18 CALIBRE 30x165 (NAVAL GUNS)

Main references used for this chapter:
A55, A75, A76, A77, A78, A79, B3, B4, B5, D20, D21, H3, I11, J20, J21 and personal examination of hardware.

18.1 30mm Anti-Aircraft Guns AK-630 and AK-630M

18.1.1 History of Development

In 1962 the 30mm naval anti-aircraft gun AK-230 was introduced into the Soviet Navy. However, during that period a new threat to warships appeared: anti-ship missiles. These could only be destroyed by delivering a high volume of fire into the flight path of the missile, but the rate of fire of the AK-230 was apparently not sufficient for that purpose. In July 1963 it was therefore decided to develop a new weapon system that was especially designed for destroying an approaching missile. Additionally, the new gun was supposed to engage aircraft, small vessels, floating mines and soft-skinned shore targets. The Central Design and Research Bureau for Sport and Hunting Weapons was appointed to develop this Close-In Weapon System. At that institute the design head was M. S. Knebelman, who was able to present the first two models in late 1964. The Instrument Design Bureau KBP in Tula provided the automatic weapon for that mount. Following the example of the United States, who had recently introduced a 20mm Gatling aircraft gun, the designers V. P. Gryazev and A. G. Shipunov built a similar weapon firing at a rate of up to 5,000 rounds per minute. Their experimental cannon was designated TKB-025 and was chambered in a new 30x165 calibre. Unlike the U.S. Gatling gun, the Soviet weapon was not externally driven, but gas-operated.

The A-213 prototype mounts produced by the Tula machine building plant were tested on the firing range between 1964 and 1966. The high rate of fire made it necessary to continuously cool the barrels during shooting. Different methods were tested, including a special cooling cartridge that was repeatedly introduced into the ammunition belt. This special cartridge was loaded with cooling liquid and was fired like a standard round. However, these internal cooling mechanisms were not successful and the final version of the TKB-025 cannon was equipped with a cylindrical jacket that allowed cooling liquid to circulate around the barrel cluster.
The official on-board tests of the A-213 mounts were carried out between May and October 1971 and had to be repeated during the following year, because of a defective radar system. During these tests the firing regime against aerial targets was also determined. Fire was opened in short bursts at the maximum slant range and switched to long bursts when the target entered the zone with the highest kill probability. In 1972 the weapon system was slightly modified according to the test results and again tested in summer 1973. On January 6th 1976 the 30mm Close-In Weapon System was finally introduced into service and received the official designation AK-630. The series production of the cannon and the mounting was carried out by plant No. 535 and from 1969 to 1972 a total of 67 naval anti-aircraft guns were produced by that plant. The TKB-025 cannon received the official designation AO-18.

In the early 1970's a new generation of destroyers and missile cruisers was supposed to be equipped with the AK-630 anti-aircraft gun. However, the installation possibilities on these ships required a more compact ammunition storage facility than the cabinet-like magazine of the AK-630, so a curved 2,000 round magazine was introduced. The modified weapon system was tested with an improved radar in the Baltic Sea in late 1979. On August 26th 1980 it was officially adopted and received the designation AK-630M. Series production of the improved Close-In Weapon System was started at plant No. 535 in 1972. The AK-630M is one of the most widely encountered Soviet naval anti-air-

30mm AO-18 Gatling gun inside the AK-630 turret.

A large 300-round magazine supplied the grenade launcher with ammunition. In contrast with the infantry version, the belt links were not semi-disintegrating, but fully disintegrating. However, the weapon still had to be charged manually with a retractable handle. The AG-17A is 895mm long and weighs 21 - 22kg. Width and height are identical to the infantry version. During the Afghan war the AG-17A was frequently installed in door mounts on the Mi-8T transportation helicopter. Today it is installed in the GUV-8700 gun pod, which is intended for the Mi-24 gunship.

The Naval version AG-17M differs from the infantry grenade launcher AGS-17 only in having a different barrel that provides better cooling. It is installed on pedestal mounts on ships and also in the turret of the airborne BMD-3 infantry fighting vehicle.

