The Boobytrap Recognition Manual

Vol. 4

USSR/Russian Firing Devices and related material

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2021

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Introduction

These publications are a result of frustration trying to find those little tidbits of information that are spread throughout many books, manuals and papers. They are my attempt at putting it in one place and making it easier to find. In this case I received an immense amount of help from George Zahaczewsky who shared the information and photos he has collected on Russian boobytrap mechanisms. In addition, George wrote many of the pages. We both hope you will also find it useful.

This publication will only detail officially manufactured mechanisms, we will not attempt to describe any improvised devices or methods. The items are not presented in chronological order but are instead presented in an alpha numeric order to make them easier to find.

It should be noted that the photos are certainly not all ours, we have been collecting photos from other collectors, museums and off the net for years and as a result of poor record keeping in many cases have no idea where I found them. Where known, I have put it in the credits page. If you find one of your photos in here and your name is not in the credits, please accept our apologies for using it without permission.

This series is not simply my effort, many people have contributed to its completion, have read it over, offered corrections and pointed out blatant errors. You know who you are and my thanks for your help. If you happen to find one of those errors, please let me know so it can be corrected.

Enough said, on to the interesting bits……

RUSSIAN ACRONYMS

BKM = БКМ (Беспроводной Комплект Минирования) = “wireless mining kit”

ChV/ChMV = ЧВ/ЧМВ (Часовой Взрыватель) = “clockwork fuze”

ChZ = ЧВЗ (Часовой Замыкатель) = “clockwork circuit closer”

ED = ЭД (Электро Детонатор) = “electric detonator”

EKhV = ЭХВ (Эпектро-Химический Взрыватель) = “electro-chemical fuze”

EKhZ = ЭХЗ (Эпектро-Химический Замыкатель) = “electro-chemical circuit closer”

KhV = ХВ (Химический Взрыватель) = “chemical fuze”

MD = МД (Механический Детонатор) = “mechanical detonator”

ML = МЛ (Мина Ловушка) = “trap mine”

MS = МС (Мины Сюриризы) = “surprise mine”

MUV = МУВ (Модернизированный Упрощённый Взрыватель) = “modernized simplified fuze”

MV = МВ (Механический Взрыватель) = “mechanical fuze”

MVE = МВЭ (Минный Взрыватель Электронный) = “electronic-fuzed mine”

NVU = НВУ (Неконтактное Взрывательное Устройство) = “noncontact explosive device”

PMP = ПМП (Противопехотная Мина Пластмасса) = “antipersonnel mine, plastic”

PV = ПВ (Поездной Взрыватель) = “train fuze”

PVU = ПВУ (Противопоездное Взрывательное Устройство) = “anti-locomotive train fuze”

UV = УВ (Упрощённый Взрыватель) = “simplified fuze”

VPF = ВПФ (Взрыватель Подевых Фугасов) = “fuze for field fougasse”

VPZ = ВПЗ (Взрыватель Подводных Зарядов) = «fuze for underwater charge”

VV = ВВ (Взрывчатые Вещества) = “explosive substance”

VZ = ВЗ (Вибрационный Замыкатель) = “vibration circuit closer”

VZD = ВЗД (Взрыватель Замедленного Действия) = “fuze delayed action”

VZDKh = ВЗДХ (Взрыватель Замедленного Действия, Химический) = “fuze delayed action, chemical”

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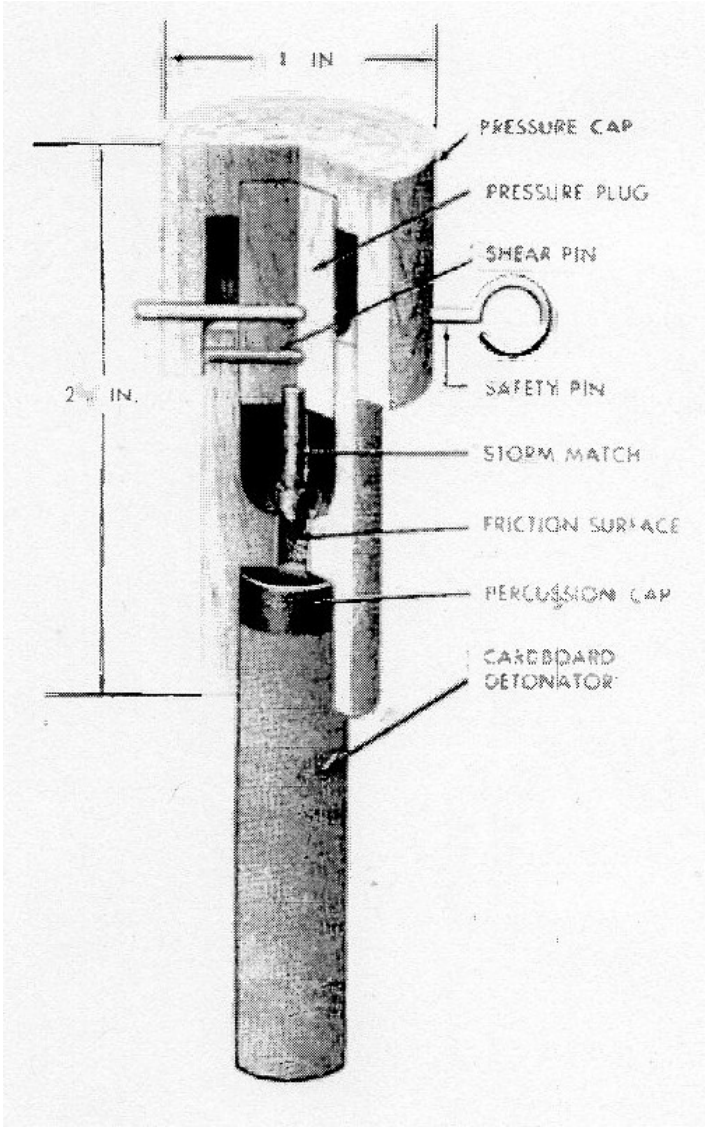
Wooden Pressure Fuze (Designation unknown)

Type- Pressure
Weight-
Length- 2 2/32 in. (67 mm) less detonator
Diameter- 1 in. (25 mm)

This can only be described as a stopgap fuze to be used until more effective firing devices could be developed. Likely only used in the early period of WWII. It was designed to be used in non-metallic mines but could also be used for pressure activated boobytraps. The device is made completely of wood and cardboard except for the percussion cap and safety pin. As such it would be susceptible to moisture and likely caused many misfires.

The device consists of a tubular wooden body, wooden pressure plug, wooden cap, storm match, percussion cap and cardboard detonator. The body has a constriction in the lower half that is lined with friction compound. The pressure plug fits in the top of the body and is held in place by a shear pin. A storm match is mounted in the bottom centre in line with the hole in the body constriction. The cap fits over the top of the pressure plug and covers the end of the shear pin. The safety pin fits through holes in the cap and pressure plug, but on top of the main body. The detonator assembly is a cardboard cased detonator with a percussion cap mounted in the top.



Wooden Pressure Fuze

Pressure on the cap forces down on the pressure plug until the shear pin breaks. The pressure plug continues its downward movement forcing the storm match through the hole and friction compound causing it to ignite. The flame produced causes the percussion cap to fire into the detonator setting it off and causing the mine or charge to detonate.

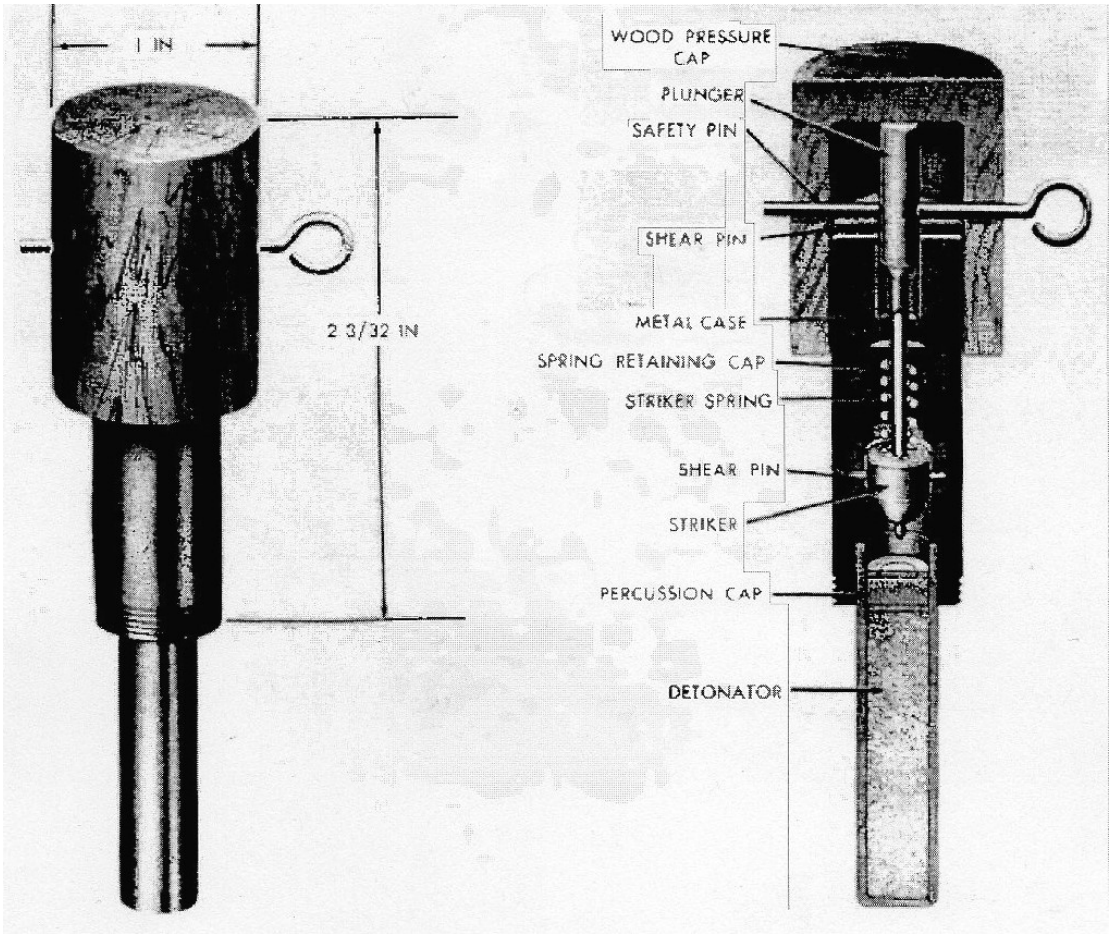
Wood Capped Metallic Pressure Fuze (Designation unknown)

Type- Pressure
Weight-
Length- 2 3/32 in. (68 mm) less detonator
Diameter- 1 in. (25 mm)

This appears to be a modification of the earlier Wooden Pressure Fuze to increase reliability and moisture resistance. It is still susceptible to moisture in its use of a cardboard detonator. It was designed for use with non-metallic mines but could also be used in pressure activated boobytraps.

The main body is cylindrical and made of metal. It is threaded at the bottom end to screw into the fuze well of a mine. A spring-loaded striker is contained within the body and held in position by a shear pin. A plunger at the top is held in place by a shear pin. A safety pin also fits through the body and plunger preventing movement until the pin is removed. The bottom end of the plunger is hollow to fit the striker shaft. A spring retaining cap is attached to the bottom end of the plunger. The top of the fuze is covered by a wooden cap. The cardboard detonator assembly containing the detonator and percussion cap fits into the bottom of the fuze.

Pressure on the wooden cap pushes down on the plunger causing the shear pin to break allowing the plunger to continue its downward movement. The downward movement of the plunger compresses the spring until the spring retaining cap contacts the head of the striker. Continuing pressure causes the striker shear pin to break releasing the striker, which under pressure of the compressed spring drives down onto the percussion cap. When the percussion cap flashes into the detonator it fires and causes the main charge to detonate.



Wood Capped Metallic Pressure Fuze

ВКМ-6 (БКМ-6)

Type – Concussion
Weight – 8.8 oz. (249 g) VZDA-16Ch
9.5 oz. (269 g) VZDP-16Ch
Length – 6 in. (152 mm)
Width – 2.6 in. (66 mm)
Height – 0.4 in. (10 mm)

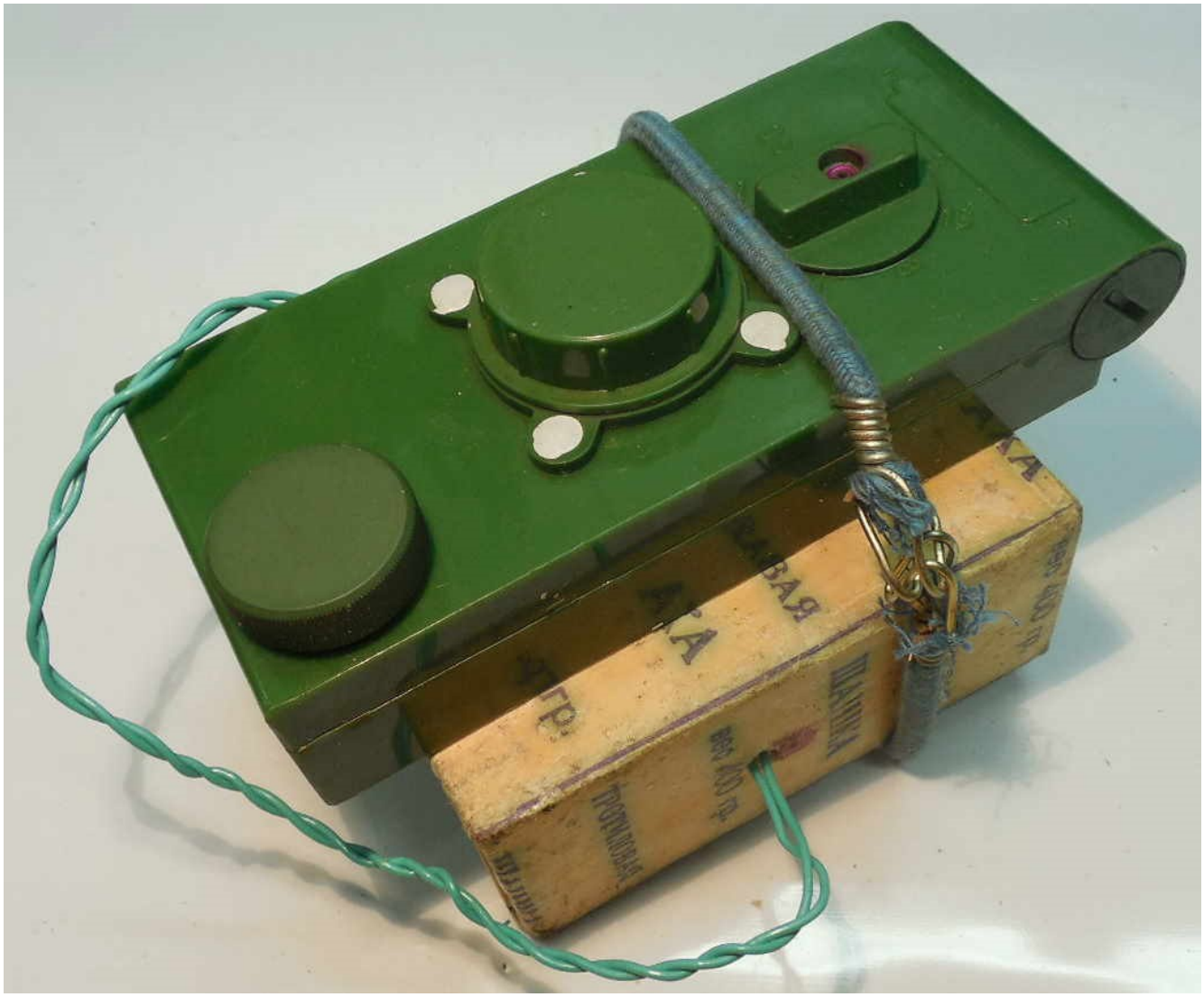
VZDA-16Ch firing device (left)
VZDP-16Ch sensor (right)

The BKM-6 is an electronic firing device system consisting of a VZDA-16Ch firing device and up to five VZDP-16Ch shock wave initiators/sensors. This device is then capable of simultaneous initiation of multiple demolition charges that are within 50 metres, without any direct connectivity, such as wire or radio. Only a shock wave (i.e., concussion) is required to initiate the device. In principle it is similar to the VPZ-1 firing device, even though it is not employed underwater.

The complete BKM-6 system consists of one active base unit/firing device (VZDA-16Ch) that does not contain a shock wave sensor, and five passive units (VZDP-16Ch) that do contain shock wave sensors. The system requires a 7РЦ (12V) battery. Each element of the firing device has a 30-minute to 16-hour delay arming time, and an LED that flashes for the first 15 minutes of the delay period.

This is selectable by the operator by a switch on the face of each device, with increments of 0.5, 1, 2, 4, 8, and 16 hours. The firing device also incorporates a self-destruct that functions in the event of battery discharge, or if any attempt is made to remove the battery. The BKM-6 system is supplied with six MD-5M detonators.

Further technical and operational details of the BKM-6 are unknown.



VZDP-16Ch sensor with attached demolition charge

ChMV 10 (ЧМВ-10)

Type- Delay
Weight-
Diameter- 2.125 in. (54 mm)
Height- 4.25 in. (108 mm)

This delay device was first developed during WWII. It was also used by North Vietnamese and Viet Cong sappers in attacks on US ammunition storage facilities during the Vietnam conflict. It can be used to fire a percussion detonator or to close an electrical circuit. The device provides a delay of up to 10 days.

When first developed the outer casing was made of cardboard and measured 3 7/8 inches (98 mm) high and 2 inches (51 mm) diameter. Post war devices have the outer casing made of Bakelite and are slightly larger. The top lid is threaded into the lower portion of the casing. The bottom of the stem has a threaded hole to fit an MD-2 detonator assembly or an electrical contact cap with leads. The joint is waterproofed by a rubber washer.

The clockwork mechanism is contained in the upper section of the mechanism. The spring-loaded striker is contained in the lower stem. There is a knurled disc on the top used to wind the clock mechanism. The side of the clockwork mechanism has a window through which the time settings are viewed. The numerals on the dial indicate days with the divisions between numerals indicating 2-hour increments.

ChMV 10 internal parts
Photo– G. Zahaczewsky

ChMV 10 Firing Device with cap removed

The striker is held in the cocked position by a tension hook.

To set the mechanism, remove the lid and using the knurled disc wind the clock mechanism until the desired time setting is lined up with the indicator mark on the window. When released the mechanism starts. Replace the lid to complete the arming. The device should not be set for less than six hours as it is unreliable up to that point. The device can be set for any period from six hours to ten days.

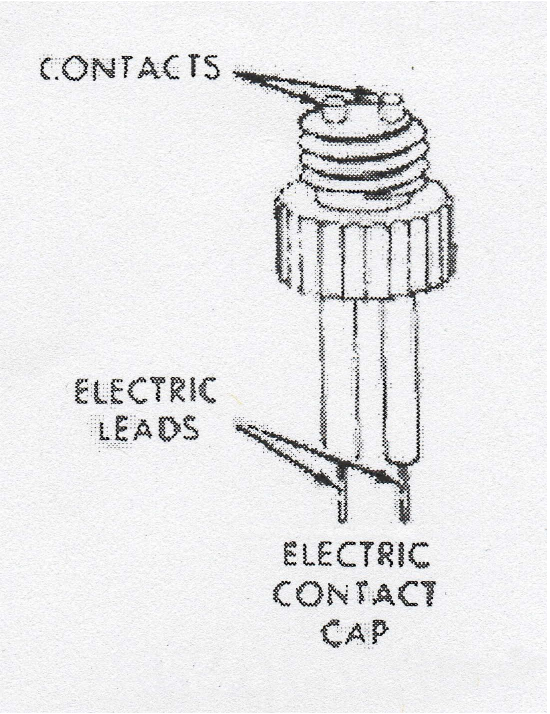
When the device counts down to the set delay a striker release lever trips the tension hook and releases the striker. The striker is driven down under pressure from the striker spring. The point of the striker hits the percussion cap in the MD-2 detonator assembly and fires the device. If set for electrical firing, the point of the striker completes the electrical circuit.

ChMV 16 (ЧМВ-16)

Type- Delay
Weight– 17.6 oz. (500 g)
Diameter- 2.125 in. (54 mm)
Height- 4.25 in. (108 mm)

The ChMV 16 is virtually identical to the ChMV 10 in form and function except it can be set for delays up to 16 days.

ChMV 16 Firing Device



Electrical base used with ChMV devices

ChMV 60 (ЧМВ-60)

Type- Delay
Weight- 45.8 oz. (1300 g)
Diameter- 4.5 in. (115 mm)
Height- 4.5 in. (115 mm)

ChMV 60 Firing Device

This device was developed in WWII. It is a mechanical clockwork delay mechanism that can be set for a delay from 2 to 60 days. Accuracy when set for 2-10 days is plus or minus 9 hours, when set for 10-60 days accuracy is plus or minus 18 hours. The device is meant to detonate large explosive charges.

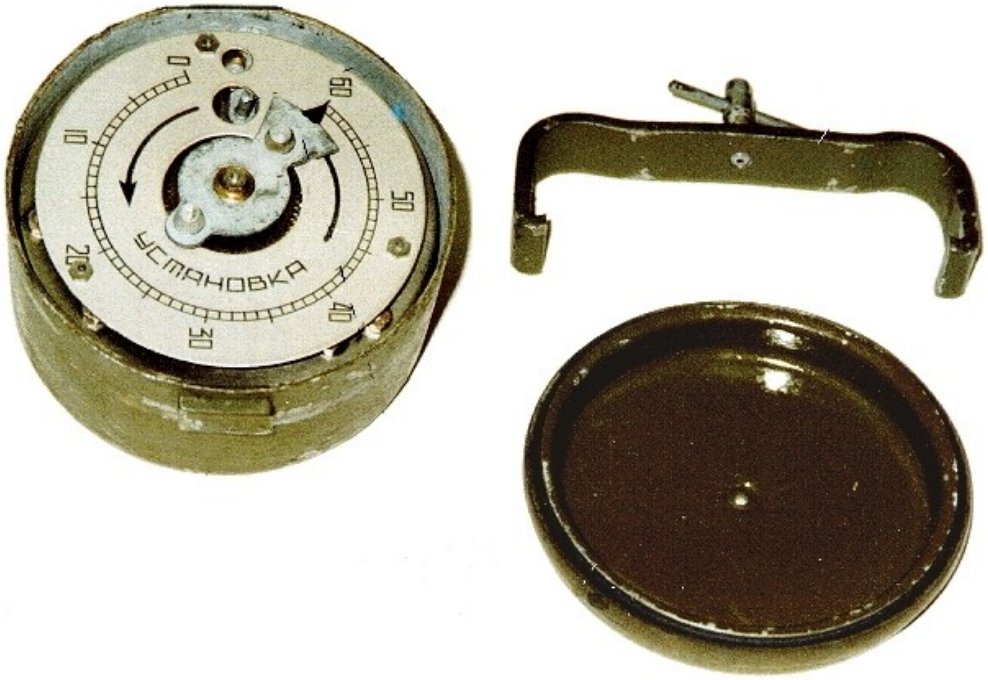
The device consists of a casing, clockwork mechanism, lid, clamp and MD-2 or MD-5M detonator assembly.

The main casing is cylindrical and has two anchor lugs attached to the side of the casing opposite each other. The bottom of the casing has an adapter to accept the detonator assembly and a hole closed by a screw plug to allow winding of the clockwork. The lid fits over the top of the casing to close and waterproof it. The clamp is "U" shaped and has a threaded key in the centre that is used to tighten the lid. The key is a combination of tightening screw and is also used to cock the striker and wind the mechanism. The top of the key has a square socket for winding the device and the other has a depression to catch the point of the striker.

The clockwork mechanism has a dial on top calibrated from 0 to 60. Two arrows on the top point counterclockwise to indicate the direction of movement to set the delay. Two holes located between the 0 and 60 markings allow a view to see that the striker is cocked and the other allows a trigger pin to protrude. The trigger pin is attached to a trigger lever below the dial. The trigger lever is hinged at the end opposite the trigger pin. A "U" shaped cutout on the lever is designed to engage in a slot on the striker. The striker is spring loaded under the trigger lever. An indicator is mounted centrally and on top of the dial. There are two knurled knobs on the indicator.

The unit is stored with the clockwork unwound and the striker uncocked. It is shipped in a wooden container closed by retractable lids. The container is divided into two compartments divided by a partition. The partition has holes to allow the detonator assembly to protrude into the bottom compartment and one to allow the winding hole cover to fit into it so that the device sits flat on the partition. The bottom portion is designed to fit two 400-gram and one 200-gram explosive cartridges.

