ABC RPA

**CASR PART** **101**

**RPAS** **Sample Operations Manual**

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Preface

This operations manual (this manual) outlines the procedures, instructions and guidance for use by {ABC RPA}’s operations personnel in the execution of their duties. It also contains the necessary information to ensure the safe conduct of aviation operations. This manual is integral to the organisation’s controlling and supervising flight operations. All {ABC RPA} personnel must comply with relevant instructions and procedures contained in this manual.

Amendment record

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Version no. | Date | Effective date | Parts / sections | Details |
| {1.0} | {insert date change is made to each section or page} | {e.g. immediate or a delayed date} | {e.g. Section 1.6.3} | {Summary of changes made} |

**Note:** the version number and date should also be inserted in the document’s footnote and updated accordingly.

Glossary

Acronyms and abbreviations

|  |  |
| --- | --- |
| Acronym / abbreviation | Description |
| AGL | Above ground level |
| ALARP | As low as reasonably practicable |
| ATSB | Australian Transport Safety Bureau |
| ATC | Air traffic control |
| BVLOS | Beyond visual line of sight |
| CAA | Civil Aviation Act 1988 (the Act) |
| CASA | Civil Aviation Safety Authority |
| CASR | Civil Aviation Safety Regulations 1998 |
| CRP | Chief remote pilot |
| EVLOS | Extended visual line of sight |
| HLS | Helicopter landing site |
| IAW | In accordance with |
| JSA | Job safety assessment |
| MOS | Manual of Standards |
| MC | Maintenance controller |
| NM | Nautical miles |
| NOTAM | Notice to airmen |
| OC | Operational crew member |
| RePL | Remote pilot licence |
| ReOC | Remotely piloted aircraft operator’s certificate |
| RP | Remote pilot (or UAV controller) |
| RPA | Remotely piloted aircraft (same meaning as UAV) |
| RPAS | Remotely piloted aircraft system (same meaning as UAS) |
| SMS | Safety management system |
| SOC | Standard operating conditions – reference reg 101.238 CASR (1998) |
| SOP | Standard operating procedures |
| UOC | Unmanned aerial vehicle operator’s certificate |
| VLOS | Visual line of sight |
| VMC | Visual meteorological conditions |

Definitions

For the definition of terms used in this manual, refer to the Part 1 Dictionary at the end of Volume 5 of the Civil Aviation Safety Regulations (1998) (CASR), the Part 101 MOS, or the CASA-produced Flight Operations Regulations Consolidated Dictionary (downloadable from CASA’s website). Operator-specific terms are defined here:

|  |  |
| --- | --- |
| Term | Definition |
| Official authorisation | An authorisation, however termed, from CASA, Airservices Australia, or any other authority responsible for providing an aviation authorisation, including the controlling authority of a prohibited or restricted area. |
| Defect | Any confirmed abnormal condition of an item, irrespective of whether the condition could eventually result in a failure. In addition to imperfections that may impair the structure, composition or function of the RPAS, the scope of this definition encompasses any intermittent failure, spurious warning or fault in the operation of a RPAS that may cause it to deviate from the manufacturer’s specifications. |
| Major defect | A defect, the magnitude of which may affect the safety of the aircraft or cause the aircraft to become a danger to persons or property. |
| Minor defect | A defect that is not a major defect. |
| Operational crew member | All {ABC RPA} personnel (except for the RP) who have a duty that is essential to the control or navigation of an RPA operation. |
| Personnel | All {ABC RPA} personnel (including employees, contractors and volunteers) who have a duty relating to the safety of RPA operations. |
| Safety occurrence | Any event that affects, or could affect, the safety of an RPA operation. |
| Visual meteorological conditions | For {ABC RPA}’s RPA operations, this refers to a horizontal visibility greater than 5000 metres and clear of cloud. |

# Policy and procedures

## Operator information

### Organisation details

Table 1: Organisation details

|  |  |
| --- | --- |
| Contact details |  |
| Name of legal entity |  |
| Trading name |  |
| Registered office address |  |
| ARN |  |
| ABN |  |
| Operational headquarters address |  |
| Operational headquarters phone |  |
| Operational headquarters email |  |

### Organisational overview

Sample text

{ABC RPA} is an entity that holds a remotely piloted aircraft operator’s certificate (ReOC) to conduct aerial work activities in remotely piloted aircraft systems (RPAS). {ABC RPA} specialises in aerial survey operations over mine sites utilising the RPA listed in Appendix B.

Remote pilots and ground crew are employed on a full-time, part-time or casual basis depending on demand and level of activity. Maintenance is subcontracted to various organisations as required.

### Organisational diagram

Sample diagram

Figure 1: Organisational diagram

## Key personnel

Each key personnel position must be filled by an individual appointed by the organisation and approved by CASA. Operations must not be conducted where a key position is vacant unless approved by CASA.

### List of key personnel

Table 2: Key personnel

|  |  |  |  |
| --- | --- | --- | --- |
| Nominated position | Name | ARN | Date approved |
| Chief remote pilot |  |  |  |
| Maintenance controller |  |  | N/A |
| CEO |  |  | N/A |

### Key positions and responsibilities

#### Chief executive officer (CEO)

The CEO is responsible for the safety and corporate compliance of {ABC RPA}’s RPA operations. Without limiting the duties and accountabilities of the CEO, the CEO must:

* ensure that, for the safe conduct of RPAS operations in accordance with (IAW) the ReOC and the civil aviation legislation, {ABC RPA}:
  + has sufficient suitably experienced, qualified and competent personnel
  + has a suitable management structure
  + is adequately financed and resourced.
* establish and regularly review {ABC RPA}’s safety performance indicators and targets
* ensure that {ABC RPA}’s approved documented practices and procedures are monitored and managed for continuous improvement
* ensure that key personnel satisfactorily carry out the responsibilities of their positions IAW this manual and the relevant civil aviation legislation
* ensure that CASA is notified any of change of:
  + {ABC RPA}’s name, address or contact details
  + nominated personnel
  + financial status where the change may impact the safety of RPA operations.

