

## *Laser weapons*

Lasers had long been a science fiction weapon and the SDI programme had demonstrated this with its “Star Wars” nickname. Used for many years in low powered laser designators and range finders, they had gradually (as power output increased) become more viable as weapons in their own right. In space they were used as ASAT weapons and had started to be used as a dazzling device in the 1990s with their use limited to ships due to their size and power requirements. By the start of the war in 1995, these disorientating devices had been developed by the USA, USSR and China and had also been confirmed as deployed by the UK (which had deployed them as early as the 1982 Falklands War). It is believed that other nations had also deployed them, namely France and Israel. It is not thought that Warsaw Pact had any in use, their use being limited to the Soviet Navy.

During the Gulf War of 1990 two trial versions of the AN/VLQ7 Stingray laser system were deployed to Saudi Arabia on Bradleys but were never used in action. These systems used a laser to detect enemy optical systems in low power and then send a pulse towards any detected acting as a blinding system. This could be used in three ways, fully automatic (which required no user input), semi-automatic (which recognised the threat but then prompted the user to trigger it) and manual only. Further trials of the prototypes showed that while they were effective in open environments, in built up areas there were too many false positive reflections from broken glass. As a result the trial systems were consolidated in the 24<sup>th</sup> Infantry Division (Mechanised) as this was rolled for deployment to CENTCOM where the open spaces would make the system more effective.



*Illustration 1: M3A1 SDS Bradley of the 24th Infantry Division (Mechanised) preparing for deployment to Iran*

Initial deployment was one per platoon with an aim of increasing this to three.

Production of the system never raised the number above the initial deployment allowing for battlefield losses. With the Mexican invasion, a number of AN/VLQ7s were issued to the Vth Army where they were consolidated into scout units. In US service Bradleys equipped with this system were given the suffix of SDS (Stingray Defence System).



*Illustration 2: The St Pietor just before the incident. The MSU1K12 is the round object just visible to the right of the bridge. Japanese Maritime Self Defence Force*

The first confirmed terrestrial use of a laser in combat was in December 1995. This was a development of the dazzling laser by increasing the power to develop a blinding effect. A Japanese naval helicopter pilot Lt Hiro Kasawa was partially blinded from the deck of the St Pietor, a Soviet fishing boat/spy ship just off the Kurile Islands. In newspaper interviews, Lt Kasawa stated that he had been observing the boat through a pair of binoculars

when he suddenly suffered a tremendous headache and everything went black (he later regained sight in his left eye but the burn damage to the right was severe enough to permanently blind him in it). His co-pilot who had been controlling the helicopter while Lt Kasawa observed returned it to base safely (suspicions were now raised regarding the crash with the loss of all crew of Sea Hawk of the US Navy observing a similar ship the month before). The Japanese reacted angrily and issued a formal protest to the Russian ambassador. The Russians denied the incident had taken place. Many commentators have claimed that this event was one of the main reasons that Japan was willing for American ships heading for China to form convoys under US Naval protection in Japanese territorial waters and for aircraft to be used from bases in Japan. By late January, the Japanese Maritime Self Defence Force (Navy) had actually started to offer convoy escorts up to Chinese territorial waters (Japanese ships are believed to have sunk at least two Yankee class submarines in the period January to May although these were attributed to the Chinese Navy and survivors handed over to them). A recently declassified document on the incident shows that the Japanese believed the weapon to be a development of the weapon used in the 1K11 vehicle and known as the MSU1K12 (MSU was a cover name standing for powerful propulsion unit) boosted by extra batteries. The St Pietor is listed as missing in Soviet archives around the time of the invasion of the Kurile Islands.

In 1993 development started on the MEWS, this was intended for bomb disposal teams to use to destroy unexploded ordinance. Production versions mounted in M1121 HMMWVs were rushed into service with the Air Force in late 1996 in an attempt to give EOD teams a better standoff capability to deal with unexploded ordinance, especially when the Chinese reported new anti-handling devices were being fitted to Soviet bombs. This system worked by using the laser to heat the casing on the weapon and disrupt the device. Used with great success on unexploded ordinance it was never capable of the energy output to make it a viable weapon system. The US Army and Marine Corps looked at the device and both ordered small numbers for their EOD teams. A number were purchased by the UK for mounting in the FV4319 Sunbeam (a Spartan with the laser system taking the place of the top hatch and three of the passenger places). A trial of the FV4320 Shuriken (an identical mounting using the Stormer chassis as a base) resulted in the non acceptance of this vehicle as it was felt that nothing was added by using this chassis. These were used teams detached from 33 Engineer



*Illustration 3: MEWS M1211 HMMWV destroying an unexploded Soviet bomb. US Army*

Regiment (EOD), primarily for work around airfields. In January 1998 the UK elements were reorganised with US Air Force teams as the Joint EOD Group (US/UK) with detachments based around the country at major military and civilian airfields. Placed operationally under RAF and US Air Force control they performed valuable service until the unit disbanded in February 2000. The vehicles were retained by 33 (EOD) Regiment, Royal Logistic Corps.

