Submission 142 – Murray Hogarth

Murray Hogarth

[redacted]

drones@infrastructure.gov.au.

SUBMISSION ON REMOTE IDENTIFICATION (REMOTE ID) - DISCUSSION PAPER FOR PUBLIC CONSULTATION - JULY 2023

Introduction

My comments are from the point of view of a recreational model aircraft hobbyist. Model aircraft are by far the lowest risk sector of aviation. Radio control models have been operated in Australia for more than 70 years, and there has never been a fatality. Contrast this to manned aviation, where we see around 35 fatalities and 5000 serious incidents each and every year.

Any suggestion that Remote ID be required for all model aircraft represents unjustified regulatory overreach. The Department of Infrastructure (the Department), and the Civil Aviation Safety Authority (CASA) should instead focus on the real issues in manned aviation, the ~35 fatalities that occur under their watch each and every year.

General Comments on the discussion paper

Wrong starting point

The Department and CASA seem to have jumped into the policy development process with the clear intention of implementing Remote ID rather than carrying out a proper risk assessment to determine what approaches might be worthwhile. Remote ID seems to be an end in itself with possible benefits identified afterwards. This is flawed approach for a system that would involve large costs to hobbyist and drone operators to implement, and for the Department and CASA to regulate and administer.

In determining what systems or processes will be needed to manage drones into the future, the appropriate policy response would be to consider the future risks and consider a range of options to deal with these. Instead, the Department and CASA have jumped to only consulting on Remote ID. Presumably this is because they are robotically following the lead of the US FAA rather than doing the hard work of thinking for ourselves and considering systems that are appropriate for Australia. It should as be noted that the danger of following the FAA is that we will inherit the mistakes that they have made. The Department and CASA have not clearly identified and defined the problem that Remote ID is supposed to solve. It seems instead to be yet another excessive government data gathering exercise, the repercussions of which have not been properly thought through.

In the background section of the discussion paper the Department and CASA have jumped straight to claiming that Remote ID is essential to having better information of about where aircraft are operating, and that this is integral to safe and efficient operation of drones. They have done this

with no demonstration of, or argument for, this proposition. A false equivalence has been drawn between the operation and risk of manned aircraft with a range of drones that are orders of magnitude smaller in size and weight (which has some correlation to risk) than manned aircraft.

It would seem that the Department and CASA are wedded to the idea of developing a future UTM that integrates crewed and uncrewed aircraft and that this is driving the need for Remote ID. It does not consider alternatives to such a UTM. For example, would it not be simpler to keep crewed and uncrewed aircraft physically separate. This is the common sense approach that has been used in the past, with uncrewed aircraft being kept to low altitudes and away from airports and crewed aircraft being generally prohibited from low altitudes.

Fanciful list of users, uses and benefits of Remote ID

Below I provide some comment on the list of benefits that are identified in the discussion paper. Given that the introduction of a Remote ID system will be expensive for pilots/operators and also require a lot of resources for the Department and CASA to administer, you would expect these benefits to be significant and unequivocal, yet this is far from the case.

- *Increased situational awareness to prevent mid-air collisions with traditional aircraft and other aircraft.*

  Insofar as this relates to remote control model aircraft, Remote ID is unlikely to reduce the risk of collisions. Physical separation of the allowed airspace for operation traditional aircraft and remote control models is the primary way to prevent collisions. The assertion seems to be based on the idea that a tracking system would improve situational awareness for pilots to avoid collisions. For the model aircraft pilot, the addition of a phone-based location application is likely to detract from their situational awareness, which is mostly focused on monitoring the aircraft being flown to ensure that it is flown safely. In addition, the precision of the location information is currently too low to assist in avoiding collisions. It is also my understanding that most traditional aircraft currently do not have equipment that monitor the location of other traditional aircraft. So the introduction of a system to monitor the location of drones to the precision needed to avoid collisions seems a long way off in the future.

- *Helping track illegal or noncompliant drone use and report potentially suspicious drone activity to relevant authorities for further action.*

  This doesn't really make sense. Illegal or noncompliant drone users are unlikely to have active Remote ID on their drones in the first place. Operators that intend to carry out illegal operations would most likely disable Remote ID or not install it on their drones in the first place. They would be very dumb if they did not.