#### Chief remote pilot (CRP)

The CRP is responsible for safely managing the RPA operations of {ABC RPA}. Without limiting the duties and accountabilities of the CRP, the CRP must:

* ensure that RPA operations are conducted IAW relevant civil aviation legislation
* ensure that pilots and crew are suitably qualified and have appropriate experience and skills to enable them to satisfactorily fulfil the duties of their position
* maintain a record of qualifications held by the RP and OC
* monitor the operational standards and proficiency of the RP and OC
* review compliance and facilities by:
  + conducting internal audits
  + reviewing audit findings
  + taking any necessary corrective action to rectify deficiencies as soon as possible.
* review scheduling and rostering of crew to ensure that fatigue does not adversely affect the safety of operations
* provide the RP and OC with ready access to all documents and manuals necessary to ensure the safety of all flights
* advise the CEO of any matter pertaining to RPA operations that is relevant to the CEO’s duties.

#### Maintenance controller (MC)

The MC is responsible for ensuring that {ABC RPA}’s operating RPAS are properly maintained. Without limiting the duties and accountabilities of the MC, the MC must:

* control all RPAS maintenance, either scheduled or unscheduled
* keep records of all personnel permitted to perform maintenance on RPA, including details of their training and qualifications
* develop, enforce and monitor RPAS maintenance standards
* maintain a record of RPAS defects and unserviceability issues
* ensure that each item of equipment essential to the operation of {ABC RPA}’s RPA is serviceable before being released to service
* maintain a thorough technical knowledge of RPAS operating under the authority of the ReOC of {ABC RPA}
* ensure that all maintenance activities are conducted IAW the procedures detailed in Section 3 of this manual
* investigate all significant defects in the RPAS
* monitor the failure rates of RPAS components and impose additional maintenance requirements as necessary to ensure the safety of operations.

### Changing key personnel

A change of key personnel is considered a significant change and requires prior approval from CASA. Wherever possible, the CEO will ensure the change of personnel is approved by CASA prior to the holder of a key position vacating that position.

## Operations manual administration

### Access and distribution

This manual is maintained electronically at {electronic document location}. Copies of this manual that are not accessed directly from the system are designated as uncontrolled. Uncontrolled copies of the manual are not to be used unless the copy is verified to be identical to the current edition of the manual stored in the system.

All personnel must provide a written acknowledgement (an electronic acknowledgement such as an email is permitted) to the CRP stating that they have accessed, read and understood this manual before carrying out any duty essential to the control or navigation of an RPA.

### Continuous improvement

This manual must reflect the practices and procedures of {ABC RPA} and will be amended to facilitate any changes. Staff are encouraged to consider improvements in practices and procedures, and to provide suggestions to the CRP. All errors in the manual must be reported to the CRP as soon as practicable.

Planned changes to operational practices and procedures must be incorporated into this manual before implementing the change (see Section 1.3.3 of this manual).

The CRP must review the operations suite of documents at least annually to ensure the relevance and currency of all procedures, and to achieve full compliance with legislative requirements.

### Amendment procedure

Prior to making a significant change[[1]](#footnote-2) to the operation including to this manual, the CRP must submit a draft of the sections with proposed changes to CASA for approval. Only after the change is approved by CASA is the amendment to be incorporated into the manual.

The CRP may make non-significant changes to this manual without approval from CASA.

For all changes, whether significant or non-significant, the CRP must provide a copy of the updated manual to CASA within 21 days of the change being made.

Amended versions of this manual must include the date and have a new version number assigned. Details of the amendment must be recorded in the Amendment record table on page 5 in this manual. The amended manual must be uploaded to {electronic document location}.

The CRP must ensure that a notification is sent to all personnel summarising all changes. This includes details and background on why the change was made, the delayed effective date for any changes (if applicable), the reasons for the changes, and any implications for staff.

All personnel are required to provide a written acknowledgement (an electronic acknowledgement such as an email is permitted) of having read and understood the amendment prior to carrying out any duty essential to the control or navigation of an RPA after the effective date of the amendment.

## Record keeping and management

### Control of records

All records are stored electronically on {electronic document location}. Records fall into 4 categories:

* Personnel records
* Flight-related records
* RPA-related records
* Administrative records.

The CRP is responsible for managing personnel, flight-related and administrative records. The MC is responsible for managing RPA-related records.

The record-keeping templates at F must be used at all times.

### Required records and retention

Table 3: Personnel records

|  |  |
| --- | --- |
| Type of record | Minimum retention period |
| Training event | 7 years after date on which the record was made |
| Checking event | 7 years after date on which the record was made |
| Attainment of RP qualification (including relevant qualifications held before commencement of employment) | 7 years after date of the RP’s last operation of an RPA for {ABC RPA} |
| Attainment of qualification of competency in relation to the safety of RPA operations (other than RP duties) | 7 years after date on which the person ceases to be employed by {ABC RPA} |
| RP logbook\* | 7 years after date of the RP’s last operation of an RPA for {ABC RPA} |

\* Accumulated flight experience (including experience held before commencement of employment) to be maintained by the RP – see Section 10.06 of Chapter 10 Division 2 of the Part 101 MOS for minimum requirements.

Table 4: Flight-related records

|  |  |
| --- | --- |
| Type of record | Minimum retention period |
| Flight Record (Form F1) | 7 years after date on which the record was made |
| Written consent to operate at a distance of less than 30 metres from a person | 7 years after date on which the consent was provided |

**Note**: The Flight Record includes and combines the job safety assessment (JSA), authorised RPAS operational release and RPAS operational log.

