



ARES

Raising Red Flags:

An Examination of Arms & Munitions in the Ongoing Conflict in Ukraine

2014

Jonathan Ferguson & N.R. Jenzen-Jones

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CREDITS

Authors: Jonathan Ferguson & N.R. Jenzen-Jones

Contributors: Yuri Lyamin & Michael Smallwood

Technical Review: Yuri Lyamin, Ian McCollum & Hans Migielski

Copy Editor: Jean Yew

Layout/Design: Yianna Paris, Green Shell Media

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ARMAMENT RESEARCH SERVICES Pty. Ltd.

t + 61 8 6365 4401
e contact@armamentresearch.com
w www.armamentresearch.com

ABOUT THE AUTHORS

Jonathan Ferguson

Jonathan Ferguson is a Technical Specialist with Armament Research Services, and Curator of Firearms at the Royal Armouries Museum in Leeds, UK. He is based at the National Firearms Centre, successor to the MoD Pattern Room and is in possession of one of the most comprehensive firearms collections in the world. He is a specialist in the identification of small arms and light weapons, including identification based solely on component parts or weapon fragments. Mr Ferguson routinely fields enquiries from and delivers training to the military, government, and law enforcement on subjects ranging from firearms technology, criminal use of firearms, familiarisation with legacy and non-service weapons, identification of component parts, and practical shooting instruction. Mr Ferguson has published various articles and a book, and has made several appearances to discuss firearms and their impacts.

N.R. Jenzen-Jones

N.R. Jenzen-Jones is a military arms and munitions specialist and security analyst focusing on current and recent conflicts, and the Director of Armament Research Services. He has produced extensive research and analysis on a range of small arms & light weapons (SALW) and small arms ammunition issues, and has also provided technical assessments of ordnance, incendiary weapons, cluster munitions, and conventional arms proliferation. His other research fields include counter-piracy, counter-narcotics, and the exploitation of technical intelligence. Mr. Jenzen-Jones works closely with government and non-governmental organisations, journalists, individual researchers, and local sources, and has produced a range of outputs covering various regions of the world, including conflicts in Gaza, Libya, Mali, Somalia, South Sudan, Syria, and Ukraine. He is a certified armourer and ammunition collector, and a member of the International Ammunition Association and the European Cartridge Research Association.

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Remember, all arms and munitions are dangerous. Treat all firearms as if they are loaded, and all munitions as if they are live, until you have personally confirmed otherwise.

If you do not have specialist knowledge, never assume that arms or munitions are safe to handle until they have been inspected by a subject matter specialist. You should not approach, handle, move, operate, or modify arms and munitions unless explicitly trained to do so.

If you encounter any unexploded ordnance (UXO) or explosive remnants of war (ERW), always remember the '**ARMS**' acronym:

AVOID the area

RECORD all relevant information

MARK the area to warn others

SEEK assistance from the relevant authorities

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ABBREVIATIONS AND ACRONYMS

AGL

Automatic grenade launcher

AGS-30

Avtomat Granatomyot Stankovyy 30 mm
(‘Heavy automatic grenade launcher, 30 mm model’) [Russian]

AK

Avtomat Kalashnikova (‘Kalashnikov automatic rifle’) [Russian]

AKS

Avtomat Kalashnikova Skladnoy (‘Kalashnikov automatic rifle, folding’) [Russian]

AK-74

Avtomat Kalashnikova obraztsa 1974
(‘Kalashnikov automatic rifle, model of 1974’) [Russian]

AK-74M

Avtomat Kalashnikova obraztsa 1974 Modernizirovanny (‘Kalashnikov automatic rifle, model of 1974, modernised’) [Russian]

AKM

Avtomat Kalashnikova Modernizirovanny
(‘Kalashnikov automatic rifle, modernised’) [Russian]

AKMS

Avtomat Kalashnikova Modernizirovanny Skladnoy (‘Kalashnikov automatic rifle, modernised, folding’) [Russian]

AKS-74U

Avtomat Kalashnikova Skladnoy obraztsa 1974 Ukorochnyy (‘Kalashnikov automatic rifle, model of 1974, folding, shortened’) [Russian]

APR

Advanced precision rifle

APS

Avtomat Podvodny Spetsialnyy (‘Special underwater assault rifle’) [Russian]

AS

Avtomat Spetsialnyy (‘Special assault rifle’) [Russian]

ASVK

Armeyskaya Snayperskaya Vintovka Krupnokalibernaya (‘Army large-calibre sniper rifle’) [Russian]

ATGW

Anti-tank guided weapon

B

Belted (when used as suffix in cartridge calibre designation)

DSHK

Degtyareva-Shpagina Krupnokalibernyy
(‘Degtyareva-Shpagina large calibre’) [Russian]

DShKM

Degtyareva-Shpagina Krupnokalibernyy Modernizirovanny (‘Degtyareva-Shpagina large calibre, modernised’) [Russian]

ERA

Explosive reactive armour

GM-94

Granatomet Magazinnyy (‘Magazine-fed grenade launcher’) [Russian]

GP-25/30

Granatomet Podstvol'nyy (‘Underbarrel grenade launcher’) [Russian]

GPMG

General-purpose machine gun

ABBREVIATIONS AND ACRONYMS

- HE**
High explosive
- HE-FRAG**
High explosive fragmentation
- HEAT**
High explosive anti-tank
- HMG**
Heavy machine gun
- KPV**
Krupnokalibernyy Pulemet Vladimirova
(‘Vladimirov large calibre machine gun’)
[Russian]
- KSVK**
Krupnokalibernaya Snayperskaya Vintovka Kovrovskaya (‘Kovrov large calibre sniper rifle’)
[Russian]
- LMG**
Light machine gun
- MANPADS**
Man-portable air defence system(s)
- MLRS**
Multiple-launch rocket system
- MP5**
Maschinenpistole 5 (‘Machine pistol model 5’)
[German]
- MRO-A**
Malogabaritnyy Reaktivnyy Ognemet (‘Small-sized rocket-propelled flamethrower’; -A indicates thermobaric warhead) [Russian]
- NPZ**
Novosibirskiy Priborostroitelnyy Zavod
(‘Novosibirsk Instrument-making Plant’)
[Russian]
- NSV**
Nikitina-Sokolova-Volkova (these are the names of the weapon’s primary designers)
[Russian]
- NSVT**
Nikitina-Sokolova-Volkova Tankovyy (‘NSV Tank machine gun’) [Russian]
- NVD**
Night vision device
- OCCRP**
Organized Crime and Corruption Reporting Project
- OSCE**
Organization for Security and Co-operation in Europe
- PK**
Pulemyot Kalashnikova (‘Kalashnikov machine gun’) [Russian]
- PKM**
Pulemyot Kalashnikova Modernizirovannyy (‘Kalashnikov machine gun, Modernised’)
[Russian]
- PKP**
Pulemyot Kalashnikova Pekhotnyy
(‘Kalashnikov infantry machine gun’) [Russian]
- PKT**
Pulemyot Kalashnikova Tankovyy (‘Kalashnikov tank machine gun’) [Russian]
- PM**
Pistolet Makarova (‘Makarov pistol’) [Russian]
- PPS-43**
Pistolet Pulemyot Sudaeva (‘Sudaeva submachine gun, model of 1943’)

ABBREVIATIONS AND ACRONYMS

PPSh-41

Pistolet Pulemyot Shpagina ('Shpagin submachine gun, model of 1941') [Russian]

PPZR

Pistolet Pulemyot Shpagina ('Shpagin submachine gun, model of 1941') [Russian]

PTRD

Protivotankovoye Ruzh'yo Degtyaryova ('Degtyaryov anti-tank rifle') [Russian]

PTRS

Protivotankovoye Ruzh'yo Simonova ('Simonov Anti-Tank Rifle') [Russian]

PYa

Pistolet Yarygina ('Yarygin pistol') [Russian]

R

Rimmed (when used as suffix in cartridge calibre designation)

RFE

Radio Free Europe

RGN

Ruchnaya Granata Nastupatel'naya ('Offensive hand grenade') [Russian]

RGO

Ruchnaya Granata Oboronitel'naya ('Defensive hand grenade') [Russian]

RPG

Ruchnoy Protivotankovyy Granatomyot ('Hand-held anti-tank grenade launcher') [Russian]

RPO-A

Reaktivnyy Pekhotnyy Ognemet ('Infantry rocket-propelled flamethrower') [Russian]

SALW

Small arms and light weapons

SAM

Surface-to-air missile

SBU

Sluzhba Bezpeky Ukrayiny ('Ukrainian Security Service') [Ukrainian]

SKS

Samozaryadnyy Karabin sistemy Simonova ('Simonov self-loading carbine') [Russian]

SMG

Submachine Gun

SMM

OSCE Special Monitoring Mission to Ukraine

SOF

Special operations forces

SPG

Stankovyy Protivotankovyy Granatomyot ('heavy anti-tank grenade launcher') [Russian]

StG 44

Sturmgewehr 44 ('Storm rifle 1944'; now generally recognised to mean 'assault rifle') [German]

SVD

Snayperskaya Vintovka Dragunova ('Dragunov sniper rifle') [Russian]

SVDS

Snayperskaya Vintovka Dragunova Skladnaya ('Dragunov sniper rifle, folding stock') [Russian]

TRG

TaRGet (rifle)

TT-33

Tokarev-Tula (Designer [Tokarev] and manufacturing plant [Tula] names, 'model of 1933') [Russian]

ABBREVIATIONS AND ACRONYMS

UAV

Unmanned aerial vehicle

US

Umen'shennoy Skorost'yu ('Reduced speed')

[Russian]

UXO

Unexploded ordnance

VSS

Vintovka Snayperskaya Spetsialnaya ('Special sniper rifle') [Russian]

ZPU

Zenitnaya Pulemetnaya Ustanovka ('Anti-aircraft machine gun system') [Russian]

ZRP

Zaryad Razminirovaniya Perenosnoy ('Portable mine clearance charge') [Russian]

ZU

Zenitnaya Ustanovka ('Anti-aircraft gun') [Russian]

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INTRODUCTION

The ongoing conflict in Ukraine has been fought with a variety of arms and munitions, from the modern and effective, to the outdated and obscure.

This report examines over 100 distinct weapons systems, over 60 different types of munitions, and over 70 different models of armoured fighting vehicles, as well as miscellaneous associated materiel, in the context of the ongoing conflict in Ukraine. Particular attention is paid to items which may indicate flows of arms and munitions into and within the affected areas of Ukraine. Beginning with an assessment of the arms and munitions employed during the initial unrest in Kiev, in February 2012, the report documents relevant materiel up until the time of publication (November 2014).

As is typical of conflict in the internet age, commentators are quick to point to apparent discrepancies in photographs and video as evidence of external assistance. This conflict, with its internecine trappings, has been no exception, notably in the misidentification of various older anti-tank weapons as their modern replacements. Whilst information warfare undoubtedly has a role to play, many of these errors need not be the product of deliberate propaganda. The complex history of Soviet and Russian weapons development has resulted in the erroneous identifications of certain weapons systems. For example, the 1970s vintage NSV heavy machine gun is virtually indistinguishable from its replacement in Russian service, the Kord. Because the latter entered service in 1998, a sighting of this weapon might suggest Russian assistance to the rebels. Because the NSV can be encountered with features superficially similar to the Kord, it is easily misidentified. Likewise, the twenty plus year old RPG-26 is easily mistaken for the diagnostically more modern RPG-30, which can also lead to unfounded conclusions. Yet amidst this type of uninformed speculation and anomaly hunting, the trained and critical eye can discern instances of genuinely 'alien' weapons and pieces of equipment – so-called 'flag items' – that can serve as significant indicators of external supply.

This report examines the significant range of arms and munitions carried and employed throughout the conflict by armed individuals on all sides. It also examines, somewhat less extensively, the range of armoured vehicles and aircraft observed in the conflict. The contents of the report represent only an initial assessment of materiel documented in Ukraine. This assessment relies primarily on publicly released material made available through mainstream media sources and social media platforms. This is supplemented by material collected directed by journalists, NGO workers, and local sources on the ground.

Recognising these limitations, the key findings of the report are:

- The most significant sources of arms, munitions, and armoured vehicles for pro-Russian separatists in eastern Ukraine remain those which are domestically available;
- It is **very likely** that pro-Russian separatist groups have received some level of support (including small arms, light weapons, guided light weapons, heavier weapons systems, and armoured vehicles) from one or more external parties;
- Landmines, cluster munitions, and incendiary munitions have all seen regular use in the course of the conflict;
- The identified materiel was manufactured primarily in the USSR or Russian Federation. This is unsurprising given the intertwined military and political history of Ukraine and Russia;
- Further research focusing on the arms and munitions of the ongoing conflict in Ukraine is necessary. This type of analysis can provide insights into aspects of the combatants' training, logistics (including foreign support), disposition, and doctrine.

UNREST IN UKRAINE

During the initial unrest in Kiev in February 2014, Ukrainian security forces deployed with a range of small arms and light weapons (SALW).

These included various domestically-produced AK type rifles of pre-1991 production, various pump-action shotguns, PKM machine guns, and PM type pistols - all standard issue for Ministry of Internal Affairs and indeed the regular army troops that became involved later. Armour-piercing 12 gauge shotgun slugs were recovered from areas where protesters and security forces had clashed, amid claims that they had been fired into crowds. These projectiles featured a brass or aluminium slug with a core of what is believed to be hardened steel, designed to be employed to disable vehicles, and referred to as 'car stoppers' (Jenzen-Jones & Diehl, 2014).

Significant in the domestic security context, sniper rifles were also observed in the hands of government security forces (Jenzen-Jones, 2014a). These included the SVD (chambered for 7.62 x 54R mm), the Sako TRG bolt-action sniper rifle, and limited numbers of the TS 308 (both in .308 Winchester), a lesser-known licenced copy of the Brügger & Thomet APR bolt-action sniper rifle. These are likely to be the 'unusual rifles' referred to in an interview with a separatist fighter who spoke in July of "...agents of the Ukrainian SBU Security Service who had come over to the Donetsk People's Republic. They had unusual rifles that I'd never seen before -- not Dragunov sniper rifles" (Radio Free Europe, 2014). In the same month, further purchases of modern long-range rifles were made. These included further examples of the APR and TS 308, but also other contemporary designs such as the Swiss SAN 511 anti-materiel rifle (Arhat, 2014). Other, more modern weapons have been procured or manufactured locally, such as the Tavor X95 compact bullpup assault rifle and Negev light machine gun, both of which are Israeli designs produced under licence in Ukraine by RPC Fort (Johnson, 2014b; VestiOnline, 2014; VICE News, 2014).



Photo 1 An armour-piercing 'car stopper' 12 gauge projectile recovered from the scene of clashes between protesters and security forces.

Photo credit: Christopher Miller



Photo 2 A reference image of the armour-piercing 'car stopper' 12 gauge cartridge, believed to be developed and produced by the *Spetstekhnika* design bureau in Kiev.

Photo credit: Confidential source



Photo 3 TS 308 sniper rifle, a Ukrainian license-produced copy of the Swiss Brügger & Thomet APR.
Photo credit: Christopher Miller



Photo 4 Swiss SAN 511 anti-materiel rifle.
Photo credit: Christopher Miller

Although not seen in significant quantities in this conflict, a German *Sturmgewehr 44* (StG 44¹) type rifle also made an appearance with one of the Ukrainian loyalist protesters who took over the presidential palace near Kiev in February (VICE News, 2014). The StG 44 was the original assault rifle, and despite having a limited production run and being chambered for the unusual 7.92 x 33 mm cartridge, has been spotted in other recent conflicts around the world, from the former Yugoslavia to Ethiopia and Syria. In this case, however, it seems likely that the weapon was taken from the personal collection of former president Yanukovich, who was a known collector of firearms.

INCURSION IN CRIMEA

Of greater interest by March 2014 were the arms carried by unidentified but uniformed soldiers that crossed into Crimea.

These so-called 'little green men' or 'polite green men', now known to be Russian soldiers, were well-equipped and armed with a range of weapons not dissimilar to those available to local security forces. However, notable differences in armament, in addition to equipment, dress, and apparent level of training, were significant in identifying these men as Russian military and tracking subsequent developments (see, for example, Chivers, 2014e). Soon after, other armed individuals began to appear without uniform and with faces hidden, though there remained continuity in terms of the weapons they carried. Later still, as unrest spread into eastern Ukraine, individuals with mixed civilian and camouflage dress took to the streets equipped with a far greater range of military and civilian weapons.

Unsurprisingly, the ubiquitous Kalashnikov family of rifles has been in use with all parties involved in the conflict. Notably, the most common variant carried by the initially unidentified uniformed personnel was the AK-74M (chambered for 5.45 x 39 mm), identified by its black polymer furniture, push-button folding solid butt-stock, and optical sight rail on the left side. This specific type is standard issue for Russian Federation forces and is not commonly seen elsewhere, with the only other known users being Azerbaijan and Cyprus. As it was not produced until after Ukrainian independence in 1991, and has not been exported from Russia to Ukraine subsequently, it is not part of that country's inventory.



