SAFETYSENSE LEAFLET 16a
BALLOON AIRMANSHIP

1 INTRODUCTION

a) This guide is intended for pilots of hot air balloons; however, much of the advice will apply to any lighter-than-air craft.

b) Today hot air ballooning has become a significant leisure activity, with many commercial operators undertaking passenger flights in large, compartmented baskets. This makes the use of safe operating practices vitally important. The objectives are to safeguard persons and property on the ground as well as the balloon and its occupants. The invaluable work of the representative organisation, the British Balloon and Airship Club (BBAC)*, is gratefully acknowledged and all owners, operators and pilots are encouraged to join and participate in its work.

c) The safety record of ballooning is excellent and many of the criteria which apply to the safe conduct of balloon flights apply equally to the safe conduct of any flight. These can be summarised as sound **Knowledge,** careful **Preparation,** and the exercise of good **Practice.** These are detailed below.

2 KNOWLEDGE

a) Reporting

Learn from the mistakes of others; you might not live long enough to make them all yourself. Share your knowledge and experience with others by making a report to the BBAC Safety Officer, and to the Safety Information & Data Department* of the Civil Aviation Authority, on any incidents from which you think others might learn. Your report could prevent someone else's accident.

Improve your knowledge by reading as many accounts of other people's ballooning problems as you can. The BBAC Pilot's Circular and Web Forum; CAA Newsletters, Balloon Notices, FODCOMs and Safety Notices; Bulletins issued by the General Aviation Safety Council* and by the Air Accidents Investigation Branch* of the Department of Transport are regular sources of safety information.

* See addresses at end of Leaflet.

b) Statistics

Accurate statistics for ballooning are difficult to obtain. A total of over 1,850 hot air balloons are now registered in the UK. There is no record of the total number of balloon flights per annum; however, in recent years there have been nearly 10,000 annual Public Transport flights by about 200 commercial balloons, during which over 75,000 passengers have been annually carried. In recent years there has been an average of 10 reportable accidents to balloons in the UK per annum, fortunately with only one fatality within the past 15 years; however, a small number of passengers receive injuries each year and a number of balloons are damaged. The most potentially serious situation which a balloon can encounter, other than mid-air collision, is to be in close proximity to, and up-wind of, over-head electricity cables. In recent years nearly 40% of accidents were due to wire strikes.

c) Training

Keep in regular flying practice; you will handle difficult situations more effectively if you are current. Check that you have sufficient recent flying experience to maintain the validity of the licence, and that your medical certificate is current. Occasionally fly with an experienced pilot/instructor/ examiner who can identify any bad flying habits you may have inadvertently acquired.

3 PREPARATION FOR FLIGHT

a) Paperwork

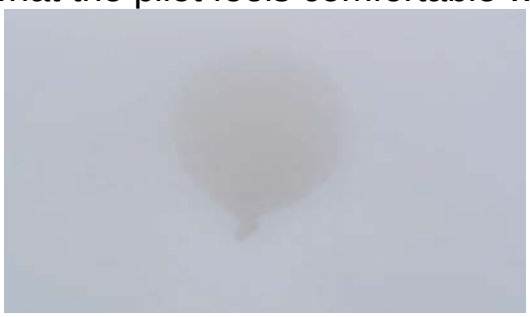
Formal documentation for private flight is relatively simple, but keeping a Balloon and Personal Flying Log Book requires a responsible attitude. Commercial operators of balloons for Public Transport must keep a Technical Log and sign for the condition and loading of the balloon before flight. Documents and data, i.e. Flight Manuals and Log Books, must be kept up to date so that the balloon's condition and loading can be established before the next flight. The Annual or 100-hour inspection must be completed when due and an Airworthiness Review Certificate (ARC) completed before further flight.

b) Balloon Condition

Commercial balloons must be maintained to a high standard and operators are required to provide evidence of this in the Technical Log and Balloon Log Book. Private balloons must be maintained to no less a standard by using similar procedures. You must ensure that all damage or defects, even minor (balloons are not 'self-healing'), are put right in accordance with the Manufacturer's instructions before further flight. It is the pilot's responsibility to ensure that the balloon is fit for flight. **Never use unauthorised or improper parts in a balloon.**

c) Weather

Make maximum use of weather forecasts for ballooning. These are available by phone and fax from a number of commercial sources in addition to the existing Met Office Services*. The various methods of obtaining aviation weather (including codes) are listed in **'GET MET**'. This Met Office booklet may be downloaded free from their website. Avoid personal or commercial pressure to fly and, if in doubt about the conditions, **don't.** Remember "it's better to be on the ground wishing you were flying than the other way round"! Know and comply with the Visual Flight Rules as well as with the wind speed limits of the balloon, and what the pilot feels comfortable with.