- *Helping educate the community around local laws and regulations relating to drone use.*

  Having an application on your phone that gives locations of drones flying around you, does not by itself help educate anyone regarding local laws and regulations. Educating the community is a completely separate issue that can be addressed many different ways. It is not reliant on having Remote ID. The identification of such a tangential benefit suggests that the Department and CASA are really scratching around for potential benefits.

- *Gathering of data which will form an evidence-base to support future regulatory and policy development.*

To date CASA has not utilised existing data on remote control aircraft to properly assess risk, so there is currently no demonstrated intent to use evidence-based data to inform regulatory and policy development. It would be extremely optimistic to think that CASA would change its approach to embrace more evidence based approach in the future. So the data would be collected, but not used for this purpose.

- *Facilitate faster, more efficient, and/or automated approvals to operate in airspace for which drones may need permissions.*

  If this means facilitating approvals in airspaces where dromes are not normally permitted to fly (e.g. near airports or close to people/crowds), then there might be a case to be made for Remote ID to be part of a suite of conditions used to manage risks and monitor compliance. This would be on a case-by-case basis rather than a wholesale Remote ID requirement which the Department and CASA is promoting.

- *Support management of, and response to, other drone related issues such as noise, privacy, and environmental concerns, including through adjacent technologies such as the future UTM.*

  Remote ID might add some information to assist managing and responding to such concerns, but this would require integration with UTM and local authorities, which would itself necessitate a large investment in human and other resources. It is doubtful that this would be a very cost effective approach to such concerns. It should also be noted that such concerns are of a much lower priority that the issue of safety, which should be CASA's primary concern. The inclusion of such a poor value-for-money benefit to address secondary order concerns is another indication that there are few substantial benefits to the introduction of Remote ID.

Challenges

The costs for existing drone operators to add Remote ID equipment to their drones would be significant. I refer to the attached Appendix A prepared by a fellow model aircraft pilot Mr Richard Sutherland. It sets how the impracticalities of retrofitting Remote ID to model aircraft, including the costs. I would also point out that such costs would also discourage young people taking up the flying of model aircraft as a hobby. This means there will be fewer people developing the STEM (Science, Technology, Engineering, and Mathematics) skills and knowledge that the hobby requires.

The Department and CASA will require many additional resources to develop, implement and enforce Remote ID requirements. The cost of this additional resources to the Australian public is not justified given that no definite need for Remote ID has been identified (through a proper risk assessment) and that proposed uses and benefits are few and largely fanciful.

Proposed Policy Options

The approach to policy options set out in the discussion paper yet again demonstrates the Department's and CASA's flawed approach to the whole issue of Remote ID.

Once again, the Department and CASA does not seem to understand the process of carrying out an appropriate risk assessment. The starting point should be a proper risk assessment of various aircraft types and the setting of sensible risk categories for different masses, types (including different construction material, e.g. carbon-fibre vs polystyrene foam), and types of operations (only so far as these affect risk). Then take into account other factors that may mitigate the risk, such as operation in a designated area, before deciding what categories might benefit from the use of

Remote ID (i.e. necessary to have risk reduced to acceptable levels). Noting that by itself, Remote ID does not directly reduce the risk of harm to the public, regardless of some of the fanciful benefits the discussion paper describes. Instead, the Department and CASA jumps straight to categorising 'drones' for the introduction of Remote ID on the basis of things that are not directly related to risk (e.g. type of operator commercial, recreational, government).

The Department and CASA need to do a proper risk assessment in consultation with knowledgeable groups and not just follow what other jurisdictions have done. Open the risk assessment to public comment to make sure it is fit-for-purpose. Then base the policy on the final risk assessment.

Response to the discussion paper questions

Firstly, it should be noted that the questions seem to be largely based on the proposition that Remote ID is necessary and will be implemented.

As discussed above, the need for an expensive Remote ID system has not been demonstrated and the Department and CASA should carry out a proper risk assessment to determine the best way to manage the safety risks associated with future drone operations. This risk assessment should then be the basis of for developing policy, which might include some limited use of Remote ID.

Nevertheless, I provide some responses below to the questions of the discussion paper.

