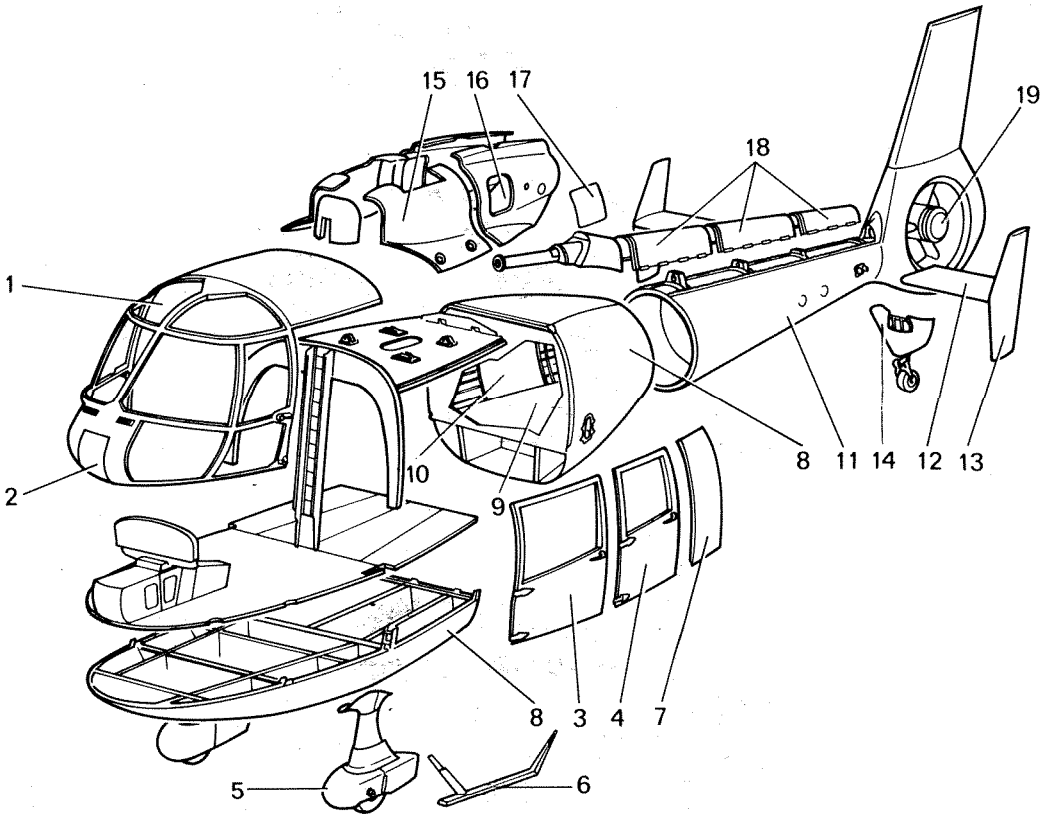
FUSELAGE

The SA 360 C is a helicopter of semi-monocoque metal construction, comprising frames, stringers and light alloy skin. Certain elements such as removable panels and cowlings are made of glass laminate, especially the main gearbox and engine ones.

The fuselage comprises :

- the canopy
- the cabin
- the bottom and body structure
- the tail-boom
- the cowlings

All the fuselage elements are anti-corrosion treated and the outside paint (polyurethane) of the fuselage is selected by the customer from a standard range (paint-scheme and colours).



1 - Canopy
2 - Battery access hatch
3 - Front doors
4 - Rear doors
5 - Main landing-gear fairings
6 - Footsteps
7 - Fixed panel (on left)
Door extension (on right)
8 - Bottom and body structure
9 - Luggage hold
10 - Luggage hold door
11 - Tail boom
12 - Stabilizer
13 - Side fins
14 - Tail wheel fairing
15 - MGB cowls
16 - Power-plant cowls
17 - Engine air-intake mufflers
18 - Tail drive cowls
19 - Tail gearbox cowlings

CANOPY

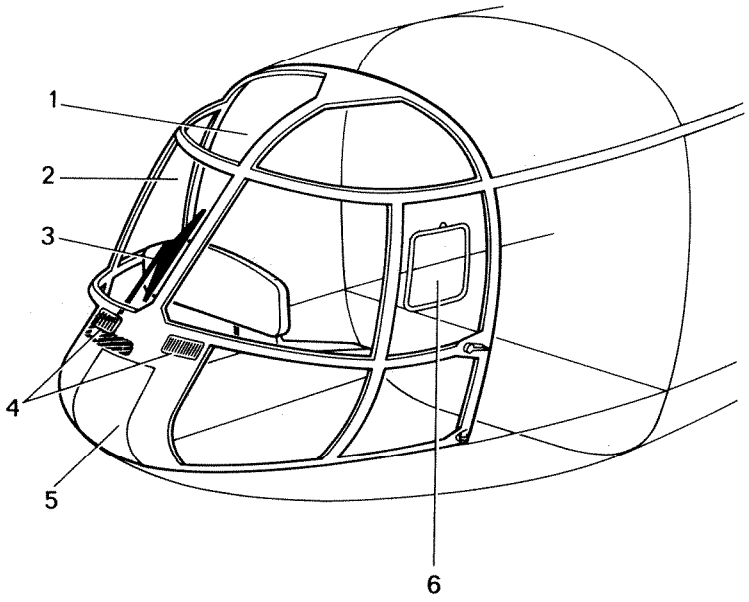
The canopy is formed of a metal frame-work of welded tubes carrying wide perspex panels held in place by covering strips. It is fitted with a demisting system and the front panel, pilot's side, has a two-speed wiper.

A bad weather window is provided in each of the upper side panels.

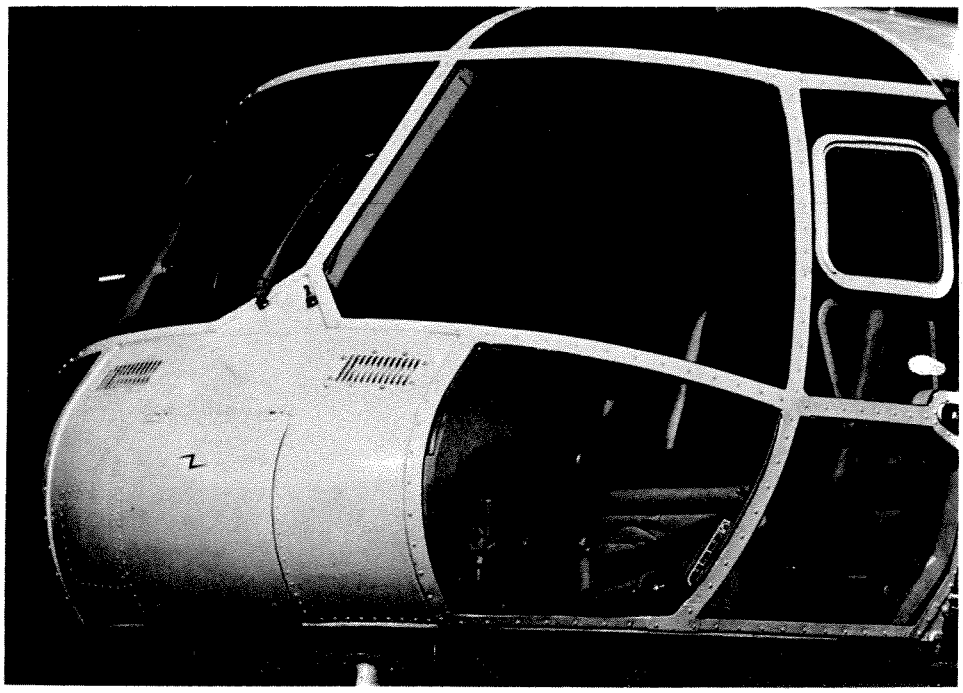
The canopy-nose is endowed with an access-door to the battery-compartment and two ventilation-grids.

The whole canopy is secured to the bottom structure and fastened to the main frame of the body structure by a laminate panel, thus forming the front part of the cabin ceiling.

The canopy has been made to take on option heating panes and a second windshield wiper.



1 - Tinted upper perspex panels
2 - Front perspex panels
3 - Wiper
4 - Ventilation-grids
5 - Battery access door
6 - Bad-weather windows

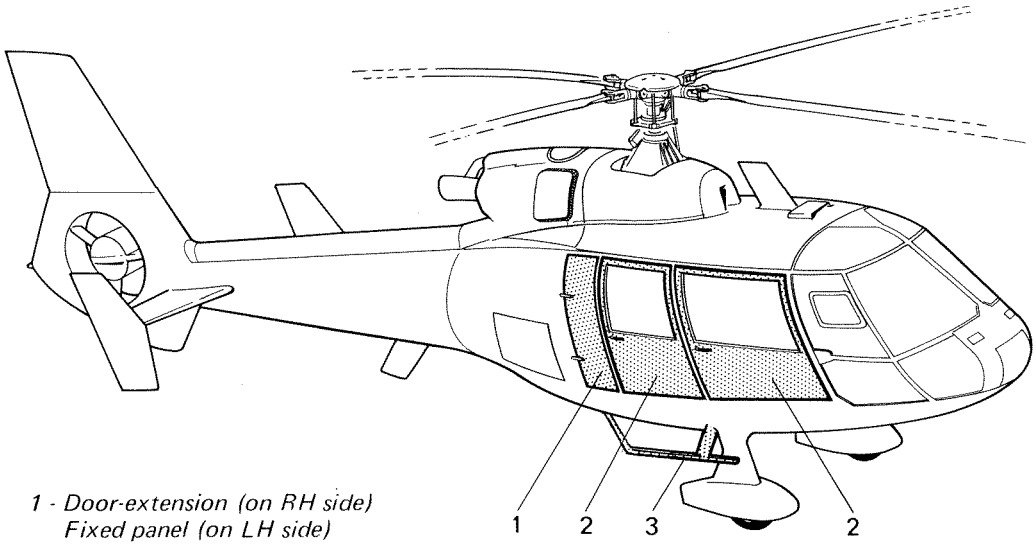


CABIN

Of simple shape and protuberance-free, the cabin is made up, at the front, of the cockpit and, at the rear, of a substantial volume available for passenger or freight carrying. The inside is painted light grey.

Cabin Access

Four jettisonable doors whose upper sections are glazed provide access to the cabin.
A door-extension at the RH rear part of the cabin, makes for easy loading.
A footstep is fixed to each side of the aircraft.

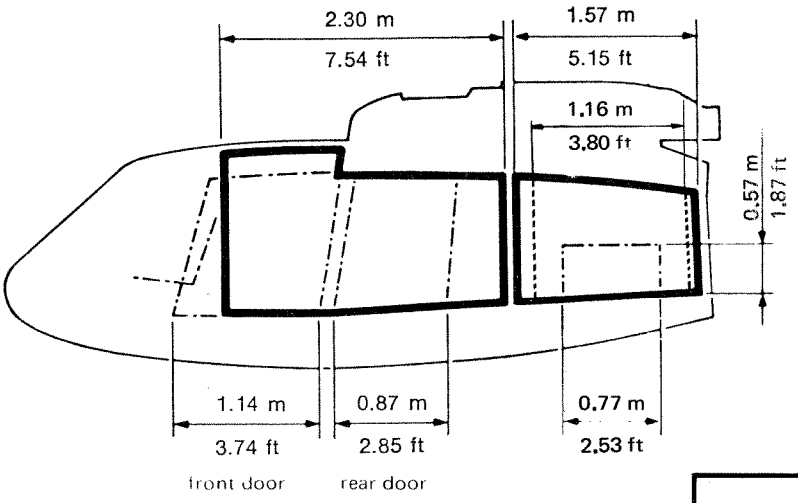


1 - Door-extension (on RH side)
Fixed panel (on LH side)

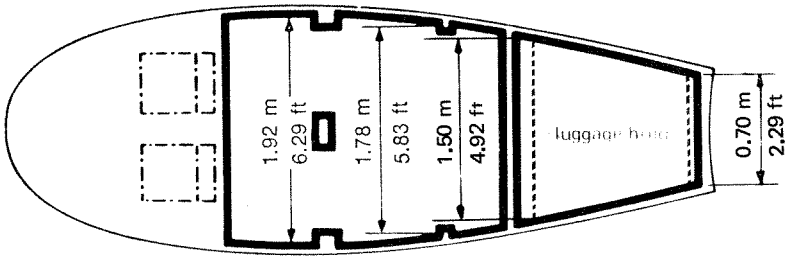
2 - Doors

3 - Footsteps

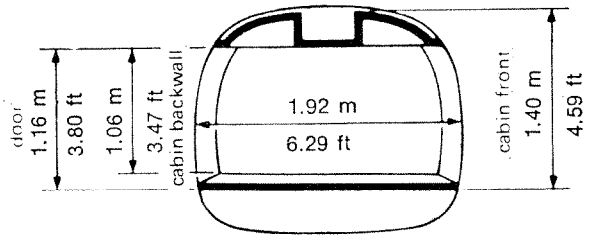
DIMENSIONS OF ACCESSES AND COMPARTMENTS



CABIN	
Area	4.20 m^2 45.20 sq.ft.
Volume	5.00 m^3 176.57 cu.ft.

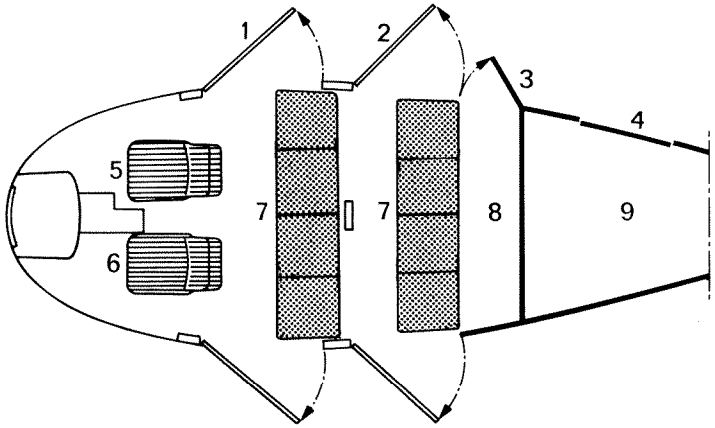


HOLD	
Area	1.15 m^2 12.37 sq.ft.
Volume	1.00 m^3 35.31 cu.ft.



Lay-out

The cabin is fitted with 2 bucket-seats at the front for the pilot on the RH side and for a passenger or copilot on the LH side, and with 4 identical 2 place bench-seats in two rows.



1 - Access to the cockpit and front seats
2 - Access to the rear seats
3 - Access to rear of the cabin
4 - Luggage hold door
5 - Pilot's seat
6 - Passenger's or copilot's seat
7 - Passenger seats
8 - Free space for cabin
9 - Luggage hold

The two front seats are made of moulded fibreglass laminate with blue covers. They are adjustable fore-and-aft over 120 mm (0.39 ft).

The bench-seats are formed of material, in dark blue, stretched over a welded tube frame and can be easily removed and folded.

Each seat has a safety-belt.

A volume of 0.75 cu.metres approximately (26.50 cu.ft) is available between the last row of seats and the rear bulkhead for stowing hand luggage or sundry equipment.

Six ash-trays are provided in the cabin : one on each side of the radio console and one on each of the doors.

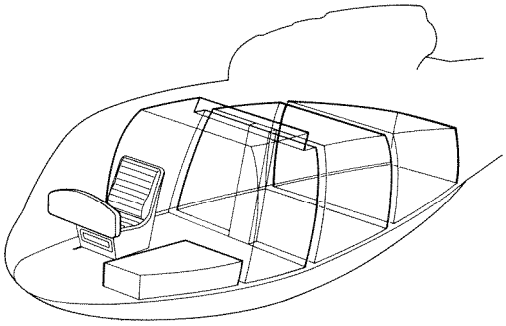
Two map cases, one on each side, are fixed to the canopy at floor level within reach of the pilot and copilot (or front passenger)

Cabin floor

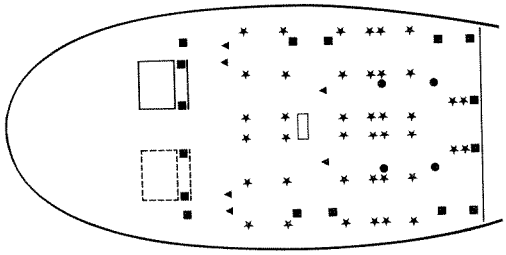
The cabin can be easily converted for the carrying of internal loads. A floor area of 4.2 m² (45.20 sq.ft) is available once the passenger seats are removed. If need be, the latter can be folded away and stored in the luggage hold.

The cabin floor can support a distributed load of 610 daN/m² (125 lb/sq.ft). It iis fitted with 12 flush-mounted tie-down rings designed for a maximum load of 1500 daN (3310 lb).

The floor also has the fixtures required for various types of optional layouts.



VOLUME AVAILABLE FOR FREIGHT CARRYING

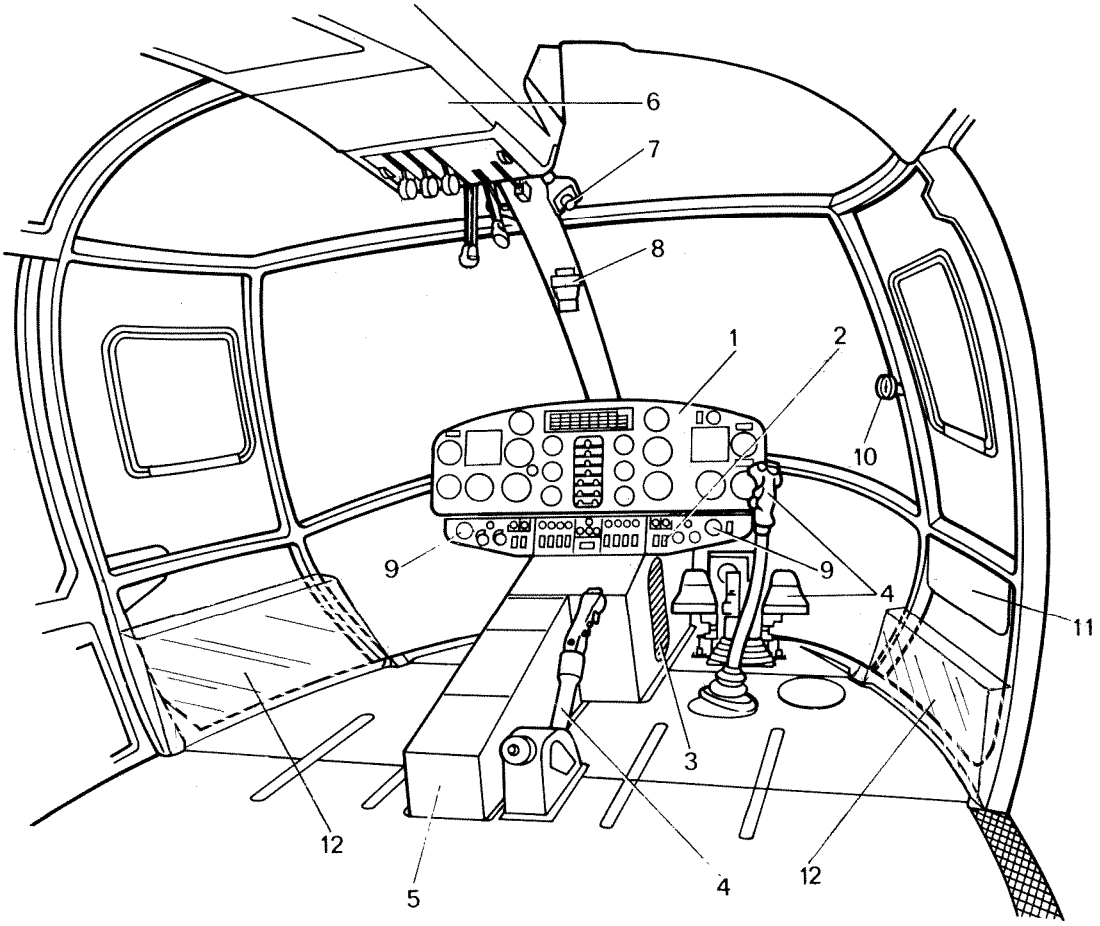


- ▲ *Tie-down rings for stretcher fixture*
- ● *Fixture for ferry-tank*
- ■ *Tie-down rings*
- ★ *Seat attachments*

Cockpit

The cockpit comprises :

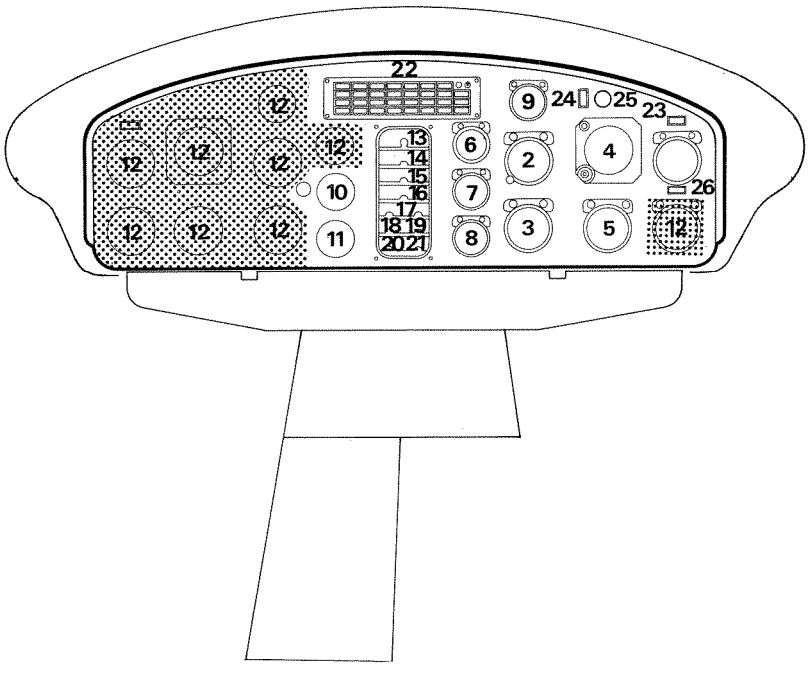
- 1 instrument-panel (1)
- 1 electrical control panel (2)
- 2 circuit-breaker panels (3)
- flight-controls (single) (4)
- 1 radio-console (5)
- 1 control quadrant (6)
- 2 ventilation-inlets (in the ceiling) (7)
- 1 stand-by compass (8)
- 2 ventilation-inlets (on instrument-panel) (9)
- 1 OAT thermometer (10)
- 1 folding console (pilot's side) (11)
- 2 map cases (12)



Instrument Panel

The instruments required for flight and navigation, together with the monitoring equipment and visual warning-lights, are grouped on the instrument-panel.

The shrouded instrument-panel with a visor is anti-vibration mounted on the upper part of the console. It is hinged at its two attachment-fittings and can be tilted forwards to facilitate servicing operations.



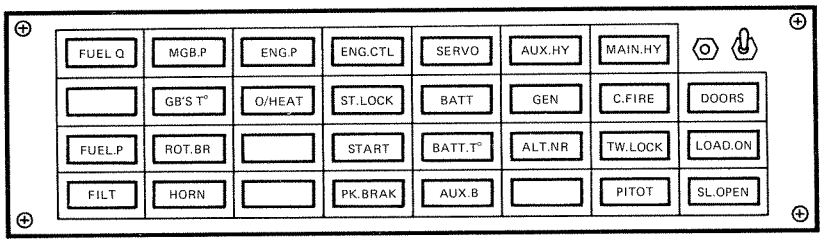
Optional equipment

The flight and navigation-instruments include :

- 1 airspeed indicator (1)
- 1 altimeter (2)
- 1 rate-of-climb indicator (3)
- 1 gyro-horizon (4)
- 1 RMI (linked to a gyro compass in the hold) (5)
- 1 torquemeter/thermal load indicator (6)
- 1 power-computer (7)
- 1 dual tachometer (rotor, turbine-engine) (8)
- 1 bank indicator (9)
- 1 fuel gauge with test push-button (10)
- 1 stopwatch (11)
- Free space for optional equipment (copilot's kit, aux. tank gauge, VOR-ILS, radio-altimeter, etc.) (12)
- 1 magnetic compass (fixed to the central upright of the canopy)
- 1 OAT indicator (mounted on the canopy)

The flight instruments are complemented by monitoring equipment comprising :

- 1 tail-pipe temperature indicator (T4) (13)
- 1 engine-oil temperature indicator (14)
- 1 engine-oil pressure indicator (15)
- 1 fuel-pressure indicator (16)
- 2 hydraulic-pressure indicators (17)
- 1 MGB oil-pressure indicator (18)
- 1 MGB oil-temperature indicator (19)
- 1 voltmeter (20)
- 1 ammeter (21)
- 1 warning panel (22)
- 1 master warning light (23)
- 1 engine fire warning light (24)
- 1 extinguishing control (25)
- 1 manœuvring limit warning-light (26)



DETAIL OF THE WARNING PANEL

The warning panel, in the middle of the instrument panel, contains red, amber, green and blue lights which advise the pilot as follows :

♦ **red warning-lights :** a failure liable to affect the operation of a system and calling for immediate action :

- overstepping of the lower limit of the usable fuel quantity (less than 17 litres = 4.5 US. gal) — FUEL Q
- oil-pressure drop in the MGB — MGB.P
- oil-pressure drop in the engine — ENG.P
- operation of the fuel flow limiter or fuel flow lever not pushed completely — ENG.CTL
- abnormal effort in the servo-controls — SERVO
- pressure-drop in the auxiliary hydraulic system — AUX.HY
- pressure-drop in the main hydraulic system — MAIN.HY
- abnormal increase in the battery temperature — BATT.T°

♦ **amber warning-lights :** an abnormality not calling for immediate action :

- overheating of the hot parts of the engine — O/HEAT
- fire in the luggage hold — CARG.FIRE
- faulty locking of one or several doors — DOORS
- pressure-drop in the fuel system — FUEL.P
- fuel filter clogging — FILT
- abnormal increase in the MGB or TGB oil temperature — GB'S T°
- locking of the rotor brake — ROT.BR
- rotor rpm aural alarm inoperative — HORN
- jamming of the start-up sequence — ST.LOCK
- parking brake applied — PK.BRAK
- no battery charge — BATT
- cut-out of the auxiliary bus bar — AUX.B
- failure in the DC generating-system — GEN
- supply-failure in AC network — ALT.NR
- pitot-head supply-failure — PITOT
- unlocking of the tail wheel — TW.LOCK

♦ **green warning-lights :** the correct operation of the following equipment :

- starter (or ventilation) drive — START
- opening of the cargo-sling hook (if applicable) — SL.OPEN

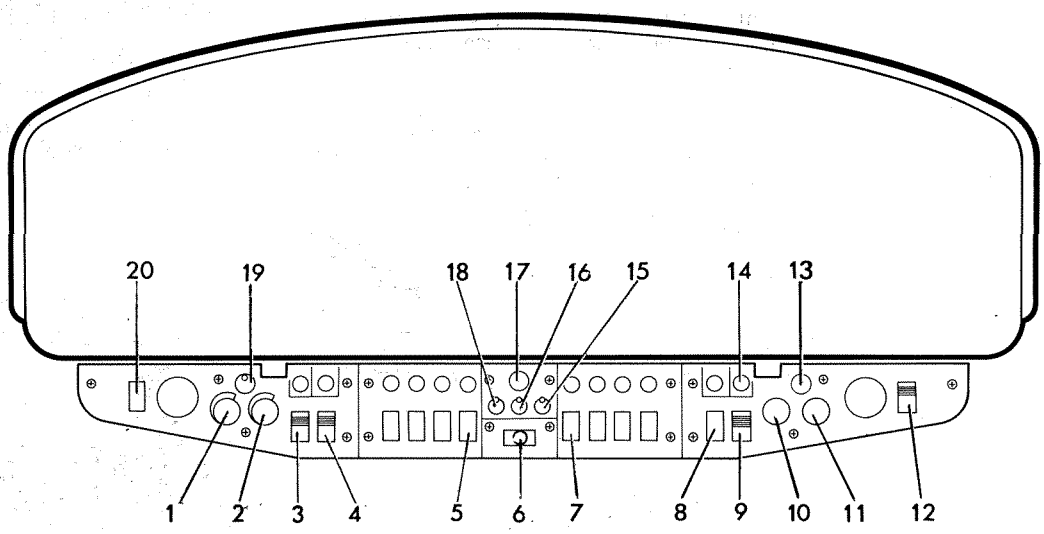
♦ **blue warning-light :**

- hook-up of cargo-slung load (if applicable) — LOAD.ON

The master warning-light « ALARM » in front of the pilot on the extreme RH of the panel flashes when any one of the red warning-lights comes on. Applying pressure to the master warning-light makes it possible, if need be, to extinguish it thus making it available for another possible failure. The warning-light on the alarm-panel remains «on» as long as the failure lasts.

Electrical control panel

This panel placed under the instrument one is attached to the console and carries the following controls and switches :



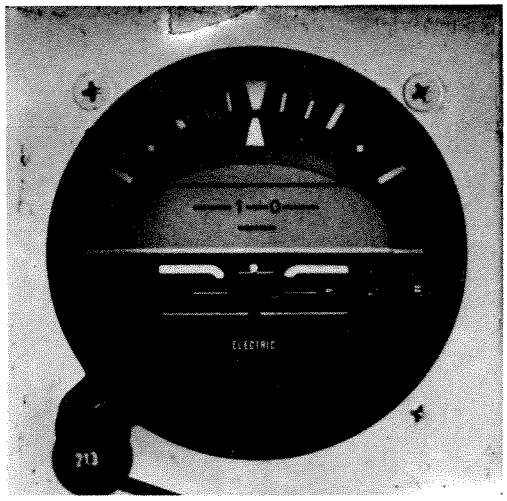
- 1 radio console lighting rheostat (1)
- 1 instrument-panel and electrical control panel lighting rheostat (2)
- 1 anti-collision light switch (3)
- 1 position-light switch (4)
- 1 windscreen-wiper switch (5)
- 1 engine «Start-Stop-Ventilation» selector switch (6)
- 1 double switch for the two booster-pumps (7)
- 1 tail-wheel castor-lock switch (8)
- 1 aural alarm switch (9)
- 1 hoist/cargo-sling mission selector (10)
- 1 voltmeter/ammeter selector (11)
- 1 pitot head heating switch (12)
- 1 gyro-compass resetting push-button (13)
- 1 SERVO alarm re-arming switch (14)
- 1 generator-switch with button for resetting over-voltage protection system (15)
- 1 battery switch (16)
- 1 electrical power emergency master switch (17)
- 1 alternator switch, with rearming button in case of tripping of protection system (18)
- 1 instrument panel, electrical control panel and console (radio) lighting switch (19)
- 1 cabin dome-light and luminous sign double switch (20)

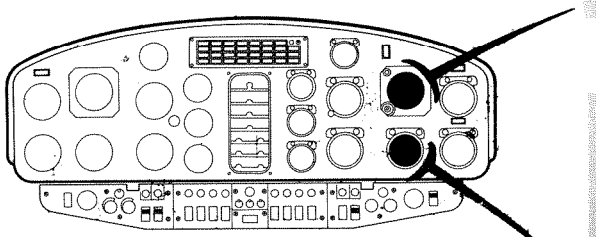
Various indicators, controls and warning lights associated with items of optional equipment may be installed on the instrument panel and console and cause the equipment described above to the relocated.

Gyro Instruments

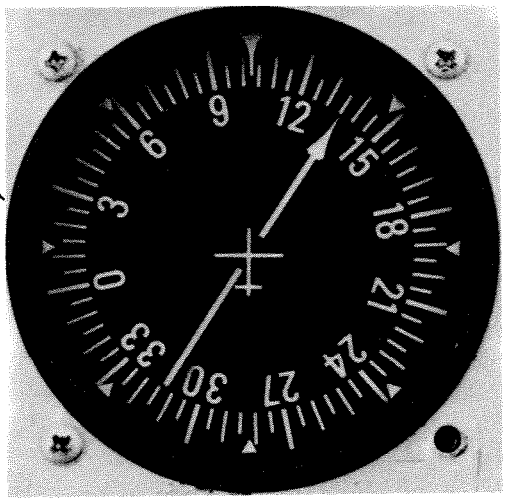
The ARC 113 B (or ARC 213 B) gyro horizon supplies the pilot with an attitude reference through a built-in gyroscope with two degrees of freedom (roll-pitch). The helicopter's bank angle is shown by an index located of the top of the dial.