d) Maps and Charts

The Air Navigation Order (ANO) requires you to carry an up-to-date chart, for obvious and sensible reasons. Balloon pilots probably need more information than most from their maps and charts because their landing area is uncertain until the final stages of the flight. Ordnance Survey maps, marked with sensitive landing and over-flying areas, are needed as well as aeronautical charts. Keep yours up-to-date and don't fly without them. Some pilots are now using electronic GPS mapping to comply with the above; however, ensure that you have checked current aeronautical charts and carry a back-up for when your computer or PDA fails.

e) Flight Planning and Navigation

The more time you spend in preparation, the better you will enjoy the flight. Armed with appropriate maps and charts, and in possession of a recent aviation weather forecast, you should be able to make a reasonable estimate of the expected track. Study the available information for the route, including NOTAMs. Check for the proximity of regulated airspace, Danger Areas, sensitive areas and other hazards, including major overhead power lines. Attention to this will avoid last-minute unfolding of maps in flight and thumbing through flight guides for the frequency of an airfield you are approaching. Call the AIS **Freephone number, 0500 354802,** for the latest information on Royal Flights, Red Arrows Displays and Airspace Restrictions.

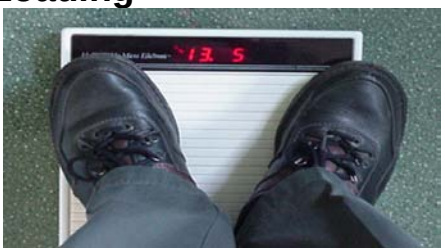
f) Landing Area

Plan to land in an area which provides a choice of suitable sites. Avoid being committed to land in an area which does not offer any alternatives if an initial approach has to be abandoned. Whilst you must not plan to land within the congested area of a city, town or settlement, the Rules of the Air Regulations now allow a balloon that is becalmed to land within a congested area provided this can be safely accomplished.

g) Radio

Carry a radio if there is a possibility that you will approach controlled airspace or an active Aerodrome Traffic Zone. Ground crews prefer that they, and you, have a well-charged radio and know how to use it. A VHF R/T licence is required if an aeronautical frequency is used. A licence for any R/T equipment must be obtained from the CAA's Directorate of Airspace Policy Surveillance and Spectrum Management*. Keep transmissions brief and to the point, and brush up your radio procedures by reading the Radiotelephony Manual, CAP 413, downloadable from the CAA website www.caa.co.uk/publications.

h) Loading



Make sure that the empty weight of the balloon, including equipment, fuel cylinders and contents, is available and accurate. Use actual weights for passengers and crew and add an allowance for miscellaneous items such as camera bags. (You may need to have scales available.) Use Flight Manual figures for calculating available **lift** and **do not exceed this figure.** Remember, there is significant loss of lifting capability on a hot day. Excessive heating will shorten the life of the balloon.

i) Re-fuelling and Fuel Planning

Use fuel from a reliable source. As propane is considerably more volatile than petrol and is stored under pressure, treat it with the respect it deserves. Re-fill cylinders in well-ventilated surroundings free of static discharge or other source of combustion. **Make sure no-one is smoking.** Keep equipment in good condition and observe the Propane Code, available from the BBAC. Propane vapour pressure is reduced by low ambient temperature resulting in loss of burner efficiency, and thus balloon performance. Nitrogen pressurisation has largely replaced warming of cylinders as the preferred method of maintaining pressure on cold days. Nitrogen pressurisation should be undertaken with care, ensure that you are correctly trained in the process. Ensure that tanks are not over-pressurised.

j) Safety Equipment

The following **must** be carried:

- alternative method of ignition;
- protective gloves;
- pilot's restraint harness (which must be worn for the landing and is strongly recommended to be worn at all times during flight);
- fire extinguisher; and
- first aid kit.

The items below are recommended:

- binoculars, to help spot power lines etc.; and
- protective helmets for all on board when flying conditions dictate.

Commercial Pilots must, and commercial ground crew should, have attended a fire and first aid refresher course within the last three years. It is strongly recommended that private pilots and crews attend similar courses too.

