FLIGHT REFERENCE CARDS

BULLDOG SERIES 120

NORMAL DRILLS

Prepared by Royal Air Force Handling Squadron
Amended by FlyLogical for G-BZFN - Aug 2012
www.flylogical.com

BY COMMAND OF THE DEFENCE COUNCIL

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INITIAL CHECKS

Initial Checks

On approaching the aircraft check:

General position	...	Clear of other aircraft No fuel or oil leaks
Ground Fire extinguisher		Available
Chocks		In position

Before commencing the external checks carry out the following checks in the cockpit:

Ignition		OFF
Turn needle		OFF flag displayed
Battery master switch	...	OFF
Throttle		CLOSED
Mixture		CUT-OFF
Canopy jettison handle	...	Indicators aligned

EXTERNAL CHECKS

Carry out a systematic check of the aircraft for obvious signs of damage, leaks, loses panels or fairings. Do not move the control surfaces by hand. In particular, check:

Canopy	Condition and operation
Cockpit transparencies ...	Condition

Left Landing Gear

Fairings	Condition, secure
Brake lead	Secure
Tyre	Examine for cuts, creep and pressure

External Checks – *continued*

Left Mainplane

Flap	Up. Linkage secure
Aileron	Linkage secure
Navigation light... ...	Condition of cover
Pitot head..	Cover removed, free of obstruction
Fuel tank filler cap ...	Access panel flush and secure

Engine

Cowling	Fasteners secure
Intakes and ducts ...	Clear
Spinner	Condition, secure
Propeller	Condition
Exhaust pipes	Secure

External Checks **3**

Nose Landing Gear

Nosewheel straight	
Steering torque link ...	Connected
Tyre	Examine for cuts, creep and pressure

Right Mainplane

As for left Mainplane except pitot head.

Landing and taxy lamps	Condition

Right Landing Gear

As for left landing gear

Tail Unit

Elevator	Linkage secure
Rudder	Secure, trim tab secure, linkage secure
Tail bumper	Undamaged

COCKPIT CHECKS

Before entering the cockpit, check:

Chocks & Towbar	...	Removed

On entering the cockpit, check:

First aid kit/baggage/ fire extinguisher	...	Stowed and secure
Seats	...	Backs adjusted, locking pins fully home, seat restraint straps tight
Harnesses	...	Condition and security Right harness connected and tightened if flying solo
Parachute(s)	...	Condition and serviceability
Flying control locks	...	Remove and stowed
Loose articles ...	...	None

Enter cockpit, adjust and lock the rudder pedals evenly, strap in and check or select:

(continued)

Cockpit Checks – *continued*

Cockpit Checks

4

Propeller	Clear
Battery Master	On
External power	Off
Intercom	Off
Internal lighting	As required
Parking brake	On
External lights	As required
Pitot head heater ...	OFF
Circuit breakers	All made (in)
Accelerometer	Reset to +1.0g
Clock	Working, correct
Flap indicator	Correct indication
Volt/amp selector ...	AMPS
Fuel contents	Sufficient and correct
Magnetic Compass ...	Condition
Flight instruments ...	Condition, turn needle OFF flag retracted. Altimeter set to zero
Engine instruments ...	Condition
Vacuum gauge	Condition
VOR/ILS/DME/ADF ...	OFF
Transponder	OFF
GPS/VHF	OFF
Cabin heat controls ...	As required
Induction Air	COLD
Fuel Booster pump ...	OFF
Alternator	On (OFF if on external power)
Alternator warning light	On
Starter warning light ...	On
Throttle/RPM lock lever	Fully forward
Throttle	Set fully OPEN
RPM control	Exercise, set maximum
Mixture	FULL RICH
Elevator Trim	Full and free movement – Set in TO band
Rudder Trim	Full and free movement – Set to TO
Fuel selector valve ...	L
Flying controls	Ailerons and elevator – full, free and correct movement

STARTING THE ENGINE

Anti-collision lights	...	OFF
Ignition	...	OFF
Fuel booster pump	...	(See Note 1) On, check fuel pressure indication then OFF
Mixture	...	CUT OFF
Throttle	...	¼ inch open (See Note 2)
Give the start up signal	...	"CLEAR PROP"

