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A.P. 101B-1201-1A, Cover 1, Sect. 1, Chap. A.L. 110, June, 69

Chapter 3

EMERGENCY CONTROLS, EQUIPMENT AND EXITS

LIST OF CONTENTS

	Para	Para		1	Para
Introduction	1	Aileron droop and tail plane flap	Emergency ventilation control	 •••	29
Modification standard	2	emergency operation 18	Flood flow de-misting	 •••	31
		Air brakes emergency operation 19	Windscreen emergency de-misting	 	32
Centralized warning system	3	Bomb door emergency operation 20	Fuel system emergency controls	 	33
		Refuelling probe emergency operation 21	Emergency equipment		
Emergency controls		Arresting hook emergency operation 22	Survival packs	 •••	34
Emergency hydraulics		Alighting gear safety lock emergency	Emergency exits		
General services system	11	override 23	Canopy jettison	 •••	35
Flying controls system	14	Tail plane trim emergency control 24	Ejection seats	 	37
Alighting gear emergency lowering	15	Fire extinguishers 25	Underwater ejection	 •••	40
Main plane flaps emergency operation	17	Emergency oxygen control 28	Safety precautions	 	43

LIST OF ILLUSTRATIONS

		Fig		Fig	
Centralized warning panel	 	 7	Emergency equipment and exits - port side	4	
Emergency controls	 	 2	Emergency equipment and exits -		
Standby control panel	 	 3	starboard side	5	

Introduction

1. This chapter gives the location of the emergency controls and equipment and describes their operation.

Modification standard

2. The following modifications are included in this chapter:- 61, 103, 113. 120, 309, 466, 479, 497, 503, 631, 881, 930 and 1217.

CENTRALIZED WARNING SYSTEM

3. The centralized warning system provides visual and audible warning in the event of fire in the vicinity of the engines, fuel tanks or bomb bay, and in the event of failure of any of the following services:-

Autopilot Cabin pressure

RESTRICTED

Generator power supplies Flying controls hydraulic system Wing and nose folding

4. Visual warning is provided by twelve lamps incorporated in a centralized warning panel, located on the pilot's starboard console (fig 1). The operation of any one of these lamps causes two attention warning

F.S./1

lamps, mounted beneath the instrument panel coaming, port and starboard, to flash intermittently. At the same time an audible warning note is transmitted to the pilot's earphones.

5. A microswitch, actuated by the wing fold selector lever, isolates the attention warning lamps and audio warning circuit from the wing and nose fold indication circuit, when the lever is in the FOLD or INTERRUPT positions.

6. The warning system is operative when the aircraft electrical supply is on. Operation of a CANCEL push-button switch on the warning panel enables a warning to be cancelled, after the appropriate corrective action has been taken, and the system reset to receive a further warning.

7. If a circuit fault causes the attention warnings to operate continuously, they may be isolated by a switch, introduced by Mod 503, marked LIGHTS AND AUDIO WARNING, ON - OFF, situated on the starboard console adjacent to the centralized warning panel. Introduction of Mod 497 permits the warnings to be made inoperative by pulling up the muting switch situated on the centralized warning panel. A lamp in the top of the switch is then illuminated.

8. Two push-button switches, located at the rear of the centralized warning panel, control the engine fire extinguisher circuits. These switches incorporate lamps which indicate when they should be used.

9. Continuity of the warning panel lamps and the attention warning lamps, and the operation of the audible warning, can be tested by operating a TEST push-button

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Fig. 1. Centralized warning panel

switch on the warning panel. Operation of this switch also tests the continuity of the firewire sensing elements, providing an a.c. supply is available.

10. Connection of an external electrical supply automatically cuts out the autopilot, cabin pressure, generator power failure and flying controls warning lamps. To permit the testing of these lamps using an external supply, a GROUND TEST switch is provided adjacent to the fire push-button switches.