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
MEWS	1	–	50	–	1	-3/-5/-8/-12	Cumulative penetration

Cumulative penetration: Each action the weapon is fired continuously against a non moving target from a non-moving vehicle the pen is increased by 1. If a single phase is missed then the pen drops by 4 back to the values on the table. Note that once a hit is obtained the weapon can be locked onto the target.

In early 1997 an enhanced version of MEWS was developed by the Arizona Laser Manufacturing Corporation that upped the energy output by 75% using improved optics and a slightly different chemical formula. This MEWSII system was quickly rushed into production again using a HMMWV chassis and known as the M1121E1. This was produced alongside the original MEWS system although it had been planned to change over production to completely MEWSII in 1998 (production rates were lower than MEWS as the components were harder to manufacture). This was used only by the US Air Force although it had been planned for the US Army to also adopt it.



*Illustration 4: M1121E1 with MEWSII undergoing trials. Arizona Laser Manufacturing Corporation*

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
MEWS	1	–	60	–	1	-3/-5/-8/-12	Cumulative penetration

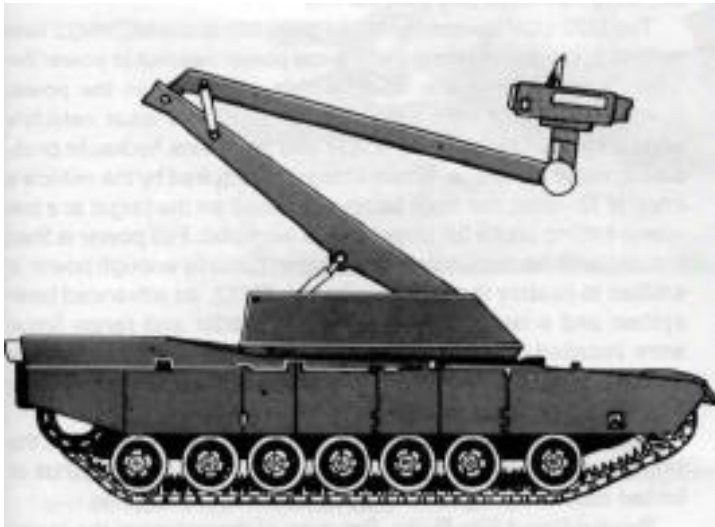
Cumulative penetration: Each action the weapon is fired continuously against a non moving target from a non-moving vehicle the pen is increased by 2. If a single phase is missed then the pen drops by 4 back to the values on the table. Note that once a hit is obtained the weapon can be locked onto the target.

In early 1992 US scientists working on the highly classified HEWS (High Energy Weapon System) project made a theoretical breakthrough that allowed a higher efficiency in the energy output of lasers. By early 1994 prototypes small enough to be used on a large armoured vehicle were available using a deuterium fluoride laser. The XM12 based upon the M1 tank hull with an XM4 300Mw laser in an armoured housing on a “cherry picker” arm was developed. The gas turbine engine of the original M1 hulls used provided enough energy to quickly power the capacitors (although the vehicle may not move while the capacitors are charging as the drive is disengaged). The initial plan to use surplus M60 hulls was abandoned when the power output was calculated to be too low to allow an effective rate of fire. The XM4 itself had originally been intended as an anti-aircraft weapon and the sophisticated fire control system shows this although no radar was ever fitted to an XM12 (the version on the drawing board included a radar and this is usually known as the XM12E1 although this was never an official name). The radar was intended to allow the tracking of the weapon onto the target, once this was achieved, the laser fired a wider beam on low power and the return was used to indicate a lock on. Once this was achieved the computer then fired the main beam at the point indicated by the return for 0.01 of a second. If no return was made, the main beam did not fire. From the operator’s perspective however all that happened was the weapon was aimed and the firing button pressed. If the main beam did not fire then a warning flashed on the firer’s console. Used in manual mode the sophisticated digital TV like camera was used to locate the target (this had a variable optical zoom up to 10 power and digital zoom up to 40 power). Once the target was located in the aiming



reticule the weapon was fired as above. Here the system only did not fire if there was no return (i.e. the weapon was pointing at the sky). The digital link to the hull position included both thermal and passive IR options (although the resolution on these limited the zoom to 6 power using optical zoom and 20 power using digital zoom).