Photo 5 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an (unloaded) AK-74M rifle. Simferopol Airport, February 2014. Note the light grey rectangular latch for folding stock and smooth (non-ribbed) top-cover. Photo credit: Getty Images



Photo 6 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an (unloaded) AK-74M rifle equipped with a GP-25 40 mm underbarrel grenade launcher. Crimea, March 2014.
Photo credit: Andrei Kanishchev

Many of these combatants, both in and out of uniform, were observed carrying weapons exhibiting a great degree of customisation. This included military issue optical sights like the NPZ-produced 1P76, 1P78, and PK1; night vision devices (NVD) including the 1PN93-2 night vision sight; GP-25 and GP-30 (including GP-30M) type 40 mm underbarrel grenade launchers; and PBS series suppressors. Other various commercially available accessories were noted, including rail mounting systems, vertical foregrips, and aftermarket pistol grips. Commercially available optical sights were also seen, including unlicensed copies of EOTech reflex sights, as well as the Leapers UTG ITA, and Hakko BED-5. Whilst some may suggest that non-standard modification of weapons indicates non-military fighters, this is no longer a telling sign in many modern military forces.

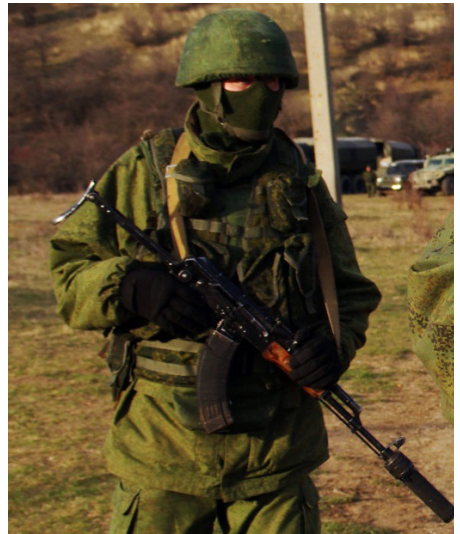


Photo 7 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an AKMS rifle, Crimea, March 2014. Note PBS-1 type suppressor.
Photo credit: AFP Photo/Alexey Kravtsov



Photo 8 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an (unloaded) AK-74M rifle equipped with an NPZ PK1 optical sight. Crimea, March 2014.

Photo credit: Ilya Varlamov



Photo 9 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an AK-74M equipped with an NPZ 1P78 optical sight.

Photo credit: Unknown source

Indeed, Ukrainian soldiers and members of the Ukrainian National Guard (following its formation in March) were also seen to be accessorising in this way ('UKRAINIAN ARMY AND SPECIAL FORCES', 2014). However, it is more likely that the modifications documented in Crimea reflect the latitude given to professional elements of the Russian military, including but not limited to special operations forces (SOF), some of whom may purchase accessories for their weapons. Many of these are produced by Russian firm Zenitco, including the RTK-3 muzzle brake observed on a number of AK-74M rifles. The greatest extent of customisation was seen amongst the force that captured Belbek air station (Crimea) in late March, whose AK-74M rifles featured Russian-made translucent magazines, American-style sliding stocks, applied camouflage, and suppressors.



Photo 10 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an AK-74M rifle, Crimea, March 2014. Note EOTech type reflex sight, and Zenitco accessory rails, vertical foregrip, DTK-1 muzzle brake.

Photo credit: European Press Agency

Also documented were the AK-74M's predecessors in Russian service; the AKS-74N, with skeletal folding stock, sight rail, and with either plum-coloured polymer or earlier wooden furniture; and the compact AKS-74U variant. Previous generation AKM and especially folding-stock AKMS rifles, chambered for the original 7.62 x 39 mm cartridge, were also seen. These are still in limited Ukrainian and Russian use alongside their 5.45 x 39 mm successors, notably with Russian naval infantry, armoured, and SOF units. In addition to pro-Russian separatists throughout the conflict, some AKMS rifles were carried by the 'green men', often with PBS-1 suppressors.

The most common longer range rifle in use was, and remains, the SVD-designated marksman rifle (often considered a sniper rifle). The standard fixed wooden butt-stock variant persists in eastern Ukraine, but the Crimean incursion was characterised in part by the abundance of the SVDS model. This was designed for Russian paratrooper use, with a tubular folding butt-stock. Both types are fitted primarily with PSO-1 4x magnification optical sights. The SVD is chambered for the 7.62 x 54R mm cartridge, as are many of the machine guns of this conflict.

Both light machine guns (LMG) and general purpose machine guns (GPMG) were observed in the Russian incursion into Crimea. The RPK-74M light machine gun was widely observed, as were the PKM and PKP GPMGs. While the PKM is common throughout conflict zones the world over, the PKP 'Pecheneg' machine gun that supplements it in Russian service is rarely seen elsewhere, and has not been procured by Ukraine. Distinguishable by its raised carrying handle and ribbed barrel, it is furnished as standard in black polymer.



Photo 11 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an SVDS sniper rifle equipped with PSO-1 scope. Crimea, February 2014.

Photo credit: European Press Agency



Photo 12 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an RPK-74M light machine gun. Crimea, February 2014.

Photo credit: European Press Agency



Photo 13 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with a PKM general-purpose machine gun. Crimea, March 2014.

Photo credit: Ilya Varlamov



Photo 14 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with a PKP light machine gun. Simferopol, March 2014.

Photo credit: Sean Gallup/Getty Images

Both the AS Val (Вал; 'Shaft') suppressed assault rifle and the VSS *Vintorez* (Винторез; 'Thread cutter') suppressed designated marksman rifle (often considered a sniper rifle) have been documented in Crimea. Both of these are Russian designs, intended for use against armoured personnel at up to 400 metres (Popenker, 2012). These designs are integrally suppressed (i.e. designed to be as quiet as possible) and chamber a specialised 9 x 39 mm cartridge. Both are in service with various Russian SOF units.

Another uncommon weapon seen in the region is the GM-94 grenade launcher, observed in early March in the hands of masked personnel in civilian clothing (Jenzen-Jones, 2014). This is a pump-action Russian design, firing a proprietary 43 mm cartridge. It has gained popularity with Russian SOF, and has also been exported to Ukraine, Kazakhstan, and Libya.

PM handguns were seen in use with suspected Russian forces, Ukrainian government forces, and pro-Russian separatists. A common handgun in the region, the PM is chambered for the 9 x 18 mm cartridge. Suspected Russian troops in Crimea were documented carrying the PYa handgun. Chambered for 9 x 19 mm, the PYa is also capable of firing the 7N21 overpressure cartridge². Apart from limited reports of small scale use in Kazakhstan, the PYa is not known to have been exported from Russia.

Russian forces in Crimea also made use of AGS-17 and AGS-30 automatic grenade launchers (AGL), as well as anti-tank weapons including the single-shot, disposable RPG-18 and RPG-22 (similar to the US LAW system), and the more advanced Russian RPG-26.



Photo 15 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an AS suppressed assault rifle.

Photo credit: Ivan Sekretarev/AP

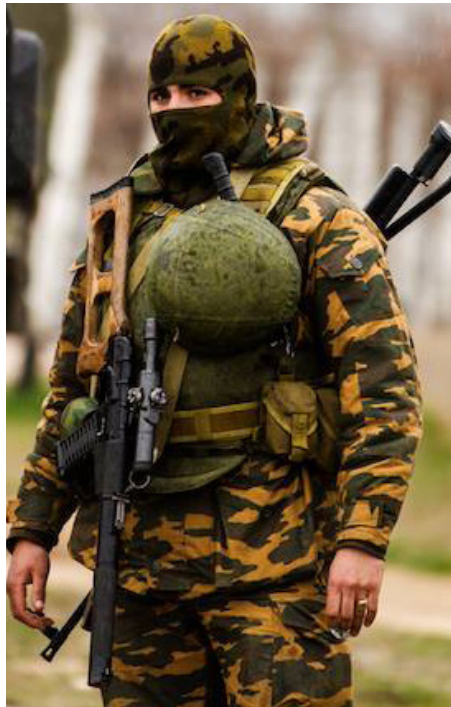


Photo 16 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with a VSS suppressed designated marksman rifle.

Photo credit: Jan Husar



Photo 17 Unidentified uniformed combatant (presumed to be a Russian soldier) armed with an AKMS rifle and RPG-18 anti-tank weapon. Crimea, February 2014.

Photo credit: Reuters

ONGOING CONFLICT IN EASTERN UKRAINE

Heavier, more exotic weapon systems have proven less common as the conflict spread towards other parts of eastern Ukraine. As some commentators have remarked, the SALW picture of this conflict shifted as the Russian annexation of Crimea was completed (Pulkki, 2014)

Whilst operations in Crimea were carried out by well-equipped and trained units possessing the full range of small arms and light weapons expected from a modern military, Pro-Russian separatists active in eastern Ukraine have clearly had more restricted access, with some resorting to civilian and expedient weapons. Another telling indicator was the widespread presence of modern ballistic protection amongst troops in Crimea, something that remains notably rare in eastern Ukraine. A comparative video analysis also highlights differences in training and equipment (see, for example, 'marwin3D', 2014).



Photo 18 A representative range of Kalashnikov rifle and machine gun types in pro-Russian militia service. These examples were allegedly captured from fighters of the 'Donbass People's Militia', in June 2014. From left to right: late 1980s production AK-74 with 'plum' coloured polymer furniture (x 2), RPK-74, PKM, RPK-74 and 1970s-80s vintage AK-74 with wooden furniture and fitted with GP-25 underbarrel grenade launcher.

Photo credit: UA Politics

A separatist fighter interviewed by Radio Free Europe (RFE) reported that his unit had been provided with only minimal training, and that they had received as armament “grenade launchers, automatic rifles, pistols, and grenades”. The militia level of training and equipment is evident in videos of combat in contested areas, and shows little improvement in capability from the early days of hostilities (Ruptly TV, 2014a). RFE’s source also made mention of sniper rifles and ‘zenits’; a generic Russian term for anti-aircraft weapons, but in this case reported to refer to MANPADS (RFE/RL, 2014). In contrast to some insurgent and militia organisations, attempts have apparently been made to assign these various weapon types to military-style roles, and where possible, to operators with previous experience. The aforementioned interviewee, for example, was given command of a ‘machine gun squad of from three to six guys’. Another video released by Ukrainian government media revealed the disposition of a typical separatist infantry squad in more detail (Військове телебачення України, 2014с).

Box 1: Arms and munitions of a typical separatist fighting unit (July, 2014)

Group “Romashka”

Assault

Romashka - AKS-74, PM, RGD-5, RPG-26
 Lyutyj - AKS-74, RPG-26, PM
 Krik - AKMS, RPG-26, PM
 Dober - AK-74, PM
 Multik - AK-74, PM
 Azov - AKS, PM
 Kot - AKS, PM (machine gun)
 Prohor ? - SVD

Support

Solovej - PM, AKS (machine gun)
 Ingus - PM, AKS
 Malysh - AKS
 Maloy - AKS
 Test - PM, AKS,
 Bodya - AKS
 Baj - PM, AKS

Total - 15

This box was translated verbatim from the video pictured below.

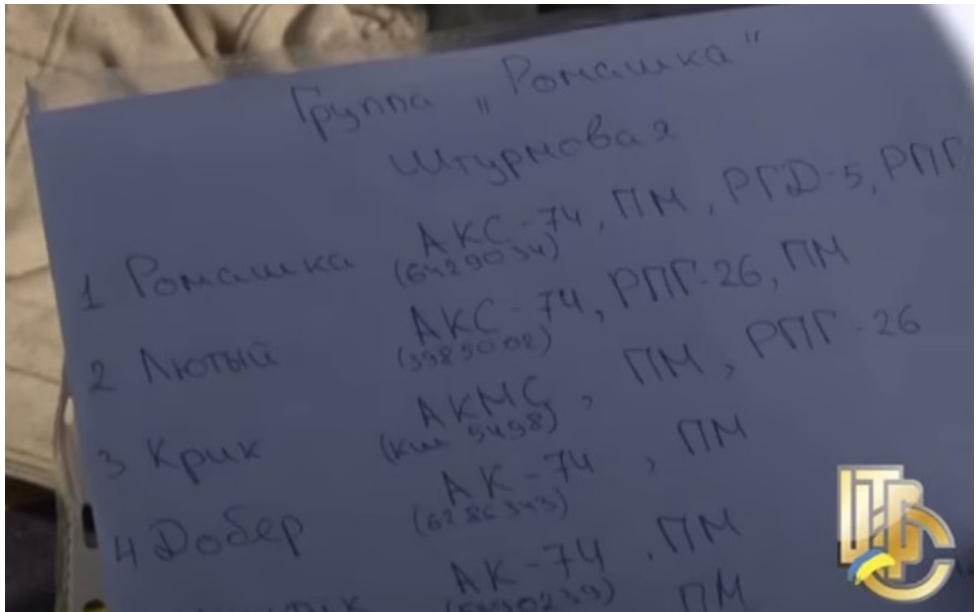


Photo 19 Original video still showing the armament of pro-Russian separatist group “Romashka”, as outlined in Box 1. Taken from Військове телебачення України, 2014

SMALL ARMS

SELF-LOADING RIFLES

Older and visibly worn AK variants predominate in separatist arsenals, including AKM, AKMS, AKS-74U rifles and older AK-74 variants fitted with plum-coloured polymer or initial-production laminated wooden furniture (see Annexe 1 for a description of common AK variants documented in the course of the Ukraine conflict). This stands in contrast to the AK-74M rifles carried by the uniformed combatants, presumed to be Russian troops, in Crimea. The National Guard of Ukraine, formed in March 2014 in response to the pro-Russian separatist threat, represent the other side of this coin. Aside from their yellow armbands, these men are distinguished by their own eclectic mixture of uniform and equipment, including a similar level of freedom in the application of small arms accessories. These ad hoc efforts by both pro and anti-Russian fighters reflect a global fashion trend driven by the firearms industry in the West, and mirror the more professionally configured AKs previously used by Russian SOF in Crimea. As seen earlier in the conflict, some of these accessories are Western in origin, most likely purchased on the commercial civilian market.

Weapons carried by these men betray a lack of training and experience relative to SOF, or even regular army troops. The AKS-74 rifle in Photo 20, below, is bristling with accessories. It is fitted with a Saiga type aftermarket side-folding stock, functionally and practically identical to the standard stock it has replaced. If anything, its greater overall length may pose a slight disadvantage to its user, due to the bulk of his body armour. A US-made UltiMAK railed gas tube³ and handguard are fitted to which a tactical light, vertical foregrip, and Aimpoint PRO reflex sight (or copy) are mounted. Uncommonly for a weapon chambered for 5.45 x 39 mm, it is also fitted with a suppressor, of an unidentified type. Suppressed AKS-74 rifles have been seen in service with several Ukrainian government troops (see, for example, Wroughton, 2014).

Some of this customisation may be prompted by a desire to 'look the part' rather than achieve any genuine tactical benefit. One guardsman was photographed with an Aimpoint Micro H-1 fitted backwards on his gas block accessory rail, both rendering it useless as well as blocking the use of the weapon's built-in 'iron' sights. The weapon's standard issue sling was also attached to the weak point of the cleaning rod mounted under the barrel. Another guardsman had fitted a green coloured EOTech 'Zombie Stopper II' reflex sight to his AK-74 (see EOTech, 2014). One distinctly Eastern Bloc-style accessory used by both sides is the unusual brown strapping seen wound around many butt-stocks. This is apparently a ready-access tourniquet that may also secure a field dressing to the weapon. In the case of AK-74 variants with side-folding skeleton stocks, the dressing is often seen inserted into the void in the stock itself.



Photo 20 A Ukraine National Guard soldier with a heavily accessorised and suppressed AKS-74 rifle. Slavyansk, July 2014.
Photo credit: Прес-центр АТО



Photo 21 A Ukraine National Guard soldier armed with a heavily accessorised AKM rifle. Note Aimpoint Micro H-1 sight installed incorrectly. Slavyansk, July 2014.

Photo credit: Associated Press



Photo 22 Ukraine National Guard soldiers armed with pre-1991 type AK-74 rifles, one customised with a EOTech 'Zombie Stopper' sight. Note brown strapping on buttstocks of rifles.

Photo credit: 'letropico'

In addition to the expected AK types, smaller numbers of AR-10 and AR-15 rifles have also been documented in service with pro-Russian separatists, in the form of the Ukrainian-made Zbroyar Z-10 and Z-15 (Zbroyar, 2014). These rifles are not standard military weapons but semi-automatic civilian sporting and recreational firearms. The presence of such weapons, and their customisation, likely reflects the involvement of civilian hobbyist shooters in the separatist movement rather than the foreign military or private military connection claimed by some commentators (see, for example, Ripley, 2014). Soviet-era SKS semi-automatic rifles were also documented in the hands of pro-Russian separatists. These rifles, chambered for the 7.62 x 39 mm cartridge later used in the AK rifle, first entered service in 1945.