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EMERGENCY CONTROLS

Emergency hydraulics

General services system

11. Emergency operation of the general services hydraulic system is by emergency electrical and hydraulic supplies and provides for any failure except failure of both pumps, both engines, or complete failure of both the normal and the emergency electrical systems. The complete hydraulic system can be transferred to emergency operation automatically or manually. F.S./2



13. The general services hydraulic system can be manually transferred to emergency operation by selecting the standby control for any of the following services:-

> Alighting gear Main plane flaps Air brakes Bomb door

◄ Refuelling probe (pre-Mod 881) Arresting hook

Flying controls system

14. Provision is made for the failure of one flying controls hydraulic system and subsequent failure of the opposite engine, or vice versa. In the event of such failure, the general services hydraulic system power supply can be connected to the serviceable flying controls system. Two integration valves, one supplied from the port pump of the general services system and the other from the starboard pump, are controlled by two switches, located on the standby control panel and marked FLYING CONTROLS. INTEGRATION VALVES, PORT, STBD, OPEN - CLOSE. When necessary, the switch associated with the operative flying controls system should be selected to OPEN.

Alighting gear emergency lowering

15. In the event of the hydraulic system being automatically transferred to emergency (by operation of the reservoir microswitches), or if the alighting gear fails to lower on a normal DOWN selection, the EMERGENCY DOWN button on the selector must be depressed. If the alighting gear still fails to lower, the probable cause is the failure of an undercarriage door unlocked microswitch, in which case the EMERGENCY OVERRIDE switch, located on the standby control panel, must be selected to DOWN. Note

This switch is fitted with a frangible guard and is spring-returned to OFF; the guard must be broken and the switch held in the DOWN position until three green lights are showing on the undercarriage position indicator.

16. Operation of the EMERGENCY OVER-RIDE switch by-passes the door unlocked microswitches and energizes the down solenoid in the emergency selector valve. After the alighting gear has been lowered by an EMERGENCY DOWN selection, the general services hydraulic system will remain on emergency supply. It will not be possible to retract the alighting gear, and all other general services must be operated by their appropriate standby selectors.

Main plane flaps emergency lowering

17. Should the flaps fail to lower on a normal selection, or if the hydraulic system is automatically transferred to emergency operation, the standby switch located on the standby control panel must be selected to DOWN. Following a standby DOWN selection the general services hydraulic system will remain on emergency supply. It will not be

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P. 4744A, Vol. 1, Book 1, Cover 1, Sect. 1, Chap. 3 A.L. 97, Sept. 65

> possible to raise the flaps, and all other general services must be operated by their appropriate standby selectors.

Aileron droop and tail plane flap emergency operation

18. Under normal flight conditions the aileron droop and the tail plane flap are interconnected and are controlled by the aileron droop selector, located on the port control panel. In the event of failure of the normal operating circuit, each of these controls must be operated by the respective standby selector as follows:-

- Aileron droop. The ailerons can be (a) drooped by selecting the standby switch, located on the standby control panel, to DOWN. Intermediate settings can be obtained by returning the switch to OFF when desired angle of droop is reached. The ailerons can be raised by selecting the standby switch to the UP position.
- (b) ' Tail plane flap. To raise the tail plane flap the standby switch, located on the standby control panel, should be selected to the OUT position. Intermediate settings can be obtained by moving the switch to OFF when the desired flap angle is reached. The tail plane flap can subsequently be lowered by selecting the standby switch to IN.

Air brakes emergency operation

19. In the event of the air brakes failing to respond to a normal selection, or if the general services hydraulic system is automatically transferred to emergency operation, the AIR BRAKE STANDBY selector switch, located on the port control panel, should be selected to IN or OUT as required. Intermediate positions are obtainable in both

KEY TO FIG 2 (EMERGENCY CONTROLS)

- 1 LOW PRESSURE FUEL COCKS (PORT & STBD)
- 2 INSTRUMENT PANEL LIGHTING POWER SUPPLY CHANGEOVER SWITCH
- 3 PRESS-TO-TRANSMIT EMERGENCY SWITCH
- 4 STANDBY UHF GUARD SWITCH (pre-Mod 466)
 - OR
 - STANDBY UHF CHANNEL SELECTOR SWITCH (post-Mod 466)
- 5 STANDBY UHF POWER SUPPLY CHANGE-OVER SWITCH
- 6 ARMAMENT JETTISON SELECTOR SWITCH
- 7 TAIL PLANE TRIM STANDBY CONTROL
- 8 ARMAMENT JETTISON POWER SUPPLY CHANGEOVER SWITCH