Table 5: RPA-related records

|  |  |
| --- | --- |
| Type of record | Minimum retention period |
| RPAS Technical Log (Form F2) | 7 years after the last time the RPA is operated by the operator |
| Register of RPA operated by {ABC RPA} including manufacturer, model, maximum gross weight and serial number | 7 years after date on which the record was made |

Table 6: Administrative records

|  |  |
| --- | --- |
| Type of record | Minimum retention period |
| Acknowledgement of access to and understanding of {ABC RPA} operations manual version | 7 years after the acknowledgement is made |
| Register of persons (other than the CRP) permitted to conduct training and checking (if applicable) | 7 years after the last time training or checking is provided by the trainer |
| Compliance audit record (see Section 1.6.1 of this manual) | 7 years from the date of the audit |
| Risk register | For each version of the register, 12 months after a new version is issued |
| Safety occurrence register | For each safety occurrence entry in the register, 7 years from date of occurrence |

## Internal training

### Persons permitted to conduct training

Only the CRP and persons nominated in writing by the CRP are permitted to provide internal training. Before authorising a person to conduct training, the CRP must ensure that appropriate measures of competency are in place to guarantee the effectiveness and comprehensiveness of all training delivered.

### Initial training

All personnel must complete induction training and assessment to ensure they have a thorough understanding of the task requirements and responsibilities of their role. Training syllabuses and minimum proficiency requirements are detailed at Appendix G.

### Type and complex operations training

Additional training and proficiency assessment appropriate to the task are required before personnel:

* undertake a new complex operation – that is, an operation outside of the standard operating conditions (SOC)
* operate a new RPA type.

Training syllabuses and minimum proficiency requirements are detailed at Appendix G.

## Internal audit process

### Operations manual and regulatory compliance

At appropriate intervals, the CRP will carry out a compliance audit on a representative sample of processes and procedures. At a minimum, the audit must assess the:

* accessibility and awareness of the current operations manual by all personnel
* accuracy and completeness of flight records and aircraft logs
* records of pilot training, proficiency checks and qualifications.

### Monitoring operational standards

At appropriate intervals, the CRP will conduct observation flights (a checking event) with each RP and OC in a representative sample of operations to assess their operational competence and compliance with the operations manual and relevant aviation legislation.

The CRP must report to the CEO confirming that the operational standards are being maintained and that corrective action (if required) is being taken.

## Fitness for duty

All {ABC RPA} personnel are prohibited from performing any task related to the safety or navigation of an RPA when unfit to perform that activity. Without limiting the definition, a person is taken to be, or is taken to be likely to be, unfit to perform a duty if:

* they are unwell or fatigued to the extent that their capacity to safely perform the duty is reduced or likely to be reduced, and/or
* their capacity to safely perform the duty is impaired, or likely to be impaired, because they have consumed, used, or absorbed a psychoactive substance (including alcohol), or they have an illness or injury, and/or
* their capacity to safely perform their duty is impaired, or likely to be impaired, because they have consumed prescription or over-the-counter medication (such as codeine and antihistamine) that can cause adverse side effects such as drowsiness.

{ABC RPA} personnel must immediately report any potential or actual unfitness for duty to the CRP who will take appropriate action to remedy the situation.

## Recency requirements

RESERVED

## Safety occurrence reporting

All personnel must report any safety occurrence[[2]](#footnote-3) to the CRP as soon as practicable.

The CRP must ensure that the following occurrences are reported to the ATSB.[[3]](#footnote-4)

Table 7: Safety occurrence reporting

|  |  |
| --- | --- |
| Occurrence | Reporting requirement |
| * Death or serious injury to a person | * Report as soon as is reasonably practicable by phoning 1800 011 034 * Follow up with a written report within 72 hours to [Occurrence Notification - Aviation | ATSB](https://www.atsb.gov.au/form/occurrence-notification-aviation) |
| * RPA missing * RPA suffering serious damage (or reasonable grounds to believe it may be seriously damaged) * RPA inaccessible with reasonable grounds to believe it may be seriously damaged * Serious property damage * Loss of separation | * Submit a written report within 72 hours to [Occurrence Notification - Aviation | ATSB](https://www.atsb.gov.au/form/occurrence-notification-aviation) |

All personnel must take reasonable steps to preserve any flight planning and operational data, telemetry logs and RPAS components that may assist in determining the cause of an occurrence.

# RPA operations

## Risk assessment

### Risk criteria

{ABC RPA} will only conduct operations if they can be conducted without an unacceptable safety risk to the RPA or any person or other property, and when they do not impose a hazard on the safety of air navigation.

### Risk register

The CRP must maintain a risk register that covers all operational profiles conducted by {ABC RPA}. The risk rating criteria and a template risk register are at Appendix E.

All current controls listed in the risk register must be linked to a procedure in this manual or a legislative requirement. Where an additional control is implemented, the control is to be included in the next amendment of the operations manual.

To ensure the accuracy of risk identification and adequacy of controls, the risk register must be reviewed and updated:

* prior to {ABC RPA} commencing a new operational profile (for example, an operation requiring a different type of official authorisation)
* after any ATSB reportable safety occurrence
* at least annually.

**Note**: {ABC RPA} uses the risk assessment and mitigation methodology contained in the CASA safety management system (SMS) kit at <http://casa.gov.au/sms>.

## Planning

### Documentation

A Flight Record must be created for all operations. Section 2 of the Flight Record contains a JSA assessment which must be completed for any operation:

* in RPA above 2 kg
* outside the SOC
* where an official authorisation is required.

Operations in RPA weighing 2 kg or less and operating IAW the SOC must consider the items listed in Section 2 of the Flight Record before commencement of operations.

### Operations requiring an official authorisation

Where an operation requires an official authorisation, the JSA must include details of any additional risk control. Applications for an official authorisation must be made by the CRP.

Where an official authorisation is provided, the RP must ensure that they have read and understood the authorisation before the commencement of operations. The RP must comply with any condition detailed in the authorisation, unless doing so would have a negative impact on aviation safety, in which case they must immediately cease the operation and advise the CRP of the issue as soon as practicable.

Copies of all current official authorisation are available at {electronic document location}.

### Flight authorisation

All operations require authorisation by the CRP. Before authorising an operation, the CRP must review the planning section of the Flight Record to ensure the operation will comply with legislation and meet an acceptable risk profile.

A flight authorisation expires on any changes to:

* the RPA
* the crew
* the location
* authorised dates and times.