Before the XM12 had been issued a modification had already been made, it was found that by running the capacitors and turbine together could produce a high energy discharge. This did however risk damaging the laser and was not authorised for use. The firing of a damaged laser completely destroys the weapon so was left in *FM732 XM12 High Energy Weapon* as a means to destroy the weapon to stop it falling into enemy hands. Troops however soon adopted the practice unofficially for emergencies.



The XM12 was quickly rushed into service with the first unit, the 276<sup>th</sup> Air Defence (Laser) Battery (Provisional) being declared fit for service in May 1997. “The Jedis” as they nicknamed themselves developed the technique of using a single radar vehicle to control each battery of four M12s (as they were now classified) using the secure low power digital broadcasts. Shipped to Europe in July 1997 the unit was deployed on the southern front where the air threat was higher. By December the doctrine for their use against ground targets was developed from the

doctrines contained in *FM78-23 Tactical Deployment of the M1E2* which had considered in depth the options when using the elevated casemate turret on the “Giraffe.” Used in this way they were highly useful against light armour but crews requested the development of the weapon pod to include a machine gun capable of being used against infantry targets as the vehicle’s M240 was usually hidden by the hull down position. Three experimental pods were hurriedly developed in the United States from the now type classified M4, the M4E1 with an M240 with 400 rounds of ready ammunition, the M4E2 with an M2HB with 200 rounds of ready ammunition (both of these could be reloaded from inside the vehicle when the cherry picker was dropped back onto the hull and aligned with a new loading hatch) and the more radical M4E3 which used a software change to vary the power of the laser to make it a more viable anti-personnel weapon. This pod was the preferred solution but difficulties in developing the software, mainly with targeting prevented it ever being a contender for the replacement for the M4. With the disruption occurring in the States, none of these pods were ever taken into service and only prototypes were built. In the meantime, in Europe technicians for the 276<sup>th</sup> produced an externally mounted M60C with 200 rounds of ready ammunition. This was fired electrically using a cable that was attached to the crane (although this often failed due to damage). Aligning it to the camera proved difficult as the laser was not affected by ballistics while the M60 was. Most crews overcame this by using a mix of 1:3 ball : tracer although some crews preferred 1:1. In addition there was the problem that the weapon could only be cleared manually if it jammed and it had to be reloaded externally (which meant breaking the NBC sealing of

the vehicle). Whilst not perfect this was the best available option to most troops. In the M4E1 and M4E2 this had been overcome by making the laser act as a range-finder and automatically adjusting the pod by the correct amount when the weapon was selected.

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
M4 - normal	3	-	600	-	10	4/2/0/-2	
M4 – high energy	1*	-	600	-	20	8/4/2/0	Overheats

Overheats: Each time the weapon is fired at this setting roll 1D10. On a 1 the laser takes minor damage from overheating. If it is fired again this will destroy the laser. Spares will be next to impossible to find.

The M12 was also developed further in mid 1997 (with Israeli co-operation) to develop the XM28 MHBEBPS (Mobile High Boosted Energy Ballistic Protection System). This used the basic M12 with the power boosted 450Mw XM6 laser linked to the Wide Man radar system in a non-elevating remote mount. This was intended to shoot down incoming artillery, mortar and rockets. Software bugs plagued the system as the control had to be fully automatic to enable the targets to be hit. Trials achieved a 55% hit rate but a large number of false positive engagements (in one test engagement the system tried to intercept six 155mm shells, two were destroyed, one damaged and did not explode and three were missed – in the same engagement two birds in the area were also hit). In late 1997 trials were abandoned and the hulls used to boost the numbers of M12s. It is believed that Israel has continued the development of this as the Ze'Gal system using static positions (although rumours of rebuilt T72s with a low profile split turret persist as the alleged Ze' Aleph Ghan – this however is unlikely as the engine is underpowered for this unless the hulls were misidentified T80s).