- 9 ENGINE RELIGHT PUSH-BUTTONS (PORT & STBD)
- 10 UNDERCARRIAGE EMERGENCY DOWN PUSH-BUTTON
- 11 AIR BRAKES STANDBY CONTROL
- 12 BLOWING SYSTEM POWER SUPPLY CHANGEOVER SWITCH
- 13 STORES JETTISON PUSH-BUTTON
- 14 ATTENTION WARNING LAMPS
- 15 AIRSTREAM DIRECTION DETECTOR POWER SUPPLY CHANGEOVER SWITCH
- 16 AUTOPILOT CUT-OUT SWITCH
- 17 ARTIFICIAL HORIZON STANDBY POWER SUPPLY
- 18 COMPASS CARD LOCK SWITCH (post-Mod 479)
- 19 WINDSCREEN EMERGENCY DE-MISTING CONTROL

RESTRICTED

- 20 BLOWING SYSTEM ON-OFF SWITCH (post-Mod 772)
- 21 FUEL/NO-AIR VALVE OVERRIDE SWITCHES (post-Mod 930)
- 22 FUEL CONTENTS GAUGE POWER SUPPLY CHANGEOVER SWITCH
- 23 FUSELAGE FUEL INTER-TANK TRANSFER SWITCH
- 24 CROSS-FEED FUEL COCK SELECTOR SWITCH
- 25 CABIN EMERGENCY VENTILATION CONTROL
- 26 MAIN TANKS FUEL JETTISON CONTROL
- 27 OVERLOAD TANKS FUEL JETTISON SWITCH
- 28 ATTENTION WARNING LIGHTS AND AUDIO WARNING CUT-OUT SWITCH (pre-Mod 497)
- 29 FLOOD FLOW DE-MISTING CONTROL





Fig. 3. Standby control panel Pre-Mod 881 added to annotation

directions; on an OUT selection by allowing the switch to spring return to the OFF position, and on an IN selection by manually returning the switch to OFF when required. As an emergency selection is available in both directions, it is possible to re-select the air brakes IN and OUT by the standby switch continuously until either the emergency hydraulic or electrical supply fails. Except in conditions of extreme emergency, however, the number of standby selections should be restricted to one extension and retraction.

since to exceed this will seriously impair the operation of the other hydraulic services on emergency supply. When the air brakes are retracted, the remainder of the hydraulic system, if it is not on automatic emergency, will revert to normal supply.

Bomb door emergency operation

Should the bomb door fail to operate 20. on a normal selection; or if the general services hydraulic system is automatically transferred to emergency operation, the

Note...

standby switch, located on the standby control panel, must be selected to OPEN or CLOSE as required. As an emergency selection is available in both directions, it is possible to operate the bomb door by the standby switch continuously until either the emergency hydraulic or electrical supply fails. When the aircraft is in flight, however, the number of standby selections should be restricted to one full cycle, i.e., open and closed; to exceed this will seriously impair the operation of the other hydraulic services on emergency supply. When the bomb door reaches the open or closed position, the remainder of the general services hydraulic system, if it is not on automatic emergency, will revert to normal supply.

- Refuelling probe emergency operation (pre-Mod 881) ◄ 21. If the flight refuelling probe fails to respond to a normal selection, or if the general services hydraulic system is automatically transferred to emergency operation, the standby switch, located on the standby control panel, should be selected to IN or OUT as required. Since an emergency selection is available in both directions, the refuelling probe can be re-selected IN and OUT by the standby switch until either the emergency hydraulic or electrical supply fails. Re-selection of the refuelling probe should not be practised when the aircraft is in flight, however, as doing so will seriously affect the operation of the other hydraulic services on emergency supply. When the refuelling probe is retracted, the remainder of the hydraulic system, if it is not on automatic emergency, will revert to normal supply.
- Mod 881 deletes the hydraulically-operated flight refuelling probe and makes provision for fitting a fixed probe.

Emergency operation of the flight refuelling probe is effected by the normal electrical



🔺 Item 7 added 🕨

system; in the event of failure of the normal electrical supply, therefore, the refuelling probe will be inoperative.

Arresting hook emergency lowering

22. If the arresting hook cannot be lowered by a normal selection, or if the general services hydraulic system is automatically transferred to emergency operation, the standby switch, located on the standby control panel, should be selected to DOWN. After the arresting hook has been lowered by a standby selection, the general services hydraulic system will remain on emergency supply. It will not be possible to retract the arresting hook, and all other general services must be operated by their appropriate standby selectors.