## Before flight

### Validation of operational documentation

Before commencement of operations, the RP must conduct an onsite validation of the operational planning documentation, and local environmental considerations. The onsite validation must be recorded in Section 4 of the Flight Record before commencement of operations. Any variable outside of the flight authorisation or manufacturer limitations requires an updated flight authorisation before operating.

### Pre-operational briefing

When an operation involves more than one person, the RP must conduct a pre-operational briefing covering details of:

* the operation
* emergency procedures
* hazards
* crew responsibilities.

All personnel relevant to the operation must attend the briefing.

### Pre-operational serviceability

Before commencement of the first flight of the day, a serviceability inspection must be completed IAW Section 3.1.2 of this manual. A checklist should be used to ensure all inspection items are covered. Details of the inspection including any identified defects must be recorded in the RPAS Technical Log before commencement of operations.

A pre-flight inspection should also be undertaken before each take-off. Any defects identified during operations are to be entered into the RPAS Technical Log as soon as practicable, and reported to the MC.

RPs must ensure that all major defects or outstanding maintenance actions previously detailed in the RPAS Technical Log have been addressed before a flight. Operations may proceed with minor defects, and these must be assessed and monitored.

**Note**: A minor defect is a defect that will not affect the safety of the aircraft or cause the aircraft to become a danger to persons or property.

## Flight operations

### RPAS documentation and instructions

All RPA must be operated IAW the manufacturer’s instructions and checklists, or an alternative procedure approved by the CRP.

Where an alternative RPA operating procedure has been approved, the procedure will be detailed at Appendix B. Before approving an alternative procedure, the CRP must conduct a risk assessment to assess the impact of the changed procedure on the safety of flight operations.

### Ensuring operations do not pose a hazard

The RP is responsible for ensuring that the RPA is not operated in such a way as to create a hazard to another aircraft, person or property.

To reduce the potential for conflict with other aircraft, the RP should not operate the RPA within 500 ft vertically or 1500 m horizontally of any airborne conventionally piloted aircraft unless approved by the CRP.

The RP must ensure that the prevailing meteorological conditions allow for visual separation from obstacles and other airspace users unless otherwise approved by CASA.

### Aeronautical radio usage

Only personnel who are qualified under Part 61 or Part 64 of CASR may use an aeronautical radio.

Use of an aeronautical radio is required for all operations in RPA with a gross weight > 2 kg within controlled airspace or outside of the SOC.

Radio broadcasts must be made:

* **in controlled airspace:** only where required or directed by ATC or CASA, or where necessary to resolve a potential conflict with a crewed aircraft
* **in uncontrolled airspace:** where necessary to resolve a potential conflict with a crewed aircraft.

Where carriage of an aeronautical radio is not mandatory, the RP should consider the benefits to situational awareness, and operate an aeronautical radio where appropriate.

### Use of transponder

A transponder / ADS-B (out)fitted to the RPA must not be activated unless specifically requested by air traffic control or IAW an official authorisation.

### Transportation of dangerous goods

RPAS are subject to the requirements of the dangerous goods legislation.[[4]](#footnote-5) The RP must ensure that RPA do not carry dangerous goods.

**Note**: When travelling to site, limitations apply to the carriage of dangerous goods, including batteries, on commercial aircraft. Crew are reminded of their obligations to comply with the carrier’s dangerous goods policy.

### Operations near people

The RP must ensure that an RPA is not operated within 30 m laterally of any person. This is measured from the point on the ground directly below the RPA to the position of any person who is not directly involved in the control or navigation of the RPA.

**Note**: Persons being filmed or photographed – such as actors, athletes or members of the public – are not considered essential to the control and navigation of the RPA.

Operations within 30 m but not less than 15 m of a person are permitted if all these criteria are satisfied:

* A risk assessment has been completed, with appropriate mitigators implemented for the level and type of risk identified.
* The person is advised of any identified risks and given details of implemented mitigation strategies.
* The person is advised of the requirement for {ABC RPA} to obtain the person’s consent to operate within 30m of them.
* The person provides consent for {ABC RPA} to operate within 30 m of them.

Any consent to operate within 30 m of a person must be provided in writing.

**Note**: A body corporate or any other entity cannot give such consent on behalf of any individual.

The RP must also ensure an RPA (other than a micro RPA) that is not a certificated RPA is not operated over a populous area at a height less than the height from which, if any of its components fails, it would be able to clear the area.

The RP may operate a certificated RPA over a populous area at a height less than the height from which, if any of its components fails, it would be able to clear the area, with a CASA approval.

An area is a populous area in relation to the operation of an unmanned aircraft if the area has a sufficient density of population for some aspect of the operation, or some event that might happen during the operation (in particular, a fault in, or failure of, the aircraft) to pose an unreasonable risk to the life, safety or property of somebody who is in the area but is not connected with the operation.

### Operations near aerodromes

The RP must not operate an RPA:

* over a movement area of an aerodrome
* within the no-fly zone of a controlled aerodrome[[5]](#footnote-6)
* within the relevant airspace of a non-controlled aerodrome during a relevant event

unless the RPA is operated:

* IAW an official authorisation
* indoors IAW Section 2.4.11
* tethered IAW Section **Error! Reference source not found.**.

### Operations at night

Operations at night are conducted under the generic night approval CASA 01/17 – Approval Operation of RPA at Night (available at {electronic document location}). Schedule 2 of the approval instrument contains equipment and environmental conditions which must be followed by the RP. Details of how the conditions will be met for the operation – and of mitigations for any additional risks – should be included in the JSA.

Only the CRP and RPs who have completed the night operations training and proficiency assessment (IAW Section 1.5 of this manual) are permitted to operate RPA at night.

### Operations above 400 ft AGL

Operations above 400 ft AGL (measured from the point directly below the RPA) require an official authorisation. Before seeking an authorisation, the CRP will conduct an assessment to identify any additional risks and the appropriate controls. Items to be considered include:

* proximity to obstacles (shielding)
* crewed aircraft flight paths
* ability to maintain VLOS
* aeronautical radio requirements
* NOTAM requirements
* environmental conditions.