1. *Who should have access to Remote ID data and to what information?*

   CASA should be the only entity able to access the full set of remote ID data, all others should be limited to a registration number that they can contact CASA regarding any issues. The information that CASA collects should be limited to the minimum absolutely necessary to identify the drone. This pretty much means that the information sent by the Remote ID module should be limited to position/time and registration number of the module. CASA can then have a separate and secure database to store information that links the registration number of the module to the operator's data.

   It should be noted that CASA needs to acknowledge and accept liability for any misuse of Remote ID data. CASA is the agency promoting the implementation of a Remote ID system and if it is to be a made a requirement through regulation, then CASA alone needs to properly manage the security and privacy issues.

2. *Should there be a data collection standard?*

   The data collection standard can be pretty simple given that the data collection should be limited to module registration number and location/time.

3. *What is the best method of providing Remote ID data to relevant stakeholders?*

   Taking into account security and privacy concerns, CASA should administer this through a central database. As previously commented, the data needs to be limited to the minimum necessary and because CASA is liable for any misuse of data, it should be tightly controlled.

4. *What types of drone operators should be required to carry Remote ID equipment to operate drones? What should be exempt and why?*

I refer to my earlier comments on how the discussion paper jumps to 'types of drone operators' as a defacto risk category, rather than carrying out a proper risk assessment and defining appropriate categories through the risk assessment process.

If a proper risk assessment were carried out, then I would expect that only fairly exceptional cases would actually require (benefit though risk reduction) a Remote ID system.

It is pretty disappointing that the question even asks "why". It should be obvious to the Department and CASA that the criteria should be based on risk. I cannot fathom why the Department and CASA even asked such a question without setting up a risk assessment framework in the first place.

Nevertheless, it is pretty easy to rule out a number of situations immediately based on a fairly basic and conservative risk assessment. I refer to Appendix B that sets out the current flawed approach to setting risk categories and proposes some fairly conservative improvements. This is only a starting point and I once again stress that the Department and CASA need to carry out their own proper risk assessment and subject it to public scrutiny. Some situations that should be ruled out from any Remote ID requirement are:

- model aircraft that weigh less than 1000 grams (due to impracticality and low risk),
- model aircraft that are gliders (due to impracticality and low risk), and
- model aircraft flown at a club field (due to known and approved location and the fact that such fields have already demonstrated that they can manage risk to public in the past)

5. *How can Remote ID privacy issues be managed?*

As previously discussed above.

- Acknowledge that CASA is directly liable for any misuse of Remote ID information and related database information.
- Limit the Remote ID broadcast information to the absolute minimum necessary, i.e. Remote ID module registration number, position/time.
- Mandate that CASA is to carefully manage the release of any Remote ID or database information and limit the scope of this to what is absolutely necessary.

6. *Is Remote ID (BRID, NRID or both) an appropriate solution for Australia? Are different types of Remote ID more fit-for-purpose in different contexts or applications? Are there other types (or variations of types) of Remote ID that should be considered?*

The need for an expensive Remote ID system has not been demonstrated and the Department and CASA should carry out a proper risk assessment of to determine the best way to manage the safety risks associated with future drone operations. This risk assessment should then be the basis of for developing policy, which might include some limited use of Remote ID.

The proposed benefits of a Remote ID system are few and fanciful compared to the high cost to drone operators/pilots and the public (through taxpayers funding of CASA to implement the system).

I expect that a proper risk assessment would determine that Remote ID would only be warranted for a few exceptional circumstances. Once these are identified, this may guide the choice of the specific system to be used.

7. *What factors should Remote ID mandates be based on, e.g. location, airspace related, other?*

Risk, risk, and risk!

Seriously, why does the Department and CASA jump into the details of an expensive and likely unnecessary Remote ID system before considering the overall objective of safety. A proper risk assessment would identify the factors. But they would be likely to include as a small subset:

- the weight of the aircraft;
- the materials of construction of the aircraft;
- the type of the aircraft (e.g. quadcopter vs foam glider); and
- existing height separation of crewed and unscrewed aircraft.

But ultimately CASA should conduct its own thorough and independent assessment of risk and define its own categories of location, drone type (aircraft, multirotor, foam scale model, ect), and types of operation.