15.1.2 Operating Mechanism

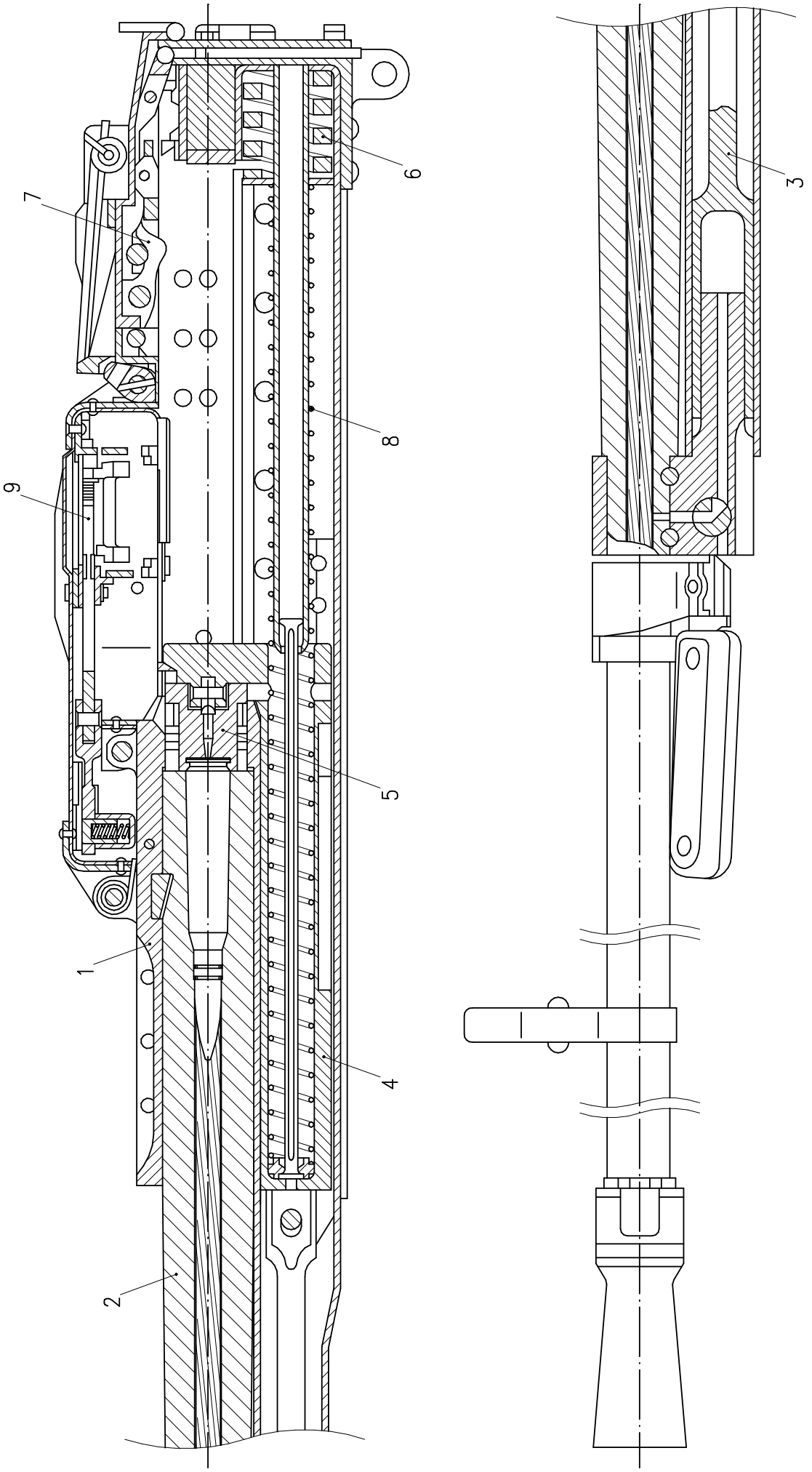
The 30mm grenade launcher AG-17 is a blowback operated weapon, which means that only the inertia of the breechblock locks the breech. The mass of the breechblock is designed to hold the breech closed for as long as the grenade is still inside the bore. Unlike most other blowback weapons, the AG-17 grenade launcher fires from a closed bolt. Ammunition is fed from a 29-round drum magazine, which is located on the right side of the receiver. Fired cartridge cases are ejected on the underside of the receiver. The trigger is located between two horizontal grips at the back plate of the weapon. The grenade launcher may fire single rounds or automatic bursts. On the left side of the receiver a fire selector lever is located (“ОД” - single shots, “АВТ” - full automatic fire).