### Operations outside of VLOS

{ABC RPA} is not approved to conduct operations outside of VLOS.

### Indoor (contained) operations

Where the conditions require the RPA to be operated as an indoor (contained) operation, the RP must ensure that it is physically impossible for the RPA to escape the containment area and fly away. Further, the RP must ensure that if the RPA collides with any part of the containment area, no material from the RPA or containment area can move or escape and cause injury to a person or property outside the area.

Details of the containment area and any additional controls required to keep the RPA within the area must be included in the Flight Record.

### Tethered operations

RESERVED

## Post-flight administration

At the completion of operations, the RP must complete the remaining items in Section 4 of the Flight Record. The completed Flight Record must be uploaded to {electronic document location}.

As soon as practicable following each operation, the RP must ensure that ‘time in service’ and any known defects are recorded in the RPAS Technical Log.

## Emergency procedures

### Emergency management

The emergency response for all RPA emergencies is to return the RPA to the ground in a safe location, where possible without damage to the RPA, in this sequence:

1. Maintain control of the RPA
2. Manoeuvre the RPA to a safe location
3. Land the RPA.

Depending on the emergency, the RP may use automation or manual flight control to manage the situation.

Expanded emergency procedures and checklists specific to the RPA may be applicable and these are outlined at Appendix B. Where the RPA has expanded emergency procedures, the RP must ensure that an emergency checklist is readily available.

Initial action principles should be used in all operations:

* **For solo RPAS operations:** Aviate, Navigate, Communicate, Administrate (ANCA).
* **For multi-crew RPAS operations:** Communicate (between crew), Aviate, Communicate (externally to ATC / relevant stakeholder) and Administrate (CANCA).

### Flight termination

Where control of the RPA is irrecoverable, the RP should activate the flight termination system. The RP should consider the likely location and trajectory of the RPA prior to activating a flight termination system.

Avoiding injury to third parties and their property is paramount and must always be considered a higher priority than avoiding damage to the RPA.

# Maintenance

## Maintenance schedules

### Periodic inspection schedule

All RPA are maintained IAW the manufacturer’s maintenance schedule and procedures. The MC must detail any upcoming maintenance item in the RPAS Technical Log.

#### Firmware and software

Updating of RPAS and control system software is considered a periodic maintenance item and must only be conducted as and when directed by the MC.

### Daily inspection schedule

A serviceability inspection of the RPA must be completed before the commencement of that day’s flight operations IAW the manufacturer’s pre-flight inspection procedures. The daily inspection is considered to be a maintenance item.

## Maintenance authorisation

### Maintenance personnel

Table 8 outlines the roles/entities that are authorised to conduct specified maintenance activities on RPAS.

Table 8: Maintenance activities and personnel

|  |  |
| --- | --- |
| Person | Maintenance items |
| MC | * All maintenance items |
| RP holding a valid RePL who has completed operator RPA type training | * Daily inspection (including pre- and post‑flight) * Replacement of propellers * Replacement and charge of batteries * Fitting and removal of payloads and role equipment * Update of firmware/software |
| Organisations and service providers assessed by the MC as competent to provide RPAS maintenance services | * All maintenance items |
| Manufacturers of RPAS items and their approved service agents | * All maintenance items |
| Ground crew who have completed operator RPA type training | * Daily inspection (including pre- and post-flight) * Replacement of propellers * Replacement and charge of batteries * Fitting and removal of payloads and role equipment * Update of firmware/software |

## Recording of defects and maintenance

It is the responsibility of all personnel to report open defects to the MC as soon as practicable.

All maintenance (including daily inspections) must be recorded in the RPAS Technical Log.

## Post-maintenance test flights

Before an RPA is returned to service following any rectification or modification to the RPAS that has the potential to impact flight safety, a test flight must be completed by an appropriately licenced and competent RP to verify that the RPA operates correctly in all available modes.

The composition of a flight test is to be determined by the MC and must be detailed on the Flight Record. All RPAS test flights must be authorised by the CRP and logged.

A test flight is not required where an external provider completes the rectification or modification, and where they provide written certification that a test flight has been successfully completed.

1. Copy of RPA operator’s certificate

< insert a copy of the RPA operator’s certificate front and back page >

1. List of RPA operated by {ABC RPA}

Table 9 lists the make and mode of each RPA operated by {ABC RPA}. Personnel must not to operate an RPA that is not listed in the table.

Table 9: RPAS operated by ARC RPA

|  |  |
| --- | --- |
| Make | Model |
|  |  |
|  |  |
|  |  |

**Note:** A change to the kinds of RPA operated by {ABC RPA} may constitute a 'significant change' that requires CASA approval. See Part 101 MOS for the definition of ‘significant change’.

1. RPAS type-specific procedures

RESERVED

1. Specialised procedures

RESERVED

1. Risk rating criteria and risk register template

Table 10: Consequence values

|  |  |  |
| --- | --- | --- |
| Value | Consequence | Meaning |
| A | Catastrophic | * Catastrophic incident * Fatality * Equipment destroyed * More than $100,000 impact * Threatens the ongoing existence of the organisation |
| B | Hazardous | * Major incident * Serious injury * Major equipment damage * $50,000 – $100,000 impact * Major impact to the organisation’s ability to provide services * A large reduction in safety margins, or creating physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely |
| C | Moderate | * Serious incident * Injury to persons * $10,000 – $50,000 impact * A significant reduction in safety margins, a reduction in the ability of the ReOC holder to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency |
| D | Minor | * Nuisance * Minor injury * $2,000 – $10,000 impact * Operating limitations required * Use of emergency procedures to manage |
| E | Negligible | * Less than $2,000 impact * Few consequences, managed through normal procedures |

Table 11: Likelihood values

|  |  |  |
| --- | --- | --- |
| Value | Likelihood | Meaning |
| 5 | Frequent | Likely to occur many times (has occurred frequently) |
| 4 | Occasional | Likely to occur sometimes (has occurred infrequently) |
| 3 | Remote | Unlikely to occur, but possible (has occurred rarely) |
| 2 | Improbable | Very unlikely to occur (not known to have occurred) |
| 1 | Extremely Improbable | Almost inconceivable that this event will occur |