Check that all time limited portable equipment is 'in date'.

k) Ground Crew

Crews should receive training as recommended by the BBAC which is provided in many parts of the country. The training should include inflation, launching and tethering, emergency procedures, refuelling, use of radio, map reading and landowner relations.

l) Flight Over Water

If your track may take you more than a mile over water, carry life jackets for every occupant. Over large expanses, or if the water is cold, also take a life raft capable of holding everyone. Check that loading figures take this equipment into account, and that these items have recently been tested by an Approved Organisation. (See SafetySense Leaflet No. 21 '*Ditching*' for a list.)

m) Tethering, Clearances and Permissions

- Anywhere in the UK:

  – In the unlikely event that the top of a tethered balloon is to be more than 60 metres above ground level, a permission in writing must be obtained in good time from the CAA's Flight Operations Inspectorate (General Aviation)* (ANO 2009 Article 163(3)(b)).

  – Permission must be obtained from the person in charge of any vessel, vehicle or structure within 60 metres of a tethered balloon (ANO 2009 Article 163(2)).

  – You must obtain the landowner's permission.

  – The local Police Authority should be notified of any intended tethered flight.

- Airspace

  – In addition to the above, if the free or tethered flight is within, or will enter, Controlled Airspace or an Aerodrome Traffic Zone, a clearance must be obtained from the appropriate Air Traffic Service Unit (ANO 2009 Article 163(5) and (6)).

- Equipment

  – Equipment for tethering must be in good condition and provision made for crowd control at public events. Check the Flight Manual for instructions and restrictions which apply to tethered flight, especially wind limits.

n) Night Flying

Free balloons, and tethered balloons above a height of 60 metres, must display the lights specified in the Rules of the Air Regulations (Rules of the Air Regulations 2007 Rules 51 and 52) when flying between half an hour after sunset and half an hour before sunrise. Particular regard must be paid to the 'endangering' Articles of the ANO (ANO 2009 Articles 137 and 138) when contemplating a night flight in a balloon, and the pilot's licence privileges and insurance must include night flying.

o) Large Events

Go to the briefing, pay attention to what is said, and comply. There are no prizes for being first off the ground, or for appearing braver than anyone else by setting off in unsuitable weather. Lives could be endangered and the future of the event jeopardised by unreasonable behaviour. BBAC-agreed practices are contained in CAP 403, the Flying Display Manual, which **must** be used by organisers of balloon events.

p) Flight Abroad

Learn the regulations for operating balloons, airspace restrictions, and how to check weather and NOTAMs, for every country you fly in. Check insurance cover. A private balloonist must carry the aircraft's Certificate of Registration, Radio Licence and Certificate of Airworthiness, with the crew's licences and Interception Procedures (SafetySense Leaflet 11). Public transport operators must also carry the Technical Log, Load Sheet, and Operations Manual. You must file a Flight Plan (SafetySense Leaflet 20) before crossing an International Boundary.

q) Pilot Fitness

Don't fly if unfit. It is better to cancel a flight than to scrap a balloon. Check the following I'M SAFE check-list:

I – Illness, any symptoms?

M – Medication, does your family doctor know you are a pilot?

S – Stress, any serious personal upsets?

A – Alcohol/drugs.

F – Fatigue, good night's sleep?

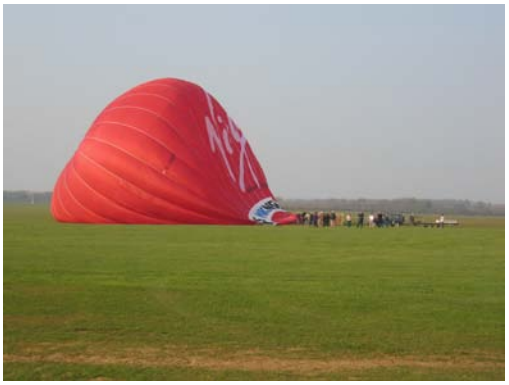
E – Eating, recent meals?

4 PRACTICE

a) Selection of Take-off Site

Check that the selected site is sheltered, unobstructed by overhead lines or other hazards, and clear of built-up (congested) areas unless an Exemption to Rules of the Air Regulations 2007, Low Flying Rule 5(3)(c) is in force (see paragraph 4(g)), in which case carefully check the conditions under which it is issued. Also, you **MUST** have the landowner's permission. Check that the expected track from the site is clear of controlled airspace, Danger Areas and other airspace restrictions as well as built-up areas. Check that there is a good choice of landing sites along the expected track within the planned flight time.

