

EXERCISE 20

NIGHT FLYING

Introduction

1. The handling of an aircraft at night is no different from that during the day, and the transition to night flying is quite easy, particularly for the pilot trained in instrument flying. Furthermore flying at night is usually smoother than day flying because of the reduction at night of thermal or convection air currents.

AIRCRAFT LIGHTING

International Navigation Lights

2. The lights displayed by an aircraft at night not only indicate to you that there is another aircraft present, but they can also be used to determine its position relative to your own aircraft. Fig 20.1 shows how each light shines through a specific arc. This is common to all aircraft and enforceable by law. Since all aircraft use the same international system then, if you see a white light ahead, you will know that you are astern of the aircraft. If the white light changes into green, you will know that you are overtaking him on the starboard side or that he has turned to his right.

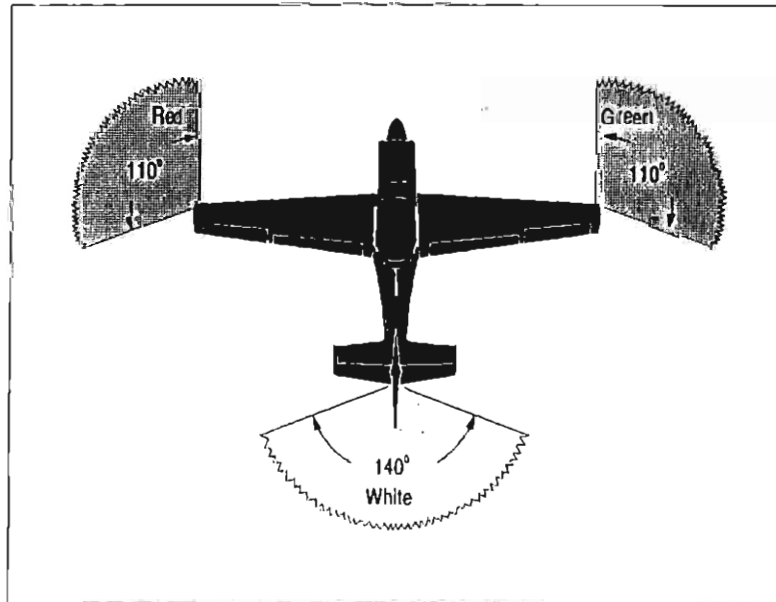


Fig 20.1 International Navigation Lights

Strobe Lights

3. The strobe lights fitted to the Firefly are used in the same way at night as day. They make it possible for the aircraft to be seen at a greater range than do the navigation lights. It is not possible to work out the relative heading of an aircraft from its strobe lights. When you are flying through cloud, strobe lights can cause disorientation so it is permissible to switch them off during cloud penetration.

Location and Operation of Switches

4. During your training so far, you have been concerned with checking the cockpit switches in daylight only. Now you must ensure that you know what each switch is for and how it is operated, so that you can operate them in the dark. It is good practice to spend some time in the cockpit before night flying giving yourself a blindfold check of all the controls and switches.

NIGHT VISION

Adjustment of Vision to Night Conditions

5. Much has been written about night vision - eg how it is necessary to sit in the crew room wearing red tinted glasses (to fool the rods in the eyeball into thinking that it is dark), or the need to eat two tons of carrots a year to maintain the correct chemical balance in the body! This may be necessary at the highest operational level but, for Firefly night flying operations, walk out to the aircraft a little early and your eyes will sufficiently adjust themselves for safe operation by the time you are ready to taxi.

6. It takes the rods in the eyeball approximately 30 minutes to adjust themselves fully to night conditions. The reverse process takes only a second or two. Therefore, do not undo 30 minutes effort by flashing a torch about the cockpit; rely on the cockpit lighting.

Lookout

7. Airborne lookout at night is the same as for day. However, if you wish to look at an object, shift your gaze slightly off centre and do not hold a steady gaze for more than a few seconds. It is another characteristic of rod vision that an image fades completely if the eyes are kept stationary for more than a few seconds.

AIR EXERCISE

8. The first night sortie will be mainly familiarisation and circuits. Your instructor will highlight all the differences between day and night operation but, to prepare the way, some of the more obvious points are dealt with in the following paragraphs.

External Checks

9. The external checks will include a functional check of all external lights. Also, pay particular attention to the cleanliness of the canopy and windscreen. You will need a torch to carry out the external checks thoroughly, and you must carry one for the flight anyway. Tie the torch to your flying suit so that it cannot become a loose article in the cockpit.

Cockpit

10. Once settled in the cockpit with the hood closed, you will see how the cockpit lights reflect from the canopy if the lights are turned up too high. Experiment with the dimmer switches until you can see out comfortably. As your eyes become more adapted to the darkness, you will be able to reduce the brightness even further.

