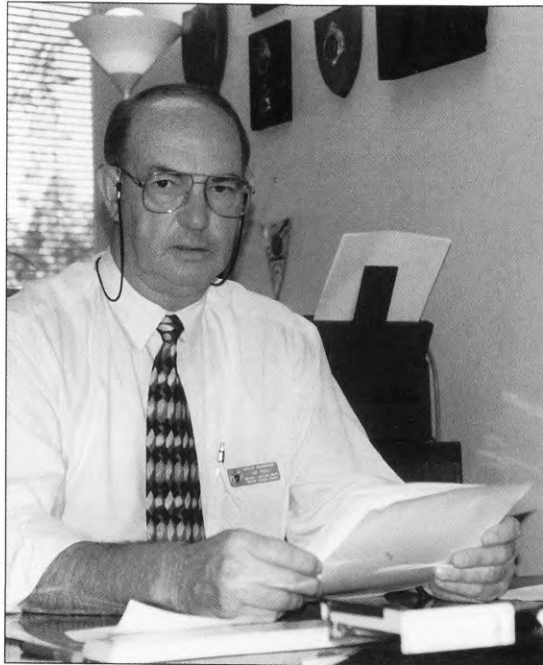


Police forensics at its very best

Daniel Cotterill looks at the stringent requirements in obtaining and presenting forensic evidence in the firearms and ballistics areas of police work and at some of the achievements of the Director of the AFP's Firearms and Ballistics, Forensic Services, Federal Agent Ian Prior. This article was first published in the May/June edition of Guns Australia magazine. Daniel Cotterill is a freelance writer and keen sporting shooter from Canberra. Reprinted with permission.



Daniel Cotterill

Federal Agent Prior

The image of law abiding shooters suffers every time a criminal uses a gun. As an honest shooter, I am happy to see criminals who use firearms brought to justice. Central to the task of catching and convicting an armed criminal are the skills of a forensic ballistics expert.

Federal Agent Ian ("Herb") Prior is the Director of Firearms and Ballistics, Forensic Services for the Australian Federal Police. Federal Agent Prior's opinion, given as evidence in court, has helped to lock many criminals away where they belong.

For a ballistics expert's opinion to be accepted in court the expert must have plenty of experience and standing. Federal Agent Prior has 21 years experience in forensic ballistics and in 1992 was awarded an Australia Day Medallion for long and dedicated services to the forensic

sciences. He is a member of the Association of Firearms and Tool Mark Examiners.

Some of Ian Prior's 21 years in ballistics have been spent travelling to inspect, first-hand, major arms and ammunition production facilities in the world. A feat that he says gives him a good idea what to expect from the firearms of various manufacturers.

"Herb" Prior knows his stuff and commands respect from his peers.

Not surprisingly, Federal Agent Prior operates from a world class forensic laboratory which is well supplied with state-of-the-art equipment. There is a reference library bulging with books and manufacturers' glossies, and an ammunition library crammed with cartridges of every conceivable type. One room houses a test-firing bench, a chronograph and an enormous water tank used to recover test projectiles. Another room houses the comparison microscopes and a computer loaded with ballistics software. It is from this room that the first leads in an investigation often come.