8. *What technical requirements, standards and governance arrangements should be considered in the introduction of Remote ID to position for integration with adjacent systems, including the development of the UTM ecosystem?*

Once again this question puts the cart before the horse. CASA should make the case for the introduction of any Remote ID based on a proper risk assessment and consideration of alternative approaches (such as the existing airspace separation for drones and manned aircraft). Based on this, it is expected that only a few drone types and operations would warrant the introduction of a limited Remote ID system. Then once the need and objective is more clearly defined for a more limited system, more detailed questions such as standards and governance arrangements will be easier to answer.

The reference in the question to the development of a UTM ecosystem seems premature and itself seems to be driving the push for the introduction of a Remote ID system.

9. *What features does Remote ID require to ensure tamper resistance and to mitigate security issues (including cyber risks)?*

Noting that CASA acknowledges that there are security issues and cyber risks, CASA should factor this into whether a Remote ID system is necessary in the first place.

However, the best feature to include would be to make CASA responsible for any such breaches of security. This will make sure that the issues and risks are factored into the design of the system, e.g. by limiting the information broadcast and restricting the release of information to that absolutely necessary — thus limiting the consequences of any such breach.

10. *What impacts could mandatory equipage have on drone operators?*

It will be expensive for all operators and compromise flight characteristics (and hence safety) for others. The costs to operators and to taxpayers of any proposed system should be balanced against the limited and somewhat fanciful benefits.

For recreational flyers, this cost will discourage younger people from taking up a hobby that utlitises and develops STEM skills and knowledge. For some types of models, the addition of extra equipment would compromise the flight characteristics of the aircraft (refer to Appendix A).

11. Should mandatory equipage be rolled out to all drone operators, or phased through types of operators and/or operations?

It should only be applied to drones and drone operations where the Department and CASA has demonstrated (through an appropriate risk assessment) a safety need for such a system. Then, if CASA wanted, it could then phase in different risk categories, if it felt that this would improve its administration of the system. For example, a phased approach might allow CASA to learn from early mistakes.

12. Are there existing standards that should be considered/adopted to facilitate Remote ID uptake in Australia?

The Department and CASA should do their own analysis of Australia's specific circumstances and develop their own standards, if necessary. The introduction of Remote ID in other jurisdictions is very recent and is not going terrible well, so there are no proven standards to pick up. However, there may be some lessons to learn from other jurisdictions on what not to do.

13. Who should we be engaging with, particularly outside of the aviation industry (e.g. telecommunications providers)?

The Department and CASA should engage with all stakeholders that may be affected by its proposed introduction of Remote ID, including the general public. In particular, as a model aircraft hobbyist I believe that CASA should engage with all hobbyists via public consultation and specifically consult with all model aircraft and quadcopter flying club/groups throughout Australia. A quick internet search would identify most groups, although CASA should have the contact details of most of these groups already.

Appendices prepared by [redacted]

APPENDIX A

Practicality of retrofitting RID Modules to Model Aircraft

While most of the currently available broadcast RID modules are much more expensive, the most affordable RID modules currently available to retrofit to home built model aircraft are:

A) DroneTag Beacon

Cost: Beacon €199
Antenna € 30
Postage €35
GST €26
Total €290 = **A$468**

Size: 37x26x16
Weight: 16g (without antenna)

B) Drone Beacon Db120

Cost: Beacon €129
Postage €35
GST €16
Total €180 = **A$290**

Size 48x38x28
Weight: 25g

C) DroneTag BS

Cost: Beacon €89
Antennas €8
Postage €35
GST €13
Total €145 = **A$234**
Size: 16x13x5
Weight: 3g (without battery or antennas)

Note: RID modules A and B allow the possibility of moving the modules between aircraft, offering the potential for a hobbyist to purchase one RID module which is swapped between aircraft. However, due to its lack of protective casing and the limited cycle antenna connectors, RID module C does not lend itself to swapping between aircraft.

Practicality in model aircraft with a weight greater than 1000 grams?

Both fixed wing and multirotor models in this weight category generally have sufficient space and weight capacity to allow any of the RID modules listed above to be used. However, the module cost is significant, and it is unreasonable to impose such a cost on hobbyists.

Note: high performance model gliders are an exception here, they are designed for minimum drag, with minimal cross section, and internal space for RID modules may not be available.