To set the device, it is removed from the container and the lid removed. Turn the indicator clockwise (against the direction of the arrows) until the arrow is pointed at the "0". Then using the key, wind the clockwork mechanism until it stops without forcing it. Replace the cover on the hole. Using the knobs on the indicator, turn the indicator counterclockwise (in the direction of the arrows) until the desired delay is indicated by the arrow on the indictor. Unscrew the cover on the adapter and using the key push the striker up into the device and ensure the trigger lever engages in the slot on the striker. Ensure the proper delay is set and make sure the clockwork mechanism is working. Close the

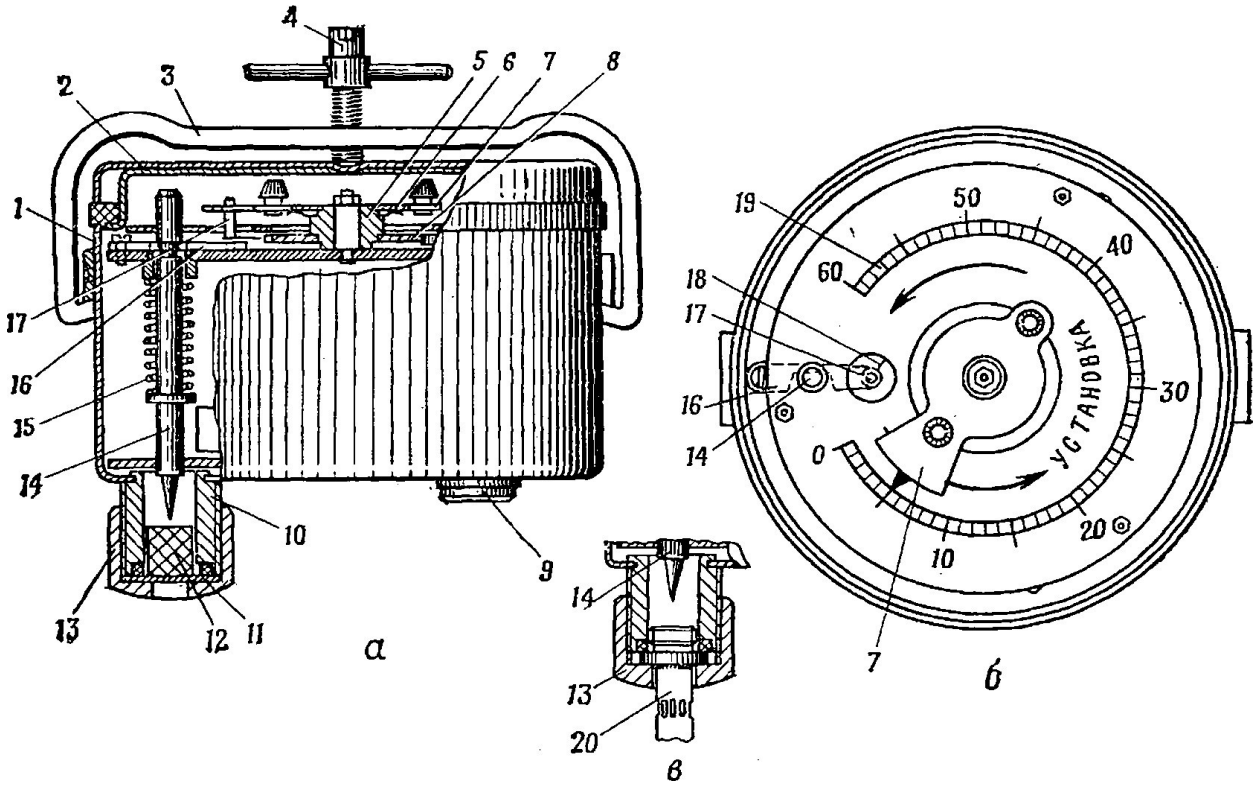


ChMV 60 with cover removed

casing by putting the cover on, and engaging the clamp with the ends of the clamp under the lugs on the side of the case. Screw the key down until the lid is tight. Screw the detonator assembly into the adapter and insert the device back into its wooden case with the detonator protruding into the explosive chamber. The one kg. integral charge in the box is meant to be an initiator for a larger charge which should be packed around the case.

As the device counts down the indicator moves with the countdown. When approaching zero, the edge of the indicator contacts the trigger pin. As the countdown continues it gradually pushes the trigger lever out until it disengages the striker at the point it reaches zero. The striker under pressure from the striker spring is driven down to hit the primer in the detonator assembly causing it to fire.

The fuze can be disarmed if there are at least two days left on the delay.



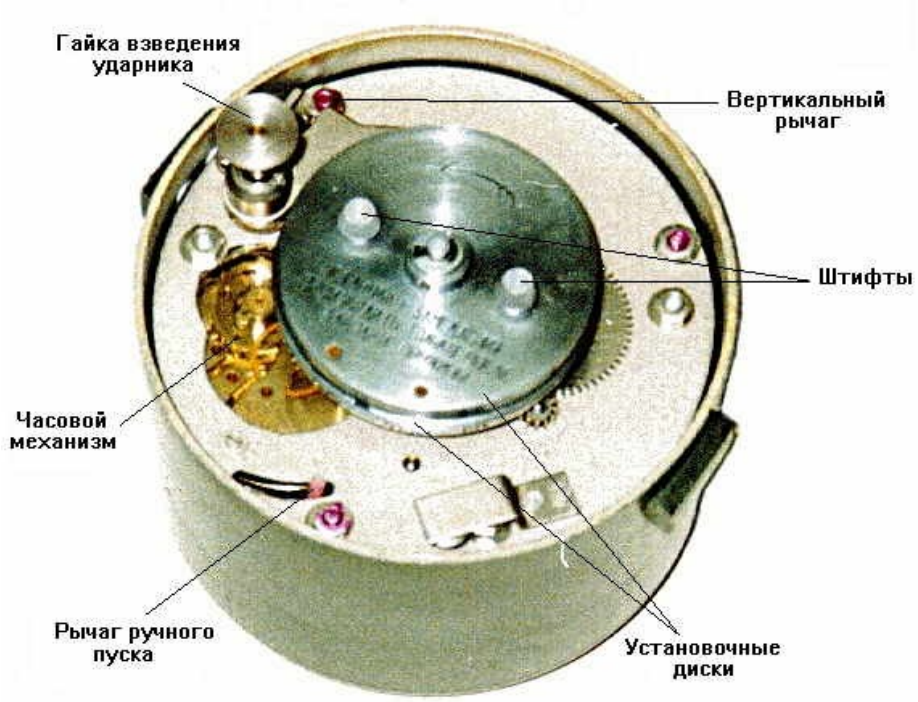
ChMV 120 (ЧМВ-120)

Type- Delay
Weight- 59.9 oz. (1700 g)
Diameter- 3 15/16 in. (100 mm)
Height- 5 3/16 in. (132 mm)

This is a mechanical time delay device that can be set for delay periods from 1 to 120 days in 6-hour increments. It should be noted that a range of accuracy must be taken into consideration. When set for 1-20 days, its accuracy is plus or minus 10 hours, when set for 20-120 days its accuracy is plus or minus 26 hours. It is normally installed in a wooden case, but it may also be used without that case to prime individual demolition charges.

ChMV-120 Firing Device

The device consists of a housing with cover, bracket, and combination screw, clockwork mechanism, manual and remote start mechanism, striker mechanism, detonator and wooden case. The housing is metal with an open top that is closed by a cover. The bracket that holds the cover on fits over the cover and attaches to lugs on the side of the housing. The combination screw is used to tighten the bracket and is also used as a tool to wind the clockwork mechanism and to open and close the plugs on the bottom of the housing. The housing has a threaded opening on the bottom used to wind the clockwork mechanism and is closed by a plug. Near the edge of the housing is a stem to fit the MD-5M detonator that is also closed by a plug. There are two wires connected to the housing used for the remote start mechanism.



ChMV-120 with cover removed

The clockwork mechanism has two discs on top used to set the time delay. The top disc is divided into 10 large divisions each corresponding with one day delay. Each of those divisions is further divided into 4 smaller divisions corresponding with 6-hour delays. An arrow on the upper surface of the disc indicates the direction of rotation to set the delay. The lower disc is divided into 12 divisions each corresponding to 10 days. Off to one side of the discs is the striker mechanism with a knob on top to allow the user to get a grip on it. About a quarter

way round the discs from the striker is a lever in a slot. This is the manual start lever. Markings on either end of the slot mean Start/Stop (in Cyrillic). The manual start mechanism is used by simply moving the lever from "stop" to "start". The remote start mechanism is a thermal relay that will start the clock after it is attached to a power source of 12-18 volts for one minute. The detonator is a standard MD-5M detonator assembly. The wooden case that comes with the fuze has two compartments closed by retractable lids. The large upper compartment contains the ChMV-120 fuze. The smaller lower compartment holds a 1 kg charge (two 400 g and one 200 g blocks). There are two holes in the lid of the small compartment, one to fit the detonator and one for the other plug on the bottom of the fuze. One corner of the lid is cut off for the wires of the remote start and a saw curf in the corner of the box closest to the cut off lid to let the wires out of the case.

ChMV-120 showing cover and bracket, note the combination tool closing screw

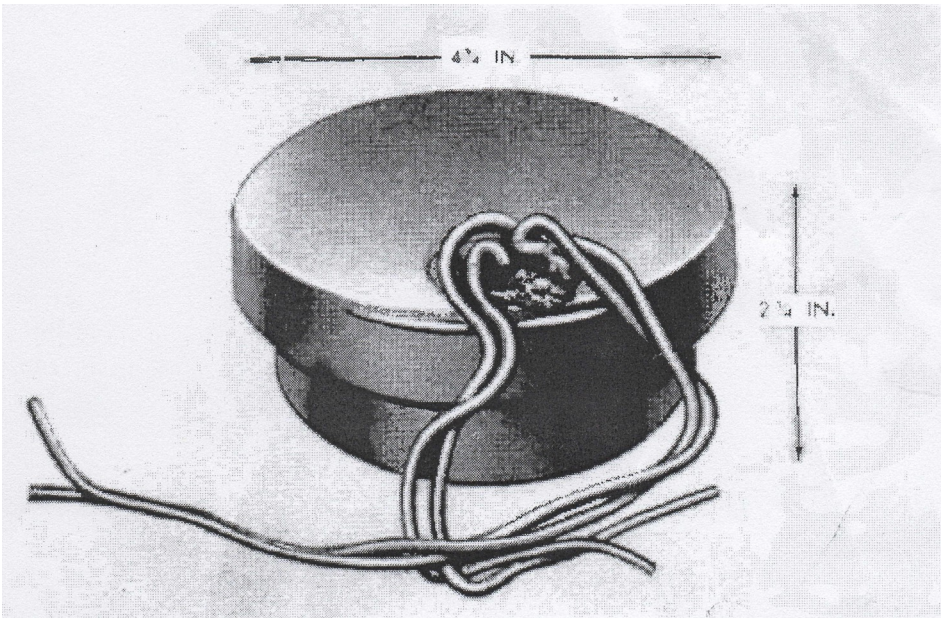
The target of the delayed demolition has a large explosive charge buried or concealed beside it. The device in its case acts as the detonator for the larger charge. The case is filled with its explosive charge and the device is opened to prepare it. The combination screw is used to remove the plug covering the winding mechanism. The upper end of the screw, which has a socket to fit the winding shaft, is used to wind the clockwork mechanism. It takes 35-40 full revolutions to completely wind the mechanism. Once wound the striker is cocked by pulling up on the knob on the striker. Rotate the discs to set the desired time delay, do not set for a period of less than one day. Move the lever to the start position and ensure the clockwork is operating, if a remote start is planned move the lever back to stop. Close the cover and install the bracket and screw. Unscrew the plug from the detonator stem, remove the gasket and put it on the detonator assembly. Screw the detonator assembly in and tighten it. Place the device in the case with the detonator protruding into the charge in the lower compartment. Close the case, if a remote start is being used ensure the wires protrude from the case. Install the case in the larger charge and conceal both. For a remote start, run wires from the case to the start site, ensuring the splices are waterproofed and the circuit is serviceable. The delay period starts when the manual lever is placed in the Start position or when the remote start is attached to a suitable power supply.

The device may be disarmed if there is a proper amount of time remaining before it is supposed to detonate. If set for a period of less than 20 days, two days must remain. If set for a period of 21 to 120 days, five days must remain.

ChVZ (ЧВЗ)

Type- Vibration
Weight-
Diameter- 4 ¾ in. (120 mm)
Height- 2 ¼ in. (57 mm)

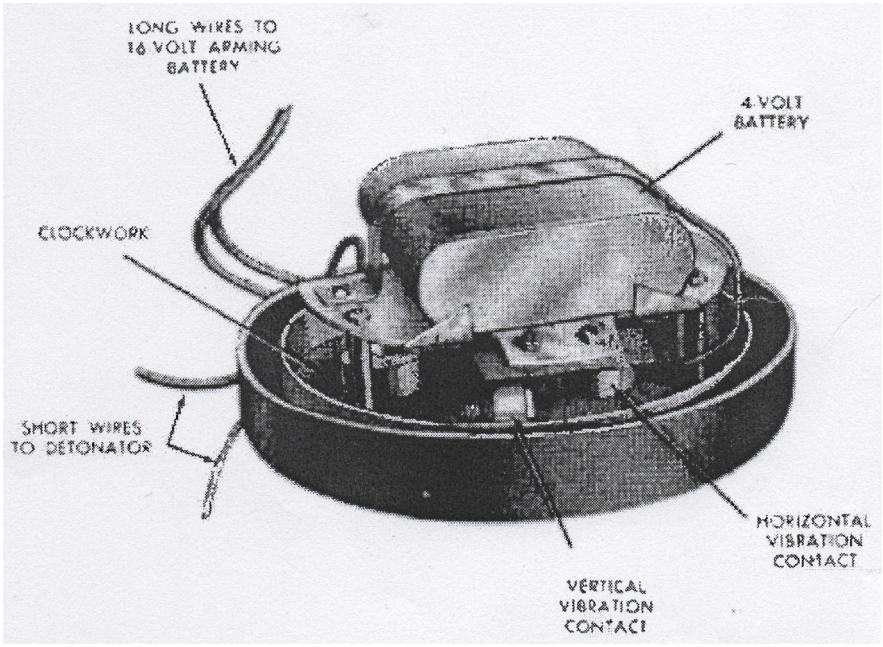
Designed in WWII for use with the DM highway mine this firing device was versatile enough to detonate any charge especially when emplaced on bridges or in terrain where passing vehicles cause vibration.



ChVZ Firing Device

The ChVZ consists of a casing, 4-volt battery, safety clockwork mechanism, horizontal vibration contact, vertical vibration contact and two sets of leads. The body is a cylindrical sheet metal casing with a cap and a hole through the cap. The battery is a 4-volt flashlight battery located on top of the mechanism. The safety clockwork is located below the battery and has a set of long leads attached to it. The horizontal and vertical vibration contacts consist of copper spiral wound contacts contained within aluminum housings. Both are also located below the battery. The short set of leads are for attachment to the detonator. One of the leads is attached to the copper spiral contacts through the clockwork mechanism. The other is attached to the aluminum housings through the battery. The electrical circuit is interrupted at the clockwork and at the vibration contacts. Both sets of leads pass out of the casing through the hole in the cap. The hole has a rubber gasket to provide moisture resistance.

For use the short set of leads is attached to the detonator which is then inserted into the main explosive charge. Once the firing device is in place, the long set of leads is attached to a battery of at least 16 volts for 5 to 10 seconds. The current melts a wire holding the cogwheel of the clockwork. Once the wire melts, the clockwork is free to run. After a delay of about 4 minutes the clockwork closes a switch completing the circuit except for the vibration contacts. The device is now armed.

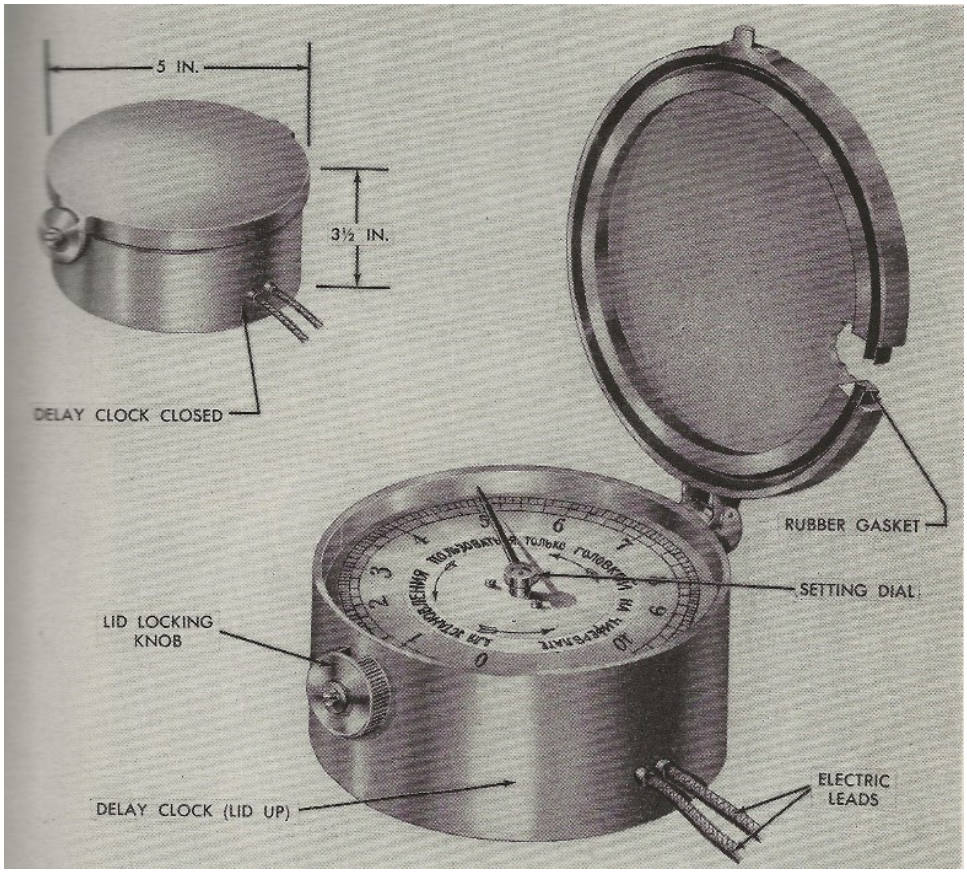


ChVZ showing internal construction

When a vehicle or anything else creates sufficient vibration it causes the spiral contacts to vibrate within the aluminum housings until one of them touches the contact within the housing to close the electrical circuit causing the detonator to fire and detonate the main charge.

ChZ 10 (ЧЗ-10)

Type- Delay
Weight- 24 oz. (680 g)
Diameter- 5 in. (127 mm)
Height- 3.5 in. (90mm)



ChZ 10 Firing Device

This is a mechanical clockwork delay mechanism designed to initiate an electrical circuit. It can be set for a delay of up to 10 days, with an accuracy over the delay period of 4 hours.

It consists of a casing, clockwork mechanism and set of electrical leads. The casing is steel with a lid hinged on one side and a knurled nut on the opposite side of the casing to lock the lid in the closed position. The lid has a rubber washer to waterproof it. Holes in the lower side of the casing allow the electrical leads to protrude. The electrical leads are waterproofed where they exit from the casing. The bottom of the casing has a winding stem with the winding key attached. The clockwork mechanism has a time disc and hand on top. Arrows on the dial indicate the direction in which the hand moves. The hand is used to indicate the delay time set. A knob in the centre of the dial is used to set the clockwork for the desired delay up to a maximum of 10 days. An inscription on the dial in Russian means “To set, use only knob on face of dial”.

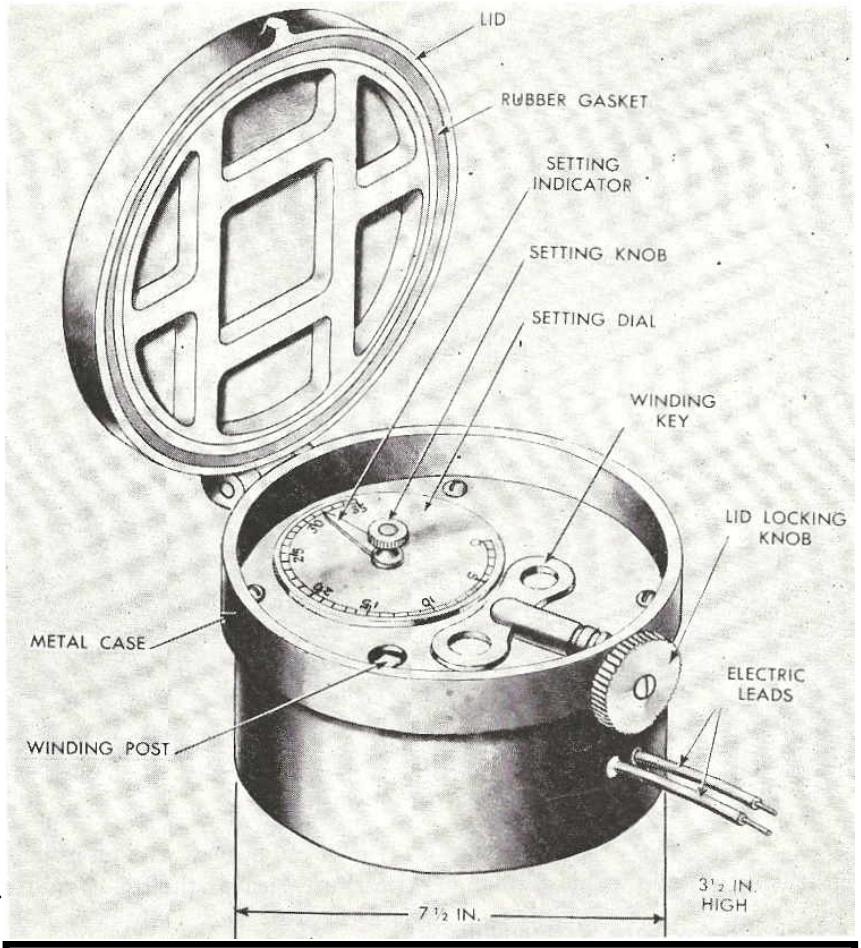
Prior to use, test the device by attaching an ohmmeter to the leads. At a setting of zero the needle should move, at any other setting it should not. Once tested, wind the clockwork with the key provided. Set the dial for the desired delay, close and lock the casing. Then attach the leads into the electrical demolition circuit.

Once the delay has expired the release lever in the clockwork trips a spring-loaded striker which closes the electrical circuit between the leads and initiates the explosive charge.

ChZ 35 Cylindrical (ЧЗ-35)

Type- Delay
Weight- 7.5 lb. (3.4 kg)
Diameter- 7.5 in. (190 mm)
Height- 3.5 in (89 mm)

This is a mechanical clockwork delay mechanism designed to initiate an electrical circuit. It can be set for a delay of up to 35 days, accuracy over the delay period is 6 hours.



ChZ 35 Cylindrical Firing Device

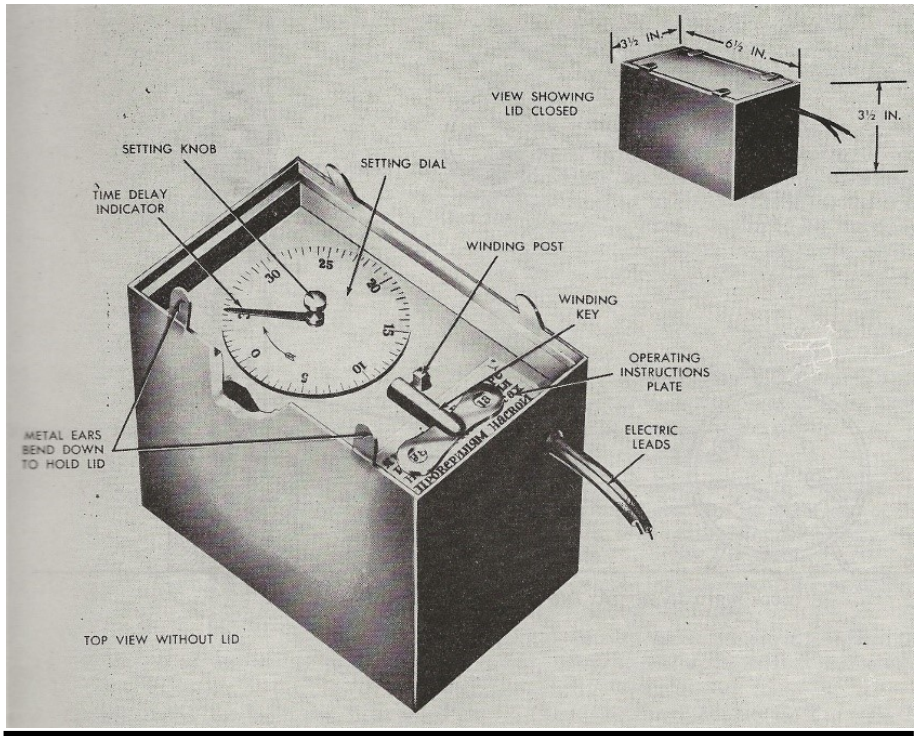
It consists of a casing, clockwork mechanism and set of electrical leads. The cylindrical casing is steel with a lid hinged on one side and a knurled nut on the opposite side of the casing to lock the lid in the closed position. The lid has a rubber washer to waterproof it. The clockwork mechanism has a small time disc and hand on top. A knob in the centre of the dial is used to set the clockwork for the desired delay up to a maximum of 35 days. The hand indicates the delay time set. The winding post and winding key are located on top of the clockwork mechanism under the lid. Holes in the lower side of the casing below the knurled nut allow the electrical leads to protrude. The electrical leads are waterproofed where they exit from the casing.