When clear, select:

Ignition	...	L
Starter button ...	...	Press until engine starts

When engine starts:

Starter button ...	...	Release
Mixture	...	FULL RICH
Throttle	...	CLOSED
Ignition	...	BOTH
Starter warning light	...	Out
Anti-collision lights	...	Red strobes selected
Transponder ...	...	SBY
Intercom/GPS/VHF	...	ON, T/R, frequencies selected; volumes adjusted

Note 1: If the engine is hot and the aircraft has been standing between 15 and 30 minutes since shutdown, do not carry out fuel booster pump check. If the engine has been shut down for less than 15 minutes, switch the booster pump on momentarily checking for a brief indication on the fuel pressure gauge.

Note 2: When the CHT is 50°C or above or oil temperature is 30°C or above, up to half throttle may be required.

If the starter warning light does not go out the engine must be closed down and the fault investigated.

FAILURE TO START

If the engine fails to start after 10 to 12 seconds, release the starter button. Check the fuel booster pump is OFF, then wait for 5 minutes before making a further attempt to start. If the cause of failure to start is overpriming, make the next attempt to start as for starting a hot engine.

AFTER STARTING

Oil pressure ...	...	25 PSI within 30 seconds
External power ...	...	Disconnected
Alternator ...	...	On

Set 1200 RPM

Alternator warning light	Out
Ammeter	Positive reading; max 10 amps, one minute after starting. *(continued)*

After Starting – *continued*

Pitot head heater	...	On, ground crew check, then OFF
Vacuum gauge ...	...	Indicating
Horizon and DI ...	...	Erecting, DI aligned with magnetic compass
Ignition	...	Check for live and dead magneto
Flap	...	Correct operation
Fuel selector valve	...	R
VOR/ILS/DME/ADF	...	On, frequency set
Transponder ...	...	TST, then as required
GPS/VHF ...	...	Test
Altimeter ...	...	Set QFE
Canopy	...	Latched
Taxy lamp ...	...	As required

TESTING THE ENGINE

Aircraft into wind

Parking break ...	...	On
Control column ...	...	Central
Fuel selector valve	...	BOTH
Oil temperature ...	...	30°C minimum
Oil pressure ...	...	25 PSI minimum
Cylinder head temp	...	100°C minimum

Set 1800 RPM

RPM control (three times for first flight of day)	...	Move towards minimum until RPM decrease. Note: Do not allow RPM to decrease by more than 500 RPM Return to max. Check RPM restored

Set 2100 RPM

Magnetos ...	...	Check max drop 175 RPM. Max drop diff between mags 50 RPM. Check RPM restored at BOTH
Induction Air ...	...	Set HOT – RPM decrease. Set COLD – RPM restored
Vacuum	...	4½ to 5 inches Hg
CHT	...	125 to 180°C
Throttle	...	Close-idling RPM 800±50

Testing the Engine – *continued*

Mixture	Move control to weak mixture gate. Check RPM rise 5 to 30 RPM. FULL RICH
Booster pump	On and audible

TAKE-OFF CHECKS

Trims:	
Elevator	In TO band
Rudder	TO
Throttle lock	Off
RPM control	Maximum
Mixture	FULL RICH
Induction air	COLD
Fuel:	
Booster pump ...	On
Contents.	Sufficient
Selector value	BOTH
Flap	INTER
Instruments:	
Pitot head heater ...	On
Lights	White strobes On/Taxy and Landing light – As required
Vacuum	Indicating
Flight instruments ...	Erect, DI synchronised
Engine instruments ...	Temperatures and pressures
Alternator warning light	Out
Ammeter	2 to 5 amps
Harnesses	Seat and parachute tight
Canopy	Latched
Flying controls	Full and free movement
Take-off emergencies ...	Brief complete

Note: The rudder should have been checked for full and free movement during taxying.