Table 9: Risk rating matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Consequence |  |  |  |  |
|  | A | B | C | D | E |
| Likelihood | Catastrophic | Hazardous | Moderate | Minor | Negligible |
| 5 Frequent | 5A | 5B | 5C | 5D | 5E |
| 4 Occasional | 4A | 4B | 4C | 4D | 4E |
| 3 Remote | 3A | 3B | 3C | 3D | 3E |
| 2 Improbable | 2A | 2B | 2C | 2D | 2E |
| 1 Extremely improbable | 1A | 1B | 1C | 1D | 1E |

|  |  |  |
| --- | --- | --- |
| Risk level | Acceptance level | Actions |
| High | CEO | Activity must be suspended  Risk considered unacceptable and requires new concept of operation |
| Medium | Chief remote pilot | Risk should be mitigated to ALARP  Activity can continue only after acceptance from chief remote pilot or senior manager |
| Low | Chief remote pilot | Risk is acceptable and activity may continue providing due consideration has been given to the activity |

**{ABC RPA} Risk register**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Reference number** | **Date entered in register** | **Hazard** | **Risk description** | **Existing controls** | Likelihood | **Initial risk**  Consequence | Risk rating | **Additional controls** | Likelihood | **Residual risk**  Consequence | Risk rating | **Risk owner** | **Review due date** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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1. Forms and templates
   1. Flight Record

### Section 1: Operations overview and preliminary assessment

|  |
| --- |
| **Operation identifier:** |
| **Name of preliminary assessor:** |
| **Task overview:** |
|  |
| **Location:** |
| **Proposed date(s) and time(s):** |
| **Proposed RPAS type/model(s):** |
| **Preliminary assessment:** |
| **YES** **NO**  30 m from people can be maintained  Clear of populous areas  Below 400 ft AGL  Outside of an active restricted area  Outside of the no-fly zone of a towered airport  Outside of the no-fly area during a relevant event  Operating in day VMC  Operating VLOS  All hazards are mitigated by organisation’s SOP  Not near active emergency operations  RPA weight 2 kg or less |
| If answered **YES** to ALL the above, complete below and submit to CRP for authorisation:  Launch location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Recovery location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Maximum height planned: \_\_\_\_\_\_\_\_\_ ft AGL  If answered **NO** to ANY of the above, complete JSA (Section 2 of Flight Record). |

### Section 2: Job safety assessment

Section 2 does not need to be completed where an operation falls within the SOC, using RPA not heavier than 2 kg and where no official authorisation is required.

|  |
| --- |
| Map of operating area showing launch and landing locations and any relevant hazard |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| Airspace class(es) and height(s) |  | Maximum operating height | ft AGL |
| PRD |  | Maximum operating altitude | ft AMSL |
| Nearby aerodromes (include location, distance, type) |  |  |  |
| Aeronautical radio frequencies |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| VLOS |  | EVLOS |  | BVLOS |  | DAY |  | NIGHT |  |

|  |
| --- |
| Airspace hazards and mitigations |
|  |

|  |
| --- |
| Ground hazards and mitigations (people, obstacles, interference, etc.) |
|  |

|  |  |  |
| --- | --- | --- |
| Does SOP adequately mitigate all hazards? (circle applicable) | YES | NO |
| If NO, detail unmitigated hazards |  |  |

|  |  |  |
| --- | --- | --- |
| Preliminary assessment / JSA accurate (circle applicable) | YES | NO |
| If NO, record changes here |  |  |
| Additional operating restrictions/limitations |  |  |
|  |  |  |
| Identification of official authorisation obtained (if applicable) |  |  |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Flight authorisation | Approved?  (circle applicable) | YES | NO |
| Date(s) approved for operations |  |  |  |
| RPA types/models approved for operations |  |  |  |
| CRP ARN: | Sign: | Date: |  |
| RP ARN: | Sign: | Date: |  |

### Section 4: Flight log

Part A

RP to complete before commencing operations.

|  |  |  |
| --- | --- | --- |
| RP | Second RP | Observer/crew |
|  |  |  |
| Weather  (confirm that conditions meet manufacturer limitations) |  |  |
| Onsite validation of planning documentation completed | RP initials: |  |