Prior to use, test the device by attaching an ohmmeter to the leads. At a setting of zero the needle should move, at any other setting it should not. Once tested, wind the clockwork with the key provided. Set the dial for the desired delay, close and lock the casing. Then attach the leads into the electrical demolition circuit.

Once the delay has expired the release lever in the clockwork trips a spring-loaded striker which closes the electrical circuit between the leads and initiates the explosive charge.

ChZ 35 Rectangular (ЧЗ-35)

Type- Delay
Weight- 4.5 lb. (2.04 kg)
Length- 6.5 in. (165 mm)
Width- 3.5 in. (89 mm)
Height- 3.5 in. (89mm)



ChZ 35 Rectangular Firing Device

This is a mechanical clockwork delay mechanism designed to initiate an electrical circuit. It can be set for a delay of up to 35 days, accuracy over the delay period is 6 hours.

It consists of a casing, clockwork mechanism and set of electrical leads. The casing is sheet metal with a separate lid. The lower casing has four tabs which are folded over the lid to lock it in the closed position. The clockwork mechanism has a small disc and hand on top. An arrow on the disc indicates the direction to turn the hand to set the delay. A knob in the centre of the dial is used to set the clockwork for the desired delay up to a maximum of 35 days. The hand indicates the delay time set. The winding post and winding key are located on top of the clockwork mechanism under the lid. Holes in the end of the casing allow the electrical leads to protrude. The electrical leads are waterproofed where they exit from the casing.

Prior to use, test the device by attaching an ohmmeter to the leads. At a setting of zero the needle should move, at any other setting it should not. Once tested, wind the clockwork with the key provided. Set the dial for the desired delay, close and lock the casing. Then attach the leads into the electrical demolition circuit.

Once the delay has expired the release lever in the clockwork trips a spring-loaded striker which closes the electrical circuit between the leads and initiates the explosive charge.

ChZ-B (ЧЗ-Б)

Type – Mechanical Delay
Weight –
Length –
Diameter –
Height –

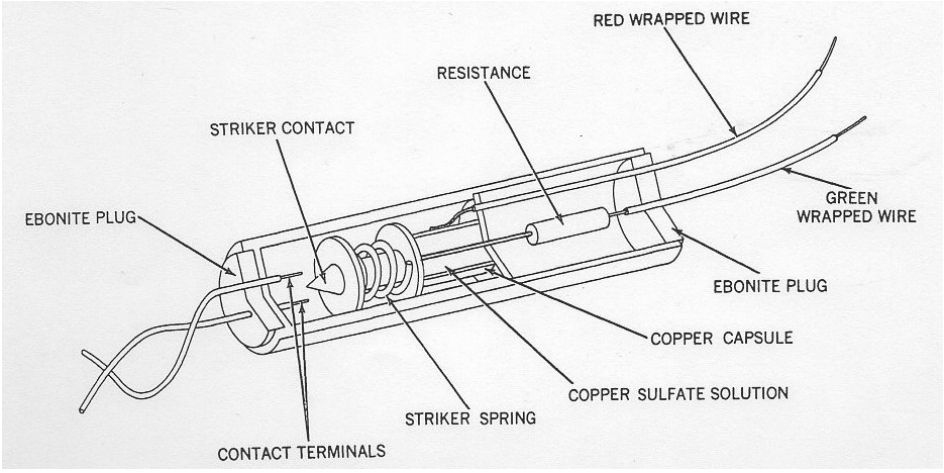
During the 1940s and 1950s, the Russians employed commercial alarm clocks as mechanical delay initiators for boobytraps and demolition charges. They designated these as ChZ-B firing devices, although there does not appear to have been any attempt to standardize the actual timing device. Today, many would consider this as an improvised explosive device. However, almost 80 years ago, the Russians officially designated it.

The firing devices utilized commercial alarm clocks fitted with a knife switch attached to the alarm mechanism on the back of the clock. A housing containing two contact arms, insulated from each other, was attached to the back of the clock. Two terminals, each wired to one of the contact arms, projected from the housing and were used to wire the clock into a firing circuit which included an external battery and electric detonator.

The ChZ-B could be used as a stand-alone device in an electrical firing circuit, or it could also be used as an arming delay in an instantaneous detonation circuit. Only imagination limited its use.

EKhP (ЭХП)

Type- Electro-Chemical
Weight-
Length- 2 in. (50 mm)
Diameter- 5/8 in. (15 mm)

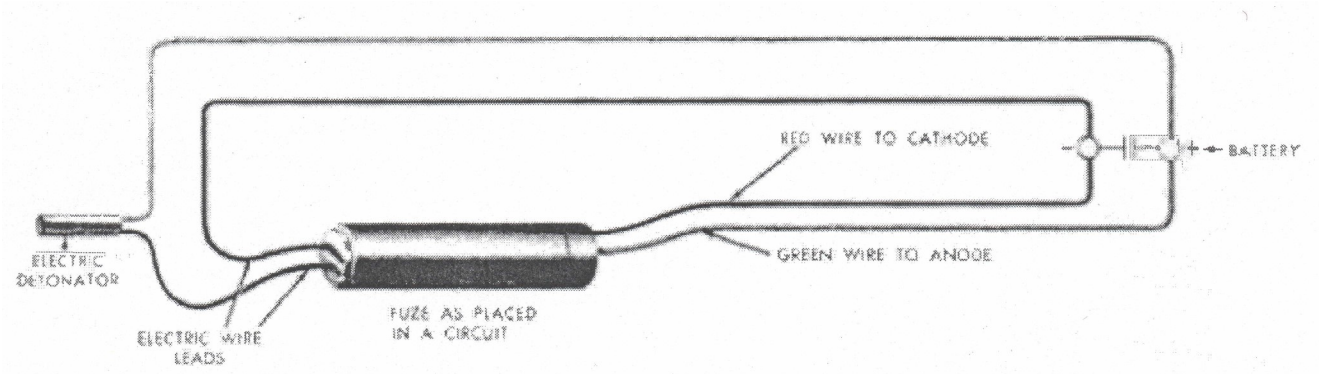


EKhP Delay Element

This is not really a boobytrap mechanism but could be adapted as a short delay boobytrap. It is mainly used as a delay element in detonation circuits to increase safety. Its delay period is between 10 minutes and 4 hours depending on temperature. At higher temperatures the delay time is short, as the temperature lowers the delay increases. There is a larger sized version measuring 5 in. (127mm) long and 1.375 in. (35 mm) in diameter. In all other respects it is identical.

The device consists of a casing, spring loaded contact, copper capsule, copper sulfate, resistor and two pairs of electrical leads. The casing is made of tar impregnated cardboard with Ebonite plugs in the ends. The body is divided into two chambers. Contained within the larger forward chamber is the spring-loaded contact attached to a copper capsule containing a copper sulfate solution. The rear chamber contains the resistor. A set of electrical leads, one green and one red, passes through the rear Ebonite plug. The green lead is attached to the resistor and the red to the copper capsule. A restraining wire from the resistor passes through the copper capsule holding the spring-loaded contact in the cocked position. The forward end plug also has a set of leads protruding into the device but do not contact anything that will conduct a current. These leads are for attachment to an electric detonator. An external battery is attached to the leads that come out the back end of the device.

When the battery is connected the current flowing through the wires causes electrolysis to begin. After a period of time, the copper sulphate solution degrades the restraining wire until it breaks and releases the contact. The contact moves forward and closes the circuit at the forward plug. Once the circuit is complete the electric detonator will fire.



EKhV (ЭХВ)

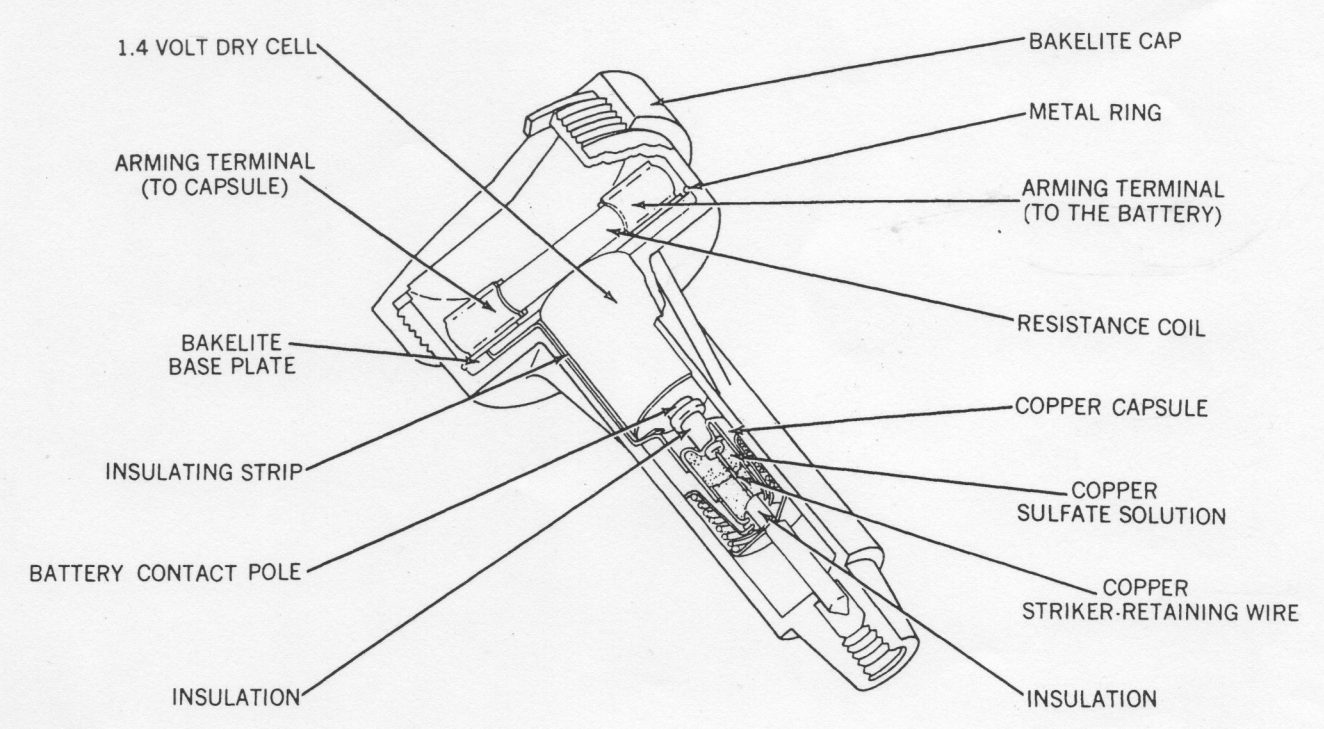
Type- Delay, Chemical-Electrical
Weight-
Length- 6.5 in. (156 mm)
Diameter- 2.5 in. (75 mm)

This firing device was introduced for service in 1941. It externally resembles the ChMV-10 and ChMV-16 clockwork fuzes. It is used for delayed detonation of mines and charges with the objective to delay, disrupt and harass enemy troops. It will provide delay periods between 12 hours and 120 days and is effective in a temperature range of -4 to +140 F.

The body of the device is Bakelite and has a screw cap on top. The bottom is internally threaded to accept the detonator assembly or an electrical contact adapter. The body contains a striker assembly, battery and arming terminal plate. The striker assembly, located at the bottom consists of a striker, striker spring, copper capsule, copper retaining wire and copper sulfate solution. The striker is located below the copper capsule containing the copper sulfate solution. The striker spring surrounds the striker and is held in compression by the copper retaining wire. The wire runs through the copper capsule but is insulated from it. The battery is a 1.4-volt dry cell located above the striker assembly. The arming terminal plate rests inside the top cover and has two arming terminals to hold the resistance coil. The resistance coil has two numbers on one end indicating the

EkHV with MD-5M detonator assembly
Photo– G. Zahaczewsky

EKhV with Electrical Contact Adapter



delay period. The upper number indicates days and the lower number hours. Each fuze is supplied with 8 resistance coils with differing delay times from 12 hours to 120 days. The copper capsule is wired to one of the arming terminals. The other arming terminal is wired to the battery and the retaining wire.

In this firing device, the copper capsule acts as an anode, the retaining wire as a cathode and the copper sulfate solution as an electrolyte. When current is applied electrolysis begins and corrodes the retaining wire until it finally breaks and releases the striker. The resistance coil determines the amount of current applied which governs the time delay.

For use, screw in either the detonator assembly (MD-2 or MD-5M) or the electrical contact adapter. Insert the fuze in the charge or wire it to the charge. Remove the top cap and ensure the battery is giving a minimum of 1.25 volts. Insert the resistance coil into the arming terminals. This starts the delay. Once the delay expires the wire will break and release the striker. The striker under pressure of the striker spring will be driven down into the percussion cap causing it to fire the detonator, or will close the circuit if using the electrical contact adapter. The maximum life of the device is about six months, limited by the life of the battery.

EKhV-5 (ЭХВ-5)

Type- Delay
Weight-
Length-
Diameter-

EKhV-5 Firing Devices

This device entered service in 1944. The EKhV-5 differs from the EKhV firing device in that it has a modified body style and a replaceable power source.

To change out the power source, unscrew the cover, remove the locking ring from the grooves and remove the retarding and impact panel from the case. Take out the existing power supply, replace it with a new one and reassemble in reverse order. The shelf and operational life of the EKhV-5 firing device is 12 months.

Further technical and operational details for the EKhV-5 are unknown at this time.

EKhV-7 (ЭХВ-7)

Type – Electro-Chemical Delay
Weight – 7.8 oz. (222 g)
Length – 8.6 in. (220 mm)
Diameter – 1.6 in. (42 mm)

EKhV-7 Firing Device

The EKhV-7 is a complex electro-chemical, time-delay (two to 120 days) firing device that entered Russian service in the 1970's. It is primarily intended for use as a boobytrap, or sabotage, device. It normally employs either an MD-2 or MD-5M detonator. It can also be fitted with an adapter that is intended to close, an electrical circuit. The body and some internal components are constructed of Bakelite, other internal parts are steel and rubber. There are reports that this device was employed in Afghanistan.

The device consists of a cylindrical body that contains an ECZ cocked striker assembly, one of ten time-varying resistance coils, a 1.5-volt dry cell battery (KB-U-1,5) as a power supply, and an arming mechanism in the top cover. The base of the body is internally threaded to accept either an MD-2, or MD-5M detonator, or an electrical circuit contact plug.

To place the EKhV-7 into operation, unscrew the top cover and insert the ECZ cocked striker assembly. The assembly contains a cocked firing pin that is restrained by a wire that will eventually be eaten away by galvanic action. Next, select and insert the appropriate resistance coil for the desired time delay. Ten discs are normally included with each device, with delays of two to 120 days, with an error factor of -25% to +75%. Following this, insert the battery power supply. Finally, screw the top cover back onto the body. The firing device is now ready for use.

Upon withdrawal of the arming pin in the top cover, a circuit is completed with the power supply. The electrical current generated by the battery is passed through to the resistance coil. Once the appropriately selected resistance is overcome, the current initiates the galvanic action in the ECZ that will corrode the wire restraining the firing pin. When this occurs, the striker either impacts the primer

of the detonator assembly or closes the electrical circuit in the contact plug.

The firing device will self-neutralize in approximately six months upon the battery life expiration.

Sectioned EKhV-7
Photo- CAT-UXO

EKhV-7 Firing Device showing internals and a full set of time resistance coils. Note the electrical circuit contact plug.
Photo- Oleksandr Mariash

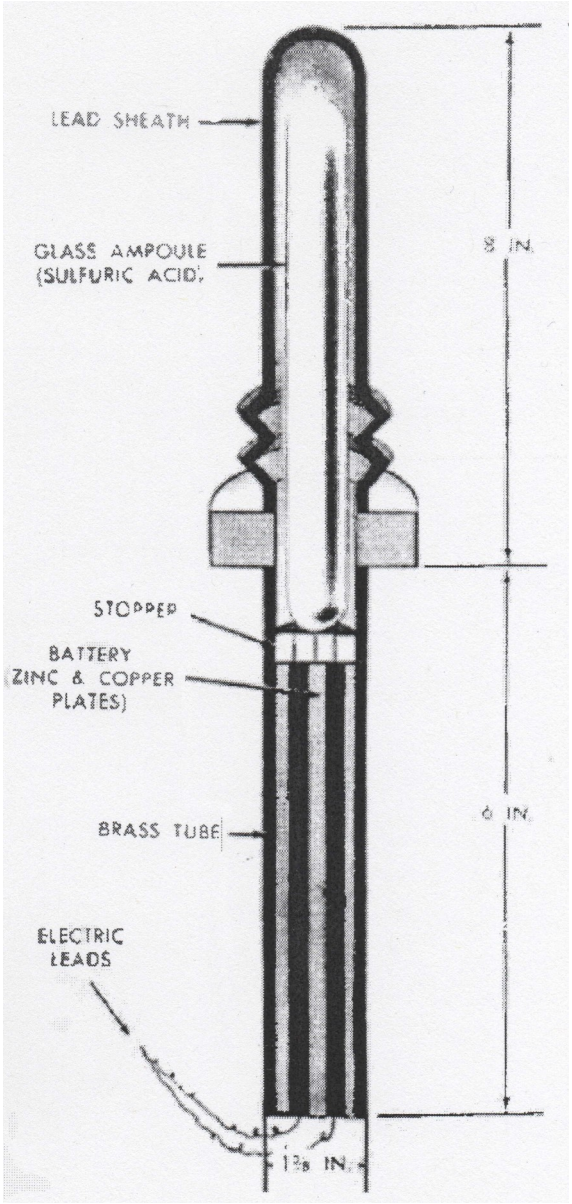
EKhZ (ЭХЗ)

Type- Electro-Chemical
Weight-
Height- 14 in. (354 mm)
Diameter- 1.375 in. (34 mm)

This firing device was designed during WWII for use in oil drum mines, but could be adapted for use with other types of charges. Not really a boobytrap mechanism but more of a mine fuze.

The device consists of a lower brass tube, upper lead tube, glass ampoule, battery plates and a pair of electric leads. The lower brass tube is sealed at the bottom and closed at the top by a stopper with seep holes in it. It contains two battery plates, one zinc and one copper. The electric leads are attached one to either of the plates and protrude out of the bottom of the tube. The upper lead tube has "corrugations" near the bottom of the tube. The upper tube contains an ampoule of sulfuric acid. A mounting ring surrounds the fuze at the junction of brass and lead tubes.

Pressure of at least 20 pounds (9 kg) or an impact on the lead tube will crush it and break the glass ampoule allowing the acid to escape. It seeps down into the brass tube and acts as an electrolyte causing an electric charge to travel down the leads to an electrical detonator.



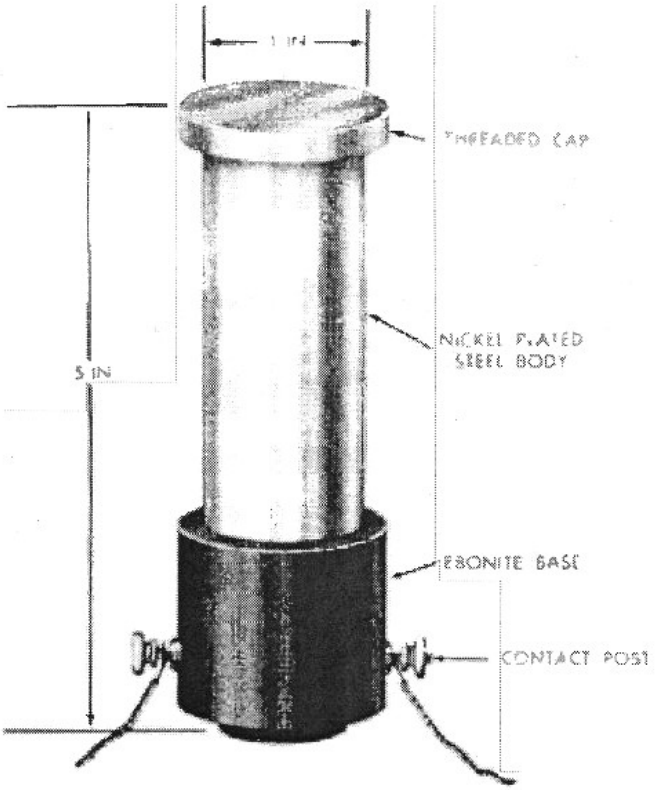
EKhZ Firing Device

EKhZ (ЭХ3) Mercury delay

Type- Delay-Electrical
Weight-
Height- 5 in. (127 mm)
Diameter- 1 in. (25 mm)

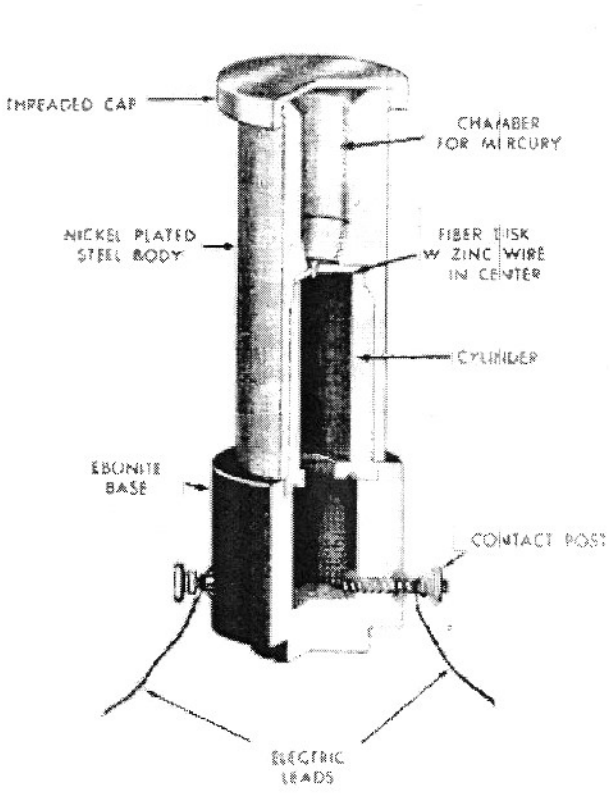
Designed during WWII this fuze is now obsolete. It is an electrical device utilizing mercury as an activating medium.

The device consists of a body, base, fiber disc, rubber cylinder and electrical contacts. The upper body is cylindrical and made of nickel-plated steel with a threaded cap. The upper body has a chamber at the top. The fiber disc fits into the upper body about half way up and is held in position by the rubber cylinder in the bottom portion of the body. A small zinc wire is located in the centre of the fiber disc. The rubber cylinder protrudes slightly from the body. The body fits onto the Ebonite base with the protruding rubber cylinder fitting into the base and the outer body resting on the top of the base. There are two contact posts screwed into the bottom portion of the base with the ends protruding into the chamber in the base. The outer ends of the contacts protrude and are designed to have firing wires wound around them without falling off.



EKhZ Mercury Delay Firing Device

When used, the device is wired into an electrical firing circuit. The cap is removed and mercury poured into the top chamber. The cap is then replaced. The mercury will corrode the zinc wire to open a seep hole in the fiber disc. Mercury will seep through the hole into the chamber in the base. When enough mercury has seeped through to fill the bottom of the chamber it will come in contact with both contact posts and complete the circuit.



EKhZ Mercury Delay Internal diagram

F-10 (Ф-10)

Type – Radio Control
Weight – 77 lb. (35 kg)
Length- 14 in. (355 mm)
Width- 7 in. (178 mm)
Height- 10 in. (254 mm)

The F-10 is a radio-controlled firing device developed during the Second World War that became obsolete shortly after the war. There are several accounts of its use on the Eastern Front as Soviet forces were being driven back by invading German armies. The first recorded use was on 12 July 1941 in the Russian village of Strugi Krasnye, where three devices were employed each detonating 250 kg of TNT. The signals initiating the firing devices were reportedly sent from 150 kilometers away.

F-10 Firing Device
Photo- Jouko Kuisma

The firing device consists of a control unit and an external 12-volt battery, both in cases of approximately the same size. Accessories include a 30-metre wire antenna, connecting cables for battery and antenna, and a rubberized carrying bag. Numerals painted on the control unit indicated the frequency range of that particular device.