Alighting gear safety lock emergency override

23. Should an emergency necessitate the retraction of the alighting gear when the safety lock is engaged (e.g., during a landing run with a total brake failure), the lock can be overridden by rotating the UP selector button clockwise through 60 deg; subsequent depression of the UP selector button will retract the alighting gear. To re-set the lock, the DOWN selector button should be depressed and a special re-setting tool, or length of stiff wire, inserted in the hole in the UP button and pressed down until the button rotates to its released position.

Tail plane trim emergency control

24. A standby switch, located on the port console at the pilot's station, can be used in the event of failure of the tail plane trim normal operating circuit. The switch, which is guarded and spring-loaded to a centre,

RESTRICTED

unmarked, off position, should be held in the NOSE DOWN or NOSE UP position until the desired trim is obtained.

Fire extinguishers

25. The engine fire extinguisher bottles, which serve spray rings around the engines, are operated electrically, either automatically, in the event of a crash landing, by any pair of a number of crashtrip switches, or manually by two push-button switches incorporated in the centralized warning panel (para 3).

26. The fire extinguishers which serve the gallery spray pipes in the fuel tanks bay, bomb bay and accessories bay are fully automatic in operation, either by firewire sensing elements in conjunction with an electrical relay, in the event of fire or abnormally high temperatures, or by the operation of any pair of a number of crashtrip switches in the event of a crash landing.

27. A hand-operated fire extinguisher is stowed on the port side of the observer's station.

Emergency oxygen control

28. An emergency oxygen control knob is mounted on the starboard side of each ejection seat pan and, when pulled, connects the emergency oxygen cylinder (carried on the starboard side of each ejection seat) to the occupant's mask. This supply is automatically turned on when seat ejection takes place. The knob is stiff to pull to guard against accidental operation.

DECTRICTER



A.P. 101B-1201-1A, Cover 1, Sect. 1, Chap A.L. 110, June, 69

Emergency ventilation control

29. A selector lever, located on the starboard console at the pilot's station, can be operated to provide emergency ventilation in the event of failure of the air conditioning system. The lever is connected by Teleflex controls to a shut-off valve, located in ducting between two small intakes, one on the inboard side of each engine intake. When the selector lever is operated to open the shut-off valve, air at ram pressure and temperature is admitted to the cabin.

30. Incorporated in the shut-off valve is a de-pressurizing valve which is connected by piping to the cabin pressure controller. When the shut-off valve opens, the de-pressurizing valve causes the discharge valve to open and relieve any pressure remaining in the cabin. Should emergency ventilation become necessary when the aircraft is at altitude, the shut-off valve must be opened slowly in order to prevent sudden decompression of the cabin.

Flood flow de-misting

31. In the event of severe misting which is beyond the control of the normal de-misting system, the de-misting valve, located to the rear of the starboard console, should be selected to the FLOOD position. This operation introduces a supply of hot air - tapped from the anti-g system - into the de-misting ducting.

Windscreen emergency de-misting

32. An emergency de-misting facility is provided for the windscreen centre panel, in the event of failure of the windscreen he g system. A short length of slotted ducting is connected to the normal de-misting system, the flow of warm air being controlled by a manually-operated valve; selection is by a toggle-type control, located just above the standby control panel and marked EMERGENCY DE-MIST, PULL AND TURN. The emergency de-misting is operative only when the windscreen normal demisting control valve is set to either the DE-MIST or FLOOD position.

Fuel system emergency controls

33. The fuel system includes three emergency controls, located on the fuel control panel, pilot's starboard console. The controls are:-

Fuselage fuel inter-tank transfer switch

- Cross-feed fuel cock selector switch with associated magnetic indicator
- Four fuel/no-air valve override switches (post-Mod 930)

The operation of these controls is detailed ◀ in Cover 3, Sect. 4, Chap. 2. ►

EMERGENCY EQUIPMENT

Survival packs

34. Two survival packs are carried and are located one in each ejection seat pan. Each pack serves the dual purpose of seat cushion and container for a dinghy and survival equipment.

