

Executive Summary- Addendum

The TFDA spent a very significant period of time working with the Government during the 18-month period that led to the creation of the now abandoned Firearms Policy. The TFDA then spent another very significant period of time preparing a submission on that firearms policy for the also abandoned Upper House Inquiry. For this reason, the TFDA will only respond very briefly to the new Terms of Reference for the second, Lower House, Inquiry. The original Submission is included as an Appendix to this submission.

The TFDA's position on the new Terms of Reference is as below:.

- a) The TFDA strongly support the introduction of a Category E covering all firearms currently listed as 'prohibited' and not already included in Category A-D. The main purpose of Category E would not be to increase access to Category E firearms, but to facilitate the correct functioning of the Permanent Amnesty for unregistered prohibited firearms. At present, the Permanent Amnesty does not function for unregistered prohibited firearms because they cannot be registered by dealers. As a result, the number of prohibited firearms handed into to firearms dealers in Tasmania is much lower than in other states. This is as evidenced in the 2017 National Firearms Amnesty.
- b) The TFDA consider that the main non-compliance with the current Firearms Act 1996 is in relation to the incorrect categorisation of firearms that 'substantially duplicate in appearance' an automatic weapon. According to the NFA, these firearms should be Category D. In Tasmania, such firearms are prohibited due to their appearance. In all other States, Category D licence holders may possess such firearms. This is in recognition of the fact that the appearance of a firearm has no bearing on the functioning of that firearm. This point is expanded on in the original TFDA submission.
- c) The TFDA support the principle of the creation of a broad-based consultative group to advise the Government on the technical aspects of firearms legislation.
- d) Please refer to the original TFDA submission for a detailed overview of the original Firearms Policy and its compliance with the NFA.

e) The TFDA have two main comments on 'incidental matters'.

- 1) Legislation allowing the possession of firearm suppressors would not breach the NFA. **The NFA does not mention suppressors, sound moderators, silencers, or any other variant in either the 1996 or 2017 versions.**

This is despite frequent claims to the contrary by noted gun control advocates.

If the NFA does not refer to suppressors, how could legislation allowing suppressors to be owned breach the NFA?

Suppressors are widely owned in many other countries with similar legislative climates to Australia and have numerous benefits for firearms owners and the broader community. Please refer to the original TFDA submission.

- 2) The permanent firearms amnesty that currently extends to Category A-H firearms should be extended to prohibited firearms. At present, firearms dealers cannot register prohibited firearms handed in to them. In reality, prohibited firearms are generally very valuable, and so are not given away, but sold.

In order to remove such firearms from the community through the amnesty process, firearms dealers must be able to register such firearms. The most expedient way to facilitate this would be create a Category E encompassing such firearms. The relevant section of the original TFDA submission is reproduced below.

“...1) The need for prohibited firearms to be included in the ongoing permanent amnesty for un-registered firearms.

At present there is a permanent amnesty for unregistered firearms in Tasmania. This amnesty allows firearms dealers to register firearms that are handed in to them, or more frequently, sold by the unlicensed owner. However, this policy does not extend to prohibited firearms.

Tasmania Police argue that this is because prohibited firearms cannot be registered under the Firearms Act 1996, as they are not Category A, B, C or D. However, at present when prohibited firearms are registered subject to a Police Commissioner's Exemption, prohibited firearms are

registered under Category D anyway. It would seem that introducing Category E would be the most effective way to resolve this issue.

It is the opinion of the TFDA that introducing Category E would have the following benefits:

1. Correctly register firearms currently registered as Category D, particularly automatic firearms, and semi-automatic firearms which have the appearance of an automatic firearm. This would assist the Police in tracking movements of firearms interstate, and within Tasmania.
2. Reduce the administrative effort of Firearms Services and firearms dealers in issuing and tracking individual Commissioner's Exemptions. Strict controls on prohibited weapons would still be enforced through the usual licencing, registration and auditing processes.
3. Allow for the registration of currently unregistered automatic and other military type firearms under the ongoing Amnesty. Over time, this would significantly reduce the numbers of unregistered military firearms in the community. At present, firearms dealers are able to accept firearms handed to them during amnesties, but are unable to register prohibited firearms for sale interstate.

Significant prohibited firearms, including fully-automatic firearms, were registered by firearms dealers in Tasmania under the permanent Amnesty that ran from 1998 to 2015. These firearms were removed from the community through this action.

Currently, firearms dealers must surrender any prohibited firearms thus handed in to the Police within seven days of acquisition. During the most recent National Amnesty, Tasmania Police gave an undertaking to firearms dealers that they may attempt to obtain Commissioner's Exemptions for any prohibited firearms that were surrendered, on the condition that the prohibited firearms be sold to licenced users in other States.

However, Tasmania Police were unable to provide such Commissioner's Exemptions ahead of time. Prohibited firearms tend to be extremely valuable, as they are often historically significant and cannot be imported. For example, a registered and licenced Thompson model 1928 sub-machine gun was listed for sale and sold for \$25,000 on a large Australian firearms classified site in 2016. The licenced purchasers are usually film and television armourers, museums, or export customers.



Figure 1: Thompson 1928 A1 sub-machine gun, offered for sale and listed as sold for \$25,000 AUD in 2016.

In the event, most Tasmanian firearms dealers were unwilling to outlay substantial sums of money to purchase unregistered prohibited firearms from any party that may have wanted to dispose of them without a guarantee that they would be able to retain ownership of them via registration. According to the final 2017 Firearms Amnesty Report, no fully-automatic firearms and only 27 semi-automatic firearms were handed in Tasmania.

There is no further breakdown of the semi-automatic firearms surrendered in Tasmania into Category C rifle, Category C shotgun, Category D rifle etc. There is a reference to two SKS semi-automatic center-fire rifles surrendered in Tasmania. As these were singled out as noteworthy, it seems likely that these were the only two semi-automatic center-fire rifles surrendered during the Amnesty in Tasmania.

It is instructive to compare the amnesty results in Tasmania to those in Queensland and Victoria which, like Tasmania prior to 1996, had historically high levels of prohibited firearms ownership. During these amnesties, dealers in Victoria and Queensland were permitted to purchase prohibited firearms from unlicensed owners, and register the firearms:ⁱ

Jurisdiction	Semi-	
	Fully Automatic	Automatic
Queensland	52	893
Victoria	16	601
Tasmania	0	27

Table 1: 2017 Amnesty results for prohibited firearms, Queensland vs. Victoria vs. Tasmania

Until 1996, Tasmania was known for a high level of ownership of fully-automatic and semi-automatic firearms ownership. Given that these firearms were also did not require registration prior to 1996, it seems likely that significant numbers of semi-automatic and fully-automatic firearms still exist in the community. The best chance of removing these firearms from circulation would be to allow at least some firearms dealers to purchase and register them, for disposal to licenced firearms owners interstate.

i <https://www.homeaffairs.gov.au/Importingandbuyinggoodsfromoverseas/documents/national-firearms-amnesty-2017-report.pdf>

Submission to Select Committee on Proposed Firearms Law Reform Inquiry

Tasmanian Firearms Dealers' Association

7/30/2018

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Executive Summary

The Tasmanian Firearms Dealers' Association (TFDA) strongly support the Government's proposed firearm law reforms as outlined in the policy document of 9 February. Members of the TFDA were consulted by the Government and actively contributed during the policy formation process. Contrary to widespread claims in the media that the process occurred at the last minute ('Liberal poll-eve plan to relax gun laws')¹, the consultation process ran for approximately eighteen months prior to the March 2018 Tasmanian State Election.

We consider that the final proposal from the Government is proportionate, compliant with the NFA, and modest in scope, particularly as all of the key aspects are already implemented in at least some other Australian States. We commend the former Police Minister, The Honourable Rene Hidding, for showing genuine interest and commitment to reform the aspects of the Firearms Act which are outdated, disproportionate or not achieving the intended result. The efforts of the former Minister in implementing service improvements in Firearms Services have already led greatly improved service levels, particularly in relation to reducing the time taken to register new firearms by firearm dealers from three months during the second half of 2016 to two weeks at present.

The TFDA are surprised at the very high level of concern expressed in the media around the general vague theme of the Government proposing to 'weaken firearms laws'. The implication that the Government was proposing a wholesale abandonment of the NFA and a return to widespread ownership of military type semi-automatics borders on absurd, especially when a detailed examination of the facts is made. This style of reporting is exemplified by a story published by the ABC on July 29 (Port Arthur massacre health workers call on Tasmanian Government not to weaken gun laws)², in which it was uncritically claimed that:

- The proposals would lead to firearms becoming un-licenced and unregistered
- The proposals could lead to an increased rate of suicide by firearm
- The proposals would lead to more gun violence up to and including mass shootings that the health system would be unable to cope with.

No evidence or reasoning was presented for any of these claims, which are even more extraordinary considering that the proposed law reform would have no effect on the broad principles of registering all firearms, requiring licences for all firearms owners, or controls on Category D semi-automatic center-fire rifles.

For the most part, the media generally have so far failed to conduct any detailed examination of the relevant facts, being:

- The current provisions of the Firearms Act 1996, and the effects
- The sections of the Firearms Act 1996 that the Government proposes to amend
- The practical effect that the amendments, if enacted into legislation, would likely have
- Which other states have already made such amendments, and the effect.
- Which of the proposals are not actually covered by the NFA at all. Notably, the NFA makes no mention of suppressors or silencers.

Most commonly, the media has persistently failed to make any differentiation between a low-powered Category C rim-fire semi-automatic rifle and a high-powered Category D center-fire semi-automatic rifle, instead referring generally to ‘semi-automatic rifles’ and often in the obvious context of the Port Arthur shootings³. This may well have led many people to believe that Liberal Government is proposing to allow increased access to the military-type semi-automatic rifles that were used to such devastating effect at Port Arthur. Needless to say this completely misrepresents the Government’s actual policy.

Had the media made the effort to properly investigate the true, limited scope of the proposals, and the fact that similar proposals have already been implemented in other States, we believe that the level of public concern would have been much lower. We can only speculate as to why the media continues focus on a meaningless ‘tough law/weak law’ dichotomy and consistently fails to discuss the precise detail of the proposed reforms to any real extent.