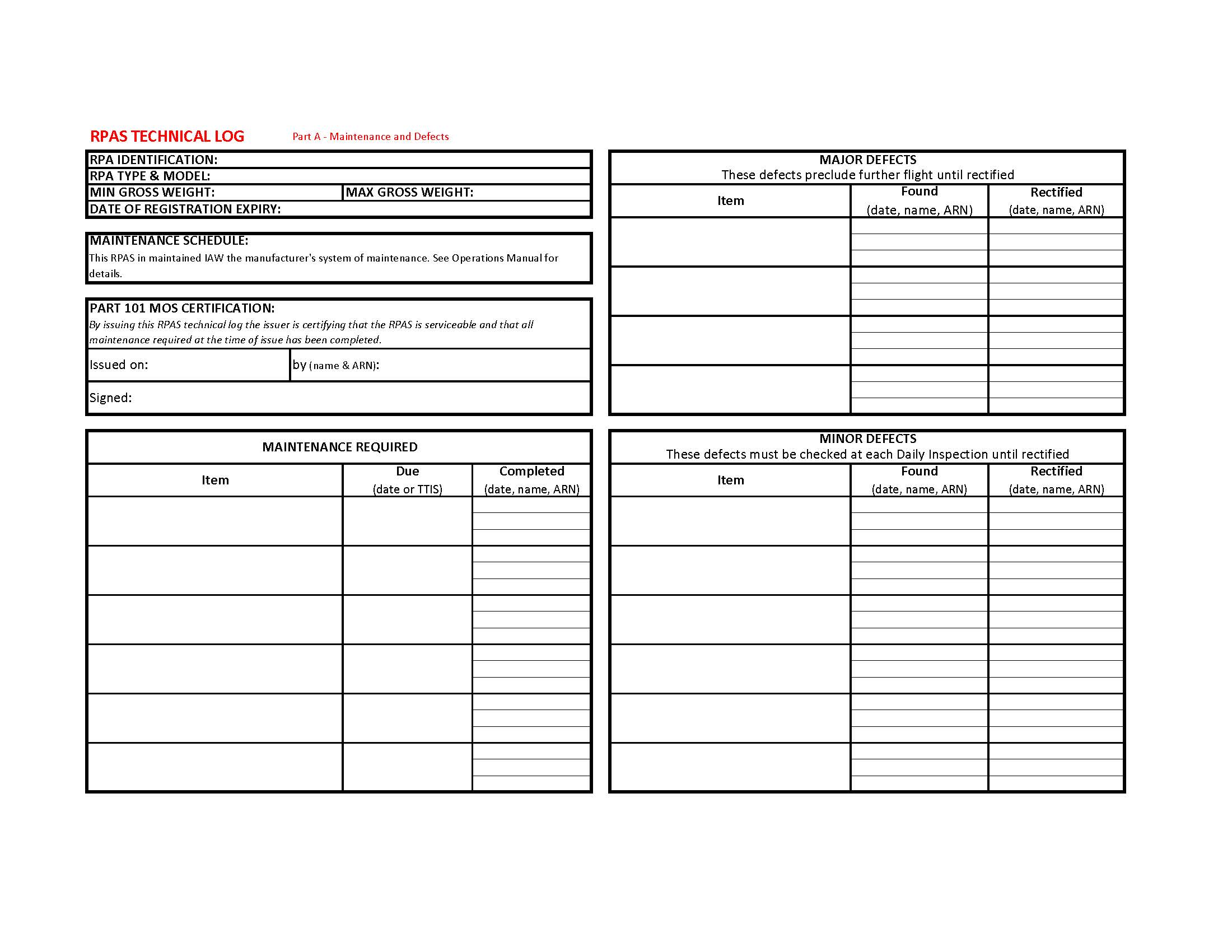
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| Detail any omissions and errors in planning document here |

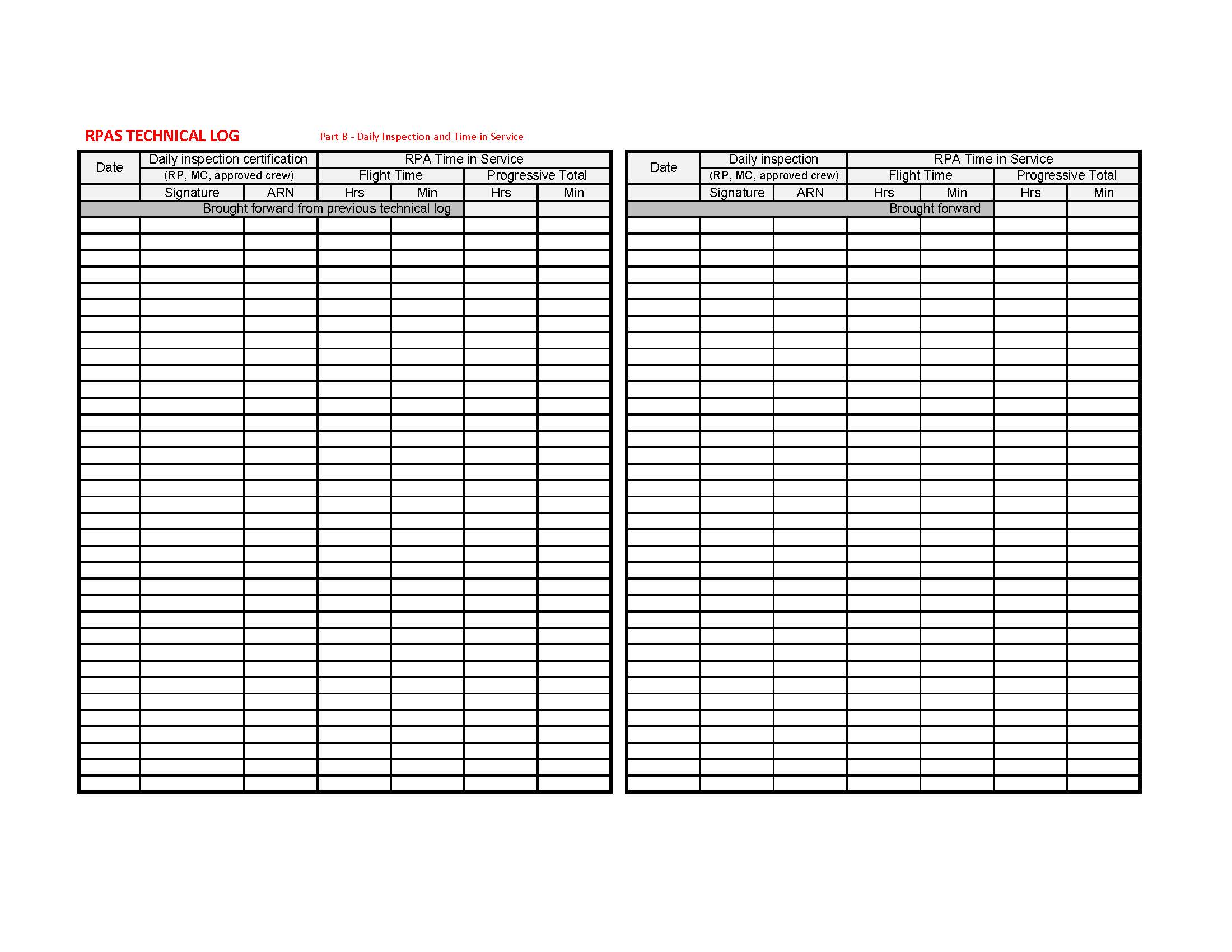
Part B

RP to complete at the conclusion of operations.

