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Menace or Myth?

A closer look at the “cop-killer” 5.7 × 28 mm cartridge

N.R. Jenzen-Jones

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Cover image: A FN Herstal Five-seveN self-loading pistol and SS197SR cartridges (source: Bobbfwed/Wikimedia).

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Abbreviations & Acronyms

ACP	Automatic Colt Pistol (cartridges)
AP	Armour-piercing
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives (also 'BATFE')
BAFTE	Bureau of Alcohol, Tobacco, Firearms and Explosives (also 'ATF')
BORFIC	Border Patrol Field Intelligence Center
CBW	Controlled bonded warehouse
CRISAT	Collaborative Research into Small Arms Technology
EPR	Enhanced Performance Round
FN Herstal	Fabrique Nationale Herstal
FTB	Firearms Technology Branch
FMJ	Full metal jacket (AKA 'ball')
GMCS	Gilding metal-clad steel
HED	Hollywood Entertainment Detail
IBPO	International Brotherhood of Police Officers
JHP	Jacketed hollow-point
LAPD	Los Angeles Police Department
NOBLE	National Organization of Black Law Enforcement Executives
NIJ	National Institutes of Justice
NLETC	National Law Enforcement and Corrections Technology Center
NRA	National Rifle Association
OTM	Open-tip match
PDW	Personal defence weapon
PLEA Act	Protect Law Enforcement Armor Act
PTFE	Polytetrafluoroethylene (Teflon)
RN	Round-nose
SCHV	Small-calibre, high-velocity
UHMWPE	Ultra-high-molecular-weight polyethylene

Introduction

The 5.7 × 28 mm cartridge, originally designed and developed by Fabrique Nationale Herstal (FN Herstal) of Belgium for their P90 sub-machine gun and the later Five-seveN self-loading pistol, has been the subject of much controversy. This is particularly true in the United States, where the Five-seveN has been referred to as a ‘cop-killer’ gun. Much of this mythology is bound up in its ability to fire armour-piercing ammunition—the sale of which is restricted to law enforcement and military customers. On 22 November 2019, the Los Angeles Police Department (LAPD) Hollywood Entertainment Detail (HED) conducted a traffic stop and recovered a loaded firearm and narcotics. According to a statement from the LAPD Hollywood Division, the weapon was recovered “with armor piercing bullets” (LAPD HD, 2019). Accompanying the statement was an image showing what is presumably the seized weapon—identifiable as a Five-seveN pistol—next to a 5.7 × 28 mm cartridge that appears to have been removed from the weapon’s chamber or magazine. The distinctive Hornady V-Max projectile with blue polymer ballistic tip makes this readily identifiable as a SS197SR cartridge (see Ammunition Types, below). As we shall see, this round meets neither the practical nor the U.S. legal definition of armour-piercing ammunition. This misidentification and mischaracterisation of the Five-seveN and its ammunition has a long history.



Figure 1.1 The FN Herstal Five-seveN handgun and ammunition recovered by the LAPD Hollywood Entertainment Detail on 22 November 2019. The cartridges were inaccurately described as being “armor piercing” (source: LAPD HED).

The LAPD HED statement was just the latest in a long line of reports that overstate or misattribute the capabilities of certain 5.7 × 28 mm cartridges, or that misunderstand the weapons that fire these rounds—especially the Five-seveN. In late 2004 and early 2005, the pistol was the subject of considerable controversy in the United States after law enforcement raised the alarm to news media, concerned about the apparent armour-penetrating capability of the Five-seveN. News media reporting was generally not nuanced, speaking of “a new kind of handgun which can render a bulletproof vest useless” and describing the Five-seveN as “the most devastating weapon [police] face” (WNBC, 2005). Both of these statements are egregiously hyperbolic.

The concern seems to have originated with the seizure of a Five-seveN handgun by the Trumbull Police Department in Connecticut. A security alert (issued by the Border Patrol Field Intelligence Center; BORFIC) refers to the Trumbull seizure and states that SS192 ammunition penetrated a Level II vest in testing (BORFIC, 2004).¹ Concern from law enforcement was likely exacerbated by the manufacturer’s marketing. At the time of the initial controversy, FN Herstal was referring to the Five-seveN and 5.7 × 28 mm round as follows: “Five-seveN pistols and SS190 round team up to defeat the enemy ... Enemy personnel, even wearing body armor can be effectively engaged up to 200 meters. Kevlar helmets and vests as well as the CRISAT protection will be penetrated” (US Senate, 2005). The 5.7 × 28 mm cartridge was, after all, being marketed to law enforcement as a solution for engaging targets wearing body armour. Glenn Byrnes of the Trumbull Police summarised many officers’ thoughts in early 2005: “Certainly, handguns are a danger to any police officer on any day, but one that [is] specifically advertised by the company to be capable of defeating a ballistic vest is certainly [of] the utmost concern to us” (WNBC, 2005).

The fundamental misunderstanding of the capabilities of the Five-seveN was widespread. Bernard Thompson, director of the National Organization of Black Law Enforcement Executives (NOBLE) reportedly said “No one is safe from a weapon like this. Police body armor won’t offer protection if a criminal has this pistol” and Steve Lenkhart, legislative director of the International Brotherhood of Police Officers (IBPO), astonishingly called the Five-seveN “an assault rifle that fits in your pocket” (US Senate, 2005). An officer posting in the *Officer.com* police forums in January 2005 wrote “Any opinions from you guys on this weapon? My understanding [sic] is that it will penetrate any form of body armor out there, and it carries 20 rounds in a clip!” Others on the forum pushed back, however; “It CAN NOT penetrate all armor, that’s just a silly thing to say” (*Officer.com*, 2005)². In 2004, Sgt. Dave Douglas, the rangemaster of the San Diego Police Department, tried to clarify the important distinction between weapon and ammunition in an article for *POLICE Magazine*, writing about the cartridge: “The first thing you need to know is that it comes in two versions: one for law enforcement and the military, and one for civilians. SS190 is the designation for the LE-only rounds. SS192 is the designation for lead-core, non-armor-piercing civilian rounds” (Douglas, 2004).

¹ It is not clear what the source or nature of the testing was, but it was likely informal in nature.