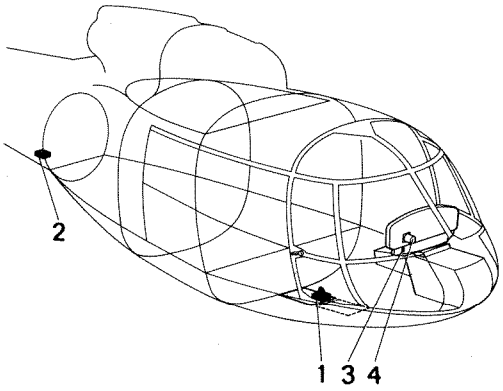
This equipment is complemented by a failure warning device (flag).





The radio magnetic indicator (RMI) shows the magnetic heading of the aircraft, as supplied by the CG 130, on a compass card with 5-degree graduations, and, when the aircraft is fitted with the appropriate optimal equipment, the bearing of VOR or ADF stations through a pointer.

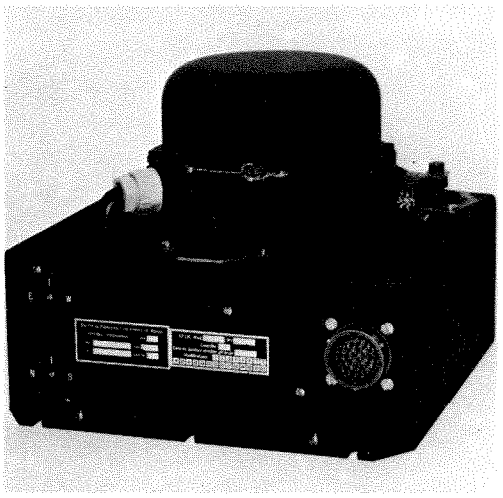




1 - Gyro-magnetic compass
2 - Flux valve
3 - Quick-resetting button
4 - RMI

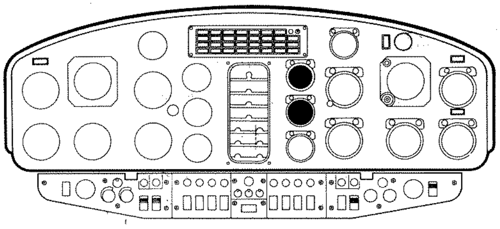
The SFIM CG 130 gyro-magnetic compass, with quick initial setting, gives magnetic heading information stabilized by a gyroscope with two degrees of freedom.

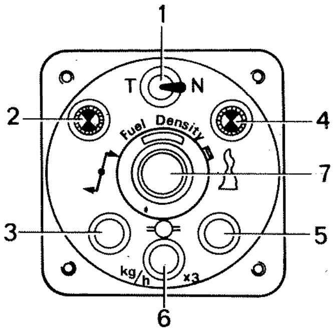
This instrument is a «hold-mounted» compass and therefore, requires an indicator on the instrument panel for displaying the heading information.

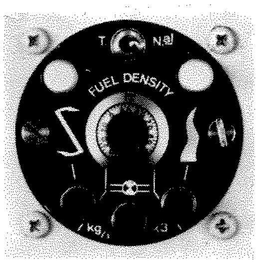


Power computer

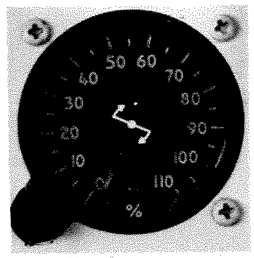
The power computer shows permanently either the transmission limitation or the turbine outlet temperature T_3 whichever is first reached. It can also show instant fuel consumption.



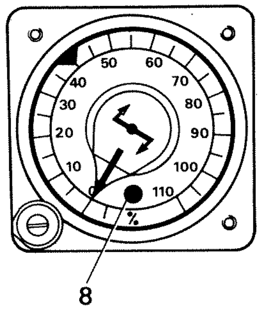




COMPUTER CONTROL BOX



INDICATOR



1 - Switch
2 - Engine torque warning light
3 - Torque display button
4 - Thermal load warning light
5 - Thermal load display button
6 - Fuel-flown display button
7 - Fuel-density setting potentiometer
8 - 100 % limitation overstep or torque computer failure warning light

When the control box switch is on «N», the indicator shows the parameter closest to 100 % (torque or T_3).

When the switch is on «T», the indicator shows the torque value directly. This position is used in case of failure of the T_3 computer.

To each of the parameters is associated a warning light which comes on when selected by the computer.

Two push-buttons enable the crew to have displayed at will the value of the parameter not set in.

Instant fuel consumption is read by pressing a button. The value shown is in terms of kilogrammes and corresponds to fuel consumption over 20 minutes flying. Hourly consumption is therefore obtained by multiplying the value read off by three (e.g. 60 % as read corresponds to an hourly fuel consumption of 180 kg).

To sum up, 100 % means :

- either the maximum torque the mechanical components can take for 5 minutes (that is a power of 650 kW)
- or the temperature the turbine can withstand for 5 minutes
- or a fuel flow of 300 kg/hr.

Instrument graduation

Fuel contents gauge : kg
Pressure gauge : bar

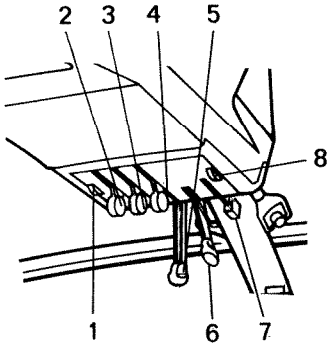
At customer's election, the instruments listed below can be graduated as follows :

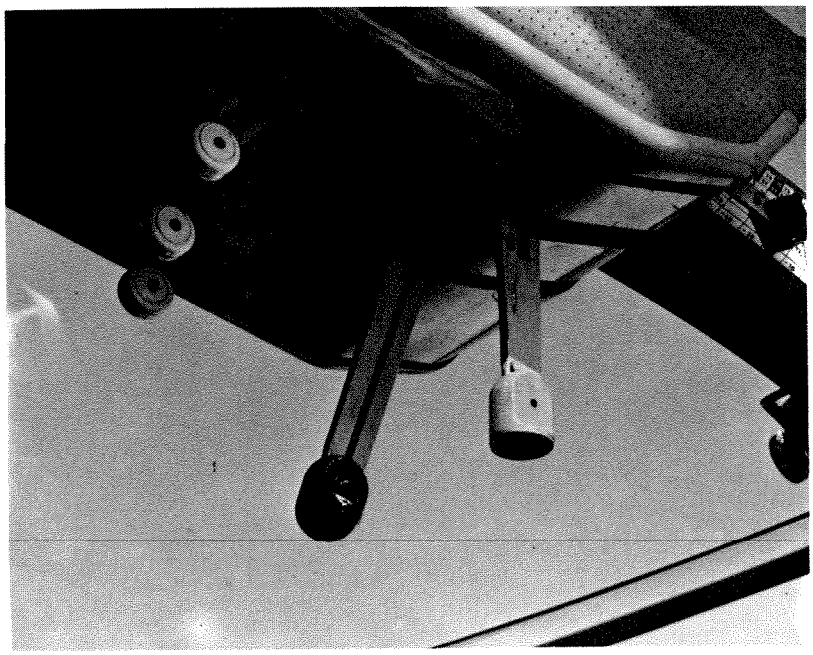
Airspeed indicator : km/hr or kts
Altimeter : metres or feet
Rate-of-climb indicator : hm/min or ft/min

Control quadrant

This quadrant, located at the front of the cabin ceiling carries the levers for controlling :

- heating system (1)
- ventilation (front ventilators and instrument panel outlets) (2)
- canopy demisting (3)
- ventilation (cabin ceiling outlets) (4)
- rotor brake (5)
- fuel flow (6)
- fuel shut-off cock (7)
- air conditionning (if applicable) (8)





Console

The console houses the battery, the NAV/COM optional equipment control boxes, two circuit-breaker panels on the sides as well as an hourmeter connected to a switching unit attached to the main landing gear LH leg.

Two plates in the console at the junction between the instrument panel and the console carry :

- 1 table for converting the fuel weight read from the fuel gauge in kilogrammes into pounds, litres and US gallons
- 1 check-list
- 1 chart showing max. permissible engine torque versus OAT and take-off weight
- 1 collective-pitch setting chart to be used in case of failure of the torquemeter

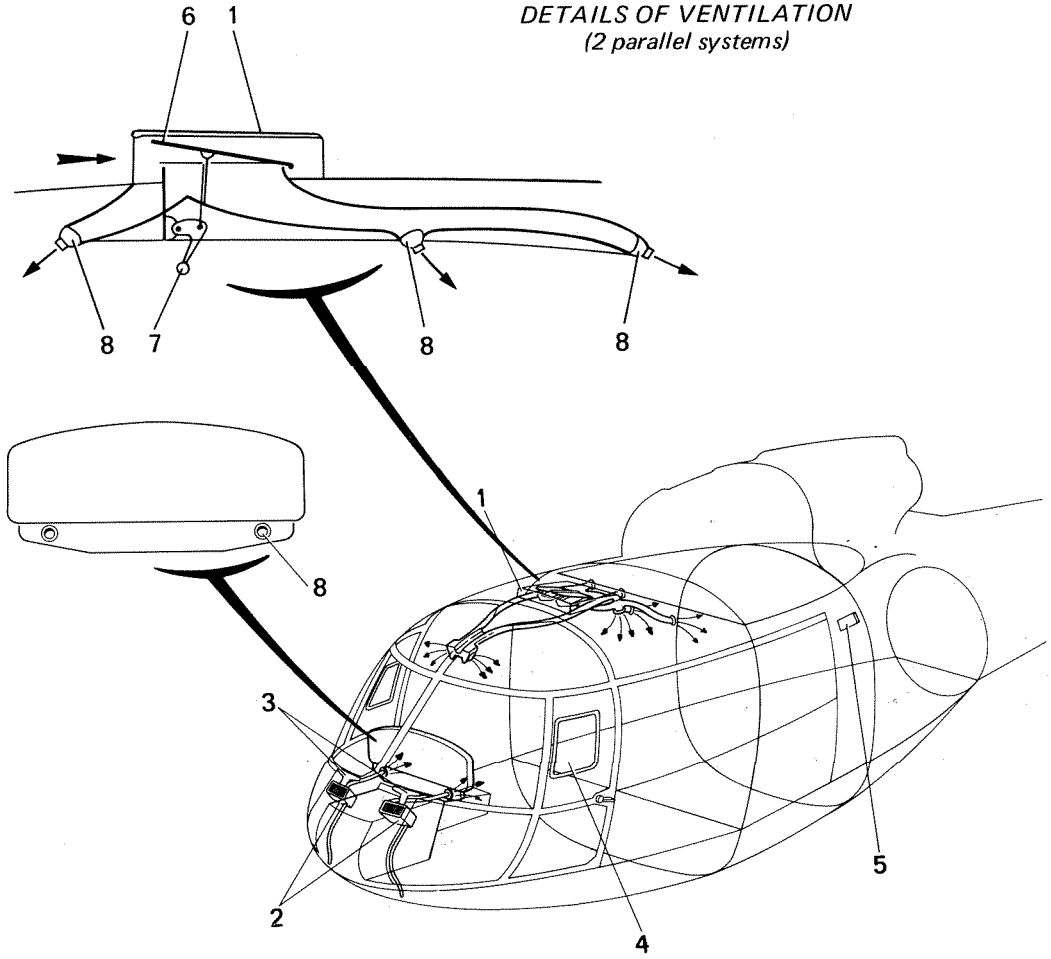
Ventilation

Ventilation of the cabin is by :

- 2 adjustable-flow discharge tubes in the nose of the aircraft blowing air on the front panes and feeding two outlets on the instrument panel
- 1 ram-air inlet on the top of the cabin and connected by two parallel systems (LH and RH) to 2 outlets at the front of the cabin, and 4 at the rear for the passengers
- 2 extraction louvres on the sides of the cabin at the rear
- 2 windows in the cockpit enclosure, in line with the front seats.

The ventilation control is on the overhead quadrant. As optional equipment, an air-conditioning unit can be connected to the ventilation system.

DETAILS OF VENTILATION
(2 parallel systems)



1 - Ram-air inlet (scoop)
2 - Ventilators
3 - Ventilation/demisting tubes
4 - Windows
5 - Extraction louvres
6 - Flap
7 - Control
8 - Outlets

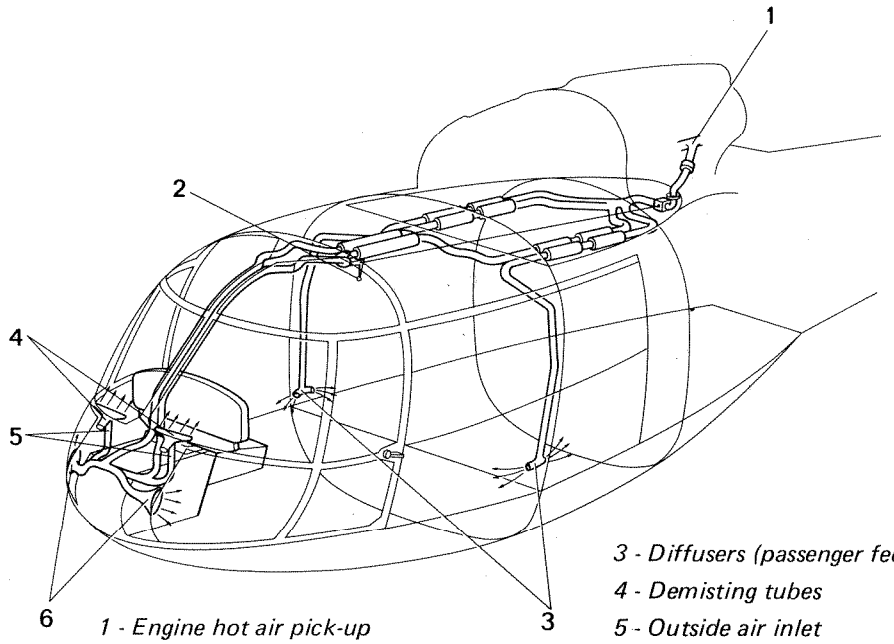
Heating-demisting

The heating-demisting system, fed with air bled from the compressor and mixed with fresh air, provides a cabin temperature of + 20°C when outside air temperature is - 20°C.

Distribution of the warm air in the cabin is by :

- 6 diffusers at floor level, 4 between the two rows of passenger seats and 2 in line with the radio console
- 2 discharge tubes pointing to the front panes and demisting them while heating the front part of the cabins.

Temperature adjustment is by a overhead knurled knob.



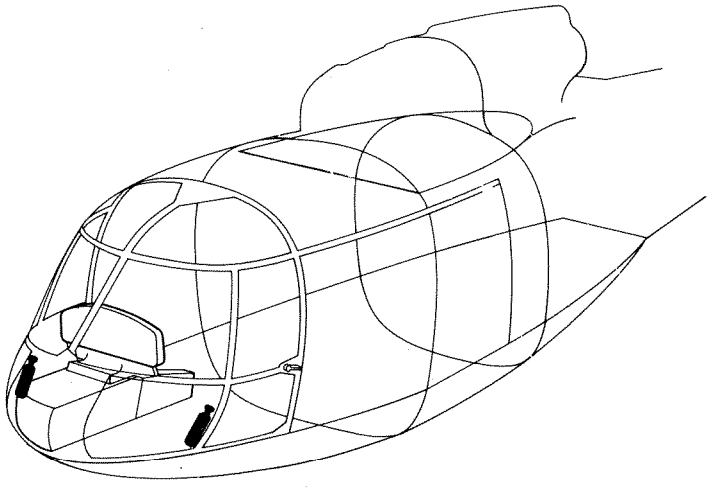
1 - Engine hot air pick-up
2 - Control
3 - Diffusers (passenger feet)
4 - Demisting tubes
5 - Outside air inlet
6 - Demisting of lower panes and heating at pilot feet level

Sound proofing upholstery

So as to reduce the noise level inside the cabin, the ceiling and the rear bulkhead are upholstered with soundproofed panelling, made up of removable sections.

Fire safety

Two fire-extinguishers are provided in the cabin, on the front former, in line with the pilot and copilot seats.

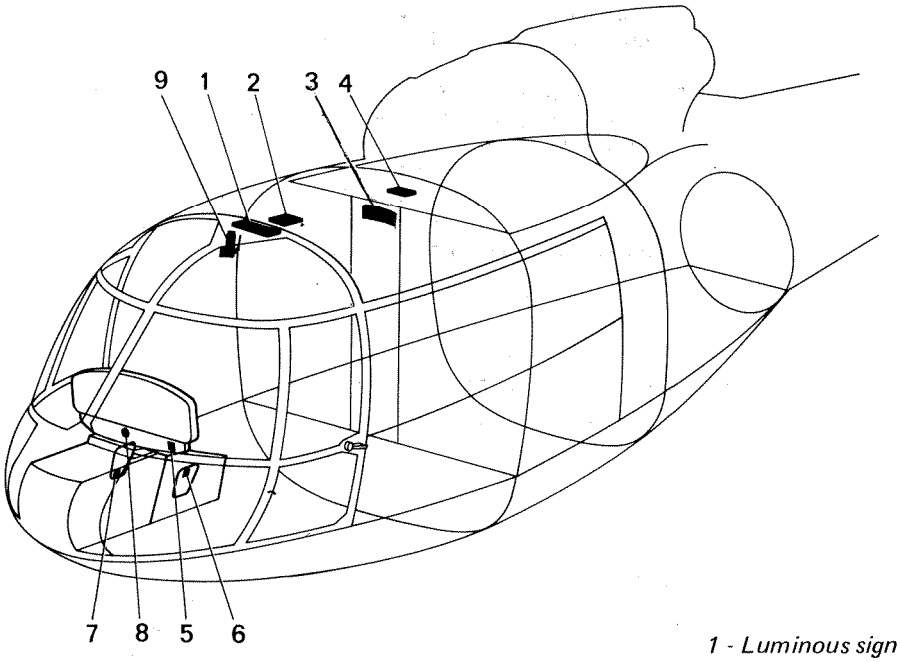


Lighting

The cabin is lit by 2 dome-lights.

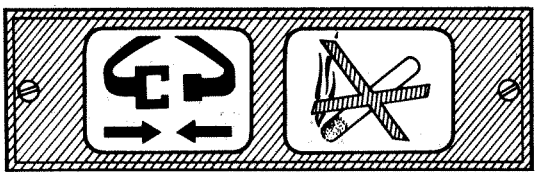
Two overhead luminous signs, located on the aircraft's axis show the «Fasten seat belts» and «No smoking» symbols.

Lighting up of the dome lights and signs is controlled by a double switch on the instrument panel.



1 - Luminous sign
2 - Dome light
3 - Luminous sign
4 - Dome light
5 - Double switch
6 - Circuit-breaker
7 - Circuit-breaker
8 - Master emergency switch
9 - Extension light

DETAILS OF LUMINOUS SIGNS



A white and red extension light, fed by a 1.70 m (5.5 ft approx) long extensible cord, is mounted overhead on pilot's side. Control and adjustment of light intensity is by a built-in switching rheostat.

The instrument panel and console instruments have their own duplicated-feeding electrical system whose lighting intensity is adjustable through 2 rheostats.

The warning panel carries a 2-position switch (normal-dimmed) whereby the lighting intensity can be adjusted for day and night conditions. A test button is provided to check if the warning lights are operative. Each warning light includes 2 lamps.

BOTTOM AND BODY STRUCTURE

The bottom and body structure comprises :

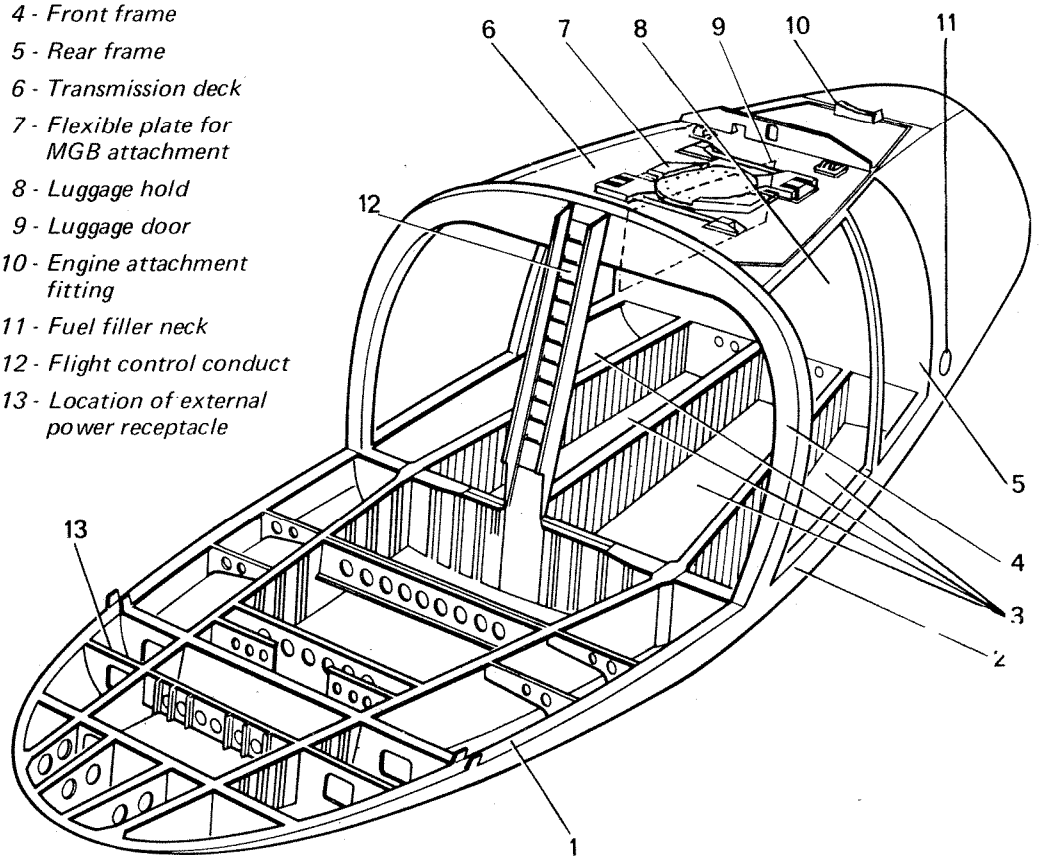
- a front bottom assembly formed of two longitudinal beams connected together by intermediate frames to constitute a box-structure with the skin.
  This part carries the front of the cabin floor and the cabin enclosure. It is fitted with opening and/or removable panels in laminated material providing access to the various components housed under the floor (flight controls, optional radio equipment etc.).
  A recess is provided in the assembly to accommodate the landing light.

- a rear bottom assembly comprising three longitudinal beams forming, with the skin, four bays for the fuel tanks. The beams carry the rear of the cabin floor.

- a rear top structure comprising two frames integral with the bottom structure and connected by a transmission deck on which the main gear box is attached through four fittings and a flexible plate.
  The front frame carries the landing gear and the footsteps for access to the cabin.

- a tapering box structure, made up of frames, stringers and a metal skin, carrying at the top an engine attachment fitting. The LH side is provided with a recess for the fuel filler neck.

1 - Front bottom structure
2 - Centre body structure
3 - Fuel tank bays
4 - Front frame
5 - Rear frame
6 - Transmission deck
7 - Flexible plate for MGB attachment
8 - Luggage hold
9 - Luggage door
10 - Engine attachment fitting
11 - Fuel filler neck
12 - Flight control conduct
13 - Location of external power receptacle

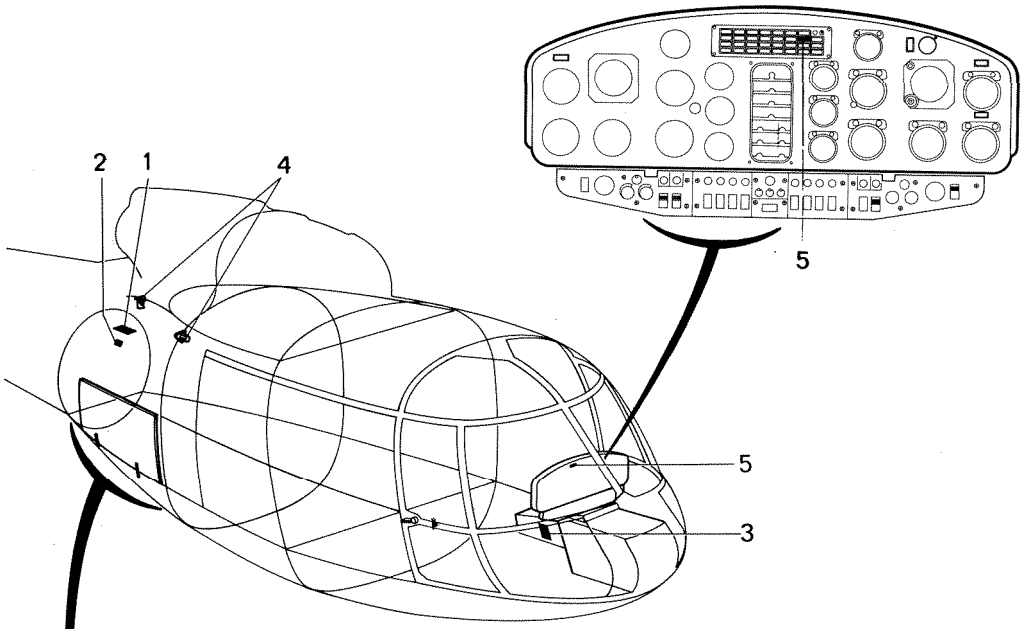


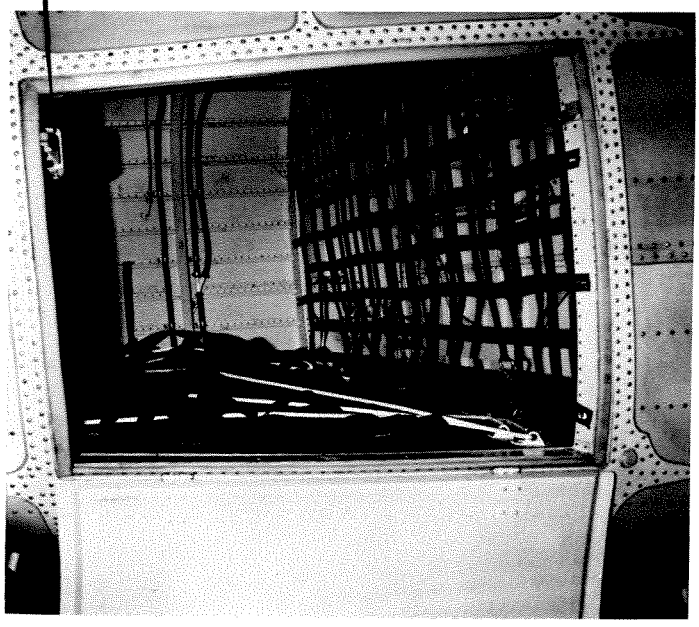
Luggage hold

The luggage hold is the body rear box-structure. It includes a floor capable of supporting a distributed load of 350 daN/m^2 (72 lb/sq.ft) and 6 rings, with a max. strength of 500 daN (2,270 lb) for tying a cargo net down.

Two protection nets, at the front and the rear of the hold, partition the loading space. The load limited to 150 kg (330 lb), is introduced by a door located on the RH side of the aircraft.

The hold is lit by a dome light controlled by a switch attached to the door frame. Two fire-detectors are fitted in the hold and connected to a warning light on the warning panel of the instrument panel.





1 - Dome-light
2 - Switch
3 - Circuit breaker
4 - Fire detectors
5 - Hold fire warning light

TAIL BOOM

The tail boom, of metal construction, is made up of light-alloy frames, stringers and a skin. It is bolted to the luggage hold rear frames. Tapering in shape, it ends up in an asymmetrical fin with a round aperture accommodating the tail gearbox and rotor.

A stabilizer, in two parts each terminated in a lateral fin is attached to the tail boom, in front of the tail rotor (fenestron).

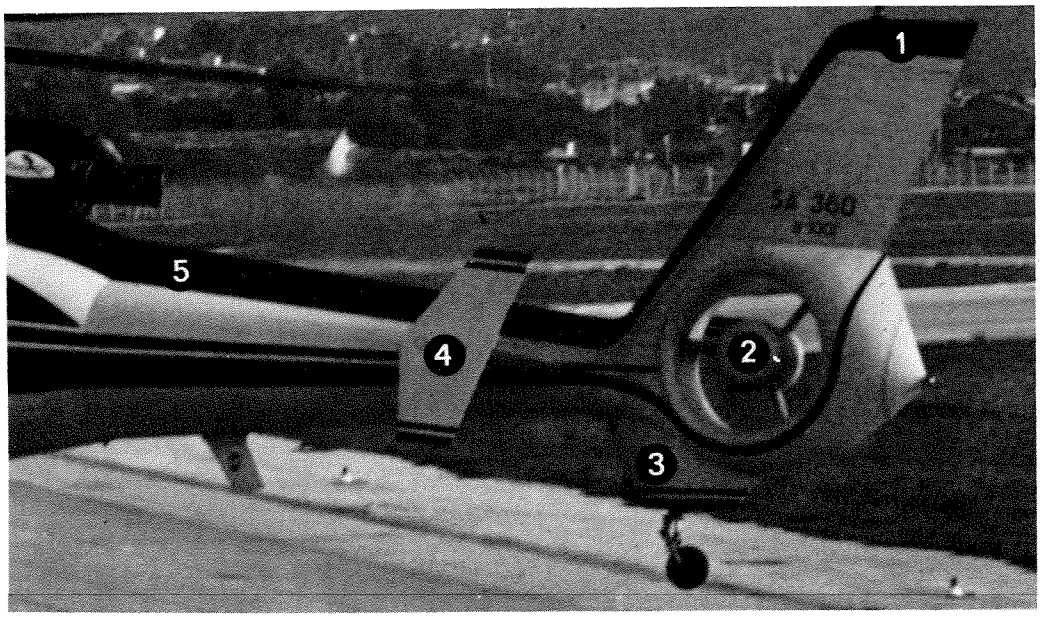
The upper part of the central fin is fitted with a removable, laminated-material cap which carries the anti-collision light. The rear point of this fin also in laminated-material and removable, accommodates the rear position light.

A laminated-material fairing, attached to the bottom of the central fin, streamlines the tail wheel, mounted at the tail boom/fin junction.

Four bearings installed on the top of the tail boom bear the tail drive. The latter is protected by a hinged fairing, for rapid access to the components if need be.

The tail boom has the provisions for the various radio antennas.

In cruising flight, the asymmetric profile of the central fin compensates the main rotor torque, thus reducing the power taken by the tail rotor.



1 - Central fin
2 - Tail rotor gearbox and rotor
3 - Tail wheel fairing
4 - Stabilizer assembly
5 - Tail drive fairing

FAIRINGS

The mechanical components, the engine and ancillary equipment are protected by fire-resistant cowlings in fibreglass/resin laminated material.

These cowlings have a quick-opening feature so as to facilitate pre-flight inspection and maintenance. They open upwards and are also removable. They include :

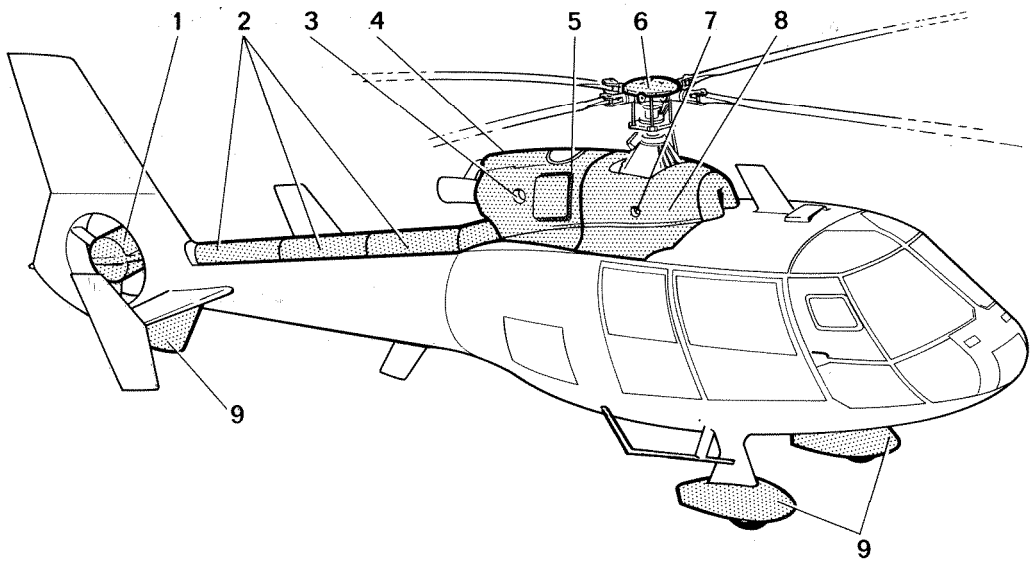
- the main gearbox cowlings
- the engine cowlings
- the tail drive cowlings
- the tail gearbox cowlings.