SVD self-loading designated marksman rifles have seen service in eastern Ukraine, commonly being employed by both Ukrainian government forces and pro-Russian separatist units. Limited numbers of *Tigr* (Тигр; 'tiger') rifles – a derivative of the SVD, intended for the civilian market – have also been documented in service with separatist groups (СБ України, 2014с). In at least one case, later-production designated marksman rifles were documented in the hands of a separatist group, notably two VSS rifles (Pseush, n.d.). These Russian-produced weapons are analogous to those seen in the hands of presumed Russian forces during the annexation of Ukraine, and are not known to be in the inventory of any Ukrainian security forces. Their appearance at this later stage of the conflict is noteworthy.



Photo 23 A pro-Russian separatist armed with a Zbroyar Z-15 rifle helps to detain Ukrainian military personnel. Note the sound suppressor and Zeiss telescopic sight. Simferopol, March 2014.
Photo credit: AAP



Photo 24 A pro-Russian separatist fighter posing with a VSS suppressed designated marksman rifle.
Photo credit: Ruslan Pseush



Photo 25 Members of the Donbass Militia armed with a mixture of AKS-74 rifles and SKS carbines, June 2014.
Photo credit: russiancommun

LIGHT MACHINE GUNS

Light machine guns have been documented with great frequency, primarily the Kalashnikov-based RPK-74. Separatist groups, as well as Ukrainian National Guard units, have also employed the earlier RPK, chambered for 7.62 x 39 mm. In some cases, pro-Russian separatist units have been documented employing the RPK-74 as their primary arms, with up to six combatants in an eight man squad being equipped with these weapons. Belt-fed machine guns, whilst observed less often than during Russian operations in Crimea, have also been documented on both sides, and include PK and PKM GPMGs, as well as RPD light machine guns. The latter has been documented primarily in the hands of separatist groups (DNI, 2014; Pseush, n.d.). At least two Russian-produced PKP 'Pecheneg' light machine guns have also been observed, ostensibly in eastern Ukraine (Pseush, n.d.). These weapons are significant in that the PKP is not known to be in service with Ukrainian forces, and has only been exported outside of Russia in limited quantities. As described above, the PKP was documented in the hands of suspected Russian forces in Crimea.



Photo 26 A pro-Russian separatist armed with an RPK-74 light machine gun mans a checkpoint outside Slovyansk, eastern Ukraine, Friday, May 16, 2014.

Photo credit: Alexander Zemlianichenko/AP Photo



Photo 27 Two PKP general-purpose machine guns, purportedly photographed in eastern Ukraine, by a pro-Russian separatist fighter.

Photo credit: Ruslan Pseush

SHOTGUNS & BOLT-ACTION RIFLES

As in other internal conflicts, those without access to military weapons sometimes make use of sporting guns, including a wide variety of shotguns from aging break-open designs to modern semi-automatic models such as the Russian Saiga 12 or Turkish Akkar Altay types, generally chambered for various 12 gauge cartridges. An Armscor Model 30 pump-action shotgun, produced in the Philippines, was also documented in service with pro-Russian separatists (Pseush, n.d.). Bolt-action sporting rifles in calibres from .308 Winchester down to .22 LR have also been observed, alongside vintage military rifles including models of the Mosin and Mauser types, which are chambered for 7.62 x 54R mm and 7.92 x 57 mm, respectively. The Mosin M91 rifle was the standard issue Russian infantry rifle from 1891 until its replacement by the SKS in 1945. It is therefore not surprising that examples of both weapons would emerge in the hands of combatants under these circumstances. At least one Deutsche Sportmodell .22 LR training rifle, produced prior to the Second World War, was also documented. Quite often, these weapons have been in civilian possession for some time. In one case (see Photo 28, below), a pro-Russian separatist fighter claimed that the 'sawn-off' double-barrelled, break-action percussion shotgun he posed with had been in his family "for 100 years".



Photo 28 A pro-Russian separatist fighter armed with a break-action, double-barreled shotgun which has been shortened ('sawn-off'). Slovyansk, May 18, 2014.
Photo credit: Yves Choquette



Photo 29 A pro-Russian separatist armed with Turkish made Akkar Altay gas-operated semi-automatic sporting shotgun. Slovyansk, eastern Ukraine, April 25, 2014.
Photo credit: AP Photo/Sergei Grits



Photo 30 A pro-Russian separatist in eastern Ukraine poses with his Mosin M91/30 rifle. The rifle has been camouflaged, presumably for employment in the sniper role.

Photo credit: Ruslan Pseush

HANDGUNS

Handguns are not in themselves significant military weapons. However, like their larger counterparts, they can tell the observer something about the user, their organisation, and lines of procurement. For example, despite the availability of Ukrainian and Russian-designed sidearms, a Ukrainian general⁴ was recently pictured with an Austrian-made Generation 3 Glock 17 pistol, chambered for 9 x 19 mm. Otherwise, Russian designs dominate, as expected. The ubiquitous 'Makarov' PM, carried in a shoulder holster, even featured as a bizarre bridal accessory at a recent wedding between two pro-Russian separatists (RuptlyTV, 11 July 2014). The larger and select-fire Russian Stechkin APS was originally designed as a personal defence weapon for vehicle, artillery, and RPG crews, but did not meet that requirement. It later saw use with Russian interior security forces, where it can still be found in use today. Igor "Strelkov" Girkin, leader of the Donbass People's Militia and self-declared governor of Luhansk has been pictured carrying an APS. Regardless of the specific source of this example, this is quite possibly a deliberate statement of his alleged military and law enforcement background.



Photo 31 Former Ukrainian Defence Minister Valeriy Heletey pictured during the recapture of Slovyansk in July 2014. He is armed with a Generation 3 Glock 17 pistol in retention holster with lanyard.
Photo credit: Press Central ATO



Photo 32 Igor 'Strelkov' Girkin pictured with his holstered APS pistol, July 2014.
Photo credit: '@93Krivtsov'

IMPROVISED, CONVERTED & CRAFT-PRODUCED SMALL ARMS

As pistols are under strict legal control in Ukraine, many of the pistols observed are not actually lethal weapons, but rather blank-firing or 'traumatic' pistols. These are replicas and/or marginally effective less-lethal weapons chambering blank, rubber ball, and irritant powder cartridges. They may deter an attacker or perhaps serve as a prop for those wishing to be seen to participate in the conflict, but have little practical value. The example pictured in Photo 34 is a blank firing replica of the Colt Government Model, produced by the German company Umarex or one of its subsidiaries. The 'stainless steel' finish and replacement 'Delta Elite' grips lend it a very realistic appearance, but the markings on the slide and the presence of an external extractor reveal it as a less-than-effective weapon (НикВести, 2014). A weapon which appears to be a Turkish Zoraki R1 traumatic revolver, documented during clashes in Odessa, is of similarly limited utility.



Photo 33 A pro-Russian activist aims a pistol, apparently a Turkish Zoraki R1 traumatic revolver, at supporters of the Kiev government during clashes in the streets of Odessa May 2, 2014.

Photo credit: Reuters/Yevgeny Volokin



Photo 34 A blank-firing replica Colt 1911 pistol, captured by Ukrainian police in Mykolayiv, April 2014. The words 'Made in Germany' can be discerned on the slide.

Photo credit: nikvesti.com

As in other conflicts, craft-produced small arms designs have also been reported. In Ukraine, the most common of these are simple blowback submachine guns built on a tubular receiver in the long tradition of types such as the Sten gun of Second World War vintage. One documented machine pistol design (see Photo 35, below) was originally produced during the early 1990s, supposedly at the Zavod Arsenal plant in Kiev. It appears that pro-Russian separatists may have reverse engineered and produced examples of this relatively simple design (Johnson, 2014a). In a video entitled 'development of new small arms for the RDG', pro-Russian separatists in the city of Donetsk showcase a submachine gun ('N Donetsk', 2014). It is possible they have received support from former plant engineers or possess manufacturing equipment tailored to this particular design, as other common improvised designs would be simpler to manufacture⁵. Various other craft-produced firearm designs have been documented previously in Ukraine (ImproGuns, 2013).



Photo 35 A Submachine gun claimed to be craft-produced by pro-Russian separatists.
Photo credit: 'N Donetsk'

OTHER SMALL ARMS

When supplies of arms are limited, desperate combatants will even carry weapons of almost zero offensive utility, including air weapons. These vary greatly, from traditional break-action piston guns to more modern types like the Chinese Norinco B3-1, an example of which was captured in Mykolayiv in April 2014. Though superficially resembling the Chinese Type 56-2 AK type rifle, this is actually a low-powered air rifle suitable for target shooting and small vermin. Small calibre rifles chambered for .22 LR are somewhat more capable in terms of terminal ballistics, but still of questionable value to even paramilitary forces. Like other expedient types, these have likely been sourced from civilian homes.

Civilian type firearms are not only the preserve of those with only limited means, however. A bodyguard employed by controversial pro-separatist Ukrainian politician Oleg Anatolyevich Tsaryov was seen at a rally in Luhansk in May. He was wearing military-style clothing and appeared to the casual observer to be armed with a German Heckler & Koch MP5 submachine gun, a weapon chambered for the ubiquitous 9 x 19 mm cartridge and favoured by law enforcement and special operations forces the world over. In fact, he was carrying a German Sport Guns GSG-5, a .22 calibre semi-automatic replica intended for the civilian recreational market. It was fitted with an accessory sliding/folding stock unique to this type of replica (HKParts.net, n.d.). Whilst potentially lethal, this weapon would be only marginally effective in this kind of close personal protection role.



Photo 36 A Norinco B3-1 air rifle captured along with various expedient weapons by police in Mykolayiv, April 2014.
Photo credit: Forgotten Weapons



Photo 37 A pro-Ukraine supporter with a .22 LR single-shot rifle on the streets of Slovyansk, April 2014.
Photo credit: ITAR-TASS/Barcroft Media

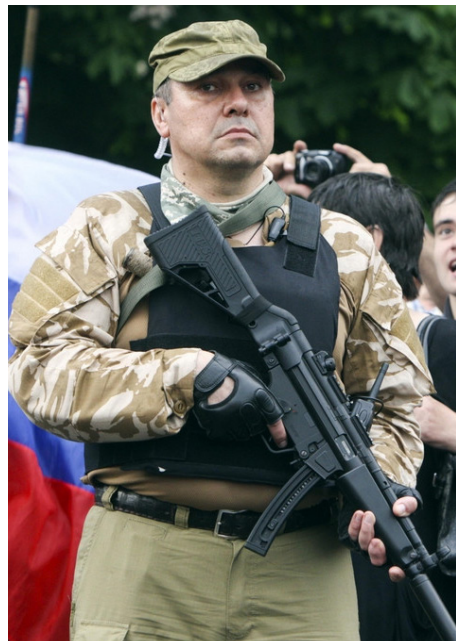


Photo 38 A bodyguard employed by Oleg Tsaryov stands guard with a .22 LR calibre GSG-5 carbine. Luhansk, 12 May 2014.
Photo credit: Valentyn Ogirenko

Submachine guns (SMGs) were a key component of Soviet infantry armament during the Second World War. The adoption of the AK rifle after the war rendered this type of weapon obsolete in Soviet service, but millions had been manufactured and many were kept in arms stockpiles. Examples of the two primary Soviet SMGs of the WWII-era have been documented in the course of this modern conflict (Novayagazeta, 2014; Rusinform.net, 2014). The PPSH-41 (*Pistolet Pulemyot Shpagina* model of 1941) can be distinguished by its wooden stock, and uses both 71-round drums and 35-round box magazines. It has a very high rate of fire and is chambered for the 7.62 x 25 mm pistol cartridge. It was augmented in Soviet service in 1943 by the PPS-43 (*Pistolet Pulemet Sudaeva*, model of 1943), which was simpler to manufacture. The PPS-43 has a folding metal stock and fires the same 7.62 x 25 mm cartridge from box magazines only and at a lower rate of fire. The ammunition used by these SMGs has not been in service with the Soviet or Russian military since the PM pistol was adopted in the early 1950s, and scarcity of available ammunition may explain why these SMGs are not seen more often in this conflict.



Photo 39 A pro-Russian separatist fighter with carrying a PPSH-41 submachine gun.
Photo credit: Rusinform.net



Photo 40 A pro-Russian separatist fighter armed with a PPS-43 submachine gun.
Photo credit: 'Novayagazeta'

LIGHT WEAPONS

ANTI-MATERIEL RIFLES

A truly obsolete Russian military rifle pressed back into service for this conflict is the Second World War-era PTRS-41 anti-tank rifle (now considered an anti-materiel rifle or AMR; see Madurski, 2014). This 14.5 x 144 mm rifle was deployed by pro-Russian separatists near the eastern Ukrainian town of Slovyansk, and in the region of Donetsk airport in May this year. It seems likely that weapons of this vintage would require some gunsmithing in order to be made serviceable. This may explain one example fitted with a muzzle brake from the equally old PTRD (Schlein, 2014). The rifle itself has not seen service since the 1950s, but the 14.5x114 mm cartridge is still available due to ongoing Russian and Ukrainian use as a heavy machine gun cartridge. The PTRD itself was later noted as being in active use in Ukraine as well. One example of the PTRS observed in service with a separatist 'mechanised brigade' was produced in 1942 ('Сводки от ополчения Новороссии', 2014).

The modern Russian ASVK anti-materiel rifle has also been documented in service with separatist forces in at least one case. The ASVK is chambered for the 12.7 x 108 mm cartridge, most commonly seen in use with heavy machine guns, and is capable of engaging targets at ranges in excess of 1000 m. The ASVK is a derivative of the earlier KSVK, produced by the Degtyarev Plant (Завод имени В.А. Дегтярев; abbreviated 'ZiD') which did not enter production until the late 1990s. The ASVK is much more recent; the Russian military has only introduced the ASVK in limited numbers, beginning less than two years ago, and is not known to have exported any of these rifles. The weapon is not in the inventories of Ukrainian government forces, and has not otherwise been documented in the hands of a non-state armed group.



Photo 41 Pro-Russian separatists stand next to newly dug trenches at a fortified front line rebel position near the eastern Ukrainian town of Slovyansk. The combatant in the trench carries a PTRS-41 anti-tank rifle, fitted with a muzzle brake taken from a PTRD anti-tank rifle. May 16, 2014.

Photo credit: Reuters/Yannis Behrakis



Photo 42 A pro-Russian separatist poses with a Russian made ASVK anti-materiel rifle.
Photo credit: Ruslan Pseush

HEAVY MACHINE GUNS

Heavy machine guns including the 12.7 x 108 mm DShKM and later NSV and NSVT, as well as the 14.5 x 114 mm KPV and KPVT have also seen use with separatist forces, in some cases having been salvaged from armoured fighting vehicles. Ukrainian government forces have also employed heavy machine guns, typically mounted to armoured fighting vehicles.

One type of machine gun documented may serve a primarily symbolic function, harking back to past victories. The Maxim PM1910 machine gun is complex and difficult to maintain by modern standards, with no ready supply of spare parts. Although chambered for 7.62 x 54R mm like many general-purpose machine guns of today, it is heavy, water-cooled, and was designed to be served by a crew of three. As such, it has limited tactical utility in modern conflict, but has twice been observed in eastern Ukraine, deployed alongside modern weapons and ostensibly ready for action. It is likely that such weapons have been sourced from the historical re-enactment community, or possibly from museums; one example, at least, is not in functioning order (see Photo 44, below).



Photo 43 Components of 12.7 x 108 mm and 14.5 x 114 mm heavy machine guns captured from separatist forces.
Photo credit: Tsenzor.NET



Photo 44 Members of a pro-Russian Crimean 'self-defence' unit with a Maxim PM1910 machine gun deployed near a Ukrainian military unit in the village of Perevalnoye, outside Simferopol. Note that this weapon is missing an essential component (mainspring) and will not function. March 2014.

Photo credit: EPA



Photo 45 Pro-Russian rebels armed with an NSV heavy machine gun defend a position on the frontline near the village of Krasnodon, eastern Ukraine. Note the combination of BZT/BZT-44M armour piercing incendiary tracer (API-T) and MDZ high explosive incendiary (HEI) cartridges.

Photo credit: Russinform.net

UNDERBARREL GRENADE LAUNCHERS & AUTOMATIC GRENADE LAUNCHERS

Whilst notably less common than in use with Russian troops in Crimea, underbarrel grenade launchers have also been documented in eastern Ukraine, in the hands of both Ukrainian government forces and separatist groups. To date, only GP-25 models have been observed, along with supplies of 7P17 VOG-25 and 7P24 VOG-25P high explosive fragmentation (HE-FRAG) projectiles. Automatic grenade launchers are also in service with pro-Russian separatist groups. Some AGS-17 AGLs, likely captured from Ukrainian government forces, have also been documented in service with separatist forces, with at least one example having been re-sprayed a neon green colour (Військове телебачення України, 2014a). AGS-17 AGLs were also employed by Ukrainian forces in their skirmishes with pro-Russian separatists.