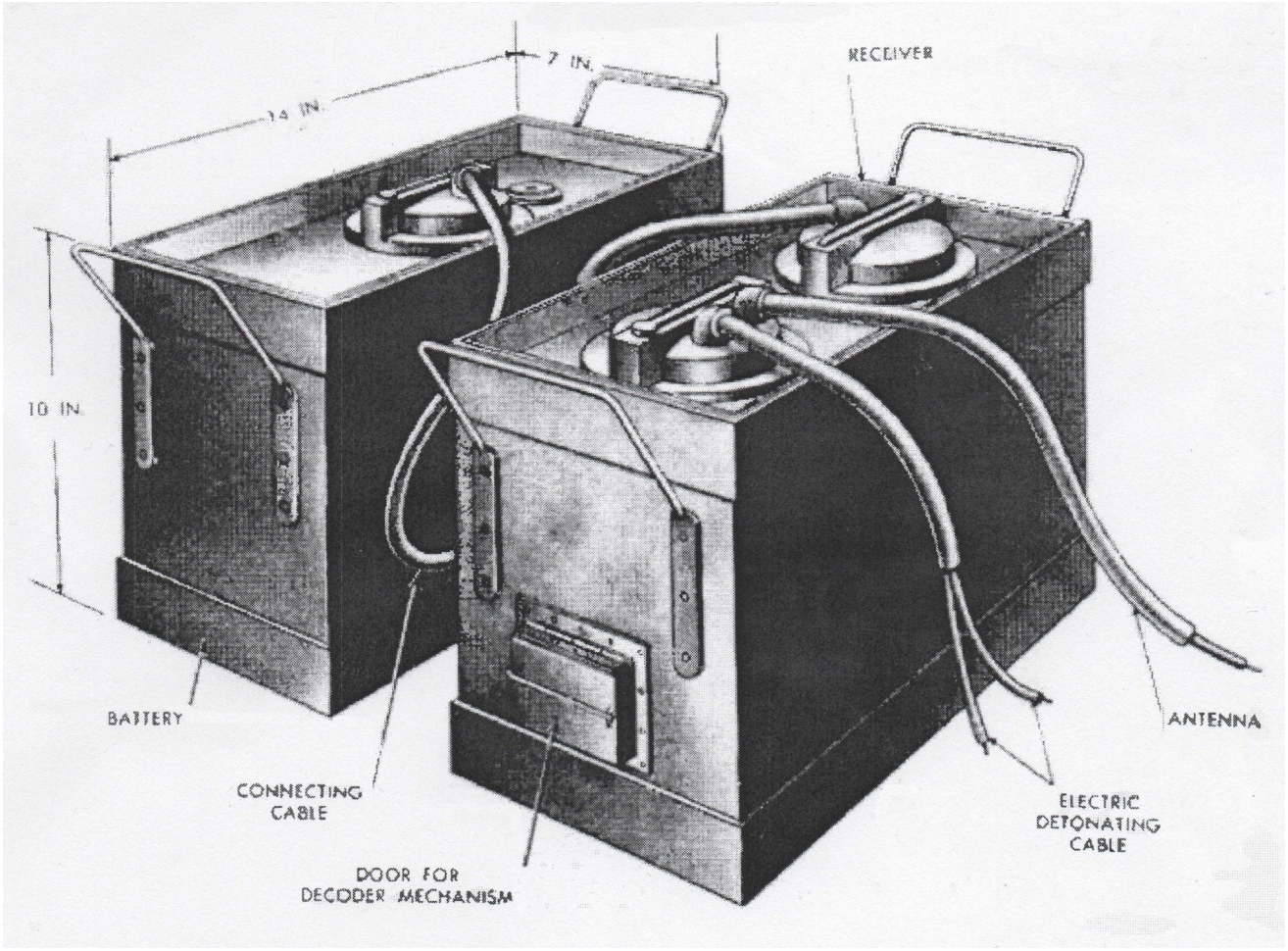
The F-10 device was most frequently employed as Soviet forces departed an area. Devices were emplaced in large buildings, bridges, airfield hangers, repair shops, power plants, and dams. The objective was to kill large numbers of enemy forces bivouacked in buildings, as well as to destroy high value targets.

To prepare the firing device for use, the control unit and battery were connected, and the antenna connection cable was installed. Additionally, up to three firing wires were connected to the control unit and could be deployed to any of three separate explosive charges up to 50 metres away. The control unit and battery were placed in the rubberized bag and normally hidden inside walls, or could be buried to a depth of eight feet. The antenna connection cable was laid out to a maximum distance of 40 metres from the control unit. It was then connected to the 30-metre antenna, which was oriented in the direction of the expected firing signal. The antenna could apparently be buried to a depth of four feet (122 cm), or laid underwater to a depth of 1.5 feet (45.7 cm), and still reliably receive a firing signal.

When placed into operation, the F-10 was limited by its battery life. Since the control unit operated on vacuum tubes that required constant energizing, the battery was drained after only four days. To extend the battery life, a clockwork mechanism was incorporated that allowed the system to power down for a short period of time – for either 2.5 or 5 minutes (i.e., 2.5 or 5 minutes on, 2.5 or 5 minutes off). This extended the battery life to 20 days for the 2.5-minute cycle, or 40 days for the 5-minute cycle.

Overall, Soviet reports indicate that the F-10 system was unreliable, and it was recommended that two or three firing devices should be used against each selected target.

An improved version, F-40, was developed with cylindrical bodies and batteries. No other information is currently available. The F-40 was followed by the F-TD, a less expensive version. Again, no further information is currently available.

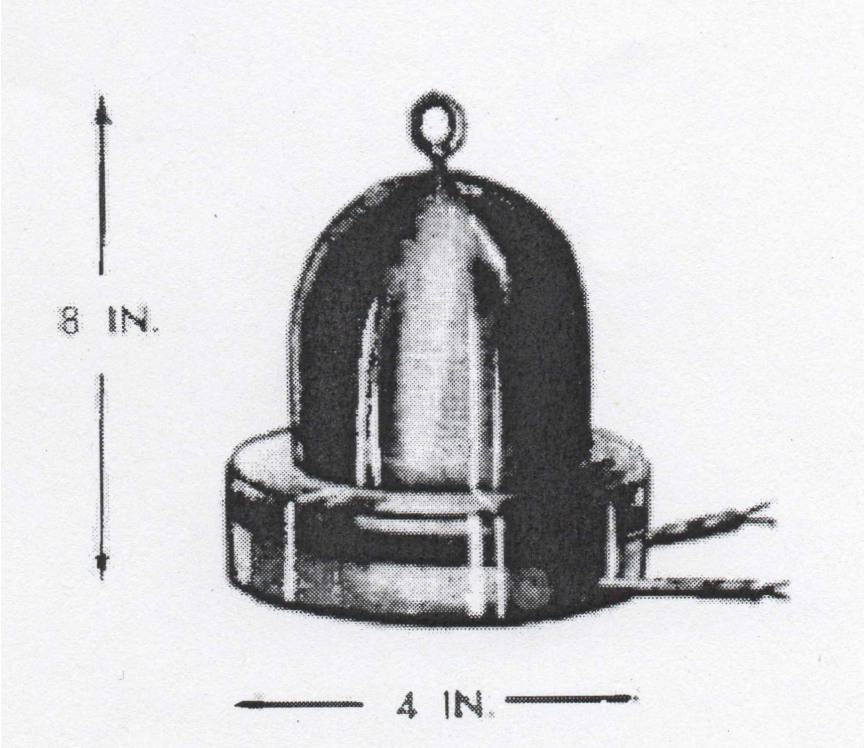


F-10 Firing Device

IZER-2 (ИЗЕР-2)

Type- Vibration
Weight- 6.1 lb. (2.76 kg)
Height- 8 in. (206 mm)
Diameter- 4 in. (102 mm)

This device was developed in WWII, mainly for mining railroads. It is waterproof and could be used underwater. It is no longer in service.



IZER-2 Firing Device

The IZER-2 has a cylindrical base made of metal. The internal mechanism is mounted in the centre of the base and is covered by a brass dome that is sealed and bolted to the base. The internal mechanism consists of a spring suspended weight, an electromagnet, spring-loaded contact lever and spring-loaded actuating lever. Two electrical leads protrude from the base of the device and are sealed to waterproof the device.

For use, the device is normally buried about 3 feet (91.4 cm) under a railbed. The charge is normally a distance away from the device and is connected by an electrical circuit. A chemical or clockwork delay is often inserted in the circuit for safety. When the delay expires it allows current from the battery to reach the device to magnetize the electromagnet closing the arming contact. The device is then armed.

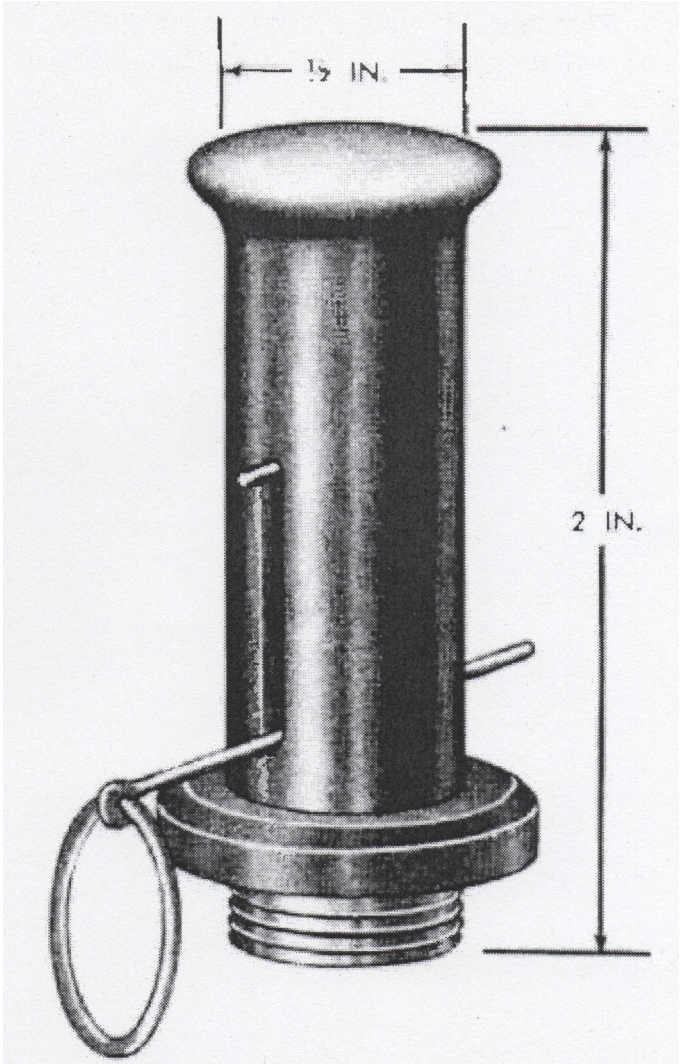
When a train is running on the track it creates vibrations that will reach the buried device. The vibration causes the spring suspended weight to move downwards. As the weight moves downwards it forces down on the actuating lever closing the contacts and completing the circuit.

Koveshnikov (Ковешников)

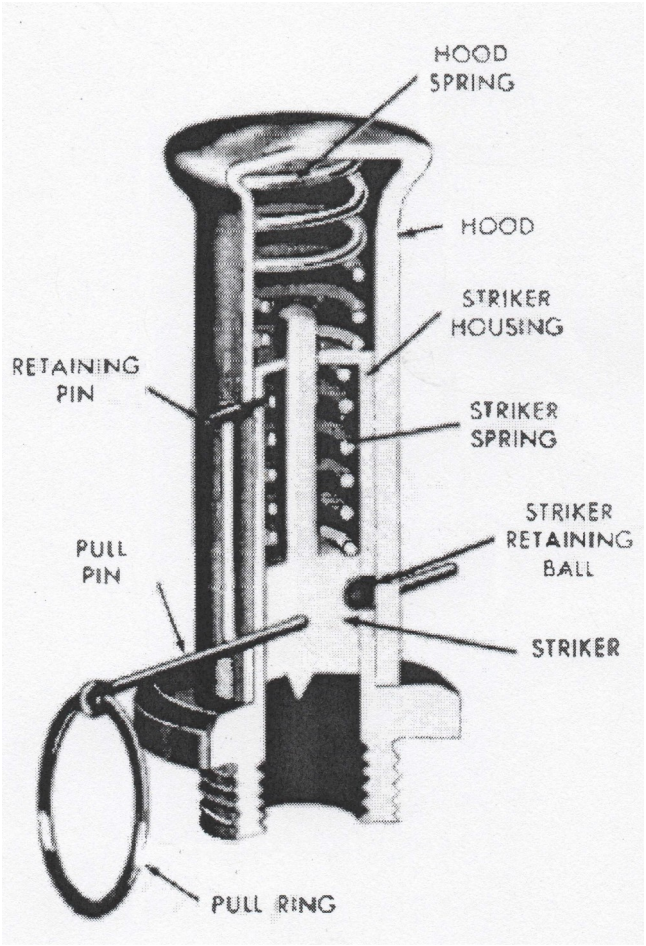
Type- Pull/Release
Weight-
Diameter- .5 in. (13 mm)
Height- 2 in. (50 mm)

The Koveshnikov fuze is exactly the same concept as the grenade fuze of the same name. In effect the only difference is the lack of a safety lever. The grenade fuze was developed in 1931. Likely this was of the same time period.

The device consists of a body, striker, striker spring, cap, actuating spring, retaining ball and safety pin. The body is brass with the base externally threaded to fit either a grenade, mine, or a small demolition charge. There is a shoulder at the top of the threading. The base is also internally threaded to accept an MD-2 detonator assembly. The body is bored out from the bottom leaving a solid top. A smaller hole is drilled through the top to fit the striker shaft. There are two holes drilled in the side of the body, a larger one to fit the retaining ball and a smaller hole at 90 degrees to the larger hole to fit the safety pin. The striker has a head to fit inside the body with a firing pin in the centre and a shaft on the opposite end. A dimple in the side of the striker is for the retaining ball and a hole to match the safety pin is drilled completely through. The cap fits over the body and has an elongated slot in the side. A retaining pin near the top prevents the cap from sliding off the body.



Koveshnikov Firing Device



Koveshnikov Firing Device internal diagram

The device is assembled with the actuating spring inside the cap being slid over the top of the body and the retaining pin inserted. The striker spring fits over the shaft on the striker. It is pushed up into the body compressing the spring with the shaft fitting through the hole in top of the body. The retaining ball is inserted, the cap pushed down to cover the ball and compress the actuating spring. Finally, the safety pin fits through the cap, body and striker to hold the device safe.

The device is normally used as a pull fuze but can also be used as a release device. For use as a pull fuze, the safety pin is used as a pull pin, a wire attached to the pin will pull the pin as the wire is tripped. The actuating spring in the cap forces the cap upwards exposing the retaining ball. The striker spring forces down on the striker which pushes the retaining ball out and frees the striker to be driven down onto the primer in the MD-2 detonator assembly. For use as a release fuze, emplace the charge and fuze and put a weight on top sufficient to hold the cap in place and remove the safety pin. When the object is moved, the fuze will operate normally.

ML-7 (MJI-7)

Type – Pressure-Release
Weight – 3.5 oz. (100 g)
Length – 2.8 in. (72 mm)
Width – 2.7 in. (69 mm)
Height – 1.1 in. (30 mm)

ML-7 Firing Device

This is a pressure-release (anti-lift) firing device adopted by the Soviet armed forces in 1984. It is a small, multifunction boobytrap device with integral explosive charges. It was used in Afghanistan (approximately 2,000 units were deployed) to boobytrap antipersonnel mines in an attempt to keep Afghan Mujahidin guerrillas from clearing minefields. The ML -7 (also designated as the VP -11) was also used in Chechnya, and has been supplied to Soviet allies in Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Ukraine.

The ML-7 is a mechanical, delay-armed, cocked striker firing device. It is constructed of plastic, and its main components are: a main body containing the VGMS-1 hydro-mechanical fuze; two cylindrical, aluminum-cased booster capsules containing 0.35 ounces (10 g) of PETN; and two plastic-cased, removable charges each containing 0.5 ounces (15 g) of PVV -5 plastic explosive.

ML-7 Firing Device showing the two removable charges

There is a range of colors for the firing device and its components, including grayish-blue, yellowish-gray, sandy brown, and olive green. Some devices are unmarked but most are marked with the designation, manufacturer, batch number and year of manufacture. Markings are in black.

Prior to use, the two explosive charge

containers are removed, the booster capsules inserted, and the explosive charge containers replaced. The device is now ready for emplacement and use.

If utilized as an anti-lift device for a mine, or boobytrap, the ML-7 is placed under an object, which must weigh at least 10.5 ounces (300 g), and the arming ring is withdrawn. This allows three ball bearings, which are set in a viscous gel that allows delayed arming, to move and initiate the arming delay, 45 seconds to 20 minutes, dependent upon ambient temperature. Once armed, if the load bearing object is removed and the hinged plastic lid of the firing device moves approximately 0.2 in (5 mm) the ML-7 will function and cause a detonation.

The ML-7 can also be used as a small demolition charge immediately upon arming (45 seconds to 20 minutes), by not placing an object on the hinged plastic lid, and then removing the arming ring. Finally, it also has the option of functioning upon pull initiation, after attachment of a tripwire to a pushrod retaining pin at the base of the fuze.

ML-8 (MJI-8)

Type – Pressure-Release
Weight – 13 oz. (368 g)
Length – 4.4 in. (112 mm)
Width – 2.3 in. (58 mm)
Height – 1.5 in. (38 mm)

ML-8 Firing Device

This is a pressure-release firing device adopted by the Soviet armed forces as an anti-lift device for antipersonnel and antitank mines that do not have integral anti-handling features. It can also be readily adapted for use as a boobytrap, or sabotage device. The ML-8 was reportedly designed and developed by Viktor Popov Aleksandrovich sometime in the early 1990's. It was produced toward the end of the Soviet Union (1991) and extending on in a limited basis in the Russian Federation. It has been documented in operational use in the Ukrainian Donbass conflict.

The ML-8 is a pyrotechnically armed, cocked striker firing device. The body is rectangular plastic and accommodates a fuze assembly, as well as an explosive charge. The body has a hinged plate covering the triggering mechanism that initiates the firing device. The fuze is screwed longitudinally into the side of the body. It consists of an initiation mechanism, two sequential pyrotechnic arming delays, a mechanical arming switch, and a firing mechanism. The fuze assembly is designed to ensure the safety of the device in storage, transport, and handling. Opposite the fuze assembly, the firing device body also contains a removable ("clip-on," similar to the ML-7) charge of PVV-5A plastic explosive.

The fuze assembly is enclosed by a screw-on cap and consists of a nylon cord that passes into the fuze. It is connected to a plate in the bottom of the initiation mechanism, and when pulled initiates the pyrotechnic arming delays. The arming delays function in the temperature range of - 40 to +50 degrees. The first arming delay is contained in a grooved circular disc and will burn for 120 to 150 seconds. The flammable composition consists of SC-1, V-II as well as a pressed quantity of TMS-06. After the first arming delay is complete, a second pyrotechnic delay consisting of two cylindrical channels is initiated, with a burn time of approximately two seconds.

The completion of both pyrotechnic delays allows a mechanical arming sequence to take place, which removes the remaining safety blocks and allows the striker assembly to align with the KD-N-10 detonator. The detonator is positioned over a booster charge consisting of 0.14 ounces (4 g) of PETN. The main explosive charge consists of 2.8 ounces (80 g) of PVV-5A, which is enclosed in a detachable container that engages with grooves on the side of the body.

When emplaced as an anti-handling device, the ML-8 is installed under the bottom of antipersonnel mines, such as the MON-50, the PMN series, the PMD-6 series, or OZM-72 and POB bounding fragmentation mines. It can also be emplaced under antitank mines, such as the TM-62 series, as well as others. When an attempt is made to move the mines, the ML-8 explodes, killing or injuring whoever is attempting to remove it. It is also likely that the boobytrapped mine itself will sympathetically detonate, further killing or severely injuring personnel.

When used as a standalone boobytrap, it is buried in the ground under an object that is likely to attract the attention of opposing forces and entice them to pick up or move the items. In this application, the firing device's integral explosive charge is sufficient to cause injury to personnel.

The firing device comes ready for use, and requires virtually no preparation. The device is simply emplaced under a mine, or an object weighing at least 8.8 ounces (250 g) is placed on top of the device, i.e., on the hinged lid. Situation specific camouflage is then applied. The last step is to remove the screw-on cap in the fuze assembly, exposing the initiation mechanism. Under the cap is a thin, nylon cord. Once this is grasped and pulled, a spring-loaded striker is released into a flash primer, and rotates an attached plate 90 degrees revealing a flash channel to the arming delay contained in a circular disc. After approximately 2 to 2.5 minutes, the pyrotechnic delay flashes down to two pyrotechnic pellets that burn for approximately two seconds. At the end of this time, sliding detents beneath each consumed pellet can move up into the cavity once occupied by the pyrotechnic pellet. One detent removes a locking ball from the firing mechanism, while the second detent allows the detonator to be moved into line with the striker assembly in the firing mechanism. The ML-8 is now fully armed and only requires the removal of the object placed on its hinged pressure plate to function. When the object on the pressure plate is lifted less than 0.5 inches (12.7 mm) a spring-actuated rod lifts the pressure plate and releases the striker assembly into the detonator, which initiates the booster charge. The booster charge, in turn, detonates the main charge.

ML-8 Firing Device note the markings on the side
Photo– Fenix Insight

Emplacing the ML-8 is quite safe. From the initial withdrawal of the nylon cord, there is a 2 to 2.5 minute delay to allow movement to a safe area. Temperature does not affect the delay period.

MS-2 (MC-2)

Type- Anti-Lift
Weight- 19 oz. (540 g)
Length- 7.4 in. (189 mm)
Width- 3.3 in. (85 mm)
Height- 1.3 in. (35 mm)

MS-2 Anti lift device

Produced during WWII as an anti-lift device for anti-tank mines it could also be used as a boobytrap. It is in fact a modification of the PMD-6 anti-personnel mine.

The device consists of a wooden body casing, igniter, spring, two pins and a standard 200-gram explosive charge. The casing is the same as the PMD-6 mine. It is a wooden box nailed together, with a lid hinged at one end. The lid fits over the lower casing. The end opposite the hinge has a vertical slot in the centre. The igniter is normally an MUV but may also be a UV or UVG. The spring is specially made with a "V" in the centre, spring coils at the base of the "V" and the ends left long and straight. The pins are long enough to fit all the way through the body, one is part of the ignition system, the other acts as a safety pin.

The spring is mounted on an axle just in front of the explosive charge about 1/3 of the way from the front of the body. It is mounted so that the "V" will abut the lid and the ends the bottom of the body.

Design of the lift spring for the MS-2

The MUV igniter uses the "P" shaped pin rather than the normal "T" shaped one. There are holes drilled through the body to fit the pins, one is located right at the front of the lid so that the pin will fit through the front wall of the lid lengthwise. The other is drilled through the lid and main body to prevent the lid lifting up. When assembled the explosive charge is inserted into the body and the igniter and attached MD-2 detonator assembly fitted so that the shaft of the striker, with the pin inserted will protrude through the slot in the front of the lid. The spring is pushed down to cock it and the lid closed against the pressure of the spring. The safety pin is inserted to prevent the lid lifting. The other pin is then inserted through its hole ensuring that it engages through the igniter pin.

When used as an anti-lift device, it is placed in a small hole underneath an anti-tank mine. The safety pin is removed and the whole either buried or camouflaged. The last step is removing the safety on the mine itself. If the mine is lifted the spring in the device reasserts itself and will push the lid upwards pulling the "P" shaped pin out of the MUV igniter which will then operate as normal and cause the device to explode. The explosion of the anti-lift device will most likely also cause detonation of the mine as well.

If used as a boobytrap a weight of at least 6.6 pounds (3 kg) must be placed on top of the device. The device will operate exactly as if a mine had been lifted off it. The detonation of the 200 gram explosive charge is enough to kill or wound whoever removes the weight from the device.

MS-3 (MC-3)

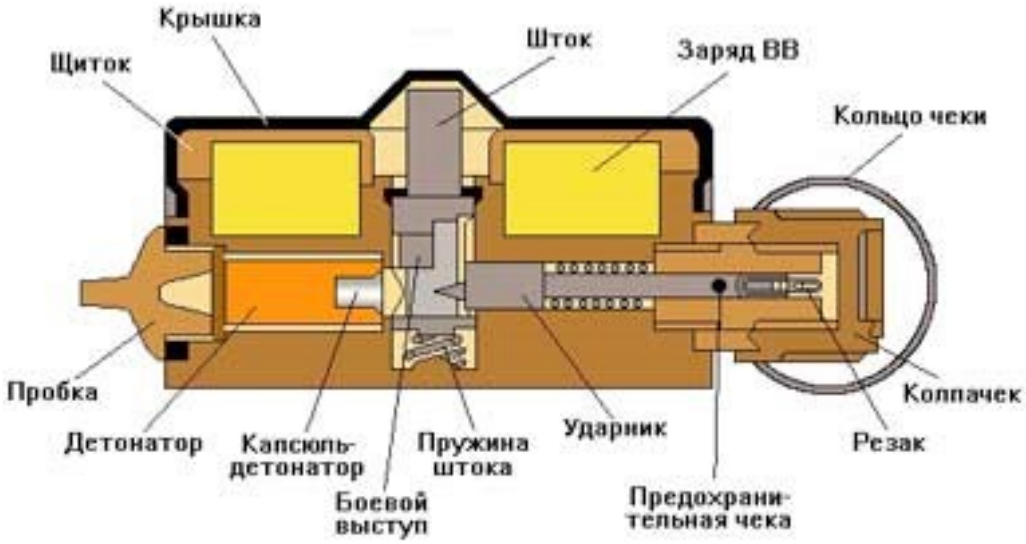
Type – Pressure-Release
Weight –23.2 oz. (660 g)
Diameter – 4.3 in. (110 mm)
Height – 2.5 in. (65 mm)

MS-3 Anti Lift Device

This is a pressure-release (anti-lift) firing device introduced into the Soviet armed forces in the 1970s. The Russians classified the MS-3 as a "surprise mine" that, in more practical terms, means boobytrap. Although over 50-years old, the firing device is still encountered in various parts of the world, such as Afghanistan. The Romanian arms manufacturer, ROMTEHNICA, is also known to have produced an indigenous version of the MS-3.