The TFDA are particularly supportive of the following elements of the policy:

1. That a Tasmanian Firearms Owners Council be established to provide user group perspectives and technical advice to the Government on firearms-related matters. Most significantly, members of this group would draw on their experience to provide advice to the Government on legislation and amendments, to help ensure that legislation was effective.
2. That Tasmania Police move to a digital platform for firearms-related transactions, in a manner similar to Victoria. This would greatly ease the administrative burden on both firearm dealers and Tasmania Police, while also improving the tracking and correct registration of firearms.
3. That a new firearms Category E be created, to encompass firearms not already classified as A, B, C, D or H and listed on the Prohibited Firearms Schedule, in a similar manner to Queensland, Victoria and New South Wales. This would allow prohibited firearms surrendered under the permanent amnesty to be properly registered and disposed of to licenced users in other States.
4. That all occupational firearms users, including primary producers, their agents, and contractors, be permitted to own and use firearm suppressors in a similar manner to Victoria, New South Wales, South Australia and the ACT. This would greatly reduce the risk of hearing damage to occupational users, reduce noise complaints and increase efficiency of crop protection activities. We note also that no-where does the 1996 NFA or 2017 NFA mention suppressors, moderators, or silencers for firearms.
5. That licence terms be extended to 10 years for A and B categories, and two years for other categories, in a similar manner to Queensland and the Northern Territory. Increased licence terms would greatly decrease the administrative burden on both licence holders and Tasmania Police.
6. That the State Government work with the Federal Government to make future NFA reviews more open and transparent, and facilitate genuine consultation with firearms owners and firearms industry groups. The perception of the firearms industry at present is that the 2017 NFA review was presented for approval by the States with little genuine consultation during the actual policy formulation and drafting process.

The TFDA consider that the great majority of the policy elements comply with the NFA, or are not covered by the NFA. Furthermore, all of the proposed reforms have already been implemented in at least some other Australian States or Territories. The sole policy element that does not comply with the current NFA is the proposal to extend licence terms to 10 years.

The NFA states that the maximum term of a licence shall be five years, but does not include any explanatory text as to how this period has been determined or what the intended public safety benefit is. We note that Queensland adopted 10 year licences in 2013 and the Northern Territory followed suit in 2016.

We urge the Committee to consider these proposed reforms in careful detail, particularly focusing on the experience of other Australian States and Territories, which have already implemented similar changes to the Firearms Acts in those places. With particular regard to firearms suppressors, we further recommend to the Committee that they carefully consider the relatively unrestricted use of firearm suppressors in countries with extremely similar social conditions to Australia, such as New Zealand, the United Kingdom, and Sweden, Finland and Norway.

Comment on the Terms of Reference

We have reviewed the Policy against the Terms of Reference of the inquiry, and make the following comments:

1. Current and Future Licencing regimes, including training and testing, licence renewal, licence infringements and licence categories;

- i) We support the extension of training and testing regimes to new entrants other than TAFE Tasmania, provided quality and safety standards are maintained. In other States such as Queensland, the SSAA administers safety training and testing with good results.
- ii) We support the extension of licence terms for 1 year licences to two years, and 5 year licences to 10 years. Already implemented in QLD and the NT.

Focusing question: How would public safety be put at risk by extending firearms licences from 5 years to 10 years, given that the Police can cancel licences at any time during the licencing period?

- iii) We support the creation of a new Category E to include all firearms and similar items not currently included in Categories A, B, C, D, or H. This would improve tracking of prohibited firearms and enable them to be registered under the Permanent Amnesty. Allowing the registration of 'prohibited firearms' so they could be disposed of to licenced owners in other States would likely significantly increase the numbers of such firearms that were disposed of to firearms dealers, thus enhancing community safety.

Focusing questions: It is known that until 1996, firearms now classified as prohibited, including fully-automatic firearms, were widely owned in Tasmania, Queensland, and Victoria. How many prohibited firearms were surrendered in Tasmania during the most recent amnesty, compared with in Queensland and Victoria?

What was the likely contribution of allowing firearms dealers in Victoria and Queensland to register prohibited firearms during the amnesty, but not in Tasmania?

2. Compliance with the provisions of the National Firearms Agreement.

Focusing question: What, if any parts of the Policy are both inconsistent with the NFA, and not already in place in other Australian States? Do these parts relate to public safety in any credible way?

A careful reading of the Policy Document released by The Hon. Rene Hidding on 9 February 2018 (the policy) suggests that the proposals can be divided into two groups:

1. Amendments that it is proposed to introduce into legislation, and;
2. Proposals to be referred to other bodies, namely the Police Minister's Council and the proposed Tasmanian Firearms Owners' Council.

We make the case that referring a proposal to another body for consideration is not the same as promising to implement it into law. This distinction appears to be lost on the media, who consistently accuse of the Government of proposing to breach the NFA, for example by proposing to make sports shooting a genuine reason to own Category C firearms⁴.

Enacting this policy into law in Tasmania would be a breach of the Paragraph 8 NFA, which requires States to prohibit shooting competitions that use Category C firearms, with the limited exception of clay target shooting. However, proposing to amend paragraph 8 of the NFA is not a breach of the NFA. We consider this distinction to be important.

The proposals relating to firearms reform are summarised below, in the order in which they appear in the policy document. A comment is made on whether the proposal is within the scope of the National Firearms Agreement 2.0 of February 2017 (The NFA), and to what extent, if any, it could be considered to breach the National Firearms Agreement.

As the TFDA was involved in the consultation process that ultimately produced the policy, we have also made a comment on the context and background to the policy, by way of explaining why it was included and what the intended effect of the policy is.

1) “...Establish Tasmanian Firearms Owners Council (TFOC), to provide advice to the Government on matters to do with firearms ownership and regulation...”

NFA Status: **Not relevant.** Nothing in the NFA would appear to prevent a State Government from establishing a body to advise the Minister for Police.

Context: The intent of the TFOC was to establish a body that could function as a peak body for firearms owners and users in Tasmania, in a similar way to the TFGA representing farmers and graziers to the Government. During the consultation process the Minister expressed frustration that no such group presently existed. This is due to the diverse nature of firearms owning and using groups in Tasmania, which include several major, and separate sporting groups, farmers and graziers, and various recreational hunters.

2) “...Require Firearms Services (FAS) to allow transactions to be carried out in a digital format...”

NFA Status: **Compliant.** Paragraph 31 of the NFA requires that “...Jurisdictions agree to store registrations on a system which is able to share information with the national information-sharing hub...” Anecdotal evidences suggests that at present, the Tasmanian system is little changed since 1996 and does not allow full information sharing with the National information system. If this is the case, then Tasmania does not currently comply with Section 31 of the NFA.

Context: Firearms owners and firearms dealers in Tasmania have expressed frustration at the inefficient and manual process of transacting in firearms in Tasmania. All aspects of the system, from applying for permits to registering firearms and providing returns are currently completed using paper forms which must be filled in by hand and sent to Tasmania police via the mail.

Other States, notably Victoria, and Queensland, have systems that allow online transactions with Firearms Services. It is important to note that a more efficient process does not mean that mandatory ‘cooling off’ periods will be reduced or compromised in any way. Rather, that the administrative burden on firearms owners and firearms dealers will be reduced.

3) “...Expand the current exclusive firearms training and testing model to allow additional training organisations to conduct training...”

NFA Status: **Compliant.** Provided that any new training providers deliver courses that meet the requirements of Paragraph 35 of the NFA, nothing in the NFA requires that only one training provider in the State is authorised to conduct firearms safety training courses.

Context: At present, only TAFE Tasmania is authorised to conduct firearms safety and training assessment. On the general principle that monopolies are detrimental to quality and efficiency, it was proposed that other training organisations be able to offer firearms safety training and assessment, provided they met the required quality and safety requirements. Such organisations would be independently audited.

4) “...Extend Category A and B firearms licence terms to 10 years, and Category C licence terms to two years.”

NFA Status: **Not compliant.** Paragraph 34 (d) of the NFA stipulates that the maximum term of a licence must be five years. It should be noted that Queensland has had 10 year licence terms for Category A and B firearms licences since 2013, and the Northern Territory, since 2016.

Context: Although the NFA specifies maximum 5 year licences, it is not clear how this enhances public safety, given that the police may cancel the licence at any time during the licencing period. The main argument for increasing licence terms was to reduce administrative burdens on firearms owners and Firearms Services.

It should be noted that a firearms licence can be cancelled at any time and firearms seized, should the circumstances of a licence holder change. The main contribution to public safety thus come from reports made to the Police by members of the public or the medical profession.

5) “...Introduction of infringement notices rather than summons for minor storage offences...”

NFA Status: **Compliant.** The NFA stresses the need for safe storage of firearms as one of the fundamental principles of the NFA (paragraphs 4, 38, 44-51. However, the policy stresses ‘*minor* storage offences’, implying technical, inadvertent breaches of storage regulations where the security of firearms has still been maintained. The degree of compliance with the wording and intent of the NFA would depend on the definition of ‘minor storage offences’.

Context: This policy arose out of a perception that in some isolated cases, the Firearms Act does not give sufficient discretion to Police in resolving a storage issue at the time of the offence. An example may be a single round of ammunition that has been misplaced, for example in the floor of a farm vehicle.

The intent of the Policy is to provide more discretion to Police officers in these instances. In practice, Police officers will tend to exercise such discretion already. The intent of the policy is to provide legal backing to this discretion.

6) “...Finalise an MOU between the Government, Tasmania Police and the Tasmanian Farmers and Graziers, including the following provisions: ...”

- i) “...The MOU will acknowledge that an active primary producer in Tasmania has a genuine reason for owning a firearm by reason of that fact....”

NFA Status: **Compliant.** Paragraph 16 of the NFA acknowledges that primary producers have a genuine reason to own firearms in Categories A, B, C or D depending on their circumstances.

Context: This policy recognises that at present, Tasmania Police tend to apply an unreasonably high evidence burden that many primary producers can't meet. The policy has two aims:

- 1) Ensure that individuals who meet the definition of 'primary producer' are not prevented from obtaining licences, including Category C licences, even if they obtain the majority of their income from other, non-farming sources.
 - 2) Recognise that Category C firearms are more suited to primary production purposes than Category A and B firearms, by virtue of being more efficient for destroying browsing pest animals.
- ii) *"...Spells out a practical, safe and responsible method of carrying and conveying firearms while at work in primary production, the practice of which will be better allowed for by reviewing the "in use" provisions of the Firearms Act...."*

NFA Status: **Compliant.** The NFA does not provide detailed requirements for the carriage of firearms, other than Paragraph 44 (e), which states that when firearms are temporarily stored away from their usual storage locations, licence holders must "...must take reasonable care to ensure that the firearm is not lost or stolen and must take reasonable care to ensure that the firearm does not fall into the hands of an unauthorised person..."

Context: This policy recognises that at present, legal requirements for carrying firearms in vehicles for primary production purposes, particularly when operating near or crossing public roads, are either not clear or not practicable.