Photo 46 7P17 VOG-25 grenades captured from pro-Russian separatist militants in eastern Ukraine.
Photo credit: Glavnoe



Photo 47 A Ukrainian government soldier fires an AGS-17 automatic grenade launcher in eastern Ukraine.
Photo credit: Efrem Lukatsky / AP Photo

PORTABLE ANTI-TANK SYSTEMS

In contrast to the large numbers of single-shot, disposable anti-tank rocket launchers observed in Crimea, pro-Russian separatists operating in eastern Ukraine are more likely to be seen with the 'legacy' RPG-7 rocket-assisted recoilless weapon. Various RPG-7 projectiles have been documented in use, including PG-7, PG-7L, PG-7M, and PG-7S high explosive anti-tank (HEAT) rockets, OG-7 HE-FRAG projectiles, TBG-7 type thermobaric rockets⁶, and even a subcalibre training round. Unlike recent conflicts in the Middle East and North Africa, where PG-7 and other older rocket-assisted projectiles have proved the dominant type, the conflict in Ukraine has showcased the use of far greater quantities of more recent projectile types, including the PG-7M, PG-7S, and PG-7L. One example of an OG-7 projectile, reportedly recovered by Ukrainian troops from pro-Russian separatists, bears markings indicating it was produced in Russia in 2001. It is fitted with a GO-2 impact fuze, produced by the Degtyarev Plant (ZID) located in Kovrov, Russia. Markings on the fuze indicate it was produced in 1992 ('Pasha K.', 2014).



Photo 48 Pro-Russian militant armed with RPG-7V and PG-7VM projectile. Visible markings indicate the launcher was manufactured at a factory in the Soviet Union (now Russia) in 1983. Donetsk, May 2014.
Photo credit: Reuters



Photo 49 An OG-7 HE-FRAG projectile produced in Russia in 2001, fitted with a GO-2 fuze, produced in Russia in 1992.
Photo credit: 'Pasha K.'

RPG-18 and RPG-22 systems have also been acquired by pro-Russian separatists, as have a handful of RPG-26 rocket launchers. A photo published in July by the Ukrainian ATO Press Centre shows crates of RPG-18 rocket launchers with inventory paperwork indicating they were stored in a Russian military facility as recently as June 2011. Another Russian light weapon system, the MRO-A disposable incendiary rocket launcher, has also been documented in eastern Ukraine (УНИАН, 2014a). The MRO-A launches a 74 mm rocket carrying a thermobaric warhead, designed to engage structures. This system is not known to have been exported outside of Russia, and its presence in the hands of pro-Russian separatists is striking (Smallwood, 2014a). Other incendiary weapons are in service with pro-Russian separatists. Older, larger calibre RPO-A shoulder-fired recoilless weapons have also been documented in the hands of separatists on several occasions, often in notable quantities (МВД УКРАИНЫ, 2014; Glavnoe News, 2014; УНИАН, 2014a).



Photo 50 Inventory paperwork from a crate of RPG-18 rocket launchers, recovered from pro-Russian separatist forces.
Photo credit: ATO Press Centre

In one instance, a cache of weapons seized by Ukrainian security forces after fighting in Slovyansk contained a significant quantity of recently-produced RPO-A and MRO-A launchers (MoY, 2014; BB, 2014). One crate of RPO-A launchers displayed markings indicating they were produced in 2002, and an MRO-A launcher documented had production markings showing its year of manufacture as 2008 (see Photos 53 and 54, below).



Photo 51 RPG-18 systems in their transit cases, captured from pro-Russian separatist forces in eastern Ukraine. July 11, 2014.
Photo credit: Прес-центр АТО



Photo 52 RPG-26 anti-tank rocket launcher documented in service with pro-Russian separatist forces.
Photo credit: C.J. Chivers / New York Times



Photo 53 A seized MRO-A launcher with markings indicating it was produced in Russia, in 2008.
Photo credit: Міністерство оборони України



Photo 54 RPO-A shoulder-fired recoilless weapons. The markings on the crate at the bottom edge of the photograph indicate they were produced in Russia, in 2002.
Photo credit: Внутрішні війська МВС України

CREW-SERVED RECOILLESS GUNS & MORTARS

Augmenting the portable anti-tank systems is the SPG-9 recoilless gun, seen in numerous videos released on pro-Ukraine government channels online (see, for example, Військове телебачення України, 2014a). Captured ammunition for this system seems to be in good supply, with larges caches of PG-9 type HEAT rockets (see Photo 55, below) and OG-9 HE-FRAG projectiles, as well as PG-15P propelling charges, having been recovered from separatists (Військове телебачення України, 2014b). PG-9M rockets, specifically, appeared throughout eastern Ukraine (Salem, 2014b).

82 mm and 120 mm mortar tubes and mortar projectiles have also been documented in eastern Ukraine. PM-43 type 120 mm and BM-37 type 82 mm mortar tubes have both been identified, as have 82 mm O-832D HE-FRAG and 120 mm OF-842 HE-FRAG and S-842 illumination projectiles. All of these were produced in the former Soviet Union. 120 mm projectiles were seen employed with various fuzes, including the M-5 impact fuze, and the T-1 time fuze. One Russian volunteer told reporters the separatist group he joined was using a mortar tube produced in 1944 (Grove & Strobel, 2014). In at least two claimed cases, pro-Russian separatist forces associated with the so-called 'Donetsk People's Republic' have produced an improvised sound suppressor for 82 mm mortar tubes ('bigadir', 2014; 'golan1666', 2014). Government forces, as well as pro-Russian separatists, have employed the 120 mm 2B16 *Nona-K* breech-loaded rifled mortar system, and government forces have also been documented using the 2B9M *Vasilek* automatic, breech-loaded smoothbore mortar. The latter is fed from a four round *en bloc clip* and can fire four standard 82 mm mortar projectiles in approximately two seconds.



Photo 55 Numerous PG-9 type rounds recovered from a pro-Russian separatist cache, July 2014.
Photo credit: Прес-центр АТО



Photo 56 Pro-Russian separatists associated with the Donetsk People's Republic demonstrate an improvised suppressor design for a BM-37 type 82 mm mortar tube.
Photo credit: 'golan1666'

ANTI-TANK GUIDED WEAPONS

Pro-Russian separatists have also been documented with sizable numbers of anti-tank guided weapons (ATGW) and associated missiles (Лента Новостей, 2014). These include the 9K111 *Fagot* (Фарот; 'Bassoon'), as well as the more advanced 9K114 *Shturm* (Штырм; 'Storm'), and tripod-mounted 9K115 *Metis* (Метис; 'Mongrel') ATGWs (see Photo 59 below). These have all been employed in combat operations by separatist forces. The basic model of the 120 mm 9K111 (NATO reporting name: AT-4 Spigot) is capable of penetrating up to 400 mm of rolled homogenous armour (RHA) and has a maximum range of 2000 metres. The 94 mm 9K115 (AT-7 Saxhorn) is a far lighter, more portable system. Its 2.5 kg warhead can penetrate up to 550 mm RHA, but has a shorter range of up to 1000 metres. The largest of the three systems, the 130 mm 9K114 (AT-6 Spiral), is a vehicle-mounted system able to penetrate 600 mm of RHA. It also boasts the longest range of the three, at up to 5000 metres.

One ATGW stands out from the others documented in eastern Ukraine. Whilst the 9K111, 9K114, and 9K115 systems are present in Ukrainian government stockpiles, the 9K135 *Kornet* (Корнет; 'Cornet') is not. The *Kornet* (NATO reporting name: AT-14 Spriggan) is a comparatively modern ATGW, in service with Russian military forces. *Kornet* system components were found discarded on a battlefield near Starobesheve, in eastern Ukraine (Tsvetkova & Vasovic, 2014). The *Kornet* system was identified on the basis of discarded missile tubes, bearing markings indicating they held 9M133 missiles with 9N156-1 tandem charge HEAT warheads. The markings also indicated that the missiles were produced in Russia in 2007 (see Photo 58, below). 9K135 systems have been exported to several other states, including many in the Middle East and Africa, and have been documented in the hands of non-state armed groups in Gaza, Iraq, Libya, and Syria (see, for example, Smallwood, 2014b).

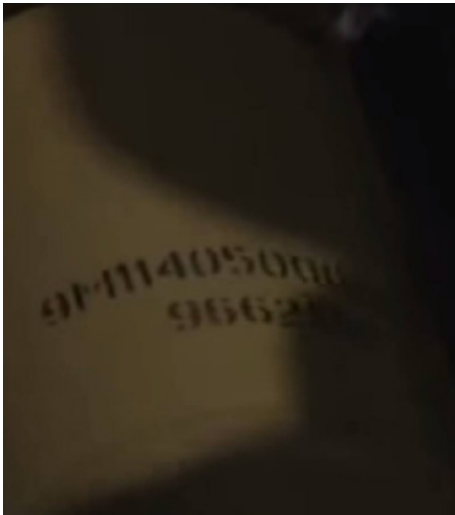


Photo 57 A 9M114 missile tube, a component of the 9K114 *Shturm* ATGW system, captured from pro-Russian separatists in eastern Ukraine.

Photo credit: 'IC'



Photo 58 Discarded 9M133 missile tube, left at the scene of clashes between Ukrainian government forces and pro-Russian separatists, near Starobesheve, in eastern Ukraine.

Photo credit: Maria Tsvetkova / Reuters



Photo 59 A pro-Russian militant readies a 9P151 anti-tank missile launcher, part of a 9K115 *Metis* anti-tank guided weapon, Slavansk, May 2014. Note the pouch of 40 mm projectiles for a GP-25 or GP-30 type underbarrel rifle grenade launcher on his left thigh.

Photo credit: Ridus.ru

MAN-PORTABLE AIR DEFENCE SYSTEMS & ANTI-AIRCRAFT GUNS

Separatist forces are at an overwhelming disadvantage in terms of air power, which has made the acquisition of Man Portable Air Defence Systems (MANPADS) and other anti-air systems a priority. Both Ukrainian government forces and pro-Russian separatist forces are known to possess an array of different anti-air armaments, although the employment of anti-air systems has been almost exclusively the province of separatist forces. Soviet-era 9K38 *Igla* MANPADS (NATO reporting name SA-18 Grouse) are the most common model in the Ukrainian government arsenal, and appear to be the most common MANPADS in the hands of pro-Russian separatists. ARES has previously documented the packaging for a 9M39 missile, fired from the 9K38 system, which was recovered from separatist fighters by Ukrainian government forces. Photos of the crate show paperwork indicating that it was previously stockpiled in a Russian military facility in Yeysk, Russia, with inventory markings indicating it was in storage there as recently as 12 April 2014 (Jenzen-Jones & Smallwood, 2014).

Another MANPADS seen in use with separatist forces is the Soviet 9K32 *Strela-2* (NATO reporting name: SA-7a Grail) (Binnie, 2014). This legacy system is no longer in active service with the Ukrainian military, and is an early generation system, with only a limited capability to engage Ukrainian Air Force aircraft. Both 9K38 *Igla* and 9K32 *Strela-2* MANPADS are known to have been in the Ukrainian government arsenal, and previous reports indicate that some stocks of MANPADS went missing early in the conflict (RT, 2014).

Perhaps more notably, Polish PPZR *Grom* MANPADS have been captured from pro-Russian separatist forces. The *Grom* (Polish for “thunder”) is a Polish-designed MANPADS drawing its design cues from the Soviet 9K38 *Igla*. Whilst the capabilities of early *Grom* missiles were largely identical to the 9K38, the system has continued to be improved and later developments, such as the *Grom E2* pictured in Ukraine (see Photo 62, below) are more capable (Jenzen-Jones, 2014c). The example seen in Ukraine was fitted with a Russian-made 9P516 gripstock, designed for the 9K38⁸. Markings on the missile launch tube indicate it was produced in 2007. One of the few known foreign exports of the *Grom* was to Georgia, who was believed to have purchased 30 launchers and 100 *Grom E2* missiles in 2007. Russian forces are known to have captured some of these.

Ukrainian air power has suffered losses at the hands of separatist MANPADS, notably including the downing of two Mi-24 combat helicopters in May and an Il-76 cargo plane in June (Cenciotti, 2014; Larrinaga, 2014). See Table 5, below, for further information.



Photo 62 A Polish PPZR Grom E2 missile tube fitted with a Russian 9P516 gripstock.
Photo credit: Ukraine Military TV



Photo 63 Close-up of markings on a Polish PPZR Grom missile tube, clearly showing the 'GROM E2' designation and indicating that the missile was produced in 2007.
Photo credit: Ukraine Military TV

SMALL & MEDIUM CALIBRE AMMUNITION

Small and medium calibre ammunition is abundant within eastern Ukraine, with Ukrainian government and separatist forces both having ample supplies. Small calibre ammunition, in particular, is commonplace throughout the conflict zone. Separatist forces have most commonly acquired small and medium calibre ammunition through battlefield capture, with sizable quantities seized from Ukrainian government stockpiles throughout eastern Ukraine⁹. This section will focus on ammunition in service with, or captured from, pro-Russian separatist forces.

The ammunition documented has predominantly originated in the USSR, which would be typical for Ukrainian government stockpiles. Examples were documented from eight different ammunition manufacturers within the former USSR, including factories located in present day Russia, Ukraine, and Kyrgyzstan. The primary calibres observed were 5.45 x 39 mm, 7.62 x 39 mm, and 7.62 x 54R mm, which is consistent with the ammunition for many of the arms documented in this report. Table 1, below, lists samples of ammunition which were documented in the hands of separatist forces. The table is far from exhaustive, but provides some representative examples of ammunition in use with separatist groups. Several types of ammunition have been documented, including PS and LPS ball (also known as full metal jacket, or FMJ), B-32 armour piercing incendiary (API), 7T3 and T-46 tracer, armour piercing, and subsonic (US¹⁰) cartridges. 14.5 x 114 mm and 23 x 152B mm BZT armour-piercing incendiary tracer (API-T), and 23 x 152B mm OFZ high explosive incendiary (HEI) cartridges were also documented. Most of the ammunition documented was produced between 1962 and 1988. Limited quantities of 7.62 x 54R mm ammunition were observed, packaged in galvanised tins which were soldered closed, a style of packaging typical of Second World War-era production.

Limited quantities of the ammunition documented were produced after the fall of the Soviet Union. Two different 5.45 x 39 mm headstamps and four different 7.62 x 39 mm headstamps, all produced at Lugansk Cartridge Works (LCW), in Luhansk, were observed. Several 7.62 x 39 mm cartridges produced in 2014 were documented (Salem, 2014b). Two of the identified 7.62 x 39 mm cartridges identified were produced under contract at LCW. Red Army Ammunition cartridges were photographed by a pro-Russian separatist and posted to a social networking site (Pseush, 2014). Red Army Ammunition is a trademarked brand owned by Century International Arms (Century International), a US company based in Florida. Century International sell ammunition produced under contract at a number of manufacturing plants in different countries. Ammunition of this calibre produced on their behalf by LCW is known to bear the headstamp 'RED ARMY LU 7.62 x 39', with the 'LU' marked in small text at the 3 o'clock position denoting manufacture at LCW. Ammunition produced for Global Trades Company, a US company based in Texas, has also been documented in the possession of a pro-separatist unit. These cartridges are marked with the headstamp '7.62 x 39 ARSENAL USA' (see Photo 66), and were also produced under contract at LCW. Global Trades Company sold AK type rifles under the 'Arsenal USA' brand from 2002, before renaming this to 'Armory USA' in September 2004¹¹. This ammunition was intended to enter the US market in 2004, but it is unclear how much of it was actually exported from Ukraine, after the change in brand name.

One example of ammunition produced outside of Ukraine and after the fall of the Soviet Union was also documented. A sealed tin of 7.62 x 54R mm PS *Snaiperskiye* (снайперские; 'sniper') match-grade ammunition intended for use with designated marksman and sniper rifles was observed, with markings indicating it was produced in Russia in 1994 (see Photo 65).

A convoy of Russian military trucks, referred to by Moscow as a "humanitarian aid convoy", entered eastern Ukraine in August (RIA Novosti, 2014b). According to the Ukrainian government and some analysts, this convoy participated in the looting of several critical Ukrainian defence industry facilities, and the return of materiel taken from these facilities to Russia (Johnson, R., 2014). LCW was amongst the facilities targeted, with reports that a cartridge manufacturing plant was removed. ARES has not been able to independently verify these claims. If true, this would constitute a significant blow to Ukraine's ability to domestically produce small calibre ammunition. ARES has contacted the Russian and Ukrainian governments, as well as LCW, for comment regarding this matter. At the time of publication, no responses have been received.