² By way of highlighting the differences, a standard US Army M4A1 ‘assault rifle’ is capable of automatic fire, whereas the Five-seveN is restricted to semi-automatic fire; the M4A1 has an effective range of 500 metres or more, whilst the Five-seveN takes great skill to accurately shoot at 50 m; and the M4A1 is typically fed from a 30-round detachable box magazine, rather than a 20-round magazine. An M4A1 firing 5.56 × 45 mm M855 ball ammunition will achieve a V_0 of 2,970 fps (approximately 905 m/s; versus the 500–650 m/s of the Five-seveN). When firing M995 ‘Armor Piercing 3’ ammunition, muzzle velocity is increased to some 1,030 m/s and the M4A1 is capable of defeating NIJ Level III armour. Other 5.56 loadings have been known to defeat Level IV armour, and the now-standard-issue M855A1 cartridge has been shown to consistently defeat Level III plates (Hoffman, 2018; FN America, 2019; FN Herstal, 2019a; FNH USA, 2012; Nammo, 2014; US Army, 2010). It is important to make very clear the tremendous difference between the protective qualities of Level IIIA and lower ‘soft armours’ and Level III and—especially—Level IV armour plates.

On 20 January 2005, the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Firearms Technology Branch (FTB) issued a clarification of some of the technical issues surrounding the Five-sevenN pistol and its ammunition. FTB examined the SS196 cartridge and determined it was not considered armour-piercing under U.S. law. The statement also referenced FNH USA³ claims that SS192 ammunition did not penetrate National Institute of Justice (NIJ) Level IIIA vests during testing, and that SS196 did not penetrate Level II vests during testing. A summary of 5.7 cartridge types also indicated that SS195 was not considered to be armour-piercing. According to the ATF, FNH USA indicated in early 2005 that SS192 was no longer being imported for sale in the United States (ATF, 2005).

Shortly thereafter, FNH USA made a further statement seeking to clarify matters. They noted that a.) “The only ammunition available to the public are the cartridges defined by Bureau of Alcohol, Tobacco, Firearms & Explosives (BATFE) as suitable for sporting use” and b.) “All 5.7 x 28 restricted ammunition (armor piercing) is sold only to law enforcement and military agencies. This ammunition is only released and shipped from a U.S. Customs controlled custom bonded warehouse (CBW) upon BATFE and U.S. Customs approval” (FNH USA, 2005). The Brady Campaign’s 17 February 2005 media release appears to have popularised the ‘cop-killer’ label, which would go on to be used by a number of media organisations and law enforcement agencies (Brady Campaign, 2005). In the same year, two bills comprising the ‘Protect Law Enforcement Armor Act’ (PLEA Act), targeting the Five-sevenN and its ammunition were introduced in Congress. H.R. 1136 was introduced in the House of Representatives by Eliot Engel (D-NY). In the Senate, S. 527 was introduced by Frank Lautenberg (D-NJ). Neither bill proceeded to a vote, but politicians embraced the ‘cop killer’ descriptor (GovTrack, 2005a; 2005b).



Figure 1.2 Senator Charles Schumer (D-NY) holds a Five-SevenN handgun during a news conference announcing legislation he co-sponsored to ban the weapon, on 3 March 2005. Note the ‘Cop Killer’ poster in the background (source: Kevin Wolf/AP).

The ‘cop-killer’ moniker was nothing new, of course, and other developments have been misunderstood and sensationalised. Concerns about armour-piercing ammunition were voiced by law enforcement beginning in the late 1970s (ATF, 2015a). Perhaps most famous amongst munitions tarred with the ‘cop-killer’ label, at least in a U.S. law enforcement context, were the Teflon-coated bullets produced by KTW Inc. in the 1980s. Many reports erroneously focused on the Teflon coating⁴ on the projectile, claiming it increased armour penetration (Vizzard, 1995, p. 343). The KTW ammunition was in fact specifically identified by the ATF as being armour-piercing in nature, however this was not a result of the Teflon coating but rather the solid brass, tungsten, or steel construction (ATF, 1986, p. 2; Parsons, 1979)⁵. The inventor—himself a

³A subsidiary of FN Herstal of Belgium. Now known as FN America.

⁴Polytetrafluoroethylene (PTFE)—better known by the brand name Teflon, introduced by DuPont/Kinetic Chemicals in 1945—is a synthetic polymer used as lubricating, non-corrosive coating in a variety of industrial and commercial applications, such as in non-stick cookware (DuPont, 2009).

⁵Note that the ammunition was marketed as ‘metal piercing,’ and the designers described penetration of automobile bodies as a primary goal. There was some discussion as to whether such designs would constitute ‘armour-piercing’ ammunition types in other jurisdictions, such as Canada (Koffler, 1995, pp. 63–64).

coroner, who had started KTW with two colleagues: a coroner's investigator and a former police officer—testified that the presence of Teflon actually *decreased* the penetration of the projectiles in Kevlar; it was added to reduce ricochets (Ahern, 1979; Kopsch, 1990; Parsons, 1979).



Figure 1.3 A range of KTW cartridges in various calibres, treated with a Teflon outer coating (source: SAC).

In the 1990s, a similar epithet was thrust upon the Winchester 'Black Talon' series of hollow-point cartridges. In 1994, an article in the *Washington Post* noted that "Since the 1980s, federal law has banned "cop killer" bullets, which are able to rip through bulletproof vests. But it does not address "barbed" ammunition such as the Black Talon" (Sanchez, 1994). Winchester voluntarily removed these rounds from sale in 1994, before subsequently rebranding them as the Ranger SXT (and later the Ranger Talon) series, and offering them for law enforcement sales. At no point could these designs be reasonably considered to be armour-piercing (Swift & Rutt, 2004). The Black Talon series of hollow-point rounds are not considered particularly unusual or innovative in their design today, and the Teflon-coated projectiles of the 1980s have been all but cast aside by modern shooters. In both cases, however, manufacturers and consumers were affected by the 'cop killer' appellation; in both cases, attempts to ban these ammunition types were made at the U.S. federal level (Judiciary Committee, 1984; Thomas, 1993). Despite failures at the national level, Teflon-coated projectiles remain inexplicably restricted in some U.S. states today—regardless of whether or not these constitute armour-piercing ammunition under U.S. federal law, as the KTW projectiles did.⁶ Winchester opted to cease selling their Black Talon range to the general public, despite other similar products remaining available (Thomas, 1993).

⁶ See various state codes, e.g. AL Code § 13A-11-60; Okla. Stat. Ann. tit. 21, § 1289.19; SC Code 16-23-520; NCGS § 14-34.3, etc.