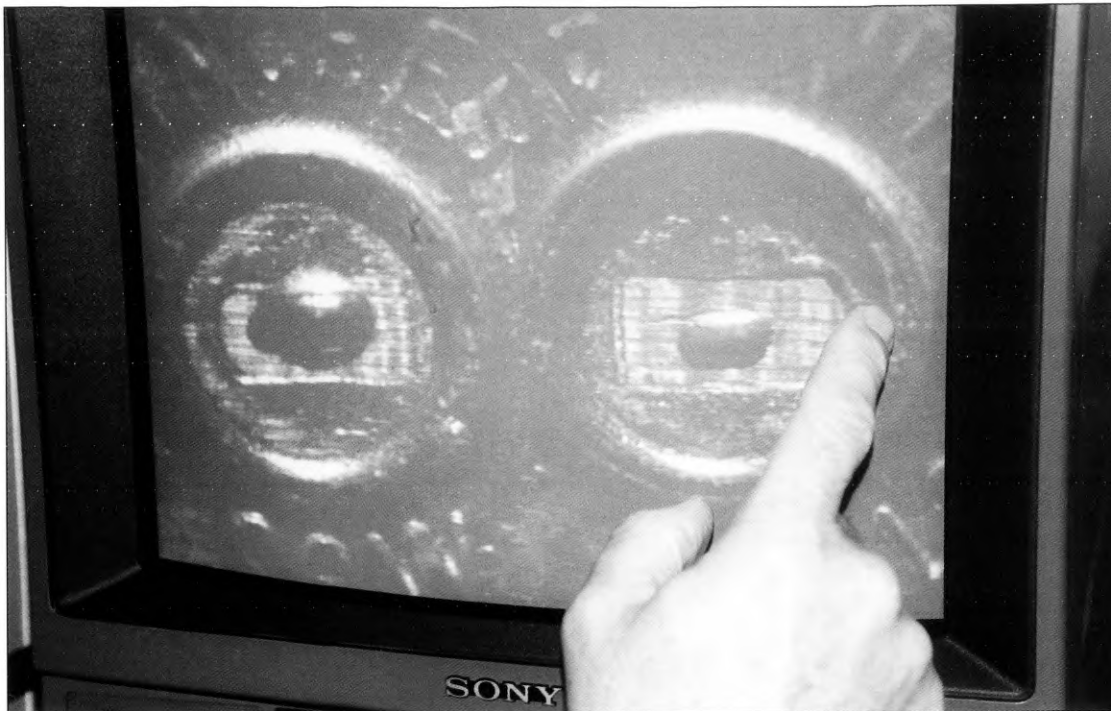
The comparison microscope is used to examine spent cartridge cases recovered from the crime scene or, all too often, a projectile recovered from the victim at a post mortem. High power magnification will make several characteristics clearly visible to the examining expert. A cartridge case will show the shape of the firing pin and the distance it protrudes. Extractor and ejector marks are usually visible and these can tell the expert many things about the weapon used to fire it. A projectile, if in good condition, may display the number, depth and width of the rifling marks.

A modern comparison microscope has an enlarged colour display monitor which allows for precise measurement of the above characteristics. Armed with this information the expert will consult an FBI computer database called General Rifling Characteristics. After feeding in the information gained from microscopic examination of the crime sample, the expert waits a few moments until the computer program suggests which firearm, or family of firearms, the projectile has come from. Then it's off to the firearms library for test weapons.



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Above and below: The first leads in an investigation often come from the room that houses equipment such as the comparison microscope. High power magnification will make several characteristics clearly visible to the examining expert.



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Did I forget to mention the firearms library? The AFP has a collection of around 3300 rifles, pistols and shotguns for test firing. Every imaginable type of firearm is securely stored away against the day someone commits a crime with a similar weapon.

Test firing followed by examination of the test-sample allows the expert to deduce what type of weapon was used in the crime. Sometimes as soon as

one hour after the crime sample is examined investigating detectives can be told with certainty the type of gun they are looking for.

The process seems straightforward, but don't get the wrong impression – there are no easy answers found in ballistics. Quick identification of a crime weapon is a useful tool for investigating police, but is not the sort of work which can be presented as



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Federal Agent Prior at the water tank used to recover test projectiles.

evidence in court. The degree of precision required for such evidence means that many long hours are spent measuring and checking, then re-measuring and re-checking. Nothing is left to chance.

If the crime weapon is recovered, a detailed test-firing program is undertaken with the same type of ammunition used by the criminal. This important detail of correct ammunition can become time consuming in itself as not all criminals use factory made cartridges. The AFP has an impressive array of hand-loading equipment to enable them to reproduce any handmade ammunition they may come across. A number of test rounds will be fired with each test sample carefully measured, examined, and compared to the crime sample. This information is collated and averages taken to ensure accuracy.

It is on such comprehensive and carefully gathered data that a forensic ballistics expert bases his opinion to be given as evidence. According to Federal Agent Prior it is simply "the validation of approved methodology". Approved methodology demands the utmost care be taken in the collection, storage and examination of evidence. Even the position of a spent cartridge case at the crime scene can sometimes reveal much to investigators.

After examining the scene of a multiple murder in the 1980's, Prior was able to track the killer's movements through the house in which several people died. A piece of the extractor broke away on the weapon used by the murderer when he was only half way through his foul

deed. With reference to marks on the spent cartridge cases, and their position in the house when found, Prior was able to tell the investigating detectives the order in which the victims met their fate and the position of the killer at that time.

Even if the crime weapon is not recovered a significant amount of work can still be done – especially if the history of the suspect weapon is known and previous owners can be contacted. One such case recently in which Federal Agent Prior was involved saw a man convicted and sentenced to life in jail for murder, without the murder weapon ever being recovered. Despite never finding it, Prior believes he knows the serial number of the murder weapon.