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
XM6 - normal	10	-	300	-	6	2/1/-2/-4	
XM6 – high energy	1*	-	800	-	30	12/8/6/2	Overheats

Overheats: Each time the weapon is fired at this setting roll 1D10. On a 1 the laser takes minor damage from overheating. If it is fired again this will destroy the laser. Spares will be next to impossible to find.

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
Ze'Gal - normal	12	-	400	-	5	1/0.-3/-6	
Ze'Gal – high energy	1*	-	800	-	30	12/8/6/2	Overheats

Overheats: Each time the weapon is fired at this setting roll 1D10. On a 1 the laser takes minor damage from overheating. If it is fired again this will destroy the laser. Spares will be next to impossible to find.

Parallel developments in the high energy field also resulted in the U S Navy's Mark 77 Mod 1 CRAMS (Close Range Anti Missile System). This utilised a modified version of the software of the Phalanx system (a similar weapon using a conventional gun) to shoot down incoming missiles in their terminal phase. Since the system was designed for use at sea there were less problems with false positives. Drawing on the power of the ship, the weapon was mainly restricted by the cooling system. After 30 seconds of intense engagement (regarded as 50 or more shots) it required an hour to cool down or the system would suffer damage. Capable of achieving an impressive 65% hit rate against most missiles, the Mark 77 was never deployed due to the



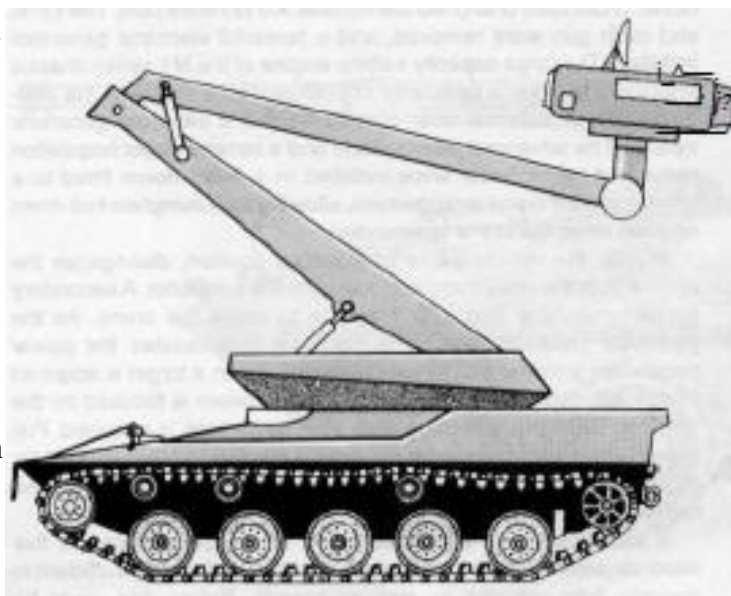
*Illustration 5: Mark 90 on the USS Pemberton, 2025*

cooling difficulty. Many years later it would however lead to the development of the Mark 90 which overcame the difficulties using the new super conducting heat tiles and the lower heat generating super deuterium gas.

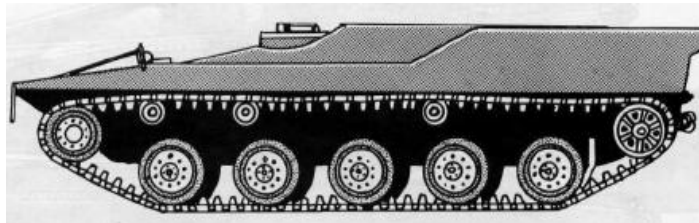
Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
Mark77 Mod 1 CRAMS	20	-	500	-	3	1/0.-3/-6	Rapid fire overheating
Mark 90 CRAMS2	20	-	500	-	4	2/1/-1/-3	

Rapid fire overheating: Each time the weapon is fired 50 or more shots at this setting roll 1D10 per further shot. On a 1 the laser takes minor damage from overheating. If it is fired again this will destroy the laser. Spares will be next to impossible to find. The weapon effectively cools 1 shot per action.