CHECKS DURING TAKE-OFF

Oil Pressure	60 to 90 PSI
RPM	2650 to 2700
Fuel pressure	7 to 10 PSI

CHECKS AFTER TAKE-OFF

Engine instruments ...	Checked
Flap	Up at safe height
Transition Altitude/Airfield Departure:	
Altimeter	1013 mb/RPS set
Fuel booster pump ...	At 1000 ft agl OFF
Mixture	Adjust

Card 6
(AL 15)

CHECKS BEFORE STALLING, SPINNING, AEROBATICS

Height

Sufficient to recover by briefed height

Airframe

Flap	UP for spins and aerobatics
Elevator trim	In TO band for spins

Security

Harnesses	Seat and parachute tight
Canopy	Closed and locked
Loose articles	None

Engine

RPM control	2600 RPM
Mixture	Best power
Induction air	COLD
Fuel booster pump ...	On
Fuel contents	Satisfactory. Tanks balanced
Fuel selector value ...	BOTH
Instruments	Indications normal

Location

Clear of controlled airspace, active airfields, built up areas and cloud

Take-off/ In flight

Lookout

6 Clear of other aircraft

Recommended speeds for aerobatics

Roll	130 knots
Barrel Roll	120 knots
Stall Turn	120 knots
Loop	140 knots
Half Roll off Loop ...	145 knots

CHECKS AFTER STALLING, SPINNING, AEROBATICS

Fuel booster pump ...	OFF
Fuel selector valve ...	As required for balance
RPM	Adjust as required
DI	Synchronised

IN-FLIGHT ROUTINE CHECKS

Fuel	Contents, balance, booster pump as required
Engine	Temperatures, pressures and suction within limits
Electrics	Positive rate of charge, alternator warning light out
Location	Position and pigeons to base

PRE-DESCENT/RECOVERY CHECKS

Fuel	Contents sufficient Booster pump on below transition level
Instruments	Erect and synchronised. Vacuum pressure normal
Radio	Frequencies selected
Altimeter	Set as required
Demist and screen heat...	As required
Induction Air	As required

APPROACH PROCEEDURE

Instrument Approach Settings

	Configuration	*RPM Control*	*Throttle set to*	*IAS kt*
Initial decent	Flap UP	2400	2200 RPM	100
Glidepath	Flap INTER	Max	As reqd	100

Fly the instrument pattern at 100 knots, flap UP. When in visual contact with the runway, set FULL flap and reduce to threshold speed +5 knots.

LANDING CHECKS

Checks Before Landing

RPM control	Max
Mixture	FULL RICH
Induction air	COLD
Fuel	Booster pump on Contents sufficient
Flap	As required
Harness	Tight
Canopy	Latched
Breaks	Off. Passenger feet clear

Threshold speeds are given on Card 7 (continued)

Landing Checks – *continued*

Threshold Speeds (knots)

	FULL flap	*Flap UP*
Powered	65	70
Glide	75	75
Short landing	55	-

These speeds are for an AUW of 1066 kg and may be reduced by 1 knot per 20 kg reduction in AUW

For crosswind and/or turbulent conditions, add 5 knots

CHECKS AFTER LANDING

Pitot head heater ... OFF
Taxy lamp ... ... As required
Anti-collision lights ... Red strobes
Transponder ... ... OFF
VOR/ILS/DME/ADF ... OFF
Fuel booster pump ... OFF
Flaps ... ... UP

SHUTDOWN

Parking break ... ... On
VHF/GPS/Intercom ... Off

Set 1100 RPM and allow temperatures and pressures to stabilise. When cylinder head temperature is below 180°C:

Throttle ... ... CLOSED
Ignition ... ... Check for dead magneto, then momentarily select OFF then BOTH (ensure dead cut)

Mixture ... ... CUT OFF
Ignition ... ... OFF (when engine stops)
Fuel selector valve ... L or R

Alternator ... ... OFF
Electrical services ... Off
Transponder ... ... OFF
Anti-collision lights ... OFF
Battery Master ... ... OFF

Portable VHF ... ... OFF
Chocks ... ... In position

Parking brake ... ... Off

LIMITATIONS

Note: The following limitations are taken from the RAF Release to Service document and the Bulldog Series 120 Flying Manual No. SH3.3 which should be consulted for the latest release standard.