- iii) *“...Provides for genuine employees to include contractors or agents of primary producers to be able to hold Category C licences for standard crop protection and pest control purposes...”*

NFA Status: **Compliant.** Paragraph 6 (c) (i) provides that Category C firearms can be licenced to occupational users who’s occupation includes the extermination of animals. Furthermore, Paragraph 6 (v) states that Category C and D firearms may be licenced to “... additional occupational needs and other limited purposes as authorised by legislation or Ministerial discretion...”. The licencing of contractors and agents of primary producers to carry out pest control on behalf of the primary producer would certainly seem to be consistent with Paragraph 6 of the NFA.

Context: This policy recognises the changing nature of farm employment, particularly that relatively few primary producers would employ full time workers. Primary producers are far more likely to employ part-time contractors. The policy would provide for such bona-fide contractors or agents to obtain Category C licences for use in their primary production occupations.

- iv) *“...For workplace health and safety reasons, permits Category C holders or crop protection permit holders to own and use sound suppressors in the course of the use of their firearms for primary production purposes...”*

NFA Status: **Not Relevant.** Neither the original NFA of 10 May 1996 or the revised NFA of February 2017 mention firearm sound suppressors. This would indicate that the regulation of sound suppressors is outside of the scope of the NFA.

In any case, Paragraph 3 of the NFA provides that “...Nothing in this Agreement prevents jurisdictions from adopting additional, including more restrictive, regulations...” This would seem to allow the State Government to implement legislation allowing the ownership of sound suppressors and still remain compliant with the NFA. Regulation of suppressors to allow licencing under the Firearms Act 1996 would seem to be consistent with this provision.

Context: Around the world, awareness of the importance of occupational health and safety in the workplace is increasing. In this context, a growing number of countries are recognising the benefits of firearm sound suppressors (suppressors) and de-regulating or otherwise allowing their use by both recreational and occupational firearms owners. We have expanded on the use and benefits of suppressors under Section (5).

- v) *“...We will refer to TFOC for an examination of a simpler renewal process for Category C licences if circumstances of the ownership and of the holder have not changed...”*

NFA Status: **Not Relevant.** The NFA does not prescribe a licence renewal process beyond mandating that the maximum term of a licence be 5 years.

Context: This policy arose out of a perception that the renewal process for Category C licences is unnecessarily complex, akin to applying for a licence for the first time.

- vi) *“...We will review the income threshold that defines a person to be considered a 'primary producer' for the purposes of the Firearms Act...”*

NFA Status: **Not Relevant.** The NFA does not define a Primary Producer, beyond Paragraph 16 (a) prescribing that such a Primary Producer must satisfy licencing authorities of their ‘genuine reason’ to possess firearms. The Australian Tax Office definition of Primary Producer, being tested and comprehensive would seem to be reasonable.

Context: Many primary producers in Tasmania receive income from multiple sources. In many cases, their income from off-farm work is larger than their primary production income, depending on seasonal variations.

At present, there is a perception that Tasmania Police apply an unreasonably high threshold to determining whether someone is a bona-fide primary producer. This is particularly true compared to the evidence threshold of other states.

7) “...Clarify arrangements for target pistol events to harmonise events between jurisdictions....”

NFA Status: **Compliant.** The NFA contains detailed provisions for target pistol events. This policy does not contain any details that would contravene those provisions.

Context: The intent of this policy is to ensure that Tasmania is consistent with other jurisdictions, for the purposes of hosting national-level pistol shooting competitions in the State.

8) “...Replace the existing requirement that a competition clay target shooter wishing to use a Category C semi-automatic shotgun must belong to one particular clay-target organisation, with a choice of approved clubs being made available....”

NFA Status: **Compliant.** Paragraph 13 (b) (iii) (1) allows for Category C shotguns to be used, on medical grounds, by shooters who may belong to one of a number of clubs provided those clubs are affiliated with the Australian Clay Target Association.

Context: This policy arose out of a concern that clay target shooters with a medical reason to use a semi-automatic shotgun were being unfairly restricted in their choice of clay target club membership.

9) “...Amend Section 98 of the Firearms Act to clarify that for firearms received temporarily from interstate for repairs it is sufficient to have seen the interstate registration subject to normal reporting...”

NFA Status: **Compliant.** Provided that the firearms are registered in a jurisdiction, nothing in the NFA would require firearms dealers receiving a firearm for repair to register that firearm in Tasmania, provided the transaction was entered into their dealer’s record.

Context: This policy arose out of the lengthy and time consuming process of registering a firearm in Tasmania. At the time the policy was approved, new firearm registrations in Tasmania were taking up to 90 days to process. This was greatly impeding the ability of firearm dealers and gunsmiths in Tasmania to work with customers in other States. The following scenario was typical:

- Gunsmith in Tasmania was retained to repair, modify or upgrade an interstate customers' rifle
- Gunsmith received rifle from dealer in customer's State
- Gunsmith applied to register firearm in Tasmania
- Gunsmith completed repairs or modifications in 7-14 days
- Gunsmith waited further 70-80 days for Tasmania Police to complete registration of firearm and mail registration certificate to them
- Gunsmith received registration certificate after 90 day period
- Gunsmith returned rifle to interstate firearms dealer and filed registration certificate back with Tasmania Police advising them of transfer.

At present, new registrations are typically taking 14 days to complete.

Under the proposed policy, firearms dealers would have to view evidence that the firearm was registered in another State. They would still receive the firearm from a firearms dealer in that State, and return the firearm to a licenced firearms dealer.

10) "...Re-define the term "manufacture" to allow certain repairs and assembly of firearms to take place in an appropriate manner. ..."

NFA Status: **Compliant.** Paragraph 22 (a) states that jurisdictions have "...regulations addressing firearm manufacturers...". Such a regulation would define what activities constitute "...manufacture..." of firearms, and conversely, what activities constitute repair, modification, re-barrelling or other activities that would collectively be known as gunsmithing or armouring.

Context: This policy arose out of a new interpretation that Tasmania Police began applying to the definition of 'manufacture'. Until 2016, 'Manufacture' was considered to be manufacturing a firearm from raw materials i.e. through turning, machining, cutting etc. This activity required a Commissioner's Exemption to carry out. In mid 2016 Tasmania Police began to consider assembling a firearm from already manufactured components to be considered 'manufacturing'.

For example, a gunsmith may build a custom rifle for a customer by purchasing a registered, serial numbered action, and then fit a custom made barrel to that action. Generally the degree of precision and quality of workmanship will determine the accuracy of the finished rifle. In all other States this work is considered to be part of the normal activities of a gunsmith or armourer, and is lawful provided the person doing the work holds a firearms dealers or armourers licence and maintains full records of their transactions.

11) "...Amend the Firearms Act to allow an owner to have a dedicated and secured room which can be designated a temporary "safe area" for the purposes of the reloading of ammunition...."

NFA Status: **Compliant.** Nothing in this policy contravenes paragraph 44 (c) (iii), which states: "...all ammunition must be stored in locked containers separate from any firearms..."

In this instance the room in which ammunition re-loading was being carried out would function as the 'locked container' referred to in the NFA, providing it was appropriately secured.

Context: This policy arose out of a highly specific concern around wording in the existing Firearms Regulations around whether a 'locked room' can be considered a 'locked container' for the purposes of the Act and Regulations.

12. “...Develop a protocol between Tasmania Police and antique firearms and militaria groups for the operation of shows, militaria and re-enactment events in a way that provides a high level of safety and compliance, but also for reasonable and lawful trade and display of material....”

NFA Status: **Compliant.** The proposal refers to a protocol to be developed with the approval of Tasmania Police, who would ensure that any such protocol complies with the Firearms Act.

Context: Policy arose out of frustration around restrictions of the display of antique firearms, which are exempt from licencing and registration requirements provided that ammunition is not available for them.

13) “...We will refer to the new TFOC:

The creation of a new Category E to encompass all "prohibited firearms" - as most of these are not prohibited to all citizens, and certain specialists have lawful reasons to possess them....”

NFA Status: **Compliant.** The NFA does not refer to all categories of firearms or items generally regulated under State and Territory firearms acts. These items include objects as diverse as fully-automatic firearms, pepper sprays, tasers, crossbows, and artillery. The creation of a Category E firearms category would be consistent with the approaches in Victoria, NSW, and Queensland, where formal categories for ‘prohibited weapons’ exist.

Context: This policy arose out of a new Tasmania Police Policy that came into force in 2016. Between 1996 and 2016, firearms were primarily classified by length and method of operation. For instance, all semi-automatic firearms under 650mm in length were classified as handguns. All center-fire semi-automatic firearms over 650mm in length were considered Category D firearms regardless of their appearance.

All fully-automatic firearms, regardless of length, were considered also Category D firearms. In practice, this distinction had little effect. The number of licence holders that qualified for Category D firearms in Tasmania was extremely small, anecdotally reported to be as low as five individuals, not including firearm dealers. Their access to Category D firearms could still be controlled through the permit to acquire process. Such an individual would not have a permit

for an automatic firearm granted, even though they possessed a Category D licence. In 2016, the Tasmania Police policy toward prohibited firearms changed, based on a re-interpretation of the Firearms Act 1996.

The new Tasmania Police Policy was that prohibited firearms could not be licenced to anyone, other than by the individual Commissioner's Exemption process. However, once a Commissioner's Exemption was approved, the firearm was still registered as a Category D firearm as per the 1996-2016 policy.

The main practical effect of this policy was that unregistered prohibited firearms could not be purchased and registered by firearms dealers. As these firearms tend to be extremely valuable, this meant that prohibited firearms are very unlikely to be surrendered at present, or in future amnesties. This is explored in detail in section 6 (1), 'The need for the Permanent Amnesty to include prohibited firearms'.

14) “...To review and develop a useful and safe protocol for the carriage of firearms in public places in vehicles to deal with all practical circumstances...”

NFA status: **Compliant.** The NFA does specify any specific requirements on the carriage of firearms, other than specifying in paragraph 1 that public safety is improved by the 'safe and responsible... carriage... of firearms'.

Context: This policy arose from concerns expressed by farmers and graziers that the current Firearms Act 1996 did not adequately allow for the practical carriage of firearms in a primary production context.

15) "...The entire matter of "military appearance" laws for a full review...."

NFA status: **Compliant.** The Government has proposed to review 'military appearance' laws, not implement any changes to them. In addition, the interpretation of 'military appearance' as it relates to firearms varies widely between the States and Territories. Despite all States and Territories being signatories to the same NFA, approaches vary from prohibiting all firearms with pistol grips or camouflage coatings (Western Australia) to not regulating firearms by appearance at all (South Australia).