Further developments in the efficiency and the need for a lighter vehicle deployable by C130 resulted in the development of the XM21 and XM22. The XM21 used the lighter XM5 laser (as this required less power). In order to charge the capacitors the drive train was uncoupled (with a small auxiliary generator used to power the non-laser systems) and the XM22 power supply vehicle linked up to the system (with it's drive train uncoupled) using a 25m heavy duty cable. The XM21 and XM22 were both based upon the LAV75 hull. While the separate vehicles and the requirement to



disconnect the drive systems were unsatisfactory the design worked tolerably well as it could be transported by two separate C130s (although the penetration and rate of fire was significantly less than the M12's laser). The US Army was not happy with the design however, looking for a more combat suited vehicle (in particular they criticised the need to uncouple the drive train and use a second vehicle). The Air Force on the other hand felt that the design would be useful to be used for airfield defence but capable of moving easily to other locations. Using a fire control system that was slaved to a mobile radar unit (usually carried in a HMMWV) the software was changed to allow better engagement of air targets. Lessons learned on the XM28 were incorporated and a less ambitious software package was used that required the user to designate targets. Left in place was the original manual mode (similar to the M12) for engagement of ground targets (mainly due to nobody thinking to remove it than any practical use).



Approximately 20 paired systems were produced before the capability to create more was devastated by nuclear strikes. Most of these were deployed to Europe although a battery of four pairs was sent south to Texas when the Mexicans attacked. In Europe, one is credited with the destruction of a Soviet SS21 aimed at Templehoff Airport and at least four aircraft were destroyed during a raid on the same airfield two days later. At least two pairs of vehicles were filmed during Operation Omega at Bremhaven (on one the markings are unclear, the other shows none at all so unfortunately their origin

remains unknown) and later declassified documents show these were an exception to the abandoning of vehicles in Europe for the German Army. It is known that Upper Hayfield in the UK received at least one pair of vehicles. The fate of these is unknown.

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
M4 - normal	3	-	600	-	10	4/2/0/-2	Lower power input

Lower power input: Requires both vehicles to charge the capacitor. Incapable of firing more than 3 shots without recharging. Incapable of firing a high power discharge.

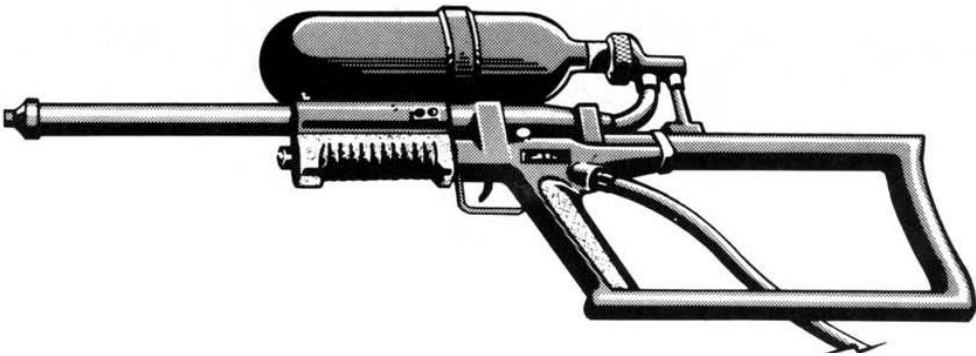
Perhaps the strangest developments to come out of the various American laser programmes was the AALW (Anti Armour Laser Weapon). Whilst initial trials of the lasers were successful the problem became one of power. Three prototypes struggled to the prototype stage, the XM80 MAAWL (Medium Anti Armour Weapon – Laser), the XM81 PAAWL (Personal Anti Armour Weapon – Laser) and the XM82 LaPeW (Laser Personal Weapon).

The XM80 was a tripod mount weapon that was quickly dropped as it did not have major any advantage over even the obsolete recoilless rifles that had been pulled from storage. A high bulk, especially of the batteries, low rate of fire and significant thermal signature after firing did not offset the accuracy of the weapon. An abortive attempt to overcome the thermal signature by applying the low tech approach of a water jacket (making it the XM80E1) and lightening it with a bipod mount was the final nail in the weapon's coffin.



*Illustration 6: XM80. Note that the battery shown here holds enough for two shots only and appears to be missing the carrying handles.*

The XM81 (known to it's manufacturer as the Armington Laser Carbine Model 2) however was felt to have at least some potential and trials continued. Using a large backpack battery, the weapon looked like something out of a science-fiction film, a look not helped by the large liquid nitrogen cylinder over the