AIRFRAME

Maximum Speeds (knots)

Never exceed speed V_{NE}.	185
Normal operating speed V_{NO}	145
For full application of aileron, elevator or rudder V_A	140
Flap: between UP and INTER V_{FE}	135
between INTER and FULL	100
Canopy open (maximum 8 inches)	120

Operating Limitations

Maximum altitude	10,000 ft
Maximum OAT (sea level)	+35°C
Minimum OAT (sea level)	minus 10°C

Aerobatics and spinning prohibited when:

Flaps are extended, Baggage is carried, Seatbacks installed, Zero fuel weight exceeds 984 kg.

Weight

Maximum for take-off and landing	1066 kg
Maximum load in baggage compartment ...	100 kg

Airfield Limitations

Aircraft must not be operated when wind speed on the ground is gusting at or in excess of 40 knots.

Maximum crosswind component ... ... 30 knots

Arrester Gear Trampling

RHAG or PUAG ...	Erected cable may be crossed at right angles up to 30 knots, no braking applied
CHAG	Erected cable should be crossed only at walking pace, with marshaller

Negative g

Maximum time for continuous application 15 seconds

Note: A period of rough running may follow the re-application of positive g which may last approximately 15 seconds starting approximately 25 seconds after the original application of negative g.

(continued)

Aircraft Limitations – *continued*

Normal Acceleration

The normal maximum permitted positive and negative g limits are given below:

Note: Never exceed limits are given in the Flight Manual.

Clean Aircraft

1. Symmetric manoeuvres

	Aerobatics permitted	*Non-aerobatic*
	1. ZFW below 984 kg	1. ZFW above 984 kg and/or
	2. No baggage	2. Baggage carried and/or
	3. Flaps up	3. PSP fitted
Normal g limits	+4.75 to –2.0 (-1.5 above 140 kt)	+3.0 to –0.75 (+0.25 above 140 kt)

2. Rolling manoeuvres using any amount of aileron deflection at speeds up to 140 knots

	Aerobatics permitted	*Non-aerobatic*
	1. ZFW below 984 kg	1. ZFW above 984 kg and/or
	2. No baggage	2. Baggage carried and/or
	3. Flaps up	3. PSP fitted
Normal g limits	+3.15 to minus 1.0	Limited to 30° bank using low role rates

Flaps Extended at Any Setting

Maximum normal g limit +2.0g

Engine Limitations - *overleaf*

RPM

Max permissible	2700
Max (oil temp below 30°C)	1200
Ground idling	800±50

Note: Report extent and duration of all excursions above 2700 RPM.

Maximum Manifold Pressure (in Hg)

RPM	1800	1900	2000	2100	2200	2300
Sea level	25.0	25.6	26.3	26.9	27.5	28.2
Reducing to at (altitude) (See Note)	23.2 6000	24.1 5000	25.0 4000	26.0 3000	26.9 2000	27.8 1000

Note: These altitudes correspond to full throttle height for the associated RPM.

Magneto Drop at 2100 RPM

Max each magneto	175
Max between magnetos	50

Cylinder Head Temperature (°C)

Max at full throttle	246
Max before shutdown (after flight)	180
Min before exceeding 1200 RPM (following engine start on ground)	100
Min during flight	50

Oil Pressure (PSI)

Min at idling RPM	25
Min (normal operation)	55
Max (normal operation)	95
Max during start and warm up	100
Minimum during a closed throttle descent at 1200 RPM	40
Minimum during inverted flight	Zero

Oil Temperature (°C)

Maximum	118
Min (continuous operation)	60
Min before exceeding 1200 RPM	30

Fuel Pressure (PSI)

Maximum	12

PERFORMANCE

EN-ROUTE CLIMB-ISA, Maximum take-off weight, Maximum power

Altitude (ft)	Time (mins)	Distance (NM)	Fuel Used (UK gal)
Sea level to 2000	2.5	3.5	0.5
4000	5.0	7.0	1.0
6000	7.5	11.0	1.5
8000	10.5	15.0	2.0
10,000	14.0	20.0	2.6

CRUISE PERFORMANCE

Power %	*IAS (knots)*					
	1043 kg AUW			*862 kg AUW*		
	SL	4000	8000	SL	4000	8000
95	134	-	-	135	-	-
90	130	-	-	132	-	-
80	123	120	-	126	123	-
70	116	113	110	120	116	113
60	108	107	103	113	111	107
50	100	97	95	104	102	101
40	89	86	83	94	91	89