The main and tail gearbox cowlings are maintained in the open position by scissors.

This is complemented by removable cowlings :

- engine anti-icing air intake mufflers, with grid
- landing gear fairings
- main rotor head «skullcap»

Openings in the main gearbox, engine and tail gearbox fairings make it possible to inspect, from the ground, the oil levels of the mechanical units and engine, as well as the hydraulic fluid reservoir levels.



1 - Tail gearbox cowling
2 - Tail drive cowlings
3 - Engine oil level sight gauge
4 - Engine cowlings
5 - Engine air intake mufflers
6 - Main rotor head «skullcap»
7 - Main hydraulic system sight gauge
8 - Main gearbox cowlings
9 - Landing gear fairings

ACCESS TO TRANSMISSION DECK AND INSPECTION DOORS

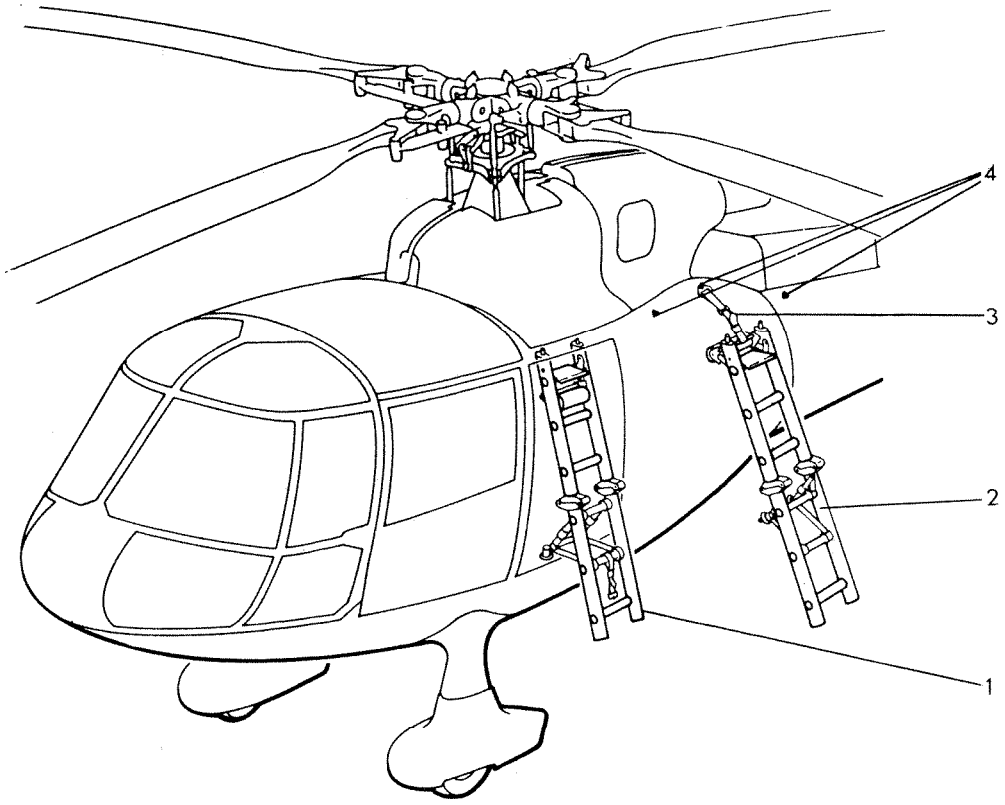
Access means

Access to the transmission deck is through a removable ladder which can be fixed either side of the aircraft, to the rear door frame.

The same ladder, resting on the ground and held by a strap attached to the structure, makes for engine access.

Zones covered with anti-skid material and the transmission deck are used as footsteps.

The ladder is foldable and can be stowed in the luggage hold.



1 - Position of ladder for access to transmission deck

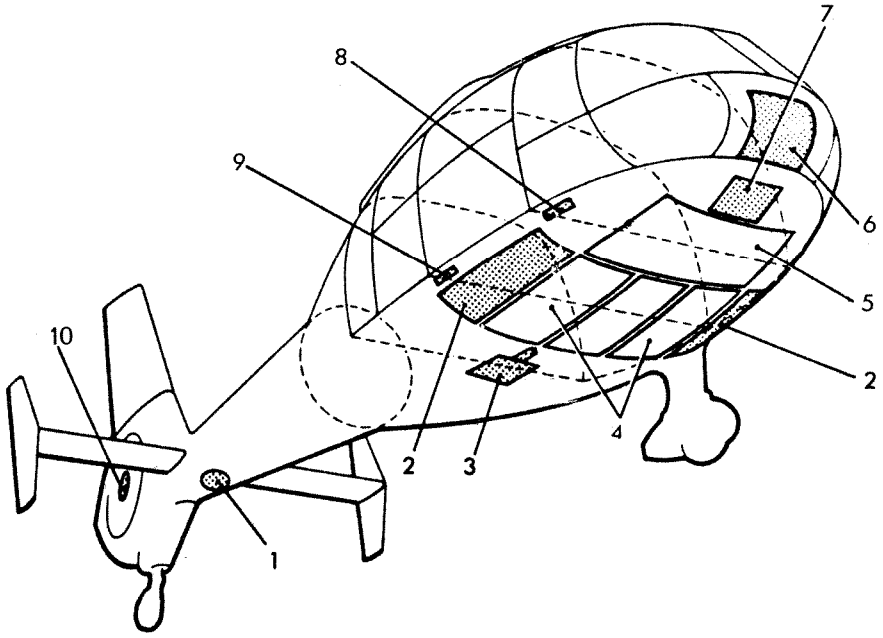
2 - Position of ladder for access to engine

3 - Safety strap

4 - Attachment dowels

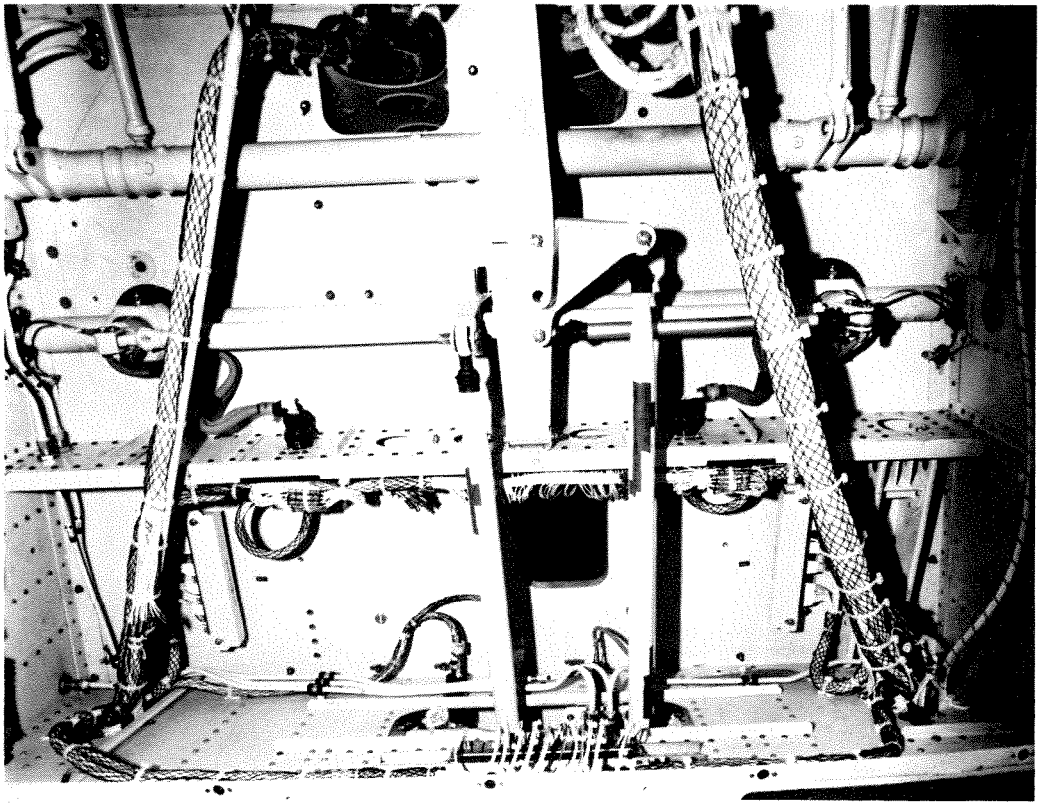
External inspection doors

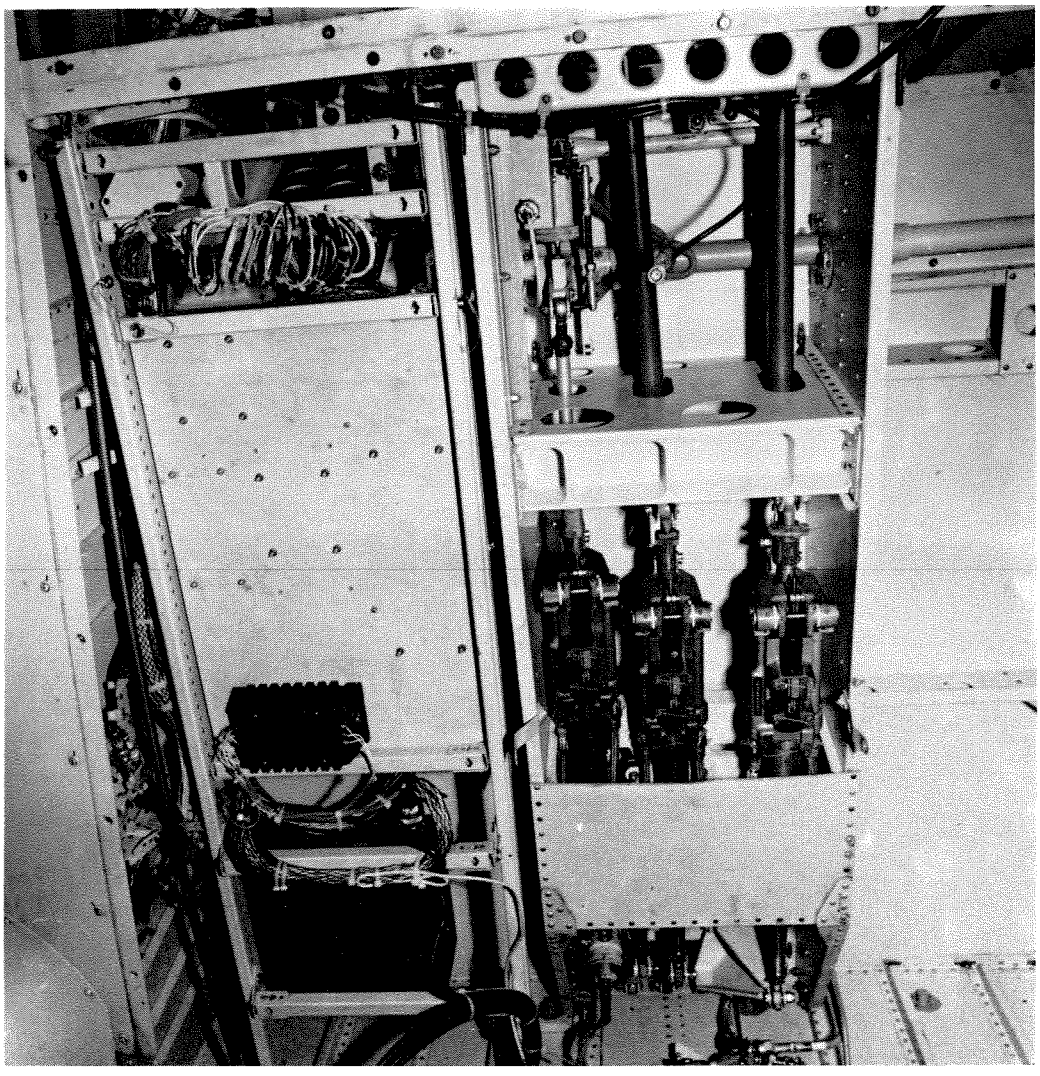
Doors or removable panels give rapid access to servicing points and facilitate equipment maintenance.



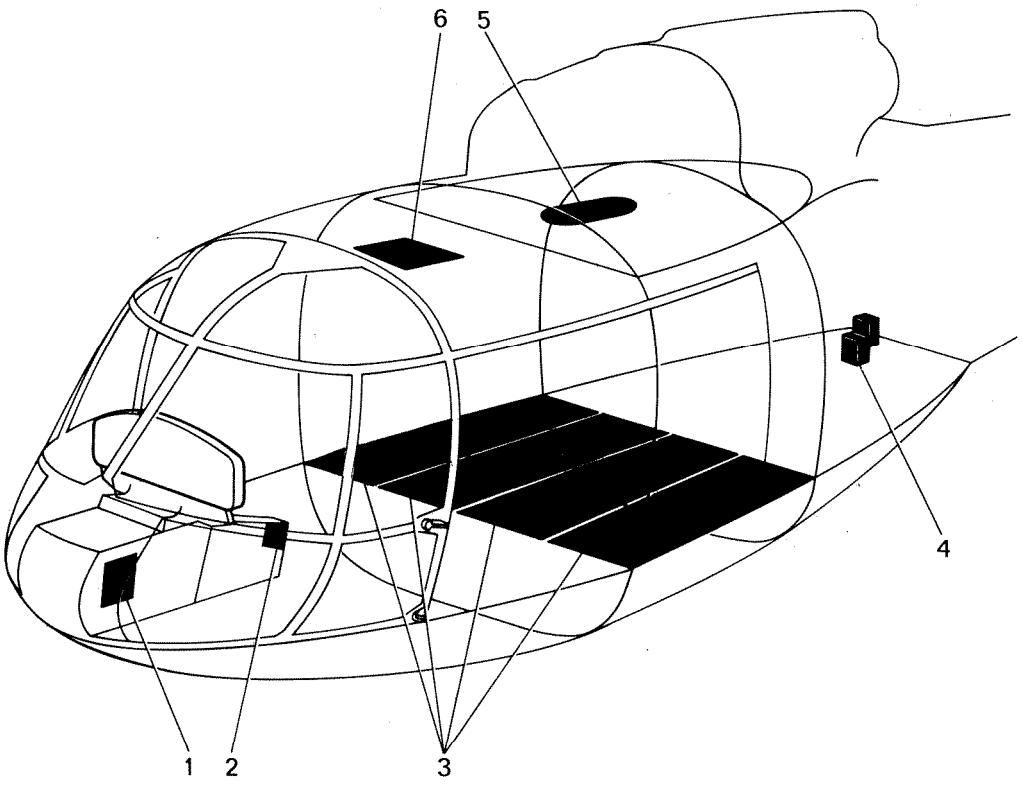
Index	Reference	Access
1	Tail boom inspection door	Stabilizer spar. Tail boom/fin attachment
2	LH and RH side fairings	Main landing gear
3	Rear lower hatch	Fuel tank plate
4	LH and RH lower fairings	Flight controls Radio equipment
5	Front lower fairing	
6	Battery door	Battery
7	Front door in line with console	Electrical cabinet
8	Ground receptacle flap	Ground power receptacles
9	LH and RH blanks	Main landing gear attachments
10	Tail gearbox fairing	Tail gearbox

Access to flight controls and equipment





Internal inspection doors



Index	Reference	Access
1	Console inspection door	Electrical cabinet
2	Ancillary box inspection door	Ancillary equipment
3	Floor panels	Fuel tanks
4	Fuel filter box inspection door	Fuel filter
5	Cover under MGB	MGB bottom
6	Ceiling inspection hatch	Cabin ceiling

ROTORS

MAIN ROTOR

It is a semi-articulated type 11.50 m (37.72 ft) in diameter. It includes a rotor head and four fibreglass blades rotating clockwise (as viewed from above) at 349 r.p.m.

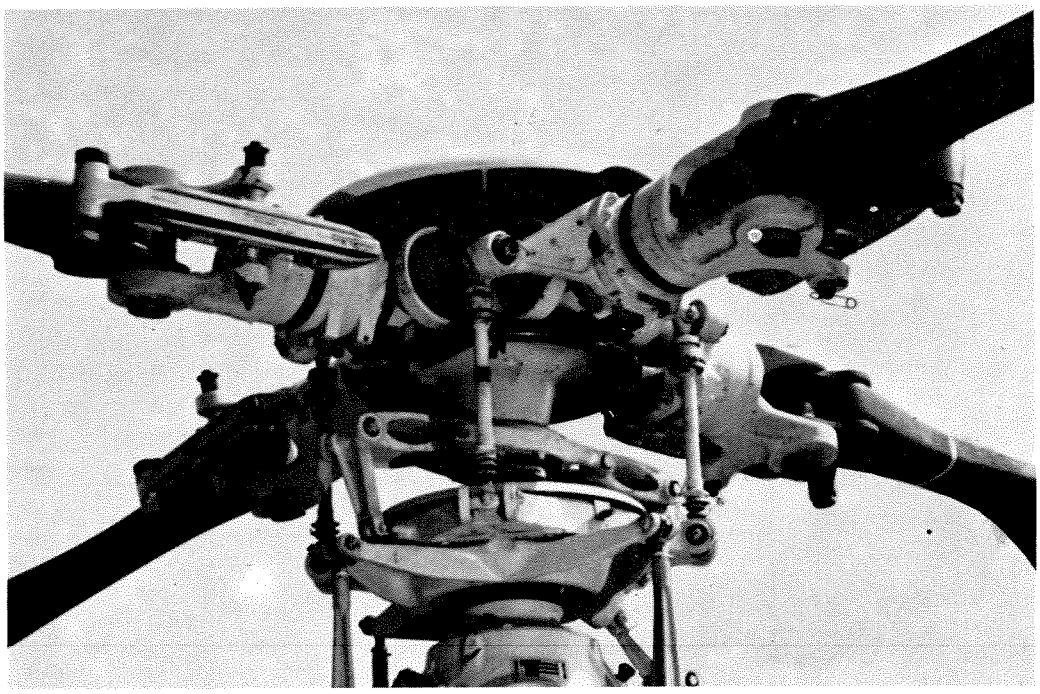
Rotor head

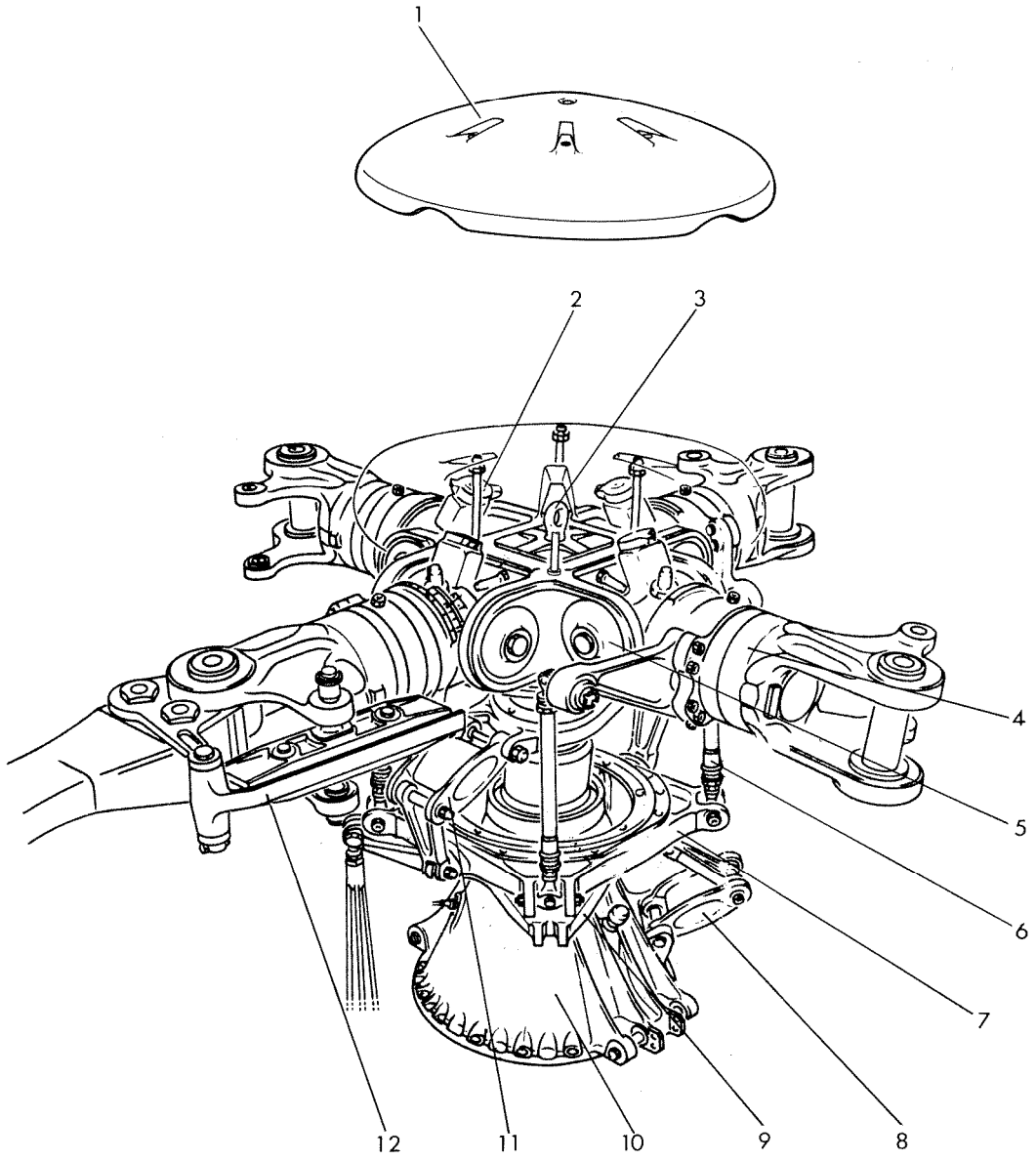
It includes a single-piece rotor shaft and four-lobe hub. The rotor shaft, splined onto the MGB second reduction stage, is maintained by a conical casing. Each lobe of the hub carries a spindle articulated in flap.

Blade feathering motion is by a sleeve restrained by a boom of wires and connected to the hub by a pin and anti-friction bearings. Lubrication is provided by a transparent oil reservoir located on the sleeve above each hinge.

A swash plate with a non rotating star and a rotating star is installed on the main rotor shaft. It conveys to the blades the cyclic and collective pitch movements through control rods. The non-rotating star is connected to the main gearbox upper casing by a non-rotating scissors. Two rotating scissors link the rotating star to the main rotor shaft.

The blade cuff is attached to the sleeve by a pin and a visco-elastic frequency-adapter. A streamlining skullcap tops the main rotor head.





1 - Streamlining «skullcap»
2 - Oil reservoirs
3 - Hoisting hook
4 - Sleeves
5 - Flapping hinge
6 - Pitch-control rods
7 - Swash-plate rotating star
8 - Non-rotating scissors
9 - Non-rotating star
10 - Main gear box upper casing
11 - Rotating scissors
12 - Frequency-adaptors

Main rotor blades

The moulded rotor blades are made up of a fibreglass-roving spar constituting the leading edge, of a fibreglass and carbon fibre cloth skin and of plastic honeycomb filler. In the root end tapering section, the filler material is moltoprene.

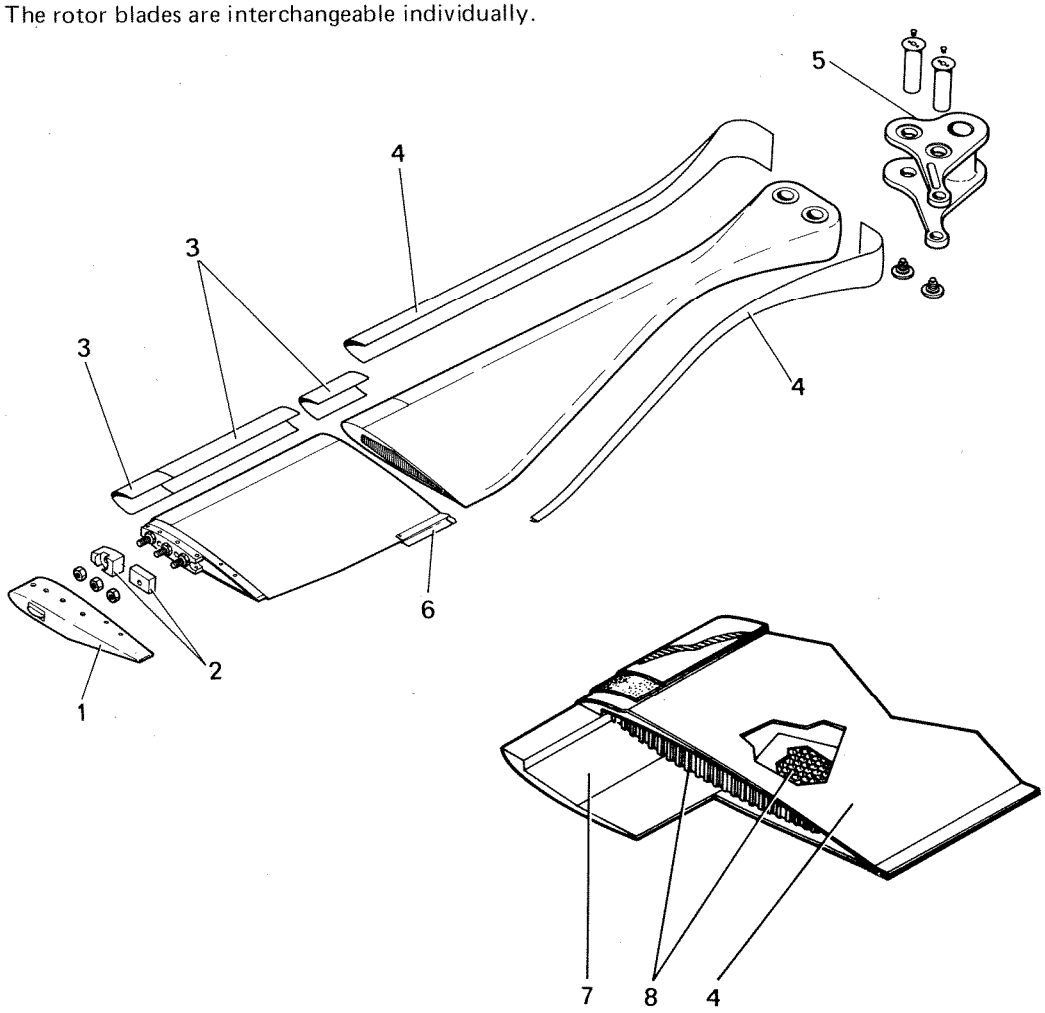
The leading edge is protected against erosion by a stainless steel strip over the whole blade span.

The very nature of the materials employed provide the blades with fail-safe characteristics.

Each blade, attached to its sleeve by two pins ends up in a removable top fairing covering the balancing weights. Blade characteristics are as follows :

■ Length	5.20 m (17.0 ft)
■ Chord length	0.35 m (./14 ft)
■ Profile	NACA 0012
■ Built-in twist	-8° from rotor axis to top
■ Top paint	upper and lower surfaces : matt green with low infrared signature

The rotor blades are interchangeable individually.

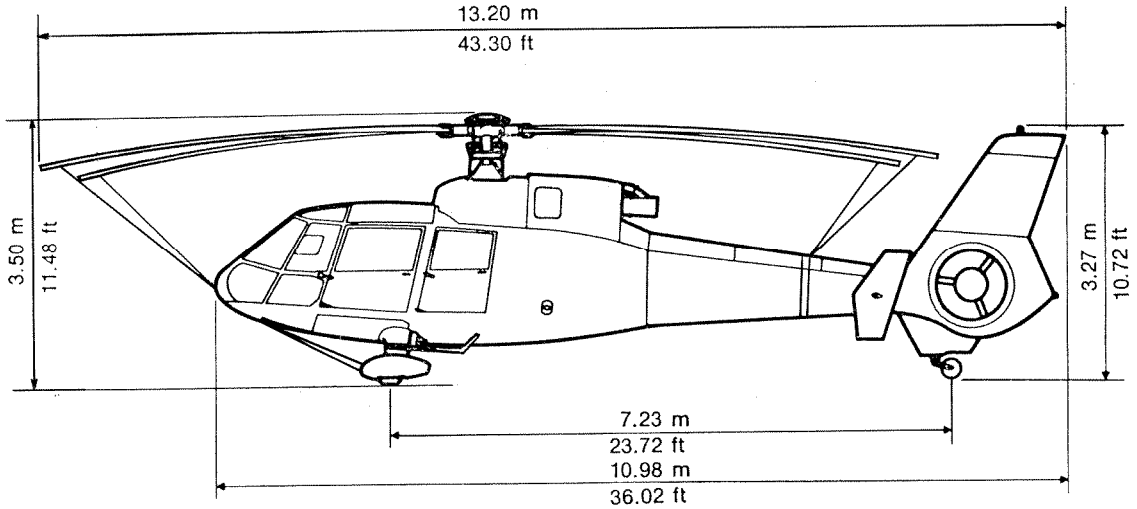


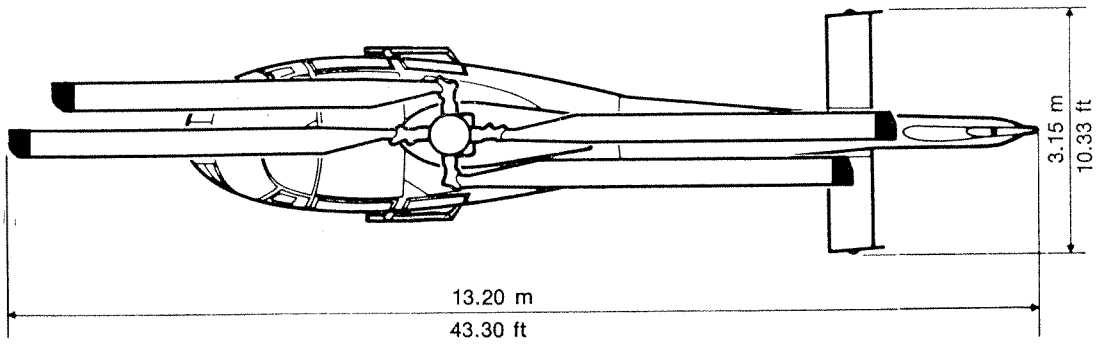
1 - Top cap
2 - Balancing weights
3 - Stainless steel strip
4 - Glass/carbon fibre cloth
5 - Cuff
6 - Tab
7 - Fibreglass-roving spar
8 - Honeycomb

Dimensions with blades folded

The rotor blades can be folded manually : 2 pointing forward, 2 rearward, parallel to the fuselage.

In this configuration, the aircraft's dimensions are as follows :





Folding of the blades and locking them in the folded position require special tooling,to be ordered separately.

SHROUDED TAIL ROTOR

This assembly includes the tail gearbox and rotor, housed in a cylindrical aperture in the main fin. This layout has been named «fenestron». This 0.90 m (2.95 ft) diameter rotor rotates clockwise (as viewed from the RH side of the aircraft) at 4,693 r.p.m.