Table 1: Small & medium calibre ammunition associated with pro-Russian separatists

Calibre	Type	Country of Origin	Manufacturer	Year of Manufacture	Headstamp	Quantity Observed	Source
5.45 x 39 mm	AP (model unknown)	Unknown	Unknown	Unknown	Unknown	1080	СБ України, 2014b
5.45 x 39 mm	Tracer (7T3)	Unknown	Unknown	Unknown	Unknown	1080	СБ України, 2014b
5.45 x 39 mm	Ball (PS)	USSR (now Ukraine)	Soviet State Factory, Luhansk ¹²	1976	270 76	4320	СБ України, 2014f
5.45 x 39 mm	Unknown	USSR (now Ukraine)	Soviet State Factory, Luhansk	1977	270 77	*	Chivers, 2014d
5.45 x 39 mm	Ball (PS)	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze ¹³	1980	60 80	1080	Pseush, n.d.
5.45 x 39 mm	Unknown	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1980	60 80	*	Salem, 2014b
5.45 x 39 mm	Unknown	USSR (now Ukraine)	Soviet State Factory, Luhansk	1981	270 81	*	Salem, 2014b
5.45 x 39 mm	Ball (PS)	USSR (now Russian Federation)	Barnaul Machine Tool Plant ¹⁴	1982	17 82	6480	СБ України, 2014f
5.45 x 39 mm	Ball (PS)	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1982	60 82	2160	СБ України, 2014f
5.45 x 39 mm	Ball (PS)	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1982	17 82	1080	ATO Press Centre, 2014
5.45 x 39 mm	Ball (PS)	USSR (now Ukraine)	Soviet State Factory, Luhansk	1982	270 82	1080	Pseush, n.d.
5.45 x 39 mm	Unknown ¹⁵	USSR (now Russian Federation)	Ulyanovsk Machinery Plant SPA ¹⁶	1982	3 82	* ¹⁷	Chivers, 2014d
5.45 x 39 mm	Unknown	USSR (now Ukraine)	Soviet State Factory, Luhansk	1982	270 82	*	Salem, 2014b
5.45 x 39 mm	Unknown	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1984	17 84	*	Chivers, 2014d
5.45 x 39 mm	Unknown	USSR (now Russian Federation)	Ulyanovsk Machinery Plant SPA	1985	3 85	*	Chivers, 2014d
5.45 x 39 mm	Unknown	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1985	60 85	*	Salem, 2014b
5.45 x 39 mm	Unknown	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1986	60 86	*	Salem, 2014b
5.45 x 39 mm	Unknown	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1986	17 86	*	Salem, 2014b

Table 1: Small & medium calibre ammunition associated with pro-Russian separatists (cont.)

Calibre	Type	Country of Origin	Manufacturer	Year of Manufacture	Headstamp	Quantity Observed	Source
5.45 x 39 mm	Unknown	USSR (now Russian Federation)	Tula Cartridge Works ¹⁸	1988	539 88	*	Chivers, 2014d
5.45 x 39 mm	Unknown	USSR (now Russian Federation)	Vypel SPA ¹⁹	1990	7 90	*	Chivers, 2014d
5.45 x 39 mm	Unknown	Ukraine	Lugansk Cartridge Works	1992	270 92	*	Salem, 2014b
5.45 x 39 mm	Unknown	Ukraine	Lugansk Cartridge Works	2000	270 00	*	Salem, 2014b
7.62 x 39 mm	Ball	Ukraine	Lugansk Cartridge Works ²⁰	Unknown	7,62 x 39 ARSENAL USA	1	Pseush, n.d.
7.62 x 39 mm	Subsonic ball (US)	Unknown	Unknown	Unknown	Unknown	Approx. 40	Pseush, n.d.
7.62 x 39 mm	Ball	Ukraine	Lugansk Cartridge Works ²¹	Unknown	Unknown ²²	Approx. 160	Pseush, n.d.
7.62 x 39 mm	Unknown	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1962	60 62	*	Salem, 2014b
7.62 x 39 mm	Ball (PS)	USSR (now Kyrgyzstan)	Soviet State Factory, Frunze	1970	60 70	700	Pseush, n.d.
7.62 x 39 mm	Unknown	USSR (now Russian Federation)	Tula Cartridge Works	1986	539 86	*	Salem, 2014b
7.62 x 39 mm	Unknown	Ukraine	Lugansk Cartridge Works	2014	LCW 14 7,62 x 39	*	Salem, 2014b
7.62 x 54R mm	Unknown	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1959	111 59	*	Chivers, 2014d
7.62 x 54R mm	Tracer (T-46)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1970	188 70	440	СБ України. 2014b
7.62 x 54R mm	Light Ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1971	188 71	440	СБ України. 2014b
7.62 x 54R mm	API (B-32)	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1973	17 73	880	СБ України. 2014f
7.62 x 54R mm	API (B-32)	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1973	17 73	440	ATO Press Centre, 2014
7.62 x 54R mm	API (B-32)	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1973	17 73	440	СБ України. 2014b
7.62 x 54R mm	API (B-32)	USSR (now Russian Federation)	Barnaul Machine Tool Plant	1973	17 73	440	Pseush, n.d.

Table 1: Small & medium calibre ammunition associated with pro-Russian separatists (cont.)

Calibre	Type	Country of Origin	Manufacturer	Year of Manufacture	Headstamp	Quantity Observed	Source
7.62 x 54R mm	Light ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1975	188 75	2640	СБ України. 2014f
7.62 x 54R mm	Light ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant ²³	1976	188 76	880	СБ України. 2014f
7.62 x 54R mm	Light Ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1986	188 86	440	СБ України. 2014b
7.62 x 54R mm	Light ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1986	188 86	440	Pseush, n.d.
7.62 x 54R mm	Light ball (LPS)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1986	188 86	440	Pseush, n.d.
7.62 x 54R mm	Sniper ball (PS снайперские)	USSR (now Russian Federation)	Novosibirsk Low Voltage Equipment Plant	1994	188 94	440	Pseush, n.d.
12 gauge	Unknown	Germany	Dynamit Nobel AG ²⁴	Unknown	RWS/GECO 12 ROTT-WEIL 12	Approx. 30	Pseush, n.d.
14.5 x 114 mm	API-T (BZT)	Unknown	Unknown	Unknown	Unknown	40	Pseush, n.d.
23 x 152B mm	HEI (OFZ)	Unknown	Unknown	1978	Unknown	210	ATO Press Centre, 2014
23 x 152B mm	HEI (OFZ) & API-T (BZT)	Unknown	Unknown	Unknown	Unknown	Approx. 60	ATO Press Centre, 2014



Photo 66 7.62 x 39 mm ammunition produced for Global Trades Company in the US, under their 'Arsenal USA' brand. Documented in the possession of pro-Russian separatists fighters.
Photo credit: Ruslan Pseush

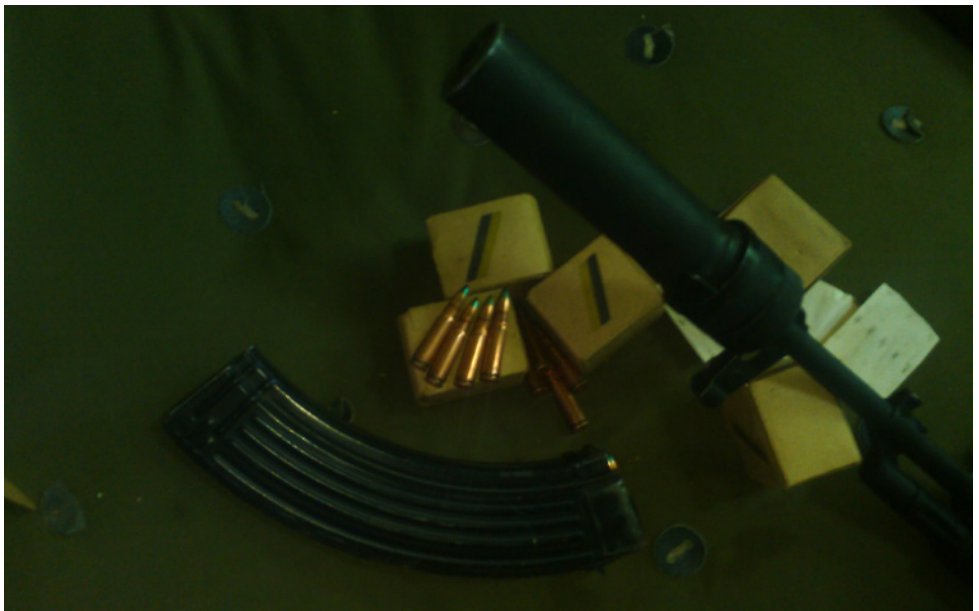


Photo 67 *Umen'shennoy Skorost'yu* (US) type subsonic ammunition pictured in the possession of a pro-Russian separatist in eastern Ukraine. Note the PBS-1 suppressor attached to what is presumably an AKM type rifle.
Photo credit: Ruslan Pseush

HAND GRENADES

Several different hand grenades have been observed during the course of the conflict. Ukrainian government forces have been documented with RGD-5 type fragmentation grenades, whilst separatist forces have been documented with RGD-5, F1, RG-41, and RGN fragmentation grenades (Censor, 2014; СБ України. 2014d; СБ України. 2014e). All of these entered production in the Soviet era, and the F1 and RG-41 are generally considered obsolete. Both the RGD-5 and RGN are in service with the Ukrainian armed forces, and with Russian armed forces. The majority of the hand grenades documented were all seen either unfuzed, or fitted with UZRGM type fuzes. One RGD-5 grenade, with a UZRGM type fuze, was documented as part of an improvised, victim-activated 'booby trap'. The grenade was secured to a tree trunk using adhesive tape, and a trip wire was affixed to the safety pin; if sufficient force were applied to the trip wire, the pin would be removed, and the grenade armed (see Photo 69).

Improvised thrown incendiary and explosive devices have also been observed in the conflict. Improvised incendiary devices, commonly called 'Molotov cocktails', have proven to be a staple of the pro-Russian separatist arsenal. Increasingly, these have been augmented by improvised hand grenade type devices, including so called 'pipe bombs' and a range of other designs. The explosive material used to manufacture these sorts of improvised explosives can come from a variety of sources. Pro-Russian separatist groups have been observed with sizable quantities of plastic explosives, detonators, and other demolitions materiel ('Ukraine Investigation', 2014).



Photo 68 RGD-5 and RGN type hand grenades, recovered from pro-Russian separatists on a train travelling from Mariupol to Lviv.

Photo credit: Censor.net



Photo 69 RGD-5 grenade employed as an improvised booby trap.

Photo credit: Harriet Salem / VICE News



Photo 70 Improvised incendiary devices ('Molotov cocktails') prepared by pro-Russian separatist fighters.

Photo credit: ATO Press Centre



Photo 71 Demolitions materiel seized from pro-Russian separatists, of the type which could be used to construct improvised hand grenade type explosive devices.

Photo credit: 'Ukraine Investigation'

LANDMINES & OTHER ORDNANCE

A variety of anti-personnel and anti-vehicle landmines have been recovered from pro-Russian separatist groups. Anti-personnel landmines have included the MON-50, MON-90, and MON-100 directional anti-personnel mines, which operate in a similar manner to the US M18 Claymore. ARES has received several reports of these mines being emplaced near Donetsk, in both command-detonated and victim-activated (fitted with pull fuze and tripwire) configurations²⁵. A display by Ukrainian security forces of arms seized during fighting in eastern Ukraine contained MON-50 anti-personnel directional mines with markings indicating they were produced in Russia in 2002. A pro-Russian separatist combatant, associated with the 'Zarya Battalion', has been documented emplacing another munition, the PMN-4 anti-personnel mine, in eastern Ukraine ('Обмапидарас стопудов', 2014).



Photo 72 MON-100 directional anti-personnel mines recovered by Ukrainian government troops from pro-Russian separatist forces in eastern Ukraine.

Photo credit: ATO Press Centre



Photo 73 A MON-50 directional anti-personnel mine, with markings showing it was produced in Russia in 2002.

Photo credit: 'Askaj_1', 2014

Several OZM-72 bounding anti-personnel mines have been observed in Ukraine. When the fuze functions, the OZM-72 is propelled into the air by a small charge before exploding, roughly at midsection height. One example of the OZM-72 was documented fuze with an MUV type or similar pull fuze, designed to be initiated by a tripwire. According to a pro-Russian separatist interviewed by a correspondent in eastern Ukraine, the fuze OZM-72 was recovered from Iloviask School. Ukrainian government forces were based there during operations in the area²⁶.

When the OZM-72 is employed as a command detonated mine, it does not fall under the definition of an "anti-personnel mine" in Article 2 (1) of the Ottawa Convention. According to the Landmine & Cluster Munition Monitor:

"Ukraine also noted that while its MON-type and OZM-type anti-personnel mines can be used in command-detonated mode in compliance with the Mine Ban Treaty, these stockpiled mines are excessive and not suitable for use, and it has plans to destroy them."
(Landmine & Cluster Munition Monitor, 2013).

Anti-vehicle landmines have also been documented in eastern Ukraine. TM-62M anti-vehicle mines have been observed in use with MVZ-62, MV-Ch-62, and MVN-62 fuzes (УНІАН, 2014). UDSH smoke pots, which appear superficially similar to the TM-62 series landmines, have also been observed ('Вечна Русская', 2014).

In July, ARES noted the recovery of ZRP-2 *Tropa* (Трона; 'Path') mine clearance explosives from pro-Russian separatist forces operating in eastern Ukraine. The ZRP-2 system consists of the DKR-150A line charge, D-ZRP-2M rocket engine, connecting rope, fuze, brake cord, initiation device, launcher, anchors, and backpack for transport. After assembly, the line charge is launched and propelled over the minefield by a rocket engine. The charge is remotely detonated by a mechanical fuze, and is designed to create a breach in an anti-personnel minefield under combat conditions (Lyamin, 2014).



Photo 74 An OZM-72 bounding anti-personnel landmine, fitted with a MUV type pull fuze, and intended for use with a trip wire.

Photo credit: Harriet Salem / VICE News



Photo 75 A TM-62M anti-vehicle landmine with MVZ-62 fuze, recovered from pro-Russian separatist forces.

Photo credit: ATO Press Centre



Photo 76 A ZRP-2 mine-clearing line charge seized from pro-Russian separatist forces.

Photo credit: Glavnoe

A handful of air-delivered munitions have been documented in the hands of pro-Russian separatists. Typically, these are remnants of munitions which have failed to function, collected at the point of impact, or munitions seized from captured stockpiles. Unlike many other contemporary conflicts, these are rarely seen repurposed for ground combat (see, for example, Jenzen-Jones & Lyamin, 2014). Two varieties of S-8 80 mm air-to-surface rockets were documented. The S-8KOM is a HEAT rocket with an additional fragmentation sleeve (HEAT-Frag). It is stated as being capable of penetrating 400 mm of rolled homogeneous armour (RHA). S-8KOM rockets were documented by ARES as the most likely weapon to have been employed in a Ukrainian government airstrike on Luhansk, on 3 June 2014 (ARES, 2014a; OSCE, 2014). Foreign correspondents working in Ukraine also documented 9-VU-285 parachutes associated with the SAB-250-200 and SAB-250T special purpose illumination aircraft bombs. These are typically employed with the TM-4B time fuze, and release seven parachute flares, each producing approximately 8 to 10 million candela of illumination for a minimum of 6 minutes (Babkin, A.B. et al., 2008).

ARTILLERY

Artillery, including self-propelled artillery (see Table 4 below), has played an important role in the ongoing conflict in Ukraine, becoming a primary method of engagement for both Government forces and pro-Russian separatists (Magnay & Mullen, 2014). Both government and separatist forces have employed a variety of artillery of Soviet or Russian design. One of the most common amongst these is the 122 mm D-30 howitzer, employed frequently by parties to the conflict (see Photo 77, below). 122 mm OF-56 and OF56-1 HE-FRAG projectiles appear to be the most common type employed. Other types of towed artillery documented include the 100 mm BS-3 anti-tank gun and its later replacement the 100 mm MT-12 anti-tank gun, as well as the larger 152 mm 2A65 *Msta-B* (Mcrta; named for the Msta River²⁷) howitzer. These systems have each been documented in service with both government and separatist forces (Lost Armour, n.d.). 152 mm OF45 HE-FRAG projectiles have been documented throughout eastern Ukraine, and appear to be a common type. Rebel forces have also been observed in possession of the ZiS-3 76 mm field gun. The ZiS-3 originally entered service in 1943, and it is not clear whether these weapons were in a serviceable state, or if they have been used in combat (Vasilyeva, 2014). The 2A65, by contrast, is a comparatively modern system, with a maximum firing range of over 28 km. Contrary to some reports, the 2A65 is found in the inventories of both Ukraine and Russia.