Context: This policy arose from a major change of direction by Tasmania Police which was announced in mid-2016. Schedule 1 Item (6) of the Firearms Act 1996 defines a prohibited firearm as 'any firearm that substantially duplicates in appearance a firearm referred to in Item 1 (machine gun, sub-machinegun). This has the effect of requiring Tasmania Police to consider the appearance of all firearms, regardless of function or action type, when determining the category that the firearm falls into. For example, a single shot air rifle that was styled after an M16 military rifle would be a prohibited firearm under this clause.

Between 1996 and 2016, the interpretation of Tasmania Police was that all firearms were either Category A, B, C, D, or H. A firearm that was neither A, B, C, or H was considered Category D by default. This included machine guns and submachine guns. In addition, Tasmania Police did not strictly apply Item 1 (6) to any Category A, B, C, or H firearms between 1996 and 2016. In practice, the number of firearms that Item 1 (6) could reasonably be applied to at this time was extremely small.

In 2016, Firearms Services became concerned about two types of firearms that were owned in Tasmania, the AAA SAP pistol and the Warwick Firearms WFA1 rifle. Two AAA SAP pistols were registered in the state, and three WFA1 rifles. Both firearms were Category H and B respectively under the firearms act 1996, but were considered by Tasmania Police to have a 'military appearance' and thus be prohibited.

Tasmania Police then established a committee to establish if any other firearms currently sold had a military appearance, and published an interim list that contained a further 24 firearms that they proposed to declare prohibited, many of which had already been sold in Tasmania. This effort appeared to coincide with a marked decrease in service levels, presumably as staff were tasked with working on the new 'military appearance' project.

After the intervention of the Minister for Police, the list was revised to remove all of the Category B firearms with the exception of the Warwick Firearms WFA1. Shortly afterwards, a review of Firearms Services commenced.

While the matter of classifying firearms based on appearance is a matter for a future review, it should be noted that previous reviews in other States, including one carried out by the Law Reform Commission of Western Australia in 2016, found that⁵:

"...The Commission favours a technical, evidence-based approach that limits subjective and ad hoc decision making, and recommends that Western Australia negotiates at the national level for the **removal of the 'appearance' provision** from the definition of a 'self-loading centre fire rifle designed or adapted for military purposes'...."

16) "...The restrictions on carriage of ammunition across Bass Strait between Victoria and Tasmania, removing unfair barriers for travelling competitors and hunters...."

NFA status: **Not Relevant.** The NFA does not mention carriage of ammunition, other than to specify that the commercial transport of ammunition with firearms is prohibited. This policy relates to the transport of ammunition by recreational shooters specifically on the Spirit of Tasmania passenger ferry.

Context: The Spirit of Tasmania guidelines on the transport of ammunition specifically prohibit the transport of reloaded ammunition. This was felt to disadvantage shooting competitors, who rely on custom-made ammunition for shooting competitions.

17) “...We will refer to the Council of Police Ministers:

The need for sound, sustainable, safe and non-political amendments to the National Firearms Agreement to reduce the frustrations of differing standards and the need for harmonisation of firearms laws across jurisdictions.

NFA status: **Not Relevant.** The NFA does not prohibit States from proposing amendments to the NFA. The Council of Police Ministers is the correct forum for proposing any such amendments.

Context: This policy arose out of a general frustration expressed by shooting groups and the firearms industry generally that the process of reviewing or amending the NFA is completely opaque and is done with very little input from firearms users generally. The perception of the firearms industry generally is that the whole NFA process is highly politicised. The trigger for the most recent NFA review was ostensibly the Lindt Café terrorist attack, despite this crime having no link to licenced firearms or firearms owners.

It appears that changes to the NFA are prepared in secret by the Federal Government and then presented to States fully drafted and at the last stage as a fait accompli. During the most recent revision of the NFA, there was no meaningful opportunity for public comment during the drafting process.⁶

18) “...The possibility to expand the "reason to own" a Category C firearm to include competition shooting, as occurs for clay target shooters, for recognised competition shooting events in Australia....”

NFA status: **Not Relevant.** As above, the NFA does not prohibit States from proposing amendments to the NFA. The media has generally reported that the Police Minister proposed allowing Category C firearms for competition use.

In fact, the Minister proposed referring this policy to the Council of Police Ministers. This strongly implies that the policy was contingent on the other Police Ministers forming a consensus. Such a consensus would seem extremely unlikely in the current environment, which in effect lets the Minister off the hook. In terms of keeping the election pledge, he merely has to propose the amendment to the Police Ministers Council.

Context: Some states currently allow Category C firearms to be owned for competition use. These include the Northern Territory, which according to Regulation 12 of the Northern Territory of Australia Firearm Regulation 2007 allows the use of Category C pump-action and semi-automatic shotguns to be owned for any sports shooting conducted at an international level, including International Practical Shooting Confederation (IPSC) events.

3. Role of Tasmania Police, Firearms Services (FAS) and the proposed Tasmanian Firearms Owners Council (TFOC).

The TFDA support the establishment of TFOC to function as a peak body for firearms users in Tasmania and to provide advice to Government on matters related to the ownership and use of firearms in Tasmania. The main benefit of TFOC would be the members using their technical knowledge to help ensure that new legislation or amendments will achieve the intended purpose.

We consider that the role of Tasmania Police is to enforce existing firearms legislation and regulations and that the role of Firearms Services is to efficiently administer the licencing, registration and transfer of firearms.

Focusing question: Involving the firearms industry in reviewing new legislation and regulations is often presented by gun control activists as evidence of a powerful and malevolent gun lobby in Australia ('Peter Dutton in talks to create gun lobby 'council' to change firearms laws')⁷.

Since firearms users and the firearms industry are the main focus of any firearm legislation in Australia, why would the government not benefit from the perspective and opinions of such groups on the effectiveness of any proposed legislation?

4. The role of the proposed Memorandum of Understanding between the Government, Tasmania Police, and the Tasmanian Farmers and Graziers Association (TFGA)

The TFDA support the Memorandum of Understanding, particularly with regard to clarifying that Primary Producers should have access to Category C firearms. We also support the policy of providing for Agents and Contractors to act on behalf of Primary Producers, the ownership and use of suppressors by primary producers, and their agents and contractors.

The TFDA also support the clarification of the definition of primary producer for the purposes of issuing Category C firearms licences.

Focusing question: Why would a person be considered a primary producer by the Australian Taxation Office, but not be considered a primary producer by Tasmania Police?

5. The ownership and use of sound suppressors by Category C licence holders.

The TFDA support the ownership and use of sound suppressors for the following reasons:

- Improved occupational health and safety through a reduction in risk of hearing damage for primary producers and other occupational firearms users involved in primary production as employees, contractors, or agents of primary producers.
- Reduced noise complaints to Tasmania Police and improved amenity for people living in rural areas.
- Increased efficiency of vertebrate animal control for crop protection.

Suppressors are already used in other Australian States, including New South Wales, South Australia, Victoria, and the ACT.

Suppressors are also widely used in many other countries with comparable social backgrounds to Australia.

These countries include:

- New Zealand: No permits required to own or use a firearm suppressor
- The United Kingdom: Firearm suppressors require permit, generally granted to any firearm licence holder
- Norway: No permits required to own or use firearm suppressor
- Sweden: Permit required, legal for recreational hunting purposes.
- Finland: No permit required, firearms licence required.
- Germany: Permit and firearms licence required, generally lawful for hunting.

Several jurisdictions in Australia already allow suppressors to be used in occupational contexts, including Victoria, New South Wales, and South Australia. This policy would allow suppressors to be used in primary production in Tasmania, under the same strict licencing and storage controls applied to Category C firearms.

The health and safety benefits of firearm suppressors are well understood. A report from the UK Government Health and Safety Laboratory, Assessment of Firearms Moderators (suppressors) 2004, attached in Appendix 1, found the following:

1. Even when wearing ear-muffs, noise exposure can exceed allowable peak levels due to the recoil of firearm temporarily disturbing the position of the ear muffs.
2. The best suppressors tested reduced the sound to hearing safe levels, even on center-fire (full bore) rifles using supersonic ammunition.
3. When using supersonic ammunition, the peak sound level of the shot in front of the muzzle did not reduce, as the noise of the bullet breaking the sound barrier was louder than the noise of the discharge.
4. The use of suppressors on center-fire rifles reduced recoil levels by 20-30%.

Focusing question: Suppressors can be owned without any permits at all in New Zealand. What has been New Zealand Police's experience with suppressors in relation to criminal activity?

Focusing question: How many shooting-related noise complaints do Tasmania Police attend each year? How many shooting-related noise complaints result in prosecutions under the Firearms Act 1996, or any other Act?

6. Any other matters incidental thereto:

1) The need for prohibited firearms to be included in the ongoing permanent amnesty for un-registered firearms.

At present there is a permanent amnesty for unregistered firearms in Tasmania. This amnesty allows firearms dealers to register firearms that are handed in to them, or more frequently, sold by the unlicensed owner. However, this policy does not extend to prohibited firearms.

Tasmania Police argue that this is because prohibited firearms cannot be registered under the Firearms Act 1996, as they are not Category A, B, C or D. However, at present when prohibited firearms are registered subject to a Police Commissioner's Exemption, prohibited firearms are registered under Category D anyway. It would seem that introducing Category E would be the most effective way to resolve this issue.

It is the opinion of the TFDA that introducing Category E would have the following benefits:

- 1.** Correctly register firearms currently registered as Category D, particularly automatic firearms, and semi-automatic firearms which have the appearance of an automatic firearm. This would assist the Police in tracking movements of firearms interstate, and within Tasmania.
- 2.** Reduce the administrative effort of Firearms Services and firearms dealers in issuing and tracking individual Commissioner's Exemptions. Strict controls on prohibited weapons would still be enforced through the usual licencing, registration and auditing processes.
- 3.** Allow for the registration of currently unregistered automatic and other military type firearms under the ongoing Amnesty. Over time, this would significantly reduce the numbers of unregistered military firearms in the community. At present, firearms dealers are able to accept firearms handed to them during amnesties, but are unable to register prohibited firearms for sale interstate.

Significant prohibited firearms, including fully-automatic firearms, were registered by firearms dealers in Tasmania under the permanent Amnesty that ran from 1998 to 2015. These firearms were removed from the community through this action.

Currently, firearms dealers must surrender any prohibited firearms thus handed in to the Police within seven days of acquisition. During the most recent National Amnesty, Tasmania Police gave an undertaking to firearms dealers that they may attempt to obtain Commissioner's Exemptions for any prohibited firearms that were surrendered, on the condition that the prohibited firearms be sold to licenced users in other States.