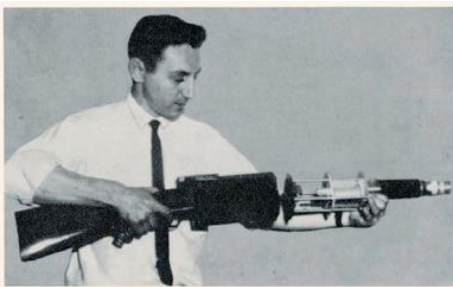
*Illustration 7: Original model XM81PAAWL without side mounted scope (note the holes for attaching it above the hand guard – a duplicate set was mounted on the opposite side for left handed firers) or backpack barrel. Capable of firing only one shot every 30 seconds and only six shots before*



recharging the battery and replacing the nitrogen. Aiming was simple as there was no ballistic drop or travel time, the weapon hit where it was pointed. Most weapons used a 2.5 zoom optical scope, even before they were issued however production was changed to the XM81A1 which used a picatinny rail that allowed a range of scopes to be used (note that this weapon does not have an integral iron sight). To zero the weapon a low powered aiming dot could be used (this was capable of being left on continuously as the battery drain was negligible). In extreme cases when no scope was fitted this could be used to aim at short ranges.

Described by one observer as “an absolutely ingenious solution in need of a problem,” the XM81 was moderately successful in defeating light armour and the high temperatures caused often resulted in spectacular ammunition or fuel explosions. Most users however disliked the fact that the laser did not cause any explosion when used in a bunker busting role, instead just punching a hole in the bunker and at best killing one of the occupants. As a result the USMC continued to use the SMAW in the role, passing their trial weapons to the US Army who persevered with the weapon. A number (believed to be about 30) were issued to the 4<sup>th</sup> Infantry Division in Europe in November 1999 (where most were reported as “lost in action” within a month). At least 20 were shipped to CENTCOM in early 2000 where one was used in May 2000 to shoot down a Soviet Hind. In Iran they have acquired the nickname “Blue Moons” from their rate of fire. The 9<sup>th</sup> Infantry Division has pioneered an anti-armour tactic with these weapons. Teams are deployed in fours, the no1 is the commander who will carry binoculars to act as the spotter for the weapon (he will carry his choice of personal armament), the no2 is the laser gunner who will carry a pistol as a back up weapon, the no3 is the close protection and will carry an M249 and the no4 will carry an M203 (usually with plenty of smoke grenades to cover a withdrawal). Note that no extra batteries or gas are carried in these teams due to their bulk and their scarcity. In addition it is felt unlikely that a single team will need to engage enough targets to justify their carrying. These teams will move forward of the main defence line at night and dig in in cover sighting along likely approach routes (in many ways similar in approach to a sniper team). The long range of the weapon allows foregoing of the stalking required normally by anti-tank teams (these will still tend to operate aggressively by night often in an attempt to force enemy vehicles out of covered areas into sight of the laser armed teams), the XM81 being used more as an anti-vehicle sniper.

Weapon	ROF	Dam	Pen	Blk	Mag	Recoil SS	Recoil Burst	Rng	Notes
XM81	1*	12	2	5	12	-	-	60	1 shot per 30 sec



*Illustration 8: Photo from the German magazine Das Spiegel showing the early prototype XM82 being disassembled. Note the battery connector just behind the right hand.*

The XM82 did not have such a successful career, trials gave the weapon a faster rate of fire without overheating but the backpack battery mechanism did not allow more than four shots without recharging. Only a dozen were made before the XM82 was dropped. New York Technology who made the weapon however did continue to tinker with the design but no major improvements were made. The optical enhancement technology would however later be incorporated into the Mark90.



Weapon	ROF	Dam	Pen	Blk	Mag	Recoil SS	Recoil Burst	Rng	Notes
XM82	1	8	2	5	4	-	-	65	