The grenade launcher AG-17 has a box-shaped receiver, which forms the main housing of the weapon. The barrel is relatively short and is connected to the receiver by a locking pin. It is equipped with a jacket with a number of circumferential grooves on its outer surface in order to improve cooling. The breechblock consists of a massive box-shaped bolt, which runs longitudinally back and forth inside the receiver. A vertically moving supply plate forms the face of the breechblock and picks the incoming cartridge from the belt link. Inside the breechblock body there is an hydraulic buffer to decelerate the recoil and counter-recoil movements. There is a strong return spring to each side of the hydraulic buffer. The firing mechanism is located on the left side of the receiver, outside the main weapon housing. It consists of a cylinder containing the firing pin spring and the safety mechanism. The feed mechanism is located on top of the receiver and its cover can be flipped up to insert the ammunition belt into the feed mechanism. A retractable handle at the back plate is connected to a cable, which acts on the breechblock with the help of a pulley.

After the ammunition belt is inserted into the feed mechanism, the retracting handle has to be pulled once to load the grenade launcher. During this operation the breechblock is moved to the rear and the feed mechanism pulls the first round into the receiver. The hydraulic buffer does not work when the breechblock is moved slowly. On releasing the retracting handle both return springs push the breechblock forward and into battery position. The incoming round is picked up by the breechblock and chambered. As soon as the breechblock is in battery, the grenade launcher is ready for firing.

When the trigger is pressed, the compressed firing pin spring is released and hits a pivoting lever inside the breechblock body. This lever transfers the rearward motion of the spring into a forward motion of the firing pin. The round is fired and gas pressure inside the bore causes the breechblock to recoil. Because of its considerable inertia, the breechblock does not recoil until the grenade has left the bore. The return springs and the hydraulic buffer decelerate the breechblock as it travels to the rear. During this operation the fired cartridge case is extracted from the chamber and wiped off the breechblock face by an ejection lever. After the breechblock has hit the back plate, it is forced forward again by the compressed return springs. In the initial phase of counter-recoil the supply plate on the forward end of the breechblock is raised by two pivoting levers. These two levers are located on each side of the breechblock and each has a lug that runs inside a curved cam path in the receiver. The supply plate picks the incoming round from the belt link. During further forward travel of the breechblock the pivoting levers cause the supply plate to descend in order to bring the cartridge into alignment with the barrel axis. At the same time the firing pin spring is compressed and cocked. The forward travel of the breechblock is again decelerated by the hydraulic buffer. If the trigger is set to full automatic mode, the firing pin spring is released automatically in the instant the breechblock has reached the battery position.

The feed mechanism is operated by the recoiling breechblock. It consists of a pivoting feed lever, whose roller on the rear end engages a curved cam path on the upper side of the breechblock. During recoil the feed lever pivots inwards and pulls



12.7mm machine gun NSV:
Cutaway view from the left side. 1 – receiver, 2 – barrel, 3 – gas piston, 4 – breechblock carrier, 5 – breechblock, 6 – buffer spring, 7 – sear mechanism, 8 – return spring, 9 – feed mechanism.

4.9 Ammunition Used in the 12.7mm Machine Guns Post WWII

Soviet Designation	Transliteration	Type	Weight of Projectile [gm]	Muzzle Velocity [m/sec]	Fuze Model	DWG No.
Б-32	B-32	API	48.2	818	-	002
БЗТ-44	BZT-44	API-T	44.0	818	-	012
БС	BS	API HC	55.8	818	-	013
МДЗ	MDZ	HEI	43.0	828	air-compr.	014
ЗМДБЧ	ZMDBCh	HEI Anti-Balloon	n/a	n/a	Ya-10s	n/a
1СЛ	1SL	Duplex	31.0 / 31.0	735 / 680	-	016
1СЛТ	1SLT	Duplex-T	31.0 / 27.0	730 / 700	-	017
ХОЛОСТОЙ	Kholostoy	Blank	-	-	-	018

After the war the **B-32 bullet** was left unchanged. It is a proven design and is still used in modern machine guns today.