However, Tasmania Police were unable to provide such Commissioner's Exemptions ahead of time. Prohibited firearms tend to be extremely valuable, as they are often historically significant and cannot be imported. For example, a registered and licenced Thompson model 1928 sub-machine gun was listed for sale and sold for \$25,000 on a large Australian firearms classified site in 2016. The licenced purchasers are usually film and television armourers, museums, or export customers.



Figure 1: Thompson 1928 A1 sub-machine gun, offered for sale and listed as sold for \$25,000 AUD in 2016.

In the event, most Tasmanian firearms dealers were unwilling to outlay substantial sums of money to purchase unregistered prohibited firearms from any party that may have wanted to dispose of them without a guarantee that they would be able to retain ownership of them via registration. According to the final 2017 Firearms Amnesty Report, no fully-automatic firearms and only 27 semi-automatic firearms were handed in Tasmania.

There is no further breakdown of the semi-automatic firearms surrendered in Tasmania into Category C rifle, Category C shotgun, Category D rifle etc. There is a reference to two SKS semi-automatic center-fire rifles surrendered in Tasmania. As these were singled out as noteworthy, it seems likely that these were the only two semi-automatic center-fire rifles surrendered during the Amnesty in Tasmania.

It is instructive to compare the amnesty results in Tasmania to those in Queensland and Victoria which, like Tasmania prior to 1996, had historically high levels of prohibited firearms ownership. During these amnesties, dealers in Victoria and Queensland were permitted to purchase prohibited firearms from unlicensed owners, and register the firearms:⁸

Jurisdiction	Semi-	
	Fully Automatic	Automatic
Queensland	52	893
Victoria	16	601
Tasmania	0	27

Table 1: 2017 Amnesty results for prohibited firearms, Queensland vs. Victoria vs. Tasmania

Until 1996, Tasmania was known for a high level of ownership of fully-automatic and semi-automatic firearms ownership. Given that these firearms were also did not require registration prior to 1996, it seems likely that significant numbers of semi-automatic and fully-automatic firearms still exist in the community. The best chance of removing these firearms from circulation would be to allow at least some firearms dealers to purchase and register them, for disposal to licenced firearms owners interstate.

2) Comment on the role of the media in reporting on the proposed reforms

Gun control advocacy groups and the media generally have a strong tendency to reduce any debate on firearms legislation to a 'tough laws / weak laws' dichotomy. Any attempt to further an understanding of the specific detail of the current legislation, the proposed legislation, and the difference between the two seems to be avoided. By referring to firearms legislation only in vague terms, the media are able to imply that the proposed changes are far broader and more significant than they really are.

In the matter of coverage of the Tasmanian Liberals Firearms Policy, we consider that media coverage has erred in the following areas.

- 1) Implication that the policy, if enacted, would lead to firearms of the type used in the Port Arthur Shootings, being Category D military type center-fire semi-automatic rifles.
- 2) Implication that the policy would generally be in breach of the National Firearms Agreement
- 3) Implication that the policy is somehow unique to Tasmania or unprecedented in some way. In fact. Every proposal in the Policy is already in place in at least one other state, and in some instances, most States.
- 4) Confusion between 'policies that the Liberals would enact into legislation' and 'policies that the Liberals will refer to other bodies for further consideration and review'.
- 5) Implication that the policy was deliberately concealed from the public by the Government until it was revealed by the mainstream media less than 24 hours before the election.

Firearms user groups, technology, and legislation is complex and nuanced. An increasing number of people in Australia own firearms and participate in shooting sports. However, the general public do not generally have a detailed knowledge of firearms, or the legislation that governs firearms in Australia. For this reason the constant attempts by the media to frame any kind of legislative change as a return to an pre-1996 era of low regulation is extremely unhelpful in terms of informing non-firearm owning people.

In general, the media give the impression of being somewhat, to very supportive of gun control advocacy groups. Statements by such groups are often run uncritically, and attempts by shooting groups to correct inaccurate or misleading details are often ignored.

In the case of the recent debate around the Liberal Firearm Policy, a number of misleading statements were made.

- 1) That the Liberal Government's policy was a secret and concealed from the general public. In fact, the policy was released to a number of organisations on February 9 including the Tasmanian Farmers and Graziers Association, the Sporting Shooters Association of Australia, and the Tasmanian Field and Game association. Collectively, these organisations have over 190,000 members in Australia.

A timeline of the policy release and publication is shown below:

February 9: Police Ministers' Office emails policy document to all members of the firearms policy working group, with instructions to distribute as they like.

February 10: Queensland lobby group Law Abiding Firearms Owners publish extensive commentary on the policy on their website, focusing on proposal to extend permits to firearm suppressors.⁹

February 10- March 1: Extensive commentary on Liberal Firearms Policy on social media and shooting forums, particularly commenting on firearm suppressors.

February 14: Sporting Shooters Association of Australia, National Branch, publish the policy in full on their website. Access is public.¹⁰

February 20: Shooters, Farmers, Fishers Party (SFFP) publish media release praising Liberal Firearm Policy and referring to it extensively. Media release is sent to all Tasmanian media outlets. Only www.tasmaniantimes.com publish release.¹¹

March 2: The day before the election, The Australian newspaper publish story 'Poll eve plan to relax gun laws'. By publishing the story only hours before the election day media blackout takes effect, the ability for the Government to respond is limited.¹²

March 3: Liberal Government is returned with majority.

March 3-24: Media organisations run a large number of stories, generally exaggerating the scope of the policy and the intended changes. Bill Shorten calls on the Prime Minister to intervene, saying that "...As Prime Minister, you cannot stand by and allow Australia's world-leading gun laws to be watered-down..." and referencing '...devastating, senseless tragedies occurring in the United States...'”¹³

March 25: State Government announces support for Legislative Inquiry into Firearms policy.

3) Clarification of difference between Category C and Category D firearms

The most significant misrepresentation by the media recently is their frequent attempts to conflate the Liberal Policy on Category C firearms with an increased availability of 'semi-automatic rifles'.

As this is usually mentioned in the obvious context of the Port Arthur Shootings, a reasonable person is left with the impression that the Liberal Policy is to provide increased access to the types of semi-automatic rifles used in the Port Arthur shootings.

Such firearms are semi-automatic center-fire rifles, most particularly semi-automatic versions of military assault rifles. A key example of this is the use of the term 'semi-automatic rifle' to refer to all semi-automatic rifles, including Category C rim-fire rifles and Category D center-fire rifles. For example, Gun Control Australia Vice-President Roland Browne, in the context of a Gun Control Australia commissioned poll of 2nd May 2018, was quoted as saying:

*"...The poll results also confirm most Tasmanians want to feel safe and don't want Premier Hodgman to make semi-automatic rifles available (again). It would take Tasmania back to pre-Port Arthur massacre gun laws, it would undermine the National Firearms Agreement, and it would make Tasmania a laughing stock across Australia..."*¹⁴

A reasonable person would interpret this statement to mean that the Liberal Government was proposing to make semi-automatic center-fire rifles of the type used in the Port Arthur Massacre generally available in Tasmania, which of course is false on a number of levels:

- i) The proposed law reforms only relate to Category C rimfire rifles, not the far more powerful Category D center-fire rifles
- ii) Category C rimfire rifles have already been available to primary producers since 1996, and the NFA explicitly provides for this in Paragraph 16.
- iii) The proposed law reforms still have an occupational threshold for issuing a Category C rimfire rifle, proposing to only slightly extend this from primary producers and their direct employees at present, to agents or contractors.

While it is true that both Category C rimfire and Category D centerfire rifles are semi-automatic in operation, there is a huge difference in the lethality of both types. This is reflected in the fact that in most Western countries, including the UK, semi-automatic center-fire rifles- particularly those in a military configuration- are heavily restricted or prohibited, while semi-automatic rimfire rifles are generally available to any firearms licence holder without any special occupational threshold.

An illustration to compare two typical Category C and Category D firearms, and their ammunition, is useful:



Figure 1: Browning SA-22 rifle, caliber .22 LR. Semi-automatic rimfire rifle, Category 'C'. Widely owned by recreational shooters in most other Western countries. Prohibited in Australia except to primary producers.



Figure 2: Colt SP1 Carbine, caliber .223 Remington. Semi-automatic center-fire rifle, Category 'D'. Of a type used in Port Arthur shootings. Generally highly restricted in most countries. Prohibited in Australia to all but a very small number of professional vertebrate pest controllers.



Figure 3: Comparison of .223 Remington center-fire cartridge (left) and .22LR rimfire cartridge (right).

A 223 Remington cartridge typically has a muzzle energy of 1,800 joules. A 22 LR cartridge typically has a muzzle energy of 180 joules. While the 22 LR cartridge is potentially lethal, it has relatively low power and short range compared to most center-fire rifle cartridges. In short, Category D semi-automatic rifles are generally ten times more powerful than Category C semi-automatic rimfire rifles.

As a result, 22 LR firearms, including semi-automatic 22 LR firearms, are generally considered to have reduced risk to public safety in most countries other than Australia.

Of countries that generally allow civilian firearms ownership, Australia is unique in very heavily restricting semi-automatic rimfire rifles. Semi-automatic rimfire rifles are widely owned for recreational or sports shooting in the great majority of other Western countries, including in the UK, which is generally considered to have the strictest firearms ownership laws in the Western world.

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Appendix 1: UK Health and Safety Laboratory, Assessment of Moderators (Suppressors)

Harpur Hill
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SK17 9JN



Assessment of firearm moderators (short report)

HSL/2004/01

Project Leader: **Elizabeth Brueck BSc MIOA**

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Science Group: **Human Factors**

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EXECUTIVE SUMMARY

OBJECTIVES

Large calibre rifles are used by the Forestry Commission for the culling of deer. These rifles produce high levels of noise in excess of the peak action level given by the Noise at Work Regulations. Hearing protection is used but the response of hearing protectors is difficult to predict when using firearms. There remains a risk with full-bore rifles that exposure while wearing properly selected hearing protection still exceeds 200Pa (140dB). Fitting moderators to these rifles reduces the peak noise level and the overall noise exposure, and it has also been claimed moderators reduce the recoil.

To assess the benefits of moderators measurements were made during the firing of nine different full-bore rifles and one .22 calibre rifle. Moderator models A, B and C were tested with full-bore rifles, model D on the .22 rifle. Only a limited range of moderators was selected for testing, as the intention was not to validate all the devices available but to find whether any were effective with the chosen rifle types.

MAIN FINDINGS

Without a moderator full-bore rifles gave peak sound pressures levels over 150dB(C). Only the smaller .22 rimfire gave peak levels below 140dB(C). The peak level under hearing protection could exceed the Noise at Work Regulation's 200Pa (140dB) Peak Action level as the effectiveness of hearing protection worn during firing was reduced by the recoil and muff movement.