b) Inflation



Brief an adequate number of ground crew and check that they, as well as the pilot and passengers, are wearing gloves and suitable long-sleeved non-synthetic clothing. Check that the balloon is serviceable, that the cylinders are re-fuelled and that loading will be within limits. Test burners and check for leaks. Attach the quick-release tether to a vehicle which has an effective handbrake and is in gear. Before starting the cold inflation, attach the flying wires prior to laying out the envelope and the rip line. Carry a lighter, and spare matches or striker. Keep passengers well clear, but paying attention, and move spectators to a safe distance. The fire extinguisher should be readily available.

c) Pre-Take-off

Take your time, use a check-list, and do not hesitate to **cancel the flight** if all is not well with the condition of the balloon, its instruments and equipment, with the take-off site or with the weather. Test the deflation system, and double check all burner systems for leaks, contents and correct functioning. Leave nothing to chance.

d) Passenger Briefing

Article 88 of the ANO 2009 requires that all passengers **MUST** be given a briefing on what they should do in the event of an emergency etc. The briefing must include the following:

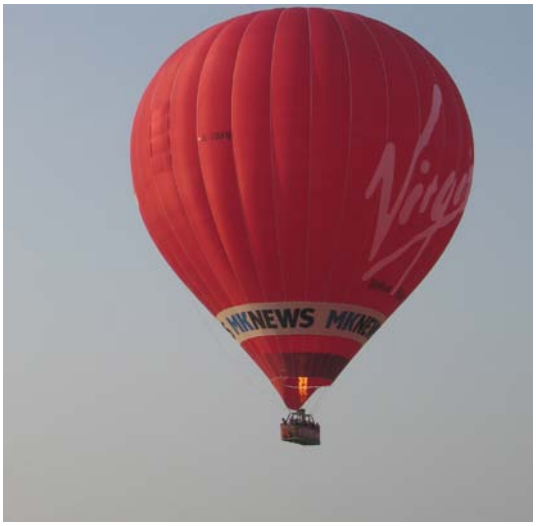
- do not hold on to hoses, valves or control lines;
- hold on to the internal rope handles or fuel cylinder rims; and
- on landing, normally face backwards, hold on tightly and always pay attention to the pilot's instructions, keep arms inside the basket and **do not leave the basket without the pilot's permission.**

It is recommended that children are not carried on any flight unless they are old enough to understand the briefing, and are tall enough to see over the edge of the basket unaided.

e) Burner Handling and Fuel Management

Test all systems before take-off. Memorise cylinders in use and know the state of the others. Plan cylinder changes in advance, watch the gauges and change cylinders **before** the pressure drops. Check the burner after changing cylinders. Double check all hose connections. Know and practise emergency procedures for pilot-light failure, burner failure and fire in the air.

f) Take-off



Make a final communications check with the ground crew. Agree a contact telephone number and hand over the vehicle keys. Use a take-off technique appropriate to the prevailing wind conditions. Employ both ground crew and a quick-release tether in other than calm conditions to ensure a clean departure. Immediately after take-off, check again that all systems are ‘go’.

g) Low Flying Rules

The Rules of the Air Regulations apply to ALL aircraft, which includes balloons. Fly no lower than 1,000 ft above the highest fixed object within 600 metres of the balloon when over a congested area (unless in possession of an Exemption to Rules of the Air Regulations 2007 Rule 5(3)(c) for take-off and climb-out). Over open country, remain at least 500 feet clear of any persons, vessels, vehicles or structures (Rules of the Air Regulations 2007 Rule 5(3)(b)) unless taking off or landing in accordance with normal aviation practice (Rules of the Air Regulations 2007 Rule 6(a)(ii)).

h) Avoidance of Obstacles and Overhead Lines

Although binoculars are helpful, if obstacles or power lines are seen at the last moment, make a decision to climb or to land and then **stick to this decision.** For a fast climb, use all burners together, but be careful not to exceed the maximum permitted rate of climb or envelope temperature. To descend, use the deflation valve but be ready to slow the sink rate with the burner when it is safe to do so. Remember, it is easier to maintain or increase the vertical motion of a balloon, either up or down, than to reverse it. From level flight a balloon responds faster when put into a descent than when asked to climb.

Do not deliberately fly near power lines (bear in mind the 500 ft rule) and **avoid touching them at any cost.** When you have identified a set of wires, do not concentrate on them to the exclusion of all else – watch out for others!

If contact is inevitable, descend as fast as possible so that the envelope and **not** the basket assembly contacts the wire. Shut down the fuel system and vent fuel lines before contact. If the balloon is caught in the wires, **do not** touch any metal parts. If possible, remain in the basket until the electrical power is switched off. Do not allow ground crew near the balloon until the power is switched off.

i) Controlled Airspace

See ANO 2009 Article 163 'Balloons'. Before embarking on a flight in a direction which could involve approaching controlled airspace (CAS), pre-plan possible landing areas to avoid entry and study SafetySense Leaflet 27.