Figure 1.4 Winchester ‘Black Talon’ .45 ACP cartridges (source: Wikimedia).

Despite efforts by FN to clarify matters with regards to their 5.7 mm cartridge, the media and the public do not appear to have learned from the errors of previous decades, and the misconceptions persisted. In an astonishing and frankly bizarre chapter in this saga, Michael D. Barnes—then-president of the Brady Campaign—challenged NRA Executive Vice President Wayne LaPierre to be shot with a Five-seveN pistol whilst wearing a “bullet proof vest”. The NRA, unsurprisingly, declined and responded by noting that this would be a flagrant violation of gun safety principles (NRA-ILA, 2005). In 2006, the Boston Globe described 5.7 × 28 mm ammunition as being able to “pierce most body armour at distances up to 650 feet” (Smalley, 2006). In the following years, the Five-seveN continued to be portrayed in U.S. media sources as a nefarious weapon, in part due to its increasing use by cartel forces in Mexico. A Dallas news station reported on the presence of the Five-seveN in Mexico in 2009, and made sensationalised claims: “The FN Five-Seven is an assault weapon you can hold in your hand ... The projectile tumbles when it hits the target, ripping a large hole in the victim, much like the M-16 rifle used by American troops in combat ... Its bullets can tear through a protective vest”.

The Brady moniker certainly seems to have stuck. In the United States, it appears that, more than fifteen years after the Five-seveN entered the country, it has only been used in the killings of two police officers—one in March 2015, and another in November 2019 (WDCI, 2015; Grasha & Knight, 2019). However there are reported claims that the weapon has been used to wound and kill several police officers in Mexico, and media reporting has continued to use the term ‘cop killer’ in conjunction with these developments.⁷ The phrase looks to have spread beyond U.S. borders, too. ATF Special Agent James Ruffin is quoted as saying the weapon was “known as a ‘cop killer’ down in Mexico” (Harris, 2009). Despite claims that Five-seveN pistols and armour-piercing ammunition were obtained in the U.S. and smuggled to Mexico, at least some of the weapons—and, most likely, the majority of the AP ammunition—were sourced locally (Stewart, 2011). Five-seveN handguns have also been documented by ARES on the black markets in Libya and Venezuela. There is no evidence of the ‘cop killer’ moniker. In Venezuela, however, the term was used in one sales post. In another post, the weapon was photographed alongside SS197SR cartridges that were incorrectly described as armour-piercing (Pérez, Ferguson & Jenzen-Jones, 2020).



Figure 1.5 A FN Herstal Five-seveN self-loading pistol and ammunition for sale on the illicit market in Venezuela. The SS197SR cartridges were inaccurately described as “armour-piercing”.

⁷ See, for example, Grillo, 2007.

5.7 × 28 mm Ammunition Types

The 5.7 × 28 mm cartridge was developed to meet a particular NATO requirement for a ‘personal defence weapon’ (PDW), a highly compact sub-machine gun or machine pistol envisaged as a compromised between a full-size rifle and a handgun, and intended for second-line troops. The requirements evolved over time, as did FN Herstal’s plans to meet those, but armour penetration at range became central to the team’s design goals. The 5.7 mm round and P90 sub-machine gun eventuated from this project, being first issued in 1991. Broadly speaking, the basic concept for the cartridge design was to use a high-velocity projectile with a low-density core. The SS90 round was developed, and featured a sharply pointed, conical projectile with a polymer and steel (rather than aluminium and steel) core.⁸ The P90 was later joined by its companion weapon, the Five-seveN self-loading pistol, in 1998 (Hogg, 2002).

Introduced a few years earlier, in 1994, the SS190 replaced the SS90 cartridge. The SS190 round propels a 32 gr (2.1 g) projectile built around an aluminium core and steel penetrator with a gilding metal-clad steel (GMCS) full metal jacket (FMJ) (see Figure 2.1). Fired from the Five-seveN pistol, the projectile achieves a muzzle velocity (V_0) of approximately 650 m/s (2,133 fps) and a muzzle energy of approximately 434 J (320 ft-lb). The SS190 cartridge is designed to defeat a NATO-standard CRISAT⁹ target (1.6 mm titanium plate with 20 layers of Kevlar). According to FN Herstal, “The SS190 will perforate 48 layers of Kevlar at up to 200 meters when fired from the P90 and achieve the same results at up to 50 meters with the Five-seveN handgun” (FN Herstal, 2019a).¹⁰

A range of other ammunition types and loadings have also been offered by FN Herstal (see Figure 2.1; Table 2.1).¹¹ Often described as ‘hollow-point’ rounds, the SS192, SS194/T194, SS195LF, and SS198LF cartridges all feature a projectile type better known as ‘open-tip match’ (OTM). Unlike a hollow-point projectile, which features a deep cavity at the tip of the bullet designed to expand on impact, OTM projectiles are not intended to expand on impact. They are manufactured in the opposite manner of traditional FMJ projectiles, in that the jacket is drawn up and around the base of the lead core, leaving a small hole at the tip (Williams & Jenzen-Jones, 2016, pp. 5–6; 14). Some confusion has arisen as several manufacturers and retailers, including FNH USA, have referred to their OTM projectiles as ‘hollow point’ bullets—describing the physical design or appearance of the bullet, not necessarily its terminal ballistics (Parks, 2012).

The SS196SR and SS197SR (Figure 2.1f) cartridges used jacketed hollow-point (JHP) Hornady V-Max projectiles which are designed to expand upon impact. Bullets of this design use the polymer nose plug, or ‘ballistic tip’ to act as a wedge upon impact, aiding in the rapid expansion of the projectile’s nose cavity (see Figure 2.2) (Williams & Jenzen-Jones, 2016, p. 18). The SS197SR cartridge is described by FN America as “intended for general target, competition and hunting use” (FNH USA, 2008). Other specialist 5.7 mm ammunition made by FN include the SS199 frangible round, as well as blank, proof, and dummy cartridges. Table 2.1 provides a comparison of some of the key data for selected 5.7 × 28 mm ammunition.

⁸ See US Patent 5012743.

⁹ A NATO-developed target arising out of the Collaborative Research into Small Arms Technology (CRISAT) studies, and defined in NATO Standardisation Agreement (STANAG) 4512.