Moderator A consistently reduced the peak noise level below 137dB(C). With this moderator full-bore firearms could be fired without hearing protection. A similar reduction was obtained in the vicinity of the person firing proving additional protection would be given to a dog, or an observer without hearing protection.

Moderators B and C were significantly less effective than moderator A confirming a wide variation between different designs.

With supersonic ammunition moderators gave little reduction in the noise at a distance in front of the firing point as noise from the bullet flight dominates. A reduction is only possible when subsonic ammunition is used but this is not recommended as a practicable noise control measure.

The recoil of the full-bore rifles was reduced by 20 to 30% with moderators A, B and C.

RECOMMENDATIONS

The highest peak level with moderator A fitted is just at the new Physical Agents (Noise) Directive action level of 137dB(C). Although not essential some lightweight hearing protection should be used in combination with this moderator when firing full-bore rifles, until the effect of age and use on the efficiency of the moderator is known.

1 INTRODUCTION

Large calibre rifles are used by the Forestry Commission for the culling of deer. These rifles produce high levels of noise, with peak levels in excess of 150dB. The peak action level given by the Noise at Work Regulations is 200Pa, equivalent to 140dB. This will also be the upper peak pressure limit in the Physical Agents (Noise) Directive (PA(N)D) (due to be adopted in February 2006), while hearing protection will be required at peak levels above 137dB(C). Under the current Regulations there is a duty to reduce the noise exposure of employees as far as is reasonably practicable by means other than the use of hearing protection.

The response of hearing protectors when using firearms is difficult to predict. There remains a significant risk that even with the use of hearing protection peak sound pressures are in excess of 200Pa at the ear. Moderators reduce the noise level, and it is claimed they also reduce recoil.

At the request of the Forestry Commission and the Health and Safety Executive (HSE), the Health and Safety Laboratory made measurements during the firing of full-bore rifles to assess the benefits of selected moderators. Three models of moderator were tested on full-bore rifles, identified as A, B, and C, and a measurement was made on a .22 rimfire with a fourth moderator, model D. Descriptions of each moderator are given in Appendix A.

Only a limited range of moderators were selected for testing, as the intention was not to validate all the devices available but to ensure a suitable moderator effective with the range of rifles was found. Measurements were made of the noise at the ear, both under and outside the muffs, the noise heard by a dog to the side of the man firing, and the noise heard by the quarry. The relative recoil with and without the moderator was measured with accelerometers fitted to the stock during firing.

2 MEASUREMENT METHOD

2.1 ON SITE RECORDINGS

Firing took place from a raised area, located part way up the side of a sheltered wooded valley that formed the firearms testing area. The raised area consisted of a mound of loose earth with a rough concreted area at the top. Carpet was placed over the concrete during the measurements to give some cushioning to the men firing. The weather was cool, with little wind. Eight professional forestry rangers provided and fired the rifles, five shots with the moderator fitted and five without. They each fired from the right shoulder, in a prone position and wore the earmuffs they normally wear when using rifles. These earmuffs were of a variety of types and ages.

2.1.1 Noise recordings

The noise outside the muffs was recorded with microphones held by the side of the head as shown in Figure 1. The noise under their muffs was recorded with miniature microphones fixed at the ear canal entrance as shown in Figure 2. Noise recordings were also made with tripod mounted microphones 2m to the side of the firing position and at a position 23m in front to assess the noise exposure of a dog and the noise heard by the quarry.



Figure 1 Measurements either side of the ranger's head



Figure 2 Miniature microphone on the ear for measurements under the muffs

The microphones and accessories used are listed below.

By the side of the ranger's head and 2m to the side at the position of a dog:

- Brüel & Kjær 4136 ¼ inch microphones with gooseneck extensions and windshields,
- Brüel & Kjær 2619 preamplifiers
- Brüel & Kjær 2804 microphone power supplies.

Under the ranger's muffs:

- Knowles CA 2832 miniature microphones powered from Brüel & Kjær 2804 microphone power supplies

23m in front of the firing position:

- Brüel & Kjær 4134 ½ inch microphone with gooseneck extension and windshield,
- Brüel & Kjær 2619 preamplifier
- Brüel & Kjær 2804 microphone power supply.

The outputs from the microphone power supplies were taken to two TEAC RD135T DAT recorders. These were set to 4-channel operation and double tape speed to allow recording up to 20kHz. A calibration was recorded for each microphone at the beginning and end of each day with a Brüel & Kjær 4226 sound calibrator set to provide a 1kHz, 114dB calibration tone.

2.1.2 Recoil recordings



Figure 3 Accelerometers fitted on stock

The acceleration associated with the recoil was recorded using two accelerometers fixed firmly to the end of the stock. The primary measurement was in the direction of fire; a second measurement was also made in a perpendicular direction. On the first day this was horizontally across the main axis of the rifle to record the sideways movement; on the second day the vertical direction was chosen.

The force of the recoil is dependent on both the acceleration and the mass of the rifle. The weight of each rifle was noted with and without the moderator fitted.

The recoil instrumentation is listed below:

- Brüel & Kjær 4393 accelerometers
- Brüel & Kjær 2635 charge amplifiers

The acceleration was recorded on the DAT recorders simultaneously with the noise. In addition a calibration for each accelerometer was recorded at the start and end of each day with a Brüel & Kjær 4294 vibration calibrator giving a 160Hz signal, with an r.m.s. acceleration of 10ms^{-2} .

3 ANALYSIS OF THE RECORDINGS

Noise measurements were analysed by replaying the recordings through a Brüel & Kjær 2260 sound analyser.

3.1 PEAK SOUND PRESSURE

High peak sound pressures are hazardous to the ear. The Noise at Work Regulations aim to reduce the peak sound pressure at the ear to no more than 140dB. The Physical Agents (Noise) Directive sets a limit at this level and also requires hearing protection to be worn at peak levels above 137dB(C). The use of the C-weighting excludes frequencies outside the audible range.

The maximum C-weighted peak level in each series of five shots is reported here.

Above 126dB the miniature microphones under the muffs only measure positive sound pressures. Above 126dB the under muff results may be underestimated by up to 1dB because of this limitation. Below 126dB the microphones measure the full positive and negative pressure variations in the sound.

3.2 SOUND EXPOSURE LEVEL (SEL)

There is also a requirement to control the daily noise exposure arising from the number of shots fired in a day. The Noise at Work Regulations sets a first daily noise exposure ($L_{EP,d}$) action level of 85dB(A), and a second action level at 90dB(A). The Physical Agents Directive has action levels at an $L_{EP,d}$ of 80 and 85dB(A) and a limit at 87dB(A). Measurements are A-weighted to simulate the susceptibility of the ear to the frequency of the sound.

The sound exposure level (SEL) is the equivalent steady level over one second. It gives a measure of the total noise in a shot. The mean SEL of one shot in each five shot series is reported here. The $L_{EP,d}$ is calculated from the SEL using the following procedure.

$$L_{EP,d} = SEL + 10(\log N) - 44.6 \text{ dB(A)}$$

where N is the number of shots fired in a day.

SEL measurements were not possible under the muffs if the peak level exceeded 126dB due to the absence of the full negative pressure variations.

3.3 MEASUREMENTS FOR ESTIMATION OF HEARING PROTECTOR ATTENUATION

Hearing protector attenuation is frequency dependent. The difference in the C and A-weighted maximum sound pressure level measured with a Fast time constant ($L_{C, \text{fast max}} - L_{A, \text{fast max}}$) is used to estimate the frequency content of gunfire. According to EN 458:1993 the protector M-value is the predicted attenuation if the $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ value is less than 5dB. A revision of EN 458 due for publication in 2004 gives the M value minus 5dB as the predicted attenuation during gunfire.

A and C-weighted r.m.s. maximum levels recorded outside the muffs of the ranger firing were measured and the mean $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ result of each five shot sequence is reported.

3.4 RECOIL RECORDINGS

There is no recognised standard test for assessing the effect of recoil, so measurements have been based on the frequency range between 0.4Hz and 100Hz which is the range defined by ISO 2631-1:1993 for assessing exposure of the whole body to vibration or shock. The acceleration due to the recoil was measured by replaying the recorded signal from the accelerometers on the stock through a Larson Davis HVM 100 vibration meter. The measurements were band limited to the required frequency range but no additional frequency weighting was applied.

Both the maximum peak and maximum r.m.s. acceleration, obtained with a 1 second exponential time constant, were measured. The peak gives the highest instantaneous acceleration, the r.m.s. exponential time average maximum is dependent on both the level and duration.

4 RESULTS

Numbers and letters together with a brief description in the tables identify the moderators, firearms, and hearing protectors in these results. The names have been removed to avoid promotion of any particular device.

4.1 BY HEAD OF THE RANGER FIRING

Table 1 gives the sound levels measured by the side of the head and outside the muffs of the ranger firing.

4.1.1 Peak sound pressure levels

The measured peak level on the right was higher than on the left. Without a moderator all full-bore rifles gave peak levels in excess of 150dB on the right side of the head. The smaller .22 rimfire gave a peak level of 131dB without a moderator.

Moderator A reduced the peak level of full-bore rifles to below 137dB(C), giving a reduction in peak level of between 18 and 27dB. Moderators B and C gave no more than an 8dB reduction in peak level.

4.1.2 Sound exposure level (SEL)

Without a moderator the full-bore rifles gave an SEL between 118 and 124.5dB by the right ear. With Moderator A the SEL was 100.5 to 105.5dB(A). An SEL of 105.5dB(A) corresponds to a daily exposure ($L_{EP,d}$) of 85dB(A) after 257 shots and an $L_{EP,d}$ of 80dB(A) after 81 shots.

Without a moderator the .22 rimfire rifle gave a sound exposure level (SEL) of 91dB(A) at the right ear. 7,000 shots would have to be fired in a day to reach a daily exposure ($L_{EP,d}$) of 85dB(A) at the unprotected ear.

4.1.3 $L_{C, \text{fast max}} - L_{A, \text{fast max}}$

High $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ values indicate low frequencies dominate the sound, low values indicate high frequencies dominate the sound. More high frequencies were heard in the shot when the moderator was fitted and low $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ values reported for the measurements at a distance confirm this. By the head of the ranger there is a large spread in the $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ values which suggest that when the moderator is used sounds from recoil and movement are adding to the measured sound as they are no longer masked by the shot.