Photo 77 Pro-Russian separatists crew a 122 mm D-30 howitzer in eastern Ukraine.
Photo credit: 'nedouchenn'

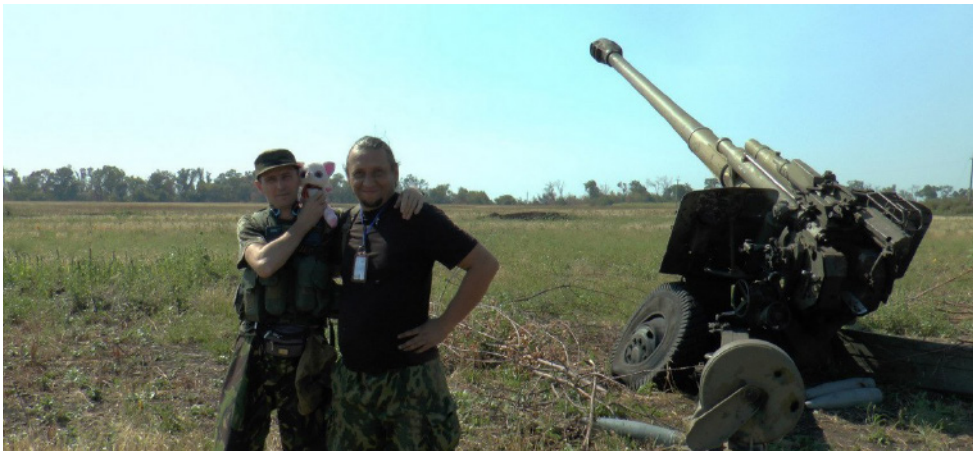


Photo 78 Pro-Russian separatist fighters pose with a 152 mm 2A65 howitzer captured from Ukrainian government forces.
Photo credit: 'antimaidan_ovenki'

ARMoured FIGHTING VEHICLES

A wide range of armoured fighting vehicles (AFVs) have been employed by both Ukrainian government forces and pro-Russian separatists. Crudely armoured, improvised 'technicals', infantry fighting vehicles (IFVs), main battle tanks (MBTs), self-propelled artillery, and various specialised armoured vehicles, including engineering vehicles, artillery support vehicles, and nuclear, chemical, and biological (NBC) warfare reconnaissance vehicles, have all been documented in service during the conflict (Lost Armour, n.d).

The capture and repurposing of AFVs in Ukraine has been a common occurrence, often making it difficult to attribute an AFV to a particular force or unit. As can be seen from Tables 2, 3, 4, and 6, both parties to the conflict both possess many of the same types of vehicles. These tables summarise ARES research, augmented by data collected by 'Lost Armour' (Lost Armour, n.d). The table lists AFVs known to have been in possession of either the Ukrainian government or pro-Russian separatist forces at one time. Selected vehicles are discussed in further detail; for images of the complete range of vehicles listed in the tables, see Annexe 2: Armoured Fighting Vehicles. The bulk of the data was collected by analysing publicly available sources, and many of the vehicles listed have been destroyed in the course of the conflict. Each type is only listed once; this report makes no attempt to discern the numbers of each type in current service with the combatant parties. Further complicating matters, there are reports indicating that marking practices used to identify vehicles in service with, or captured by, Ukrainian government forces²⁸ are now being replicated by separatists, presumably in an effort to deceive enemy forces (Baczynska, 2014; Judah, 2014).

MAIN BATTLE TANKS

Table 2: Main battle tanks of the Ukrainian conflict

Ukrainian government forces	Pro-Russian separatist forces
T-64A	IS-3
T-64B	T-34-85
T-64B1M	T-64A
T-64BM	T-64B
T-64BV	T-64BM
	T-64BV
	T-72B
	T-72B3
	T-72BA
	T-72B Mod. 1989 ²⁹

Main battle tanks (MBT) have been employed by both Ukrainian government forces and pro-Russian separatists, although the former have fielded these in greater numbers. Ukrainian forces have most commonly been documented using T-64BV tanks, the most numerous MBT in their arsenal prior to the outbreak of fighting. The T-64BV features *Kontakt-1* (Контакт ; 'Contact') explosive reactive armour (ERA), in addition to fixed *Tucha* (Туча; 'Cloud') 81 mm smoke grenade launchers. Several unexploded projectiles from OF26 type HE-FRAG 125 mm smoothbore ammunition have been documented. 81 mm 3D6 smoke grenades for Tucha launchers have also been documented (Salem, 2014b). There have been multiple instances of the capture of T-64BV MBTs by separatist forces (Lost Armour, n.d.; УНІАН, 2014b).



Photo 79 Likely the earliest example of a T-64BV in the hands of pro-Russian separatist forces. Donetsk region, 12 June 2014.

Photo credit: 'bmpd'



Photo 80 A Ukrainian government T-64BV engages pro-Russian separatist fighters in Slovyansk. 6 June 2014.

Photo credit: Efrem Lukatsky / AP Photo

Another MBT in the T-64 series, the T-64B1M, has been observed in service with Ukrainian government forces. It is believed that these tanks were originally being upgraded by the Kharkiv Morozov Machine Building Design Bureau (KMDB) for the Democratic Republic of Congo (DRC). When fighting broke out, it appears they were repurposed by the Ukrainian government, and they are believed to be currently employed by NGU forces³⁰.



Photo 81 A T-64B1M with Ukrainian flag in heavy fog, 7 November 2014.

Photo credit: Gazeta

The most recent iteration of the T-64 in Ukrainian government service, the T-64BM *Bulat* (Булат; 'Damascus steel'), has also been deployed during the ongoing conflict. Modernized by KMDB, the primary modifications to the T-64BM include an upgraded fire control system and additional passive and reactive armour (KMDB, 2014). Documented instances of the destruction or capture of these tanks are strong indicators of the capability of separatist anti-tank (AT) systems and the operators of such. Other tanks employed by Ukrainian security forces include the T-64A and T-64B, with separatists known to possess the same in their arsenal. In addition to those captured from Ukrainian forces, there have been reports suggesting that some T-64 series tanks in separatist hands may have come from across the Russian border (Gordon et al., 2014; Marcus, 2014).



Photo 82 The remains of a destroyed Ukrainian T-64BM *Bulat* MBT, near Lutugino, July 2014.

Photo credit: Lost Armour

Pro-Russian separatist forces have also employed a number of T-72 series MBTs. Alongside T-72B tanks, separatist forces have been documented operating T-72B Model 1989 tanks³¹, which Russia is not known to have exported (Tsvetkova & Vasovic, 2014). The T-72BA and T-72B3 variants have also been employed by separatists, with the presence of the T-72B3 being particularly noteworthy. With *Kontakt-5* ERA, an upgraded fire control system, a ballistic computer and a modern thermal sight, the T-72B3 represents the latest T-72 model in Russian service. It was introduced in 2013, and is not known to have been exported. One video uploaded by separatists shows a T-72B3 they claim to have captured after fighting with Ukrainian forces. Such an example may illustrate the frequency with which materiel appears to change between opposing sides within the conflict ('Vesti Backstage', 2014).



Photo 83 A destroyed T-72B Model 1989, near separatist-controlled Starobesheve, eastern Ukraine. 2 October 2014.

Photo credit: Maria Tsvetkova / Reuters



Photo 84 A T-72B3 tank, which Ukrainian forces claim was destroyed near Ilovaisk.

Photo credit: Телеканал 24

The importance separatist forces place on the acquisition of heavily armoured fighting vehicles is highlighted by the presence of two Second World War-era tanks documented under separatist control. Taken from a display pedestal in a village near Kostiantynivka, an IS-3³² was reactivated and saw combat in June 2014 ('Александр Маленький', 2014). It was captured by Ukrainian forces in the following month. Similarly, separatists reactivated a T-34-85 from a display pedestal in the Donbas region ('Cossacks Rada', 2014). It is worth noting that these tanks were evidently not properly deactivated prior to being displayed as historical monuments.



Photo 85 The reactivated IS-3 being transported after its seizure by Ukrainian forces.
Photo credit: Valentyn Ogirenko / Reuters

INFANTRY FIGHTING VEHICLES & ARMoured PERSONNEL CARRIERS

Table 3: Infantry fighting vehicles & armoured personnel carriers of the Ukrainian conflict

	Ukrainian government forces	Pro-Russian separatist forces
<i>Infantry fighting vehicles</i> ³³	BMD-1	BMD-1
	BMD-2	BMD-2
	BMP-1	BMP-1
	BMP-1KSh	BMP-1KSh
	BMP-2	BMP-2
	BMP-2K	BMP-2K
	BRDM-2	BRDM-2
	BRM-1K	BRM-1K
	BTR-3E1	BTR-4E
	BTR-3K	BTR-4K
	BTR-4E	BTR-82AM
	BTR-4K	

Table 3: Infantry fighting vehicles & armoured personnel carriers of the Ukrainian conflict (cont.)

	Ukrainian government forces	Pro-Russian separatist forces
<i>Armoured personnel carriers</i>	BTR-60PB	BTR-60PB
	BTR-70	BTR-70
	BTR-80	BTR-80
	BTR-D	BTR-D
	MT-LB	GT-MU
		MT-LB
		MT-LB 6MA
		MT-LBVM
		MT-LBVMK
		PTS-2

Infantry fighting vehicles (IFV) and armoured personnel carriers (APC) are the most commonly documented and used types of AFV in the Ukrainian conflict, with both sides employing a broad range of platforms and variants. While both IFVs and APCs are intended to act as armoured troop-transports, IFVs are differentiated by having a main armament of 20 mm in calibre or greater, in order to provide some offensive capability³⁴.

The most common IFV among both Ukrainian government and separatist forces appears to be the BMP-2, with no shortage of destroyed or captured examples. Among the many others, one notable model of IFV seen is the BTR-82AM. This is a modernised version of the BTR-80, with modifications to bring it up to the standard of the latest-production BTR-82A. The BTR-82AM was only adopted into Russian service in early 2013. Russia is not known to have exported examples to any other country. To date, only separatist fighters have been documented in possession of this IFV (Lost Armour, n.d.).

The BTR-80 is one of the more common APCs documented in the ongoing conflict, with both sides making extensive use of this platform. Picture 87, below, illustrates the commonplace practise of adding improvised armour to a vehicle ('up-armouring'), with sandbags lining the sides of the vehicle. Another frequently observed APC is the MT-LB, with many examples of destroyed and captured vehicles (Lost Armour, n.d.). Variants of the MT-LB, such as the MT-LB 6MA, the MT-LBVM, and the MT-LBVMK – all later Russian models from the 1990s and early 2000s – also appear to have been documented in service with pro-Russian separatist forces (Lost Armour, n.d.)³⁵.



Photo 86 Ukrainian government forces atop a BMP-2 near the village of Smeloe. 23 October 2014.

Photo credit: Ukrainian News Photoagency (LUFA)



Photo 87 Ukrainian security forces operating a BTR-80 APC with sandbags acting as improvised armour.

Photo credit: Efrem Lukatsky / AP Photo

SELF-PROPELLED ARTILLERY

Table 4: Self-propelled artillery of the Ukrainian conflict³⁶

	Ukrainian government forces	Pro-Russian separatist forces
<i>Self-propelled artillery</i>	2S1	2S1
	2S19	2S19
	2S3	2S3
	2S5	2S5
	2S9	2S9
<i>Self-propelled anti-aircraft systems</i>	2S6	9K33
	9K33	9K35
	9K35	9K37 ³⁷
		Pantsir-S1 ³⁸
<i>Self-propelled rocket artillery</i>	9K51	9K51
	9K57	
	9K58	
	9K79 ³⁹	

Self-propelled artillery has been documented in service during the ongoing conflict, with the same systems employed by both Ukrainian security forces and pro-Russian separatists. These systems include the 122 mm 2S1 *Gvozdika*, the 152 mm 2S3 *Akatsia*, the 152 mm 2S5 *Giatsint-S*, the 120 mm 2S9 *Nona-S*, and the 152 mm 2S19 *Msta-S*. Whilst Ukrainian government forces have employed significant numbers of self-propelled guns, fewer have been documented in the hands of pro-Russian separatists (Lost Armour, n.d.).



Photo 88 A Ukrainian government MT-LB captured by pro-Russian separatists.

Photo credit: Lost Armour



Photo 89 A 2S19 Msta-S, captured by separatist forces near Starobeshevo.

Photo credit: Lost Armour

SELF-PROPELLED ROCKET ARTILLERY

Both Ukrainian government forces and pro-Russian separatists have employed the 9K51⁴⁰ Grad (Град; 'Hail') MLRS in the ongoing conflict (Gordon & Kramer, 2014; Parfitt, 2014). 9K51 systems in their typical configuration carry 40 unguided rockets, which can be fired in fewer than 30 seconds, if required. Grad type platforms are common in many current and recent conflict zones, and are capable of firing a range of rocket types, including HE-FRAG, incendiary, smoke, and cargo (cluster) munitions.

Identified rockets for the 9K51 system have included both HE-FRAG and incendiary varieties. A photograph taken in eastern Ukraine in early November 2014 shows recovered components from a 9M22S incendiary rocket, produced in the USSR in 1982. The 9M22S is a 122 mm, Russian-designed rocket with an incendiary cargo warhead, fired from the 9K51 and similar systems.

It is based on the Russian 9M22 high explosive fragmentation (HE-FRAG) rocket, but instead carries the 9N510 warhead, containing 180 individual incendiary elements (see Photo 92). These incendiary elements are hexagonal prism shells made of magnesium alloy ML-5, and are filled with a pyrotechnic composition. Each element has a burning time of at least two minutes (Lyamin & Smallwood, 2014). The 9M22S rockets documented have been fitted with TM-120 mechanical time fuzes, which initiate a bursting charge whilst the rocket is in flight, scattering incendiary elements from above (see Photo 91, below).

It should be noted that while there have been reports of white phosphorous (WP) use by Ukrainian government forces, ARES has been unable to independently verify these claims. The Ukrainian government, and likely also separatist forces, are known to possess various WP smoke munitions.



Photo 90 A 9K51 MLRS captured by pro-Russian separatist forces in eastern Ukraine. Note the 'double white stripe' identification markings, often applied by Ukrainian government forces to vehicles⁴¹.
Photo credit: 'ЮГО-ВОСТОК! ЕНОТЫ!'



Photo 91 A TM-120 mechanical time fuze which failed to function. Eastern Ukraine, November 2014.
Photo credit: Harriet Salem / VICE News



Photo 92 The remnants of a 9M22S rocket which failed to function. Located between the villages of Oleksandrivka and Chumaky, eastern Ukraine, November 2014.
Photo credit: Mark Hiznay / Human Rights Watch.

Whilst separatist forces have only been documented in possession of the 9K51 122 mm MLRS, Ukrainian government forces have been observed operating the much more capable 9K57, 9K58, and 9K79 systems. On July 3, ARES reported that remnants from 9M55K cargo rockets and 9N235 submunitions had been recovered in Kramatorsk. Designed to be fired from the Russian-designed 9K58 *Smerch* (Смерч; 'Tornado') 300 mm MLRS, the 800 kg 9M55K cargo rocket carries 72 9N235 HE-FRAG submunitions. The 9A52 or 9A52-2 combat vehicle can launch twelve rockets in under 40 seconds. While the 9K58 *Smerch* is in the inventories of both Russian and Ukrainian forces, no examples are known to have been captured by pro-Russian separatists, and it is likely that Ukrainian armed forces were responsible for this particular employment (Jenzen-Jones, 3 July 2014; Lost Armour, n.d.).

Less than a week later, remnants from several Russian-designed 220 mm 9M27K series cargo rockets, discharged from the 9K57 *Uragan* (Ураган; 'hurricane') MLRS, were photographed in Slavyansk (Jenzen-Jones, 11 July 2014). Again, while both Ukrainian and Russian armed forces possess the 9K57 *Uragan*, it is probable that Ukrainian government forces were responsible for their use in this case. VICE News, with assistance from ARES, reported the further use of cluster munitions, with 220 mm 9M27K cargo rockets and 9N210 HE-FRAG submunitions used in an October 2 attack in Donetsk (Salem, 2014a; ARES, 2014b). These rockets were launched by a 9K57 *Uragan* MLRS, located somewhere south of the city. Several other attacks have been documented. Markings on some of the submunitions identified from a later attack indicate that they were produced in 1989 (Salem, 2014b). Human Rights Watch investigated claims of use throughout the region, and concluded that Ukrainian government forces employed cluster munitions against targets in Donetsk in early October (HRW, 2014). It should be noted that neither Russia, nor Ukraine, is party to the 2008 Convention on Cluster Munitions.



Photo 93 9N235 submunition documented near Kramatorsk.

Photo credit: 'sergey ivan'



Photo 94 Remnants of a 9N210 HE-FRAG submunition identified by ARES for VICE News.

Photo credit: Harriet Salem / VICE News

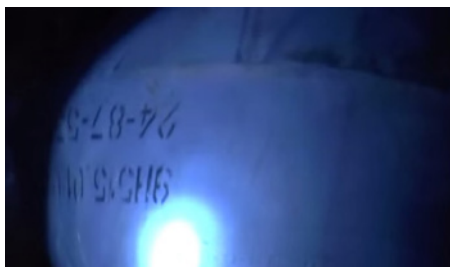


Photo 95 Remnants of a 9N515 fuel-air explosive warhead for the 9M51 220 mm rocket documented in Donetsk.

Photo credit: ANNA



Photo 96 Remnants of a 9M79 or 9M79-1 tactical ballistic missile, launched from the 9K79 or 9K79-1 system.