The west were not the only ones developing a man portable laser. The Soviets had been developing the 9M23L24 “Bolt” known in the west as the AL1 “Silver Streak.” This took a radically different approach to the western solution using a chemically pumped laser using Deuterium Fluoride. This device consisted of a small scope and lens unit which clipped to the pre-packaged cartridge. On firing the cartridge was discarded but the sight unit and lens retained for future use. Sighting was by a simple x5 optical scope (non-adjustable) with the option to fire a visible red dot using a separate battery powered unit in the launcher. The option not to use this as the main aiming system is believed to have been a suspicion by the Soviets that the west was using automatic countermeasures for laser ranging devices or at least a laser warning system. In appearance it consisted of a tube 23.5cm in diameter and 78cm long. Attached to this approximately at the half way point was a green metallic box containing the scope (with rubber covers) and a flip switch covering the two buttons (targeting and main beam). The box also had a small bipod to assist in aiming. The biggest draw back of this weapon was the highly corrosive and toxic gasses that firing the system produced. Similar in size to the back blast from an RPG these were vented to the rear of the weapon (the firing drills have the firer lying at an angle of 45 degrees to the weapon to avoid this as much as possible. The Soviet manual for the AL1 insisted that the weapon was not to be fired unless the firer was wearing a full chemical warfare suit and mask. These were to be replaced after ten shots or 24 hours after the first firing, whichever came first. The launcher itself was capable of firing six rounds before a new launcher was required (the lenses by this point were in need of replacement). The scope however could be salvaged and reused. Many weapons exceeded this limit and suffered badly for this. The AL1 was never widely issued, troops often being (rightly) concerned at the gas system. Photographs exist of a BRDM-3 with a row of 6 AL1s on a remote mount (this has never been seen in the field and may just be a mock up or development vehicle). There is a drill version of the round which is painted white and contains a low power laser (enough to register hits on a detection system) and CS gas (presumably to ensure correct drills are used). This was battery powered and as long as the gas was replaced could be used a large number of times).

Weapon	ROF	Dam	Rld	Pen	Blk	Mag	Recoil SS	Recoil Burst	Rng	Notes
AL1	1	50	1	20	6	1	-	-	200	Corrosive back blast, degraded with use.

Corrosive back blast: Anybody in a 10m cone to the rear takes 1D6-2 to each location (-1 more if fully clothed, no damage if in NBC). Anyone not wearing a mask additionally takes 1D6 damage to the chest.

Degraded with use: After each six full shots from the same launcher treats penetration as one range further away than it is.

In development was the 9M23L54 “Basilisk” known in the west as the AL2 “Sundance.” This used a similar launcher (seemingly a development of the AL1) with a shorter squatter package. This appears to have tried to overcome the gas problems by placing all of the vents on the opposite side to the firer. It is not known how far development had proceeded when the laboratory was destroyed in October 1999 by a nuclear strike.

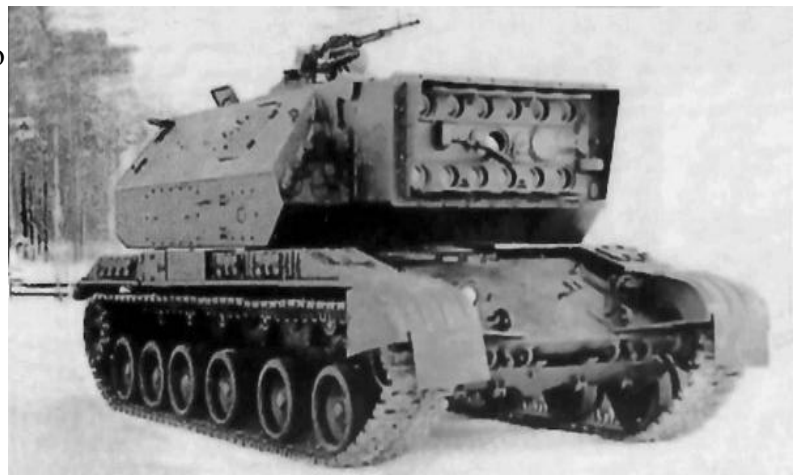


*Illustration 9: 1K11 during November 1996*

destroyed in action during the fighting in Germany in late 1996/early 1997 while part of the 9<sup>th</sup> Tank Division.

From this design the NPO Astrofizika developed a series of improved versions culminating in the 1K17 Szhatie. This used the hull from a 2S19 self propelled gun (itself based on the T80) with a box turret containing a bank of ruby lasers. This was trialled in 1990 and series

production began in 1992. This was intended to again act as a weapon to damage optics. This used a mass of lasers rather than the single laser of the 1K11 to achieve a shotgun effect. It was felt that this method would widen the capabilities of the 1K17 to allow it to attack helicopters and aircraft. Kept a secret, it had not been reported in the West before the outbreak of the war. As the vehicle had been kept out of sight of prying western eyes, the first use in China came as a surprise when the Soviets deployed a number in an attempt to deal with the large numbers of NATO ATGMs that had been shipped to China in the winter of 1995/96. Chinese troops engaging the 9<sup>th</sup>



*Illustration 10: 1K17 of the 37th Motor Rifle Division outside Leningrad Winter 1998 (the 37th was re-equipped when withdrawn from China and as a result often found itself with state of the art systems alongside systems older than the crews). The small armoured cover that is open is for the day sight, the larger cover to the right of it is the night sight. TASS*