4.2 UNDER THE MUFFS OF THE RANGER FIRING

Table 2 gives the results under the muffs of the person firing. Without the use of a moderator peak levels under the muffs sometimes exceed 140dB(C). Peak levels are consistently below 140dB(C) when any of the moderators are used. Table 3 gives the mean and range of the muff attenuation measured for each shot together with the muff M-value.

When a moderator is used the recorded attenuation of the muffs worn by the man firing has reduced. In the case of rifle number 7 the peak level under the muffs has even exceeded the peak level measured outside (shown by negative attenuation values in Table 3). Viewing of the waveform recorded under the muff cups shows frequencies below 50Hz are often dominating when the moderator is used. These low frequencies are due to movement of the muffs with the

recoil, rather than the direct sound of the shot. This movement is also present when no moderator is fitted, but in this case the sound of the gunshot dominates. Analysis of the waveform under the muffs during the firing of rifle number 7 has also picked out a possible low frequency impact on the muffs, immediately following one shot.

4.3 AT A DISTANCE FROM THE RANGER FIRING

Table 4 gives the results for the recordings made 2m to the side and 23m forward of the person firing. Without a moderator peak levels 2m to the side are between 152 to 157dB(C). With moderator A these fell below 134dB(C), with reductions in the peak level of 26 to 29.5dB. Moderator A reduced the A-weighted SEL by between 18 and 22dB.

Moderators B and C were less effective. They reduced the peak sound pressure by 12 and 10dB respectively 2m to the side and gave a reduction of around 10dB in the A-weighted SEL.

The moderators both at 2m and 23m distance reduced the $L_{C, \text{fast max}} - L_{A, \text{fast max}}$ values. This confirms the moderators are removing the low frequencies from the sound.

23m in front of the firing point there was little or no reduction in the peak sound level from the full-bore rifles when a moderator was used and no more than a 5dB reduction in the A-weighted SEL.

Moderator D gave a 24dB reduction in the peak level 2m from the ranger firing when used with the .22 rimfire rifle, and a 13dB reduction 23m in front of the firing point.

4.4 RECOIL

Table 5 gives the recoil results in the direction of fire. These include the weight of the firearm, the mean acceleration for the five shots, and a force reduction ratio consisting of the weight times the acceleration with the moderator to the weight times acceleration without. The results show that the recoil is reduced by 20 to 30% when the moderator is used. It should be noted that the actual force could not be calculated because the mass acting with the acceleration is only proportional to the recorded weight.

Table 6 gives the mean acceleration measured in the directions perpendicular to the direction of fire. The force associated with the acceleration in these directions is thought to be proportional to a much lower mass than in the direction of fire, so the measured acceleration is of less significance to the actual recoil force.

5 DISCUSSION

5.1 CAN HEARING PROTECTION ALONE PROVIDE ADEQUATE PROTECTION?

When no moderator is used muffs have sometimes proved inadequate against the peak levels from full-bore rifles. Peak sound pressures at the ear have exceeded 140dB(C). Most muffs gave considerably less protection than the M-value estimate, especially when the moderator was used. This suggests the attenuation is limited by noise produced under the muffs, due to movement of the muffs and impacts on the cups as the firearm recoils.

5.2 IS HEARING PROTECTION REQUIRED WHEN A MODERATOR IS USED?

Hearing protection was required when any of the full-bore rifles were fired without a moderator. Only the .22 rimfire rifle was quiet enough to be used without hearing protection.

With moderator A full-bore rifles could be fired without hearing protection. Moderator A reduced the peak sound pressure levels to below 137dB(C), while hearing protection is required by the Noise at Work Regulations when the peak level exceeds 140dB. Also with moderator A the worse case daily noise exposure ($L_{EP,d}$) would only exceed 85dB(A) if more than 250 shots were fired in one day.

When the Physical Agents (Noise) Directive replaces the Noise at Work Regulations hearing protection will be required when the peak level at the ear exceeds 137dB(C). This value is close to the highest peak level measured with moderator A. There may therefore be a benefit in maintaining the use of some lightweight hearing protection in combination with firearm moderators. Also no measurements have yet been made to determine whether the moderator efficiency reduces with age, so some precautions are advisable.

Someone in the vicinity of the person firing would not need hearing protection under the current Noise at Work Regulations or the Physical Agents (Noise) Directive if moderator A were used as the peak noise level 2m to the side was reduced below 134dB(C).

Moderators B and C did not give sufficient reduction in the peak sound pressure to allow full-bore rifles to be used without hearing protection.

5.3 NOISE EXPOSURE OF A DOG

Peak levels 2m to the side of the ranger firing are between 151 and 157dB for full-bore rifles without a moderator. With moderator A the peak levels were below 134dB(C) and the SEL was reduced by 18 to 22dB. Assuming the frequency weighting for human hearing may be applied to dogs the results show this moderator would considerably reduce the noise exposure of a nearby dog.

The peak level remained above 140dB when moderators B and C were used and the SEL was reduced by just 10dB. These moderators would provide less protection for a dog.

5.4 DISTURBANCE OF THE QUARRY

Moderators on full-bore rifles gave no reduction in the peak sound level 23m in front of the firing point and only a reduction between 2.5 and 5dB(A) in the SEL. At this distance the flight

noise of the supersonic ammunition dominates over the gunfire both with and without a moderator.

It is difficult to predict whether the quarry will be less disturbed when a moderator is used as the sound heard is not significantly quieter. The sound from the bullet flight, without the sound of the gunfire may be more difficult to locate. With the moderator the sound contains less low frequencies and this may also alter how the quarry reacts to the sound.

There is a reduction in the gunfire noise at a distance in front of the rifle when subsonic ammunition is used. When moderator D was used with the .22 rimfire, there was a 13dB reduction in the peak and a 16dB in the SEL 23m in front of the firing point. This will be heard as a quieter sound by the quarry.

5.5 MODERATOR EFFECTS ON RECOIL

The peak level of the recoil reduces by 20% when both the moderators A and B are used, and the r.m.s. maximum reduces by 30%. Moderator C gave a 30% reduction in both the peak and rms maximum recoil force.

The acceleration in perpendicular directions has not been added to the recoil assessment because it is assumed this is rotational and associated with significantly less mass than the acceleration in the line of fire.

6 CONCLUSIONS

- Without the use of a moderator hearing protectors are required when firing full-bore rifles. Of the rifles tested only a .22 rimfire could be fired without hearing protectors. Hearing protectors which were predicted to provide adequate protection according to standardised methods, did not always reduce the peak exposure below 200Pa (140dB). Muff movement during firing frequently caused low frequency sound under the muffs and in addition at least one impact on the muff cups was recorded during recoil.
- With moderator A the peak level from full-bore rifles reached a maximum of 136.5dB(C) by the head of the ranger firing. The overall noise level was such that over 250 shots could be fired before the $L_{EP,d}$ exceeded 85dB(A). Under the Noise at Work Regulations hearing protection should to be provided, when the number of shots fired in a day exceeds 250.
- Hearing protection will be required at peak levels of 137dB(C) with the enactment of the Physical Agents Directive. Also whether moderator efficiency changes with age and use is unknown. The use of some lightweight hearing protection in conjunction with moderator A is therefore recommended.
- Moderators B and C did not provide sufficient reduction of the noise when fitted to full-bore rifles to permit use without hearing protection. The performance of different models of moderator is clearly variable. To comply with the Noise at Work Regulations there is a duty to reduce as far as is reasonably practicable the noise exposure of an employee; the more efficient moderators should therefore be preferred.
- Moderator A reduced the peak level by 26 to 29.5dB at the side of the man firing, and the sound exposure level (SEL) by 18 to 22dB. This moderator gives significant protection for a dog or another person in the vicinity. The reduction in level is sufficient to remove the need for a person nearby to wear hearing protection.
- Moderators gave no reduction in noise that arises from the bullet flight when it travels over the speed of sound. There is therefore little reduction in the peak level forward of the firing point.
- With subsonic ammunition moderator D reduced the peak and SEL of the noise forward of the firing point by 13 and 16dB respectively.
- Moderators A, B and C all gave a 20 to 30% reduction in the recoil of full-bore rifles.

7 REFERENCES

The Noise at Work Regulations 1989 Statutory Instrument 1989 No 1790 – Health and Safety

Health and Safety Executive Reducing noise at work – Guidance on the Noise at Work Regulations 1989

Directive 2003/10/EC of the European Parliament and of the Council 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise).

International Organisation for Standardisation ISO 2631-1:1985 Evaluation of human exposure to whole-body vibration

Pääkkönen and Kyttälä (1999) Report of Finnish Sound Suppressor Trials
www.guns.connect.fi/rs/trial1999.html

TABLES

Table 1 Sound levels measured by the side of the head during firing

Rifle no., calibre, ammunition and moderator	Maximum peak dB(C)		Mean SEL dB(A)		$L_{C, \text{fast max}} - L_{A, \text{fast max}}$ dB	
	Left	Right	Left	Right	Left	Right
Rifle # 1, .243, 100 grain						
Without moderator	149.5	155	114	120	3	1
With moderator A	128.5	131.5	99	100.5	-0.5	-1
Rifle # 2, .25-06, 90 grain						
Without moderator	153.5	155	118	121	3.5	2.5
With moderator A	135.5	136.5	102	105.5	9	-1
Rifle # 3, 6.5 x 55, 156 grain						
Without moderator	151	See	115.5	See	2.5	See note
With moderator A	130	note 1	99	note 1	7.5	1
Rifle # 4, .270, 130 grain						
Without moderator	150	153.5	115	119.5	1.5	4
With moderator A	130.5	131	99.5	101	1	1
Rifle # 5, .270, 150 grain						
Without moderator	153	154.5	119	121.5	3	1
With moderator A	135.5	135	101	103	0	-1
Rifle # 6, .308, 123 grain						
Without moderator	150	153	114	118.5	0.5	1.5
With moderator A	129.5	133	97	100.5	3	0.5
Rifle # 7, .308, 123 grain						
Without moderator	See	158	See	122	See note	1.5
With moderator A	note 2	130.5	note 2	100.5	2	2
Rifle # 8, .22 rimfire, 117 grain low velocity						
Without moderator	See	130.5	See	91	See note	11.5
With moderator D	note 2	127.5	note 2	84.5	2	21.5
Rifle # 9, .25-06, 117 grain						
Without moderator	156	159	122.5	124.5	2	2
With moderator B	151	153	116.5	118.5	1	0.5
Rifle # 10, .270, 130 grain T-mantle						
Without moderator	148	152.5	113.5	118	4	5.5
With moderator C	140	149	103	106	4.5	11

Note 1 Recorded levels were thought to be too low to be correct when compared with measurements in other positions.