|  |  |  |
| --- | --- | --- |
| Was the operation conducted IAW Sections 1 to 3 of this Flight Record? | YES | NO |
| If NO, record changes here |  |  |

|  |
| --- |
| General comments |
|  |

* 1. RPAS Technical Log



* 1. Initial remote pilot employee record

PLACEHOLDER

* 1. Induction training record

PLACEHOLDER

* 1. Continuation training record

PLACEHOLDER

* 1. Observation flight record

PLACEHOLDER

* 1. Safety occurrence reporting form

PLACEHOLDER

* 1. Safety occurrence register

PLACEHOLDER

* 1. RPA register

PLACEHOLDER

1. Training syllabus and checking matrix
   1. Policy and procedure training syllabus

Applicability:

* All RPs and operational crew members.
  + 1. Ground/theory
* Knowledge of operations manual
* Knowledge of normal operations:
  + Planning requirements (NAIPS, flight plans, NOTAMS, etc.)
  + Forms required for general operations (Section 2 in the operations manual)
  + Briefing requirements IAW pre-operations briefing form
  + Roles and responsibilities of assigned crew positions
  + Emergency procedures (Section 2 in the operations manual)
  + Conduct of job safety and risk management
  + Maintenance procedures and internal authorisations
  + Safety and risk management strategies and WHS issues
* Crew coordination and support crew duties.
  1. RPAS type training syllabus

Applicability:

* RPs operating RPA type (all items)
* Operational crewmembers handling RPA type (items relevant to role).
  + 1. Ground/theory
* Description of RPAS and components
* Handling of RPAS and transportation
* Handling and charging of LiPo batteries
* Assembly/disassembly of the system, including camera
* Detailed explanations on the use of the transmitter and operating frequencies and limitations
* Flight controls, sound and light signals
* Manual and reversionary modes
* Pre-flight inspection
* Problem-solving, fault analysis
* Pre- and post-flight procedures
* Crew management and responsibilities
* Crew coordination (including use of standard phraseology)
* Use of operating software
* Use of ancillary equipment.
  + 1. Flight exercises
* Range check
* Take-off and landing
* Practical flight exercises (normal automatic control)
* Practical flight exercises (backup manual control)
* Automatic safety features
* Camera operation
* Emergency procedures (may talk through on relevant EPs that cannot be simulated safely during flight)
* Specialised RPAS training: night VLOS (N-VLOS), EVLOS, BVLOS as applicable
* Safety.
  1. Night visual line of sight training syllabus

Applicability:

* RPs operating at night.
  + 1. Description of training (N-VLOS-D)
       1. Unit description

This unit describes the skills and knowledge required to operate an RPA at night-time.

* + - 1. Elements and performance criteria
      2. Pre-flight preparation

The RP confirms that:

1. The RPA meets the equipment requirements for an N-VLOS flight.
2. A risk assessment is completed that incorporates the night visual conditions.
   * + 1. Night operations
3. Perform all normal manoeuvres under N-VLOS conditions using either manual control or an AFMS.
4. Orient and navigate the RPA efficiently and safely at distance.
5. Maintain an effective lookout for other aircraft and take appropriate action to maintain separation and prevent conflict.
   * + 1. Night landing
6. Land the RPA safely and without damage within N-VLOS tolerances.
   * + 1. Range of variables
7. Various payloads and RPA configurations.
8. Operations both in dark conditions and under artificial illumination.
9. Various weather conditions.
   * + 1. Underpinning knowledge
10. RPA equipment requirements.
11. Human performance considerations.
12. Night operation considerations.
13. Knowledge of rules and considerations under artificial illumination.
14. N-VLOS operational requirements for operations at a controlled or non-controlled aerodrome (if required).
    * 1. Practical assessment (N-VLOS-P)
         1. Flight test requirements

A person operating under an N-VLOS approval must demonstrate their knowledge of N‑VLOS flight requirements as set out in subclause G3.2.2 and competency, in the units of competency mentioned in subclause G3.2.3, by performing manoeuvres with an aircraft in the desired category.

* + - 1. Knowledge requirements

The applicant must demonstrate their knowledge of the privileges and limitations of the rating and must also demonstrate knowledge of:

1. The definition of ‘night’ for aviation purposes.
2. RPA requirements for flight at night (compared to day VMC).
3. Applicable rules and considerations for flight at night under bright lights.
4. Considerations for carrying out an N-VLOS flight at a controlled or non-controlled aerodrome (if applicable).
5. The visual illusions and human performance limitations that may eventuate with an N‑VLOS flight.
   * + 1. Practical flight standards
6. Ensure the aircraft is fit to fly and is equipped for night flight.

Competently conduct all normal manoeuvres at night manually or with an automated mode as applicable.

Under manual or automated control, orient and navigate the aircraft efficiently and safely at a distance from the control station.

Maintain an effective lookout for other aircraft and take appropriate action to maintain separation and prevent conflict.

* + 1. Theory (N-VLOS-T)
       1. Flight at night theory test

1. Enumerate the additional considerations needed to operate an RPA during an N‑VLOS flight (compared to a flight during the day):
   * under bright lights and
   * in an otherwise dark area.

Define ‘night’ for aviation purposes.

Describe the aircraft equipment requirements for an N-VLOS.

Describe the considerations for carrying out an N-VLOS flight at a non-controlled aerodrome.

Describe the additional considerations for coping with equipment failures at night.

* + - 1. Human performance

Explain the relevant human performance and physiological limitations for the conduct of RPAS operations at night:

1. Describe adaption of the eye to darkness and explain how long the eye takes to fully adapt to night conditions.
2. Describe why lights have a red filter during night operations.
   * + 1. Risk assessment – night operations

Describe and list any special precautions a RP might take for a night operation.

1. See Part 101 MOS for definition of ‘significant change’. [↑](#footnote-ref-2)
2. A safety occurrence is any event that affects, or could affect, the safety of an RPA operation. [↑](#footnote-ref-3)
3. ATSB reporting requirements are outlined in the *Transport Safety Investigation Regulations (2021).* [↑](#footnote-ref-4)
4. See Section 23 of the CAA and Part 92 of CASR. [↑](#footnote-ref-5)
5. See Chapters 4 and 9 of the Part 101 MOS. [↑](#footnote-ref-6)