SAFETY Considerations for Fixed-Firing-Pin (FFP) Blow-Back (BB) Submachine Guns (SMGs)

The first step is to fully understand how these machine guns function. The cycle process is as follows:

(The World's Submachine Guns, Vol. 1, by Nelson & Lockhoven)

1. The weapon fires from the open bolt.

2. Upon insertion of a loaded magazine, the retracting handle attached to the bolt is drawn to the rear, compressing the main operating spring, and the bolt is retained in the open position by the sear.

3. The first cartridge in the magazine is forced into the path of the bolt by the magazine spring.

4. Pressing on the trigger causes the sear to release the bolt, which is pushed forward by the compressed main operating spring, stripping a round from the magazine, and feeding it into the chamber.

5. As the firing pin strikes the primer, the extractor snaps over and engages the cartridge rim. (Note: in the STG system as with many other SMGs, this process is reversed. The extractor is designed to prevent firing pin-to-primer contact until the cartridge is fully chambered.)

6. When the cartridge fires, the pressure exerted in all directions drives the bullet forward and the case rearward, driving the bolt to the rear. Due to the much greater mass of the bolt, as compared with the weight of the bullet, initial velocity of the bolt is low, permitting the bullet to leave the barrel, and allowing the high pressure to drop, before the bolt opens.

7. The energy imparted to the bolt carries it to the rear, compressing the main operating spring. During rearward travel of the bolt, the empty cartridge case is held in the bolt face until the case strikes the ejector. The empty shell is then pivoted around the extractor and thrown out the ejection port in the receiver.

8. The backward movement of the bolt is stopped by the compressed main operating spring and by the impact of the rear of the bolt against the receiver cap or buffer. The compressed main operating spring then drives the bolt forward, and the cycle repeats, until pressure on the trigger is released, or the magazine is empty.

FFP / BB SMGs do not possess any locking system to rigidly lock the chamber at the point of firing. As noted in step 6 of the cycle process: "When the cartridge fires, the pressure exerted in all directions drives the bullet forward and the case rearward, driving the bolt to the rear. Due to the much greater mass of the bolt, as compared with the weight of the bullet, initial velocity of the bolt is low, permitting the bullet to leave the barrel, and allowing the high pressure to drop, before the bolt opens." Thus, only low-pressure pistol ammo is suitable for use in these systems. A failure in the cartridge, feeding process, or bolt face my result in the system jamming or firing out-of-battery. For example, a miss-fed cartridge may be deformed and not properly seat in the chamber when fired resulting in the bullet failing to leave the barrel and the pressure to explode at the chamber end. **A Note on Reloaded Ammo:** Poorly sized or swaged reloads can also result in improper chambering. Squib rounds are especially dangerous as the system will continue to cycle with an obstructed barrel.

9mm SMG Chamber Wear and Headspace Gauge



1) Check for Chamber Wear: The 'Plunk' Test

The inside front surface of the chamber is very important in the function of Fixed Firing Pin Blow Back (FFP-BB) SMGs. This controls the final critical stage of the cycling process when the mouth of the case makes a firm and crisp stop on the inside cutout of the chamber. At this instant, the extractor snaps over the case rim and allows the firing pin to contact the primer and detonate the cartridge. This is detailed on Step 5 on page 1.

If this front chamber stop surface is worn such that this .365ø gauge cannot make a clean stop / "plunk" at the inside chamber cutout, the barrel should be replaced or re-chamber if there's enough room to maintain headspace.

Instructions: With the barrel out of the gun, take this gauge and drop it into the chamber by hand. You should hear a pronounced 'plunk' as the gauge front edge makes a clean and firm stop on the inside cutout of the chamber. The gauge should also be easy to pull out and rapidly repeat this test. If the inside edge of your chamber is worn, the gauge will stick in the chamber.

**A NOTE ON RELOADED AMMO: Properly dimensioned case mouths are very important for FFP-BB systems. If you are shooting reloaded ammo, be sure to measure for proper case mouth dimensions and/or 'plunk' test the ammo before using. Improperly sized case necks (mouths) will result in out-of-battery detonations. Many reloading companies do not properly size case mouths on pistol ammo as it is not critical for most recoil-operated pistols.



2) Check for Ample Headspace

In a FFP-BB SMG the headspace is determined by the depth of the bolt face pocket and the length of the case protruding from the rear of the barrel. Since it is very important that the full energy of the bolt bottom on the rear of the case rather than the rear of the barrel, the exposed case must protrude longer from the rear of the barrel than the depth of the bolt face pocket. Specifically, the depth of the STG 9mm bolt face is .09" so we'd want at least .095" of case protrusion from the rear of the barrel. Given the .754" length of a 9mm case, this means the chamber should not be deeper than .659" to maintain proper headspace.



Instructions: With the barrel out of the gun, take this gauge and drop it into the chamber by hand. The line on the cutout of the side marked "STG 9mm min .095" should be above the rear of the barrel. If the line is sunken into the barrel, the chamber is too deep and the bolt will stop on the rear of the chamber rather than the rear of the cartridge. A barrel with a chamber too deep can be repaired by removing material from the end of the barrel.