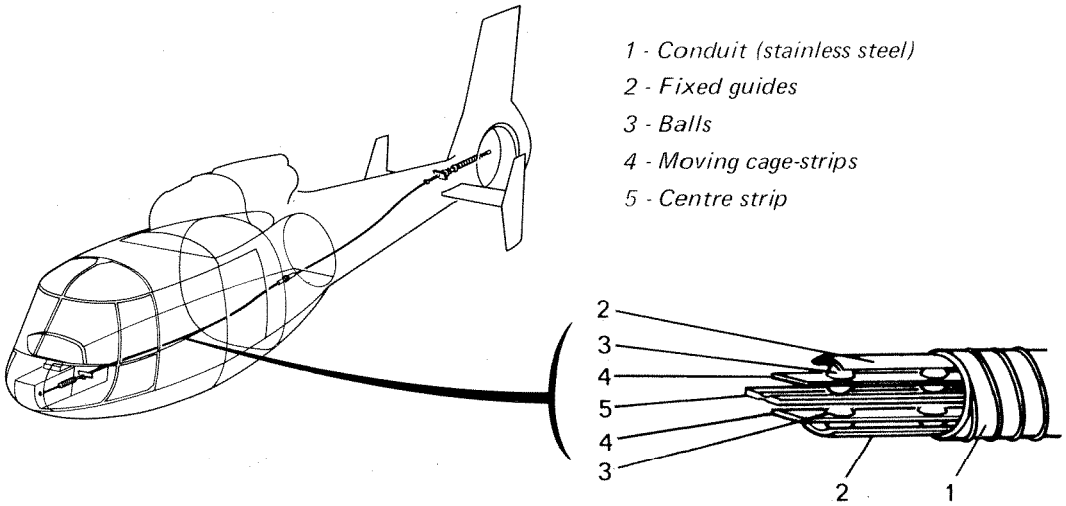
It includes a hub and 13 die-forged blades, in light alloy, mounted on plastic bearing not requiring any lubrication. A star-shaped spring stack connects the blades to the hub.

The individually-interchangeable blades have the following characteristics :

■ Length	0.25 m (0.82 ft)
■ Chord length	0.04 m (0.13 ft)
■ Profile	NACA 63 A
■ Built-in-twist	7°

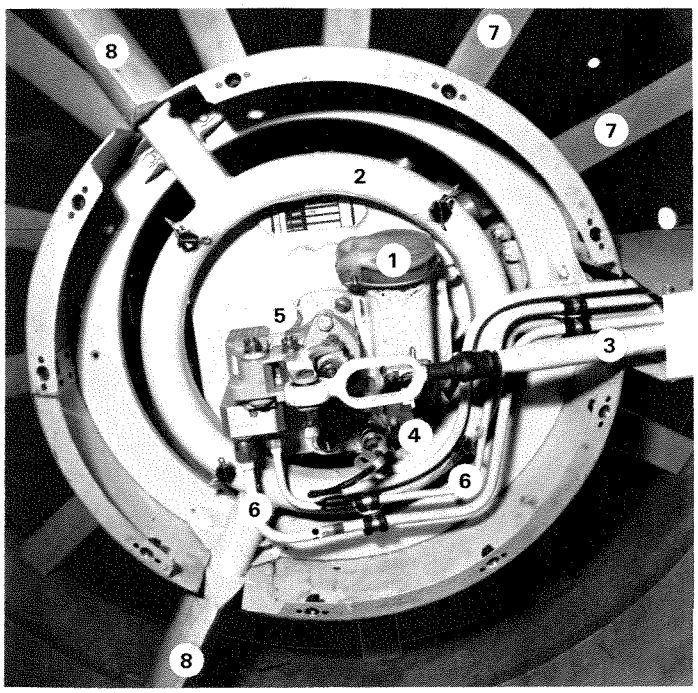
Feathering of the rotor blades is controlled by the pedals which act on a ball-control running parallel to the tail drive. This control actuates a rod which through a servo unit, controls a pitch-change plate.

DETAILS OF BALL CONTROL



1 - Conduit (stainless steel)
2 - Fixed guides
3 - Balls
4 - Moving cage-strips
5 - Centre strip

The tail gearbox and rotor head unit is surrounded by a cylindrical fairing closed at both ends by a laminated-material cover. The oil level in the gearbox casing can be checked through an opening in the RH cover.



1 - Oil filler
2 - Support
3 - Rod
4 - Oil sight gauge
5 - Servo control
6 - Hydraulic line
7 - Blades
8 - Support arm fairings

FLYING CONTROLS

The helicopter is laid out for flight handling from the right hand seat. It incorporates the connecting and linking means for installing dual controls at copilot's station (optional equipment). Each component of the dual controls (cyclic stick, collective-pitch lever, pedals) can be installed easily.

The aircraft can the fitted, on option, with an autopilot.

The flying controls include :

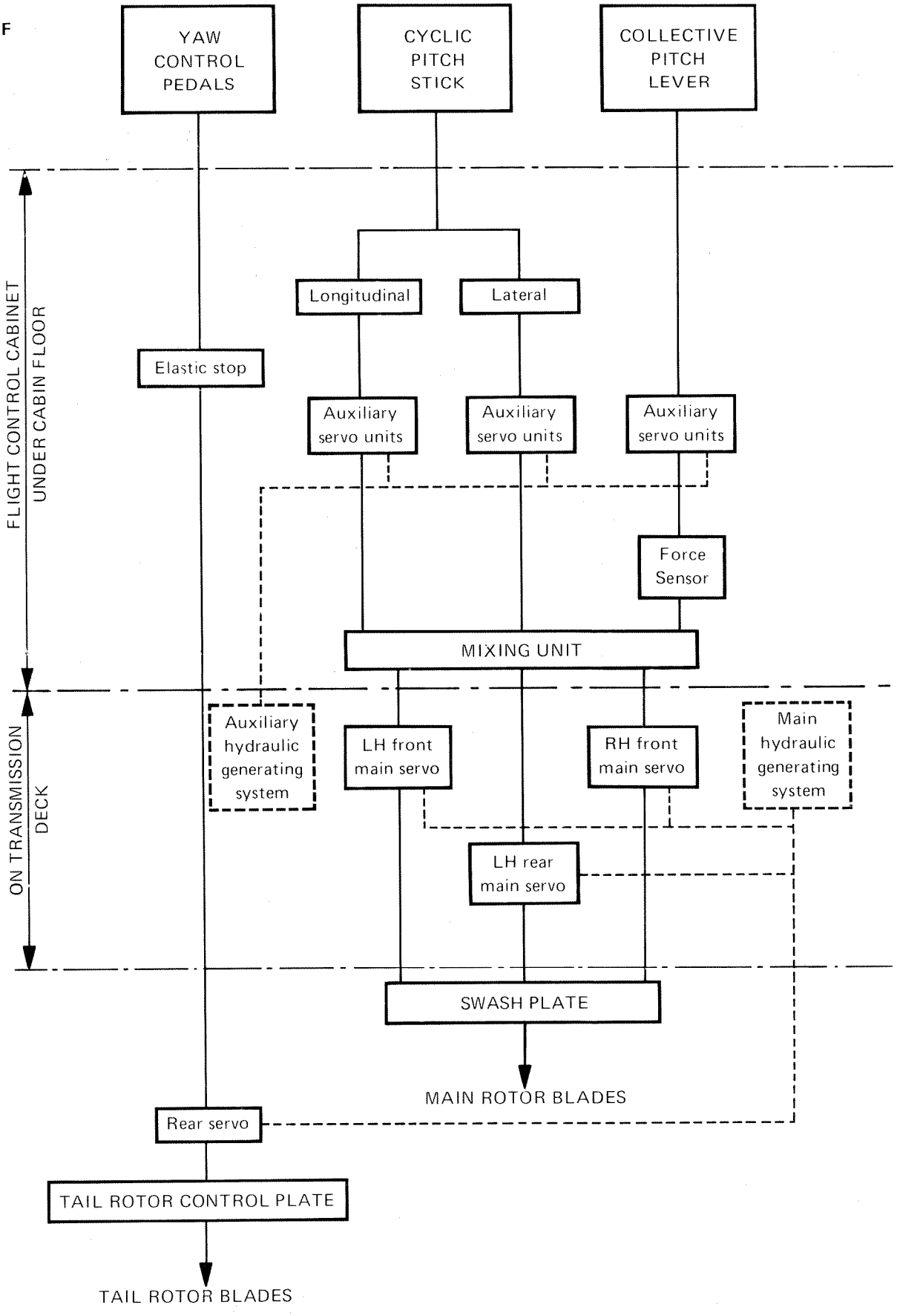
- A cyclic control stick, hinged to the floor, acting on the tilt-angle of the swash-plate. When the autopilot is not installed, the stick is fitted with a friction-control device. The stick handle incorporates :
  - 1 radio press-to-talk switch,
  - 1 switch intended for disengaging the autopilot magnetic brakes,
  - 1 switch intended for disengaging the autopilot,
  - 1 4-direction cyclic trim control,
  - 1 selector switch intended for «hoist» and «cargo sling» functions, when this equipment is installed on option.
- A collective-pitch lever which controls the vertical motion of the swash-plate. Two stops are provided whereby the pilot feels the power limits imposed in various flight configurations (hover and climb, cruise and manœuvers) without having to watch the instrument panel.

  A ramp, adjustable by the pilot based on prevailing outside air temperature ranges provides, through a spring box, an artificial feel arrangement whereby the pilot is warned when the limits are reached. The collective-pitch setting of the rotor blades is shown by a pointer for use in an emergency, in the event of failure of the torquemeter.

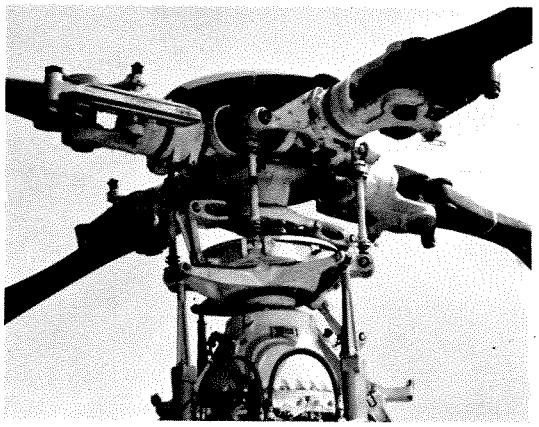
  The collective-pitch lever is also provided with a friction-control device.
- The following switches are available on a control box attached to the collective-pitch lever :
  - 1 switch controlling the feeding of the servo units with hydraulic pressure,
  - 1 landing light ON-OFF switch,
  - 1 landing light ON warning light,
  - 1 landing light extension and retraction switch,
  - 1 push-button controlling either emergency opening if the cargo sling release (optional equipment) did not take place normally or the severing of the hoist cable (optional equipment) in an emergency.
- Two yaw-controls pedals acting on the tail rotor pitch setting through a ball-control, a rod and a hydraulic servo unit.

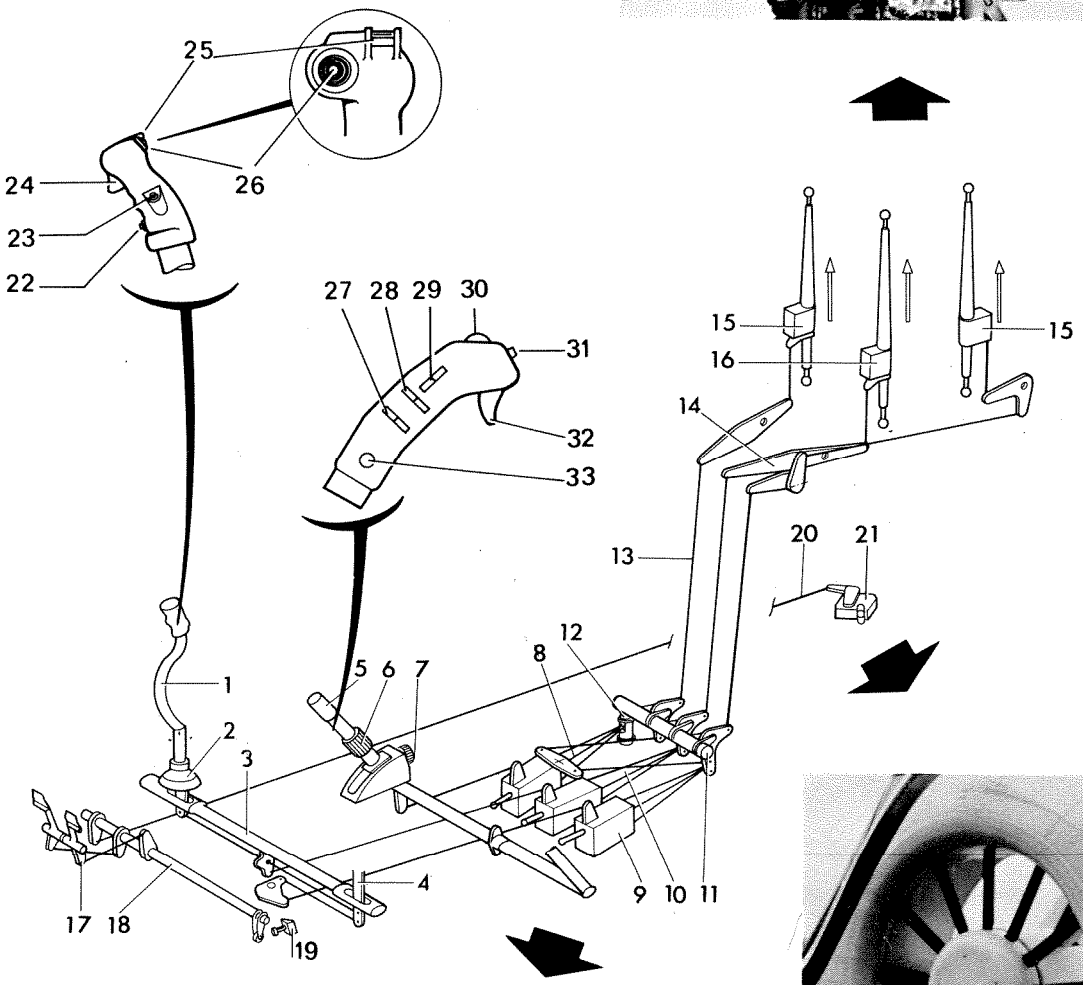
  These pedals are fitted with differential brakes acting on the main landing gear wheels. They can be adjusted in reach to match pilot's size (3 positions).
- A mixing unit on the collective-pitch channel, comprising a double-threshold force sensor which warns the pilot :
  - of the main servo unit «transparent» operation through the coming on of the LIMIT light (1st threshold),
  - of any seizing of the main servo units through the coming on of the SERVO light (2nd threshold).

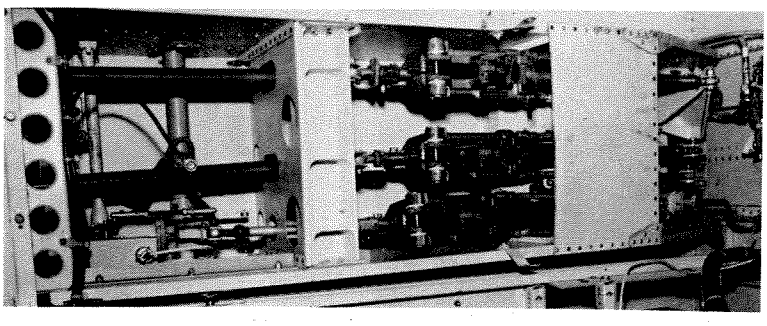
SYNOPSIS OF FLIGHT CONTROLS

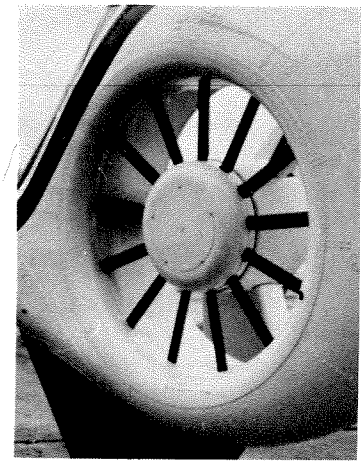


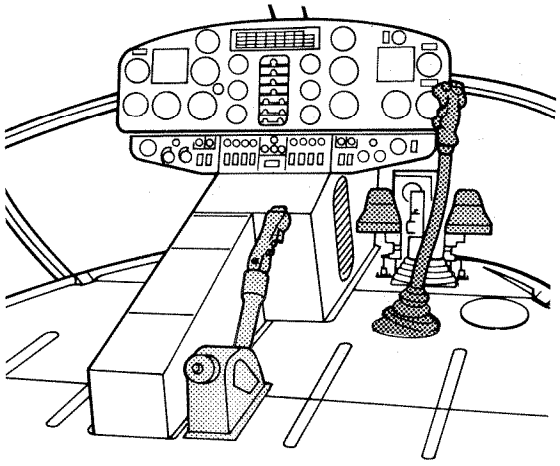
SCHEMATIC VIEW OF FLIGHT CONTROLS









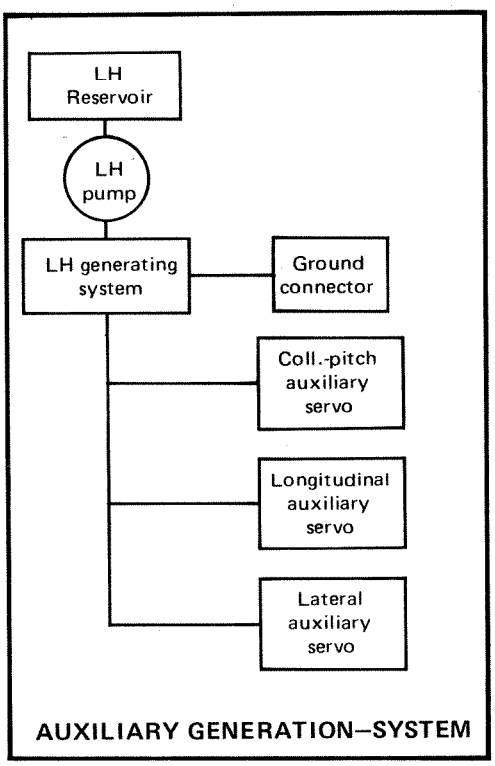


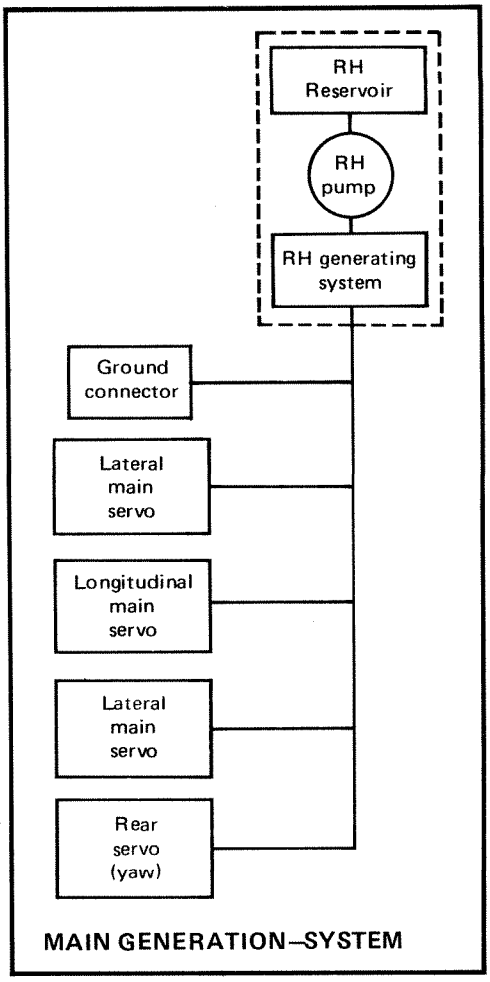
1 - Cyclic-pitch control stick
2 - Stick friction-control (ball and socket)
3 - Cyclic-stick connecting shaft
4 - Location for dual controls (optional equipment)
5 - Collective-pitch control lever
6 - Collective-pitch lever friction-control
7 - Adjustment of engine stop in terms of OAT
8 - Auxiliary servo-unit on collective-pitch channel
9 - Auxiliary servo-unit on cyclic-pitch channel (lateral)
10 - Auxiliary servo-unit on cyclic-pitch channel (longitudinal)
11 - Mixing unit
12 - Double-threshold force senser
13 - Control rods
14 - Bell cranks
15 - Main servo-units (lateral)
16 - Main servo-unit (longitudinal)
17 - Yaw-control pedals
18 - Yaw connecting shaft
19 - Elastic stop
20 - Rear servo-unit ball-control
21 - Rear servo-unit
22 - Autopilot disengagement (associated with optional equipment)
23 - Autopilot magnetic brake disengagement (associated with optional equipment)
24 - Radio press-to-talk switch
25 - Cargo sling release guarded push-button (associated with optional equipment)
26 - Trim controls (associated with optional equipment)
27 - (available)
28 - Landing light ON-OFF switch
29 - Landing light retraction switch
30 - Hydraulic generation cut-out sliding button
31 - Landing light ON warning light
32 - Cargo sling jettison (associated with optional equipment)
33 - Inflation of emergency floatation gear (associated with optional equipment)

SERVO UNITS AND HYDRAULIC POWER GENERATION SYSTEMS

The hydraulic power the aircraft requires is supplied by two wholly-independent generating-systems :

- 1 main generation-system forming a compact unit (reservoir, pump, regulation-assembly) fitted to the RH side of the main gearbox (MGB), the pump of which is driven by a MGB power take-off.
- 1 auxiliary generation-system comprising a reservoir fitted to the LH side of the transmission-deck, and a gear pump attached to the MGB, driven by a power take-off depending on a different gear than the one driving the RH power take-off.





SYNOPSIS OF FLIGHT CONTROLS

Each generation system feeds 1 set of single-body servo units, operating under 53 bars (770 PSI), series-mounted on the flight controls.

The RH generation system feeds 3 main servo units attached to the MGB which actuate directly the swashplate, and 1 tail rotor servo unit affixed to the tail gearbox casing.

The LH generation system feeds 3 auxiliary servo-units, installed under the cabin floor, in the flight control cabinet, ahead of the mixing unit.

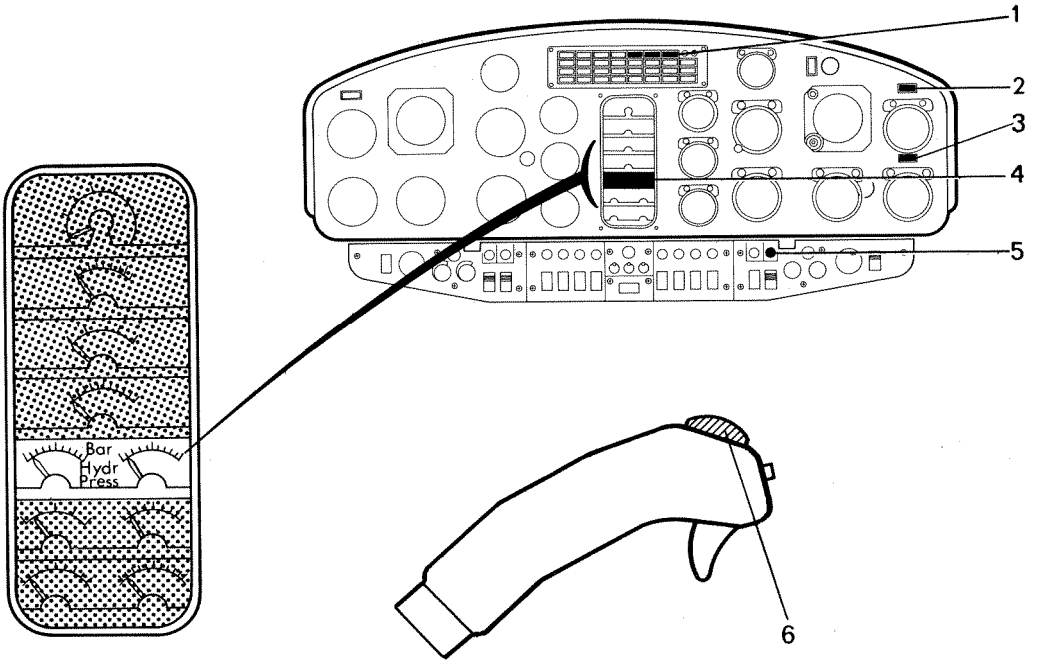
The latter incorporate the electrical inlets required for receiving the orders from the autopilot (optional equipment) when installed.

Flying remains possible in the event of failure or pressure drop in one of the two hydraulic systems. Two self-sealing plugs allow a ground test rig to be plugged in. The oil level is visible in each of the reservoirs.

INSTRUMENTS

Monitoring of the hydraulic generation system is by :

- 3 warning lights on the alarm panel (1)
- 1 master warning light (2)
- 1 manœuvring-limit warning light (3)
- 1 dual pressure indicator (4)
- 1 SERVO alarm rearming push-button (5)
- 1 switch on the collective pitch lever for the two generation systems (6)

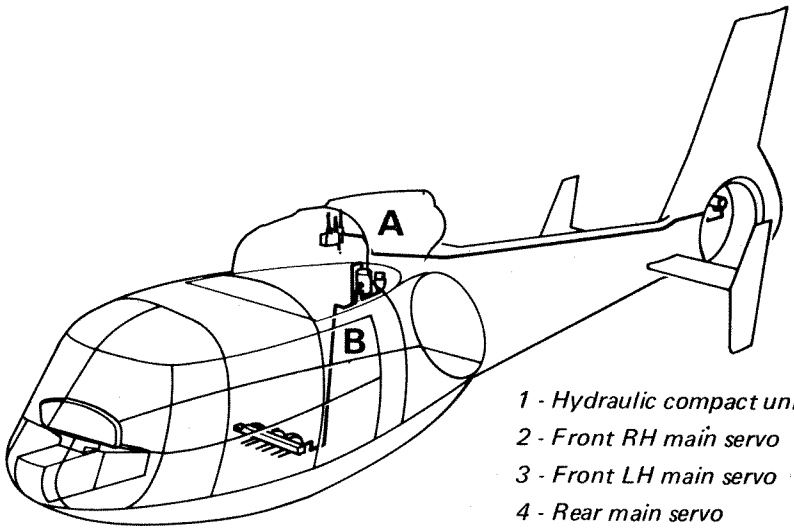


HYDRAULIC FLUIDS

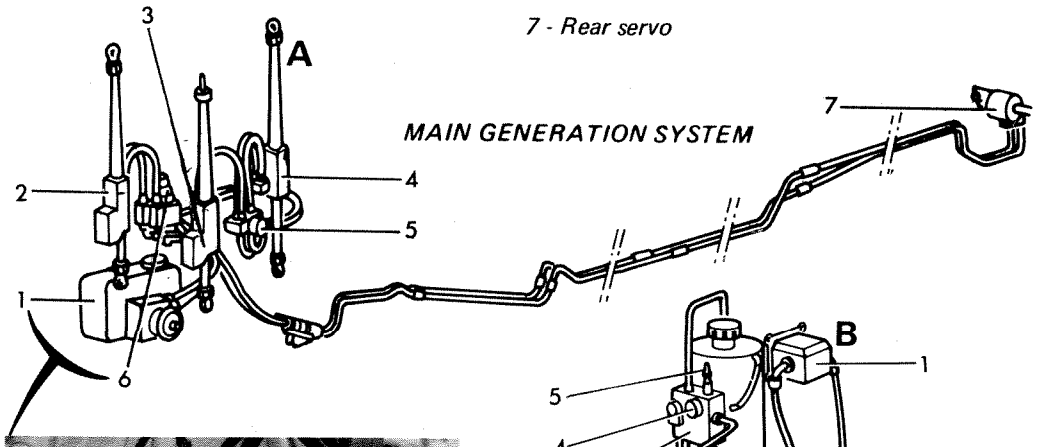
French Specifications	British Specifications	American Specifications	NATO Symbol
AIR 3520	DTD 585	MIL.H. 5606	H.515

Note : Use suffixes and amendments in force.

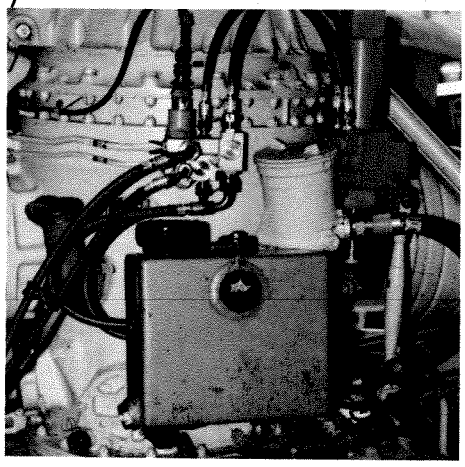
HYDRAULIC GENERATION SYSTEMS

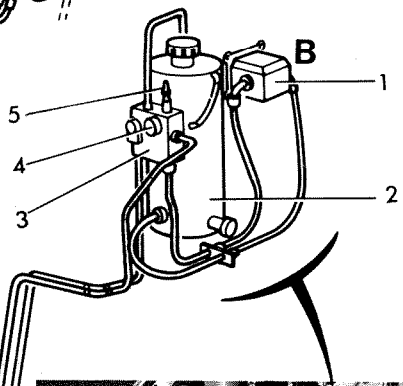


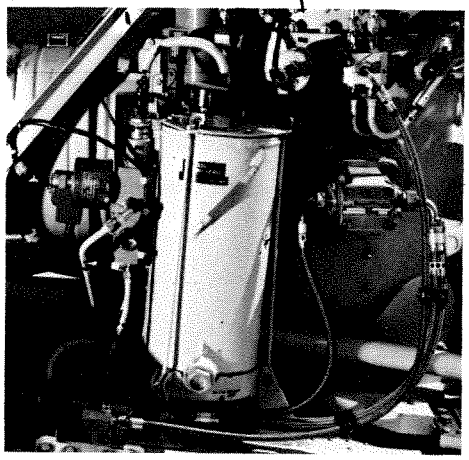
1 - Hydraulic compact unit
2 - Front RH main servo
3 - Front LH main servo
4 - Rear main servo
5 - Pressure transmitter
6 - Pressure switch
7 - Rear servo



MAIN GENERATION SYSTEM







1 - Gear pump
2 - Hydraulic reservoir
3 - Regulation assembly
4 - Pressure transmitter
5 - Pressure switch

AUXILIARY GENERATION SYSTEM

LANDING GEAR

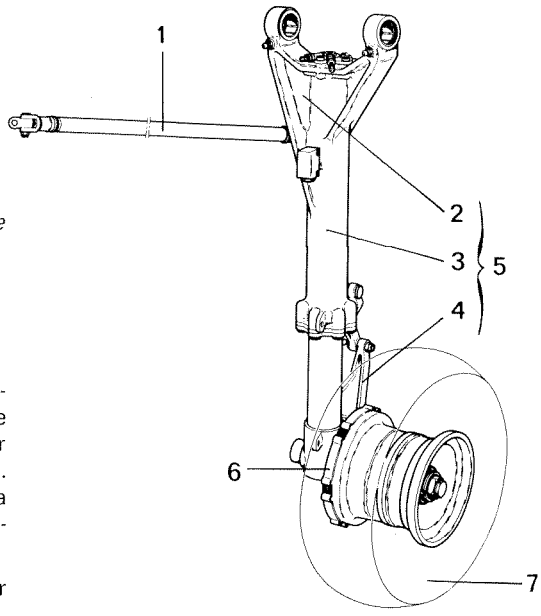
The Dauphin is fitted with a conventional three-wheel landing gear with a tail wheel.

The main gear is attached to the front frame of the body structure.

Each half-gear includes :

- 1 leg with a two-chamber oleo-pneumatic shock absorber attached to the structure by its yoke,
- 1 strut,
- 1 disc brake,
- 1 wheel fitted with a tyre and an inner tube inflated to 6.2 bars.

MAIN LANDING GEAR



1 - Strut
2 - Yoke
3 - Shock-strut
4 - Scissors
5 - Legs
6 - Disc brake
7 - Wheel

The disc brakes are controlled by two independant hydraulic circuits, connected to the rudder pedals, and ensuring the differential or symetrical braking of the main wheels. Hydraulic locking, ensured by means of a cock (attached to the console), holds the aircraft at rest on a 10° slope.

A removable fairing covers the landing gear legs.