Practicality in small model aircraft (Parkflyer types) with weight up to 1000 grams?

These small aircraft typically cost between A$75 to A$200 with about half the cost being the model kit and half being the motor and control electronics.

Available space and weight constraints in these small model aircraft make the larger RID modules A and B technically impractical.

For models that weigh less than **500 grams**, the limited space and weight constraints are such that none of the available modules are technically practical.

For models that weigh between **500 and 1000 grams**, RID module C is a technically viable option, but since RID module C does not lend itself to swapping, a separate RID module would be required for each aircraft. The module would also need to be wired into the aircrafts electronic system to provide power, and thus would be transmitting whenever the aircraft was powered, even for maintenance, firmware updates, and preflight checks etc.

Many hobbyists have 20 or more models and requiring a A$234 RID module to be added to each model is unjustified and totally UNREASONABLE.

Note: While RID module C could be used in models between 500 and 1000 grams, weight distribution constraints would necessitate placing this module close to the radio control (RC) receiver. Since the RC receiver operates in the 2.4Ghz spectrum, an adjacent RID module (which is a transmitter also operating the 2.4Ghz spectrum) will significantly increase the RF noise that the RC receiver must contend with. This would degrade the quality of the control link, and could cause a loss of control.

APPENDIX B

The LAUGHABLE non-science behind CASA's 250 gram SAFETY threshold for 'DRONES'

CASA has specified a 'drone' safety threshold of 250g for registration and flight within 5.5km of an Airport. However, many aeromodellers know (based on decades of experience and observations) that 250g is much lower than could be reasonably justified on safety grounds. So, have you ever wondered why CASA has set such a low threshold of 250g?

- Was it the result of a comprehensive Quantitative Risk Assessment? No
- Was it from the detailed analysis of empirical data from decades of recreational model aircraft operations internationally? No

Inappropriate criteria

Amazingly, it harks back to Lieutenant General Heinrich Wilhelm Rhone of the Prussian Army in 1896. Now, while there weren't many 'drones' around in 1896, Rhone suggested that a bullet needed 80 joules of kinetic energy (KE) "*to remove a human from the battlefield …*" This criteria was deemed useful in training infantrymen in the effective range of their rifles.

Surprisingly, Rhone's work was not based on rigorous testing or detailed calculations, but simply on empirical observations, stories-sort-of-like: 'old Sergeant Otto reckons at Waterloo he clocked a French Grenadier at 220m with his musket'. Rhone's criteria was subsequently adopted by the US military in the 1930s, whereas the British favoured a momentum based approach. Rhone's criteria was contested and debated over many decades since, but it continued to be used for body penetrating ordinance by some agencies.

When applied to blunt force trauma (non penetrating), Rhone's criteria was found to be even more wanting. A paper "Common Risk Criteria for National Ranges: Inert Debris, April 2000", found that explosive debris (metal, concrete, bricks etc) needed 203.4 joules of KE to have a 90% probability of causing a fatality, 103 joules of KE to have a 50% probability, and 51.5 joules to have a 10% probability.

Examples of common items with 80 joules of KE

As an example of Rhone's criteria, a 15g bullet would need to be travelling at 370 km/hr to have 80 joules of KE. What other common objects have 80 joules of KE:?

- a 52g tennis ball served at 189 km/hr. This is about the average first serve speed of an ATP player. The fastest serve in tennis was clocked at 263 km/hr;
- a 163g cricket ball going 113 km/hr. This is slower than the average speed of a swing or seam bowler at 128 km/hr and well below an express bowler at 160 km/hr;
- a 480g AFL footy kicked at 66 km/hr. The average football speed over a 20m kick is around 108 km/hr;
- a 600g basketball thrown at 59 km/hr; or even
- a 90 kg AFL player sauntering along for a soft tackle at 4.8 km/hr.

All of the above sports balls are intentionally thrown, hit, kicked or bowled directly at people, clearly demonstrating the fallacy of using 80 joules as a threshold for regulation of sports balls or indeed model aircraft.When determining lethality, the KE that can be transferred from the projectile

to the victim is important. While a chunk of concrete may impart 100% of its KE, a quadcopter would impart much less, probably around 60 to 70%, and a balsa or foam model aircraft would be lucky to impart 20%. Therefore blast debris criteria is not applicable to 'drones'.

