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Mortars

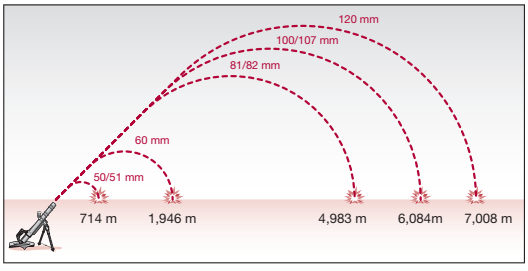
Mortars are generally smooth-bored indirect-fire support weapons that enable users to engage targets that are outside their line-of-sight. A mortar's high-trajectory fire makes the weapon effective against enemy positioned behind hills and other obstacles. Mortars enable ground forces to engage their targets dynamically and at relatively close range, while minimizing their exposition to direct enemy fire.

As far as light weapons are concerned, there are, generally speaking, three categories of crew-portable mortar: 'light' (up to 60 mm), 'medium' (61 mm to 82 mm), and 'heavy' (83 mm to 120 mm). The Survey considers most mortars up to and including 120 mm[1] to qualify as light weapons. With traditional ammunition these mortars can engage targets less than 100 m. from the firer's position to more than 7 km away (see Figure). Specialized ammunition has augmented these weapons' operational capacity in terms of range, lethality, consistency, and accuracy. Some light mortars can be carried and operated by a single person. But most mortars are crew-served weapons; one soldier carries the launch tube and fire-control unit, another carries the base plate, and a third carries the bipod or tripod. This three-person team can carry the requisite munitions for smaller mortars (a 60 mm mortar bomb weighs around 2 kg, for example). Larger systems, however, typically require additional team members or light vehicles to transport the munitions (Jane's, 2007, pp. 511–85, 707–63).

The mortar is one of the oldest forms of artillery and it is produced in many countries. The weapon was likely used as long ago as the siege of Constantinople in 1453. Modern-day versions are based on a 1915 design by the British engineer, Wilfred Stokes. He invented what became known as the 3 in. (76.2 mm) muzzle-loading Stokes mortar for British use during the First World War (WWI) (Jane's, 1979, p. 405). Such mortars won wide acceptance in part because they were cheap, easy to make, and easily transportable. Nearly 50 countries have manufactured one or more types of mortars, making it the most widely produced light weapon. Only around 30 of these countries, however, continue to produce or partially produce one or more types of mortar (Small Arms Survey, 2008, pp. 34–35).

There have been numerous refinements to mortar systems and munitions over the past few decades. Lighter materials used in mortar systems' construction have enabled soldiers so equipped to be more mobile, carry more projectiles or other kit, or transport larger systems than was previously possible.[2] The lightest models weigh less than 7 kg. Fin-stabilized munitions permit mortars to travel further or carry larger warheads than traditional rifled munitions. Developments regarding mortars' fuses have increased these systems' lethality. Fire-control units now sometimes use Global Positioning Systems (GPS) or other sophisticated software to reduce the time needed to alter trajectories and engage targets (Jane's, 2004, pp. 550–52, 555; Bonomo et al., 2007, pp. 34–37). Insensitive munitions have been developed to withstand shock, fire, transport and impact by shrapnel.

Figure **Mean maximum ranges for 50 mm to 120 mm mortars with standard munitions**



Source: Wilkinson (2008)

But the most revolutionary development regarding mortars concerns the introduction of precision guidance systems to minimize collateral damage and reduce the logistical burden. Guided mortars mostly use one of four technologies: infrared (IR), radio frequencies (RFs), laser-beams, and fibre optics. IR and RF systems have the advantages of fire-and-forget targeting, but can mistake similar 'signatures' for the intended objective. Systems using laser beams can provide the user with a higher degree of reliability but require a 'man-in-the-loop', or a forward observation team within a kilometre of the target and with an unobstructed view to illuminate the mark so that the projectile can latch on to it. A system utilizing fibre-optic technology allows the operator to be far from the target (or the launch site). GPS software is also being used—sometimes on its own and also in conjunction with other forms of terminal guidance. The first precision mortar system—the 120 mm IR-guided Saab Bofors Strix—entered service in 1994 with a 7 km range. Most precision mortars are also equipped with technological improvements that extend their ranges. Changes include booster rockets, deployable fins, and extendable wings. It is not uncommon for ranges to be extended two or more times the distance of traditional mortars (Bonomo et al., 2007, pp. 20–38). To reduce costs, standard mortar bombs are equipped with tail kits, and guidance fuses with GPS receivers. Currently, a 120 mm mortar is the most common calibre for effective precision rounds. Several countries, however, are developing 81 mm guided mortar rounds, and smaller.

Non-state armed groups have used mortars with deadly effect. Mortars have found favour among these actors given their wide availability, longevity, ease of operation, and low cost. In 1994, for example, a single 120 mm mortar round fired into a market in Sarajevo killed 60 civilians and wounded more than 200 (Smith, 1994). Barrages of mortars in Monrovia in 2003 resulted in hundreds of deaths and thousands of injuries (HRW, 2003). To date, no non-state armed group has been reported to use or possess guided mortars. ■

Sourcing

This *Research Note* is based on Eric G. Berman and Jonah Leff, "Light Weapons: Products, Producers, and Proliferation," *Small Arms Survey 2008: Risk and Resilience*, Cambridge: Cambridge University Press, pp. 7–41. It has been updated by Eric G. Berman and Pierre Gobinet.

Notes

1 The Survey considers most mortars up to and including 120 mm to qualify as light weapons. Light vehicles can tow some 120 mm mortars and carry sufficient ammunition for the system to operate as intended (a defining concern for the Survey's classification system of small arms and light weapons) (see Small Arms Survey, 2008, pp. 8–11).

2 Argentina, for example, produces a 120 mm mortar system that a crew of three can operate and transport by foot.

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This Research Note forms part of a series available on the Small Arms Survey website at www.smallarmssurvey.org/publications/by-type/research-notes.html. The online version of this document will be updated as more information becomes available. For more information about mortars, please visit www.smallarmssurvey.org/weapons-and-markets/products/light-weapons.html.

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