In that case, samples from the crime scene, and test samples from weapons in the AFP firearms library, clearly indicated the type of firearm involved. Federal Agent Prior and his staff began a laborious test-firing program of every example of that model weapon they could find. Examination of the test samples soon eliminated these firearms from the investigation. Their attention turned to those examples of the crime weapon they could not obtain for testing.

With information gleaned from other investigations, police drew up a short list of suspect weapons. The previous owners of these weapons took police to areas where they had been fired, and the police set about collecting samples of spent cases. This was an enormous undertaking, but one which proved fruitful.

Cartridge cases from one of these weapons

were found to be an exact match for those found at the crime scene. Investigation into the whereabouts of this particular weapon became intense, and police interviewed all previous owners. Eventually, a link was made between a suspect in the case and the purchase of the murder weapon. Ian Prior's evidence, validated by the FBI and Israeli Police, was instrumental in the conviction of this killer despite the weapon never being found.

Some are sceptical of the ballistics expert's ability to differentiate between projectiles or cartridge cases fired from identical weapons. The answer of course is that there are no two identical weapons. According to Federal Agent Prior, "It's like fingerprints . . . I don't think there is any firearms examiner in the world who has ever written a paper saying he's found two identical firearms".

Obvious differences between firearms emerge through careless cleaning procedures, wear, and component failures – but the real reason why no two weapons are identical lies in metallurgy. The steel used to make a firearm is a mixture of many elements. For the sake of a simple explanation, let's look at just two – carbon and silicon. From the time when a large metal ingot is first produced, to the time when smaller parts of the ingot are extruded into blanks of gun components, the distribution of carbon and silicon throughout the metal is not uniform.

When these blanks are machined the cutting tool will react differently to individual sections of the steel depending on its composition. A section of the steel that is high in carbon content may cause the cutting tool to "chatter", where a section high in silicon will allow the cutting tool an easier passage. The result of all this is that different tool marks are left on the steel at random depending on the metal's composition. Despite wear, these unique characteristics stay

with the barrel or mechanism for life.

Some criminals tamper with their guns after use in an effort to avoid detection. One man convicted of murdering his wife had cut the barrel of the murder weapon into short lengths, and claimed to have done so months before the killing. Police found the fragmented parts and passed them on to a forensic examiner. The firearms expert rigged up a universal chamber and test fired each barrel segment, and was then able to prove them to be part of the murder weapon. Federal Agent Prior was called upon to validate the expert's methodology and was clearly successful as the murderer was subsequently convicted.

As clever as some offenders are, Federal Agent Prior does not rate highly the firearm skills of most criminals saying, "Once a firearm has been taken into the hand of criminals, by one means or another, it's usually butchered".

There is a plaque in Herb Prior's office which offers insight into the man and his outlook. Illustrated on top of the plaque is a relaxed country gent walking along with a shotgun over his shoulder. The caption reads, "All times wasted wots not spent shootin". Given that Herb's days off are often spent trap shooting (he is an AA grader), and his insistence that he and his staff fire at least one different type of firearm, each and every day to maintain their expertise, it's fair to say that he has taken the expression to heart.

So when the next armed robbery or murder makes the news and the media start calling for more restrictions on honest, law-abiding shooters to prevent crime, rest assured, the police with their 'Prior' knowledge of firearms are making life hard for those who damage the sporting shooter's good name.

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Since the Port Arthur massacre on April 28 this year, Federal Agent Prior has been involved with the National Initiatives on Gun Control, providing advice to various authorities including the Commonwealth Law Enforcement Board, parliamentary back bench committees, the Defence Minister, Cabinet, and the Prime Minister.

He received a Commissioner's Certificate as 'Highly commended in recognition of his outstanding dedication in the preparation and presentation of scientific evidence resulting in the successful completion of a highly complex and protracted investigation into the murder of Assistant Commissioner Colin Winchester, code-named Operation Peat'.

He appeared for the prosecution in the successful trial of Ivan Milat 'The Back Packers Murders', and gave forensic ballistic evidence supporting and supplementary to the NSW Police forensic findings.

He attended the Association of Firearms and Tool Mark Examiners Training Seminar (AFTE) in Milwaukee, USA recently and presented the opening key-note paper titled 'Seven Hundred Rifles Test Fired – The Colin Winchester Homicide'. While at the seminar he was elected to the AFTE Standardisation Committee – the first foreign member to be elected to a committee position – which will overview the expert status certification program. It will review also the AFTE Training Manual, looking closely at minimum standard core training curriculum and remedial training, focussing on results of proficiency testing programs.