

## **Explanatory Statement**

### **Civil Aviation Act 1988**

### **Civil Aviation Order 82.6 Instrument 2007**

#### **Purpose**

Civil Aviation Order 82.6 (the *CAO*) establishes operational and airworthiness standards and approval requirements for the use of night vision goggles (*NVG*) in specialised helicopter aerial work operations. The CAO has the effect of making unlawful any unapproved use of NVG as a primary means of terrain avoidance for safe air navigation by means of visual surface reference external to an aircraft. The CAO is an interim measure pending finalisation of Part 133 of *Civil Aviation Safety Regulations 1998* which will cover rotorcraft operations generally and is still under development.

#### **Background**

NVG are a head mounted night vision enhancement device. They consist of a binocular imaging unit, with associated power and counterbalance fittings, which uses image intensifying technology to amplify the available ambient light (including low levels of moonlight or starlight) sufficiently for images to be seen through the NVG eyepieces as a monochromatic green image.

NVG technology evolved mainly in advanced military forces, including in Australia. In certain strictly controlled circumstances, the use of NVG can enhance crew situational awareness and improve overall flight safety under night visual flight rules (*NVFR*). As a result of helicopter industry demand and overseas developments in the use of NVG for civilian helicopter operations, CASA has established a trial to facilitate the use of NVG in certain public interest helicopter operations.

The trial is for *permitted NVG operations*, namely search and rescue, law enforcement, aerial fire fighting, aerial fire fighting support, emergency medical services, marine pilot transfers, training for any of these, and demonstration and positioning flights.

#### **Flight safety implications**

Although operational safety advantages are gained from proper use of NVG, there are limitations and associated risks which must be minimised. These include decreased visual acuity, much reduced field of view, degraded object recognition, degraded depth perception and distance estimation due to the monochromatic image effect and lack of contrast.

There are also other human factor aspects that are particularly important at lower altitudes when flying over featureless terrain or over water, for example, estimating closure rates to obstructions, sighting of power lines or estimating closure rates when in close proximity to other aircraft.

Weather conditions, including the amount of moonlight or other ambient light available, may affect, and possibly degrade, the operational safety of NVG. The

presence of rain or high humidity produces a “flecking” in the eyepieces and degrades NVG performance. Aircraft modifications are required to ensure that internal and external lighting is NVG-compatible to prevent NVG degradation. At the same time, it is essential that warning and caution lights are readily visible to the crew without NVG degradation.

Crew procedures must reflect the higher than usual degree of human factors and crew resource management awareness and training required for NVG operations. Crew fatigue is higher than normal due to the physiological limitations of extensive night operations, and the higher workload and concentration levels required for NVG flight. The risk of spatial disorientation is increased because of decreased visual input and decreased peripheral vision which is normally very important in vertical and low speed flight.

Strict procedures must eliminate the potential for operator and crew complacency, overconfidence and overestimation of the capabilities of NVG. Equally, it is essential to ensure that the proficiency and currency of the specialised flying skills required for NVG operations are maintained.

### **Risk mitigation**

The risks associated with NVG operations can be mitigated by limiting operations to certain specialised areas of public interest, excluding non-essential occupants, and requiring proper NVG training, NVG-compatible lighting modifications, recency training, ongoing airworthiness standards and sound operating procedures. These safety requirements are provided for in the CAO.

The CAO permits NVG operations only by a specialised part of the aviation industry and only under strict conditions imposed in the interests of safety. Any other use of NVG for operational purposes is prohibited. CASA Instrument 30/07 (made on 15 February 2007) was issued as a direction under subregulation 209 (1) of the *Civil Aviation Regulations 1988 (CAR 1988)* that night vision devices (*NVDs*) may not be used in private operations as the primary means of terrain avoidance by external visual surface reference. Subsection 3D of CAO 82.0 (inserted on 15 February 2007) made it a condition of an AOC that NVD may only be used as the primary means of terrain avoidance by external visual surface reference if CASA has approved the use.

### **The 12 month trial of NVG**

To ensure the legislation meets the operational requirements of civil operators in Australia, the CASA 12 month trial of NVG will involve regular joint CASA/industry meetings to review progress and developments. International aviation safety regulators with expertise in NVG have been invited to observe at the review meetings. This aspect of the trial will allow the operational standards and legal rules to be fine-tuned before being incorporated in CASR Part 133.

### **Legislation**

Section 98 of the *Civil Aviation Act 1988* (the *Act*) empowers the Governor-General to make regulations for the Act and the safety of air navigation.