The MS-3 was specifically designed to serve as an anti-lift device for the Russian OZM-72 bounding fragmentation mine, and has the same diameter, in order to fit neatly underneath the mine when buried. However, it can also be used to boobytrap other mines, to include antitank mines. It has also been used to boobytrap other objects, such as stacks of ammunition in Angola, as an example.

The device has virtually the same configuration as the Russian PMN antipersonnel mine. It consists of a Bakelite body, with a black rubber cover with a truncated cone in the center covering the spring-loaded pressure-release mechanism. The internal components consist of a lead alloy shear strip that serves as an arming delay and incorporates a spring-loaded striker, a spring-loaded pressure-release mechanism, an MD-9 stab-sensitive detonator assembly, and a 11.9-ounce (340 g) Trotyl (TNT) explosive charge.



Internal view of the MS-3

The device is brown with a black rubber cap. Markings on top give the designation, manufacturers code, batch number and year of manufacture.

Prior to use, a temperature appropriate lead shear strip is selected and inserted in the arming delay assembly. The firing device is supplied with two lead shear strips – one for summer and

one for winter. The firing device is issued with one shear strip installed in the arming delay, and one located in the arming delay cover. The operator simply has to select which one to use. The firing device is then placed under an object that weighs at least 11 pounds (5 kg), which depresses the internal, spring-loaded pressure-release mechanism. After this has been accomplished, the safety pin in the arming delay is removed. After a delay, 5 minutes to 15 hours depending on ambient temperature, the cutter assembly will cut through the lead shear strip, thus arming the MS-3 by freeing the spring-loaded striker. When the weight on the firing device is removed, the pressure release mechanism frees the spring-loaded striker to initiate the detonator, and the device functions.

The MS-3 can be used as a stand-alone, delayed action demolition charge by simply *not* placing any weight on top of the device, and removing the safety pin. After a certain amount of time (determined by ambient temperature conditions), the cutter assembly in the arming delay will shear through the lead shear strip, releasing the spring-loaded striker into the detonator.
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MS-4 (MC-4)

Type – Time Delay or Antidisturbance
Weight – 14 oz. (410 g)
Length – 6.1in. (155 mm)
Width – 3.6 in. (92 mm)
Height – 1.2 in. (31 mm)

MS-4 Antidisturbance Device
Photo- Oleksandr Mariash

This is a delayed action or anti-disturbance (tilt/trembler) firing device that was introduced into the Soviet forces in the mid-1970s. The Russians considered it a multipurpose mine, and nicknamed it the "MS-4 Boot Mine." However, for practical purposes, because it contains a relatively small 4.23 oz. (120 g) explosive charge, it is normally employed as an initiating device for a larger charge of explosives. It is well suited to be used as a boobytrap for antipersonnel or antitank mines, as well as a firing device for a larger, emplaced demolition charge.

The MS-4 can be employed to function as: (1) a delayed-action firing device, with a 15-minute to 360 -hour time delay; (2) a boobytrap device employing a tilt switch that will function if it is moved more than 20 degrees in any direction; or (3) if it is set in a vibration mode, it will function if it senses any movement. If the MS-4 is utilized as a time-delay firing device, a lead alloy shear strip (suitable for

Internals of MS-4, wooden block representing the explosive charge
Photo- Oleksandr Mariash

the time delay desired) is utilized. This appears to be identical to the Russian VZD-3M. When employed in the boobytrap mode, an arming delay of 10 to 20 minutes can be set. The particular function mode of the firing device cannot be externally determined. It does not contain a self-destruct feature; however, it should become inoperative at the end of its battery life (~six months).

The device consists of a container with a hinged lid, an internal explosive charge, and a removable tray that contains all of the arming and firing components, as well as the battery compartment.

The device is painted olive green with no external markings noted.

Prior to use, the hinged lid is opened, and the removable tray is withdrawn by using an attached white cloth pull tab. A 4.23 oz. (120 g) block of Trotyl is connected to the explosive adapter on the side of the tray. The function mode is then selected by rotating the three-position selector switch to the desired feature – time delay, tilt, or vibration. If tilt or vibration is selected, then a separate switch is used to determine the arming time. The last step is to remove the red cloth arming tab. The firing device is now ready for placement and use.

MS-5 (MC-5)

Type – Pressure Release
Weight – 23 oz. (660 g)
Length – 4.2 in. (107 mm)
Width – 3.2 in. (82 mm)
Height – 0.78 in. (20 mm)

The MS-5 is believed to be a pressure release firing device. Russian documents further identify simply as a device "intended to defeat enemy forces," with an ignition element that is "mechanical with a metal element."

The firing device consists of a metal casing resembling a cigarette case, an embedded 3.8 oz. (110 g) TNT explosive charge, an arming and striker assembly, and an MG-8-T detonator.

The casing of the device has a hinged body that allows it to be opened like a cigarette case. This allows for the safety pin to be removed from the arming and striker assembly. The arming delay is very similar to those seen in the MUV-2 and MUV-3 firing devices in that it incorporates a soft metal strip that the striker assembly cuts through over a period of time. The arming delay time ranges from 15 minutes to 360 hours, solely dependent upon ambient temperature. The temperature range for the proper functioning of the MS-5 is -40 to +40 degrees Centigrade.

MS-5 Firing device showing the internal mechanism.
Photo- Oleksandr Mariash

It is believed that once the delay element has expired, if the casing is opened the device will detonate, or the interior mechanism can be emplaced under some other object, when the object is moved and the weight removed, the device will detonate.

Further technical and operational details of the MS-5 are unknown.

Outer casing of MS-5 firing device
Photo- Oleksandr Mariash

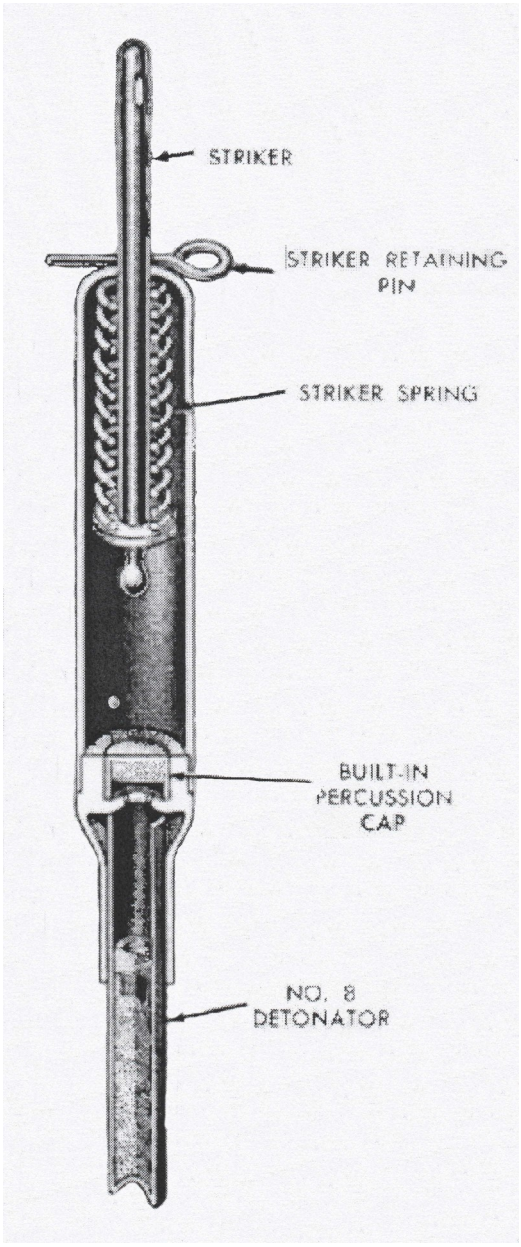
UV (УВ)

Type- Pull/Pressure
Weight-
Length- 3.5 in. (69 mm)
Diameter- 0.5 inch. (13 mm)

This firing device was adopted in early WWII, perhaps a bit earlier. Most observed examples have a date of 1940.

The device consists of a body, striker, striker spring, arming pin, transit/safety pin and the base adapter. The main body is made of steel and may have a copper wash for rust prevention. The body is cylindrical with the top end closed with a small hole in the centre to allow the striker shaft to protrude. The opposite end has some internal threading to allow the adapter to screw in. There is some knurling at the top end. The striker has a shaft with a guide on the bottom end above the striker head. The striker point is quite rounded. There are two holes in the striker, one near the top end to hold a transit/safety pin and one further down for the arming pin. The striker spring fits between the top of the body and the guide on the striker. The base adapter has a short threaded portion to fit into the body of the device. It is necked down to leave a hole just large enough to fit a non-electric detonator. Knurling around the top end of the adapter provides a gripping surface. The adapter contains a percussion primer.

UV Firing Device



UV Firing Device internal diagram

Markings on the body just below the knurling at the top give a manufacturers number code and the year of manufacture.

For use, the device is prepared by pulling on the transit/safety pin to draw the striker back so the arming pin can be put into place and hold the device in the cocked position. The adapter is screwed in and a detonator fitted. The armed device can then be placed into the mine or charge. The arming pin can be a straight pin with a loop or one in a "T" shape designed especially for use in mines. Once emplaced, the safety pin is removed.

When a pull is applied (or pressure when installed in a mine) to the arming pin, it is pulled out of the striker allowing the striker spring to reassert itself and drive the striker down to hit the percussion cap. The percussion cap firing will cause the detonator to fire and in turn detonate the main charge.

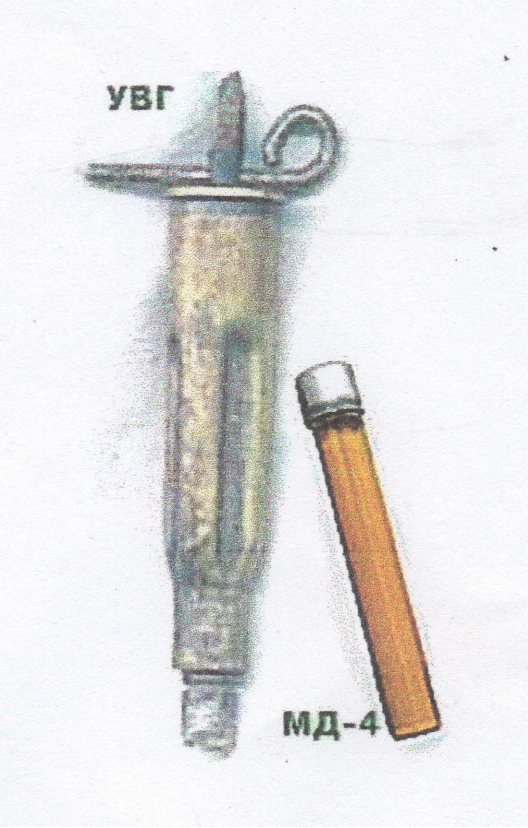
UVG (УВГ)

Type- Pull/Pressure
Weight-
Length-
Diameter-

This is a simplified fuze made from a cartridge casing. They were made in cartridge factories using a simple and readily available body. In all respects they are the same as a UV fuze. Made and used during WWII these are no longer in service.

The body is a 7.62 x 54R cartridge casing modified by drilling out the primer pocket to fit the end of the striker and having corrugations pressed into the side of the casing to form guides to keep the striker centred so it will strike the percussion cap properly. A striker and spring are fitted inside the casing and held in place by a release pin through a hole in the end of the striker. A detonator assembly with percussion cap is fitted in the end of the casing. There are other variations that have been noted with the base cut off and the neck used as the top of the device. It is likely that the variations come from different factories.

Use is exactly the same as the UV.



UVG Firing Device

Variations of the UVG Firing Device

MUV (МУВ)

Type- Pull/Pressure
Weight- Metal- 1.1 oz. (31 g)
Plastic- 0.6 oz. (16 g)
Length- 3.25 in. (64 mm)
Diameter- 0.5 in. (13 mm)

Normal MUV on left, flat striker MUV on right

The MUV was developed in about 1940-41 to replace the UV fuze. Modifications included the striker head and the internal threading to match the MD-2 detonator assembly. It has been in use since adoption and is likely still to be found in use. The MUV has been extensively copied by other nations. It is used by China as the Type 59, the former East Germany as the MUW and Bulgaria to mention a few.

The device consists of a main body, striker, striker spring, transit pin, arming pin and base. The main body is a cylindrical steel tube with one closed end and the other end internally threaded to accept the base. The closed end has a hole in the centre to allow the shaft of the striker to pass through. A band of knurling is normally found near the top. The striker has a shaft with a striker head on the bottom end. Around the striker head is a guide washer. There are two holes in the shaft, one at the top end for the transit pin and one further down for the arming pin. Examples have been found with a flat striker stamped out of sheet steel. The striker spring fits around the shaft above the guide washer. The transit pin is simply a straight pin, the arming pin has a short shaft with a ring formed to attach to the trip wire. For use in a mine the arming pin is replaced with a T-shaped pin. The base is an MD-2 detonator assembly consisting of a threaded base, percussion cap and TAG-8A detonator. It could also be fitted with the later MD-5 detonator assembly which uses a TAT-8A detonator.

It should be noted that the MUV has a number of different body styles and materials. The closed end can be quite flat with only a minimum of rounding off, it can be quite rounded or someplace in between. The knurled bands can be wider or thinner, heavy or light. The body is normally steel, but has been found in plastic as well (first noticed in the Korean War). The plastic bodied MUV is internally identical to the metal bodied ones. The difference is the body itself is made from plastic. Normally a green plastic although examples have been noted in brown, black and cream. It is unknown if they are all of Russian manufacture or from one of the other countries that have copied it.

The bodies are normally unpainted with a stamped marking around the top. Markings give the

Plastic bodied MUV Firing Device

designation, factory and year of manufacture.

The device is normally issued un-cocked. The arming pin is slipped over the exposed striker shaft and kept in place by the transit/safety pin. At this point there is a small amount of spring tension on the striker to hold the striker down and put pressure on the pin to hold it in place. For use, separate the arming pin from the shaft, pull up on the transit/safety pin until the hole for the arming pin is clear and insert the arming pin. Screw in the detonator assembly and insert the firing device in the main charge. Attach the trip wire and when set, remove the transit/ safety pin. The device is armed. When the arming pin is pulled out, the striker spring reasserts itself and drives the striker down to hit the percussion cap. The percussion cap fires into the non-electric detonator causing it to fire which in turn causes the main charge to explode.

The MUV will operate with a pull of 2-6 pounds (0.9 – 2.7 kg) or a pressure of 4-30 pounds (1.8 – 13.6 kg).

MUV-2 (МУВ-2)

Type- Pull/Pressure
Weight- 1.4 oz. (43 g)
Length- 3.3 in. (84 mm)
Diameter- 0.5 in. (13 mm)

This is a modification of the MUV fuze to incorporate a delayed arming device. The MUV-2 has been copied by other countries, including Bulgaria where it has a Bakelite body and the designation MUV-2M. The MUW-2 is a former East German copy and can be identified by the gold-anodized arming delay mechanism attached to the metal fuze body.

The device consists of a main body, striker, striker spring, delay device body, delay element, arming pin, safety pin, cap and detonator assembly.

The main body is identical to that of the MUV. The striker has a shaft with a striker point formed on the bottom end. A guide is either formed with the striker or added as a separate washer just above the striker point. Rather than being round it is triangular in shape. An elongated hole 7/16 inches (11 mm) long is located in the upper half of the striker shaft. At the top end, a stiff wire loop is attached. The striker spring is a strong coil spring 2 inches (51 mm) long. The delay device body is cylindrical with a groove just below the top. The top is split by two slots at 90 degrees to each other. At the bottom there is a slot to fit the arming pin, just above that is a hole to fit the safety pin 5/16 inch (8 mm) above the slot. The delay element is a soft metal strip that is fitted through one of the top slots and bent around into the groove around the top to hold it in place. The delay element passes through the wire loop on the top of the striker. The arming pin can either be a loop for use as a pull fuze or a T-shape for use as a pressure fuze. The safety pin has a pull ring attached. The cap is either rubber or plastic and covers the top of the delay device. The base is a standard MD-2 detonator assembly or it could be fitted with the later MD-5 detonator assembly.

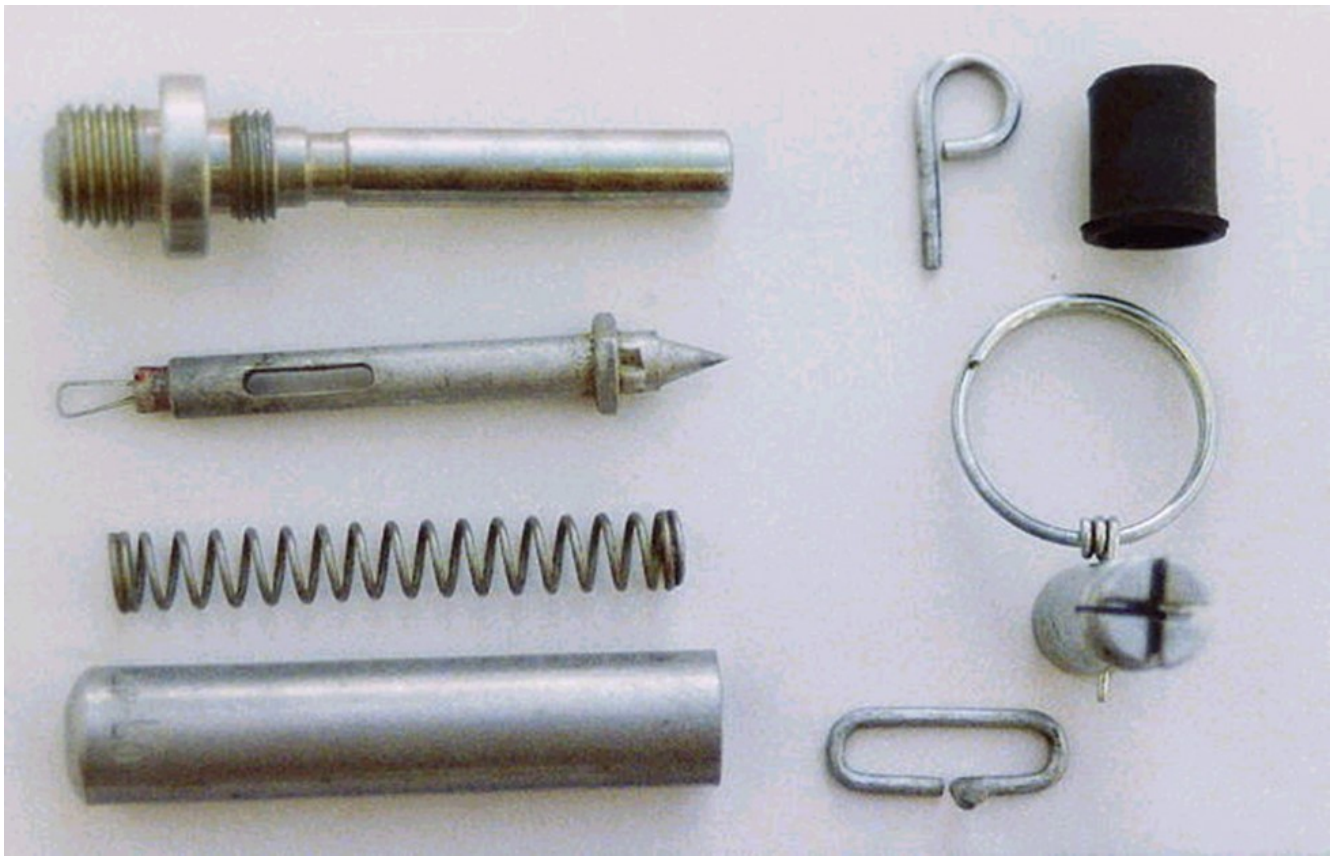
MUV 2 Firing Device
Upper safety pin is not as issued

A later modification in the delay device has one larger slot in the top to fit the delay element which is a small wider piece of soft metal. It is held in position by a rubber band in the groove around the top. In all other respects it is the same.

When the device is set, upon removal of the safety pin, the striker under pressure of the spring pulls down in the elongated slot. As the striker is pulled down, the wire cuts through the delay element in about 25-30 minutes. Once it does that, the device is fully armed and removal of the arming pin will allow the striker under pressure of the spring to fly down and hit the percussion cap in the detonator assembly.

The device operates with a pull of 1-2 pounds (0.45 – 0.9 kg) or a pressure of 3-20 pounds (1.4 - 9 kg). The MUV-2 can also be used as a delay fuze by removing both the safety and arming pins.

After the normal arming delay of 25-30 minutes, without the arming pin the device will operate as normal.



MUV 2 disassembled, note the detonator assembly is an inert training version

MUV-3 (МУВ-3)

Type- Pull/Pressure
Weight- Metal- 1.4 oz. (38 g)
Plastic- 0.9 oz (25 g)
Length- 3.3 in. (64 nm)
Diameter- 0.5 in. (13 mm)

The MUV-3 is a slight modification of the MUV-2. In all respects it is identical with the exception of a clip on the arming pin to increase the amount of pull or pressure required to operate. The arming pin can be replaced by a T-shaped pin for use as a pressure fuze.

The MUV-3 can be found with either metal or plastic bodies. Metal bodies are normally unpainted with stamped markings around the top. Markings give the designation, factory and year of manufacture. Plastic bodies are normally green plastic with stamped markings around the centre of the body giving the designation, factory and date of manufacture.

Plastic body MUV-3 Firing Device
Photo– G. Zahaczewsky

The MUV-3 is normally used with the MD-5M detonator assembly.

After the arming delay has completed the device will operate with a pull of 3-13 pounds (1.36 – 5.9 kg). If used as a pressure fuze, it will operate with a pressure of 3-33 pounds (1.36 – 15 kg).

The MUV-3 can also be used as a delay fuze by removing both the safety and arming pins. After the normal arming delay of 25-30 minutes, without the arming pin the device will operate as normal.

Metal body MUV-3 Firing Device
Photo– G. Zahaczewsky

MUV-4 (МУВ-4)

Type- Pull/Pressure
Weight- Metal- 1.9 oz. (54 g)
Plastic-1.3 oz. (37g)
Length- 4.5 in. (121 mm)
Diameter- 0.66 in. (17 mm)

The MUV-4 is another modification of the MUV series incorporating a delayed arming device.

MUV-4 Firing Device with metal body. Photo– G. Zahaczewsky

The main body can be either metal or plastic and is virtually identical to other MUV fuzes except the metal version may have a groove around the top to accept the clip for the arming pin as used on the MUV-3. The striker has a shaft with a striker point formed on the bottom end. A guide is either formed with the striker or added as a separate washer just above the striker point. Rather than being round it is triangular in shape. An elongated hole 7/16 inches (11 mm) long is located in the upper half of the striker shaft. The top of the striker is turned to have a ball on the end with a groove immediately below that. The striker and striker spring fit through the body with the striker shaft protruding from the top of the body to engage the delay mechanism. The delay mechanism is fairly complicated. The bottom section fits over the striker shaft with a portion at the top that is wider and is drilled out wider than the striker and internally threaded. The bottom portion is drilled through with a hole just wide enough for the striker to fit. The bottom portion also has holes for the arming pin and safety pin. The centre section is externally threaded at the bottom to fit the lower section. The bottom is blind drilled about halfway through to form a bottom chamber. The top is also externally threaded and drilled forming an upper chamber leaving a constriction between the bottom chamber and upper chamber with a small hole in the centre. The top section is simply an internally threaded cap. Most of the mechanism is contained in the centre section. The top chamber contains a piston and piston shaft that fits through the hole into the bottom chamber. The bottom chamber contains a bushing with two holes for ball bearings. When the device is assembled the piston shaft is inserted in the bushing and protrudes from the top. It is trapped in the bushing by a wider base. When the bushing is assembled into the device the piston shaft enters the top chamber and the piston is fitted and clipped on. At the same time the striker shaft is inserted into the bushing and the two ball bearings engage the groove below the ball shaped head. When the bushing is inserted into the chamber the walls prevent the ball bearings from moving and so hold the striker in position. The arming pin fits through the body into the bottom of the elongated hole. The arming pin can be replaced by a T-shaped pin for use as a pressure fuze. The safety pin fits through the body into the top of the elongated hole. Once assembled the top chamber is filled with a silicone gel and the cap screwed on. The bottom of the body is internally threaded to accept an MD-5M detonator assembly.

