Japanese 12.7mm (12.7x81SR) Machine Gun Ammunition

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During the late 1930s, the IJA realized that the 7.7mm MGs that were the principal armament of their fighter aircraft lacked sufficient punch to engage enemy aircraft that they were likely to encounter.

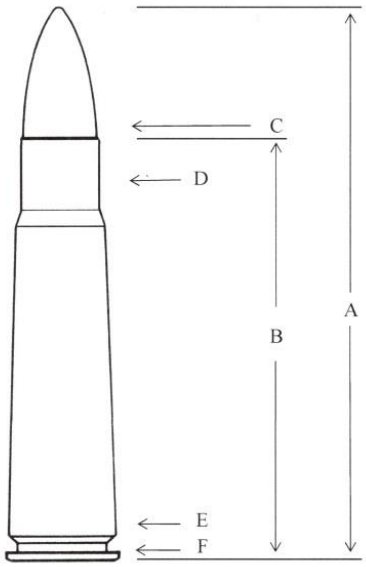
The Japanese developed an aircraft machine gun closely based on the U.S. .50 caliber Browning HMG (12.7x99). The weapon was designated Ho 103 in the IJA weapons designation system.

It is not surprising that they turned to their Axis partners for assistance with the selection of a cartridge. In 1936, Bredà[1], one of Italy's top armaments companies, developed a 12.7x81SR HMG cartridge, loosely based upon the .5-inch Vickers HMG round made by Kynoch.

As manufactured by the Japanese, the cartridge cases are brass, semi-rimmed, bottlenecked, tapered, and use two-hole Berdan primers with circular crimping. The Japanese adopted the cartridge, initially identifying it as "Aircraft Use 12.7 millimeter Machine Cannon Ammunition (航空機用一二七粍機關砲實包), and, later, as the "Aircraft Use Type 1 Machine Cannon Ammunition (航空機用一式機關砲實包).[2]

The Japanese initially purchased both weapons and ammunition from Italy.[3] However, the deteriorating international situation made continuing deliveries questionable. To assure a reliable supply, the Japanese initiated production of both the weapons and ammunition at the Tokyo 1st Army Arsenal as early as 1941. Initial Japanese test production of the ammunition clearly indicated the origin of the cartridge design as it was identified in Japanese specification documents as "12.7millimeter Breda Experimental Production Ball Ammunition (12.7 粍ブレダ試製普通實包).

Cases are often marked the cartridge case bases with one of two Japanese characters; either the *KANJI* character 井 – *SEI* (or possibly *SHŌ* or *I)* or the *katakana* character シ- *shi*. The latter character is known to have been used by the Tokyo 1st Army Arsenal as an inspection stamp, but the reason these characters were applied to cartridge bases is unknown.



Characteristics:

The following basic details refer to the 12.7x81 ball cartridge. The figures were taken from the references noted in the bibliography. Maximum differences between the sources are noted in parentheses.

(A) Cartridge length overall:	107mm (-.3)
(B) Case length:	81mm (+2.8/-.3)
(C) Bullet diameter:	12.7mm (+.3)
(D) Case neck diameter:	13.8mm
(E) Case diameter (maximum):	18.9mm
(F) Rim diameter:	19.6mm
Bullet particulars:	GM-FMJ-P
Bullet composition:	Aluminum (or wood) & Lead
Bullet weight:	550gr
Bullet length:	44.6mm
Powder charge:	~128gr
Powder type:	Tubular smokeless nitro cellulose
Muzzle velocity:	2,428 fps / 740mps

[1] Società Italiana Ernesto Bredà, Italy.

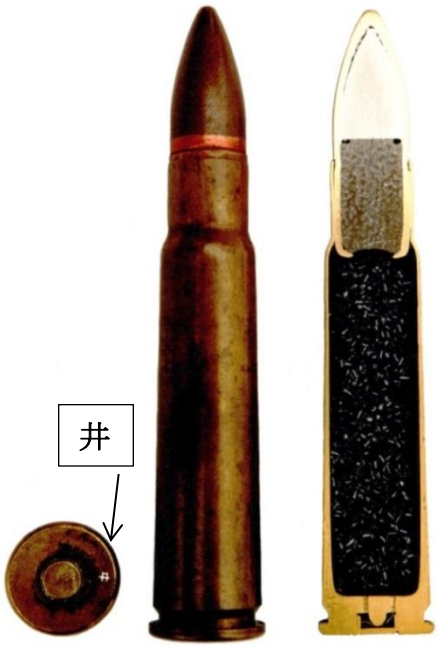
[2] Note that the IJA referenced HMGs as "Machine Cannons - 機関砲".

[3] Two million rounds of this ammunition were shipped from Italy to Japan as late as 1943.

Ball – The standard, or "ordinary", rounds in Japanese terminology, have pointed brass FMJ-P bullets, which weigh ~550 gr and the cartridges have pink neck bands/sealants. The FMJ jacketed bullet's core composition is either aluminum, or wood, in the forward half, with lead in the rear half. Powder weight is ~128 gr. The bullet is secured by segmented case mouth crimping.

Pictured are sectioned Italian and Japanese 12.7x81SR Ball cartridges. Note that both examples have aluminum in the forward section of the bullet and lead below. Powder weight of the sectioned Italian example was 125.1 gr, while the Japanese example was 123.5 gr. *(Photo courtesy of George R. Masters)*

Tracer – These rounds have ~546 gr brass FMJ bullets. They have mild steel cores within a lead sheath with a hole in the base of the core filled with a tracer compound. The powder weighs ~127 gr. Indentification is determined by the presence of a green neck band/sealant. The bullet is secured by segmented case mouth crimping.