¹⁰ The effects of 5.7 mm projectiles on the human body are not addressed herein. Nonetheless, the literature contains a limited number of analyses of projectiles in this calibre by forensic pathologists and medical examiners (see, for example, Poulos, 2013).

¹¹ Others have been offered by third-party manufacturers, such as Federal Ammunition in the USA and VBR in Belgium.



Figure 2.1 Various 5.7 × 28 mm cartridges, with headstamp dates in parentheses; a.) SS190 (2002); b.) L191 (2001); c.) SS192 (2001); d.) SB193 (2001); e.) SS195LF (2007); f.) SS197SR (2006); g.) blank (2004); h.) dummy (2009). Photos source: user XIMO via Municion.org.

Table 2.1 — 5.7 × 28 mm ammunition specifications.

Designation (alternative)	Type	Restricted?	Projectile	Projectile Measurement at Muzzle (Five-seveN)	
				Velocity	Energy
SS190	AP	Yes	2.1 g ¹² (32 gr)	650 m/s ¹³ (2,133 fps)	434 J (320 ft/lb)
SS191 (L191)	AP Tracer	Yes	2.1 g ¹⁴ (32 gr)	640 m/s ¹⁵ (2,100 fps)	427 J (315 ft/lb)
SS192	OTM	No	1.8 g (27 gr)	640 m/s (2,100 fps)	373 J (275 ft/lb)
SS193 (SB193 ¹⁶)	FMJ (subsonic) Matchking	Yes	3.6 g ¹⁷ (55 gr) ¹⁸	300 m/s (984 fps)	160 J (118 ft/lb)
SS194 (T194)	OTM	No	1.8 g (27 gr)	640 m/s (2,100 fps)	373 J (275 ft/lb)
SS195LF	OTM	No	1.8 g (27 gr)	625 m/s (2,050 fps)	346 J (255 ft/lb)
SS196SR	JHP (ballistic tip) V-Max	No	2.6 g (40 gr) ¹⁹	472 m/s (1,550 fps)	292 J (215 ft/lb)
SS197SR	JHP (ballistic tip) V-Max	No	2.6 g (40 gr) ²⁰	518 m/s (1,700 fps)	347 J (256 ft/lb)
SS198LF	OTM	Yes ²¹	1.8 g (27 gr)	655 m/s (2,149 fps)	Unknown
SS199 (FR199)	Frangible	Unclear ²²	2.3 g (35.5 gr)	515 m/s (1,690 fps)	Unknown
Blank (10700004)	Blank	Yes ²³	N/A	N/A	N/A
Dummy (10700005)	Dummy	No	Dummy	N/A	N/A

Source: FNH USA, 2008; 2011; FN America, 2019; FN Herstal, 2019a; 2019b.

Notes: Availability as per FN America website, 25 November 2019. There are differences between the given figures for some cartridges when comparing U.S. and Belgian FN sources. Where conflict exists, the U.S. figures (2011) are preferred. Belgian figures (2019) are footnoted. Additionally, as FN Herstal implements their 'Azuron' program to remove hazardous materials from their ammunition range, minor changes to specifications are occurring (FN Herstal, 2019b).

¹² 2 g per FN Herstal, 2019a.

¹³ 615 m/s per FN Herstal, 2019a.

¹⁴ 2 g per FN Herstal, 2019a.

¹⁵ 615 m/s per FN Herstal, 2019a.

¹⁶ Rendered 'Sb193' per FN Herstal, 2019a.

¹⁷ 3.9 g per FN Herstal, 2019a.

¹⁸ Sierra GameKing projectile.

¹⁹ Hornady V-Max projectile.

²⁰ Hornady V-Max projectile.

²¹ In the FNH USA 2009 catalogue, SS198LF is listed as a restricted cartridge. In a 2008 brochure, with an entry marked 'new' it is listed as unrestricted. At the time of publication, the cartridge is listed on the FN America website as a restricted cartridge (FNH USA, 2008; 2009; FN America, 2019).

²² As of November 2019, the FR199 round is only listed on the FN Herstal website, not the FN America website. It is not clear whether it is restricted to LE/military sales in the U.S. or not (FN Herstal, 2019a).

²³ The 2012 FNH USA *Law Enforcement and Military Catalogue* makes a distinction between 'Unrestricted' (SS195LF, SS197SR, Dummy), 'Commercially Restricted' (Blank), and 'Government Restricted' (SS190, L191, SS198LF) (FNH USA, 2012, p. 83).



Figure 2.2 Sectioned examples of selected 5.7 × 28 mm cartridges; a.) SS197SR, b.) SS196SR, c.) L191, d.) SS190. Note the aluminium core (rear) and steel penetrator (forward) in the SS190 round, and the hollow-point design with ballistic tip of the two sporting rounds (source: Wolfgang Gross).

Certain ammunition types are restricted to law enforcement and military sale. A 2011 FNH USA brochure explains that “All restricted 5.7x28mm armor piercing, tracer and subsonic projectiles are designed for specific tactical applications and their sale is limited to law enforcement agencies and the military in compliance with BATFE and U.S. Customs regulations for armor piercing ammunition”. According to the FN America website in November 2019, “... All restricted ammunition is only released and shipped from a U.S. Customs-Controlled Bonded Warehouse (CBW) upon BATFE and U.S. Customs approval” (FN America, 2019). Conversely, the 2011 brochure also notes that “All unrestricted 5.7x28mm projectiles are designed to be compliant with BATFE standards for construction and materials for non-armor piercing sporting ammunition and may be purchased through regular commercial ammunition channels” (FNH USA, 2011).