You may be able to obtain entry clearance from the controlling authority for the airspace if you telephone well in advance, but if an unexpected wind change carries you towards CAS, make an early radio call requesting clearance. A transponder may be useful in obtaining that clearance, particularly as the balloon may not show up well on primary radar.

You must not enter CAS without clearance, so **land** if you do not receive it. However, if landing is not a safe option and you are drifting into CAS without clearance, make an urgency call ("PAN PAN") to warn the controlling authority that you are likely to be a hazard to others.

j) Aerodrome Traffic Zones

See SafetySense Leaflet 6 (and 26 for military aerodromes). You must not enter an ATZ during its hours of operation (check in the AIP and NOTAMs) without at least calling on the radio to obtain information for safe flight. If an Air Traffic Controller is on duty, you need his permission to enter the ATZ. If you cannot obtain permission, either climb above it or land before entering, as for CAS.

Call when entering and leaving the ATZ. Your size may distort others' estimation of your position.

k) Sensitive Areas and Code of Conduct

Whilst not really a safety matter, it is relevant that the pilot should be fully aware of the BBAC Code of Conduct, agreed with the National Farmers Union (NFU) and the CAA, and observe sensitive areas along the line of flight. Don't frighten animals or damage crops; these are the farmer's livelihood. Ask for permission before retrieving the balloon.

l) Landing

Tell the ground crew where you are planning to land. Check that the approach to the selected site is clear and that sufficient fuel remains in the cylinder in use in case it is necessary to make an approach to an alternative site. Brief passengers, emphasising that they must **NOT** leave the basket until told to do so. Stow all loose articles. Locate the rip-line and prepare to use it. Turn off fuel just before touch-down. Avoid the risk of setting fire to crops or scorching grass by extinguishing the pilot-light and checking that there is no residual flame. Make sure that spectators are not at risk. When you have finished the retrieve, make certain gates are left as you found them, and remember to thank the landowner.

5 USEFUL ADDRESSES:

- Civil Aviation Authority
  Safety Regulation Group
  Aviation House
  Gatwick Airport South RH6 0YR

  – Flight Operations Inspectorate (GA)
    Tel: 01293 573227 Fax: 01293 573973

  – Aircraft Registration
    Tel: 020 7453 6299 Fax: 020 7453 6262

  – Licensing Dept:
    Tel: 01293 573700 Fax: 01293 573996

  – Medical Department
    Tel: 01293 573700 Fax: 01293 573995

  – Safety Data Dept
    Tel: 01293 573220/1 Fax: 01293 573972

  Radio Licensing Section
  Surveillance & Spectrum Management
  Directorate of Airspace Policy
  CAA House K6G6
  45-59 Kingsway
  London WC2B 6TE
  Tel 020 7453 6555 Fax 0207 453 6556
  e-mail: radio.licensing@caa.co.uk

- Aircraft Accidents Investigation Branch
  Dept. for Transport
  Berkshire Copse Road
  Aldershot GU11 2HH
  Tel: 01252 510300 01252 512299 (24 hr)

- British Balloon & Airship Club
  Information Officer
  C/o Cameron Balloons
  St John Street
  Bedminster
  Bristol BS3 4NH
  Tel: 0117 963 7216 Fax: 0117 966 1168

- General Aviation Safety Council
  Rochester Airport
  Chatham ME5 9SD
  Tel: 01634 816620
  e-mail: info@gen-av-safety.demon.co.uk

- Meteorological Office
  Central Forecasting Division
  Fitzroy Road
  Exeter
  Devon EX1 3PB
  Tel: 01392 885680 Fax: 01392 885681

6 MAIN POINTS

- **Learn from the mistakes of others.**
- **Keep in current flying practice.**
- **Stick to your limitations and those of the balloon.**
- **Get a proper weather forecast.**
- **Use the latest maps and charts, and check NOTAMs.**
- **Know the balloon, its systems and equipment.**
- **Observe the Propane Code.**
- **Load the balloon correctly.**
- **Have completed first aid and fire training.**
- **Keep spectators at a safe distance.**
- **Check everything thoroughly before take-off.**
- **Stay out of controlled airspace unless clearance has been obtained to enter it.**
- **Know and observe the Regulations in the Rules of the Air.**
- **Regularly check fuel contents and cylinder in use.**
- **Observe the BBAC/NFU Code of Practice.**
- **Keep well away from power lines etc.**