Pictured here are Japanese 12.7x81SR Ball examples. Note the presence of the *KANJI* character 井 - *SEI* on the base of the example at left. *(Photos courtesy of George R. Masters)*

Armor-Piercing – This round was developed and adopted as the "12.7 millimeter Type 2 Armor Piercing Ammunition (12.7 粍二式徹甲實包)." In Japanese documents, it is reported to have the same dimensions as the Ball rounds. However, no examples have surfaced for study, and it is possible that this design was superseded early in production by the APT (Red Tracer) variation, as it has the black neck band/sealant, which is the normal indicator of AP ammunition within the IJA.

Armor-Piercing Tracer (Red Trace) – The AP Tracers with Red Trace variation examples have Brass FMJ-P bullets weighing ~546 gr. The powder weight is ~127 gr. The bullets have black neck bands/sealants and are secured by segmented case mouth crimping. Additionally, there are three slit crimps located in the lower necks, which correspond to cannelures in the projectiles. Japanese documents note the designation of the projectiles as "Type 1 Tracer Armor-Piercing Bullets (一式曳光徹甲彈)", but it is not known if this designation refers to this and next two variations collectively, or only to one of them.

Armor-Piercing Tracer (White Trace) – The AP Tracers with White Trace variation have Brass FMJ-P bullets weighing ~545 gr. The powder on a dismantled example reveals it to weigh 122.5 gr, with de-coppering foil in the powder. These rounds have green neck bands over white band/sealants. Again, the bullets are secured by segmented case mouth crimping and they have three slit crimps located in the lower necks which correspond to cannelures in the projectiles.

Appearing above are photos of the 12.7x81SR Armor-Piercing Incendiary (White Trace) cartridges. From left to right is the base clearly showing the ring crimped primer and lack of markings; then a complete round displaying the green neck band over the white band/neck sealant, neck crimp and the slit bullet crimp in the lower neck. These are followed by a partially sectioned example with the de-coppering foil visible in the powder, and lastly, a sectioned projectile. Note that the slit crimp location in the lower neck corresponds to the groove in the projectile. *(Photo courtesy of George R. Masters)*

Armor-Piercing Tracer (White Turning To Red Trace) – Based upon unconfirmed wartime reports, an AP Tracer variation with white turning to red tracer elements exists, but no specimen could be located to examine. They are said to have Brass FMJ-P bullets weighing ~546 gr, green neck band over white band/sealant, and possibly pink tips. The powder weight is ~127 gr. As with the other APT rounds, this variation has the bullets secured by segmented case mouth crimping, as well as three slit crimps located in the lower necks.

The photos above provide views of the 12.7x81SR Ma 102 High Explosive Incendiary (Fuzeless) cartridge. Note the presence of what appears to be poorly stamped character 井 on the base of the cartridge to the left, the purple neck band/sealant on the complete cartridge, crimping at the mouth of the case, and the de-coppering foil in the powder of the sectioned example to the right. The powder weight of the sectioned example was 132 gr. *(Photos courtesy of George R. Masters)*

High Explosive Incendiary (Fuzeless) - Ma 102 (マ一〇二)[4] – These HEI rounds weigh 1,246.4 gr. They have brass projectiles that have flat-noses, are made up of four-pieces separated into two sections, and weigh ~508-509.8 gr. The explosive mix is ~9.9 gr of PETN held

[4] The "Ma" notation is part of the IJA ammunition classification system.

within the brass nose cap and ~14.1 gr of RDX in the brass cup midsection. An incendiary mixture of ~17.1 gr is separated by a left-hand threaded brass plug, which has two holes, but is sealed by a cloth disk. The plug screws in place to cover the incendiary mixture, which is contained in a steel liner/cup at the bottom of the brass projectile base. The powder weighs ~128.4-132 gr and it has de-coppering foil inside it. The projectiles are secured by segmented case mouth crimping, but they do not have the slit crimps in the lower neck as in some other variations. Production data is stamped externally on the fuze body. These rounds are identified by having a purple (deep violet) neck band/sealant. Detonation is caused by compression on impact.

The photo above provides views of the 12.7x81SR Ma 103 Fuzed High Explosive Incendiary cartridge. Note the presence of what appears to be poorly stamped character シ on the base of the cartridge to the left, the de-coppering foil in the powder of the sectioned example to the right, and the white neck band / sealant. The powder weight of the sectioned example was 127 gr. *(Photos courtesy of George R. Masters)*

High Explosive Incendiary (Fuzed/Two-Piece Fuze) - Ma 103 (マ一〇三) – These HEI rounds are based upon an Italian design. They have brass projectile bodies, closing disks and fuzes. The projectiles weigh ~533 gr. Their flat tips are somewhat wider than the previous variation and the fuzes are composed of two sections. The powder weight is ~127 gr. They are identified by white neck bands/sealants.

High Explosive Incendiary (Fuzed/One-Piece Air Column Fuse) - Ma 103 (マ一〇三) – These HEI rounds also have brass projectile bodies and fuzes, but with aluminum closing disks. The bullets weigh ~533 gr and the powder weight is ~127 gr. They are identified by having clear lacquer neck sealants.

Some HEI cases have been noted with a simple "S" stamped on the base. This appears to be attributable to the use of re-cycled Italian cases, where the S refers to "Scoppainti", which translates to "Explosive."

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