### **Current regulatory framework — CAR 1988**

Under subregulation 5 (1) of CAR 1988, where CASA is empowered to issue certain instruments, it may do so in a Civil Aviation Order.

Under subregulation 157 (1) of CAR 1988, the pilot in command of an aircraft must not fly over a city, town or populous area at a height lower than 1 000 feet, or over any area at a height lower than 500 feet.

Under subregulation 174B (1) of CAR 1988, except for take-off and landing, the pilot in command of an aircraft must not fly it at night under the visual flight rules (V.F.R.) at a height of less than 1 000 feet above the highest obstacle within 10 miles.

Under subregulation 195 (1) of CAR 1988, at night and in conditions of poor visibility, the operator and pilot in command of an aircraft must comply with the rules in Part 13 of CAR 1988 about the lights to be displayed for the aircraft.

Under subregulation 207 (2) of CAR 1988, a person must not use an Australian aircraft in a class of operation if the aircraft is not fitted with the instruments and equipment approved and directed by CASA. In approving or directing, CASA may have regard only to the safety of air navigation.

Under subregulation 215 (3) of CAR 1988, CASA may give directions requiring an operator to include, revise or vary information, procedures or instructions in the operations manual (operating procedures).

Under subregulations 217 (1) and (3) of CAR 1988, CASA may specify operators who must provide an approved training and checking organisation (a *TCO*) to ensure that members of the operator's operating crews maintain their competency.

Under subregulation 249 (1) of CAR 1988, the pilot in command of an aircraft must not practice emergency procedures or fly low when carrying a passenger.

Under subregulation 308 (1) of CAR 1988, in relation to particular aircraft or categories of aircraft, CASA may exempt the aircraft, or persons in, on, or otherwise associated with the operation of, the aircraft, from compliance with specified provisions of CAR 1988. Under subregulation 308 (2), before making an exemption, CASA must take relevant safety considerations into account. Under subregulation 308 (3), CASA may make an exemption subject to necessary safety conditions.

Under section 27 of the Act, CASA may issue Air Operators' Certificates (*AOCs*) for its functions. Under subsections 27 (2) and (9) of the Act, an aircraft operator must hold an AOC in order to operate for certain prescribed purposes. Paragraph 206 (1) (a) of CAR 1988, prescribes aerial work purposes of various kinds, including aerial spotting, flying training, ambulance functions, and purposes that are *substantially similar* to these. Substantially similar purposes are generally taken to include search and rescue, law enforcement, aerial fire fighting and marine pilot transfers.

Under paragraph 28BA (1) (b) of the Act, an AOC has effect subject to, among other things, conditions specified in Civil Aviation Orders.

### **The CAO**

The CAO is designed to regulate a 12 month trial of NVG with selected suitable operators and, at the end of the trial, CASA will assess its outcomes in consultation

with the participants and decide how best to proceed in relation to the future use of NVG.

### **Transitional provisions**

Before this CAO, CASA controlled the approved use of NVG firstly, through a *Compliance Management Instruction 04/74 — Night Vision Goggles (NVG) for Helicopter Operations* (the **CMI**) and secondly, since February 2007, for holders of Air Operator Certificates through subsection 3D of CAO 82.0. Because approvals could be issued at field office level, there is some uncertainty whether any approvals were actually issued (in the form of low flying permissions under subregulation 174B (4) of CAR 1988). Following thorough checks, CASA has no record, and is not aware, of any approvals having been given under the authority of the CMI. However, as a precaution, if approvals were issued, they are revoked by the CAO. The CMI has also been revoked administratively.

### **Definitions**

Part 1 of Schedule 1 of the CAO provides definitions of various terms used in the CAO.

### **NVG operations**

In light of NVG operational requirements, and the requirements of existing civil aviation legislation, safe NVG operations require various directions and exemptions. The CAO provides for these in Part 2 of Schedule 1.

### **Private operations**

An existing subregulation 209 (1) direction (CASA 30/07) makes it a condition of all private operations that NVD (i.e. any form of night vision device) must not be used as the primary means of terrain avoidance during those operations.

### **Instruments and equipment**

Under subregulation 207 (2) of CAR 1988, for the CAO, CASA approves NVG that comply with all of the equipment requirements of the CAO, and directs use of NVG only in accordance with the CAO.

### **Operations manuals**

Under subregulation 215 (3) of CAR 1988, the CAO contains directions for operators to include certain material in their operations manuals and manuals containing this material will need to be approved by CASA.