(continued)

Performance – *continued*

FUEL CONSUMPTION – ISA, All altitudes and weights

a. Best Power Mixture

Power %	*UK Gallons per hour*		
	2600 RPM	*2400 RPM*	*2200 RPM*
95	12.5	-	-
90	11.9	-	-
80	10.7	10.5	-
70	9.7	9.4	9.1
60	8.7	8.4	8.1
50	7.7	7.4	7.1
40	6.8	6.4	6.2

b. Best Economy Mixture

Power %	*UK Gallons per hour*				
	2600	*2400*	*2200*	*2000*	*1800*
70	8.3	8.1	-	-	-
60	7.4	7.2	6.9	-	-
50	6.5	6.3	6.1	5.9	5.7
40	5.6	5.4	5.2	5.0	4.8

CRUSIE POWER SETTINGS

BEST POWER MIXTURE

Pwr %	*Fuel Press*	*Man Press*			*Fuel Press*	*Man Press*		
		SL	*4000*	*8000*		*SL*	*4000*	*8000*
	2600 RPM				*2400 RPM*			
95	6.3	28.5	-	-	-	-	-	-
90	5.7	27.5	-	-	-	-	-	-
80	4.7	25.0	24.0	-	4.5	27.0	-	-
70	3.9	22.5	21.5	20.5	3.7	24.5	23.5	-
60	3.1	20.0	19.5	18.5	2.9	21.5	21.0	20.0
50	2.5	17.5	17.0	16.0	2.3	19.0	18.0	17.5
40	1.9	15.5	14.5	14.0	1.7	16.5	15.5	15.0
	2200 RPM							
95	-	-	-	-				
90	-	-	-	-				
80	-	-	-	-				
70	3.5	26.5	25.5	-				
60	2.7	23.5	22.5	21.5				
50	2.1	20.5	19.5	19.0				
40	1.6	17.5	17.0	16.0				

(continued)

Cruise Power Settings – *continued*

BEST ECONOMY MIXTURE

Pwr %	*Fuel Press*	*Man Press*			*Fuel Press*	*Man Press*		
		SL	*4000*	*8000*		*SL*	*4000*	*8000*
	2600 RPM				*2400 RPM*			
70	2.9	23.5	22.5	21.5	2.7	25.0	24.0	-
60	2.3	21.0	20.0	19.0	2.1	22.5	21.5	20.5
50	1.8	18.5	17.5	17.0	1.7	19.5	18.5	17.5
40	1.3	16.0	15.0	14.5	1.2	17.0	16.0	15.0
	2200 RPM				*2000 RPM*			
70	2.5	27.5	-	-	-	-	-	-
60	2.0	24.5	23.0	-	-	-	-	-
50	1.5	21.5	20.0	19.0	1.4	23.5	22.5	-
40	1.1	18.5	17.0	16.0	1.1	20.0	19.0	18.0
	1800 RPM							
70	-	-	-	-				
60	-	-	-	-				
50	-	-	-	-				
40	1.0	22.5	21.0	20.0				

RANGE

Note: The fuel given in the table below is the fuel available after an arbitrary allowance of 4 UK gallons has been made for descent, landing and unusable fuel (e.g. full fuel (32 UK gallons) is 28 UK gallons plus 4 UK gallons allowance).

