpit floodlight switches (2)	8
Glider tow tail lamp switch	10
Landing lamps switch	11
Left—Lamps OFF and retracted.	
Vertical—LOW. Lamps on and beam dipped.	
Right—HIGH. Normal beam.	
Master switch (14) must be ON.	
External lamps warning lamp and master switch	14
Operation of master switch to OFF extinguishes all external lights.	



OPERATIONAL AND MISCELLANEOUS CONTROLS AND INSTRUMENTS

Operational

- Camera warning lamp 3
- Glider release handle 13
- Bomb door lever 19

Lever up—doors closed.

Lever down—doors open. Bomb release system in-operative until doors partly open.

To open bomb doors by hand pump for bombing up requires fifteen minutes strenuous pumping and it is recommended that doors are opened by pilot before switching off engines.

- Bomb release button 22

Operation releases single bombs or sticks of bombs fuzed and selected by air bomber.

Alighting gear

- Alighting gear position indicator 1

Indicator becomes operative when GROUND FLIGHT switch turned to FLIGHT.

Two green lights—locked DOWN. Two red lights—unlocked. No light—locked UP. A warning horn

- Alighting gear control lever 12

Operate in natural sense. Spring-loaded safety bolt must be held out while lever raised; re-engagement automatic when lever pushed down.

Brakes

- Brakes lever 20
- Brakes lever parking catch 23

Emergency

- Bomb jettison handle 5

To jettison bombs, pull handle.

- Containers jettison push-button (shielded) 6

Jettison containers before jettisoning bombs

- Destructor OFF-ON switch and push-buttons (buttons shielded) 9

- Fire extinguisher push-buttons (4) (shielded) 11

- Fuel jettison handle 16

Miscellaneous

- Triple air-pressure gauge 2

- Watch holder 4

- Oxygen flow and contents gauges 7

- Direct-vision windows 8

To open, rotate knob counter-clockwise, and pull down; pull handle inwards.

- Windscreen de-icing pump 14

- Volume controller 15

- Transmitter-receiver controller 17

- Seat-adjusting lever 18

- Press to transmit push-button 21