1 - Rudder pressure transmitters
2 - Parking brake control
3 - Disc brakes

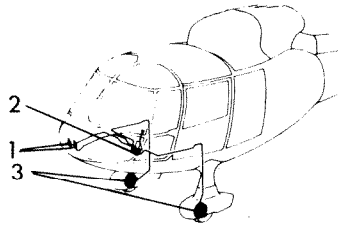
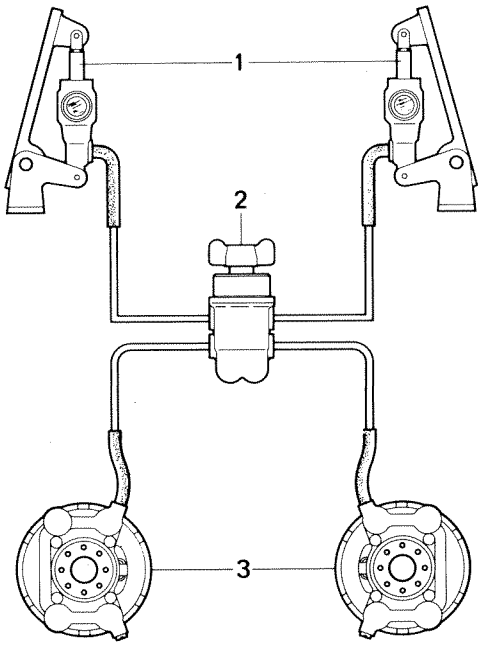


DIAGRAM OF BRAKE CIRCUIT

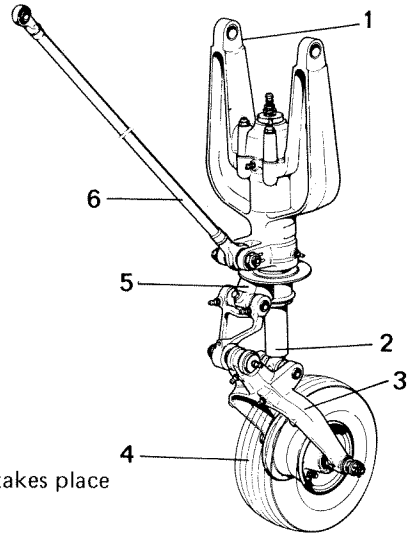


The tail wheel is fitted to the lower part of the main fin. It includes :

- 1 leg with an oleo-pneumatic absorber and fixed to the structure by a yoke,
- 1 strut,
- 1 wheel with a tyre and an inner tube inflated to 6.2 bars,
- 1 castor lock system controlled from the cockpit.

TAIL LANDING GEAR

1 - Yoke
2 - Shock-absorber
3 - Fork
4 - Wheel
5 - Link
6 - Strut

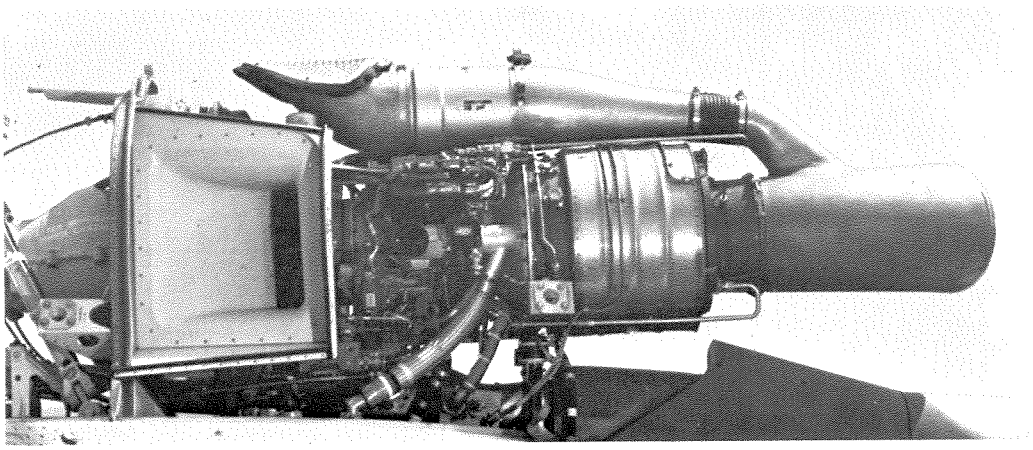


The wheel can swivel freely in every direction. Centering takes place automatically once off the ground.

A laminated-material fairing covers the tail landing gear leg.

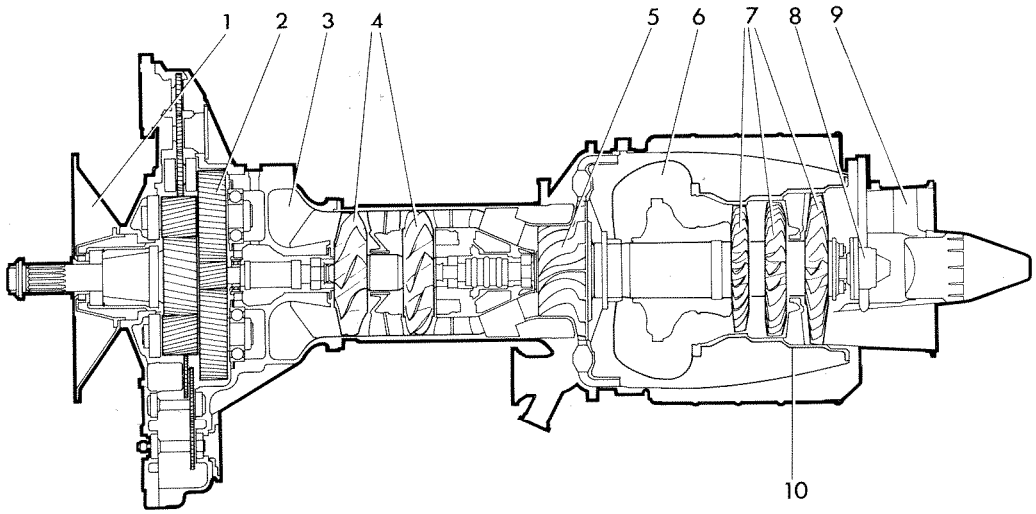
POWER PLANT

The turbine engine is attached to the top of the body structure in a fire-proof bay. It is installed aft of the main gearbox and connected to the latter through a centrifugal clutch and a connecting shaft fitted at both ends with flexible couplings.



This engine, manufactured by Turbomeca, is a single shaft Astazou XVIII A with the reduction gear at the front. It comprises :

- 1 casing bearing the power take-off (1)
- 1 reduction gear with accessory drive (2)
- 1 air-intake casing with 2 side ports (3)
- 1 two-stage axial compressor (4)
- 1 one-stage centrifugal compressor (5)
- 1 through-flow annular combustion chamber with centrifugal fuel injection (6)
- 1 three-stage axial turbine with cooled vanes (7)
- 1 rear mount (8)
- 1 outlet diffuser (9)
- 1 containment of turbine wheel 1st and 2nd stages (10)



The engine rotates at a constant rated speed of 43,000 r.p.m. that is, after reduction, 5,830 r.p.m. for power take-off.

Performance in ISA, sea level, is as follows :

RATING	R.P.M.	Max thermal power (t3)			Shaft horsepower		
		kW	ch	HP	kW	ch	HP
Max. take-off	43,000	770	1,047	1,032	650	883	871
Max. continuous	43,000	692	940	927	600	815	804

The power unit makes up a self-contained group fitted with all the equipment and accessories required for its installation and operation.

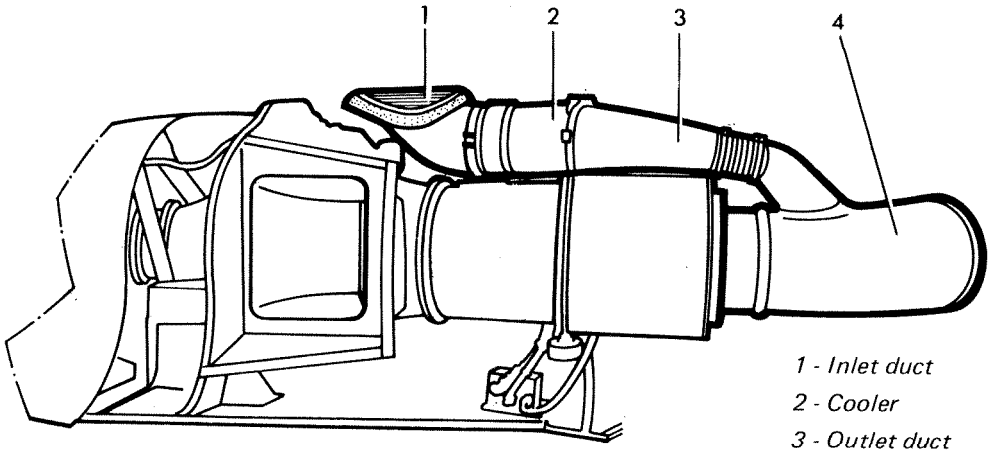
It includes :

- 2 fuel systems : one for starting and one for normal operation,
- 1 automatic fuel governing system, with flow restrictor, dispensing the pilot from any action on the fuel flow (no throttle on the collective-pitch lever). This system maintains the rotor r.p.m. within the operating limit throughout the flight envelope,
- 1 self-contained lubrication system incorporating a 12-litre (3.17 US.gal.) tank with a sight gauge,
- 1 starter-generator,
- 1 electronic-starting and high-power ignition system linked to an automatic-sequence control box,
- 1 emergency starter control,
- engine monitoring equipment.

The following equipment is fitted to the accessory plate and driven by the reduction gear : oil pump, r.p.m. governor, tachometer generator, starter-generator and alternator.

ENGINE COOLING SYSTEM

An oil cooler with thermostat, fitted above the engine, cools the engine lubricating oil.



1 - Inlet duct
2 - Cooler
3 - Outlet duct
4 - Tail pipe

The oil is circulated by a pump mounted on the accessory plate.

A by-pass valve, parallel-fitted on the feeding system, enables the flow to be diverted in case of clogging of the cooler.

The cooling air is sucked into an opening located over the engine compartment, passes through the cooler and is ejected by a venturi connected to the tail-pipe through a fire-resistant duct.

Openings in the rear of the cowls ensure the ventilation of the engine compartment.

ENGINE LUBRICANTS

	French Specifications	British Specifications	American Specifications	NATO Symbol	Remarks
Normal	AIR 3513		MIL.L.7808	0.148	Synthetic oil
	AIR 3514			0.150	
	AIR 3517		MIL.L.23699	0.156	
		D. Eng R.D. 2487		0.149	
				0.159	
Alternatives	AIR 3515		Aeroshell turbine oil 3	0.135	Mineral oil
		D. Eng R.D. 2490	Esso aviation utility oil F		
			Caltex Jet engine oil medium heavy		

Note : Use suffixes and amendments in force.

CONTROLS AND MONITORING INSTRUMENTS

Start-up and shut-down of the engine are performed with two controls grouped on the overhead quadrant :

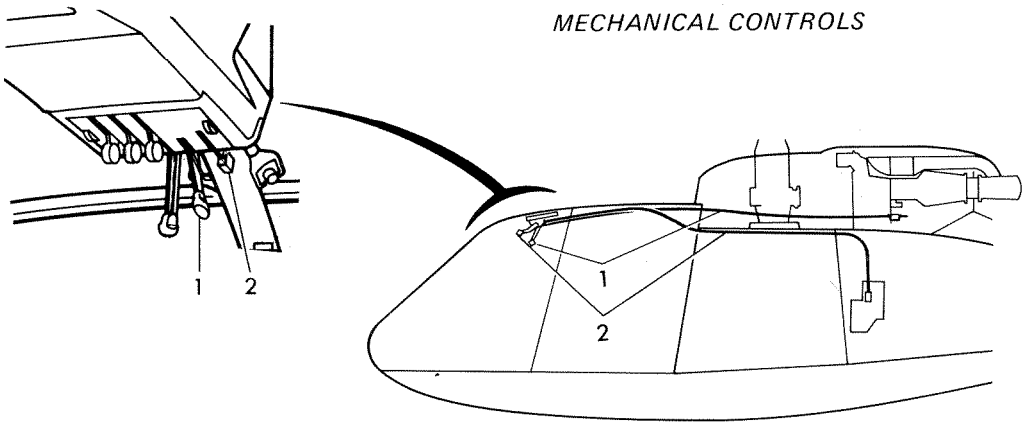
- 1 fuel flow control (1)
- 1 shut-off cock (emergency) (2)

and with two switches located on the instrument-panel :

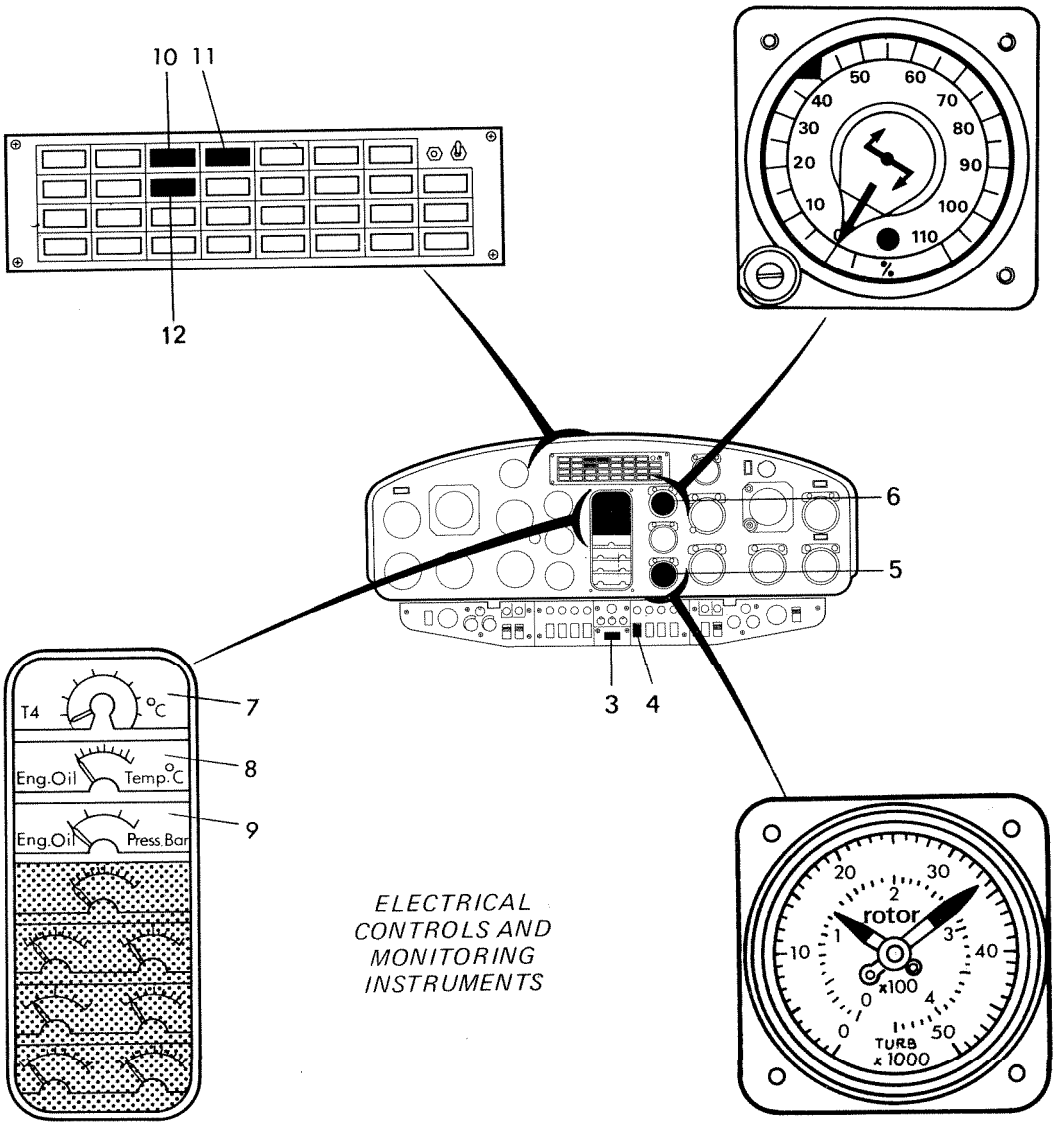
- 1 start-up selector (start-stop-ventilation) (3)
- 1 dual booster-pump switch (4)

Operation of the engine can be monitored through :

- 1 tachometer (5)
- 1 torquemeter (6)
- 1 engine tail-pipe temperature indicator (t_4) (7)
- 1 engine-oil temperature indicator (8)
- 1 engine-oil pressure indicator (9)
- 1 engine-oil pressure drop warning-light (10)
- 1 fuel-flow limit warning light (11)
- 1 engine bay overheating warning-light (12)



MECHANICAL CONTROLS



ELECTRICAL CONTROLS AND MONITORING INSTRUMENTS

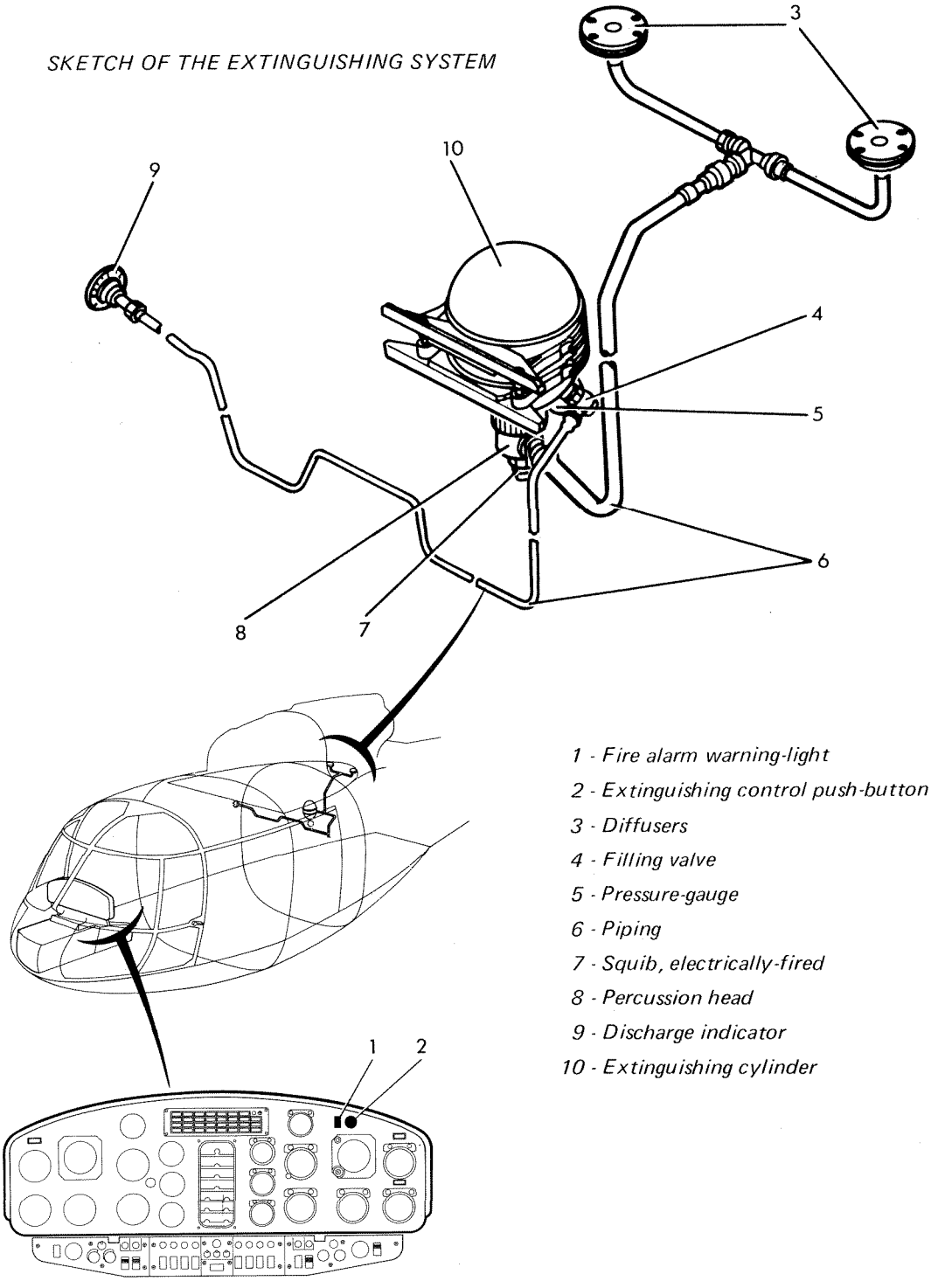
FIRE DETECTION AND PROTECTION

The engine compartment is fitted with a fire detection and protection device.

The detection system is made up of :

- 1 warning-light on the instrument-panel,
- 4 detectors on the engine.

SKETCH OF THE EXTINGUISHING SYSTEM



1 - Fire alarm warning-light
2 - Extinguishing control push-button
3 - Diffusers
4 - Filling valve
5 - Pressure-gauge
6 - Piping
7 - Squib, electrically-fired
8 - Percussion head
9 - Discharge indicator
10 - Extinguishing cylinder

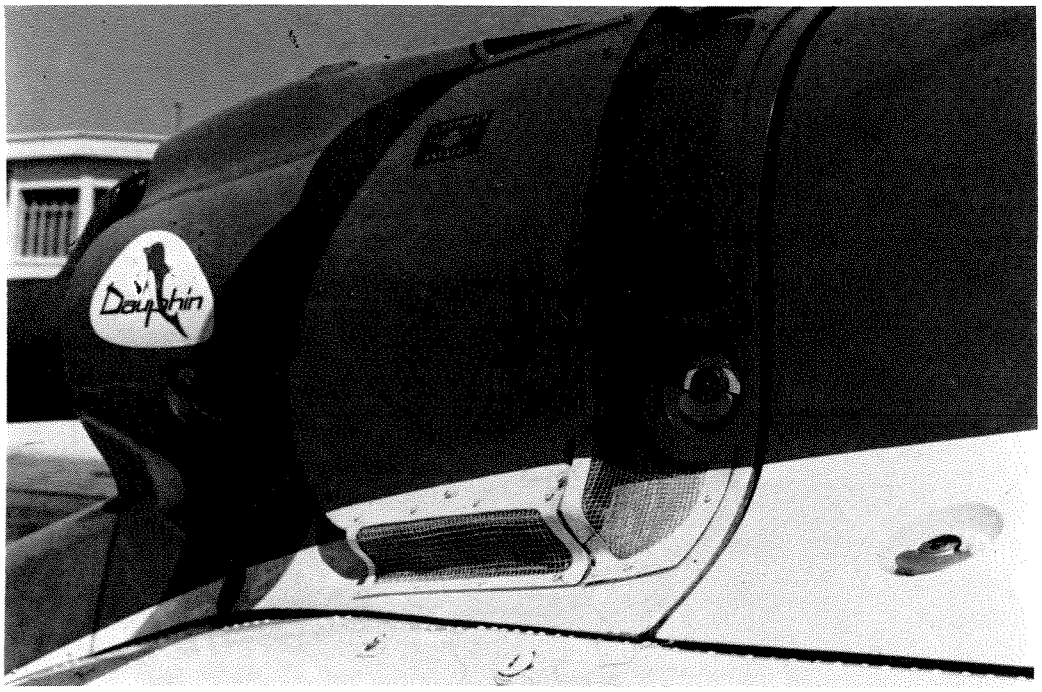
As regards the protective aspect, there are :

- 2 fire-walls : one at the front of the engine at the MGB/engine junction, and the other isolating the hot area of the engine inside the engine bay.
- 1 tail drive shaft protective tunnel.
- 1 1.5-kg freon extinguisher with a pressure-gauge and percussion-head with squib. This is fitted to the front partition of the luggage-hold.
- 2 diffusers on the engine-compartment floor connected to the extinguisher by piping in the luggage-hold.
- 1 disc-sealed push-button for firing the squib on the instrument-panel immediately beside the fire alarm warning-light.
- 1 extinguisher-discharge indicator on the RH side of the fuselage ahead of the luggage-hold door. The warning-light is white under normal conditions. If the extinguisher becomes discharged, the warning-light shows red.

ANTI-ICING PROTECTION

Each of the engine air-intakes is fitted with a shield which ensures its anti-icing and helps with lowering the compressor noise level.

The rectangular shields are installed on the engine cowls. They are fitted with a screen whose purpose is to prevent the engine ingesting foreign bodies.



FUEL SYSTEM

The installation includes :

- A system of distribution pipes which supply the fuel from the 2 fuel tank booster pumps to the engine through a 10-micron filter incorporating a drain cock.

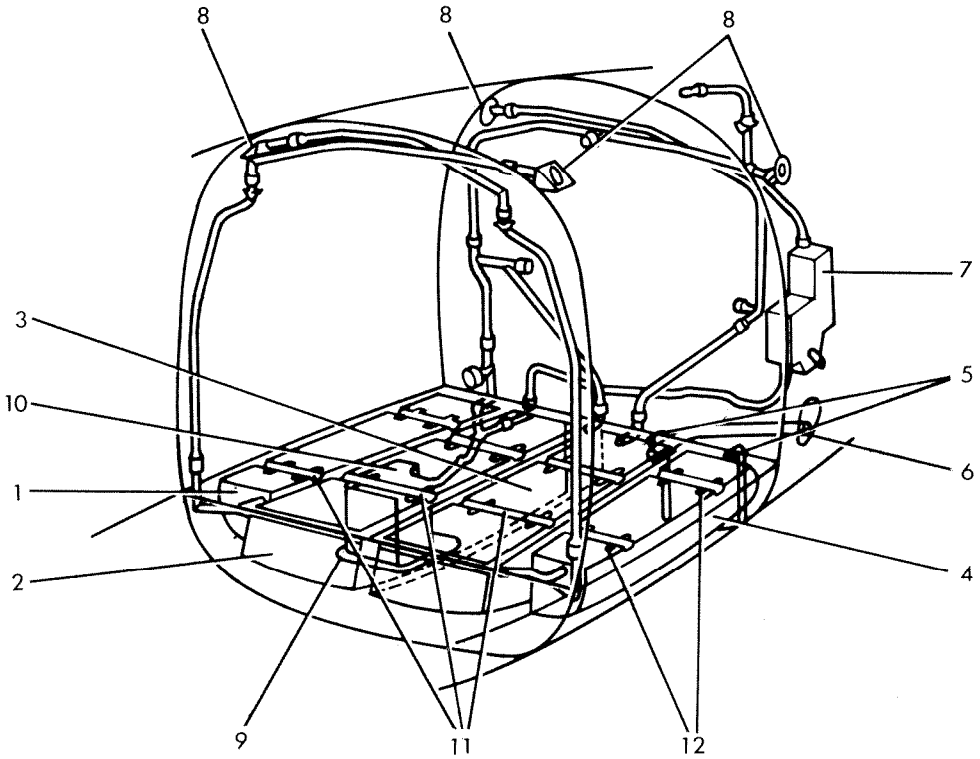
  In the event of filter clogging, fuel supply is maintained through a by-pass incorporated in the filter. A filter clogging indicator is installed on the filter and this can be seen on the right hand side of the aircraft.

- Three warning lights on the instrument-panel.

- A fuel shut-off control installed in the cockpit can be used to cut off the fuel supply in an emergency.

- Four cross-feed flexible tanks with a total usable capacity of 640 litres (169 US gal.) located in the bottom structure under the cabin floor. They are fitted with a common filler-neck on the LH side of the body structure, air-vents, separate purging and draining systems, a gauge and low-level switch.

- A feeder tank with a capacity of around twenty litres (5.2 US gal.) located in the RH central tank. An ejector fitted on a tapping of the engine fuel-system ensures the boosting element, irrespective of the fuel-level in the tanks. This feeder makes it possible to use all the fuel. A low-level warning-light advises the pilot when only 17 litres' fuel is left in the feeder, ie. approx. 5 mins' flight at a power of 300 kW.

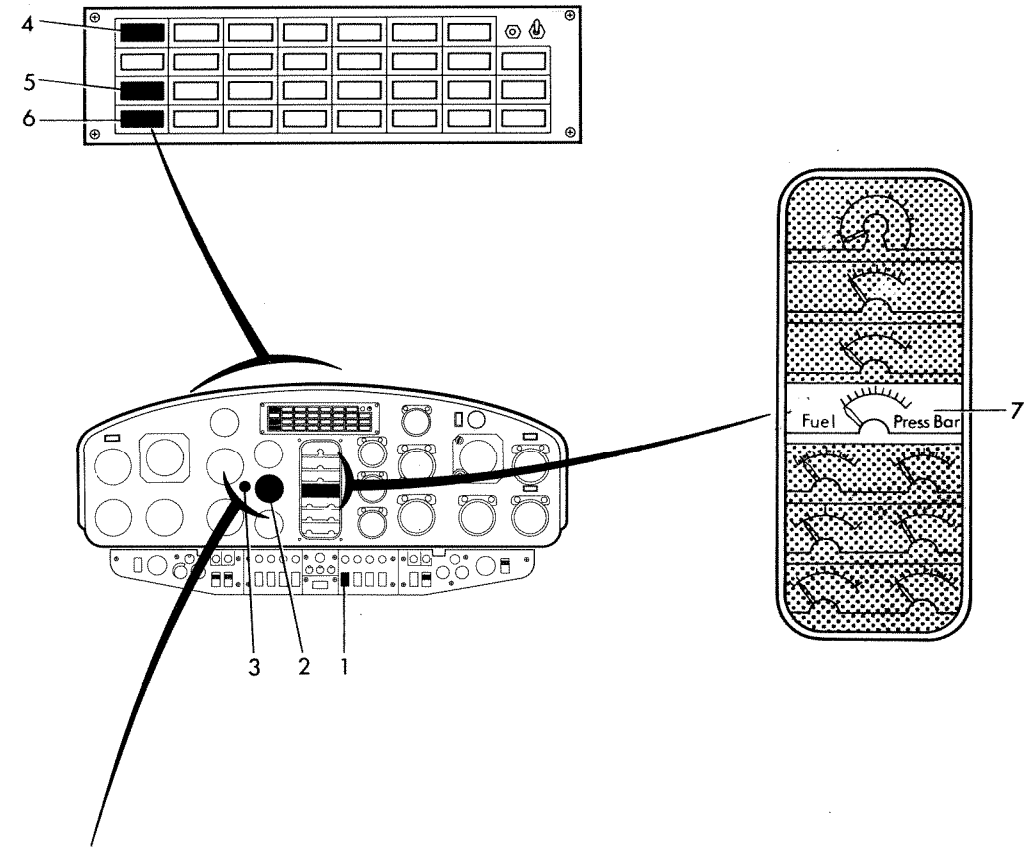


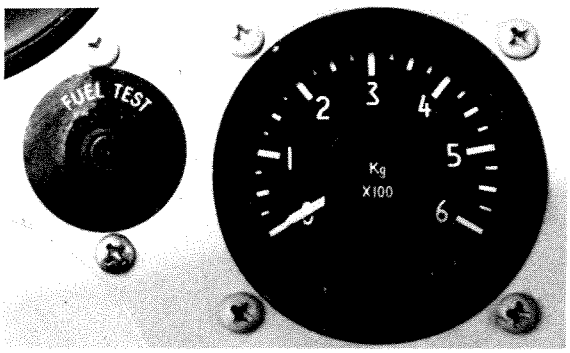
1 - RH side tank
2 - RH central tank
3 - LH central tank
4 - LH side tank
5 - Tank compartment ventilation
6 - Filler neck
7 - Filter box
8 - Tank air vents
9 - Accessory support plate
10 - Feeder
11 - Closing strips
12 - Expansion space connection

INSTRUMENTS

Fuel system monitoring is provided by :

- 1 «FUEL.Q» warning light which comes ON when the usable quantity of fuel is down to 17 litres (4.5 US gal.)
- 1 «FUEL.P» warning light which comes ON where there is a drop in pressure in the fuel system
- 1 «FILT» warning light which comes ON at the onset of fuel clogging
- 1 content gauge with test push-button

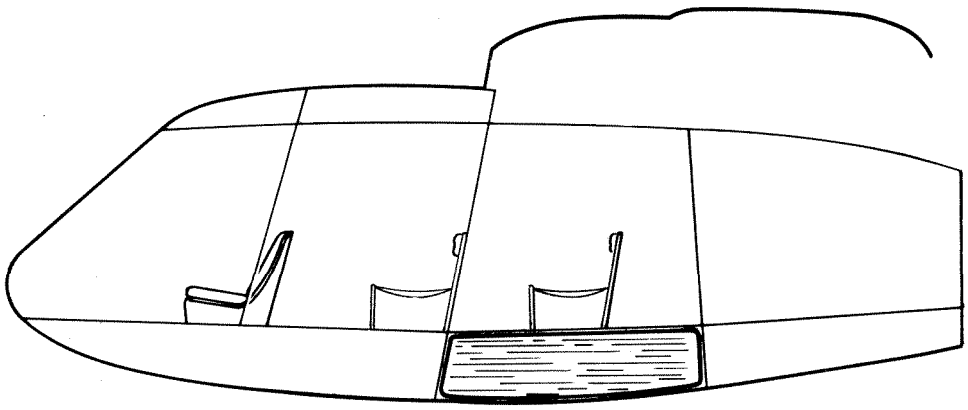




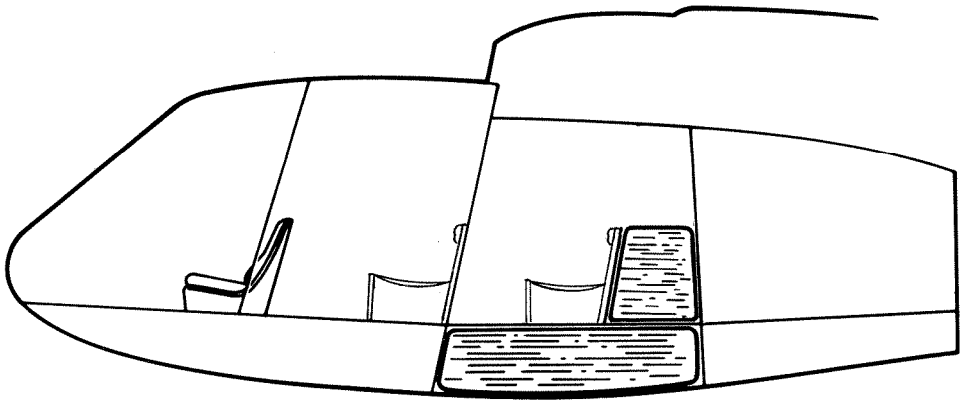
1 - Dual booster-pump switch
2 - Content gauge
3 - Test push-button
4 - Feeder low-level warning-light
5 - Pressure-drop warning-light
6 - Clogging onset warning-light
7 - Fuel pressure warning-light

As an option, the helicopter can accommodate an auxiliary tank of 215 litres (57 US gal.) usable capacity carried in a leak-proof, drained and ventilated container, or a ferrying one of 475 litres (125 US gal.). Both are located at the rear of the cabin. Their simultaneous installation is incompatible.