Metal bodies are normally unpainted with stamped markings around the top. Markings give the designation, factory and year of manufacture. Plastic bodies are normally green plastic with stamped markings around the centre of the body giving the designation, factory and date of manufacture.

MUV-4 Firing Device with plastic body.
Photo– G. Zahaczewsky

When the safety pin is removed the striker spring exerts pressure on the striker. The pressure pulls down on the striker which exerts pressure on the bushing. The bushing exerts pressure on the piston and slowly draws it through the silicone gel which retards movement. When the entire mechanism moves downward the bushing moves down until the walls no longer prevent movement of the ball bearings. When the ball bearings are forced outward, they release the striker. At this point the striker is held only by the arming pin. When the arming pin is withdrawn it allows the striker under pressure of the spring to drive down and hit the percussion cap in the detonator assembly. The cap fires into the detonator causing it to fire and in turn detonate the main charge.

After the arming delay has completed the device will operate with a pull of 3-13 pounds (1.36 – 5.9 kg). If used as a pressure fuze, it will operate with a pressure of 3-33 pounds (1.36 – 15 kg).

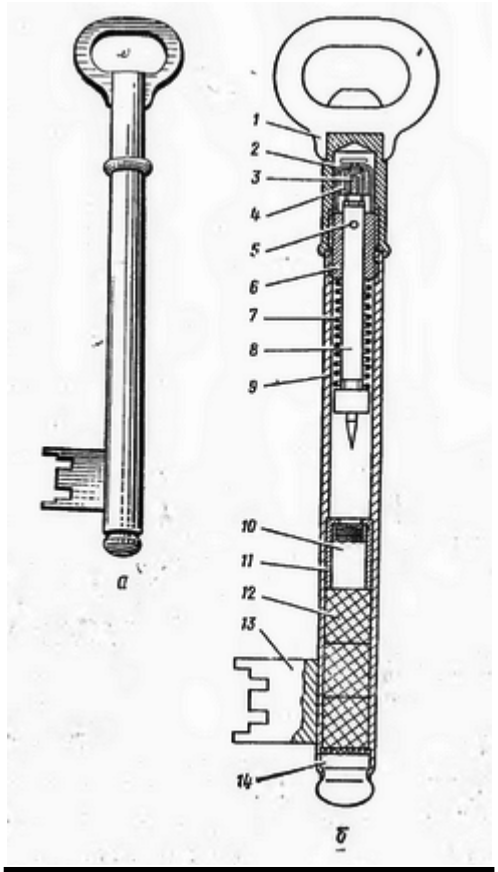
The MUV-4 can also be used as a delay fuze by removing both the safety and arming pins. After the normal arming delay of 25-30 minutes, without the arming pin the device will operate as normal.

MV-1 (MB-1), MV-2 (MB-2), MV-3 (MB-3)

These are time delay firing devices that were introduced into Soviet service during the 1970s and early 80s. They were intended for use as sabotage devices by clandestine forces.

Each firing device consists of a hollow metal body. Internally, they have initiation mechanisms that incorporate a delay element, sleeves containing a primer, as well as detonators. Each firing device is supplied with four metal time-delay elements (No. 1, No. 3, No. 5, and No. 6) that have different thicknesses. Each is color-coded.

The delay time for each metal strip depends on its thickness, as well as the ambient temperature. As an example, the No. 1 element (yellow color-coded) has a delay of nine minutes, up to one hour and four minutes at a temperature of 20 degrees Centigrade. At the same temperature, the No. 6 element (color-coded white) has a delay ranging from three hours and 30 minutes, up to 25 hours. When manufactured at the factory, a No. 6 element is installed in the firing device. The remaining three metal elements were packed in a paper bag and put into a case, along with the firing device.



MV-1 internal diagram

MV-1 (MB-1)

Type- Delay
Weight- 1.6 oz. (46 g)
Length- 5.25 in. (133 mm)
Diameter- 5/16 in. (9 mm)

The MV-1 delay firing device resembles a skeleton-type door key. It consists of a metal tubular body with an internal thread at one end to enable inserting the initiation and detonation mechanisms. The other end has a plug. The detonator and booster charge are located at the bottom of the key assembly. The firing mechanism is directly above the detonator, and is held in the cocked

MV-1 Firing Device

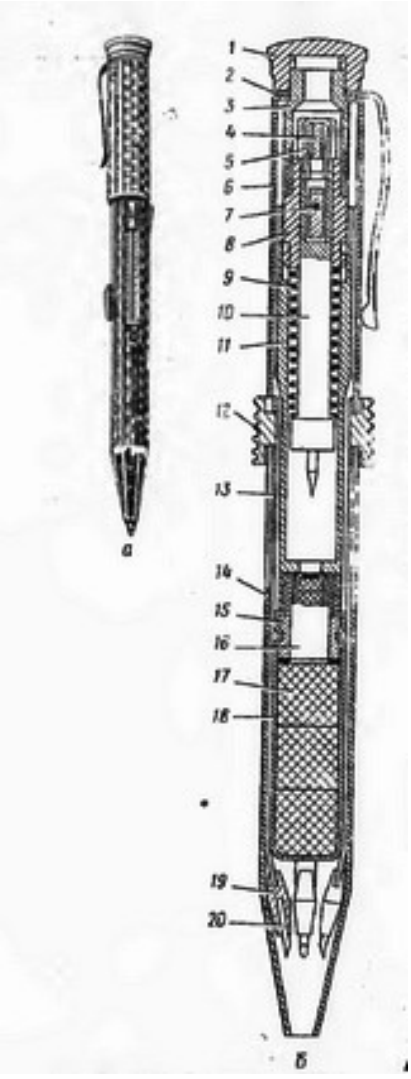
position by a cotter pin (positive safety) that passes through a hole in the striker rod.

MV-2 (MB-2)

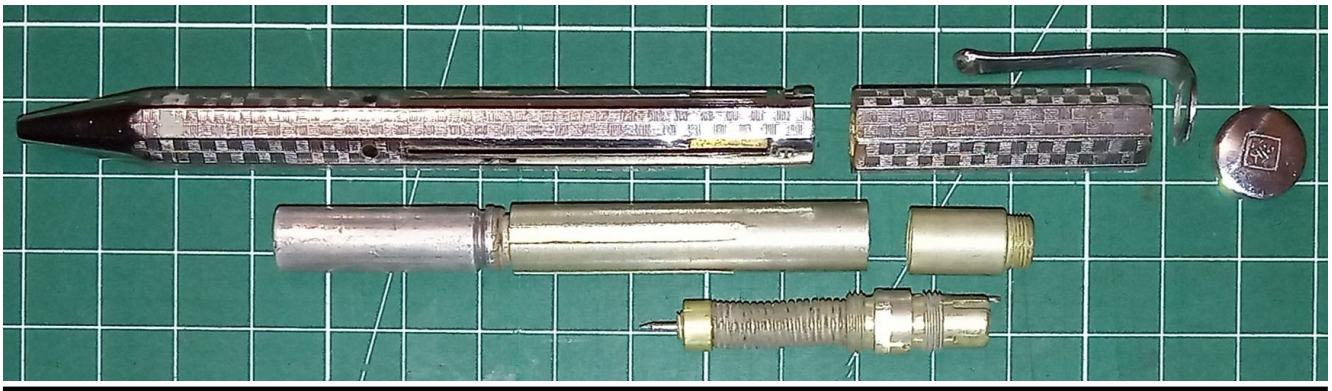
Type- Delay
Weight-
Length-
Diameter-

The MV-2 firing device has the configuration of a mechanical pencil. It consists of an octagonal metal body with female threads at both ends. On the outside of the body there are four longitudinal grooves containing the lead for the mechanical pencil. Inside the body there is an initiation assembly, as well as a sleeve containing an MG-8-T detonator and a booster charge. The initiation mechanism of the MV-2 differs from that of the MV-1, in that it has external threads at both ends for screwing the sleeve into the body and screwing a cap on top of it.

To use either the MV-1 or the MV-2, the firing device was inserted into a demolition charge and placed against the target. Then a positive safety pin was removed from the firing device that allowed the cutter assembly to shear the metal delay element. When that occurred, the striker assembly impinged the detonator that, in turn, initiated the booster charge, as well as the attached explosive charge.



MV-2 Firing Device internal diagram



MV-2 Firing device
Photo- Oleksandr Mariash

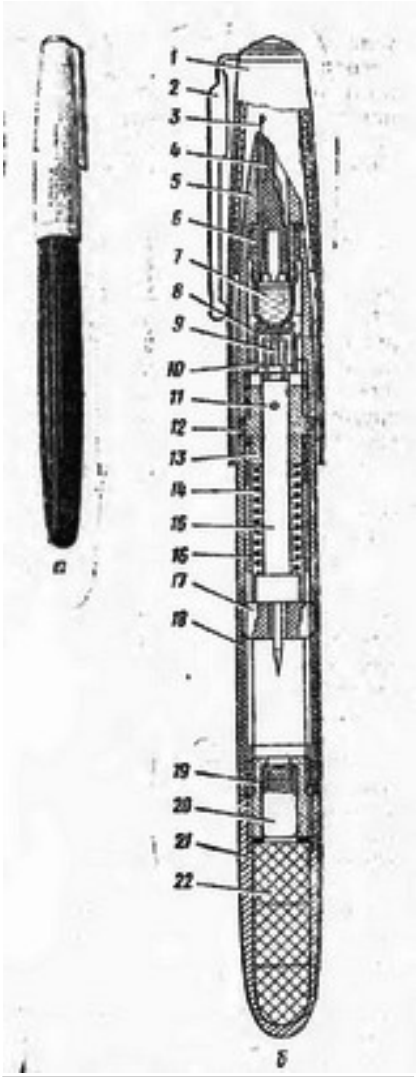
MV-3 (MB-3)

Type- Delay
Weight-
Length-
Diameter-

The MV-3 firing device is shaped like a fountain pen, with an internal thread and two longitudinal slots. A positive safety pin kept the cocked striker assembly in a safe position. A safety nut with a hole for the striker tip is located in the slots. When the outer tube rotates, the safety nut moves inside the housing along the slots down to the detonator. To make it look like a real fountain pen, it has a tip in which an ink dropper and a nib are affixed within a sleeve.

After inserting the firing device into a demolition charge, the positive safety pin is removed. The striker is held in the cocked position by a safety nut. When the outer tube (handle body) is rotated counterclockwise by 4–5 turns, the safety nut moves along the slots in the body until it stops in the sleeve aligned with the detonator, and frees the striker. At the same time, the cutter assembly, under the action of the mainspring, shears through the metal delay strip releasing the striker to hit the primer.

For training purposes, non-explosive variants of these firing devices were developed - the U-MV-1, U-MV-2, and U-MV-3. They differ from operational firing devices in that they do not have detonators, and wooden inserts are inserted in place of the booster charge. A white stripe is also painted on the body of the firing device.



MV-3 Firing Device internal diagram

MV-3K (МВ-3К)

Type – Delay
Weight – 0.8 oz. (23 g)
Length – 4.4 in. (112 mm)
Diameter – 0.4 in. (10 mm)

MV-3K Firing Device, note the protective caps at either end.

The MV-3K is a highly specialized mechanical delay firing device primarily intended for use in a select number of demolition charges, including the BM-7 high explosive-incendiary demolition charge. However, it can potentially be modified for use in improvised boobytraps.

The firing device consists of an elongated, T-shaped body. The body contains a dual, redundant initiation mechanism at each end to ensure reliability, and a detonator in the center, protruding portion in the body. Inside each end of the MV-3K is a shear wire cutter assembly that contains a cocked striker assembly, and a lead alloy shear strip for the time delay required. Several shear strips, with varying hardness, are supplied with each firing device. Each striker is held in the cocked position by a safety pin.

To prepare the device for use, choose the appropriate delay strips and insert them. It is then attached to the emplaced demolition charge, and the protective safety caps at each end removed. The dual safety pins are then pulled, fully arming the firing device. This allows the striker spring to assert pressure bringing the shear wires in contact with the delay strips. Both shear wires slowly cut through the delay strips until they sever them. At that point, the strikers are free to be driven forward under pressure of the springs until they hit the percussion caps in the detonator assembly. The caps fire initiating the detonator causing the main charge to explode.

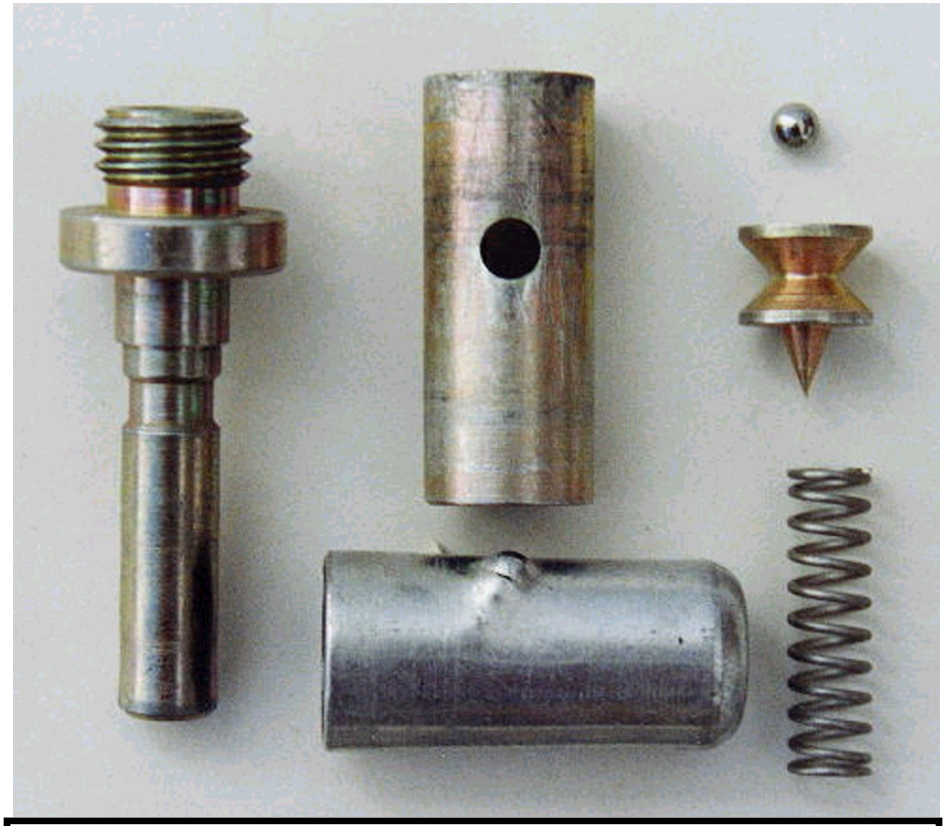
MV-5 (MB-5)

Type- Pressure
Weight- 0.7 oz. (20 g) w/o detonator
Length- 1.5 in. (43 mm) w/o detonator
Diameter- 0.5 in. (13 mm)

This is a simple, pressure operated device developed during WWII. It has been in service for many years in the former Soviet Union and other nations supplied by them. Normally used in mines it could also be used in other explosive charges. The MV-5 has been copied by other countries such as East Germany (MW-5), Yugoslavia and China.

The fuze consists of a body, cap, striker, striker spring and striker retaining ball. The body is cylindrical and is threaded internally at the bottom to accept the detonator assembly. A hole in the side, about 2/3 the way up from the bottom is to accept the striker retaining ball. On the side of the body opposite the hole is a longitudinal groove. The cap is formed with one closed end. The cap is bulged out on the side about half way up. Opposite the bulge the body is punched in to form a guide on the inside. The striker is just wide enough to fit into the body and has a V shaped groove around the middle. A sharp pointed striker is fitted into the bottom centre. The striker spring is a short length of coil spring. The striker retaining ball is simply a small ball bearing. When fitted together the striker is inserted into the body with the groove lined up with the hole in the side of the body. The striker retaining ball fits into the hole preventing the striker from moving. The striker spring fits into the cap. When the cap is put over the body, the guide on the cap fits into the groove on the side of the body causing the bulge to line up with the hole and retaining ball but not at the

MV-5 Firing Device With MD-5 Detonator Photo– G. Zahaczewsky



MV-5 Firing device disassembled, note the detonator assembly is a solid training version. Photo- Fenix Insight

MV-5 packaging dated 1961
Photo- Oleksandr Mariash

spring on the striker causes the V-shaped groove to force the retaining ball out into the bulge. Once it is out of the way, the striker is free to move under pressure from the striker spring. The striker hits the percussion cap in the detonator assembly which fires into the detonator.

MV-5K (MB-5K)

Type- Pressure
Weight- 0.7 oz. (18 g)
Length- 1.25 in. (32 mm)
Diameter- 0.625 in. (16 mm)

The MV-5K is a plastic version of the MV-5 fuze. In construction and operation, it is identical with the exception of some minor points. The guide in the cap is a small screw that fits into a groove in the body. Any other differences are unknown at this time. An East German version (MW-5K) is known to exist.

same level. The cap prevents the retaining ball from coming out of place. The striker spring is not under compression at this point. The detonator assembly, either the MD-2 or later MD-5 can then be screwed into the bottom. When used in antitank mines an MD or MD -6 detonator assembly is used. There is no safety pin.

When a pressure of at least 22 pounds (10 kg) is applied to the cap, it moves down compressing the striker spring. As it moves down, the bulge on the cap will eventually come into line with the retaining ball. The downward pressure from the

MV-5K Firing Device
(probably East German manufacture)

MVE-08 (МВЭ-08)

Type – Collapsing Circuit
Weight – 10.9 oz. (309 g)
Length – 3.4 in. (86 mm)
Diameter – 2.4 in. (61 mm)

The MVE-08 is an electro-mechanical firing device developed by the Russian Scientific Research and Engineering Institute around 2008. It is designed to be employed with existing Russian anti-personnel and signal mines, as well as any ordnance or demolition charge that will accept an MD-5M detonator. It is a successor to both the MVE-72 and MVE-92. It reportedly has both a self-neutralization option, as well as a self-destruction feature.

MVE-08 Firing Device

The MVE-08 has a metal body that contains the electronic circuitry to arm and fire the device, as well as 160 metres of breakwire filament. The other end contains a receptacle for the MD-5M detonator, or the adapter for an electrical firing circuit closing device.

It is initiated by a collapsing circuit that uses a breakwire as the activation mechanism. Further technical and operational details of the MVE-08 are unknown.

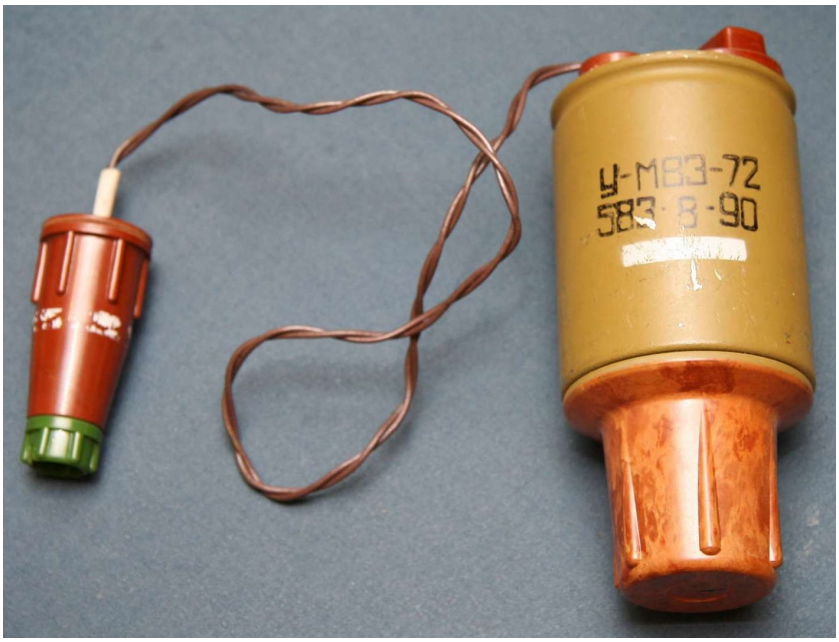
MVE-72 (МВЭ-72)

Type – Collapsing Circuit
Weight – 19.5 oz. (553 g)
Height – 5.7 in. (145 mm)
Diameter – 2.4 in. (61 mm)

MVE-72 Firing device
Photo– G. Zahaczewsky

The MVE-72 was developed as an initiation and control unit for antipersonnel mines. However, it can also be used in a boobytrap configuration, as an anti-disturbance, or a collapsing circuit, firing device for external explosive charges.

The device is constructed of metal and Bakelite. It consists of a cylindrical control unit (with an attached NM initiator), and a separate spool that contains 60 metres of fine, insulated, two-strand breakwire.



The control unit contains a 1.5 volt battery as a power source (KB-U-1.5), a friction-ignited pyrotechnic arming delay mechanism (approximately 60 seconds), an attached NM initiator (that accommodates an MD-5M detonator), an electronics circuit to function the device, and a receptacle to connect the breakwire.

To place the MVE-72 into operation, the cover is removed from the battery housing at the end of the control unit, and a battery inserted. The cover is then replaced. The control unit is emplaced in close proximity to the mine, or explosive charge. The jack on the breakwire spool is then plugged into the receptacle on top of the control unit. The wire is unspooled to cover the target area. An MD-5M detonator is attached to the NM initiator and inserted into the mine or other explosive charge. Both the control unit and explosive charge (or mine) are then appropriately camouflaged. The final step is to extract the pull cord to ignite the pyrotechnic arming delay mechanism. After approximately 60 seconds, two contacts inside the control unit are fused together, thus completing the firing circuit. The firing device is now ready for use.

The MVE-72 will function if any of the following actions occurs: (1) if the breakwire is broken or flexed; or (2) if the breakwire is unplugged from the control unit. Either action will create a collapsing circuit, initiating the firing device. If the device has not functioned before battery life expiration, the firing device will self-neutralize/deactivate.

MVE-92 (МВЭ-92)

Type – Collapsing Circuit
Weight – 7 oz. (198 g)
Height – 2.0 in. (50 mm)
Diameter – 3.4 in. (86 mm)

The MVE-92 is a battery-powered, electronic firing device, incorporating a collapsing circuit. It uses a breakwire as the initiation mechanism. It was designed in the 1990's as a means of initiating a landmine or boobytrap.

The MVE-92 has a metal body containing the electronic circuitry to arm and fire the device, a battery, as well as 80 metres of breakwire filament wound around the body at the top. The other end contains a receptacle for an MD-5M detonator, or an adapter for an electrical firing circuit closure device. The firing device can also be screwed directly onto the detonator assembly of certain mines, such as the Russian OZM-72 antipersonnel mine.

The first step in using it is to activate the battery utilizing a special tool provided with each device. The next step is to install, or insert, the firing device into a mine or explosive charge. To arm the device, the red-flagged safety pin is then removed. After no more than 60 minutes, the device is ready to function. Once armed, tripping or running over the breakwire snaps it, collapsing the circuit forcing the current to be diverted to the initiator causing it to function and detonate the attached munition.

MVE-92 Firing Device

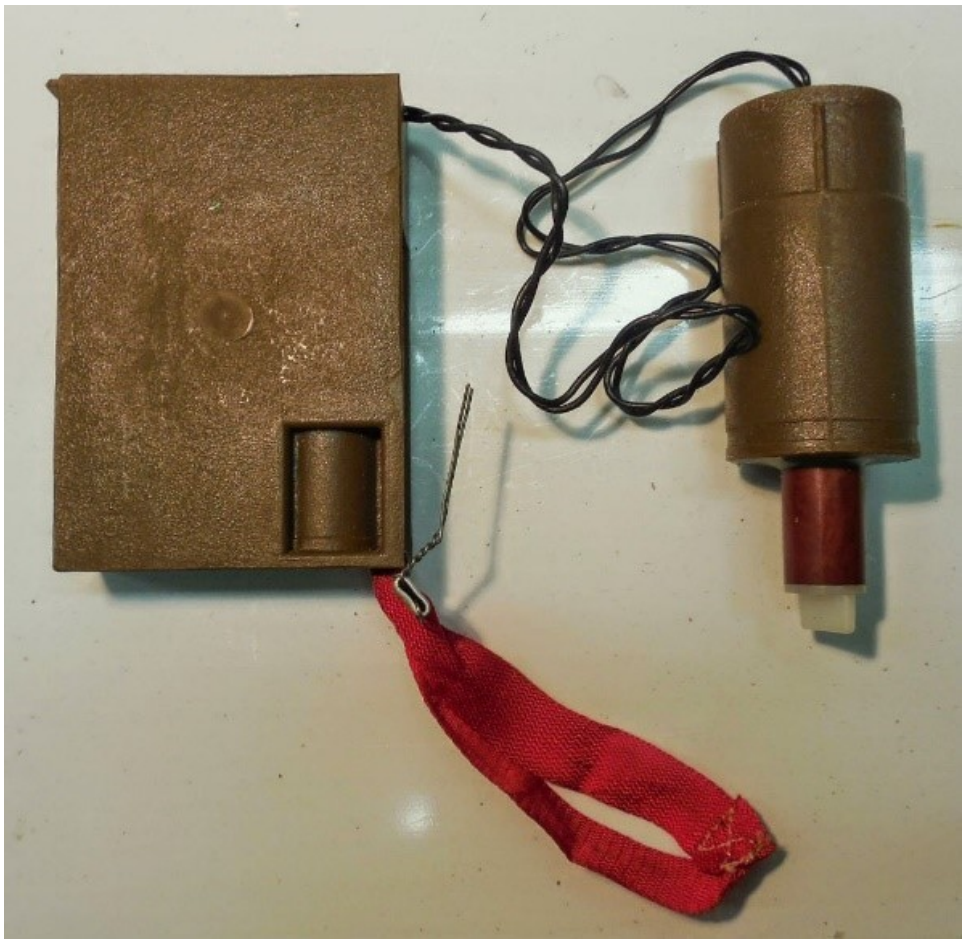
MVE-NS (МВЭ-НС)

Type – Antidisturbance, Collapsing Circuit, and Self Destruct
Weight – 8.8 oz. (249 g)
Length – 3.5 in. (89 mm) (control box/power unit, initiator/activating unit)
Width – 2.2 in. (56 mm) (control box/power unit);
1.2 in. (23 mm) (initiator/activating unit diameter)
Height – 0.9 in. (control box/power unit)

The MVE-NS is primarily intended as an electronic anti-handling device for antipersonnel mines, such as the Russian OZM-72, the MON-50, and the MON-90. It entered service in the 1980's and was employed by Soviet forces in Afghanistan. There is no practical use for the device as a stand-alone boobytrap, as it does not incorporate an integral explosive charge. When used in a boobytrap configuration, it is most frequently employed as an anti-disturbance, or a collapsing circuit, firing device for external explosive charges. It does incorporate a self-destruct feature of 25 to 90 days, which is determined by battery life – when the power drops below 6.8 volts (+/- 1.5 volts), the firing device will self-destruct.