EMERGENCY EXITS

Canopy jettison

35. The canopy can be jettisoned by operating either of two internal handles, one mounted at each crew station, and by an external handle, located on the port

RESTRICTED

side of the front fuselage, which is accessible after breaking a clear plastic protection panel. Operation of any one of these handles fires a primary breech adjacent to the handle. The gases thus generated ignite one of two main breeches — mounted on the tiebeam behind the pilot's seat — which extends the canopy rail guns to unlock the canopy rails. Extension of the starboard canopy rail gun allows the gas pressure to pass to, and ignite, the second main breech, whereupon the canopy jettison guns are extended and the canopy is thrown clear.

36. At all times when the aircraft is on the ground, each canopy jettison handle must be locked by inserting the safety pin provided. A stowage for each pin is provided at each crew station.

Ejection seats

37. Both the pilot and the observer are provided with an ejection seat. Each seat is fitted with a main firing handle and an alternative handle on the seat pan. To permit safe ejection through the canopy, the seats are equipped with canopy breakers and leg guards. When the firing handle is operated the sear is withdrawn from the ejection gun and the seat is ejected. As the seat moves up the guide rail, lines attached to the cabin floor pull the occuptant's legs into position against the seat pan, where they are held until the seat harness is released.

38. As the seat leaves the aircraft a static line operates to disengage the personal equipment connector, the emergency oxygen is automatically turned on and two static rods come into operation; one controls the drogue gun time delay mechanism and the other the barostatic time

RESTRICTED

relative unit. On post-Mod 1217 aircraft, an improved type of ejection seat is fitted to provide the facility of rocketassisted ejection, and improve the escape envelope of the aircraft. The new seat incorporates a rocket pack, the operation of which is initiated by a static line as the seat leaves the aircraft. Provision is made in the underwater escape system for the rocket pack static line to be disconnected and so render the rocket pack inoperative in the event of an underwater ejection.

39. To render the seat safe on the ground, the main firing handle and the drogue guillotine firing unit are locked by inserting safety pins; the seat pan firing handle is secured when the safety lock is engaged (pre-Mod 1198) and when the safety pin is inserted (post-Mod 1198). On post-Mod 1217 aircraft, an additional safety pin is provided to render the rocket pack safe. A red identity disc is secured to each safety pin and the pins should be stowed alongside those of the canopy jettison mechanism. To accommodate the rocket pack safety pin in this stowage, an additional stowage is provided between the crew stations on post-Mod 1217 aircraft for the pilot's and observer's drogue guillotine firing unit safety pins.

Underwater ejection

40. Mod 631 introduces the airframe provision of fully automatic underwater escape facilities for pilot and observer. The location and operation of the controls is described in the following paragraphs. A detailed description of the system operation is in Cover 2, Sect. 3, Chap. 11; a description of the system is also in A.P. 109A-0002-1. ►



Fig. 5. Emergency equipment and exits - starboard side ◀ Mod 1217 incorporated ►

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F.S./6

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A.P. 101B-1201-1A, Cover 1, Sect. 1, Chap A.L. 110, June,

41. Underwater escape selector handle. The underwater escape selector handle, to the port side of the seat, has two positions; SAFE (up) and UNDERWATER (down). The handle is locked in either of the two selective positions by a spring-loaded locking catch which must be released before the handle can be moved. The catch is released by depressing the locking knob in the end of the handle. For safety reasons, the handle should only be selected to UNDER-WATER for carrier borne take-offs and landings.

42. When SAFE is selected, a slide valve is moved to blank off the delivery ports to the base of the ejection gun and the drogue gun trip rod release unit. The same movement opens a port to allow compressed air to exhaust to atmosphere outside the cockpit should the main air bottle be inadvertently discharged. Upon selection of UNDER-WATER, the slide valve is moved to close the vent to atmosphere and the bottle contents, upon release, initiate the ejection sequence.

43. Manual firing handle. A manual firing handle is situated on the starboard thigh guard. Normally the escape sequence is initiated by pulling this handle up (the automatic operation is reserved as a fail safe facility). This action withdraws a sear from a firing pin in a breech unit mounted on a

compressed air bottle diaphragm valve assembly. When the firing pin is released, an integral striker fires a primary cartridge, the gas pressure thus generated, impinges on the diaphragm valve and removes the the restraint on the main air bottle firing pin.

Safety precautions

44. Before any routine servicing is effected in or around the cabin, the safety precautions on the ejection seats and canopy jettison system must be strictly obser-

 ✓ ved. These are detailed in A.P. 101B-1201-4H. ►