The **BZT-44 bullet** is the result of improving the BZT bullet at the end of the war. The steel bushing and the small tracer container were replaced by a large and thin-walled tracer container, which held a considerably greater amount of tracer composition for better visibility during day time. The tracer burns bright red for a distance of up to 1,000m. The colour markings on the bullet tip are identical to those of the BZT bullet. To distinguish cartridges with the BZT-44 bullet from those fitted with the early model, the ammunition crates were marked with the bullet designation.
The modernized BZT-44M is basically identical to the BZT-44 bullet and only differs from the latter in having a dark tracer up to a distance of 50 - 120m in front of the muzzle. The BZT-44M was adopted by the Russian army between 2002 and 2003.

12.7mm BS bullet on the left and MDZ bullet on the right.

The **BS special armour piercing bullet** was introduced in 1972. It was developed to increase the effectiveness of the large calibre machine guns when firing at heavily armoured targets. It contains a tungsten carbide core housed in an aluminium jacket. Two different fillers are located in the tip and inside a cup behind the core. The nose filler has a weight of 0.85gm and consists of a conventional incendiary composition No. 7. The steel cup behind the core contains 0.75gm of a high explosive incendiary composition. The latter consists of equal parts of PETN and incendiary composition No. 7. To prevent the detonation of the high explosive filler during firing the PETN is desensitized with wax and separated from the bottom of the cup with an insulating cardboard disk. A copper disk closes the steel cup and prevents the heavy alloy core from setting back onto the rear filler. The BS projectile penetrates up to 20mm of armour at a distance of 750m and at a striking angle of 70°. It is coloured magenta overall and has a black tip.

The **MDZ bullet** replaced the MDZ-3 bullet some time after the war. The earliest known specimen is dated 1971. The post-war MDZ bullet has a pointed shape, but is capable of holding the same amount of high explosive filler as its predecessor. An air compression fuze is used, which has no safety mechanism other than the copper tip covering the hardened steel air-compression tube. The bullet is coloured red overall.

The **instantaneous incendiary bullet ZMDBCh** is intended to shoot down reconnaissance balloons. According to a description in a Soviet manual it consists of a body that is filled with high explosive incendiary and closed at the top with a highly sensitive nose fuze Ya-10s. This fuze is supposed to be basically identical in design to the anti-balloon fuzes in 23mm and 30mm calibre, but it lacks the self-destruct mechanism. As outlined in the entry of the A-12.7 aircraft machine gun, the ZMDBCh bullet was equipped with a self-destruct mechanism in the early 1970's. It is believed that this was accomplished with a tracer. Although no specimen has yet been seen, the ZMDBCh bullet apparently can be identified easily by a flat point. The nose fuze might have a red coloured tip.

Packaging: AM-23 ammunition was packed in two different ways: The early packaging was identical to the packaging of NS-23 ammunition and is outlined in detail in that chapter. Since the 1970's Soviet 23x115 ammunition has been packed in 44 rounds batches in a lock-seamed steel can that measures 325x230x125mm. Inside the hermetically sealed can, eleven cartridges each are arranged in four horizontal rows with the heads and tips of the rounds alternating. The cartridges inside the can are separated from each other with paper and cardboard sheets. Every steel can contains two cartridges equipped with a decoppering agent. On the lid of the olive drab coloured can the following markings are stencilled in black: the weapon designation, the projectile type, the lot number and the year of manufacture.

Three steel cans are packed in a wooden crate with a hinged top lid which contains a total of 132 rounds. The olive drab coloured wooden crate measures 870x400x200mm and has a gross weight of 60 - 61kg. Every crate contains a simple can-opener to open the steel cans. The wooden crate has the following markings stencilled on the front side wall: the projectile type, the weapon designation (one or several), the production information of the fuze, the production information of the round, the production information of the propellant, the total number of rounds inside the wooden crate and the gross weight. To the rear side wall the following markings are applied: the railway stations of sender and addressee, the contract number, the delivery number, the gross and net weights and the crate number. The hazard class number is located on the hinged top lid.

Lock-seamed steel cans containing drill rounds with PRL projectile (top picture) and FZ projectile. The early wooden crates shown above contain drill rounds with OFZ projectile (left picture) and BZA projectile. Note the knife used to open the cans, which is located in a pocket between the two right cans.

Modern wooden crate containing OFZ rounds. Note the opened can and one of the two rounds with decoppering lead wire (yellow band on projectile) per steel can. The stencilling on the front side wall of this crate provides the shipping information and the gross and net weights. The manufacturing information is hereby applied to the rear side wall.