The device is constructed of polyethylene plastic, and consists of a square control box connected by a two-lead wire to an oval activation unit, which will accept either an MD-2 or MD-5M non-electric detonator.

The control box contains a 7RTs53U battery as a power source, a time delay arming mechanism (that is factory preset for either seven or 30 minutes, and has the delay embossed on the outside of the control box), 40-metres of breakwire filament (used to establish a collapsing circuit) on a spool under a removable cover, a breakwire target sensor, and an electronics circuit that controls both arming and firing. The activation unit contains a firing mechanism to initiate the detonator assembly, as well as the electronics circuit to function the device if it is moved or the connection to the control box is broken.



MVE-NS Firing Device

To place the MVE-NS into operation, remove the cover from the battery housing at one end of the control box, and insert a battery. Replace the cover. Open the cover at the opposite end of the control box and remove the spool of breakwire. Up to 40 metres of breakwire can be placed around the device and its

associated explosive charge. Screw a detonator assembly into the adapter at the end of the activation unit and insert the detonator assembly into the mine or explosive charge. The firing device is now ready for use.

Pulling the red-cloth arming tab removes it from the control box and initiates the arming delay. An LED at the end of the control box will begin flashing, and will continue through two-thirds of the arming delay time (4.6 minutes or 13.3 minutes). At the end of the delay time, the condenser in the electronic circuit is fully charged, and the device is armed.

The firing device will function if any one of the following actions occurs: (1) if the breakwire is broken; (2) if the firing device is moved and, in doing so, the breakwire is stressed; (3) if the wires connecting the control box to the activating unit are cut or broken, or the power source is removed; and (4) if the power source level falls below 6.5 volts, thus initiating the self-destruct feature.

MY-8 (МЙ-8)

Type – Chemical delay
Weight – 0.6 oz. (18 g)
Length – 4.25 in. (108 mm)
Diameter – 0.3 in. (8 mm)

The MY-8 is a chemical delay firing device, often referred to as a chemical or time pencil. Little is known about this device but, it was most likely developed during the Second World War from a British device, and is no longer in service. In appearance, it is similar to the British "Switch No. 10 Delay Mk. I", but it also shares some of the same characteristics of the Former Yugoslav "UDVK chemical delay firing device". It is unknown whether the MY-8 is used with an incendiary charge, an explosive detonator, a safety fuse holder or possibly all of them.

Although little information exists regarding the MY-8, it appears to be constructed in the same manner as the other chemical time delay pencils mentioned above. Specifically, the copper end of the cylindrical body contains a glass vial filled with a corrosive liquid and absorbent material. Attached to this copper segment of the firing device is another brass section containing a cocked striker assembly that is held in place by a retaining wire. There is a safety strip between the striker assembly and the other end, which contains an adapter for the attachment of either an incendiary charge, an explosive detonator, or a safety fuse holder. It is likely that this device was made with a variety of delays which would be indicated by the colour of the safety strip.

MY-8 Firing Device with carrying case

To use the MY-8, remove it from its plastic shipping and storage container. Attach the appropriate adapter for the charge being used. Emplace the MY-8 and attached charge against the target, and withdraw the safety strip. The final step is to crush the copper tubing surrounding the glass vial. The corrosive liquid will flow down into the absorbent material and begin weakening the wire restraining the cocked striker assembly. Once the corrosive liquid eats away at the retaining wire, the device will function.

MZU (МЗУ) and MZU-S (МЗУ-С)

Type – Multifunction
Weight – 42 lbs. (19 kg)
Length – 18 in (453 mm)
Width – 7.8 in (200 mm)
Height – 18 in (453 mm)

The MZU is a multifunction firing device originally intended as an anti-train/anti-vehicle mine intended for use against railways and highways. The device functions on either vibration, magnetic influence, command initiation or anti-handling. The MZU-S is a modified version incorporating a larger explosive charge, 35 pounds (16 kg). These devices have been encountered in Afghanistan.

The device consists of three major components: an upper fuze assembly (designated VMZU), a lower explosive charge and a remote control and testing unit (designated PU-MZU).

The lower explosive charge assembly is a tubular sheet steel casing with its top and bottom sealed with steel closure plates. The upper closure plate incorporates a central threaded fuze well. A handle is attached to the side of the tube. The charge contains 26 lbs. (12 kg) of TNT.

The VMZU (ВМЗУ) fuze assembly screws into the well on top of the charge. The fuze incorporates the following initiation options: delay (1-60 days), vibration, magnetic influence, command initiation and anti-handling. When the anti-handling option is set, a small spring-loaded plunger beneath the lid causes detonation of its 0.8 -ounce (25 g) Tetryl booster if the lid is removed.

The threaded portion of the fuze has the same threading as the TM-57 mine. The mine and fuze can be combined if desired.

MZU Firing Device

The PU-MZU remote control and testing device is connected to the fuze assembly with a jack plug and is powered by three replaceable batteries. The device is used for remote control, testing and command detonation of the device.

Although the MZU has a limited battery life a non-functional device should never be approached if there is any possibility it is still active.

The device is painted olive green and has markings on the side giving the designation, manufacturer, lot number and year of manufacture.

MZU-2 (МЗУ-2)

Type – Multipurpose
Weight – 24.6 oz. (697 g)
Length – 7.5 in. (190 mm)
Width – 4.5 in. (114 mm)
Height – 1.2 in. (30 mm)

MZU-2 Firing Device

The MZU-2 is a complex firing device that was developed by the Scientific Engineering Institute in Balashikha, Russia (State Factory 582) on the outskirts of Moscow in the mid 1970's. It was originally intended as an anti-train (anti-vehicle) mine, but it is probably more suited for use as an emplaced demolition charge, an antihandling device for antitank mines, or a boobytrap, due to its small size and explosive charge. The device functions on either seismic vibration, movement, remote-control, or time delay when employing the VZD-144Ch firing device. In addition to the vibration sensor, there are also two separate movement sensors – an inclined sensor that functions when it is tilted more than 10 degrees or moved faster than 0.05 m/s, and dual inclined sensors that trigger the firing device if it changes position by more than 10 degrees, regardless of its original orientation. The MZU-2 is sometimes referred to as the Верба ("Willow")

The device consists of a main body, an explosive charge contained in a removable cover, two removable batteries, and an MD-5M detonator assembly. The top has a control panel containing a safety device with a removable seal, a start button covered by a removable cap, a firing mode selector switch ("Emplaced," "Train," or "Boobytrap"), and an electrical connection for remote arming or detonation.

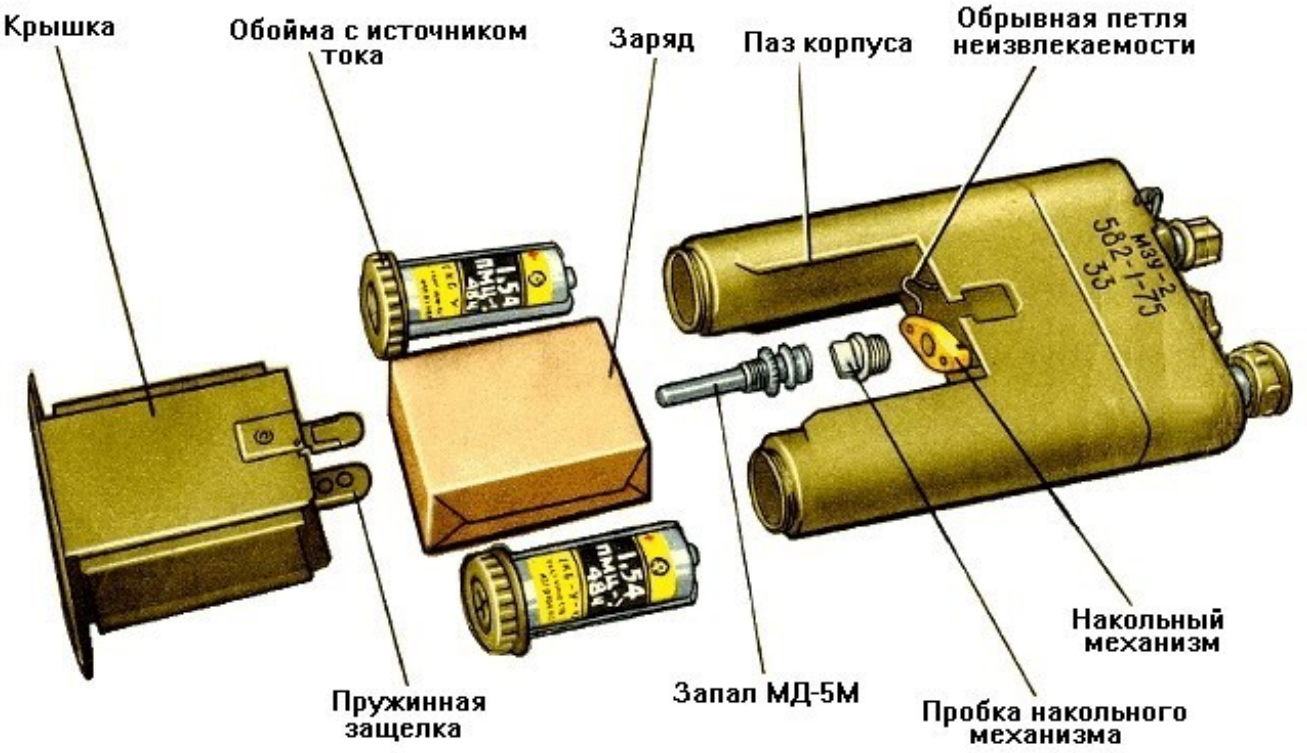
Prior to use, the explosive cover is removed from the bottom, and a 1.5V battery installed in each of the compartments on either side of the main body. A 5.3 oz. (150 g) block of Tetryl is placed into the removable container, and an MD-5M detonator assembly is inserted into the Tetryl block. On the underside of the control panel is a breakaway wire that is removed to disable the inclination sensors, if desired. Leaving the wire in place will activate these anti-handling features once the MZU-2 arms. The explosive-laden cover is then reattached to the main body of the firing device and secured with spring catches on either side of the main body. The device is now ready to be programmed for use and emplacement.

When using the MZU-2 as an emplaced charge, the device is normally attached to a larger explosive

charge suitable for the task at hand. It can be placed in any desired orientation. In this situation, it functions as a fuze/detonator for the larger charge. To prepare it for use, the mode selector is set to the "Emplaced" position. If a timed detonation delay is desired, the cover from the start button is removed and a VZD-144Ch firing device is screwed into place. Upon expiration of the time delay, the firing device functions pushing down on the start button initiating the MZU-2 and detonating the attached charge. The VZD-144Ch can also be used to set an arming delay for the MZU-2 when it is connected for remote-control initiation. (Of note. If the VZD-144Ch is not installed, then the cap must be removed from the start button releasing it into the open position thereby allowing arming and detonation of the firing device to take place.) The last step requires removal of the seal from the safety device, which then arms the device after 60-70 seconds. If the breakaway wire was not removed, then any disturbance of an armed firing device once it has been emplaced, will result in a detonation.

When employed as an anti-train mine, the MZU-2 must be emplaced in a horizontal position. In this particular application, the device would be attached to a larger explosive charge and would function as the detonator for that charge. To prepare it for use, the mode selector is set to the "Train" position. The firing device is triggered by a vibration sensor that detects a train travelling between 30 and 160 km/h at a distance of 35 metres. Additionally, if the inclination sensors were not disabled during preparation, the device will detonate if tilted or moved.

Emplacing the MZU-2 as a boobytrap requires the mode selector to be moved to the "Trap" position. The breakaway wire is not removed thus enabling the movement sensors. The boobytrapped item, or landmine, is placed on top of the firing device and the seal removed from the safety device. The device will be armed after 60-70 seconds. If desired, the VZD-144Ch time delay firing device, and/ or the remote-control initiation cable can also be connected.



Крышка *(cover);* ***Пружинная защелка*** *(spring catches);* ***Обойма с источником тока*** *(power supply);* ***Заряд*** *(charge);* ***Запал МД-5М*** *(fuze MD-5M);* ***Паз корпуса*** *(body groove);* ***Накольный механизм*** *(inclination mechanism);* ***Обрывная петля неизвлекаемости*** *(breakaway wire)*

NVU-P (НВУ-П) and NVU-PM (НВУ-ПМ)

Type – Seismic
Weight – 4.4 lbs. (1.99 kg)
Height – 14.2 in. (360 mm)
Diameter – 6.1 in. (155 mm)

The NVU-P is a seismic minefield control system, developed by the Soviet Union in the 1970's. The firing device is nicknamed "Охота," which translates to "The Hunt.". When emplaced it can initiate up to five antipersonnel mines. It can also employ a self-destruct charge that will detonate at the end of battery life (~69 days). It utilizes a VP-12 electronics package. The NVU-PM is a modification of the firing device incorporating a VP-13 electronics package. Otherwise, these firing devices are externally identical. They have been found in Afghanistan, Chechnya, and Ukraine.

NVU-P Firing Device

NVU-P Geophone

The NVU-P consists of a metal cylinder containing batteries and a VP-12 electronics unit. The top of the firing device contains: five firing wires to which mines can be attached (normally OZM-72 bounding fragmentation types, but other types can be used); one electrical connection with an SV-20-P geophone attachment; a threaded adapter to which an arming device can be attached; and a pair of black wires that can be used to connect a self-destruct charge, or another NVU-P unit. There is also a red light to indicate that the device is turned on and in the process of arming.

Prior to emplacing it, six 1.5-volt dry cell batteries (Type 373, R20) are installed, and the geophone is connected to the top of the firing device. The selected arming device – either an MUV-4 mechanical delay firing device, or an EKhV-7 electro-chemical delay firing device – is threaded onto the adapter on top of the device. The two black wires are connected to an EDPr detonator or an NM initiator with an MD-5M, and inserted into a seven-ounce (200 g) block of TNT, which is taped to the side of the body in a white rectangular painted area. The geophone is then pushed into the ground until it is flush with the surface. The NVU-P is buried, or hidden close by. The firing wires are run out and connected to five mines that cover the target area.

VP13 note the attached demolition charge and MUV-4 firing device.

The final step is to remove the safety pins from the arming device, and leave the area. The geophone can detect ground vibrations within a 15 metre radius. Once the device determines the vibrations are footsteps, then a firing impulse is sent to the first of five mines that is connected to the firing device. Any further activity will cause the second mine to fire, and so on for the third, fourth, and fifth mine.

NVU-P2 (НВУ-П2)

Type – Seismic
Weight – approximately 4.5 lbs. (2 kg) (sensor/fuze unit and remote-control/test set only)
Length – 7.8 in. (198 mm) sensor/fuze unit; 7.7 in. (198 mm) remote-control/test set
Width – 4.3 in. (109 mm) sensor/fuze unit; 5.5 in. (140 mm) (remote-control/test set)
Height – 2.4 in. (61 mm) sensor/fuze unit; 3.9 in. (99 mm) remote-control/test set

NVU-P2 Firing System
Photo- D.Mokrushin

The NVU-P2 is a seismically activated, remotely (or autonomously) controlled, minefield control system that can, according to Russian sources, activate up to four "engineering munitions or prepared demolition charges." The "engineering munitions" include the OZM-72 and POB bounding antipersonnel fragmentation mines. The system is intended to seismically detect a "walking or crawling" soldier, or up to ten combatants, within a radius of approximately 50 metres. The system also has a programmable self-destruct time. The NVU-P2 appears to be an updated version, and successor to, the NVU-P and NVU-PM minefield control systems. The firing device is nicknamed "Охота 2," which means "The Hunt 2." It is reported to have entered Russian service in 2014.

The outer casing of the sensor/fuze unit, as well as the remote-control/test set, appear to be of a green, plastic material. The cable reel itself appears to be of a plastic and metal construction. The construction of the components appear to indicate that the device was not intended for long-term exposure to the elements.

The NVU-P2 consists of five major components (along with associated attachments) – a sensor/fuze

unit, a detachable seismic sensor (“floor device”), a remote control/test set, a 100-metre reel of firing wire, and four IM (or VUZ) initiators. Additional reels (up to 400 metres) may be added to the system, along with a PD-440 “executive device,” that ostensibly provides the remote-control function.

The NVU-P2 can supposedly activate one connected explosive device at the end of 400 metres of control wire, or four explosive charges at the end of 100 metres of firing wire. As previously mentioned, the firing device is capable of being employed in a remote-controlled, or an autonomous mode. These options are selected by a two-man team of operators, who are responsible for testing, emplacing, and arming the system.

If employed autonomously, the system can be programmed to self-destruct if a target does not appear in the detection range of the NVU-P2 for a set period (7, 14, or 28 days). Reportedly, this is accomplished through the detonation of the connected explosive charges (or munitions), and the fusing of system electrical components.

In the remote-controlled mode, when the "Target" light flashes, accompanied also by an audible signal, the operator presses the "Start" button, selects the appropriate munition, and detonates it.

To employ the system, one operator attaches the seismic probe to the fuze/sensor unit, and then prepares to emplace it. The other team member calculates the best method of employment utilizing the system’s ancillary components. Once that has been accomplished, the team buries the mines or prepared demolition charges, connects the charges to the fuze/sensor unit and conceals it, and then selects either the remote-controlled or autonomous method of operation. When arming the installed fuze/sensor unit by withdrawing the red-tagged safety pin, a red-light flashes on the remote control/ test set for 80 seconds. This is the approximate time that it takes to charge the device’s capacitors. The system will be fully armed in three minutes.

The NVU-P2 becomes non-functional in three situations: (1) after detonating all four munitions, (2) after the expiration of the self-destruct time in the autonomous mode, (3) after depletion of the battery power supply.

PMP (ПМП) Mine

Type- Pressure
Weight- 5.2 oz. (145 g)
Length- 4.625 in. (120 mm)
Diameter- 1.375 in. (36 mm)

PMP Mine
Photo- Oleksandr Mariash

While not really a boobytrap mechanism the PMP mine is similar in concept to the British "Switch, No. 8, Anti-Personnel, Mk. I". The mines were produced between 1954 and 1961 in Factory 608 in Russia. Approximately 16,879 were produced. The mines were normally shipped in wooden crates containing 96 mines. Although quite old, some of these were found in the Ukraine in 2020.

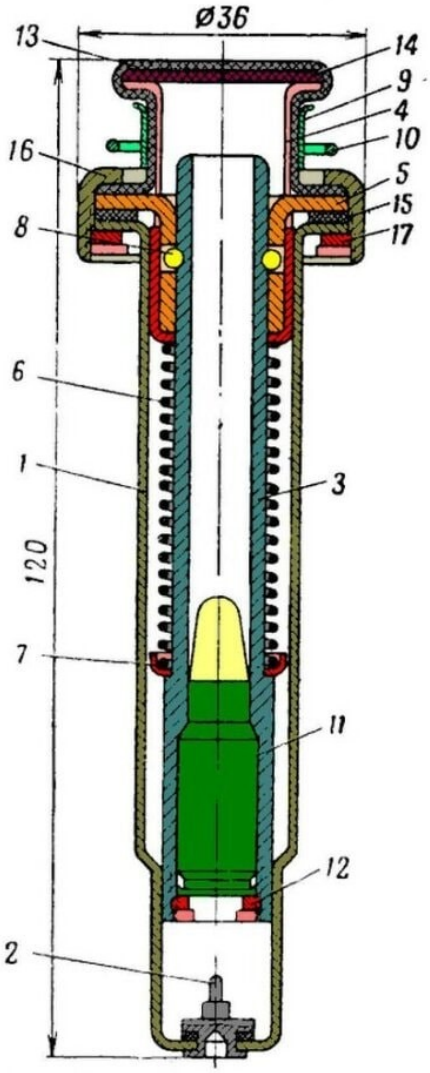


Рис. 88. Противопехотная мина ПМП:

1 — корпус; *2* — боек; *3* — ствол; *4* — втулка; *5* — муфта; *6* — пружина; *7* — шайба; *8* — шарики; *9* — предохранительная скоба; *10* — откидное кольцо; *11* — пистолетный патрон; *12* — гайка для крепления патрона; *13* — резиновый колпачок; *14* — кружок; *15* — резиновая прокладка; *16* — накидная гайка; *17* — гайка

The mine consists of several parts and assemblies. The body assembly, barrel assembly, pressure head assembly and a locking ring. The body assembly is made of sheet metal as a tube with a reduced diameter at the bottom and a flange at the top. The firing pin is mounted in the bottom of the body. The barrel assembly is made up of the barrel, that has a chamber for the 7.62 x 25 TT pistol round at the bottom end and a groove around it near the top end. A cupped washer fits over the barrel and rests on the top of the chamber portion of the barrel. The firing spring fits over the barrel resting on the cupped washer. The bottom of the chamber is threaded to accept a nut to hold the cartridge in place. The pressure head assembly consists of an inner sleeve with a flange at the top and two holes in the side of the sleeve to fit the retaining balls. The flange is cut out to allow the top of the outer sleeve to fit through the flange. The outer sleeve is sheet metal with a solid sleeve at the bottom end and two slots opposite each other in the upper section. A metal disc covers the top of the outer sleeve and is held in place by a rubber cover. The locking ring has a metal and rubber washer that fit inside the ring.

When assembled, the barrel assembly, with cartridge loaded, fits through the top of the body with the chamber section of the

barrel fitting into the top of the reduced section of the body. The pressure head assembly fits into the top of the body surrounding the barrel. The retaining balls fit into the holes in the sides of the inner sleeve and engage into the groove in the barrel. The outer sleeve presses down on the spring partially compressing it. The pressure of the spring pushes up on the outer sleeve keeping the solid portion of the outer sleeve pressed up over the inner sleeve holding the retaining balls in place. The flange on the inner sleeve rests on top of a rubber washer on top of the body. The combination of the retaining balls and the outer sleeve resting on the body prevents the barrel assembly from moving down. The locking ring and washers are press fitted over the top of the mine and are pushed over the flanges with the end of the rubber cap underneath the ring. This in combination with the rubber washer waterproofs the interior of the mine and keeps it together. A safety collar fits around the pressure cap preventing its movement downwards.

When the mine is laid and the safety collar removed the mine is armed. When a pressure of 15 - 65 lbs. (7 - 30 kg) is applied to the top, the outer sleeve is forced down further compressing the spring. As the outer sleeve moves downward the slots will eventually uncover the retaining balls. The spring pressure on the barrel assembly will force the balls out of the groove in the barrel and allow the spring to reassert itself and force the barrel assembly down onto the firing pin. The primer in the cartridge strikes the firing pin causing the primer to fire the cartridge. The bullet travels up the barrel and into whatever has applied pressure on the top of the mine.