Taxying

11. It is more difficult to judge the taxying speed at night. The tendency is to taxi too fast, glancing out to the side will help you to judge your speed. If in doubt, slow down and, if you think that you are approaching a hazard of any sort, STOP. Do not proceed at any time unless you are sure it is clear ahead; use your taxi lamp if necessary. When you stop the aircraft, make sure that the brake is fully on and look outside to check that you are not moving.

Instrument Checks

12. Since night flying is a combination of instrument and visual flying, it is important that the instruments are checked fully serviceable whilst taxiing out.

Take-off

13. Before taking off, your instructor will pause for a few moments whilst you take note of the visual references of the touchdown position. This will help you with the landings later. Note that the runway lights converge ahead of the nose when you are correctly lined up. Your take-off technique is exactly the same as by day except that, to keep straight, you must aim to maintain the same picture of lights converging evenly from each side.

Climb After Take-off

14. Once safely airborne transfer to instruments before the runway lights pass from view. It is inadvisable to look back at the airfield until you are halfway round the turn onto the downwind leg. As you gain height in good weather, visual references will become more apparent and you can begin looking out again.

General Handling

15. At night, the aircraft is controlled using both visual and instrument indications. The balance between instrument and visual flying depends entirely on the prevailing conditions and clarity of the horizon. If there is a moon, you will find that visibility into moon is better than that down moon; you will also find that the contrast between land and water is marked.

Night Disorientation

16. You will already have been given instruction on the physiological effects of flying on instruments. No doubt you may have experienced spatial disorientation during instrument flying and, to a lesser degree, during VMC flying. Night disorientation, however, is a supplementary problem and you should be aware of its implications.

17. During instrument flying, the eyes receive attitude information entirely from the aircraft instruments. Night flying, however, is a sensible combination of visual and instrument flying and, as such, the eyes receive a certain amount of outside visual reference as well as instrument indications. On a very dark night, any external small groups or pin-points of light can give false impressions of attitude that may be at variance with the instrument picture. During the look-out scan, and particularly during manoeuvre, the pilot can be easily confused by this unreliable orientation source. The problem may be compounded if the aircraft attitude changes without the pilot realising and, when referring back to instruments, he is confronted with a totally unexpected picture.

18. In all cases of night disorientation, you must rely solely on instruments to re-establish orientation. This will require you to totally ignore the outside visual indications and to concentrate entirely on instruments. In order to cut down the intensity of the outside distraction, it may help if the cockpit illumination is turned up, thereby allowing re-orientation in familiar surroundings.

19. Being a purely physiological phenomenon, night disorientation cannot be simulated. Your instructor, however, will give you practice at steep turns and recovery from various manoeuvres, as part of your night familiarisation, during which you will experience the supplementary disorientation problem of having outside distraction while recovering on instruments.

20. Remember, night disorientation can happen to anyone and usually it happens when it is least expected. Whatever your in-flight conditions, if you are in doubt, forget what is going on outside the cockpit and rely

entirely on the instrument picture for orientation, while recovering back to straight and level flight using the UP recovery technique.

Radio Calls

21. At night, every effort must be made to make all circuit RT calls from the standard positions so that ATC and other pilots have a reliable indication of your position. For the same purpose, it is also usual to make an additional RT call when crossing the upwind end of the runway during the rejoin procedure, but this additional call is not acknowledge by ATC.

Emergencies

22. In addition to the normal emergency procedures, there are three peculiar to night flying: failure of the navigation lights, radio failure, and total electrics failure. Since the procedures for dealing with such emergencies vary slightly from one airfield to another, they cannot be dealt with in this book: the procedures will be available locally and will be covered fully at each night flying briefing.

23. If you suffer an engine failure, your course of action will vary with the circumstances:

- a. In the circuit because you are below 1500ft agl, you will have no option but to land the aircraft. If you have commenced your turn onto the downwind leg after take-off, the airfield should be within your reach.
- b. If your engine fails during the initial climb after take-off, you will normally have to land straight ahead. The night may be bright enough to allow some judgement of an approach; the use of the landing and taxi lights will also help. Complete your crash actions if you have time, making sure that your harness is really tight. Then, when you hit the ground, you should come to little harm.

Landings

24. A good touchdown at night is probably the most difficult aspect of night flying. The secret is in having the correct threshold speed. Try to make a definite assessment of whether or not you are at the correct height, and avoid feeling hopefully for the ground. At the correct height, you will have the feeling of being down amongst the runway lights, the picture being similar to that on take-off. When you have touched down, maintain the runway centre by keeping equidistant from each set of runway lights looking well ahead to the far end of the runway. Before turning off the runway, conscientiously check that you have slowed to normal taxiing speed.