Photo credit: ANNA



Photo 97 A Ukrainian government 9K57 MLRS, destroyed by pro-Russian separatist forces in eastern Ukraine.
 Photo credit: Lost Armour

The 9K57 system has also been employed to deliver the 220 mm 9M51 rocket. The 9M51 delivers the 9N515 fuel-air explosive warhead, with a 30.2 kg payload. This rocket is designed to engage infantry and light vehicles, and is particularly effective against targets in confined spaces. Reports suggest that the 9M51 rocket was employed by Ukrainian government forces to target pro-Russian separatist forces in Donetsk (ANNA, 2014a; ANNA, 2014b). Markings on one documented example indicate that it was produced in 1987.

Reports surfaced in July which indicated that the Ukrainian government was employing tactical ballistic missile launchers in operations targeting pro-Russian separatists in eastern Ukraine (CNN, 2014). The Ukrainian government denied these reports (DW, 2014). Whilst the system in use was not originally clear, remnants of a 9M79 or 9M79-1 missile, launched by the 9K79 or 9K79-1 *Tochka* (Точка; 'point') tactical ballistic missile system, were later documented (ANNA, 2014b). The 9K79 is also referred to as the OTR-21 (OTR: оперативно-тактический ракетный комплекс, or 'Tactical-operational Missile Complex'), or by its NATO reporting name: SS-21 Scarab. This Soviet-era missile system has a maximum range of 70 kilometres, and a Circular Error Probable (CEP) of approximately 150 m. A modernised version, the 9K79-1 *Tochka-U* (Scarab-B), was introduced in the 1980s, with an increased maximum range of 120 km and a CEP of approximately 92 m.

Some sources have also suggested that pro-Russian separatists may have been provided with the modern *Tornado* (Торнадо; 'Tornado') MLRS, although it is unclear which particular model these claims refer to (Bezhan, 2014; Seldin, 2014). The most likely candidate would be the 9K51M Tornado-G, essentially a modernised *Grad* system, rather than the more advanced Tornado-S, which has not yet entered Russian service. ARES has not been able to independently verify these claims.

SELF-PROPELLED AIR DEFENCE SYSTEMS

In addition to MANPADS, separatist forces have relied on other air defence systems in order to combat the Ukrainian government's significant air power advantage. Self-propelled air defence systems have been documented in the hands of both Ukrainian government forces and pro-Russian separatists, however only separatists forces have employed surface-to-air missiles. Air defence systems documented in the conflict include the 9K33 *Osa* (Oca; 'Wasp') and the 9K35 *Strela-10* (Стрела; 'Arrow'), first documented by ARES in July 2014 (Karpa, 2014). In optimal conditions, the basic model of 9K33 is capable of engaging targets with its 9M33 series missiles at ranges up to 15 km, and a maximum altitude of 12,000 m (FAS, 2000). The 9K35 fires the 9M37 series of missiles and has a maximum range of 5 kilometres, and a maximum altitude of 3,500 metres. Both systems have been upgraded several times in later models.



Photo 98 Pro-Russian separatist fighters sit atop a captured Ukrainian 9K33 'Osa' air defence artillery vehicle.
Photo credit: Nations Presse



Photo 99 Pro-Russian separatists gesture from inside a captured 9K35 'Strela-10' at a checkpoint on the outskirts of Donetsk city. 10 July, 2014.

Photo credit: Maxim Zmeyev / Reuters

The capture, manning, maintenance and operation of more advanced systems such as the 9K35 'Strela-10' represents a serious improvement in their capability to engage aircraft (Karpa, 2014). Their greater range and capability has contributed to the loss of several aircraft in Ukraine.

Table 5 shows a list of military aircraft which have been sustained substantial damage whilst airborne, having been engaged by pro-Russian separatist forces⁴² using a variety of shoulder-fired and vehicle-based systems.

The Il-76 shot down over Luhansk in mid-June resulted in the deaths of 49 Ukrainian servicemen. Ukrainian transport aircraft have since been observed employing countermeasures, particularly flares to counter heat-seeking missiles, during take-off (Cenciotti, 2014; Polityuk & Vasovic, 2014).

On 17 July 2014, Malaysia Airlines flight 17 (MH17), a Boeing 777-200 airliner, crashed near the village of Grabovo in eastern Ukraine, killing all 298 passengers on board (New York Times, 2014). The aircraft is widely believed to have been shot down, with the most likely weapon involved being claimed by many sources to be one of the Russian-made *Buk* (Бук; Beech) family of surface-to-air (SAM) missile systems (NATO reporting name: SA-11 Gadfly⁴³) (Chivers, 2014a; Wasserbly & Richardson, 2014). Whilst other missile systems in the Russian and Ukrainian arsenals would be capable of downing a commercial airliner under similar conditions, Buk systems were documented in the area at the time (Leonard & Karmanau, 2014; Walker, 2014).

Table 5: Ukrainian government aircraft losses

Type	Date	Location	Aircraft	Fatalities / Occupants	Source
Rotary-wing Aircraft	25 April 2014	Kramatorsk	Mil Mi-8	0 / 1	Aviation Safety Database, n.d.; Segodnya, 2014
Rotary-wing Aircraft	2 May 2014	Slovyansk	Mil Mi-24P	2 / 3	Aviation Safety Database, n.d.; Larringa, 2014
Rotary-wing Aircraft	2 May 2014	Slovyansk	Mil Mi-24P	3 / 3	Aviation Safety Database, n.d.; Larringa, 2014
Rotary-wing Aircraft	2 May 2014	Slovyansk	Mil Mi-8MT	0 / ?	Aviation Safety Database, n.d.; Larringa, 2014
Rotary-wing Aircraft	5 May 2014	Slovyansk	Mil Mi-24P	0 / 2	Aviation Safety Database, n.d.; Globe and Mail, 2014
Fixed-wing Aircraft	6 June 2014	Drobyshevo	Antonov 30	5 / 8	Aviation Safety Database, n.d.; ITAR-TASS, 2014
Fixed-wing Aircraft	14 June 2014	Luhansk	Ilyushin 76MD	49 / 49	Aviation Safety Database, n.d.; Polityuk & Vasovic, 2014b
Fixed-wing Aircraft	14 July 2014	Izvaryne	Antonov 26	2 / 8	Aviation Safety Database, n.d.; Interfax-Ukraine, 2014d
Fixed-wing Aircraft	16 July 2014	Ukrainian-Russian border region	Sukhoi Su-25M1	0 / 1	Aviation Safety Database, n.d.; Interfax-Ukraine, 2014b
Fixed-wing Aircraft	23 July 2014	Shakhtarsk	Sukhoi Su-25M1	0 / 1	Aviation Safety Database, n.d.; Herszenhorn & Tavernise, 2014
Fixed-wing Aircraft	23 July 2014	Shakhtarsk	Sukhoi Su-25	0 / 1	
Fixed-wing Aircraft	7 August 2014	Yenakievo	Mikoyan MiG-29	0 / 1	Aviation Safety Database, n.d.; Hanna et al., 2014
Fixed-wing Aircraft	17 August 2014	Luhansk	Mikoyan MiG-29	0 / 1	Al Jazeera, 2014; Cenciotti, 2014c
Fixed-wing Aircraft	20 August 2014	Luhansk	Sukhoi Su-24M	0 / 2	Prentice & Zinets, 2014
Fixed-wing Aircraft	29 August 2014	Starobeshevo	Su-25M1	0 / 1	Aviation Safety Database, n.d.; Interfax-Ukraine, 2014c

The preliminary results of a Dutch investigation in mid-September describe MH17 as being struck by “multiple high-energy objects from outside the aircraft”, matching the kind of damage that a surface-to-air missile would cause (Dutch Safety Board, 2014; Chivers, 2014b). The specific system used has not yet been conclusively identified. Several sources, including German, Ukrainian, and US intelligence agencies, have concluded that pro-Russian separatists were responsible for the incident (Der Spiegel, 2014; Tharoor, 2014:). The Ukrainian government has further claimed that “Russian citizens” aided separatists in operating the SAM system, and there have been allegations that the launcher was quickly moved across the border into Russia (Leonard & Karmanau, 2014; Piper & Polityuk, 2014). Russia was quick to deny any involvement in the incident, instead suggesting the Ukrainian government was responsible (Miller, 2014).

One other self-propelled air defence system may be in use in Ukraine. Photo 101, below, shows a 95Ya6 first-stage booster rocket from a 57E6 series surface-to-air missile, the primary armament for the 96K6 *Pantsir-S1* (Панцирь; ‘Cuirass’) air defence system (NATO reporting name: SA-22 Greyhound) (Kopp, 2009). The same 95Ya6 booster is believed to be in use with the 95Ya6-2M target missile system, and with ground-attack missiles for the *Hermes* air-to-surface and surface-to-surface guided missile systems. The *Pantsir-S1* system is only known to have been exported in limited quantities, primarily to the Middle East. The *Hermes* system is only in service with Russian armed forces.



Photo 100 A piece of wreckage from MH17, showing damage consistent with a hit from a fragmenting missile warhead.

Photo credit: Noah Snieder / New York Times



Photo 101 A 95Ya6 booster rocket used with the 57E6 series of SAMs, as well as other missiles.

Photo credit: Ruslan Pseush

OTHER ARMoured VEHICLES

Other, special purpose vehicles have been documented throughout the conflict. Some have been utilised in their intended roles, while others appear to have functioned more as expedient heavy or armoured vehicles. One example of this is a separatist BRDM-2RKhB – a radiological, chemical and biological reconnaissance vehicle – seized from a local fire department and repurposed. While this BRDM-2RKhB was initially unarmed, separatists fitted to it a 12.7 mm NSV heavy machine gun. Other unusual vehicles include a BREM-1 armoured recovery vehicle, a ZS-88 armoured vehicle with loudspeaker assembly, a GMZ-3 tracked mine-laying vehicle, and a MTU-55 armoured vehicle-launched bridge (AVLB) tank.

Battlefield surveillance radar vehicles have also been seen, with the 1RL232 *Leopard* and the 1RL239 *Lynx* being photographed under separatist control near Torez, east of Donetsk (Huijboom, 2014). Intended for the reconnaissance of enemy positions, as well as providing fire control for artillery, these battlefield surveillance systems represent a significant advance in the capability of separatist artillery. Under optimal conditions the 1RL232 is able to detect movements of certain targets at a range of up to 40 km, and the 1RL239 can be used for fire control purposes at a range of up to 20 km. Unlike the 1RL232, the 1RL239 is particularly significant as it is not known to be in Ukrainian service (Научно-производственное объединение “Стрела”, n.d.).

Table 6: Other armoured vehicles of the Ukrainian conflict

Ukrainian government forces	Pro-Russian separatist forces
1V119	1RL232
1V14	1RL239
1V18	1V14
BRDM-2RKhB	1V18
BREM-1	BRDM-2RKhB
BREM-2	BREM-1
HMMWV	BTS-4
BTS-4	GMZ-3
BTR-60PU	IMR-2
GMZ-3	MDK-3
IMR-2	K1Sh1
MDK-3	PRP-3
MTU-55	
PRP-3	
R-145BM	
K1Sh1	
ZS-88	



Photo 102 A separatist BRDM-2RKhB, repurposed and fitted with a 12.7 mm NSV heavy machine gun.
Photo credit: Korrespondent.net



Photo 103 The burned remains of a destroyed ZS-88, with loudspeaker affixed to the roof.
Photo credit: Lost Armour

IMPROVED ARMOURED VEHICLES

The importance of armoured vehicles to those fighting is again reflected in the efforts that some have gone to when purpose-built machines are unavailable. There are multiple instances of vehicles being modified, typically with the addition of heavy metal plating or mesh, with the aim of providing greater protection to those within. Teams of volunteers in the city of Slavutych, for example, turned minivans into makeshift armoured vehicles for National Guard of Ukraine forces (Al Jazeera, 2014).



Photo 104 Minivans turned into makeshift armoured personnel carriers, for Ukrainian security forces.
Photo credit: Vitaly Shykun

UNMANNED AERIAL VEHICLES

The use of Unmanned Aerial Vehicles (UAVs) is well-documented within the Ukrainian conflict, with multiple reports of Ukrainian UAVs having been shot down or captured by separatist forces. In March, authorities in a pro-Russian separatist region of Moldova reported the downing of a Ukrainian UAV that was launched by “people close to the Ukrainian Security Service and the Defence Ministry” (AP, 2014). A later report in June claimed that separatists in Slovyansk shot down a UAV over the village of Mykolaivka (RIA Novosti, 2014a). Pro-Russian separatists have also been documented in possession of a captured Soviet-era Tupolev Tu-143 Reys (Рейс; ‘Trip’) reconnaissance UAV after knocking it from the air in August (Cenciotti, 2014).

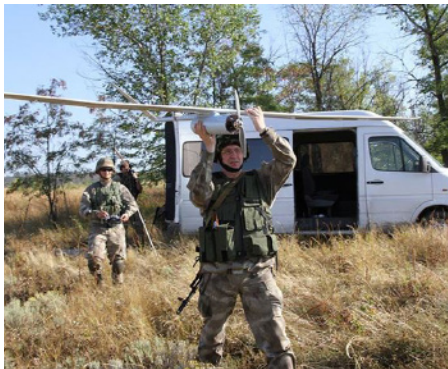


Photo 105 Ukrainian soldiers launch an unmanned aerial vehicle.
Photo credit: ATO Press Centre



Photo 106 A pro-Russian separatist fighter poses with a captured Tu-143 Reys UAV.
Photo credit: '@dnrpress'

Pro-Russian separatists have also been observed employing UAVs, with a separatist news website showing a group of fighters in Donetsk using a commercially available rotary wing type in a target acquisition and surveillance role. The UAV was used to adjust fire from a mortar system targeting Donetsk Airport ('brigadir', 2014). On May 28th the Security Service of Ukraine (SBU) issued a statement claiming that a modified Orlan-10 reconnaissance UAV, originally of Russian design and in service with the Russian military, was shot down by government forces (СБ України, 2014а). Ukrainian officials have stated that "drones are flown over Ukrainian camps in the area of the anti-terrorist operation regularly to spy on [their] personnel". Russia later denied any involvement in the incident (Ostrovsky, 2014).



Photo 107 Pro-Russian separatists launch a consumer-grade UAV near Donetsk Airport.
Photo credit: 'Движение Интербригады'



Photo 108 Wreckage of an Orlan-10 UAV, recovered by Ukrainian government forces.
Photo credit: СБ України

More recently, independent observers from the Organisation for Security and Co-operation in Europe (OSCE) have deployed four Schiebel CAMCOPTER S-100 UAVs to the region as part of its Special Monitoring Mission to Ukraine (SMM). These are already in use, and will be operated both in the south of Donetsk and near the Russian border (OSCE, 2014a). The OSCE reported that one of its S-100 UAVs was subjected to "military-grade GPS jamming" while deployed over separatist-controlled Chermalyk, north-east of Maiupol. When contacted by OSCE SMM representatives, the Air Operations Liaison Officer for the Ukrainian 'Anti-Terrorism Operation' (ATO) said there was no jamming by Ukrainian forces. (OSCE, 2014b)

There are some indications that pro-Russian separatist forces are employing UAVs in an offensive role, outfitting them to drop hand grenades as improvised air-delivered munitions. In at least one incident, Ukrainian soldiers described how a grenade was dropped on their position by a UAV piloted by separatist fighters; they were fortunate that it failed to detonate ('Stas Teren', 2014). Another photograph uploaded by separatists to a Russian social media site appears to show an improvised assembly designed to drop an RGO or RGN type grenade with additional fragmentation material from a UAV (Сводки от ополчения Новороссии, 2014).



Photo 109 A Schiebel S-100 UAV with OSCE markings, photographed prior to deployment in Ukraine.
Photo credit: Schiebel



Photo 110 An improvised assembly developed by pro-Russian separatists, designed to drop a hand grenade from a UAV.
Photo credit: Сводки от ополчения Новороссии

SOURCES & MECHANISMS OF SUPPLY

DOMESTIC SOURCES OF ARMS & MUNITIONS

Given the political situation in Ukraine, it is inevitable that questions will be raised over the provenance of the various types of arms and munitions in use, as stakeholders seek to determine likely ingress vectors for illicit arms and munitions. Despite the initial influx of readily identifiable foreign arms and munitions with Russian forces in Crimea, it is safe to say that the majority of items documented during the conflict to date have originated within Ukraine. The Ukrainian inventory last received a major update in the early 1990s, and a great deal of ageing equipment remains stockpiled at facilities around the country.

Battlefield capture has played an integral role in the acquisition of arms and munitions by pro-Russian separatist forces. Arms and munitions are seized from Ukrainian military bases, captured from routed units, or taken from police and civilian stockpiles. The vast quantities of arms and munitions in Ukrainian government stockpiles, and perhaps in unregistered stockpiles left over from the Soviet collapse, go a long way to explaining the relative scarcity of truly modern types in the hands of pro-Russian separatist forces.

