

Damage From Small Arms

- When I roll damage for small arms, I use a d10 instead of a d6. I think that *Twilight 2000* v2.2 firearms simply cause too little damage using the standard rules. Weapons listed as +1 would do 1d10+1, weapons listed as +2 would do 1d10+2; weapons listed as -1 would do 1d10-1 (possibly doing no damage), and weapons like the tiny Kolibri pistol, with a damage rating of -2, would do 1d10-2 damage.
- Virtually no weapons with muzzle brakes are capable of firing sabot rounds, including SLAP rounds and sabot shotgun slugs. Sabot halves begin to separate immediately upon leaving the barrel, and separate so fast that they come apart inside a muzzle brake. This mangles the muzzle brake; the round just fired would almost certainly not hit anything unless it was just in front of the barrel, and a subsequent shot would most likely split open the end of the barrel and compound the damage to the muzzle brake, making the weapon useless after that point, even if the muzzle brake's remains were removed. There are a very few weapons that have muzzle brakes designed for use with sabot ammunition (the Austrian IWS-2000 and Barrett M-107A1 are examples), and some aftermarket muzzle brakes can be added to weapons that are also designed for use with sabot ammunition.

Add-On Bipods

- Many rifles have designed for them simple "scissors bipods" which may be squeezed in scissors-fashion, then placed on the barrel of a rifle and used to support the rifle and let go, giving it an *ad hoc* form of bipod-type extended range. (The scissors bipod available for the M-16 series, designed primarily to allow the M-16 to be used as a *faux* automatic rifle before the M-249 was available, is the example which comes to mind immediately.) Such a bipod adds 0.2 kg to the weight of the rifle and costs \$20. It adds 15% to the range of the rifle when used and halves recoil (rounded up) when the weapon is fired from the bipod. Whether or not such a bipod can be attached depends upon the diameter of the rifle barrel (most such bipods are designed specifically for a certain rifle, or at least for a rifle with the same barrel diameter), and the exposed length of the barrel (this is not easy to determine quickly without the GM researching the weapon, but in general bullpup carbines, weapons with unusually-long handguards in relation to their barrel lengths, and submachineguns cannot use scissors bipods). An unfortunate side-effect of a scissors bipod is that they fit very loosely, and therefore rattle around loudly when the shooter moves.
- Other rifles, particularly those with under-handguard MIL-STD-1913 rails or specific attachments, can mount actual bipods. Adding one to a rifle with the appropriate attachment interfaces on both the weapon and the bipod is an Easy: Small Arms task or an Average: INT or EDU task. Characters with Gunsmith skill must only roll a d20, with only a 1 indicating a failure to properly mount the bipod; if they fail, another d20 is rolled, and a 1 indicates that they damaged the weapon or bipod interface (GM's choice) and the interface must be repaired before further attempts can be made. Attaching a proper bipod increase the range of the weapon by 30% and reduced recoil by half (rounded up) when firing from the bipod. No tools are typically required beyond a screwdriver or tool of the appropriate size.
- Some real bipods are designed to be attached to sling swivel attachment point; for this to occur, the sling swivel itself must be removed, and the bipod attached to the swivel attachment point. Removing the swivel takes no skill; attaching the bipod is done at the same chance of success as above as attachment to hard mount as above. Such a bipod increases range when fired from the bipod by 25%, and cuts recoil in half (rounded up). Normally, only a screwdriver or other tool of the appropriate size is required, though sometimes the procedure is more involved. The mount is not as stable as a hard mount as above, and the bipod will probably rattle a bit when the shooter is moving.
- A regular bipod can be added to many rifles which do not have such rail or mount interfaces or sling swivels; this almost always requires a weapon which has a solid fore-end (whether wood or synthetic). This essentially required "drilling and tapping" of a sort, making attachment holes to screw the bipod attachment points into. Normally, this requires the services of a Gunsmith with appropriate tools and is an Average skill for him, though a person with Small Arms skill may try it, with a Formidable level of difficulty. This sort of attachment is normally solid, though if the person who attached the bipod rolls within one of the number below that needed for success, the attachment is a little sub-par and the bipod tends to loosen gradually (frequency and amount of loosening will be the GM's call, but should be judged partially on the skill level of the person who mounted it and partially on the amount of abuse the weapon is put under).

Personnel Movement and Combat

- Personnel may move during or before they fire most small arms, and some heavier weapons. When they do, they incur some penalty to their task resolution, depending upon the amount of movement. Difficulty ratings are for unaimed shots; for the most part, aimed fire when moving is not possible.

Weapon	Crawl	Walk (1/3 Move)	Trot (2/3 Move)	Run (Full Move)
Automatic Pistol	Formidable	Difficult	Difficult	Formidable
Revolver	Formidable	Difficult	Difficult	Formidable
Special Purpose Handgun	Formidable	Difficult	Difficult	Formidable
Submachinegun	Formidable	Difficult	Difficult	Formidable

Assault Rifle	Formidable	Difficult	Formidable	Impossible
Battle Rifle	Impossible	Difficult	Formidable	Impossible
Lever-Action Rifle	Impossible	Difficult	Formidable	Impossible
Sniper Rifle	Impossible	Difficult	Impossible	Impossible
Sporting Rifle	Impossible	Difficult	Impossible	Impossible
Automatic Rifle	Impossible	Difficult	Impossible	Impossible
Machinegun	Impossible	Formidable	Impossible	Very Impossible
Grenade Launcher	Impossible	Formidable	Impossible	Very Impossible
Light Rocket Launcher (<5 kg)	Impossible	Formidable	Impossible	Very Impossible
Medium Rocket Launcher (5-8 kg)	Impossible	Impossible	Very Impossible	Very Impossible

- Laser aiming module-type sights may be used for aiming at short range during any movement that allows a Difficult probability shot, or half short range during daylight or in bright light.
- Reflex-type sights allow for aimed shots during any movement that allows a Difficult probability shot. The reflex sight is useful at short and medium range, provided there is enough light for the shooter to see his target.
- If the character is Sprinting (see my House Rules), increase the difficulty of the running hit penalty by two levels. "Very Impossible" situations become situations where the player must roll a 1 on a 1d20 for his character to hit anything with a firearms, and hitting with a grenade launcher, light rocket launcher, or heavy rocket launcher are not possible while Sprinting.