Mixt	*Fuel (UK Gal)*	Pwr %	*Range – NM*								
			Sea level at RPM			*4000 ft at RPM*			*8000 ft at RPM*		
			2600	*2400*	*2200*	*2600*	*2400*	*2200*	*2600*	*2400*	*2200*
BEST POWER MIXTURE	**28**	95	247	-	-	-		-	-	-	-
		90	256	-	-	-	-	-	-	-	-
		80	268	274	-	278	-	-	-	-	-
		70	283	290	300	282	302	312	301	-	-
		60	298	307	319	309	319	331	319	331	343
		50	312	324	338	321	334	348	334	348	362
		40	326	340	357	336	352	369	346	360	379
	21	95	175	-	-	-	-	-	-	-	-
		90	181	-	-	-	-	-	-	-	-
		80	190	194	-	197	-	-	-	-	-
		70	200	205	213	202	214	221	214	-	-
		60	211	218	226	219	226	235	226	235	243
		50	221	230	239	228	237	247	237	247	257
		40	231	241	253	238	250	262	245	255	269
	14	95	103	-	-	-	-	-	-	-	-
		90	107	-	-	-	-	-	-	-	-
		80	112	114	-	116	-	-	-	-	-
		70	118	121	126	122	126	130	126	-	-
		60	124	129	134	129	134	139	134	139	144
		50	130	136	141	135	140	146	140	146	152
		40	136	143	150	141	148	155	145	151	159
BEST ECONOMY MIXTURE	**28**	70	331	339	350	343	350	-	335	-	-
		60	350	361	373	366	375	387	376	388	-
		50	367	380	394	382	394	409	397	411	426
		40	385	397	414	397	411	428	411	423	441
	21	70	235	241	248	243	248	-	252	-	-
		60	248	256	265	259	266	275	267	276	-
		50	260	270	280	271	280	290	282	292	302
		40	273	282	294	282	292	304	292	300	313
	14	70	138	142	146	143	146	-	148	-	-
		60	146	151	156	153	157	162	157	161	-
		50	153	159	165	160	165	171	166	172	178
		40	161	166	174	166	172	179	172	177	185

Intentionally Blank

BULLDOG SERIES 120
EMERGENCIES

EMERGENCY ENGINE SHUTDOWN
(Engine Fire or Mechanical Failure/
ENGINE FAILURE IN FLIGHT
(Non-Mechanical)

FORCED LANDING
ENGINE FAILURE AFTER TAKE-OFF/
ENGINE FIRE ON THE GROUND
COCKPIT FIRE
FUMES IN THE COCKPIT

ROUGH RUNNING IN FLIGHT
PROPELLER MALFUNCTIONING/
ELECTRICAL FAILURES

COMMUNICATIONS FAILURE/
ABANDONING
DITCHING

EMERGENCY ENGINE SHUTDOWN
(Engine Fire or Mechanical Failure)

Note: No engine fire extinguisher is fitted.

Immediate Actions

Warn crew
Turn towards nearest suitable landing area

Speed	Reduce to 75 kt for the glide
Fuel Booster pump ...	OFF
Throttle	CLOSED
Mixture	CUT-OFF
Ignition	OFF
Fuel selector valve ...	OFF
Cabin heat	Off
Alternator	OFF

WARNING: Do not attempt to restart the engine

Subsequent Actions

Above 2000 feet AGL:

Fire not extinguished – carry out the **Abandoning** checks (Card 15)
Fire extinguished/Mechanical Failure – decide between **Forced Landing** (Card 12R) or **Abandoning** (Card 15)

Below 2000 feet AGL:

Harness	Tight
Canopy	Closed and locked
Parking brake	Off
Radio	R/T call

Maintain 75 knots throughout descent until roundout
When final flap selection has been made:
Battery master switch ... OFF

ENGINE FAILURE IN FLIGHT (Non-Mechanical)

Immediate Actions

Warn Crew
Turn towards nearest suitable landing area

Fuel booster pump	...	On
Throttle	...	CLOSED
Speed	...	Reduce to 75 knots for glide

Subsequent Actions

Below 2000 feet AGL:

Carry out **Forced Landing** Checks (Card 12R)

Above 2000 feet AGL:

If time permits, set or confirm:

Fuel selector value	...	BOTH
Fuel booster pump	...	On
Induction air	...	As required
Ignition	...	BOTH
Mixture	...	FULL RICH
RPM	...	Max
Throttle	...	Slightly open

If propeller is windmilling:

Throttle ... ... Open
If engine does not pick up:
Throttle ... ... CLOSED
Decided between **Forced Landing** (Card 12R) or **Abandoning** (Card 15)

Emergy Shutdown/ Eng Failure 12

If propeller is stationary:

Starter button ... ... Press until engine fires
Starter warning light ... Out
Throttle ... ... Open
If engine does not pick up:
Decided between **Forced Landing** (Card 12R) or **Abandoning** (Card 15)

Note 1: If engine does not turn using starter motor the propeller may be rotated by diving steeply to 140 knots. If still stationary, a firm pull-out assists propeller rotation. Only attempt this if a successful Forced Landing or Abandoning would still be possible if engine fails to start.