### **Provision of a TCO**

Under subregulations 217 (1) and (3) of CAR 1988, the CAO specifies that each NVG operator must provide a TCO for NVG initial training (i.e. for initial qualification) unless the training is provided by an approved NVG training provider (i.e. an approved provider of NVG initial training inside or outside Australia).

If the operator does not use a TCO, or an NVG training provider for NVG initial training, the operator itself may only conduct non-initial training (i.e. training for proficiency) and then only if the operations manual specifies the line and role training requirements for such training.

**Exemption — V.F.R. flights at night**

Under subregulation 308 (1) of CAR 1988, the CAO exempts certain pilots in command of helicopters from the restriction in subregulation 174B (1) of CAR 1988 that, except for take-off and landing, the pilot must not fly it at night, under the visual flight rules (**V.F.R.**), at a height of less than 1 000 feet above the highest obstacle within 10 miles.

The exemption only applies for NVG helicopter search and rescue, law enforcement, aerial fire fighting or emergency medical services operations, or for NVG proficiency or positioning flights for one of these operations, or for NVG initial training. The NVG must be used in accordance with the CAO and it must be operationally necessary to fly below the relevant LSALT that would otherwise apply. The exemption does not apply to NVG marine pilot transfers, NVG aerial fire fighting support or NVG demonstration flights.

**Exemption — navigation lights**

Under subregulation 308 (1) of CAR 1988, the CAO exempts the operator and the pilot in command of a helicopter in an NVG operation from a lighting requirement of Part 13 of CAR 1988 provided he or she is complying with any lighting requirement of the CAO that is at variance with Part 13.

**AOC conditions**

Under Part 3 of Schedule 1 of the CAO, a condition is imposed on all AOC holders to comply with the CAO if and when using NVG. Only an NVD that complies with the CAO may be used and only in accordance with the CAO and the operator's operations manual.

If a TCO or a training provider is approved to use NVG for initial training, the TCO or the provider must have an NVG approval that authorises NVG flying training.

CASA will only give NVG approvals to AOC holders under the CAO and will no longer issue any approvals under *Compliance Management Instruction 04/74 — Night Vision Goggles (NVG) for Helicopter Operations*.

**Restricted use of NVG**

Under Appendix 1 of Schedule 1 of the CAO, NVG operators must have a risk assessment, an operations manual that complies with the directions in the CAO and CASA's written approval to use NVG in a permitted operation for the trial.

An approved operator must make certain quarterly reports to CASA about NVG operations and any safety issues or incidents.

Permitted NVG operations may only be conducted under the V.F.R. and at, or above, the LSALT unless permitted otherwise under the CAO.

An NVG approval may be suspended or revoked if the operator fails to comply with the CAO or the operations manual.

### **NVG qualifications**

NVG qualifications are for an NVG pilot, an NVG chief pilot, an NVG testing officer, an NVG flight instructor, an NVG training and checking pilot, an NVG aircrew member instructor and an NVG aircrew member.

Before commencing NVG training, a person must meet certain prerequisites. Initial training may only be conducted by a TCO or an approved provider; non-initial training may only be conducted by an NVG flight instructor or a person approved by CASA and acting in accordance with the operations manual.

An NVG pilot qualification is in the form of a log book endorsement made by CASA, or an NVG testing officer, following successful completion of training and competency assessment.

Similar arrangements apply for NVG aircrew member qualifications. The log book endorsement may only be made after the applicant has been assessed and the NVG training syllabus has been approved by CASA.

An endorsement may be based on recognition of foreign training and experience subject to regulatory knowledge and a local flight test with an NVG testing officer or an NVG flying operations inspector (*NVG FOI*).

CASA may accept that a flight test conducted in a country outside Australia by an NVG training provider meets the above requirements if the person gives CASA persuasive written evidence that the relevant competencies have been demonstrated in the flight test. Persuasive evidence is normally a statement, signed by a person approved for NVG testing by the country's national airworthiness authority, recording that each of the competencies has been demonstrated.

### **Capability check flights and flight tests**

For an operation requiring a person to have a particular NVG qualification, the person must have competency, recency and capability in terms of capability check flight requirements in accordance with the CAO and the operator's operations manual. Specific rules deal with who may conduct these checks and other test flights.

### **Contents of the operations manual**

Under Part 1 of Appendix 2 of Schedule 1, the CAO directs operators conducting NVG operations to have in their operations manuals, as a minimum, the information, procedures and instructions required by Part 2 of Appendix 2, in the detail and to a standard acceptable to CASA.

The directions deal with NVG training programs, airworthiness and maintenance, NVG flight operations (including planning, crew composition and weather), operating phraseology and emergency procedures.