16.2.4 Czechoslovakian Ammunition:

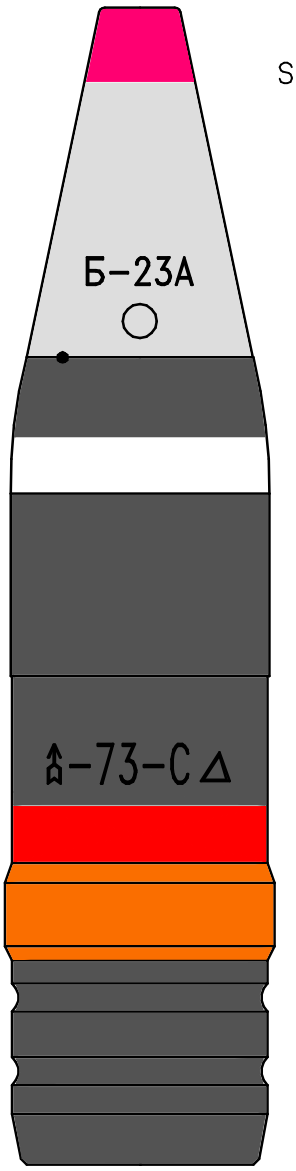
Czechoslovakia made only three different projectile types. The first two are copies of the Soviet OFZ and LP projectiles of the old ammunition generation.

Czechoslovakian Designation	Type	Weight of Projectile [gm]	Muzzle Velocity [m/sec]	Fuze Model	DWG No.
OFZ	HEI	410	780	A-30	160
LP	TP	410	780	dummy fuze	161
LP-3	TP	410	780	-	162

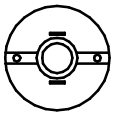
Czechoslovakian NR-30 cartridges from left to right: OFZ, LP-3, LP, reference and drill round. While the other rounds were made during the 1960's, the LP target practice projectile was made in 1991. The reference cartridge consists of a standard LP round and is identified by a blue band.

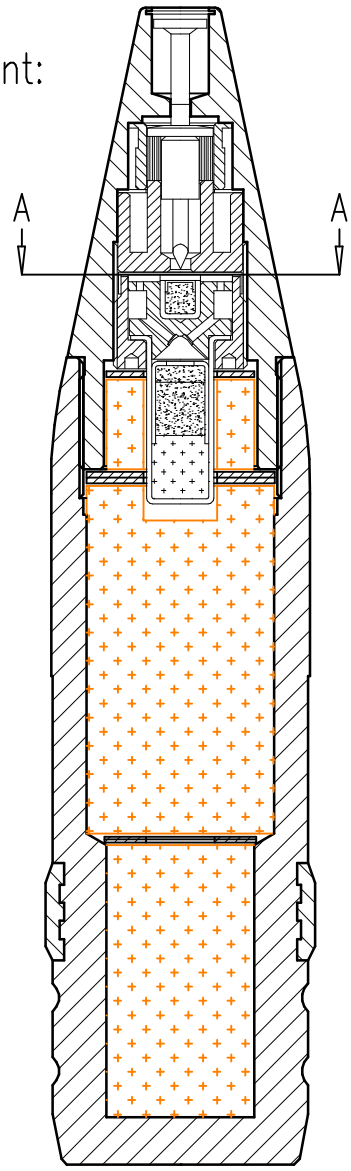
Calibre: 23x115 AM-23 and GSh-23 Aircraft Cannon
Projectile: Soviet High Explosive Incendiary OZ

DWG No.:
069



Section A-A
showing delay element:





Description:

The projectile consists of a steel body with a copper driving band. It is filled with compressed blocks of high explosive incendiary that are separated by cardboard washers. The projectile is fuzed with the B-23A delay nose fuze that is steel. The projectile is natural colour black and has a white and a red band on the side. The tip of the fuze is coloured magenta. Source of information: specimen (headstamp H 73)

Characteristics:

Weight of projectile: 175.0gm
Muzzle velocity: 710m/sec
Length of projectile: 102.0mm

Propellant: 37.0gm 4/7 TsGR powder
Filler: 17.4gm A-IX-2
Misc.: /

Scale
1.5:1