Armour Penetration

Technical Considerations

The goal of defeating body armour with the 5.7 mm cartridge was clear from the outset, and SS190 was the cartridge developed to do just that. The SS190 loading has been the cause for much of the controversy surrounding the 5.7 × 28 mm cartridge, as its capabilities are often mistakenly considered to be synonymous with those of the 5.7 × 28 mm round more broadly. Additionally, when velocity and energy figures for the SS190 (and, indeed, for other 5.7 mm ammunition) are cited, they are often taken from the figures generated when fired from the substantially longer barrel of the P90 sub-machine gun. Whilst the Five-seveN MK2 has a barrel length of 122 mm (4.8 in), that of the P90 Tactical is more than twice as long, at 264.15 mm (10.4 in). This allows the projectiles of almost all available cartridges to develop greater velocity (and hence impact energy) when fired from the sub-machine gun, versus the pistol.²⁴

According to the 2011 sales brochure, the SS190 projectile “Incorporates a steel penetrator and aluminum core projectile to defeat soft body armor with limited risk of over-penetration” (FNH USA, 2011). The SS190 projectile is of a GMCS full metal jacket (FMJ) design, with a black tip. In the NATO small-calibre ammunition marking scheme, a black tip colour is used indicate an AP load (Jenzen-Jones, 2018, p. 160). The SS190 round was introduced (in Belgium) with no tip colour, before changing to black, and then to a black-over-white marking. Finally, the tip colour reverted to plain black.²⁵

Under U.S. federal law, armour piercing projectiles must be marked as such.²⁶ It seems likely the black tip marking was applied specifically for the U.S. market, to denote a round that was considered ‘armour-piercing’ under U.S. federal law and required to be marked and restricted accordingly. It appears that the L191 tracer projectiles shown on the FN America website at the time of writing (marked with a plain red tip) would not be in compliance with U.S. marking requirements for armour-piercing ammunition, if indeed they are still constructed with a steel penetrator like the SS190 and can be properly considered as armour-piercing (see below).²⁷

Despite the black tip colour and a discussion of the round’s ability to defeat armour, neither FN America nor FN Herstal explicitly use the term ‘armour-piercing’ in their online sales literature at present (November 2019). The FN Herstal (international) website describes the cartridge simply as a ball (FMJ) round, whilst noting that it is “also available with environment-friendly primer” (FN Herstal, 2019a). FN America calls it a “duty round” which “incorporates a limited-risk aluminum-core projectile” (FN America, 2019). The design of the SS190 projectile is such that it is designed to offer both good soft armour penetration and limit overpenetration. This is achieved by the combination of aluminium core and steel penetrator, and results in a projectile that typically tumbles once it passes through armour (Douglas, 2004). FNH USA says the round becomes “unstable in soft body tissue after just 2 inches of penetration” (FNH USA, 2011). As a result, some law enforcement units and individual officers have favoured them in an effort to minimise collateral harm (Douglas, 2004; Humphries, 2008, pp. 25–26; Weems, 2001, pp. 13–14). The terminal ballistics—specifically the effect on human targets—has been questioned by some, however.²⁸ Law Enforcement have also actively sought the armour-piercing capabilities of the Five-seveN

²⁴ For example, whereas SS190 has a V_0 of 650 m/s when fired from a Five-seveN, it reaches 715 m/s from the P90 (FN Herstal, 2019a; 2019c; 2019d).

²⁵ Similarly, L191 AP-T round appear to have been initially marked with a plain red tip, then with a black-over-red tip, and now with a plain red tip again (as of November 2019; FN America, 2019).

²⁶ Each licensed manufacturer or licensed importer of armor piercing ammunition shall identify such ammunition by means of painting, staining or dyeing the exterior of the projectile with an opaque black coloring. This coloring must completely cover the point of the projectile and at least 50 percent of that portion of the projectile which is visible when the projectile is loaded into a cartridge case’ (27 CFR § 478.92(a)(5)(b)(1)). It is commonplace to use a black tip to indicate an AP round in the US and other NATO and allied countries (Jenzen-Jones, 2018, p. 160).

²⁷ See FN America, 2019.

when paired with the correct ammunition for the task. A spike of interest was generated in the wake of the infamous North Hollywood bank robbery and subsequent shootout of 1997, in which two armed robbers were able to hold police at bay for significantly longer than anticipated, injuring twelve police officers and eight civilians before finally being overcome (Douglas, 2004; Parker, 2012).

As a result of the small-calibre, high-velocity (SCHV) projectile design of 5.7 × 28 mm cartridges, soft body armour at the lower end of the ballistic protection scale can be defeated by loadings other than SS190 (i.e. types not restricted for sale in the US). ATF Special Agent Joe Mangan pointed this out during a 2009 interview: “FN will say its stock ammunition ‘is not armor-piercing’ but we’ve done demos and it does pierce certain types of soft body armor” (Hooks, 2016).²⁹ However, this is not a new phenomenon. Other reasonably common pistol cartridges, such as the 7.62 × 25 mm Tokarev round (introduced 90 years ago), are also capable of penetrating certain soft armour with ball (i.e. non-AP) ammunition. One common loading propels a 5.5 g (85 gr) at 497 m/s (1,630 fps) and is known to penetrate Level IIA and Level II armour. It is also important to note that almost all rifle-calibre ammunition will penetrate soft body armour up to Level IIIA (O’Kelly, 2015). Level IIA armour is at the low end of the protection scale, and is described by the NIJ’s Justice Technology Information Center (JTIC) as “Tested to stop 9mm and .40 S&W ammunition fired from short barrel handguns. No rifle ammunition protection”.³⁰

The Brady Campaign claim that SS192 ammunition “clearly penetrates Level IIA and Level IIIA body armor” was likely not grounded in a robust scientific testing method. When firearms, ammunition, or armour manufacturers test their products ability to withstand gunfire, they typically do so in a controlled and professional manner. In the US, this most often means adhering to NIJ testing protocols. The NIJ testing methodology requires numerous vests, numerous shots, and controlled environments (including body armour that is in good condition, and not past its shelf life).³¹ Nonetheless, it seems entirely likely that the informal test carried out by the Brady Campaign using a Level IIA vest did indeed demonstrate the potential for the SS192 projectile to penetrate body armour of that rating.

In any case, just because a projectile penetrates a given vest—in this case, a vest offering a low level of ballistic protection—does not mean it is classified as armour-piercing. Quite apart from the U.S. legal definition (see below), the term ‘armour-piercing’ carries with it the implication that a round is specifically designed to defeat armour. Exactly what that might mean has evolved over time, but typically it denotes the presence of a hard metallic core (usually hardened steel, tungsten, or sometimes—in medium and large-calibre ammunition—depleted uranium). Broadly speaking, the intent of armour-piercing ammunition fired from small arms is usually to defeat the types of enemy military body armour that might be anticipated at the time of its adoption. Consistently, semi-scientific data collected by a range of enthusiasts and firearms media over more than a decade has shown that SS190 can reliably defeat soft and semi-rigid NIJ Level IIIA body armour.³² SS196SR and SS197SR, by comparison, have been shown to be capable of defeating Level IIA body armour regularly, and Level II body armour only on occasion. In this respect, there is a clear distinction between SS190—a cartridge designed to defeat contemporary body armour at the time of its introduction, according to NATO testing standards—and the SS197SR, a cartridge not capable of consistently defeating even Level II armour. According to Matt Hoffman, who has tested large quantities of 5.7 mm ammunition:

²⁸ See, for example, Roberts, 1998, pp. 326–329; Roberts & Lazzarini, 2002, pp. 302–303. It should be noted that some testing of the 5.7 mm projectiles that has been carried out made use of early or discontinued projectiles, including SS90 (23 gr). Some other tests, widely cited online, diverge from modern testing principles.