Note 2 The microphone showed a drop in sensitivity of 9.6dB when recalibrated at the end of the second day's measurements. The results for these last two rifles tested before calibration have not been reported as the measured level appears effected by the changing sensitivity.

Table 2 Sound levels measured under muffs during firing

Muff, volume, and type	Rifle no., calibre, ammunition and moderator	Maximum peak sound pressure dB(C)		Mean SEL dB(A)	
		Left	Right	Left	Right
Muff N, small volume, passive	Rifle # 1, .243, 100 grain				
	Without moderator	142	146		
	With moderator A	121	122.5	82	82.5
Muff T, small volume, sound restoration	Rifle # 2, .25-06, 90 grain				
	Without moderator	See note 2	141	See note 2	
	With moderator A		122.4		84.5
Muff O, small volume, sound restoration	Rifle # 3, 6.5 x 55, 156 grain				
	Without moderator	138.5	142.5		
	With moderator A	119.5	124	87.5	87.5
Muff P, large volume, passive	Rifle # 4, .270, 130 grain				
	Without moderator	137.5	136.5		
	With moderator A	113	126	72.5	75
Muff N, small volume, passive	Rifle # 5, .270, 150 grain				
	Without moderator	143	139		
	With moderator A	125.5	122	90.5	91.5
Muff P, large volume, passive	Rifle # 6, .308, 123 grain				
	Without moderator	134	131.5		
	With moderator A	118.5	119.5	71	71.5
Muff Q, large volume passive	Rifle # 7, .308, 123 grain				
	Without moderator	139	142		
	With moderator A	123.5	134	-	-
Muff T, small volume, sound restoration in passive mode	Rifle # 8, .22 rimfire, 117 grain low velocity				
	Without moderator	110	117.5	73.5	81.5
	With moderator D	102.5	113.5	66	81.5
Muff S, large volume, passive	Rifle # 9, .25-06, 117 grain				
	Without moderator	137	140.5		
	With moderator B	129	131.5	-	-
Muff R, large volume, passive	Rifle # 10, .270, 130 grain T-mantle				
	Without moderator	135	138		
	With moderator C	127	132.5	-	-

Note 1 Rms values are not quoted where clipping of the microphone signal occurred.

Note 2 The measured peak levels exceeded 140dB when the moderator was fitted. These peak levels are higher than those measured outside the muffs. It is probable the microphone in the left ear was displaced throughout the measurements with the firearm 2.

Table 3 Muff peak attenuation

The mean peak attenuation is shown with the range in parenthesis.

Rifle no., calibre, ammunition and moderator	Peak attenuation dB		Muff M value dB	Muff, volume, and type
	Left	Right		
Rifle # 1, .243, 100 grain Without moderator With moderator A	7.5 (6, 9) 8 (5, 12)	8.5 (7, 9) 10 (9, 10)	Not available	Muff N, small volume, passive
Rifle # 2, .25-06, 90 grain Without moderator With moderator A	- -	14 (12.5, 16) 13.5 (12, 15)	28	Muff T, small volume, sound restoration
Rifle # 3, 6.5 x 55, 156 grain Without moderator With moderator A	12.5 (11, 14) 9.5 (8, 11.5)	- -	22	Muff O, small volume, sound restoration
Rifle # 4, .270, 130 grain Without moderator With moderator A	12.5 (11, 14) 9.5 (8, 11.5)	16.5 (15, 17) 9.5 (4.5, 16)	28	Muff P, large volume, passive
Rifle # 5, .270, 150 grain Without moderator With moderator A	10 (9.5, 11.5) 9 (6.5, 11)	16 (15.5, 16.5) 14 (9, 17)	Not available	Muff N, small volume, passive
Rifle # 6, .308, 123 grain Without moderator With moderator A	15.5 (14.5, 16.5) 11.5 (9.5, 15)	21 (21, 22) 16.5 (14, 21)	28	Muff P, large volume, passive
Rifle # 7, .308, 123 grain Without moderator With moderator A	- -	16 (15, 18) -4 (-7, -2.5)	28	Muff Q, large volume passive
Rifle # 8, .22 rimfire, 117 grain low velocity Without moderator With moderator D	- -	13 14	28	Muff T, small volume, sound restoration in passive mode
Rifle # 9, .25-06, 117 grain Without moderator With moderator B	19 (18.5, 20) 22.5 (21, 23.5)	18.5 (17, 20) 21 (20.5, 21)	27	Muff S, large volume, passive
Rifle # 10, .270, 130 grain T- mantle Without moderator With moderator C	13 (12.5, 14) 13 (6, 17)	15 (14.5, 15.5) 11.5 (6, 18.5)	31	Muff R, large volume, passive

Table 4 Sound levels 2m to side and 23m in front of ranger firing

Rifle no., calibre, ammunition and moderator	2m to side			23m in front		
	Max peak dB(C)	SEL dB(A)	$L_{C, \text{fast max}} - L_{A, \text{fast max}}$ dB	Max peak dB(C)	SEL dB(A)	$L_{C, \text{fast max}} - L_{A, \text{fast max}}$ dB
Rifle # 1, .243, 100 grain						
Without moderator	154.5	117	1	142.5	108.5	2
With moderator A	125.5	95	-1	142.5	103.5	-1.5
Rifle # 2, .25-06, 90 grain						
Without moderator	157	119.5	2	145	110	3.5
With moderator A	133.5	101	-0.5	143.5	105	-1.5
Rifle # 3 6.5 x 55, 156 grain						
Without moderator	154.5	116.5	1	143.5	108.5	2.5
With moderator A	128.5	97.5	-1	143	105	-1.5
Rifle # 4, .270, 130 grain						
Without moderator	153.5	116	1.5	145	110	4.5
With moderator A	129	98.5	-1	145	105.5	-1
Rifle # 5, .270, 150 grain						
Without moderator	153.5	116.5	1.5	See note 1	See note 1	See note 1
With moderator A	129.5	97.5	-1.5			
Rifle # 6, .308, 123 grain						
Without moderator	151.5	114	1.5	147	110	3
With moderator A	126	94.5	-1	147	107	-0.5
Rifle # 7, .308, 123 grain						
Without moderator	153	116.5	1	146.5	109.5	3
With moderator A	124.5	95.5	-1.5	146.5	107	-0.5
Rifle # 8, .22 rimfire, 117 grain low velocity						
Without moderator	133	91.5	-1.5	131.5	96	-1.5
With moderator D	109	Too low	Too low	118.5	79.5	-1
Rifle # 9, .25-06, 117 grain						
Without moderator	153.5	116	1.5	See note 1	See note 1	See note 1
With moderator B	141.5	106.5	0			
Rifle # 10, .270, 130 grain T-mantle						
Without moderator	152.5	116	1	145.5	110	4
With moderator C	143	106	-1	145.5	106	-0.5

Note 1: The signal from the microphone 23m in front was lost on the first day during firing of the last two rifles, numbers 9 and 5.

Note 2 The rms sound pressure levels 2m from the firing point are not recorded for the Bruno fitted with the moderator as the noise from movement and rapid reloading masked the sound of the shot.

Table 5 Weight, acceleration, and relative recoil reduction with the moderator

Rifle no., calibre, ammunition and moderator	Weight kg	Peak ms⁻²	Relative recoil	r.m.s. max ms⁻² (1s time constant)	Relative recoil
Rifle # 1, .243, 100 grain Without moderator With moderator A	4 4.7	590 390	0.8	33 20	0.7
Rifle # 2, .25-06, 90 grain Without moderator With moderator A	4 4.5	680 420	0.7	38 21	0.6
Rifle # 3 6.5 x 55, 156 grain Without moderator With moderator A	5.5 6	580 470	0.9	32 22	0.8
Rifle # 4, .270, 130 grain Without moderator With moderator A	4.5 5	overload 560		overload 33	
Rifle # 5, .270, 150 grain Without moderator With moderator A	4.5 5	760 550	0.8	45 28	0.7
Rifle # 6, .308, 123 grain Without moderator With moderator A	5 5.5	580 420	0.8	32 21	0.7
Rifle # 7, .308, 123 grain Without moderator With moderator A	5.8 6.3	380 370	1.1	23 16	0.8
Rifle # 8, .22 rimfire, 117 grain low velocity Without moderator With moderator D	4 4	Recoil indistinguishable from movement between shots			
Rifle # 9, .25-06, 117 grain Without moderator With moderator B	5.5 6	530 380	0.8	30 19	0.7
Rifle # 10, .270, 130 grain T- mantle Without moderator With moderator C	4.8 5.3	720 470	0.7	42 26	0.7

Table 6 Acceleration perpendicular to direction of fire

Horizontal sideways motion

Rifle no., calibre, ammunition and moderator	Peak ms⁻²	r.m.s. max ms⁻² (1s time constant)
1 .243 100 grain		
Without moderator	94	7.4
With moderator A	59	4.1
2 .25-06 90 grain		
Without moderator	65	7.0
With moderator A	110	18
3 6.5 x 55 156 grain		
Without moderator	40	5.5
With moderator A	28	4.2
5 .270 150 grain		
Without moderator	64	7.5
With moderator A	38	5.9
9 .25-06 117 grain		
Without moderator	58	6.0
With moderator B	29	4.9

Vertical motion

4 .270 130 grain		
Without moderator	120	10
With moderator A	120	5.8
6 .308 123 grain		
Without moderator	140	4.2
With moderator A	93	2.9
7 .308 123 grain		
Without moderator	170	2.9
With moderator A	120	2.6
8 .22 rimfire 117 grain low velocity	Recoil indistinguishable from movement between shots	
Without moderator		
With moderator D		
10 270 130 grain T-mantle		
Without moderator	180	14
With moderator C	150	9.2

APPENDIX A MODERATOR DESCRIPTION

Moderator A - A sealed unit comprising a cylindrical steel sleeve containing an expansion chamber and a series of baffles. The expansion chamber is sleeved over the barrel and secured at 2 points; on a threaded area at the end of the muzzle and on bushing at the rear of the unit. The baffles extend slightly beyond the end of the muzzle.

Moderator B - A sealed steel cylinder containing a series of baffles. The unit is secured to a threaded area at the end of the muzzle and extends beyond the end of the muzzle.

Moderator C - A sectional unit comprising a cylindrical steel sleeve containing an expansion chamber and a series of baffles. The expansion chamber is sleeved over the barrel and secured at 2 points; on a threaded area at the end of the muzzle and on bushing at the rear of the unit. The baffles extend slightly beyond the end of the muzzle.

Moderator D - A .22 rimfire moderator comprising a sealed steel cylinder containing a series of baffles. The unit is secured to a threaded area at the end of the muzzle and extends beyond the end of the muzzle.