### **Equipment, operations, qualifications and training**

Appendix 3 of Schedule 1 of the CAO contains standards for NVG equipment and operations, and for NVG training and qualifications.

Under Part 1 of Appendix 3, aircraft lighting systems must be NVG compatible and based on specific standards. In certain circumstances, exterior helicopter lighting must be modified or risk management plans prepared to address this.

NVG equipment itself must meet specific standards stipulated by CASA.

### **NVG operations**

Certain NVG operational flights may fly below the LSALT that would otherwise apply if this is operationally necessary. However, the pilot in command in an NVG positioning flight must not fly over a city, town or populous area at a height lower than 1 000 ft above ground level (*AGL*) or over an unpopulated area at a height lower than 500 ft above ground level. (This requirement does not apply if through stress of weather, or any other unavoidable cause, it is essential that a lower height be maintained.)

### **Carriage of persons**

There are restrictions on occupants who may be carried on a helicopter during an NVG operation. The only persons who may be carried are members of the flight crew, members of the aircrew, any supernumerary crew, NVG trainees, qualified maintenance personnel present to ensure NVIS equipment is serviceable, and other persons whose presence is necessary for the success or completion of the operation. If the operation is an NVG flight to demonstrate NVG technology, a passenger acceptable to CASA may be carried to observe the demonstration.

### **Minimum crew**

There are minimum crew requirements for NVG operations. The minimum NVG crew is not less than the highest crew requirement for *NVFR* or flight under the instrument flight rules (*I.F.R.*) if used, that is specified in the aircraft's flight manual, or the operator's approved operations manual, or Australian civil aviation legislation, including this Order, that applies to the aircraft.

The minimum NVG crew must also include any additional qualified crew required by the type or class of helicopter or the nature of the operation.

### **Flight planning**

Each NVG flight must be planned to comply with NVFR weather minima, alternate aerodrome and fuel requirements. CASA may, on application, grant reduced flight planning weather parameters for specific operations.

### **Visibility**

Generally, for an NVG operation in-flight visibility of 5 000 m must be maintained at, or above, 500 ft above terrain or obstacles. If not, the pilot in command must alter the flight path to ensure the minimum visibility of 5 000 m, or climb to at least the LSALT and revert to use of NVFR or *I.F.R.* procedures instead.

### **Close proximity flights**

Close proximity means a minimum separation of 250 m horizontally and 500 ft vertically.

The pilot in command of a helicopter conducting an NVG operation may only fly in close proximity to another aircraft if the flight is in accordance with the operator's operations manual and arranged and discussed with the pilot in command of the other aircraft before the close proximity flight begins.

### **NVG qualifications and experience requirements**

Part 4 of Appendix 3 sets out the detailed NVG and non-NVG qualifications and experience required by a person to be eligible for endorsement as an NVG chief pilot, an NVG testing officer, an NVG flight instructor, an NVG qualified pilot, an NVG training and checking pilot, an NVG aircrew member instructor and an NVG aircrew member.

### **NVG recency requirements**

Part 5 of Appendix 3 sets out the minimum recency requirements for both NVG pilots and NVG aircrew before they may participate in an NVG operation.

These recency requirements may be met either by accumulation of specified amounts of flight time within certain time limits or by undergoing an NVG capability check flight (*NVG CCF*) with an appropriately qualified check pilot or aircrew member.

For additional tasks or roles that may be specific to a permitted NVG operation, additional recency requirements must be acceptable to CASA and in accordance with the operator's operations manual.

### **NVG capability check flights**

The requirements for what constitutes an NVG CCF for an NVG pilot or an NVG aircrew member are set out in the CAO and include flight tests, minimum flight times, demonstrations of competency in carrying out certain procedures or in certain situations (for example, NVG unit failure).

### **NVG qualification training**

An NVG initial qualification training course must be approved by CASA and conducted by a TCO or an NVG training provider and, as a minimum, meet the requirements of Part 6 of Appendix 3 of the CAO.

Initial training courses must be designed to achieve certain competency outcomes. Thus, at the end of the course for a trainee pilot, for example, the trainee must be able to perform the duties of an NVG pilot to safely and effectively take off, fly and navigate en route across country, and descend, reconnoitre and land or hover to a basic helicopter landing site (*HLS-NVG basic*) using NVG.

Similar outcomes are required for an NVG aircrew member training course. At the end of the course, the trainee aircrew member must be able to perform the duties of an NVG aircrew member to safely and effectively assist an NVG pilot to take off, fly and navigate en route across country and descend, reconnoitre and land or hover to a HLS-NVG basic using NVG.