²⁹ This largely agrees with independent, small-scale informal testing (e.g. C., 2013).

³⁰ Justice Technology Information Center, n.d., Understanding NIJ 0101.06 Armor Protection Levels, Rockland: National Law Enforcement and Corrections Technology Center (NLETC). Note, this description is given for Level IIA armour as per NIJ Standard 0101.6. The 9 × 19 mm test projectile as outlined in NIJ Standard 0101.4, the applicable standard at the time of the Brady Campaign and claims outlined previously, is an 8.0 g (124 gr) full metal jacket (FMJ) round nose (RN) bullet impacting at a minimum velocity of 332 m/s (1,090 fps). By way of comparison, the SS196SR projectile weighs 6.8 g (105 gr) and achieves a muzzle velocity of 472.4 m/s (1,550 fps) when fired from the Five-seveN. Note that the current NIJ Standard is version 0101.6, although this is under proposed revision at time of writing (NIJ, 2008; 2019).

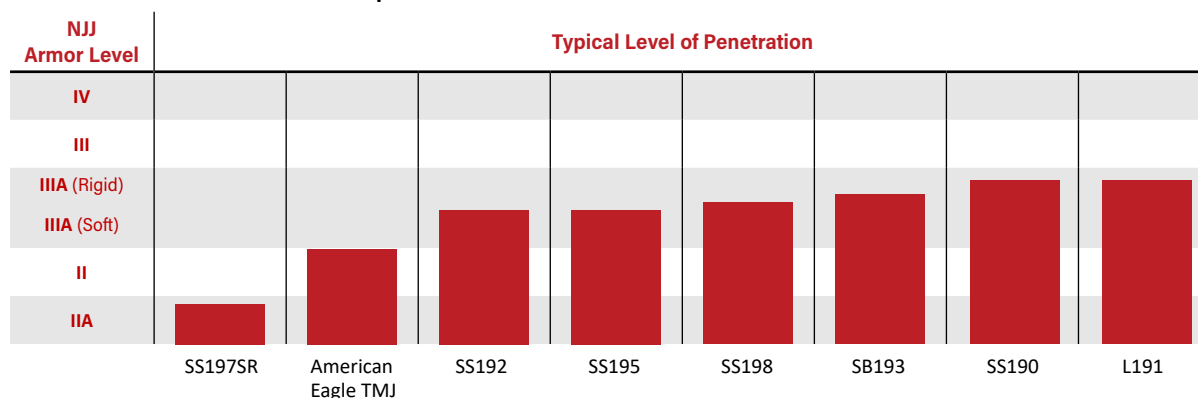
³¹ For more information, see NIJ, 2001; 2008.

I have conducted independent testing of the 5.7x28mm cartridge in various forms over the past 10 years. I have familiarized myself with the NIJ 06 testing protocols, and seek to adhere to them where practicable. For example, I always utilize a compressible test media behind armor panels (a clear gel block or a non-hardening clay), and ensure my shots are considered 'fair hits' (maintaining a spread of 2 inches or more from previous shot, and no less than 1.5 inches from a panel edge unless a manufacturer specifies otherwise). I try to control variables as much as possible.

With respect to NIJ performance standards, it is important to note that no two manufacturers' panels of the same rating will perform the same. NIJ specifications for threat ratings are considered minimum standards, and manufacturers can certainly 'over-build' their products to exceed these performance requirements. It is also important to appreciate that there are no current NIJ standards which required testing with any 5.7x28mm ammunition. Testing may incorporate 'special threat' tests, specifying cartridges beyond a given standard, including 5.7x28mm.

With factory-standard 5.7x28mm loads, my experience has shown that, when fired from the Five-Seven pistol (4.75" barrel), SS197SR travels at about 1750 fps and is unable to penetrate an NIJ Level II or higher panel. The American Eagle TMJ (1650 fps) can generally penetrate Level II panels, but not Level IIIA. The SS192, SS195, and SS198 cartridges (2000/2000/2100-2200 fps) typically penetrate Level II armor, as well as certain types of Level IIIA panels that are generally of soft construction. Soft armour panels incorporating ultra-high-molecular-weight polyethylene (UHMWPE) in their construction, such as the AR500 Armor 'Hybrid' series, will generally stop such projectiles. Rigid Level IIIA armor will almost always stop the SS192, SS195, and SS198 rounds.

Table 3.1 — 5.7 × 28 mm armour penetration



Source: Author interview with Matt Hoffman, 21 December 2019.

Notes: Table data are necessarily estimates, based on semi-scientific methods as outlined above. The findings as presented should only be considered a guideline to the armour penetration capability of these cartridges.

Cartridges restricted by FN Herstal fare better. The SB193 tends to hold its shape very well and can often penetrate multiple soft Level IIIA panels. Generally, a thicker rigid UHMWPE plate will stop this cartridge's bullet. The SS190 and L191 cartridges can both penetrate multiple Level IIIA soft panels, as well as almost all rigid non-metallic Level IIIA panels.³³

³² See, for example, C., 2013. In at least some cases, SS190 has not been able to reliably defeat rigid (e.g. steel) Level IIIA plates (see, for example, Hoffman, 2015).

³³ Author interview with Matt Hoffman, 21 December 2019.

Armour-piercing Ammunition and U.S. Federal Law

The relevant federal law³⁴ governing armour-piercing ammunition in the United States is found in 18 U.S. Code § 921(a)(17), and reads:

(B) The term “armor piercing ammunition” means—

*(i) a projectile or projectile core which **may be used in a handgun** and which is constructed entirely (excluding the presence of traces of other substances) from one or a combination of tungsten alloys, steel, iron, brass, bronze, beryllium copper, or depleted uranium; or*

*(ii) a full jacketed projectile larger than .22 caliber **designed and intended for use in a handgun** and whose jacket has a weight of more than 25 percent of the total weight of the projectile [emphasis added].*

Hence the key distinguishing factor of armour-piercing ammunition, as defined, is its ability to be fired from a handgun. (B)(i) is broader, covering a hard metallic projectile (or projectile core) “which may be used in” a handgun, whilst (B)(ii) refers only to projectiles with particularly heavy jackets, “designed and intended for use in a handgun”. There is also an exemption for some ammunition, under 921(a)(17)(C), including an exemption for “frangible projectiles designed for target shooting”.