Note 2: If engine failure was caused by intake icing, use induction hot air until clear of icing conditions.

FORCED LANDING

The recommended minimum height for abandoning the aircraft is 2000 feet AGL.

Speed	75 knots until roundout
Fuel booster pump ...	OFF
Throttle	CLOSED
Mixture	CUT-OFF
Ignition	OFF
Fuel selector value ...	OFF
Harness	Tight
Canopy	Closed and locked
Parking Brake	Off
Radio	R/T call
Transponder	ALT, code 7700

When final flap selection has been made:

Battery master	OFF

ENGINE FAILURE AFTER TAKE-OFF

Immediate Actions

Warn crew
Select attitude for gliding speed
Select landing area
Lower flap as necessary

Subsequent Actions

Radio	R/T call

Carry out as many **Forced Landing** checks (above) as time and circumstances permit

ENGINE FIRE ON THE GROUND

Warn crew
Fuel booster pump ... OFF
Throttle ... ... CLOSED
Mixture ... ... CUT-OFF
Ignition ... ... OFF
Fuel selector valve ... OFF
Battery master switch ... OFF
Parking brake ... ... Off

Collect the hand fire extinguisher and vacate the aircraft

COCKPIT FIRE

Alternator ... ... OFF
Battery Master switch ... OFF
Cabin heat. ... ... OFF
Use hand fire extinguisher

Note: If time is sufficient, make RT distress call before battery master switch OFF.

FUMES IN THE COCKPIT

Cabin heat ... ... OFF
Air flow lever ... ... SCREEN
Windscreen demist ... Pulled on
Speed ... ... Below 120 knots
Canopy ... ... Open 2 to 4 notches
Land ASAP

ROUGH RUNNING IN FLIGHT

Ensure positive g applied
Turn towards the nearest suitable landing area

Fuel booster pump	...	On
Fuel selector valve	...	Check setting
Fuel contents ...	...	Check
Engine controls ...	...	Check correctly set (see Note 1)
Induction air ...	...	Change setting if still rough running

If rough running continues, attempt to maintain at least 2000 feet AGL

Mixture ...	...	FULL RICH

If rough running continues (see Note 2):

Throttle ...	...	Set to about half open
Magneto switch ...	...	Select Left (see Note 3)

If rough running continues:

Magneto switch ...	...	Select Right (see Note 3)

If rough running continues:

Magneto switch ...	...	Select BOTH
MAP and RPM ...	...	To give smoothest running

Recover to nearest airfield from a forced landing pattern

Note 1: In the climb above 5000 feet some over-richness may occur resulting in rough running or loss of power. If either symptom occurs, use mixture control to reduce fuel pressure to attempt to remove symptom.

Note 2: Switching of magnetos in flight to attempt to isolate a defective magneto is only recommended if a forced landing away from an airfield is inevitable.

Note 3: If engine cuts, close throttle before selecting alternative magneto.

PROPELLER MALFUNCTIONING

RPM Overspeed (Exceed 2700)

Reduce RPM control until RPM are governed
Reduce speed
Use minimum throttle
Land ASAP

RPM underspeed or RPM Follow Throttle Movement in Constant Speed Range

Throttle back slowly to avoid overboosting
Use minimum throttle
Monitor engine for oil loss
Maintain 2000 feet AGL
Land ASAP from forced landing pattern

ELECTRICAL FAILURES

Alternator Failure

Indications – 1

Alternator failure light ... On
Ammeter... ... ... Negative reading
Volts ... ... 24 volts or less
Charge c/b ... ... Tripped

Actions

Non-essential electrics ... Off
Alternator ... ... OFF
Do not reset charge c/b or alternator

Indications – 2

As for *Indications – 1* but charge c/b *not* tripped

Or

Indications –3

Ammeter... ... ... Negative reading
Volts ... ... 24 volts or less
Charge c/b ... ... Tripped