The Civil Aviation Advisory Publication 174-1 (the *CAAP*) designed to provide advisory guidance for NVG operators and crews provides examples of NVG training courses that meet the requirements of the CAO.



Actual training involves a CASA approved NVG ground theory training course followed by a written examination to certify the CAO, the CAAP and the relevant operations manual contents, NVG systems, functions, limitations and maintenance, aero-medical and human factors, environmental considerations, navigation and flight planning, crew co-ordination and phraseology, and risk management awareness.

Any required flight training for initial NVG pilot and initial NVG aircrew member qualifications must be approved by CASA.

### **Prerequisites for initial NVG pilot training**

Before commencing NVG training for an initial NVG pilot qualification, a trainee pilot must meet certain minimum requirements such as holding a current commercial pilot (helicopter) licence or air transport pilot (helicopter) licence, holding a current NVFR rating for helicopters, having logged at least 250 hours of aeronautical experience as a helicopter pilot, having logged at least 10 hours as pilot in command at night (unaided) post NVFR rating (for command pilots) or at least 10 hours at night (unaided) experience (for co-pilots, and holding a current command helicopter instrument rating or having completed at least 10 flight hours of dedicated dual instrument training with an approved instrument instructor.

Training must be designed to develop specific competencies, including in aircraft lighting, pre-flight preparations, correct piloting techniques, emergency operations, loss of visual reference; procedures for deteriorating visibility, simulated recovery to V.M.C. and procedures for wire and obstacle detection and avoidance using white light.

### **Flight testing**

In a flight test for the initial NVG pilot qualification, the candidate must demonstrate competency in a range of matters, including flight planning, performing hover, taxi and transit procedures, crew resource management, dealing with NVIS malfunctions and emergencies, circuit operations to HLS-NVG basic located in areas devoid of HLS lighting or surrounding cultural lighting and performing wire and obstacle detection and avoidance procedures.

Similar prerequisites, training goals and flight test competencies are required for aircrew members in terms of assisting the pilot in an NVG operation. In particular, the aircrew member must be trained and competent to provide a timely and accurate “con” (reconnaissance) to the pilot for drift, rates of climb and descent, obstacle avoidance and ground hazards, including dust and debris.

### **Legislative Instruments Act**

Under subregulation 5 (1) of CAR 1988, CASA may issue instruments in the form of CAOs. Under subsection 98 (5) of the Act, where regulations provide for an instrument to be issued in the form of a CAO, the CAO so made is declared to be a disallowable instrument. Under subregulation 308 (1) of CAR 1988, an exemption is declared to be a disallowable instrument. Under subparagraph 6 (d) (i) of the *Legislative Instruments Act 2003* (the *LIA*), an instrument is a legislative instrument for section 5 of the LIA if it is declared to be a disallowable instrument under legislation in force before the commencement of the LIA. The CAO is, therefore, a

legislative instrument. It is subject to tabling and disallowance in the Parliament under sections 38 and 42 of the LIA.

### **Consultation**

Consultation under section 17 of the LIA has been undertaken with representatives of helicopter operators, primarily through the Helicopter Association of Australia (the *HAA*) and other interested industry members. These industry representatives have been actively involved in providing input for, and reviewing the various drafts of, the CAO.

A near final version of the draft CAO was considered in detail in April 2007 when CASA convened a meeting in Sydney with the HAA, other helicopter industry participants and industry observers. The purpose was to consider the then proposed CAO, its draft advisory materials, and the parameters of the 12 month trial. Arrangements for quarterly CASA/industry review meeting were also made.

A Notice of proposed Rule Making (*NPRM*) for the CAO was published for public consultation on 15 June 2007 and closed on 16 July 2007. No comments were received, largely because of the extensive industry consultation that had preceded the NPRM.

### **Regulation Impact Statement**

The Office of Best Practice Regulation (*OBPR*) has advised that the CAO may proceed without the preparation of a Regulation Impact Statement. The CAO is intended to establish a 12 month monitored trial of NVG by approved emergency service operators who can meet the safety requirements of the CAO. The CAO places a safety framework around the permitted use of NVG. It is up to an eligible operator to decide whether or not to use NVG and commit to the obligations associated with that. To this extent, the CAO is a machinery provision for which a RIS is not required.

### **Commencement and making**

The instrument comes into effect at the start of the day after it is registered and stops having effect at the end of July 2008.

The instrument has been made by the Acting Director of Aviation Safety, on behalf of CASA, in accordance with subsection 84A (2) of the Act.

[Civil Aviation Order 82.6 Instrument 2007]