Vehicle Movement and Combat

- Vehicles may also move and fire in the same phase, and they also incur a penalty to their task resolution.

Stabilization	1/4 Move	1/2 Move	3/4 Move	Full Move
None	Formidable	Formidable	Impossible	Very Impossible
Basic	Difficult	Formidable	Impossible	Very Impossible
Fair	Difficult	Difficult	Formidable	Impossible
Good	Difficult	Difficult	Difficult	Formidable

- Most of these probabilities are for unaimed shots. An aimed shot is possible only for those shots listed as "Difficult" probability on the table above.

Converting Weapons to Automatic Fire

- Convert semiautomatic weapon to automatic fire with a rate of 3: Average: Gunsmith. Convert semiautomatic weapon to automatic with an ROF of 5: Difficult. Convert semiautomatic weapon to automatic with an ROF of 10: Formidable. Convert lever-action weapon to automatic with a ROF of 3: Impossible. Make parts for automatic fire conversion: Difficult: Machinist or Formidable: Gunsmith. Without appropriate parts, lever-action conversions are not possible. Semiautomatic conversions are two levels harder. Converting a semiautomatic weapon takes about two hours; a lever-action weapon takes about 4 hours; these times include the time to construct the parts. Outstanding success bumps the weapon up to the next ROF level, or halves the conversion time. Catastrophic failure renders the weapon inoperable. Note that calculations will have to be made to find out what the recoil will be of the new automatic weapon; a quick and dirty rule is to add one to the semiautomatic recoil figure for a newly-automatic weapon with an ROF of 3, double the semiautomatic recoil figure for weapons with an ROF of 5, and triple the semiautomatic recoil figure for an ROF of 10.

Computerized Weapon Sights and Sniper Team Spotters

- Some weapons are listed as specifically able to mount special computerized weapon sights; others are capable of mounting them, particularly if they use MIL-STD-1913 rails or special rails for such a purpose. Some can also be mounted on standard sight rails, though this is rare. (These weapons are normally rifles or grenade launchers.) These sights add 20 meters to the short range of the weapon so equipped, and give the shooter a +2 to hit in standard shots. For aimed shots, they decrease the difficulty of the first three semiautomatic shots, or the first automatic burst, by one level, and give him a +2 bonus to hit. Computerized sights cannot be used while a shooter is moving. These computerized sights' weights vary, but for game purposes, add 4 kg for an early-1990s computerized sight, 2.7 kg for a late-1990s to early 2000s sight, and 1.3 kg for a mid-to-late-200s sight. A computerized sight costs \$2000.
- In recent years, sniper ballistic computers have become more common, though Barrett came up with the first one in the mid-1990s, and DARPA was experimenting with them in the early-1990s. These computers take information about range, wind speed, and take into account whether the shooter is firing down or upslope, as well as several other factors. They essentially help the shooter of a sniper rifle put the "dope on the scope." Some of these computers are mounted directly on the sight, and as such, cannot be used by the spotter during firing. These computers make a shot one level less difficult, and give the shooter a +1 bonus (+2 if the sniper has a spotter with him). If the sniper is alone, he may use the ballistic computer for the first five shots fired consecutively at short and medium range and the first three shots fired consecutively before he must recalculate; this requires six phases (30 seconds). If he has a spotter with him, he may use the ballistic computer's information for the first five shots fired consecutively, and then the spotter must recalculate the

information, which may be done at the same time the shooter is firing and takes two phases (10 seconds, as he is working while the sniper is shooting). The first calculation for shooting takes 6 phases (30 seconds). Modifications may be made by the GM for weather, wind, and target conditions. The ballistic computer cannot be used while the sniper or sniper team is moving. An early-1990s ballistic computer weighs 1.2 kg; a mid-1990s to early 2000s ballistic computer weighs 0.7 kg, and a mid-to late-2000s version weighs 0.4 kg. A ballistic computer costs \$2000.

- A sniper team normally consists of a shooter and a spotter (who take turns looking through the sight and the spotter's telescope). The shooter actively looks through the weapon's sight and does the shooting at targets. The spotter uses a special high-power telescope to give the shooter valuable information about his hits and misses, how far off the mark he is or whether he is right on the money, and information about weather conditions and wind where his target is. He also gives the shooter tips on shooting in general. Use of a spotter gives the sniper member a +2 to hit on his first two shots and a +1 on follow-up shots, per target if shots are made consecutively at the same target. Information flow between a good sniper/spotter team is continuous, and no time in game terms is required for the sniper to receive information about the target from the spotter and improve his chances of hitting. The spotter does, however, require one phase (5 seconds) to set up and the same time as an aimed shot to get the first information about the target to relay to the sniper. A spotter scope weighs 1.1 kg and costs \$200.