A quick examination of the FN 5.7 × 28 mm offerings using the above legislation is outlined in Table 4.1. The table provides answers to two tests related to each cartridge’s projectile or projectile core, to assess compliance with § 921(a)(17)(B)(i), and a further four tests related to each cartridges projectile jacket, to assess compliance with § 921(a)(17)(B)(ii). These are as follows:

Projectile or Projectile Core – 921(a)(17)(B)(i)

Test 1: Can the projectile or (a)³⁵ projectile core of the cartridge be used in a handgun?

Test 2: Is the projectile or projectile core constructed entirely (excluding the presence of traces of other substances) from one or a combination of tungsten alloys, steel, iron, brass, bronze, beryllium copper, or depleted uranium?

Projectile Jacket – 921(a)(17)(B)(ii)

Test 3: Does the cartridge use a ‘full jacketed’ projectile?

Test 4: Is the projectile larger than .22 of an inch in calibre (5.58 mm)?

Test 5: Does the cartridge use a projectile designed and intended for use in a handgun?

Test 6: Does the projectile jacket account for more than 25% of the total projectile weight?³⁶

³⁴ Note that the author is not a lawyer, and nothing contained herein should be construed as legal advice.

³⁵ See note in text regarding possible interpretations of the indefinite article ‘a’ in § 921(a)(17)(B)(i).

³⁶ Note that the 921(a)(17)(B)(ii) language is inclusive, and so if a cartridge fails Test 3, then 4–6 are of no value; if it passes 3 but fails 4, then 5–6 are no longer relevant, and so on.

Table 4.1 — Assessment of FN 5.7 × 28 mm cartridges under 18 USC § 921(a)(17)

Designation	Specifically Excluded? 921(a)(17)(C)	Projectile or Projectile Core 921(a)(17)(B)(i)		Projectile Jacket 921(a)(17)(B)(ii)				AP Status
		T1	T2	T3	T4	T5	T6	
SS190	No	Yes	Yes ³⁷	Yes	Yes	Yes ³⁸	No	AP*
SS191 (L191)	No	Yes	Yes*	Yes	Yes	Yes*	No	AP*
SS192	No	Yes	No	No ³⁹	Yes	Yes*	No	Not AP
SS193 (SB193)	No	Yes	No	Yes	Yes	Yes*	No	Not AP
SS194 (T194)	No	Yes	No	No*	Yes	Yes*	No	Not AP
SS195LF	No	Yes	No	No*	Yes	Yes	No	Not AP
SS196SR	No	Yes	No	No*	Yes	Yes	No	Not AP
SS197SR	No	Yes	No	No*	Yes	Yes	No	Not AP
SS198LF	No	Yes	No	No*	Yes	Yes	No	Not AP
SS199 (FR199)	Yes	Exempt						Not AP
Blank 10700004	No	N/A	No (N/A)	No	Yes	Yes*	No	Not AP
Dummy 10700005	No	Yes	No	No*	Yes	Yes*	No	Not AP

Sources: *FN America, 2019; FN Herstal, 2019a; FNH USA, 2011.*

As is apparent from the table, only SS190 and L191 could be considered AP rounds under U.S. law. However, that conclusion is perhaps not as straightforward to reach as it might seem. Take test two, as it applies to the SS190 cartridge, for example. Strictly speaking, neither the projectile nor projectile core of the SS190 are “constructed entirely (excluding the presence of traces of other substances) from one or a combination of tungsten alloys, steel, iron, brass, bronze, beryllium copper, or depleted uranium”.⁴⁰ The “projectile core” is of a two-material design, comprised of a steel penetrator and an aluminium core, and may not meet the test under a strictly literal interpretation. The SS190 projectile is similar in design to the projectile of the American M855 5.56 × 45 mm cartridge and the Soviet M43 7.62 × 39 mm cartridge, both of which feature a steel penetrator and a lead core (Labbett & Brown, 1987; Woods, 2010). It is of the jacketed type—this jacket being made from gilding-metal clad steel (GMCS). Of course—given the use of the indefinite article ‘a’ in the clause—an alternative interpretation could be put forward that the projectile simply contains two cores, one of which (i.e. “a projectile core”) is “constructed entirely” from one or a combination of the materials listed.

³⁷ See note in text regarding a possible alternative interpretation regarding the cartridges marked with an asterisk in this column.

³⁸ See note in text regarding a possible alternative interpretation regarding the cartridges marked with an asterisk in this column.

³⁹ It is not clear if OTM or JHP+ballistic tip projectiles might be considered as being ‘full jacketed’. If that term is to be considered synonymous with the term ‘full metal jacket’ (FMJ; i.e. ball), then the cartridges marked do not have projectiles of that type.

⁴⁰ As per the language in 18 USC § 921(a)(17)(B)(i).

Whilst the M855 round was designed to “increase hard target performance”, it was never considered an AP round by the U.S. Army.⁴¹ The M855 cartridge—and its close analogue, the SS109⁴²—has been specifically exempted under the ‘sporting purposes’ provision of 921(a)(17)(C) since 1986 (ATF, 2015a). Such exemptions have been implied inconsistently (some have argued arbitrarily⁴³); Soviet 7N6 ammunition is similar in construction and design intent to M855 and is fired from very similar classes of weapons, including short carbines legally categorised as ‘pistols’ in the U.S. (Jenzen-Jones & Popenker, 2019). Nonetheless, in 2015 the ATF reversed an early decision to allow its import into the U.S., determining that it constituted armour-piercing ammunition. A federal judge upheld that decision in 2016 (AP, 2015; 2016; O’Kelly, 2015; *PW Arms Inc. v. United States of America et al.*, 2015).