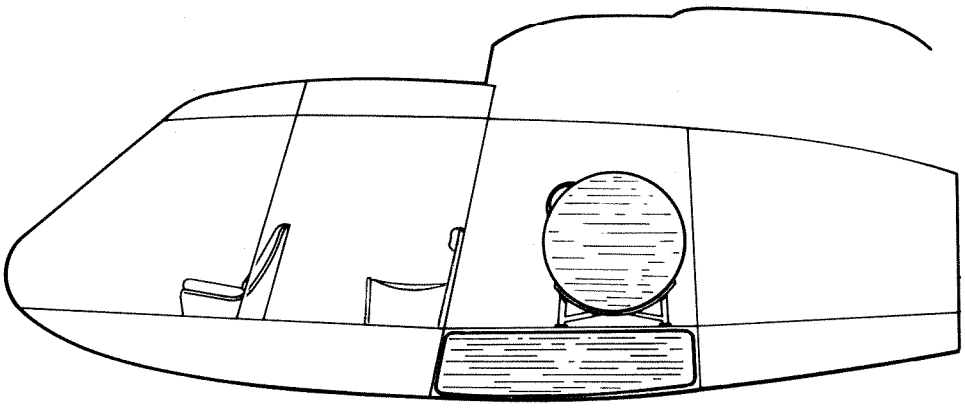
Only the auxiliary tank is authorised for use with passengers on board the hélicopter.



STANDARD TANKS
(consumable qty : 640 litres)



+ AUXILIARY TANK
(consumable qty : 640 + 215 = 855 litres)



OR FERRYING TANK
(consumable qty : 640 + 475 = 1,115 litres)

USABLE FUEL

The list of the fuels usable on the Astazou XVIII A engine is given herebelow :

Designation		French Specifications	British Specifications	American Specifications	NATO Symbol
NORMAL USE	KEROSENE	AIR 3405 TR.O	DERD 2453 AVTUR/FS 11	–	F.34
			–	ASTM Jet A	–
			DERD 2494 AVTUR	ASTM Jet A1	F.35
		AIR 3407 TR.4	DERD 2454 AVTAG/FS 11	MIL T 5624 JP 4	F.40
			DERD 2486 AVTAG	ASTM Jet B	F.45
		AIR 3404 TR.5	–	–	F.42
			DERD 2498 AVCAT	MIL T 5624 JP 5	F.44
FOR USE IN EMERGENCY	AUTOMOTIVE GASOLINE	DCEA/2D MT 80	DEF 2401	MIL G 3056	F.46
	AVIATION GASOLINE	AIR 3401 80/87	–	MIL G 5572 80/87	F.12
		AIR 3401 100/130	DERD 2485 100/130 AVGAS	MIL G 5572 100/130	F.18
		AIR 3401 115/145	DERD 2485 115/145 AVGAS	MIL G 5572 115/145	F.22
	NAVY FUEL	7120 STM GAS OIL 0	DEF 2402 47/0	MIL F 16884	F.75
		7120 STM GAS OIL 20	DEF 2402 47/20	–	F.76
	AUTOMOTIVE DIESEL OIL	DCEA 21 C	TS 10-003	VVF 800	F.54 / F.56
	ILLUMINATING OIL	DCEA 11 C	DEF 2403	VVK 211	F.58

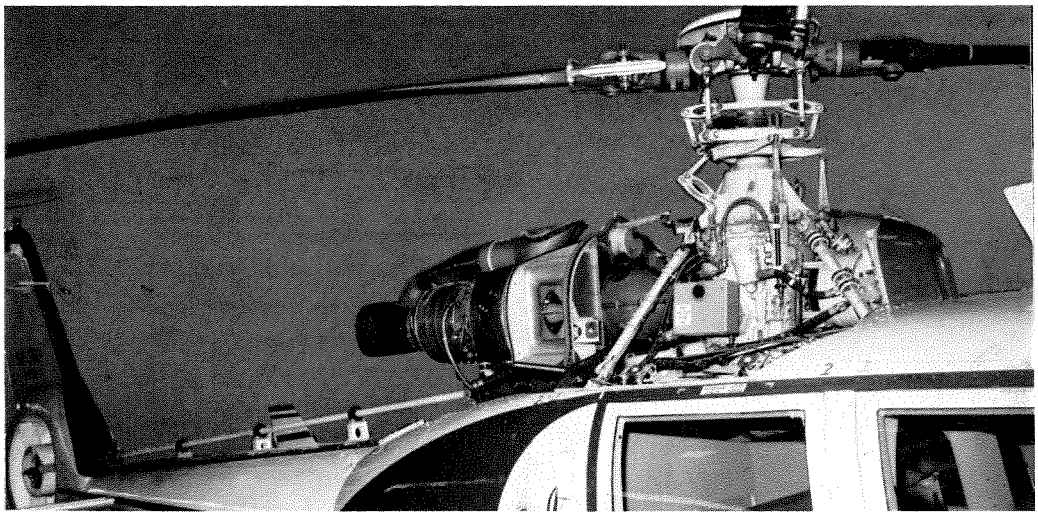
Note : The use of « emergency fuels » is subject to certain temperature and duration restrictions indicated in the « limitations » chapter of the Flight Manual.

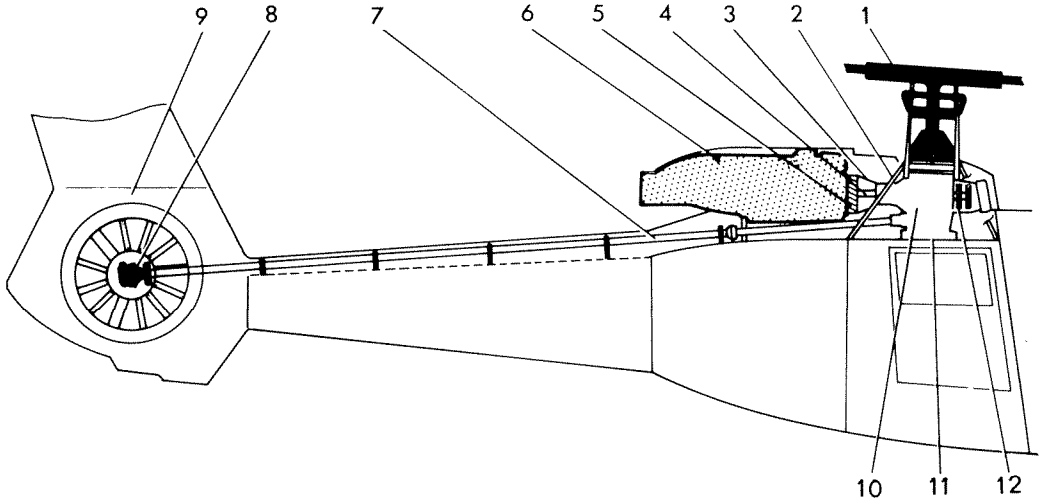
TRANSMISSION SYSTEM

The mechanical assemblies consist of :

- 1 MGB/engine drive-shaft
- 1 main gearbox (MGB)
- 1 tail drive-shaft
- 1 tail gearbox (TGB)

LOCATION OF THE MECHANICAL UNITS





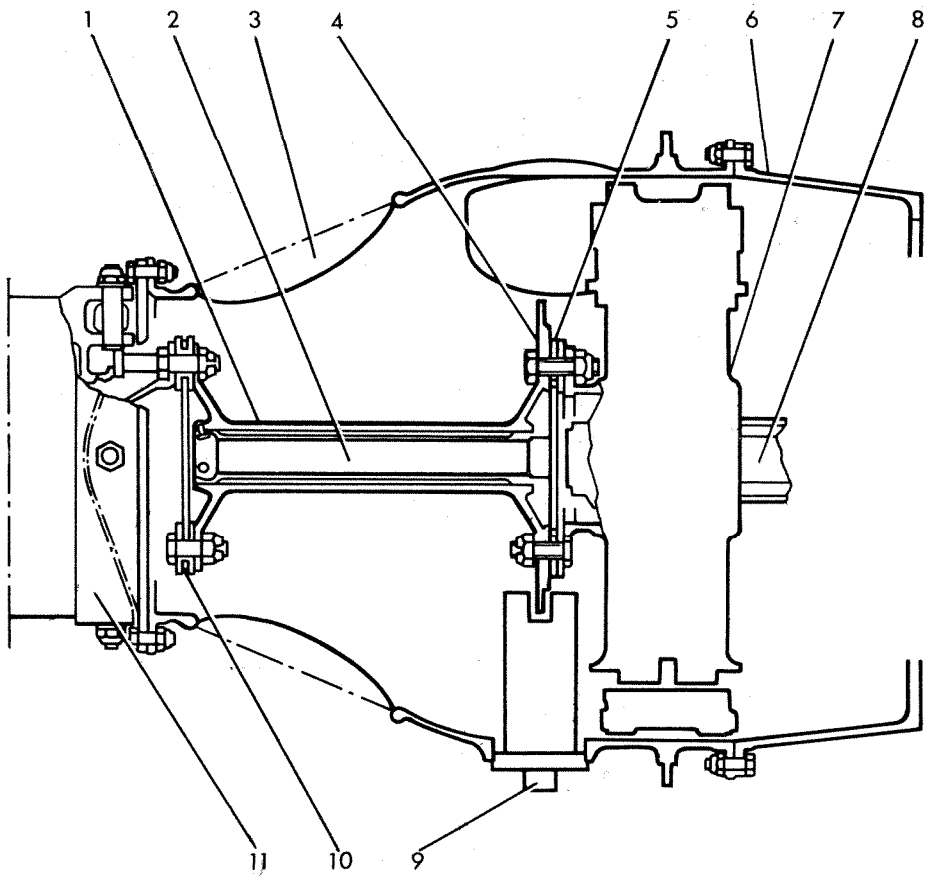
1 - Main rotor head
2 - MGB attachment bars
3 - Intermediate casing
4 - Torquemeter quill shaft
5 - Clutch
6 - Power plant
7 - Tail drive-shaft
8 - Tail gearbox
9 - Fenestron
10 - Main gearbox
11 - MGB flexible mounting
12 - Rotor brake

ENGINE TO MAIN GEARBOX COUPLING ASSEMBLY

This comprises :

- 1 dry-type centrifugal clutch attached to the output shaft of the engine reduction-gear.
- 1 liaison shaft linking the clutch to the MGB through flexible couplings.
- 1 engine-torque measurement and transmission system.

This system is housed in a casing acting as front mounting for the engine.



1 - Liaison shaft
2 - Torquemeter shaft
3 - Intermediate casing
4 - Torquemeter disc
5 - Rear flexible coupling
6 - Engine reduction gear casing
7 - Centrifugal clutch
8 - Engine output shaft
9 - Torquemeter senser
10 - Front flexible coupling
11 - Main gearbox universal joint housing

MAIN GEARBOX

The main gearbox conveys the power supplied by the engine to the main and tail rotors. It is attached to the upper part of the body structure through a flexible mounting at its lower part, and by a stand made up of 2 front bars and 2 rear ones, all identical.

The main gearbox has one reduction stage with a bevel gear and a sun and planet gear with 5 satellites contained in a light alloy casing. A free-wheel is fitted to the power take-off.

The main gearbox drives :

- 1 oil pump
- 1 fan
- 1 rotor brake disc } on a common shaft
- 1 RH hydraulic pack
- 1 LH auxiliary system hydraulic pump
- 1 power take-off for the optional fitting of a second alternator.

The control of the reduction gear assembly and its lubrication is ensured by :

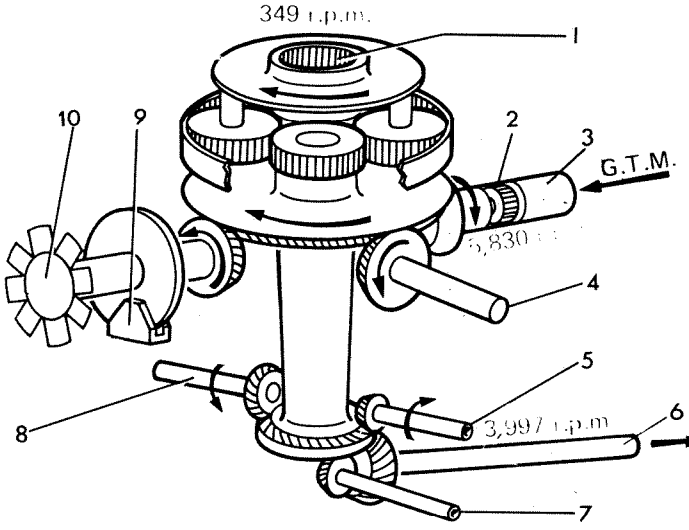
- 1 magnetic plug
- 6 openings for passing a boroscope
- 1 oil-temperature probe
- 1 oil-temperature thermal switch
- 1 oil-pressure transmitter
- 1 oil-pressure switch
- 1 opening for taking oil for spectrographic analysis
- 1 sight-gauge.

The MGB has in addition, filling and draining ports and a filter. Oil capacity in the casing is 8.5 litres (2.2 US gal.).

The main gearbox can absorb a maximum power of 650 kW (883 ch or 871 HP).

The rotor brake can be applied only when rotor speed has dropped to approximately 170 r.p.m. or less.

The time required to come to a complete standstill is approximately 20 seconds.



1 - Main rotor output shaft
2 - Free wheel
3 - Power take-off
4 - Hydraulic pump drive
5 - Alternator drive (optional)
6 - Tail drive shafting
7 - Oil pump drive
8 - Hydraulic pack drive
9 - Rotor brake
10 - Fan

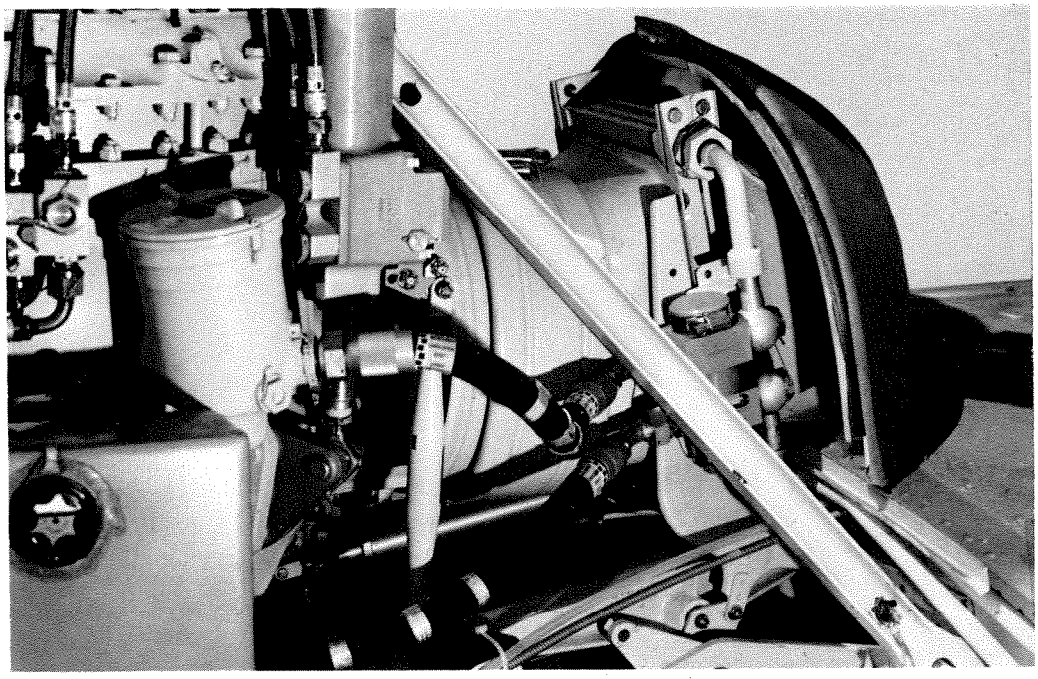
TRANSMISSION SYSTEM

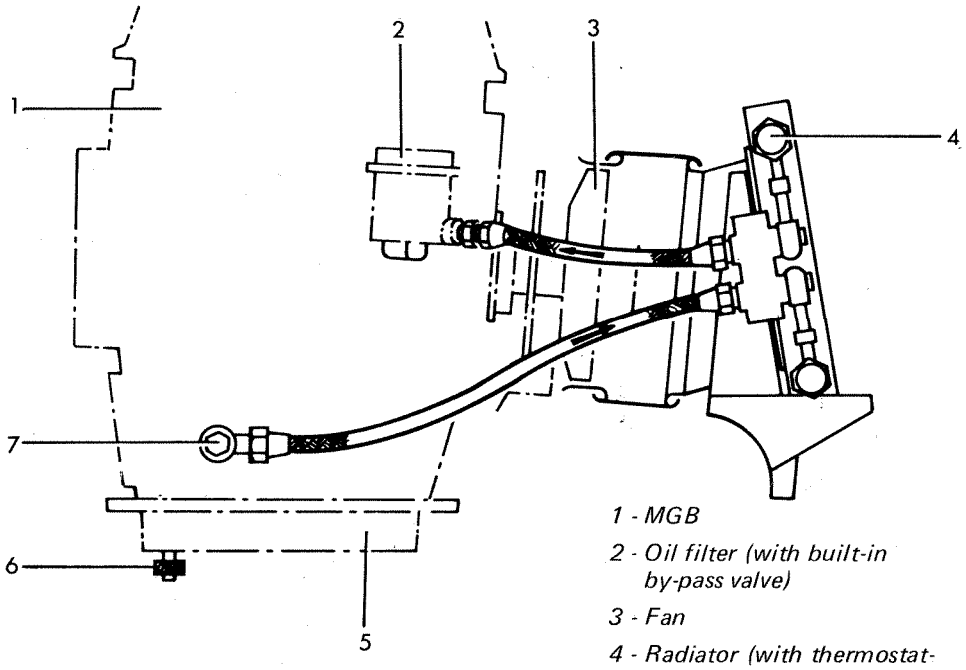
Main gearbox cooling system

Cooling of the main gearbox oil is effected by a thermostatically-controlled radiator.

The oil is circulated by a pump incorporated in the main gearbox.

The cooling-air is sucked through the radiator by a fan driven by the main gearbox. In case of stoppage or incident with the fan, the radiator is then cooled by ram air through the opening at the front of the MGB cowlings.





1 - MGB
2 - Oil filter (with built-in by-pass valve)
3 - Fan
4 - Radiator (with thermostat-controlled by-pass valve)
5 - Oil tank
6 - Drain plug
7 - Oil pump

TAIL ROTOR DRIVE

The tail rotor drive shaft is made up of 3 sections aligned between the MGB output and tail gearbox input.

- A front section, bearing-free, fixed to the MGB flexible coupling,
- A centre section with 4 bearings,
- A rear section, with 1 bearing, fixed to the TGB flexible coupling.

The five journals run in pre-lubricated, sealed anti-friction bearings which are clamped to supports provided on the body structure and tail boom. The tail drive assembly is protected by hinged fairings.

TAIL GEARBOX

The tail gearbox belongs to the tail gearbox and head unit and includes a set of bevel gears angled at 90 degrees.

The oil capacity of the tail gearbox is 0.3 litres (0.5 pt). An oil sight gauge, a magnetic plug, an oil temperature thermal-switch and filling and drain ports are provided.

This assembly is mounted on a tripod frame in the aperture of the fenestron. The assembly and the arms of the tripod are streamlined.

The list of oils used for lubricating the mechanical components is shown in the following chart.

MECHANICAL COMPONENT LUBRICANTS

French Specifications	British Specifications	American Specifications	NATO Symbols	Remarks
AIR 3525	DTD 581	MIL.L.6086	0.155	Mineral oil
		MIL.L.23699	0.156	Synthetic oil

NOTA : The flexible couplings on the MGB, the tail drive, the engine liaison shaft and the TGB are all the same.

ELECTRICAL ANCILLARIES AND LIGHTING

D.C. GENERATION

The D.C. generation is furnished by :

- 1 4.5 kW starter-generator driven by the engine
- 1 23 amp .h., 24-volt cadmium-nickel battery. This battery provides self-sustained starts and power-supply in an emergency and on the ground,
- 1 ground power receptacle, located on the RH side of the aircraft, is provided to feed the network and the starts from a ground power unit.

All three power sources are connected to the bus bar from which the various items of equipment are fed.

A voltmeter located on the instrument panels shows the voltages delivered by :

- the generator when it is switched on,
- the battery when the generator is switched off,
- the ground power unit connected to the ground power receptacle.

An ammeter makes it possible to monitor the output of the generator.

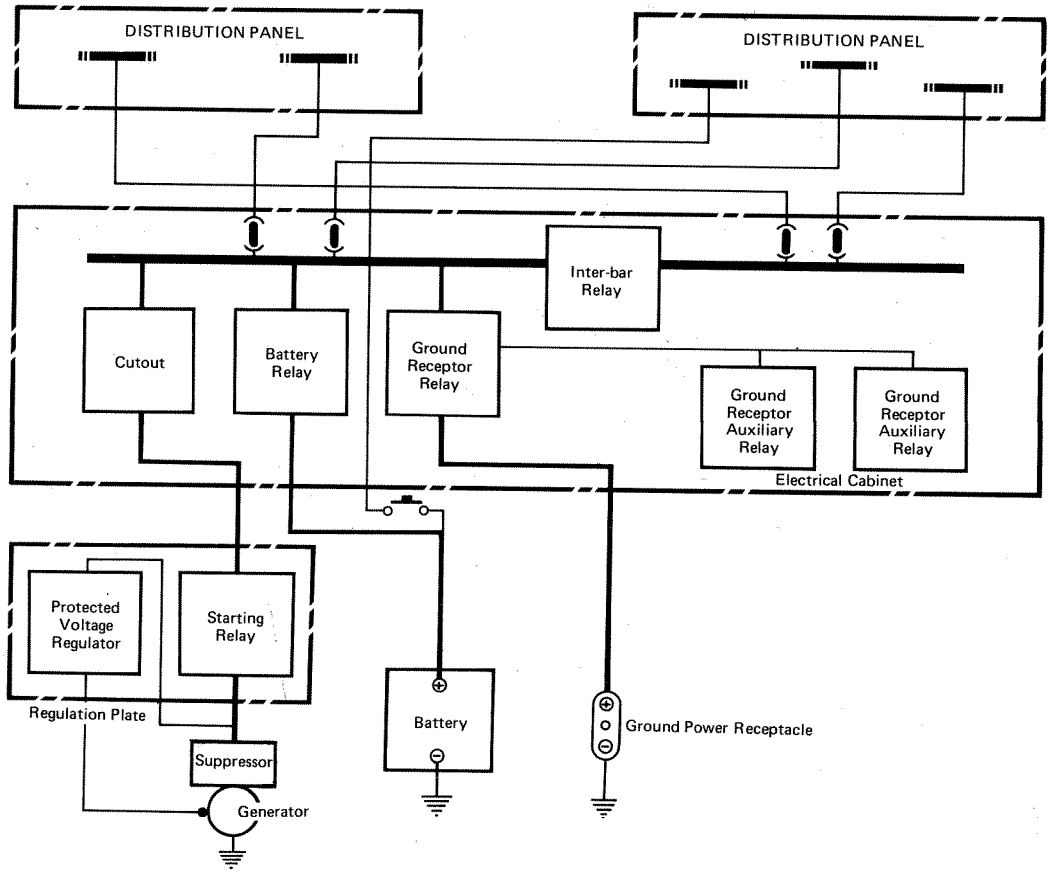
The « electrical-cabinet, battery, distribution panel » assembly is grouped in adjoining compartments at the frontmost part of the console carrying the instrument panel, under the cabin floor and is accessible through an inspection door.

The systems are protected with circuit-breakers in two boxes respectively located to the left and right of the console.

The electrical circuits are protected against the generator overvoltage surges.

The nominal voltage of the D.C. system is 28.5 volts.

D.C. generation system sync.



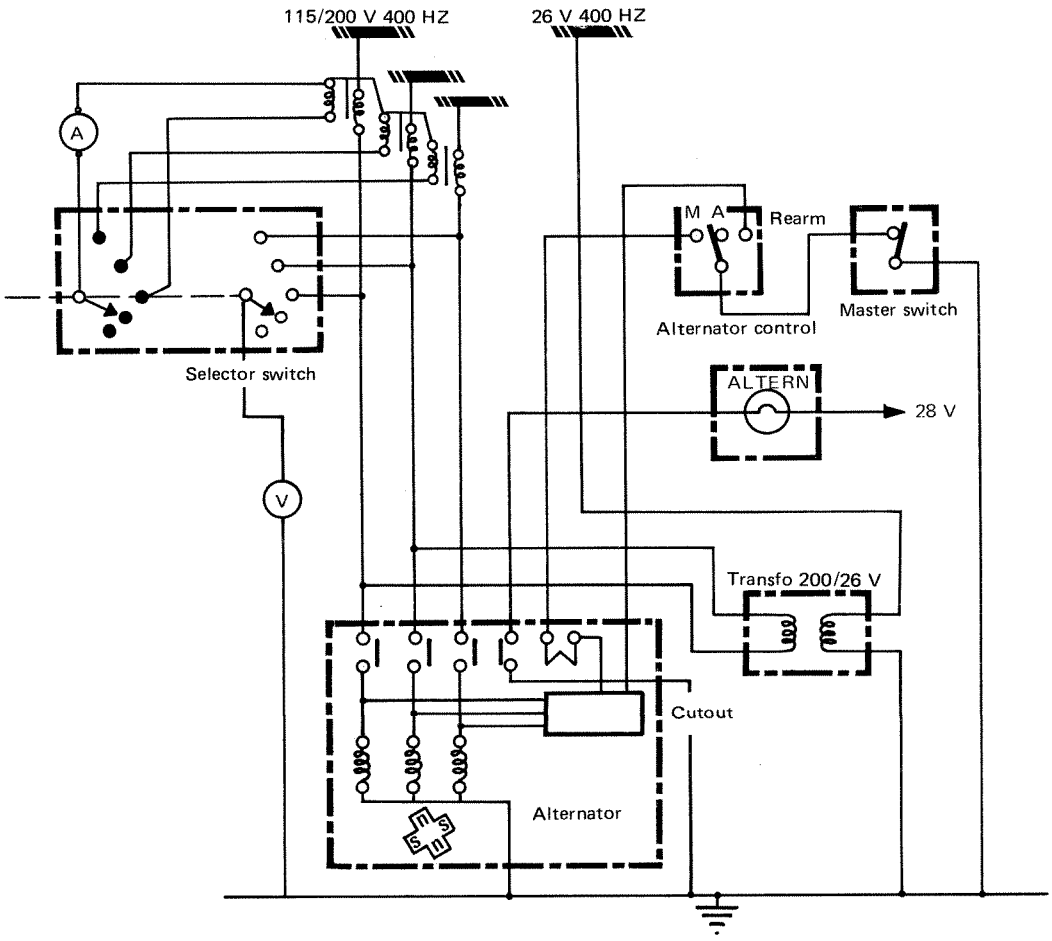
AC GENERATION SYSTEM

The helicopter is fitted with an AC generation-system comprising :

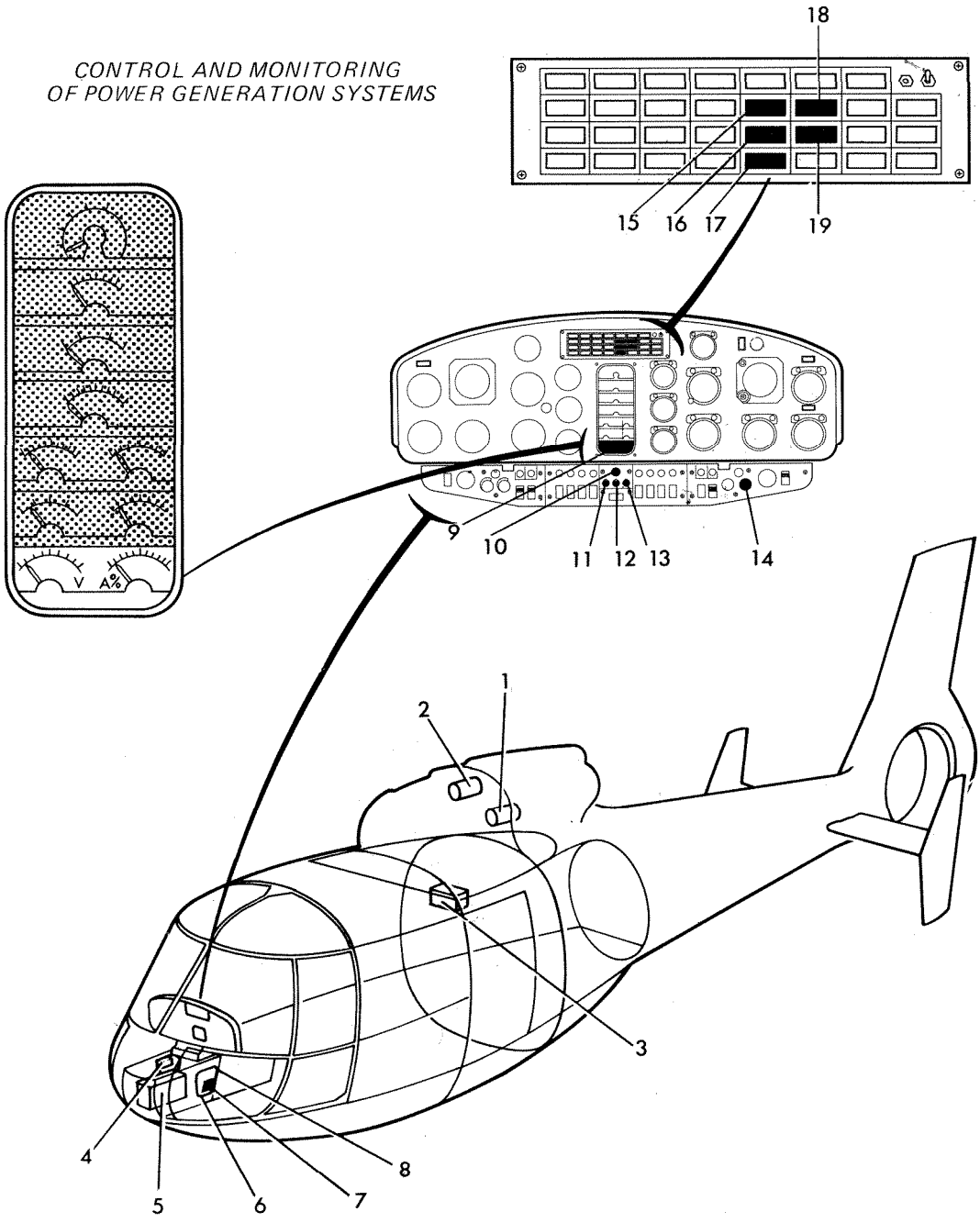
- 1 115/200 volt-400 Hz section including :
  - 1 engine-driven, 3-phase, 0.5 kVA alternator
  - 1 switch with protection device re-arming button for use in case of tripping
  - 1 AC system failure warning light
- 1 26 volt-400 Hz section comprising :
  - 1 transformer fed by one phase of the 3-phase network and delivering 100 VA.