For the STEN SMG, the bolt face pocket is more shallow than the STG 9mm and the opposite side of this gauge can be used to inspect STEN barrels as well. We've noticed a great variance in STEN bolts, so it's very important to measure the bolt face pocket to make sure that it is less than .081."



Basic SMG Malfunctions and Remedies

Out of Battery

If you ever have an out of battery discharge, do not try to fire more rounds as there is likely an obstruction in your chamber or bore, or the extractor is broken. It is important to disassemble and inspect your chamber, bore, bolt face, extractor, and ejector after any out of battery discharge.

Possible Causes: There are four things that could cause this type of malfunction:

1) The chamber is worn such that the case mouth could not make a clean "stop" at the inside chamber cutout (see **The Chamber 'Plunk' Test** in this manual). The barrel may need to be replaced.

2) Obstructed Chamber:

a) Debris in Chamber

b) Case Separation in Chamber: The case mouth was undersized or the case was of a thin/weak variety. Undersized case mouths on reloads are a common problem. Case mouth dimensions aren't too important for most pistols but critical for SMGs so most reloaders don't take the extra step to size them. On the first cartridge, it looks like the case mouth does not crisply stop on the inside chamber cutout as described in **The Critical Point** on page 5. Rather than stop at the critical point the case mouth pushes forward into the bore resulting in the case '*pinching*' the bullet at the point of firing pin to primer contact. With explosive force, the case splits cleanly in two pieces about the pressure seal and the bullet typically only travels a few inches forward down the bore because most of the pressure escaped rearward when the case rear blew off. Subsequent cartridges just jam into the remnant of the previous case and detonate out of battery (pictured right).





Subsequent cartridges out of battery due to obstructed chamber.



unsupported area

3) Premature Firing Pin Contact:

a) Broken Extractor

b) Cartridge Size / Shape Problems: If a cartridge cannot smoothly feed and chamber, premature firing pin contact is possible. We have observed improperly loaded ammo with bulges at the bullet seat as well as certain bullet shapes that are incapable of feeding in this system.

4) Obstructed Bore: Squib Round - a bullet is stuck in the barrel. This bore obstruction results in massive back pressure. A bulge or ring in bore will also prevent proper bullet travel through the barrel. A 'ringed' or bulged barrel should not be used.

Prevention:

1) If you aren't certain about your ammo, plunk test it.

2) Do not use thin-cased brass or aluminum-cased ammo. We typically use Tula/Wolf, Fiocchi, Sellier & Bellot, Remington, and Magtech. Steel cased ammo runs very well in most SMGs and will not cause excessive wear with quality barrels.

3) If you ever have an out of battery, your chamber is likely obstructed and should be cleared. It's usually pretty easy to do with a cleaning rod. Once cleared, visually check that the inside chamber cutout is crisp, check that no bullets are stuck in the barrel, inspect the bore for rings that impede bullet travel, and plunk test with gauge.

4) Keep your chambers clean and smooth.

Failure to Feed - Possible Causes:

1) Low mag or drum spring pressure: the magazine or drum did not present the cartridge in the feed lip fast enough.

2) Bent Feed Lip: The cartridge is presenting at an angle that won't allow it to feed. On some double-stack / double-feed magazines, cartridges will feed from one side but not the other. This means that one of the feed lips is bent at an inappropriate angle.

3) Bullet Size/Shape: Some shapes of bullets will not be able to feed properly due to the ramping movement necessary to chamber the cartridge.

4) Damage to feed ramp or barrel

Failure to Fire - Possible Causes:

1) Bent cartridge from feeding movement

2) Obstructed firing pin or bolt face

3) Stuck extractor

4) Massive drag on bolt movement / speed during the forward stroke

5) Barrel not oriented properly or spacer bushing not installed (KP31 shrouds only)

6) Worn Chamber: The chamber is worn such that the case mouth could not make a clean "stop" at the inside chamber cutout (see **The Chamber 'Plunk' Test**). The barrel may need to be replaced.

Failure to Eject - Possible Causes:

1) Broken ejector

- 2) Worn extractor or extractor spring
- 3) Low bolt speed or short stroking
- 4) Bent mainspring

Runaway - Possible Causes:

- 1) Broken or worn sear or sear spring
- 2) Low bolt speed or short stroking
- 3) Worn catch surface on bolt

Trigger Not Responding Properly - Possible Causes:

1) Disconnector timing and spring not resetting

2) Debris in the trigger pack

3) For BRP STG with Suomi Trigger Pack: Set screw in front of trigger guard is loose.

Accuracy / Dispersion Problem - Possible Causes:

1) For BRP STG with Suomi-Pattern Barrel Jacket Latches: Set screw at front of mag housing is too tight

2) Barrel is too loose and requires barrel shims

3) Muzzle attachment or suppressor strikes