With luck, separatist forces are able to capture contemporary types from government-controlled military bases, even if the individual weapons themselves might be more than twenty years old. One commander claimed to have captured a number of MANPADS, automatic grenade launchers, heavy machine guns, and anti-tank weapons observed under his control in this way (Roth, 2014). All manner of arms and munitions and armoured fighting vehicles have been appropriated, and frequently, recaptured by Ukrainian forces. Other separatist units make do with what they can find, which can include obsolete systems. This report documents several examples of obsolete arms and munitions – even Second World War-era main battle tanks – pressed into service by pro-Russian separatist forces. In significant quantities, these legacy systems can have strategic implications. In April, in the earlier days of the conflict, an arms depot in Soledar containing large quantities of “outdated” weapons was being targeted by separatists and defended by the Ukrainian government (RT, 2014b).



Photo 111 A pro-Russian separatist fighter displays the array of weapons which he claimed were taken from Ukrainian soldiers after a raid, in the town of Horlivka, eastern Ukraine. May 22 2014.

Photo credit: Сводки от ополчения Новороссии

Sources & Mechanisms of Supply

It appears that significant supplies of small and medium calibre ammunition were also sourced in this way (Chivers, 2014d). An analysis of video footage, images, and samples collected during field research support the idea that the huge Soviet-era stockpiles in Ukraine itself have been exploited to arm both Ukrainian government and separatist forces. The overwhelming majority of the small and medium calibre ammunition documented in Ukraine was produced in the Soviet Union, between 1962 and 1988. Small quantities of ammunition were produced in Ukraine after the fall of the Soviet Union. The one cartridge documented from outside the former Soviet Union was produced in Germany, and is likely a sporting cartridge.

In some cases, defecting units from the Ukrainian military may have taken significant quantities and types of arms and munitions, and armoured vehicles, with them (Karmanau, 2014; Marquardt, 2014). Separatist fighters have also claimed to have purchased weapons from corrupt or sympathetic members of the Ukrainian security forces (Chivers, 2014f). Improvised arms and munitions have also seen limited use in this conflict, with some separatist units operating workshops to repair, refurbish, and retrofit arms, munitions, and armoured vehicles (see, for example, Срочные новости, 2014).

EXTERNAL SOURCES OF ARMS & MUNITIONS

There have been widespread allegations of external support to pro-Russian separatist forces in eastern Ukraine. The Russian government, in particular, has been accused of providing all manner of arms, munitions, and armoured vehicles to separatist fighters (Miller, 2014; Reuters, 2014; Seldin, 2014; M3C, 2014). Some of these accusations have proven demonstrably false⁴⁴, whilst the veracity of others remains uncertain. A number of items of particular note – so-called ‘flag items’ – have been documented in this report. Typically, these are items which were produced outside of Ukraine, and are not known to be in the inventories of the Ukrainian security forces. Table 7 lists arms and munitions ARES has identified as being of particular note for these reasons, whilst Table 8 lists armoured fighting vehicles documented in Ukraine, which were not known to be in the Ukrainian government’s possession prior to the outbreak of hostilities.

Table 7: Arms & Munitions - ‘Flag Items’ Identified in Ukraine

Year of Manufacture ⁴⁵	Item	Country of Origin	Item Type	Source
2014 ⁴⁶	9K38 Iгла	Russian Federation	Man-portable air defence system	Jenzen-Jones & Smallwood, 2014
c. 2012*	ASVK	Russian Federation	Anti-materiel rifle	Pseush, n.d.
2011 ⁴⁷	RPG-18	Russian Federation	Rocket launcher	Прес-центр АТО, n.d.
2009 ⁴⁸	95Ya6	Russian Federation	Rocket booster	Pseush, n.d.
2008	MRO-A	Russian Federation	Rocket launcher	MoY, 2014
2007	9K135 Kornet	Russian Federation	Anti-tank guided weapon	Tsvetkova & Vasovic, 2014
2007	PPZR Grom	Poland	Man-portable air defence system	Jenzen-Jones, 2014c
2002	MON-50	Russian Federation	Anti-personnel landmine	‘askai_1’, 2014
2002	RPO-A	Russian Federation	Recoilless weapon	BB, 2014
c. 2001*	PKP	Russian Federation	Small arms	Pseush, 2014
2001	OG-7	Russian Federation	Recoilless projectile	‘Pasha K.’, 2014
1994	PS match ammunition	Russian Federation	Small calibre ammunition	Pseush, 2014
c. 1987*	VSS	Soviet Union/Russian Federation	Designated marksman rifle	Pseush, n.d.

Images posted on the Russian VKontakte social network between August and October, and believed to have been taken in eastern Ukraine, showed a limited return to the use of the kind of contemporary Russian small arms and light weapons not seen since the initial Crimean incursion. These included VSS designated marksman rifles, PKP Pecheneg light machine guns, and even a weapon not recorded during the Crimean incursion: the ASVK anti-materiel rifle (Pseush, n.d.). RPO-A and MRO-A incendiary weapons have both been documented with markings indicating comparatively recent Russian production (2002 and 2008, respectively). The MRO-A, in particular, is noteworthy as it is not known to be found outside of Russian military service.

Guided light weapons have also proven to be a point of interest in the examination of supply lines. In June, the Ukrainian Ministry of Foreign Affairs accused Russia of supplying man-portable air defence systems to the separatists based upon the discovery of an empty 9M39 missile transit case with documentation suggesting recent storage in a Russian military facility (Jenzen-Jones & Smallwood, 2014; M3C, 2014). It is also possible that the Polish PPZR Grom MANPADS discussed in this report could have come from a Russian source. The weapon had been fitted with a Russian-made gripstock to make it capable of firing, and markings on the missile launch tube indicate that it was produced in 2007, the same year that one of the few known foreign exports of the Grom took place (Jenzen-Jones, 2014c). Georgia is thought to have purchased 30 launchers and 100 GROM E2 missiles that were subsequently captured by Russian forces. Poland later accused Russia of planting material from this contract in Chechnya for political reasons (Gazeta.pl, 2008). An official tracing request was sent by ARES to the Polish and Ukrainian governments, as well as the manufacturers of the missile tube and gripstock. At the time of writing, no response has been received.

There is less evidence to suggest the supply of small and medium calibre ammunition from external sources. There are several explanations for this, but this is likely to be, primarily, a result of the significant ammunition stockpiles within Ukraine. Additionally, as other commentators have suggested, any intelligent attempt to supply small arms ammunition to pro-Russian separatist forces would be capable of matching the headstamps of ammunition smuggled into Ukraine with those which are already in circulation, or would be expected to form part of Ukraine's supplies (Chivers, 2014d). There is only one example of post-1991 ammunition produced outside of Ukraine documented in this report: 7.62 x 54R mm match-grade ammunition produced in the Russian Federation in 1994.

Table 8: Vehicles - 'Flag Items' Identified in Ukraine⁴⁹

Vehicle	Country of Origin	Type	Source
BTR-82AM	Russian Federation	Infantry fighting vehicle	Lost Armour, n.d.
MT-LB 6MA ⁵⁰	Russian Federation	Armoured personnel carrier	Lost Armour, n.d.
MT-LBVM	Russian Federation	Armoured personnel carrier	Lost Armour, n.d.
MT-LBVMK	Russian Federation	Armoured personnel carrier	Lost Armour, n.d.
Orlan-10	Russian Federation	Unmanned aerial vehicle	СБ України, 2014a
T-72B Model 1989	Soviet Union	Main battle tank	Tsvetkova & Vasovic, 2014
T-72B3	Russian Federation	Main battle tank	'Vesti Backstage', 2014
1RL239	Soviet Union	Battlefield surveillance radar vehicle	Huijboom, 2014

All of the vehicles listed in Table 8, above, were produced in the Russian Federation, after the fall of the Soviet Union. None of these were in the Ukrainian government inventory prior to the outbreak of hostilities. In addition to these vehicles, which may be visually distinguished from those expected to be in the possession of Ukrainian security forces, there have been allegations of external supply of older AFVs. At least one 9K51 system captured from separatists by Ukrainian security forces may have originated in Russia (Информационное Сопротивление, 2014). US and NATO officials released intelligence in mid-June which purported to document the crossing of Russian T-64 type MBTs, 9K51 MLRS, and other AFVs into Ukrainian territory (Gordon & Kramer, 2014). The Ukrainian Ministry of Defence later published images of a captured T-64BV main battle tank, which it claimed had come from Russian military stocks (de Larrinaga, 2014). Russia denied the allegations, calling them “another fake piece of information” (BBC, 2014).

Whether or not directly supplied by foreign governments, some arms and munitions have certainly entered Ukraine from foreign states. On July 3, the Organized Crime and Corruption Reporting Project (OCCRP) reported that a Moldovan criminal figure, Ion Druta, had been involved in supplying the pro-Russian movement with SALW appropriated from Russian military. Druta spoke of being able to supply large quantities of AK type rifles. According to Druta, the weapons came from the Russian 14th Army, based in Transnistria (OCCRP, 2014). The undercover deal arranged by OCCRP reporters was rather more modest, however, consisting of an RPG-18 anti-tank system and a TT-33 pistol (Munteanu, 2014).



Photo 112 Pro-Russian separatists posing with comparatively modern weapons; an ASVK anti-materiel rifle, at left, and two VSS suppressed designated marksman rifles, at centre. Neither type is known to be in service with Ukrainian government forces.

Photo credit: Сводки от ополчения Новороссии

CONCLUSION

As prior analyses by ARES and other organisations has consistently demonstrated, the recording and analysis of arms and munitions in conflict zones can provide a useful yardstick for the progress of a conflict. The original protests in late 2013 and January 2014 saw standard issue weapons in the hands of Ukrainian security forces, with few surprises. When Russian military units swept into Crimea in March, a shift was apparent towards modern Russian military weapons rarely seen on the export market, before the arms landscape again changed to depict the more rag-tag assemblage of older and expedient types now in use with pro-Russian militants in eastern Ukraine. It is clear that civilian weapons can and will be sourced by Ukrainian residents from their homes and from gun stores, but other sources are less clear. Limited illicit importation has certainly taken place. For example, there is no legitimate civilian means of ingress for many of the arms produced outside of Ukraine which have been documented in this report, including the ASVK and PKP recently observed, or indeed the several anti-tank and anti-aircraft systems identified as foreign.

ARES has assessed that it is very likely that pro-Russian separatist forces have received some level of support from one or more external parties, however the level of state complicity in such activity remains unclear. Despite the presence of arms, munitions, and armoured vehicles designed, produced, and allegedly even sourced from Russia, there remains no direct evidence of Russian government complicity in the trafficking of arms into the area (Reuters, 2014c). The majority of arms and munitions documented in service with separatist forces have evidently been appropriated from the Ukrainian security forces and their installations within Ukraine. The 1970s and 1980s vintage ex-Ukrainian military inventory is likely to continue to predominate. The various older and expedient types of arms and munitions outlined in this report should not be taken to mean that separatist forces are ill-equipped. Some of the more capable arms and munitions available to them have been outlined. However, ageing light weapons systems and larger ordnance, along with MANPADS and other SAM systems, will all retain a niche amongst pro-Russian forces in Ukraine for as long as government forces maintain their overwhelming advantage in air power and armour. The Ukrainian regime has access to more powerful weapon systems, in greater numbers, and with a more robust logistical chain than separatist forces could hope to muster without overt support from a foreign power. As it stands, the limited but noteworthy external support pro-Russian separatist forces have received has not proven significant enough to turn the tide in their favour.

NOTES

- 1 Sometimes also called the MP43 or MP44, with minor updates in production
- 2 Considered a +P+ loading.
- 3 See Ultimak, n.d.
- 4 Valeriy Heletey later served as Ukraine's Minister of Defence, from 3 July to 14 October, 2014 (Interfax-Ukraine, 2014a; Верховної Ради України, 2014).
- 5 Notably, the Belorussian WWII museum in Minsk has an extensive collection of hand-made partisan SMG copies from the 1940s.
- 6 TBG-7 type rockets were captured from pro-Russian Separatists in Donbass, in October 2014 (Прес-центр СБ України, 2014b)
- 7 The Nona systems as received the unofficial 'backronym' Noveysheye Orudiye Nazemnoy Artilerii (Новейшее Орудие Наземной Артиллерии; 'latest ground artillery cannon'), however it is likely simply named after a woman's name. The 'K' stands for Kolesnaya (Колесная; 'wheeled').
- 8 Whilst ARES has not seen Russian or Polish sources which explicitly state that the 9P516 gripstock is compatible with Grom missiles, it would not be surprising to learn as much, given their shared origins.
- 9 Interview with confidential source (CS02), eastern Ukraine.
- 10 The Umen'shennoy Skorost'yu (уменьшенной скоростью; 'reduced speed') 7.62 x 39 mm cartridge was developed for use with the AK rifle when fitted with the PBS-1 suppressor.
- 11 Interview with small calibre ammunition specialists.
- 12 Now 'Lugansk Cartridge Works (LCW)'.
13 Now 'Bishkek Machine-Building Plant (BMZ)'.
14 Now 'Barnaul Cartridge Plant CJSC'.
- 15 Entries marked with 'unknown' type typically correspond to data taken from one or more fired cartridge cases.
16 Now 'OJSC Ulyanovsk Cartridge Works'.
- 17 Entries marked with an asterisk (**) for quantity could not be determined from the source. Total sample size for all of these cartridges was small: 54 cartridges or cartridge cases (Chivers, 2014d); approximately 30 cartridge cases (Salem, 2014b).
- 18 Now 'JSC Tula Cartridge Works'.
- 19 Now 'FSE Amursk Cartridge Plant Vympel'.
- 20 Produced on behalf of Global Trades Company, an American company. See text.
- 21 Produced on behalf of Century Arms International, an American company. See text.
- 22 The likely headstamp is: RED ARMY LU 7.62 x 39 (see text for details).
- 23 Now 'LVE Novosibirsk Cartridge Plant JSC'.
- 24 Now part of RUAG Ammotec GmbH
- 25 Interview with confidential source (CS02), eastern Ukraine.
- 26 Interview with Harriet Salem (VICE News).
- 27 The 'B' stands for Buksiruyemyy (Буксируемый; 'towed').
- 28 Most commonly, these have taken the form of double white stripes, painted on to vehicles in Ukrainian government service.
- 29 Often referred to as the 'T-72BM'.
- 30 Interview with confidential source (CS01) in eastern Ukraine.
- 31 These are often referred to as the 'T-72BM'.

- 32 Sometimes transliterated into English as 'JS-3'.
- 33 Including command and staff, reconnaissance, and other variants which retain a primary armament > 20 mm in calibre.
- 34 As defined in the Treaty on Conventional Armed Forces in Europe (CFE).
- 35 Given the limited material (single source examples of each MT-LB variant, and with each image depicting burned out hulls), the identification of these vehicles should be regarded as tentative.
- 36 Including self-propelled anti-aircraft systems and self-propelled rocket artillery.
- 37 ARES has not been able to independently verify the presence of the 9K37 Buk in the separatist inventory; however, it is widely acknowledged by various sources.
- 38 ARES has not been able to independently verify the presence of the Pantsir-S1 in the separatist inventory; it is a possibility, based on a remnant of a related munition. See the text.
- 39 ARES has not directly observed vehicles associated with the 9K79 system, however remnants of the 9M79 or 9M79-1 tactical ballistic missile fired by this system have been observed (see Photo 96).
- 40 Also referred to as the 'BM-21'.
- 41 See note regarding this practice under 'Armoured Fighting Vehicles'.
- 42 In one case, there were claims that a Ukrainian Air Force Sukhoi Su-25 ground attack aircraft was shot down by a Russian fighter aircraft (see Interfax-Ukraine, 2014b).
- 43 Later variants of the Buk system have different designations and different NATO reporting names. E.g. Buk-M2 (SA-17 Grizzly), etc.
- 44 For example, a persistent rumour on many internet sites suggesting that pro-Russian separatists had been supplied with the RPG-30 anti-tank system (Chivers, 2014d).
- 45 Where the exact year of manufacture for the item in question is not known, the year the item entered service is given, marked with an asterisk (*). In the case of multiple items with a known date, the latest is given. In some cases, relevant dates other than a manufacture date may be given. These will be marked with an explanatory note.
- 46 This date refers to an inventory check date, not a year of manufacture. The munition itself was not documented, only the packaging. See source for more information.
- 47 This date refers to a inventory check date, not a year of manufacture. See source for more information.
- 48 Given the scarcity of information available regarding the 95Ya6, this date has not been confirmed. Regardless, this system was introduced well after the fall of the Soviet Union.
- 49 All vehicles in this table were produced in the Russian Federation, after the fall of the Soviet Union. None of these were in the Ukrainian government inventory prior to the outbreak of hostilities.
- 50 For a note regarding the identification of all MT-LB variants, please see the text in the relevant section.

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ARMAMENT RESEARCH SERVICES Pty. Ltd.

+ 61 8 6365 4401

contact@armamentresearch.com

www.armamentresearch.com