The latter section is protected against excessive and insufficient frequencies and voltages as well as against short-circuits.

AC generation system synopsis



CONTROL AND MONITORING OF POWER GENERATION SYSTEMS

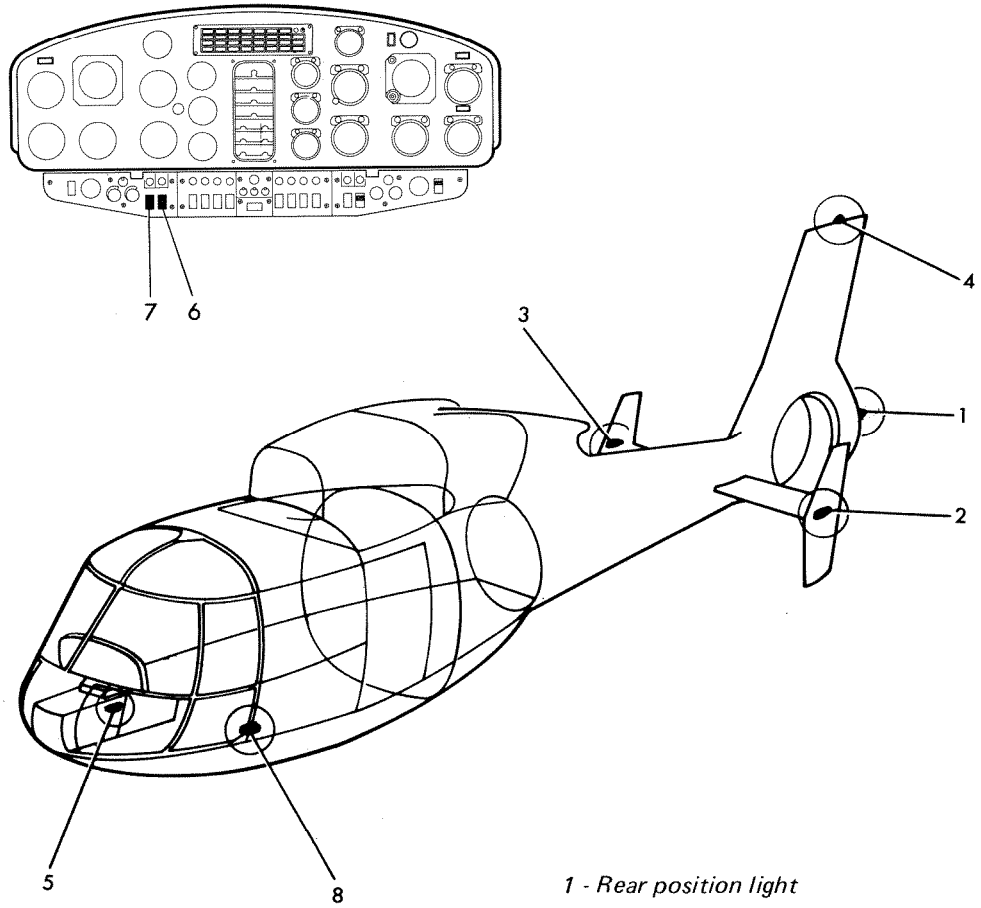


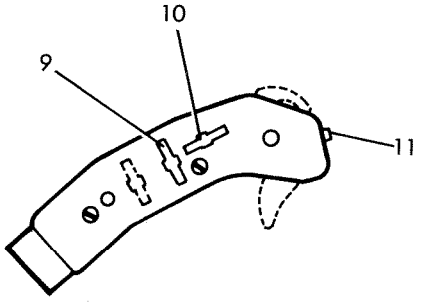
1 - *Starter-generator*
2 - *Alternator*
3 - *Voltage regulator*
4 - *Ground power receptacle*
5 - *Battery*
6 - *RH distribution panel*
7 - *LH distribution panel*
8 - *200 V-to-26 V transformer*
9 - *Voltmeter and Ammeter*
10 - *Master emergency switch*
11 - *Alternator switch*
12 - *Battery/ground power receptacle switch*
13 - *Generator switch with rearming switch for use after tripping due to overoltage*
14 - *Voltmeter/Ammeter selector switch*
15 - *Battery charging failure warning light*
16 - *Battery overheating warning light*
17 - *Aux. bus bar tripping warning light*
18 - *Generator failure warning light*
19 - *AC system failure warning light*

EXTERIOR LIGHTING

The aircraft is fitted with :

- 3 fixed position lights :
  - 2 on the side fins,
  - 1 at the tip end of the tail boom
- 1 flashing anti-collision light at the top of the main fin,
- 1 450 W landing light, iode type, trainable in elevation. This light is mounted underneath the aircraft, between the main landing gear legs and controlled by two switches on the collective-pitch control lever.
  A warning light comes ON when the landing light is energized.





1 - Rear position light
2 - LH position light
3 - RH position light
4 - Anti-collision light
5 - Flashing unit
6 - Position light switch
7 - Anti-collision light switch
8 - Landing light
9 - Landing light lamp switch
10 - Landing light motor switch
11 - Landing light «on» warning light

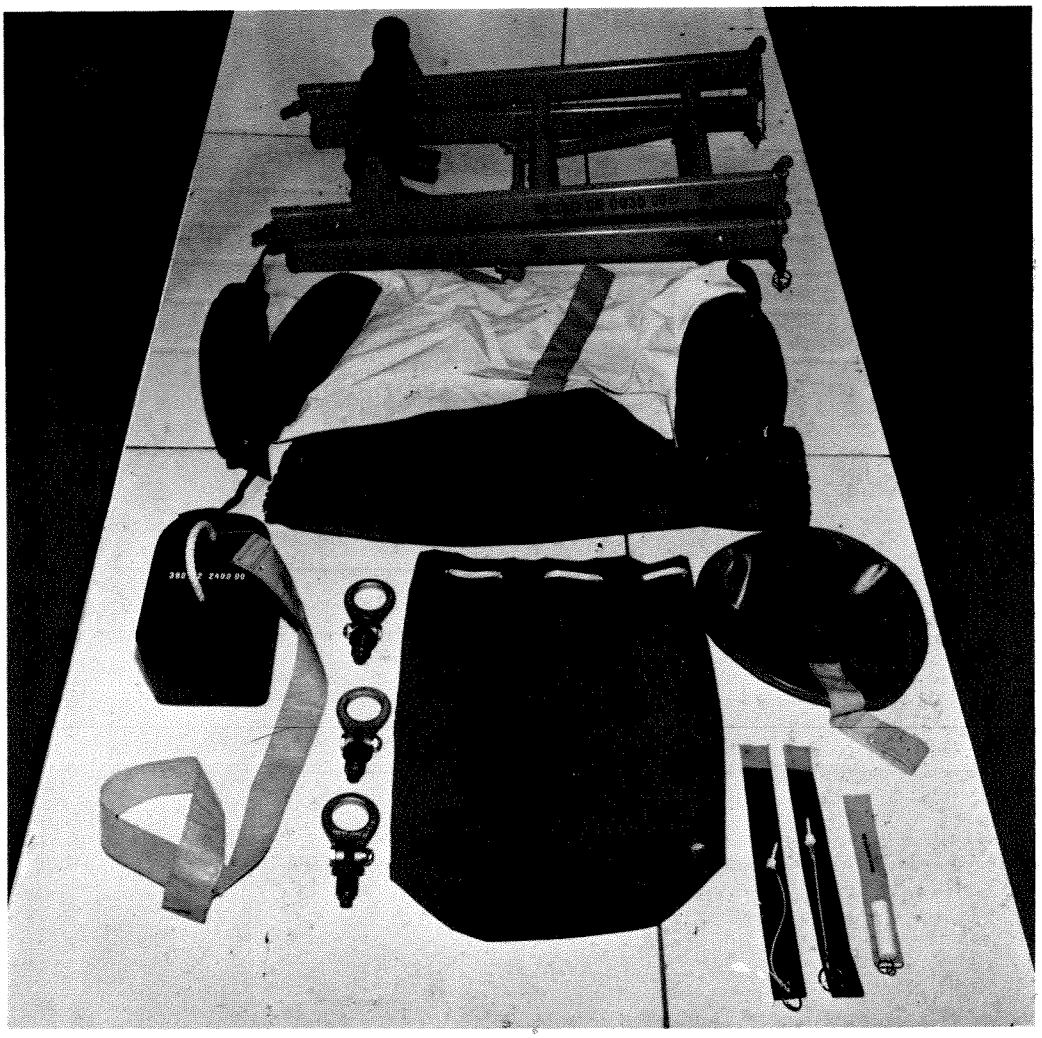
AIRBORNE KIT

The airborne kit delivered with each aircraft includes :

- 1 pitot head blank
- 2 static vent blanks
- 2 engine air intake blanks
- 1 tail pipe blank
- 3 mooring rings
- 1 ladder for access to transmission platform.

The bay containing this kit is stowed in the luggage hold.

The weight of this kit is not included in the empty weight of the standard aircraft shown under «characteristics».



ACCOMPANYING LITERATURE

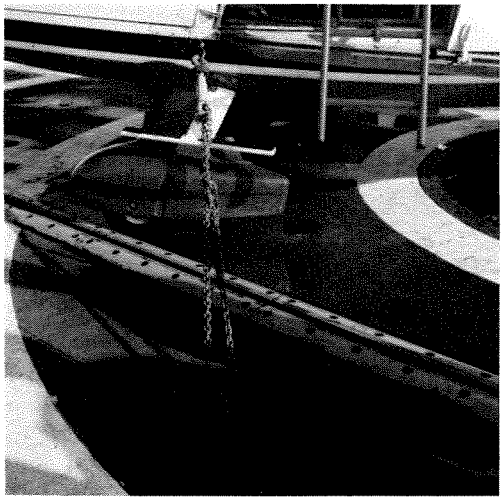
Each aircraft is delivered with the following corresponding documents (in French or English as per the operator's choice) :

- Individual Inspection Log Book, including :
  - certificate of conformity
  - inspection log book
- Engine log books
- Log cards drawn up for those components or assemblies subject to individual control
- Journey log
- Aircraft log book
- Airworthiness Certificate (for those aircraft not registered in France, it is an « export » one testifying to the fact that the helicopter would have received its individual airworthiness certificate in France).

HANDLING AND PICKETTING

Different points are provided on the fuselage for ground handling and installation of maintenance tooling :

- Mooring rings :
  - 2 rings on the bottom structure, in line with the body structure front frame
  - 1 ring at the tail boom/fin junction



FRONT MOORING POINTS

REAR MOORING POINT

- Bad weather mooring rings :
  - structural provisions (1 on each side in line with the transmission deck)
- Lifting points :
  - 1 ring at the top of the rotor head
  - 2 fittings for attaching ball-and-socket jacking points to the bottom structure, in line with the body structure front frame
  - 1 fitting for attaching a ball-and-socket jacking point to the bottom structure, in line with the tail boom junction
  - the four upper mooring points on the main frames can be used for handling the aircraft with the cargo-sling of another helicopter or a crane.

- Points for normal towing or de-bogging :
  - 2 holes on the main landing gear axles for de-bogging
  - normal towing is by pulling on the tail wheel

TOWING BAR

- Attachment points for a mechanical component removal crane :
  - 3 points, on the RH side of the aircraft
- Attachment points for the access ladder to the transmission deck :
  - 4 points either side of the aircraft : two on the deck and two on the side of the central structure.

SUMMARY OF STANDARD AIRCRAFT DEFINITION

GENERAL

Fuselage comprising the cabin and luggage hold with floor, tie-down net and access-door
Tail boom with stabilizer fitted with 2 lateral fins and terminated by a shrouded tail rotor built in the main fin
Fixed, faired-in wheeled main landing gear with differential brakes on pilot's side
1 tail wheel with castor-lock system
Hoist and cargo-sling attachment points
Jacking points and hoisting hook
Skid landing-gear provisions
Interior paint : grey ; exterior : as per customer paint scheme (glossy or dull polyurethane finish).

CABIN

1 cabin floor capable of various sitting arrangements up to 14 seats
2 removable pilot and copilot blue bucket-type seats, adjustable in reach, each fitted with a safety belt
8 folding dark-blue utility seats, each fitted with a safety belt
4 jettisonable hinged doors
1 door-extension, RH side
2 foot-steps
2 bad-weather windows
2 upper tinted panes
2 sun vizors
Cabin upholstering with soundproofing
Solo flying controls with dual-control capability
1 heating and ventilation system, with air-conditioning capability
1 windshield wiper, pilot side
2 map-cases at pilot and copilot stations
6 ash-trays (1 on each door and 2 at pilots' station)
2 fire-extinguishers
1 first-aid kit recess
1 folding console (pilot's side)
1 flight manual
1 data case.

INSTRUMENTS

1 airspeed indicator
1 altimeter
1 rate-of-climb indicator
1 gyro-horizon
1 gyro-compass with a radio magnetic indicator
1 heated pitot head
1 torquemeter/power computer
1 tail pipe indicator
1 engine oil pressure and temperature indicator
1 fuel pressure indicator
1 main gearbox oil pressure and temperature indicator
2 hydraulic pressure gauges
1 voltmeter
1 ammeter
1 fuel content gauge
1 clock
1 dual tachometer (rotor, engine)
1 stand-by magnetic compass
1 outside air temperature indicator
1 warning panel
1 master alarm light
1 fire warning light and extinguishing control
1 manœuvering-limit warning light
1 hourmeter

POWER PLANT

1 TURBOMECA ASTAZOU XVIII A - 1,047 ch (1,032 HP) turbine engine complete with starting, fuel supply, lubrification, governing and oil cooling systems
1 fuel system including four tanks (640-litre, 169 US gal)
1 fire detection and extinguishing system
2 anti-icing engine air-intake mufflers with grid

TRANSMISSION SYSTEM

1 main rotor gearbox, anti-vibration mounted with oil sight gauge, magnetic plug, oil pressure and temperature switch, rotor r.p.m. phonic wheel senser, holes for passing of endoscope and sampling of oil
1 tail rotor gearbox with oil sight gauge and temperature-switch
1 main gearbox oil cooling system
1 engine-to-main gearbox liaison shaft with torquemeter
1 clutch unit
1 free wheel unit
1 rotor brake

ROTOR AND FLYING CONTROLS

1 semi-articulated main rotor with four glass and carbon fibre blades and blade-folding capability
1 tail rotor with 13 metal blades, built in the fin
2 sets of 3 single-body servo-controls mounted in series on the flight-control channel, each fed by an independent hydraulic system :
1 main set at the main rotor head and
1 auxiliary set capable of accommodating the autopilot
1 tail-rotor servo-unit

ELECTRICAL INSTALLATION

1 0.5 kVA, 115/200 V, 400 Hz alternator
1 4.5 kW starter-generator
1 23 amp-hr, cadmium-nickel battery
1 external power receptacle
1 instrument white lighting system
1 cabin extension-light, pilot side
2 cabin dome-lights
1 hold dome-light
3 position lights
1 landing light, adjustable in elevation
1 anti-collision light

AIRBORNE KIT (weight not included in empty weight of standard aircraft)

1 pitot head cover
2 static vent blanks
2 engine air-intake blanks
1 engine tail pipe blank
3 mooring rings
1 access ladder to transmission deck
1 airborne kit stowing bag

MAIN PERFORMANCE

The following performance figures are values obtained with an average production engine. Unless otherwise stated, they are given for clean aircraft, in zero wind at sea level, standard atmosphere conditions.

Weight	kg lb	2,400 5,290	2,600 5,730	2,800 6,170	3,000 6,615
Max. speed, VNE	km/h mph kts	315 196 170	315 196 170	315 196 170	315 196 170
Fast cruise speed	km/h mph kts	279 173 150	275 171 148	272 169 147	270 168 146
Economical cruise speed	km/h mph kts	257 160 139	253 157 137	250 155 135	247 153 133
Fuel consumption at economical cruise speed	kg/km lb/st.m lb/n.m	0.75 2.65 3.06	0.76 2.69 3.10	0.78 2.75 3.19	0.79 2.79 3.23
Rate of climb	m/sec. ft/min	10.0 1,970	9.0 1,770	8.1 1,595	7.1 1,400
Maximum range without fuel reserve at economical cruise speed	km st.m n.m	690 429 372	680 423 367	670 416 362	655 407 353
Endurance without reserve at 130 km/hr (70 kts or 81 mph)	hr	4.0	3.9	3.8	3.7
Hover ceiling IGE at take-off power					
■ ISA	m ft	4,600 15,090	3,850 12,630	3,150 10,330	2,450 8,035
■ ISA + 20°C	m ft	3,850 12,630	3,000 9,840	2,150 7,050	1,400 4,590
Hover ceiling OGE at take-off power					
■ ISA	m ft	3,950 12,955	3,200 10,495	2,450 8,035	1,750 5,740
■ ISA + 20°C	m ft	3,200 10,495	2,300 7,545	1,450 4,755	600 1,970
Service ceiling (0.5 m/sec., 100 ft/min)	m ft	> 4,570 >15,000	> 4,570 >15,000	> 4,570 >15,000	4,350 14,270

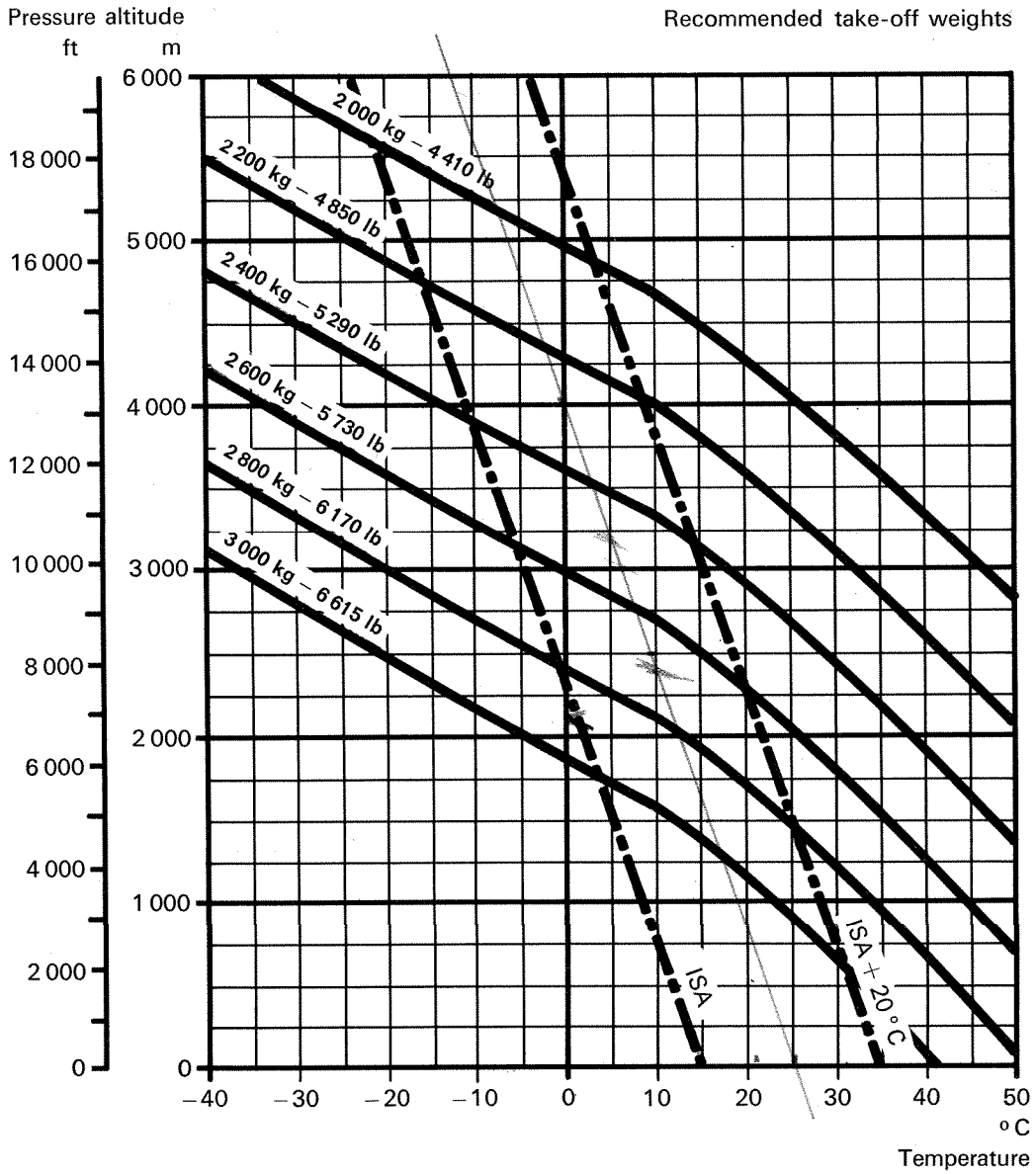
OPERATING LIMITATIONS

The aircraft is cleared to operate within the following altitude and temperature limitations :

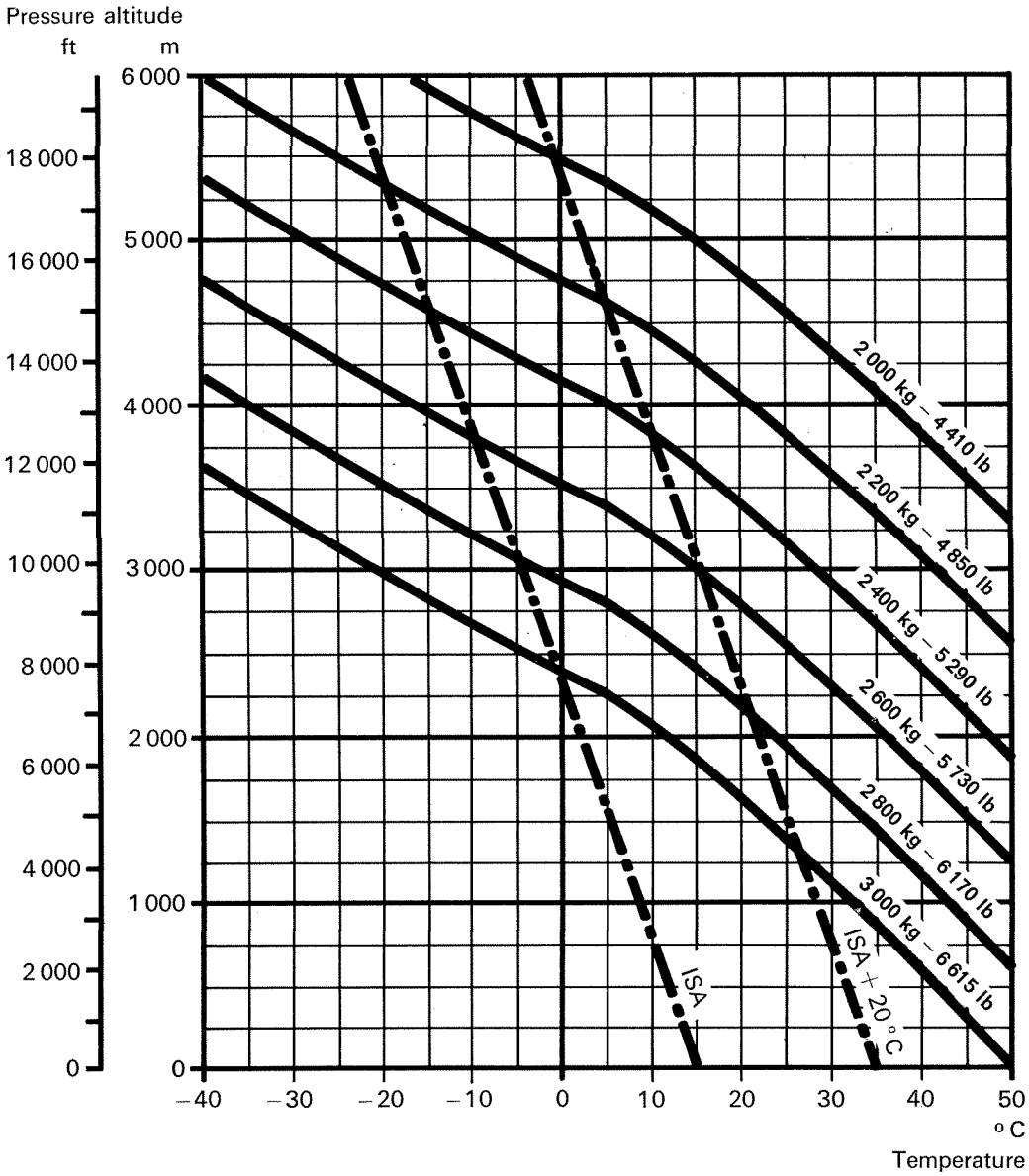
maximum pressure altitude	4,570 m – 15,000 ft
maximum temperature	ISA + 30°C limited to + 40°C
minimum temperature	- 40°C