Actions for Indications 2 and 3

Reset drill:

Non-essential electrics ... Off
Alternator ... ... OFF
Charge or field c/b ... Reset if tripped
Alternator ... ... On
See Note and considerations below

Note: If alternator is regained, check ammeter positive reading reduces to 10 amps within one minute

If alternator *not* regained or charge rate exceeds 10 amps after 1 minute, switch alternator OFF and trip CHARGE c/b

Considerations

Reduced services are available from an 80% charged battery for 45 minutes but satisfactory communications are only available for 35 minutes (VHF). For landing, full flap selection and fuel booster pump may not be available.

Flap Actuator Failure

If flap fails to operate when selected, check flap circuit breaker and if tripped make one attempt to reset.

If flap still fails to operate, continue flight with flap in achieved position, observing flap limiting speeds.

COMMUNICATIONS FAILURE

Loss of Transmit and/or Receive Facility

Mic/tel leads	...	Connected
COM 1 or COM 2	...	Use alternative radio
Transmit switch	...	Check, try other switch
If VHF reception available	...	Use speechless procedure
If complete failure remains	...	Transponder to ALT, code 7600

Loss of Intercom

Mic/tel leads	...	Connected
Audio circuit breaker	...	If tripped, make one attempt to reset

ABANDONING

The recommended minimum height for abandoning the aircraft is 2000 feet AGL. In a spin the aircraft should be abandoned by transition level plus height of ground AMSL.

Warn Crew

Radio	Transmit distress call
Transponder	ALT, code 7700
Canopy	Jettison
Speed	Reduce to safe minimum
Safety harness	Release
Parachute harness ...	Tight

Dive head first towards trailing edge of Mainplane
When clear of the aircraft, pull the parachute ripcord handle

To jettison canopy

Pull jettison handle down and aft sharply
Push canopy away if necessary

Note: Above 75 kt it should not be necessary to push the canopy away

DITCHING

If possible, abandon rather than ditch. If ditching is inevitable:

Radio	Transmit distress call
Transponder	ALT, code 7700
Flap	As required
Canopy	Jettison
Safety harness	Tight

Approach into wind at normal speed with full flap.

If power is available, hold off just clear of water.

Touch down at lowest practicable speed and close throttle.

Land on the crest of a wave if possible or, if the swell is heavy, along the swell.

Aircraft will probably turn on its back.

Release safety harness and leave cockpit; retain parachute harness until clear of cockpit.

Diversion Data – *overleaf*

BPM 2200 RPM FL40								*Indicated Fuel - Gallons*											
								10		14		18		22		26		30	
Wind Component	*Pwr %*	*MAP*	*Fuel Pres*	*IAS*	*TAS*	*G/S*	*Grnd MPH*	*Range (R) – NM and Time (T) – Minutes*											
								R	*T*	*R*	*T*	*R*	*T*	*R*	*T*	*R*	*T*	*R*	*T*
30T	40	17.0	1.6	86	91	121	14.7	88	44	147	73	206	102	265	131	323	160	382	190
20T	40	17.0	1.6	86	91	111	13.5	81	44	135	73	189	102	243	131	297	161	351	190
10T	40	17.0	1.6	86	91	101	12.3	74	44	123	73	172	102	221	132	271	161	320	190
0	40	17.0	1.6	86	91	91	11.1	67	44	111	73	155	102	200	132	244	161	289	190
10H	40	17.0	1.6	86	91	81	9.9	59	44	99	73	139	103	178	132	218	161	257	190
20H	40	17.0	1.6	86	91	71	8.6	52	44	86	73	120	102	155	131	189	160	224	189
30H	50	19.5	2.1	97	102	72	7.4	44	37	74	62	104	86	133	111	163	136	192	160
40H	60	22.5	2.7	107	111	71	6.4	38	32	64	54	90	76	115	97	141	119	166	141

The table allows 4 UK gallons of fuel overhead the diversion airfield for descent and landing. Use of BEM increase range by approximately 15%.

Do not climb above Minimum Safe Flight Level unless headwind is less at higher level; use same % power for head or tailwind component.