Guards Tank Division reported the use of a laser to blind troops. Investigation revealed that the injuries were caused to those using optics. At first this was believed to be use of the 1K11 but blurred images of a 1K17 soon emerged. After initial misidentification as a new type of MRL on a tracked chassis, a further picture soon gave the clue what the design was. Further reports from other units engaging different Soviet divisions soon completed the picture. Gradually by mid 1996 it was apparent that the design was in fairly widespread service although the number of vehicles was not high (most divisions appear to have had at most 9 vehicles). Usually these were formed into a separate

company of three platoons of three vehicles plus a command vehicle at company level. These platoons were usually detached to the assault elements during prepared attacks to reduce incoming fire. The first example seen in the west was one captured from the 38<sup>th</sup> Tank Division in January 1997. This was quickly examined and evaluated. While it was regarded as an effective weapon, NATO felt that it would not be a major difficulty due to the small numbers encountered, the report did however recommend research into hardening the optics in case of increased deployment by the Soviets. This research had been completed by the start of the nuclear exchanges but no action to implement the improvements was undertaken. Interestingly, in the West the Soviets tended to use the 1K17 in a different role, using the system as a counter to the extensive NATO use of attack helicopters (Soviet propaganda footage exists of an A10 being shot down by a 1K17 and despite this possibly being faked footage, it is well within the limits of the system's capabilities). There is an unconfirmed report from a DIA source in Finland of a variant with an extra bank of six lasers above the standard twelve which was tentatively given the NATO designation of 1K17 M2000. No further information has ever come to light about this.



*Illustration 11: ZSU-L of the 39th Guards Motor Rifle Division in Poland May 1999. Pravda*

Sanguine was usually deployed with a mono-wheel trailer carrying extra high capacity batteries for the Y54 laser (this holds the equivalent of 250 shots). The engine was capable of recharging one shot per minute of running. These weapons were usually deployed in the same manner as the vehicles used to build them in an air defence role. They did however all have a radar system which was frequently upgraded. Many had an anti-aircraft weapon added to the turret roof (operated by the commander/gunner) for close protection.

In addition to these two vehicles a number of ZSU23-4s were converted by the NPO Astrofizika to mount a higher powered laser for use against aircraft. This incorporated a lower power laser linked to the on-board radar that identified the target and tracked it before indicating to the operator that a target was locked. Alternatively the system could be put into automatic mode, automatically engaging any target that met user set parameters and was not displaying friendly IFF data. In order to ensure maximum firepower the ZSU-L



*Illustration 12: Close up of the laser from the same vehicle.*

Weapon	ROF	Mag	Range	Ammo	Damage	Pen	Notes
Y54 laser	10	100	200	-	8	3/1/0/-1	



One thing not always noted at the time is that all of these lasers did not produce any visible light when they fired. Many newspaper illustrations and TV diagrams failed to take this into account.

A major factor not always appreciated is that lasers are severely affected by smoke, rain, etc. Smoke or fog will block the laser quite effectively (1m of smoke will act as AV10 against a laser). Light rain will make the laser penetrate as if it is one range further away, medium rain as two ranges and limiting maximum range to medium and heavy rain only allows firing at close range whilst penetrating as extreme range. A green laser would treat rain as one category less although none was in service during the war. One reason that the Army were less than satisfied with the deployed weapons was that the trials and development had taken place in the Californian desert with it's dry, warm atmospheric conditions. Once the weapons were deployed to damper, colder conditions the weapons performed less well than advertised. This is probably the reason that the Joint Chiefs deployed the bulk of the weapons to CENTCOM where the conditions were better suited to it's use. It is worth noting however that hot desert air creating a mirage effect can also downgrade as laser (treat as light rain).

"I was really disappointed when I saw the M4 firing for the first time, I had grown up on "Star Wars" and was gutted to find that not only was there no light, there was only the crackling of the energy ionising the air and not a 'zap.' We all felt like that until our commander pointed out that made locating us MUCH harder. That's why we chose the nickname 'Silent Death'."

*PFC Roger Johnson  
109<sup>th</sup> Air Defence(Laser) Battery*

Surprisingly ERA was quite effective against lasers, the high temperature setting off the ERA which radiated a lot of the heat energy outwards. In game terms, lasers hitting ERA are treated as HE rounds. Note that this applies against ERA only, spaced and composite armour offer no bonus.