PERFORMANCE CURVES

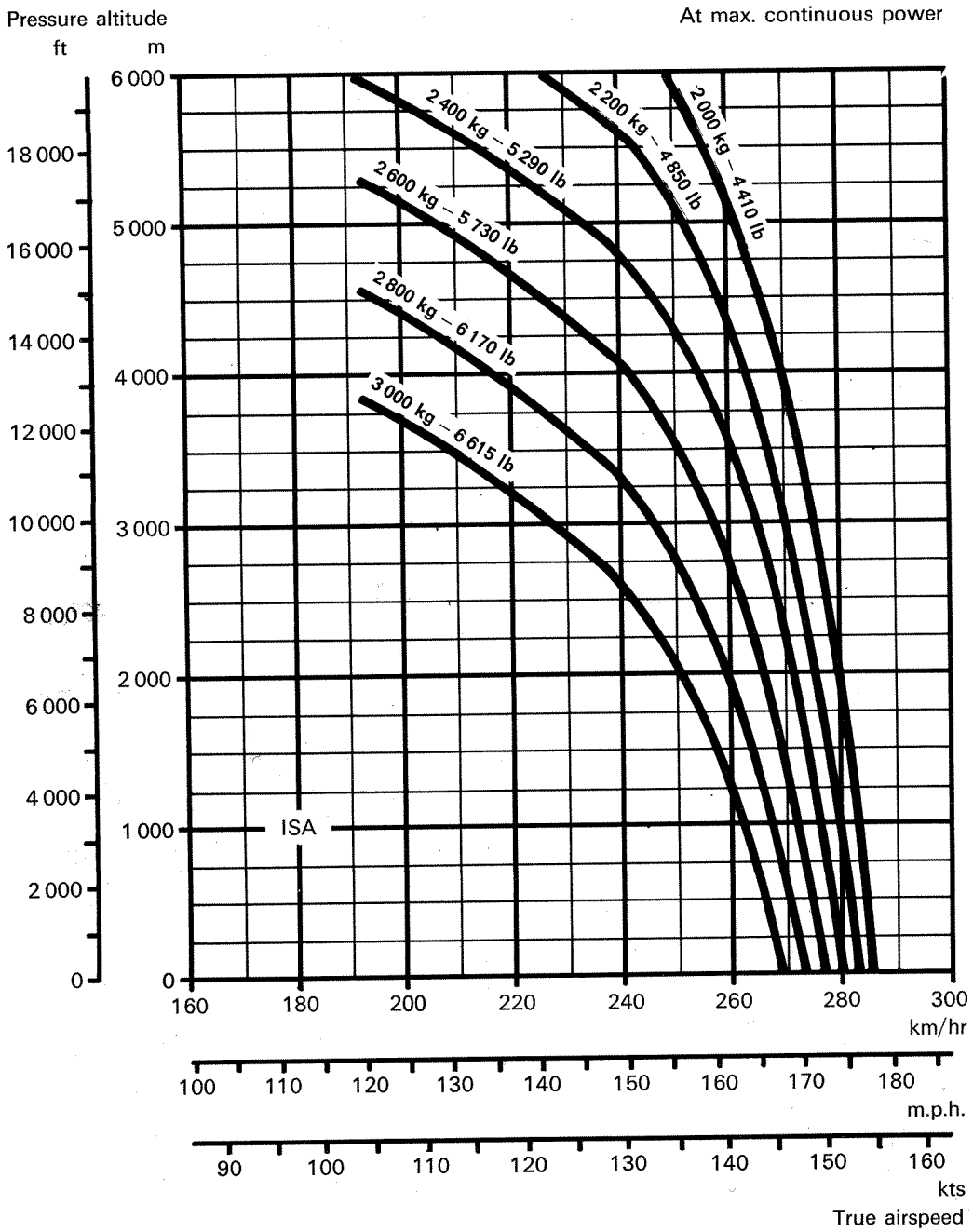
HOVER CEILING OGE
AT TAKE-OFF POWER



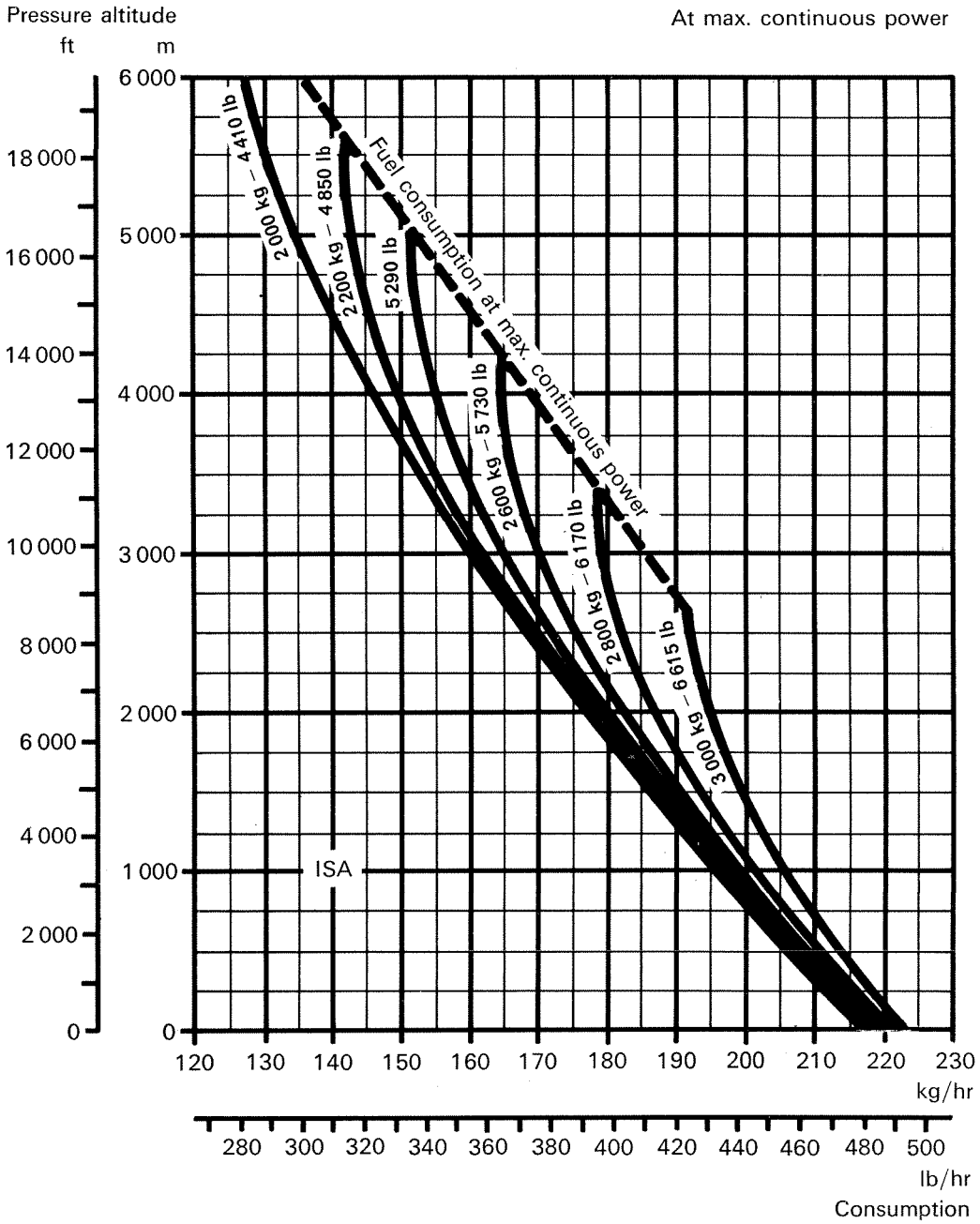
HOVER CEILING IGE
AT TAKE-OFF POWER



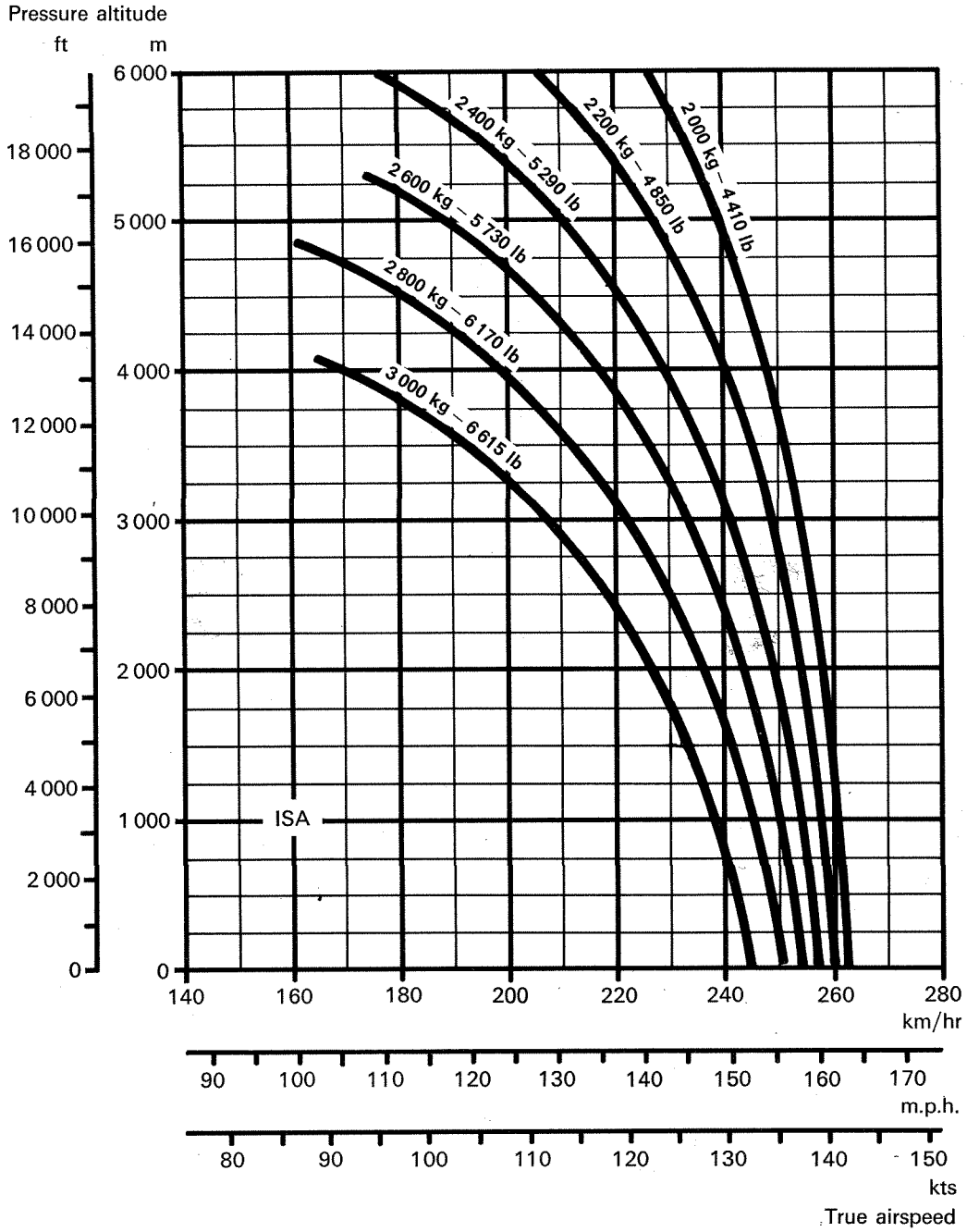
FAST CRUISE SPEED



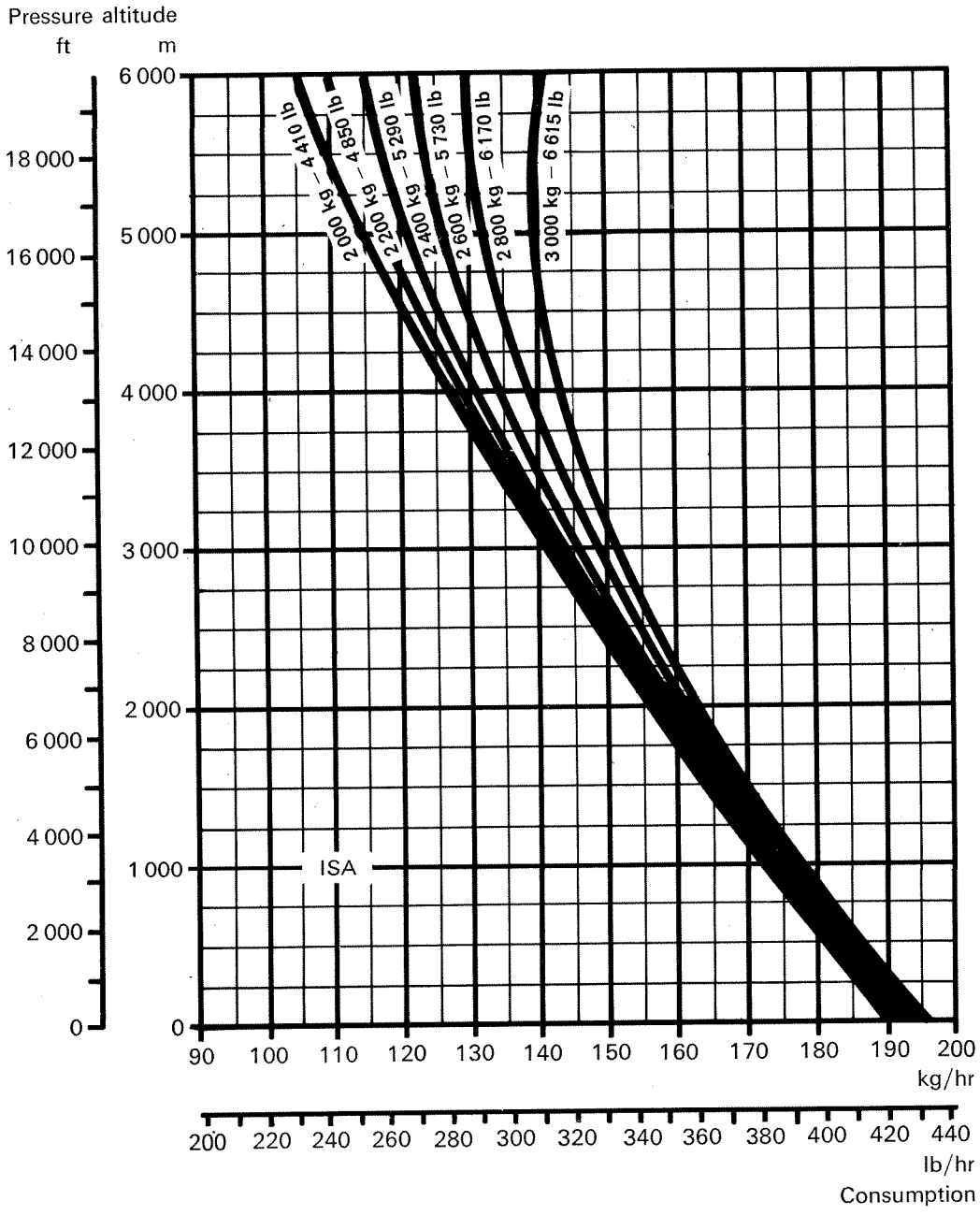
FUEL CONSUMPTION AT FAST CRUISE SPEED



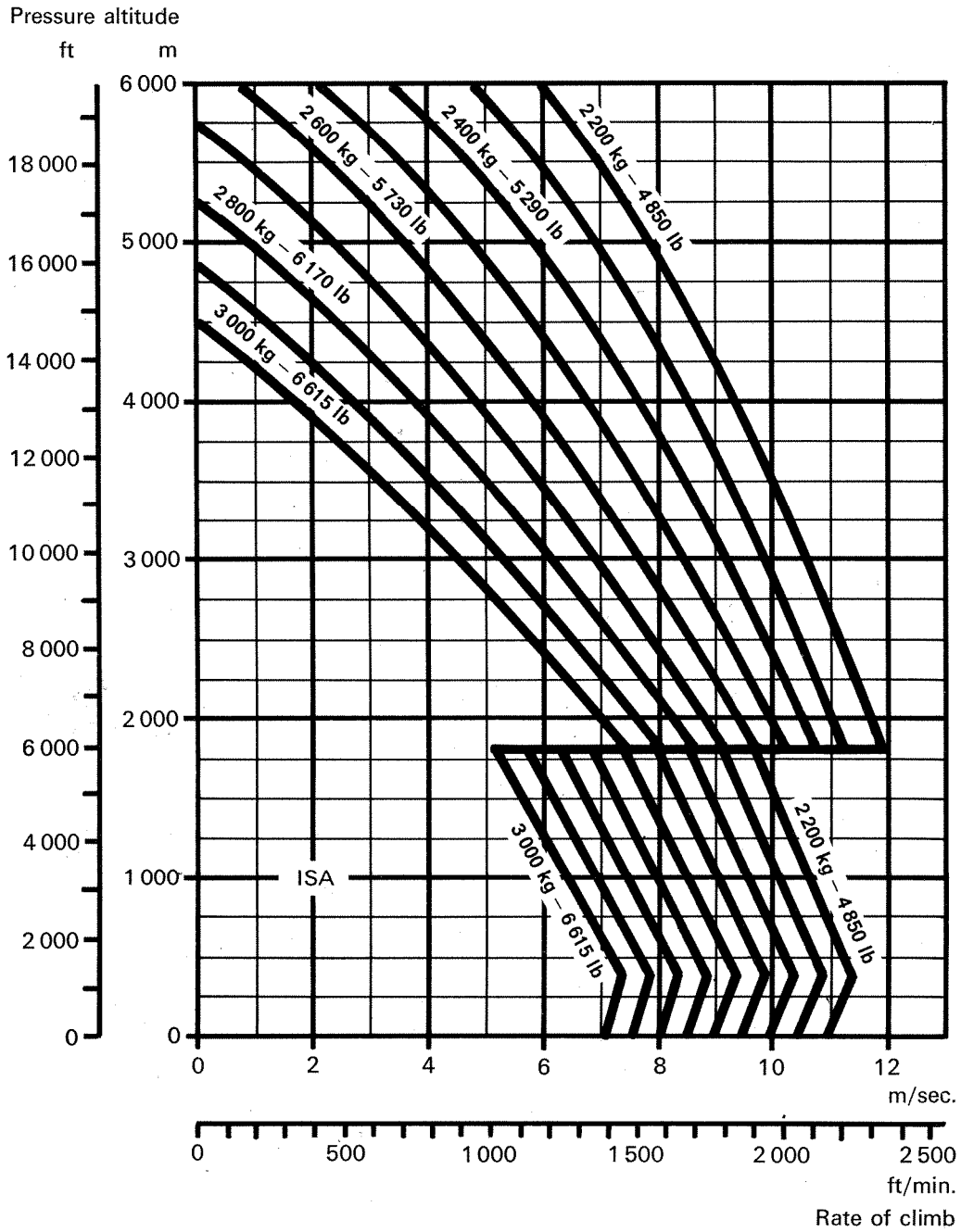
ECONOMICAL CRUISE SPEED



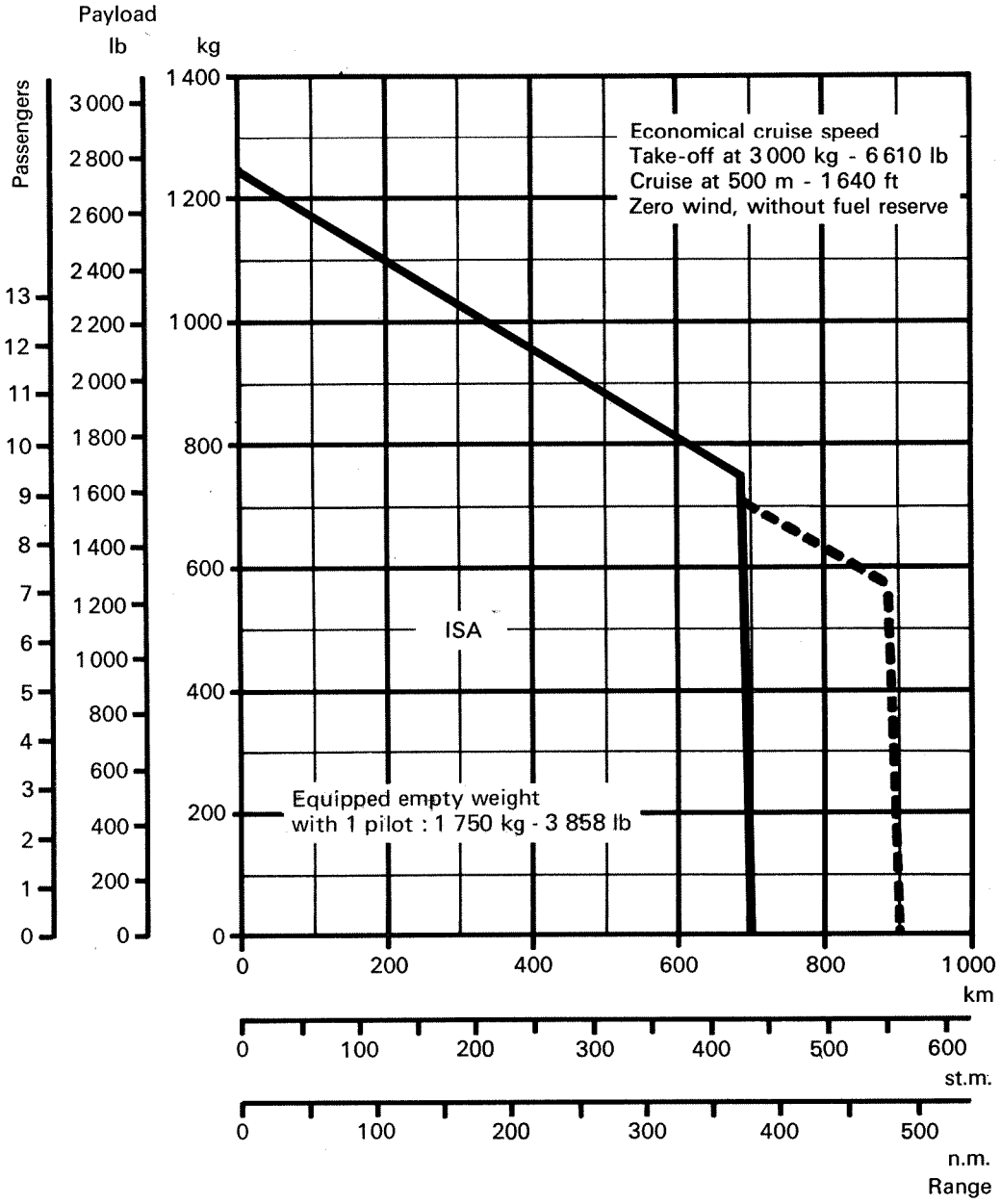
FUEL CONSUMPTION AT ECONOMICAL CRUISE SPEED



RATE OF CLIMB
IN OBLIQUE FLIGHT



PAYLOAD VERSUS RANGE



OPTIONAL EQUIPMENT

	WEIGHT SUPPLEMENT	
	kg	lb
GENERAL ITEMS OF EQUIPMENT		
■ 2 high back-rest front seats with harness and safety belt	15.8	34.8
■ Second landing light	5.0	11.0
■ Copilot kit, including :	12.5	27.5
• dual controls		
• copilot's instruments (altimeter, rate-of-climb indicator, airspeed indicator, gyro-horizon, RMI)		
• second wiper		
• second cabin extension light		
• second master warning light		
■ Air conditioning system	21.0	46.2
■ Tinted plexiglass panes (in addition to the upper ones)	0.0	0.0
■ 2 heated panes	19.0	41.8
■ 4.5 kVA, 115/200 V, 400 Hz AC generation system	7.0	15.4
■ Skid landing gear	4.0	8.8

	WEIGHT SUPPLEMENT	
	kg	lb
IFR AND NIGHT FLYING EQUIPMENT		
■ Orange panels for IFR training with 1 pair of special coloured glasses	6.0	13.2
■ SFIM 145 autopilot	15.0	33.0

	WEIGHT SUPPLEMENT	
	kg	lb
SPECIAL EQUIPMENT		
■ Emergency floatation gear for wheel landing gear	100.0	220.4
■ Emergency floatation gear for skid landing gear	100.0	220.4
■ Dynamic sand-prevention filters	being designed	
■ Skis for wheel landing gear	45.0	99.2
■ Skis for skid landing gear	being designed	

	WEIGHT SUPPLEMENT	
	kg	lb
SPECIFIC MISSION EQUIPMENT		
■ Ferrying tank (475 litres)	20.0	44.0
■ Auxiliary tank (215 litres)	31.0	68.3
■ CARGO-AIDS sling (1,300 kg)	6.2	13.6
■ BREEZE or AIR EQUIPMENT electrical hoist (275 kg - 80 m cable)	60.0	132.2
■ Sliding left rear door (hoisting installation requires the fitment of this equipment)	3.8	8.3
■ Sliding right rear door	3.8	8.3
■ Drip tub (sea rescue)	10.0	22.0
■ Casualty-carrying installation (without stretchers)	8.4	18.5
■ Stretcher	8.5	18.7
■ « De luxe » upholstery with enhanced sound proofing, carpet and foot rests	60.0	132.2
■ Folding utility bench-seat (4 places)	10.2	22.4
■ « Comfort » lay-out	37.0	81.5
• 8 passenger seats		
■ « VIP » lay-out	200.0	440.9

	WEIGHT SUPPLEMENT	
	kg	lb
HANDLING AND PICKETTING		
■ Blade folding	being designed	
■ Bad weather mooring kit	1.6	3.5

TABLE OF INCOMPATIBILITIES IN FITTING OR USING ITEMS OF OPTIONAL EQUIPMENT ON THE DAUPHIN

The possibilities for simultaneous fitment of several items of optional equipment does not necessarily imply the possibility for their simultaneous use. The helicopter must always remain within the limits stipulated in the Flight Manual (weight, centre of gravity, etc) or imposed by the operating regulations.

The alphanumerical indices appearing in the table below correspond to the partial incompatibilities described afterwards.

Tinted plexiglass panes	Heating panes	Emergency floatation gear	Skis	Ferrying tank	Auxiliary tank	Sling	Electrical hoist	Drip tub	Casualty installation (4 stretchers)	4 folding utility bench-seats	« Comfort » lay-out (8 places)	« VIP » lay-out (4 or 6 places)	
	■												Tinted plexiglass panes
■													Heating panes
			▲										Emergency floatation gear
		▲											Skis
					▲		(A)	▲	▲	▲	1	1	Ferrying tank
				▲				▲	▲	▲			Auxiliary tank
							○						Sling
				(A)		○			(B)	(B)	(B)	(B)	Electrical hoist
				▲	▲				2	▲	1	1	Drip tub
				▲	▲		(B)	2		2	3	3	Casualty installation (4 stretchers)
				▲	▲		(B)	▲	2		1	1	4 folding utility bench-seats
				1			(B)	1	3	1		4	« Comfort » lay-out (8 places)
				1			(B)	1	3	1	4		« VIP » lay-out (4 or 6 places)

Key

□ Possibility of simultaneous installation and use

■ Total impossibility of simultaneously fitting the fixed parts of the two items of equipment (and hence the impossibility of installing the two items of equipment concerned on one and the same aircraft)

◪ Total impossibility of simultaneously fitting the removable parts of the two items of equipment (the installation of one of them entails the removal of the other and vice versa)

▲ Partial impossibility of simultaneously fitting the removable parts of the two items of equipment (a combination of the fitment of the two installations is possible under certain conditions. See the remarks against the corresponding numerical index)

○ Possibility of simultaneous fitment on one and the same aircraft but impossibility of simultaneous use. (This can, in certain cases, be eased by partially removing the equipment not directly concerned with the mission. See the remarks against the corresponding alphabetical index)

1 It is possible to install simultaneously 4 « comfort » seats or 2 « VIP » armchairs with :

- the ferrying tank
  or
- the drip tub
  or
- the 4-place folding utility bench-seats

2 The two upper stretchers can be installed simultaneously with :

- the drip tub
  or
- the 4-place folding utility bench-seats

3 Two stretchers, one above the other, no matter whether on the left or right of the cabin, can be installed simultaneously with :

- 4 « comfort » seats
  or
- 2 « comfort » seats plus 1 « VIP » armchair
  or
- 2 « VIP » armchairs

4 Possibility for simultaneous fitment of :

- 8 « comfort » seats and the « VIP » lay-out fittings (wardrobe and bar)
  or
- 4 « comfort » seats and 2 « VIP » armchairs

A The use of the hoist is materially only possible when the ferrying tank is removed (since the tank takes up all the space at the rear of the cabin)

B The use of the hoist installation is compatible with the fitment of :

- 2 stretchers, one above the other, and 2 « comfort » seats
  or
- 6 « comfort » seats
  or
- 4 « comfort » seats and 1 « VIP » armchair
  or
- 3 « VIP » armchair
  or
- 2 of the places on the 4-place folding utility bench-seats (the 2 LH seats being quite simply folded against the backwall during hoisting operations)

RADIO COMMUNICATION AND NAVIGATION EQUIPMENT

VHF (VHF/AM) Transceiver

Make	Type	Category	Frequency range (spacing)	Number of channels	Power	Weights			
						Complete installation		Including fixed parts	
						kg	lb	kg	lb
EAS	TR 800	1 (Civil)	118 to 135.975 MHz (25 kHz)	720	25 Watts	5.3	11.7	2.4	5.3
COLLINS	VHF 20 A	1 (Civil)	117 to 135.975 MHz (25 kHz)	760	16 Watts	6.1	13.4	3.3	7.2
KING	KX 175 BE	2 (Civil)	118 to 135.950 MHz (50 kHz)	360	5 Watts	6.4	14.1	3.4	7.4
BECKER	AR 2010	2 (Civil)	118 to 135.950 MHz (25 or 50 kHz)	360 or 720	6 Watts	4.8	10.5	3.5	7.7

HF/BLU (HF/SSB) Transceiver

SUNAIR	ASB 100 USB option LSB	2	2 to 18 MHz	10 preset	100 Watts	15.2	33.5	7.9	17.4

ICS

Make	Type	Characteristics	Weights			
			Complete installation		Including fixed parts	
			kg	lb	kg	lb
TEAM	TB 24	3 control-boxes (of which 1 auxiliary for the rear seats controlling only the volume in the conference mode) 4 plugs for headsets 4 transmission channels (of which 2 can be used simultaneously) 8 reception channels of which : 4 adjustable for volume by a potentiometer 4 not adjustable for volume Power-output with 600-ohms headset : 100 mW	6.7	14.7	4.6	10.1
TEAM	TB 27	1 control-box (pilot and copilot) controlled by 2 separate potentiometers 1 amplifier box, in the conference mode for 8 passengers, enabling only the volume to be controlled in pairs of headsets 3 transmission channels (usable one by one) 6 reception channels (volume-controlled) 2 reception channels (not adjustable for volume) Power-output with 600-ohm earphone : 100 mW	4.5	9.9	3.0	6.6

Headsets

Make	Type	Characteristics	Weights: Complete installation kg	Weights: Complete installation lb	Weights: Including fixed parts kg	Weights: Including fixed parts lb
ELNO	247 SP 59	Earphone : Impedance : 600 ohms Pass-band : 200 to 4000 Hz Microphone : Impedance : 75 ohms Pass-band : 300 to 4000 Hz	0.6	1.3	—	—
SOCAPEX	S 6905	Earphone : Impedance : 600 ohms Pass-band : 200 to 4000 Hz Microphone : Impedance : 75 ohms Pass-band : 300 to 4000 Hz	0.4	0.9	—	—

Manual VOR LOC/GLIDE Receiver

Make	Type	Category	Characteristics	Frequency range (spacing)	Weights: Complete installation kg	Weights: Complete installation lb	Weights: Including fixed parts kg	Weights: Including fixed parts lb
KING	KI 204 + KN 73	2	Associated with NAV function of KING KX 175 BE VHF	108 to 117.95 MHz (50 kHz)	4.0	8.9	2.2	4.8
COLLINS	VIR 351 + GLS 350 + IND 351	2	Manual VOR on IND 351 indicator with crossed needles	108 to 117.95 MHz (50 kHz)	4.4	9.7	2.4	5.3

Manual VOR and Automatic LOC/GLIDE/ Marker Beacon Receiver

EAS	NR 810 + MVA 510	1	Manual VOR on EAS IVG 671 A indicator and automatic VOR on RMI. Marker beacon receiver	108 to 117.95 MHz (50 kHz)	7.6	16.7	3.4	7.5
COLLINS	VIR 31 A	1	Manual VOR on EAS IVG 671 A indicator and automatic VOR on RMI. Marker beacon receiver	108 to 117.95 MHz (50 kHz)	7.2	15.9	4.5	9.9

Marker-Beacon Receiver

EAS	RB 692	2	Comprises 1 warning-light per modulation : 400, 1,300 and 3,000 Hz Linked to KING KN 204 + KN 73 VOR/ILS or to COLLINS VIR 351 + GLS 350 + IND 351 VOR/ILS	75 MHz	1.9	4.3	1.3	2.9

Radio-Compass Receiver

Make	Type	Category	Characteristics	Frequency range (spacing)	Weights			
					Complete installation		Including fixed parts	
					kg	lb	kg	lb
COLLINS	ADF 60	1	Linked to RMI	190 to 1,749.5 kHz (0.5 kHz)	7.3	16.0	4.5	9.9
KING	KR 85	1	Linked to RMI	200 to 1,699 kHz (1 kHz)	5.7	12.5	2.7	5.9
COLLINS	ADF 650	2	Linked to RMI	200 to 1,799 kHz (1 kHz)	4.2	9.2	2.9	6.3
EAS	AD 850	1	Linked to RMI	190 to 1,749 kHz) (0.5 kHz)	6.9	15.2	4.4	9.7

Transponder

COLLINS	TDR 90	1	A and B interrogation modes Number of codes : 4,096	Transmission : 1,090 MHz Reception : 1,030 MHz	3.4	7.4	1.5	3.3
KING	KT 76	2	A and C interrogation modes Number of codes : 4,096	Transmission : 1,090 MHz Reception : 1,030 MHz	4.3	9.4	1.1	2.4
COLLINS	TDR 950	2	A and C interrogation modes Number of codes : 4,096	Transmission : 1,090 MHz Reception : 1,030 MHz	2.7	5.9	1.8	3.9
BADIN CROUZET	BCR 500	1	A and C interrogation modes Number of codes : 4,096	Transmission : 1,090 MHz Reception : 1,030 MHz	2.5	5.5	1.1	2.4

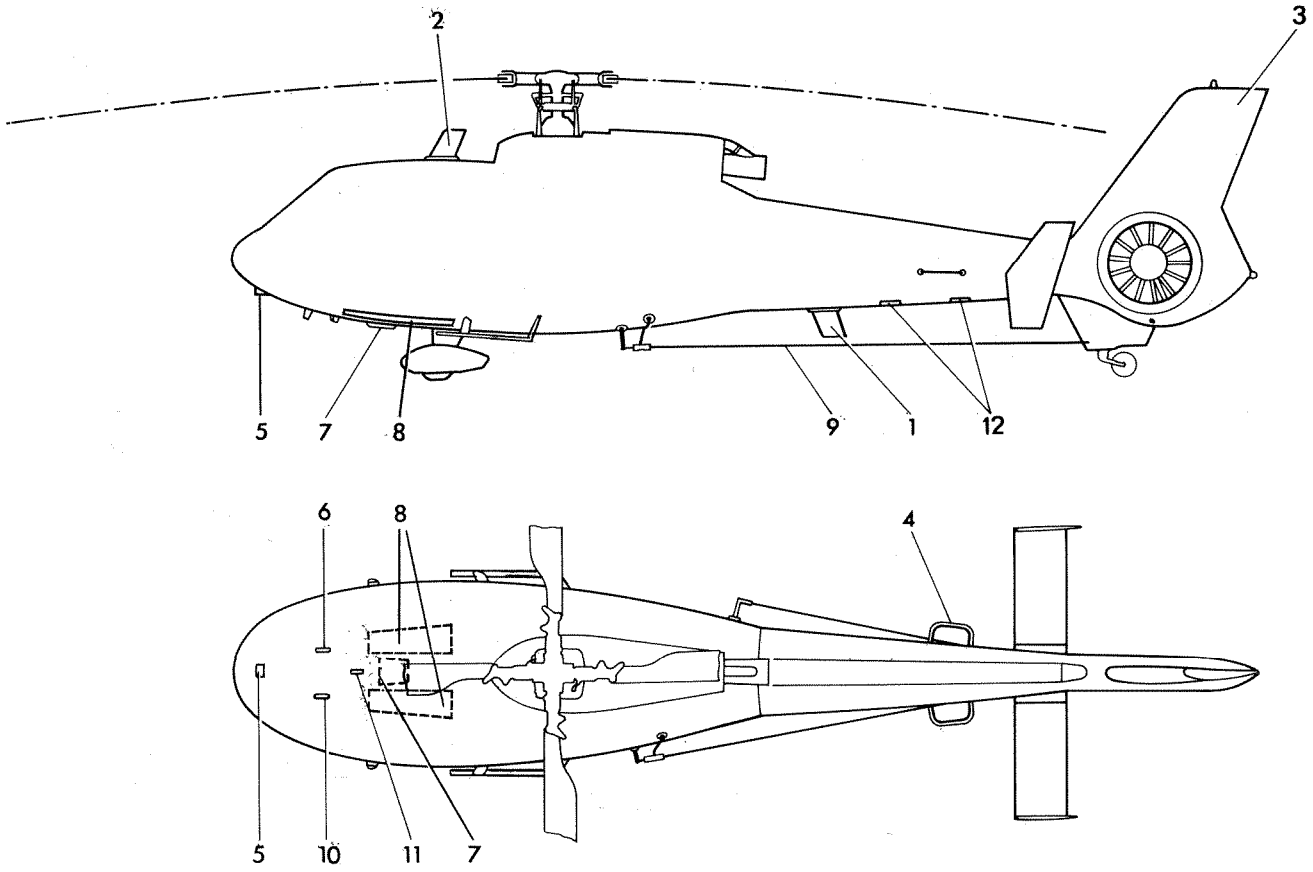
D.M.E.

COLLINS	DME 40	1	Measurable distance : from 0 to 250 n.m. Measurable ground speed : from 80 to 999 kts or corresponding time : from 0 to 99 minutes Power : 300 mW	Transmission from 1,025 to 1,150 MHz Reception from 962 to 1,213 MHz Number of channels : 252	6.0	13.2	2.0	4.4

Radio-altimeter

Make	Type	Category	Central Frequence	Operating Altitude	Power	Weights			
						Complete Installation		Including fixed parts	
						kg	lb	kg	lb
TRT	AHV 8	1	4,200 - 4,400 MHz	0 to 5,000 ft	100 mW	5.6	12.4	2.6	5.7

ANTENNA LOCATION



1 - VHF 1
• 2 - VHF 2
3 - VHF built in (VHF 2 variant)
4 - VOR
5 - GLIDE
6 - Marker
7 - Radio-compass loop-antenna
8 - Sense antenna
9 - HF – SSB
10 - DME
11 - Transponder
12 - Radio-altimeter


SA 360