Test five is also subject to interpretation. It could be argued that, because the projectiles for at least some of the projectiles used in FN Herstal cartridges were designed before the introduction of the Five-seveN handgun in 1998, they were not ‘designed and intended for use in a handgun’. There may be other reasons to consider, as well; the SB193 cartridge, for example, does not reliably cycle the Five-seveN pistol. Despite this, ATF has been quite clear in its intention to interpret the use of ammunition in a weapon defined as a ‘pistol’ under U.S. law as qualification enough for an AP classification (ATF, 2015a). Given an assessment of the FN Herstal ammunition types outlined in Table 2.1 based on the tests summarised in Table 4.1, it is clear that—under the most likely interpretation of the statutes as they stand today—only the SS190 and SS191 cartridges can be considered ‘armor piercing ammunition’ under U.S. law.

⁴¹The same is true of its replacement, the M855A1 Enhanced Performance Round, or EPR. The EPR and the SS190 cartridge even share some of the same design goals; both seek to deliver increased performance against intermediate barriers (including armour) whilst maximising the terminal effects against human targets. In fact, the Army even specifically identifies ‘excellent performance against softer intermediate barriers such as car doors, windshields, or Kevlar fabric’ as a key benefit, along with the fact that the EPR ‘also penetrates some lesser-quality body armors’ (Woods, 2010).

⁴²Another 5.56 × 45 mm cartridge, not to be confused with the SS190 5.7 × 28 mm cartridge.

⁴³See, for example, O’Kelly, 2015.

Conclusion

The Myth Endures

In November 2009, Nidal Hassan used a Five-Seven handgun during his perpetration of the Fort Hood shootings. ABC, the Associated Press, *The Telegraph*, and others chose the term ‘cop killer’ for inclusion in their articles covering the tragedy (Allen, 2009; AP, 2009; Cole et al., 2009). The *Austin American-Statesman* used another misleading historical moniker, the ‘assault rifle that fits in your pocket’ (Ward, 2009). The Brady Campaign, in particular, continued to use the term ‘cop killer’ and linked it back to their previous 2005 statement. They also conflated FN company statements meant to indicate the capability of the weapon with armour-piercing ammunition, with the capability of the weapon loaded with ammunition available to civilians (Brady Campaign, 2009).

The term has endured through the 2010s, too. *InSight Crime* used the phrase ‘cop-killer’ in the headline of a 2012 article about the Five-seven’s appearance in Colombia, and a 2013 investigation by *The Star* draws on the Mexican equivalent, ‘mata policia’, in describing a Five-seven recovered in Toronto (Pachico, 2012; Poisson & Bruser, 2013). In 2014, *Business Insider* also chose to use the phrase ‘cop-killer’ in their headline for an article examining the weapon which led to the arrest of New York Knicks point guard Raymond Felton (Gaines, 2014). In June 2017, LAPD HED arrested a suspected drug dealer, also carrying a Five-seven⁴⁴ handgun. In the announcement of the arrest, they showed a number of FMJ cartridges described as ‘armor piercing rounds’ alongside the unloaded and cleared handgun (LAPD HD, 2017). Whilst it is not possible to conclusively identify these cartridges from the single image available, it seems most plausible that these were Federal Ammunition ‘American Eagle’ 5.7 × 28 mm 40 gr (2.6 g) FMJ rounds. Ten days before the 2019 LAPD HED seizure was announced, the *Cincinnati Enquirer* reported on the use of a ‘cop-killer’ Five-seven pistol in the shooting of Dayton Police detective Jorge DelRio (Grasha & Knight, 2019).

Hyperbole and misunderstandings aside, people have remained highly engaged on the topic of armour-piercing ammunition throughout recent years. In 2015, ATF announced an ‘Armor Piercing Ammunition Exemption Framework’ for determining which projectiles that might otherwise be classified as AP would meet the ‘sporting purposes’ exemption under 18 U.S. Code § 921(a)(17)(C). The ATF’s adoption of this framework would have led them to class as AP certain 5.56 × 45 mm cartridges (SS109 and M855) that had been specifically exempted since 1986 (ATF, 2015a). They received more than 80,000 comments during the 30-day window for public comment. It was determined that the “vast majority of the comments received to date are critical of the framework”, and ATF determined it would not issue a final framework at the time, and it has not been forthcoming since (ATF, 2015a; 2015b). The ATF did note another modern tension in their framework document: under current legislation, lead-free projectiles which are increasingly preferred for hunting—such as those made entirely or primarily of brass—may be considered AP projectiles, due to the increase in weapons considered to be pistols (or “handguns”) under U.S. law, which share a calibre with rifles (ATF, 2015a, p. 6).⁴⁵

⁴⁴ Serial number: 386316366

⁴⁵ Note: certain weapons that would categorically not be regarded as handguns in any meaningful technical sense, can be legally considered a ‘handgun’ under the vagaries of U.S. laws and ongoing—and evolving—ATF interpretations. A weapon that is essentially the same as one classified as a ‘handgun’ may also be considered a ‘short-barreled rifle’ (SBR) or even an ‘any other weapon’ (AOW), depending on various factors including how and when certain components were assembled. The topic is much too complex to assess herein, but see ATF, 2011; 2017; 2019; Kraut, 2019; ITS, 2017.

In many ways, the issue remains framed in much the same way it was in 2005. Despite the intervening years, Rep. Engel has introduced versions of his PLEA Act bill seven further times since 2005, most recently in May 2019 (GovTrack, 2019a). The Act remains largely nonsensical, and contains such language as “The Five-sevenN Pistol is capable of penetrating level IIA armor ... The Five-sevenN Pistol, and similar handguns designed to use ammunition capable of penetrating body armor, pose a devastating threat to law enforcement”.

It is important to note that the overwhelming majority of handguns produced today are capable of penetrating Level IIA armour, depending on ammunition selection.

The Act introduces the concept of an “armor-piercing handgun”, which is not a category of small arms acknowledged by any subject matter specialist. Similarly, the ‘Law Enforcement Protection Act of 2019’ before Congress at the time of writing would introduce into law the concept of “armor-piercing, concealable weapons” and specifically names several cartridges—and two calibres, more broadly—including 5.7 × 28 mm (GovTrack, 2019b). It is not clear how the list of ammunition was arrived at but, as with the PLEA Act, the phrasing of this bill makes little sense and seems sure to generate further confusion in U.S. firearms law. Both of these legislative proposals indicate a fundamental lack of understanding about how firearms and ammunition interact.

It should be clearly understood: ammunition is armour-piercing, handguns are not.

The misconceptions of 2005 (or 1995, or 1985) live on.

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