The FAA chooses its criteria

So when the FAA decided to use KE for 'drone' criteria, did they undertake frangible impact testing to determine realistic values of KE transfer? No. Did the FAA simply adopt the conservative 90% probability of fatality from inert debris of 203 joules of KE? No. With an ineptitude that beggars belief, the FAA decided to apply Rhone's old 80 joule criteria, albeit with an interpolated 30% probability of fatality, for a hit to the head.

The FAA then calculated the mass a 'drone' falling from 120m needs in order to achieve 80 joules of KE. The FAA's calculation gave a result of ~250g.

Now, besides mass, there are other important variables in the terminal velocity formula - cross sectional area, and the coefficient of drag (Cd). The FAA used a cross section of $0.02m^2$ (which is in the ballpark for a 250g 3" quadcopter), but chose a slippery Cd of only 0.3! Now, given the Cd for a sphere, cube, and a skydiver are 0.47, 1.05, and 1.0-1.4 respectively, (and a skydiver doesn't clutch a large propeller in each hand and foot), 0.3 is incredibly low for a falling 'drone'. It's hard to fathom how the FAA arrived at the value of 0.3, perhaps they tasked the calculation to the janitor or the work experience kid?

It is extremely troubling when agencies like the FAA, whose **primary** purpose is **safety,** can base policy on such a ludicrous approach, flawed criteria, and incorrect parameters. But then again, the FAA was the agency responsible for the botched Boeing 737 Max 8 certification debacle which cost 346 lives.

A realistic value of Cd

So, if we use a much more realistic, but still conservative Cd of 1.0, the mass a falling 'drone' needs to achieve 80 joules of KE is 450g. Now, 450g would equate to a 4" quadcopter with a larger cross sectional area than a 3" quadcopter, and thus would fall slower, reducing its KE.

If we solve the equations of KE and terminal velocity to give the FAA's 80 joules when dropped from 120m, we end up with a typical 5" quadcopter with a cross section of $0.06m^2$, and a mass of 775g. Interestingly, 800g is the mass adopted by the French CAA for registration, showing their superior judgement in estimating Cd and cross section when compared to the FAA.

For the FAA's chosen 80 joule criteria, the threshold should be 775g not 250g

Note: if the FAA had adopted the conservative explosive debris criteria of 203 joules with 90% probability of fatality, the threshold would be around **2300g**, or an order of magnitude greater than the FAA's 250g.

Level of Risk?

In 2015, the FAA also calculated the level of risk (using the 80 joule criteria) to be $\sim 5 \times 10^{-8}$. This is about three orders of magnitude safer than general aviation, which has a level of risk of $\sim 5 \times 10^{-5}$, and two orders of magnitude safer than the level of risk generally considered acceptable in society, of one in a million.

A level of risk so low, should have been a wake up call to the FAA, that the 80 joule criteria was too conservative, and not fit for purpose. Regulatory intervention should only ever be imposed when the level of risk is likely to exceed one in a million.

The FAA's Registration Task Force

In late 2015, the FAA convened a Registration Task Force to provide advise on its criteria. The Task Force had very limited time (3 days of meeting) and there were very divergent views amongst members on what the criteria and threshold should be, and on why the FAA was regulating at such a low level of risk, but with the limited time, the Task Force accepted that 250g be used as the basis for registration. The Task Force stated "*It should also be noted that the 250 gram weight threshold was agreed to for registration purposes only and was not a validation of the underlying assumptions for any purpose other than the registration requirement.*"

CASA chooses its criteria

Of course, CASA just gullibly copied the FAA's 250g threshold, and thus also Rhone's 80 joule criteria. Sadly, CASA must have done this without even basic due diligence which would have identified the flaws in the FAA's approach. Incredibly, CASA also ignored the Tasks Forces warning, and extended the 250g threshold to flight within 5.5km of an Airport. Presumably, CASA believes that people who live, work and play within 5.5km of an Airport deserve more protection from falling 'drones'?

The way forward

Clearly, aviation regulators need to stop basing policy on nonsense, and undertake a comprehensive and transparent Quantitative Risk Assessment, in genuine consultation with hobbyists, in order to set appropriate safety criteria for 'drones' and model aircraft.