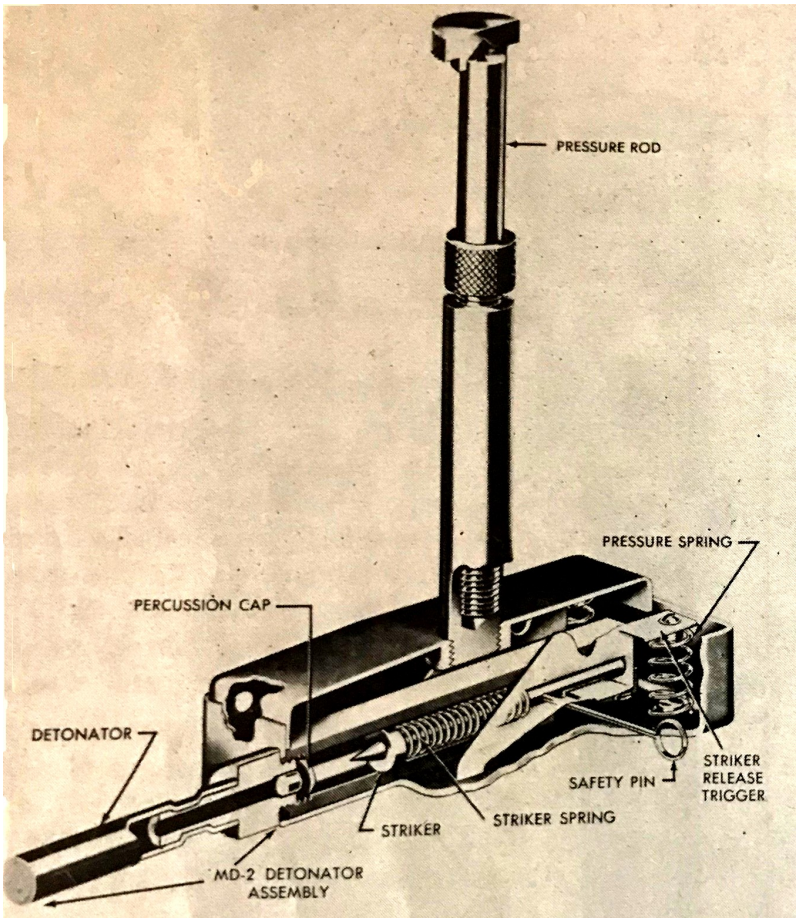
PV-42 (ПВ-42)

Type- Pressure
Weight- 4.4 oz. (125 g)
Height- 0.75 in. (20 mm)
Length- 3.75 in. (74 mm)
Width- 1.25 in. (36 mm)

The PV 42 is a copy of the British "Switch, No. 5, Pressure, Mk. I". In Russian service it is specifically used as a railway sabotage device although it could certainly be used for other purposes. The device is virtually identical to the British device but has been modified to use the Russian detonator assemblies. In addition, the extension rod is substantially different to the British version.

The switch consists of a steel case with a hinged steel lid fitting inside the case. The lid has a centre threaded hole to screw an extension into. A body is fixed inside the case by a countersunk bolt.

PV-42 Firing Device



Internal Diagram of the PV-42 Firing Device

The end of the body is threaded to accept an MD-2 or the later MD-5M detonator assembly. Two studs on the bottom of the case keep the sear springs in position. The striker is formed with a shoulder and firing pin on one end and a detent on the other. The sear is formed of steel and has two studs riveted on to correspond with the studs on the case to retain the sear springs. The pressure points on the sear project up on either side of the body. A safety pin passes through the case, body, and striker to ensure the device will not fire when it is in position.

An extension rod assembly is made in two parts, a socket that screws into the top of the lid and a rod that screws into the socket. The rod has a knurled nut at the bottom end and a flat head that screws onto the top. The extension provides a height adjustment up to 4 inches (101 mm) and is adjustable in height by varying the amount that the rod is screwed into the socket. If a shorter extension is required, the socket may be used without the rod.

When the device is assembled, the striker and striker spring are inserted in the end of the body with the detent facing down. The striker is pressed back until the detent engages the sear and holds the striker in the cocked position. The safety pin is then passed through the holes in the side of the body to make the device safe.

The pressure necessary to operate the device varies from about 24 - 40 lbs (11 - 18 kg). dependent upon where on the lid the pressure is applied. When pressure is applied to the switch the lid presses down on the sear. As the sear is pressed down it disengages from the detent allowing the striker to fly forward under pressure of the striker spring. The firing pin hits the percussion cap and fires the charge.

PVU-79 (ПВУ-79)

Type – Pressure
Weight – 3.3 lbs. (1.5 kg)
Length – 1.6 in. (41 mm) piezo fuze assembly
Diameter – 1.4 in. (36 mm) actuator rod assembly;
1.1 in. (28 mm) piezo fuze assembly
Height – 5.7 in. (147 mm) actuator rod assembly

PVU-79 Firing Device

The PVU-79 firing device is intended to destroy railroad tracks and derail trains. It is an improved version, and successor to, older PV and PZ-series devices, such as the PV-42 or PZ-12, that were used in the 1940's and 50's.

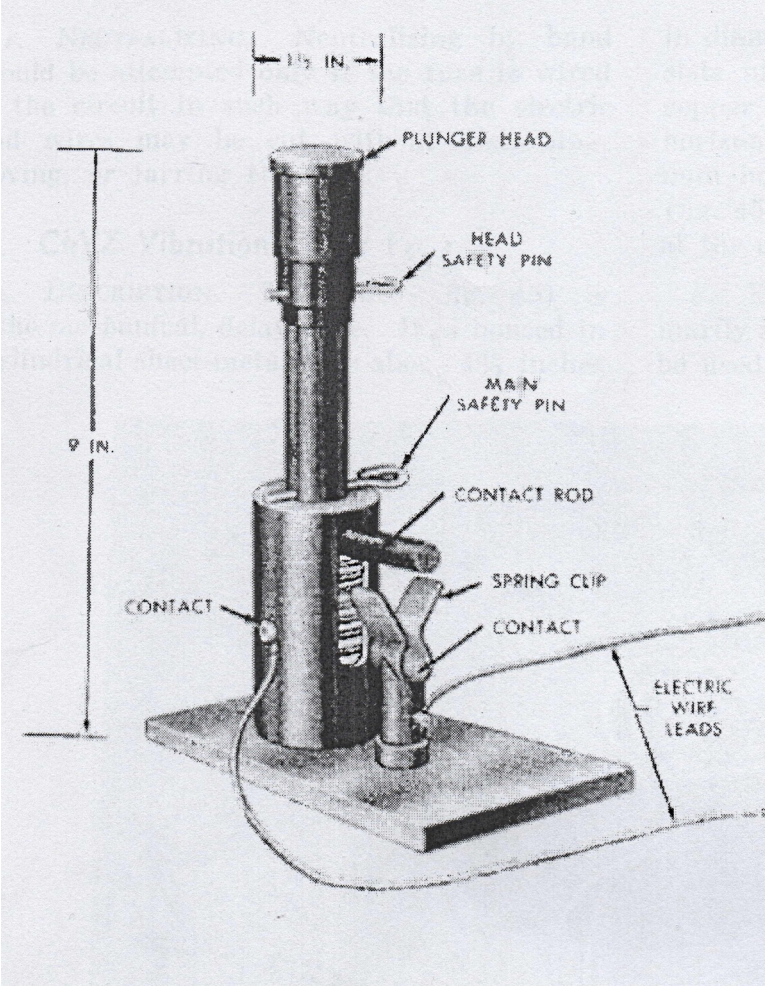
Much of the PVU-79 appears to be manufactured from a Bakelite-type material. The actuator rod appears to be metal. The device consists of an actuator rod assembly, a piezo-electric fuze assembly, two initiators and a housing that also serves as a base assembly for the device.

In preparation for use, the entire assembly is emplaced under a train rail. The spring-driven actuating rod is extended until it stops against the bottom of the rail. MD-5M detonators are screwed into the two initiators and then inserted into explosive charges that are placed against the rails, or against the ties holding the rails in place. The firing device, initiators and explosive charges are then concealed and camouflaged, as much as possible, using surrounding material. Finally, the red-flagged safety is

removed.

In operation, when the first pair of train wheels passes over a train rail, the rail flexes and presses down on the actuator rod. In the base of the actuator rod, there is a piezo-electric fuze assembly. When stressed, the piezo fuze produces an electrical current that is passed to the initiators. The initiators are electro-mechanical devices that drive a firing pin/striker assembly into the primer of an MD-5M detonator. The detonator, in turn, initiates the attached explosive charges, destroying whatever target they are attached to.

PZ-12 (ПЗ-12)



Type- Pressure-Electrical
Weight-
Height- 9 in. (229 mm)
Diameter- Main section- 1.5 in. (38 mm)

This firing device was developed prior to 1940 mainly for mining sections of railroad tracks.

It consists of a brass plunger with a plunger head mounted into a brass base containing a spring. The base is mounted on a metal plate. The plunger has a safety pin located near the top and a second one where the plunger enters the base piece. A contact rod at 90 degrees to the plunger is attached to the plunger through a slot in the base piece. One electrical contact is attached to the base piece. The second contact is attached to a spring clip mounted in such a manner that the contact rod will engage it when the plunger moves downward. There is no other information available regarding the construction of the device.

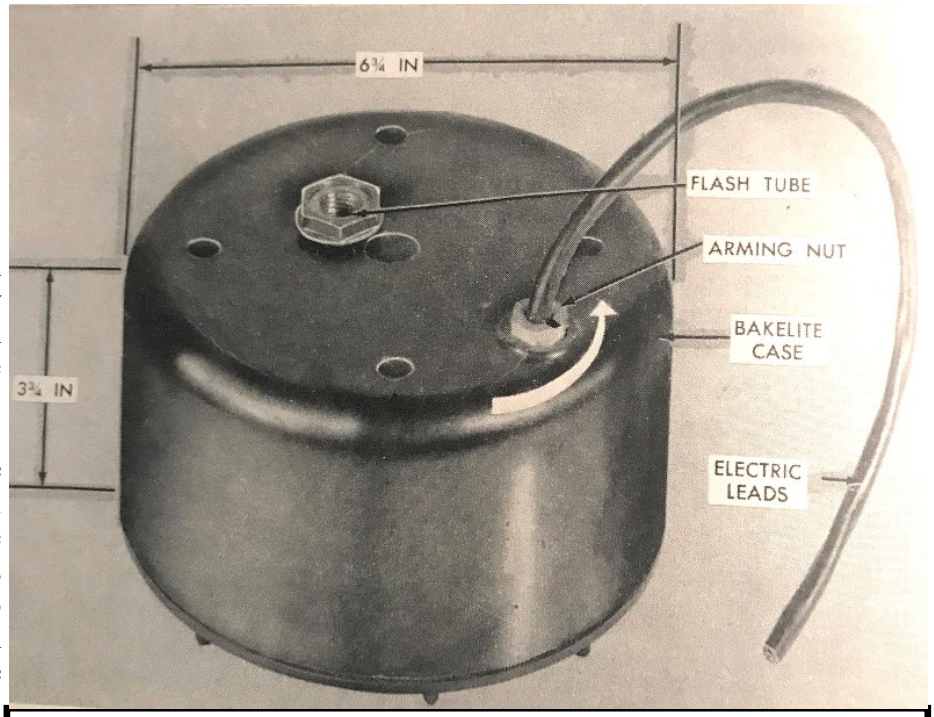
For use, a hole about 10 inches (250 mm) deep must be dug under a rail or tie. An 8 x 12-inch (200 x 300 mm) board is placed in the bottom of the hole. Place the device on the board so that the head of the plunger is nearly flush with the bottom of the rail or tie. Connect the device into an electrical firing circuit. A delay clock may be wired in to provide an arming delay. Removing the safety pins completes the arming of the device.

When a train passes over the device it will cause the rail or tie to flex somewhat. This will push down on the plunger until the contact rod slides into the spring clip and completes the electrical firing circuit. The firing device may be contained within a wooden box to ensure that dirt cannot interfere with the operation of the device.

SM-12 (CM-12)

Type – Frequency Induction
Weight – 2.5 lbs. (1.13 kg)
Diameter – 6.75 in. (171 mm)
Height – 3.75 in. (95 mm)

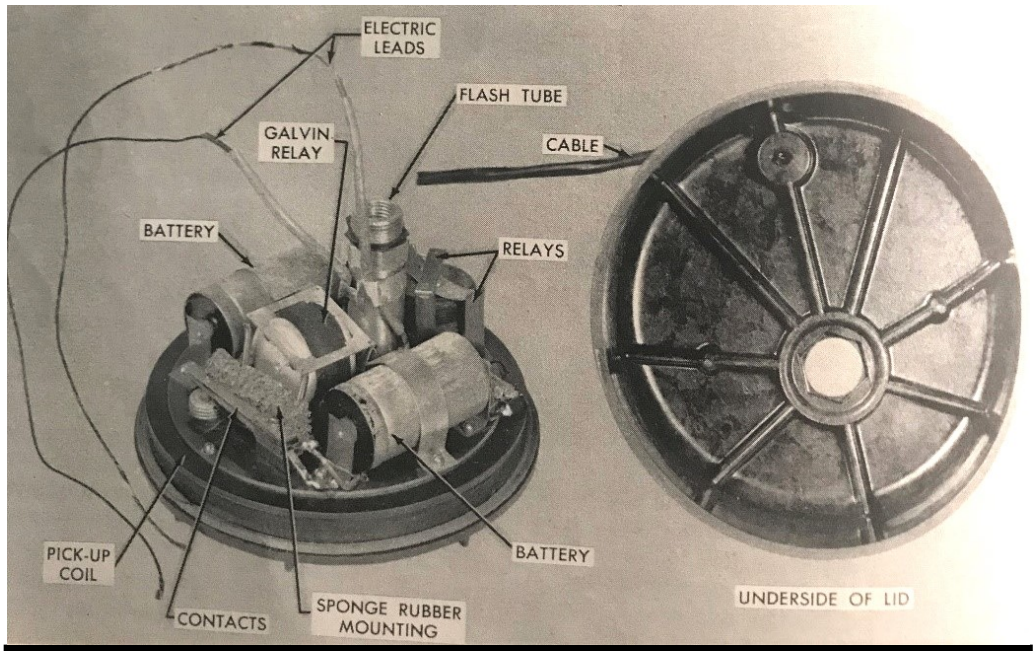
The SM-12 was an instantaneous, electrically initiated, frequency induction firing device designed by the Russians in World War II. The German Armed Forces modified and refined the device after capturing several samples before the end of the war. The firing device was intended as a boobytrap to explode a mine, or demolition charge, when it detected the signal from an electronic mine detector.



SM-12 Firing Device

Two models of the SM-12 were manufactured – an early one with an oval, black, laminated wood case, and a later one with a cylindrical, brown Bakelite body. The firing devices contained sponge-rubber mounted components that were screwed to the case body. A flash tube passed through the firing device, with openings at the top and bottom of the assembly. An arming nut – surrounding the leads of the firing wire - was positioned on the top of the device, with a white arrow indicating the direction to turn the screw to arm the SM-12. The internal components of the firing device included: sensitive relays, dry-disc rectifiers, pickup coils, condensers, resistors, leaf-type arming switches, delay arming switches, and 1.5-volt batteries.

The firing device was employed by connecting its firing wire to a detonator, which was then inserted into the mine or demolition charge. The arming nut on top of the device was turned in the direction indicated by the white arrow. This action completed a circuit that initiated an arming delay of 1.5 to 2 hours. After the expiration of the delay, the SM-12 was fully armed and would detonate when it detected the pulses of an electronic mine detector.



SM-12 with cover removed

VP-04 (ВП-04)

Type – Seismic
Weight-
Diameter-
Height-

The VP-04 is an earlier version of the NVU-P series of seismic minefield control systems. It was developed by the Soviet Union prior to 1980 to autonomously detonate antipersonnel mines, such as the OZM-72 and the MON-50. Little is known about this device, except that it has been encountered in Afghanistan, Angola, Mozambique, and Zimbabwe.

It consists of a cylindrical metal body with a Bakelite top. Wires protruding from the top of the device connect a geophone, a signal processing device, and several firing leads. Any other information is currently unknown.

VP-04 Firing Device
Photo- G. Zahaczewsky

VP-04 Firing Device showing geophone and signal processing device.
Photo– C. King

VPF (ВПФ)

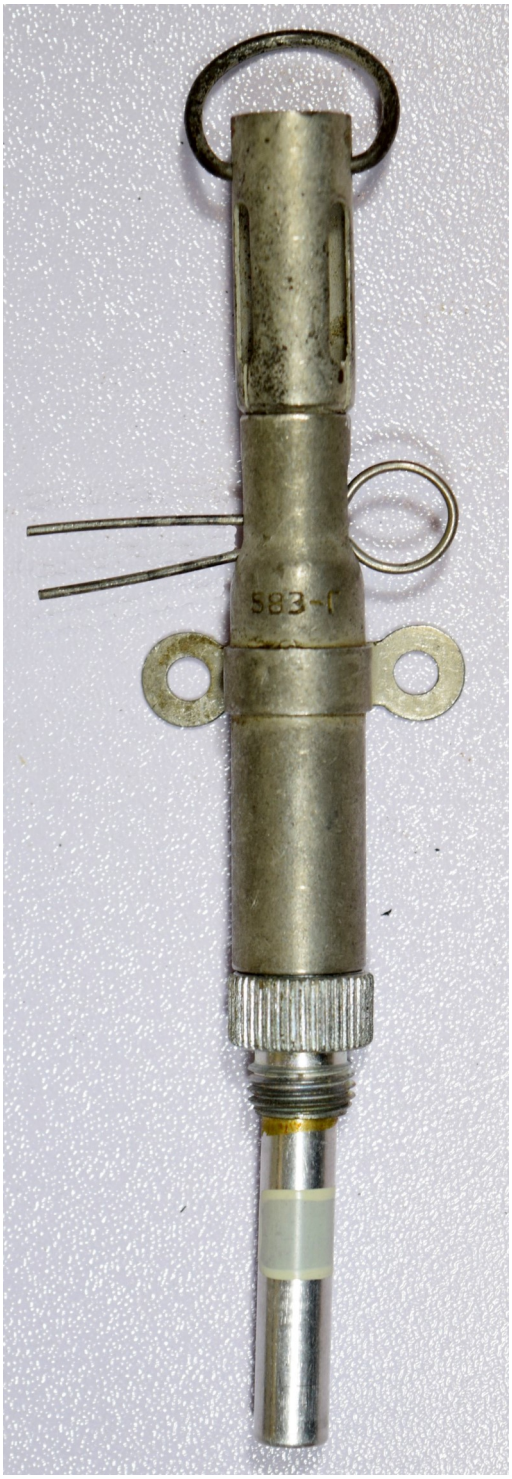
Type- Pull
Weight– 0.8 oz. (22.6 g)
Length- 3 in. (95 mm) w/o detonator
Diameter- 5/8 in. (15 mm)

The VPF firing device was developed during WWII and was used for many years after, it is now obsolete. It could be employed in both anti-personnel mines and boobytraps.

The device is made entirely of metal and consists of a body, striker, striker spring, striker retaining clamp, safety pin and detonator assembly. The body is cylindrical with the top section reduced slightly in diameter. The bottom is internally threaded to accept the detonator assembly. The top has an elongated hole to fit the safety pin. A thin strip of sheet metal with fixing eyes at either end is soldered around the centre of the body. The striker has a ball shaped top and the bottom end has a head just smaller than the interior diameter of the body with the striker point in the centre. A hole through the shaft allows the safety pin to fit through. The striker spring fits between the bottom end of the striker and the reduced section of the body. The striker is held in the cocked position by the safety pin. The striker retaining clamp is cylindrical and has four flexible prongs. The prongs are separated by key shaped slots with the bottom of the prongs formed to fit slightly inside the top of the body. A pull ring is fitted through the top of the clamp. The detonator assembly can be either the MD-2 or later MD-5.

When assembled the striker and striker spring are inserted through the bottom of the fuze and pushed up until the safety pin can be fitted through the body and striker. At this point the ball shaped end of the striker protrudes from the top of the body. The striker retaining clamp fits over the top of the ball. The detonator assembly screws into the bottom of the body.

For use, it is assembled and inserted into an explosive charge or mine. When the safety pin is removed, the striker retaining clamp holds the striker in the cocked position. It is prevented from releasing the striker by the bottom of the clamp fitting slightly into the top of the body. An axial pull of about 9 pounds (4 kg) or a lateral pull of about 3 pounds (1.4 kg) on the pull ring will allow the clamp to release the striker. The compressed striker spring will reassert itself and drive the striker down to hit the percussion cap in the detonator assembly.



VPF Firing Device
Photo– G. Zahaczewsky

VPZ-1 (ВПЗ-1) and VZLS (ВЗЛС)

Type – Concussion
Weight – 33.5 oz. (950 g)
Diameter – 2.7 in. (69 mm)
Height – 5.3 in. (134 mm)

VPZ-1 Firing Device
Photo- G. Zahaczewsky

This is a concussion-initiated firing device that was introduced into Soviet service prior to 1980. It is used primarily for underwater demolitions, and is technically not a boobytrap (i.e., victim-initiated), but does qualify for special treatment or consideration if encountered. The VPZ-1 would normally be employed in a Russian SZ-6 (or similar) underwater demolition charge that is emplaced with several other demolition charges, one of which would be equipped with either a time delay or command-initiated firing device. When that charge is detonated, all the adjacent charges equipped with the VPZ-1 (or VZLS) firing device would be sympathetically detonated. As a corollary concern, any VPZ-1 or VZLS demolition charge in close proximity to any underwater detonation will explode, regardless of the time delay on the initiation charge.

VZLS on left, VPZ-1 on right
Photo- G. Zahaczewsky

The firing device has a metal body and incorporates a lead shear wire arming delay mechanism similar to that in the PMN series of landmines, and later versions of the MUV series of fuzes. The Russian version comes complete with three different arming delay strips. The East German version (WPZ-1) has four arming delay strips – red, gold, blue, and black. The device is initiated when the shock wave from a nearby explosion impacts the rubber diaphragm in the upper part of the VPZ-1. This device is similar in appearance to the Russian VZLS firing device, which is also concussion initiated.

To place the VPZ-1 into operation, the screw-on cover from the arming delay mechanism is unscrewed, and the appropriate time delay lead strip inserted into the cutting mechanism. The cap is then screwed back on. The firing device

is then screwed into the demolition charge and the charge emplaced against the target. Once this has been done, the safety pin is withdrawn, freeing up the safety plunger and initiating the arming delay. Once the arming delay has expired, the device will overcome the safety plunger and initiate the integral detonator and booster charge when it senses an acoustic wave against the rubber diaphragm in the top part of the fuze. In turn, this detonates the attached explosive charge.

Above- Side views of VZLS
Right- Top of VZLS showing diaphragm
Photos- Oleksandr Mariash

VUZ-2 (ВУЗ-2)

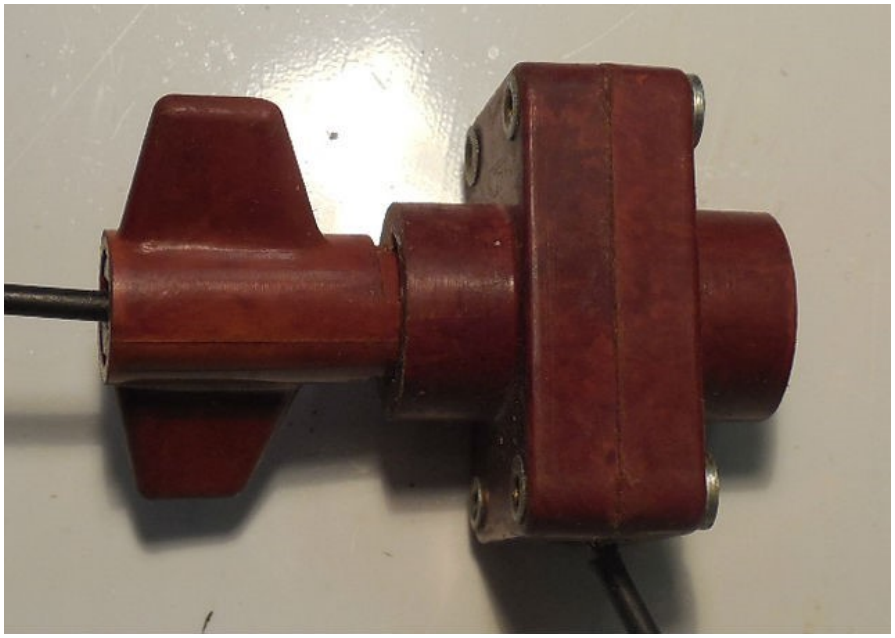
Type- Impulse Generator
Weight- 14.1 oz. (400 g)
Diameter-
Height-

This is an electrical impulse generator used to initiate two separate charges. It is used in conjunction with a VZD delay device or with an MUV series pull fuze. The MUV-2, 3 or 4 can be used as a delay or as a command detonated device using a long wire to pull the release pin.

VUZ-2 Firing Device

The generator capsule is cylindrical and made of Bakelite and metal. The Bakelite section contains a piezoelectric element, pyrotechnic charge and primer at the top. The top is closed by a transit cap screwed on that is replaced by the firing device when set. Wires protrude out the bottom leading to two electronic triggering devices. The triggering devices are connected to the generator by 10 metres of wire contained in cardboard sleeves. A detachable contact consisting of a block and tip are also attached to the wire, one end to each of the wires. The detachable contact breaks the electrical circuit

VUZ-2 Generator Capsule



VUZ-2 Detachable Contact

while the device is in storage. The triggering devices are internally threaded to accept an MD-5M detonator assembly.

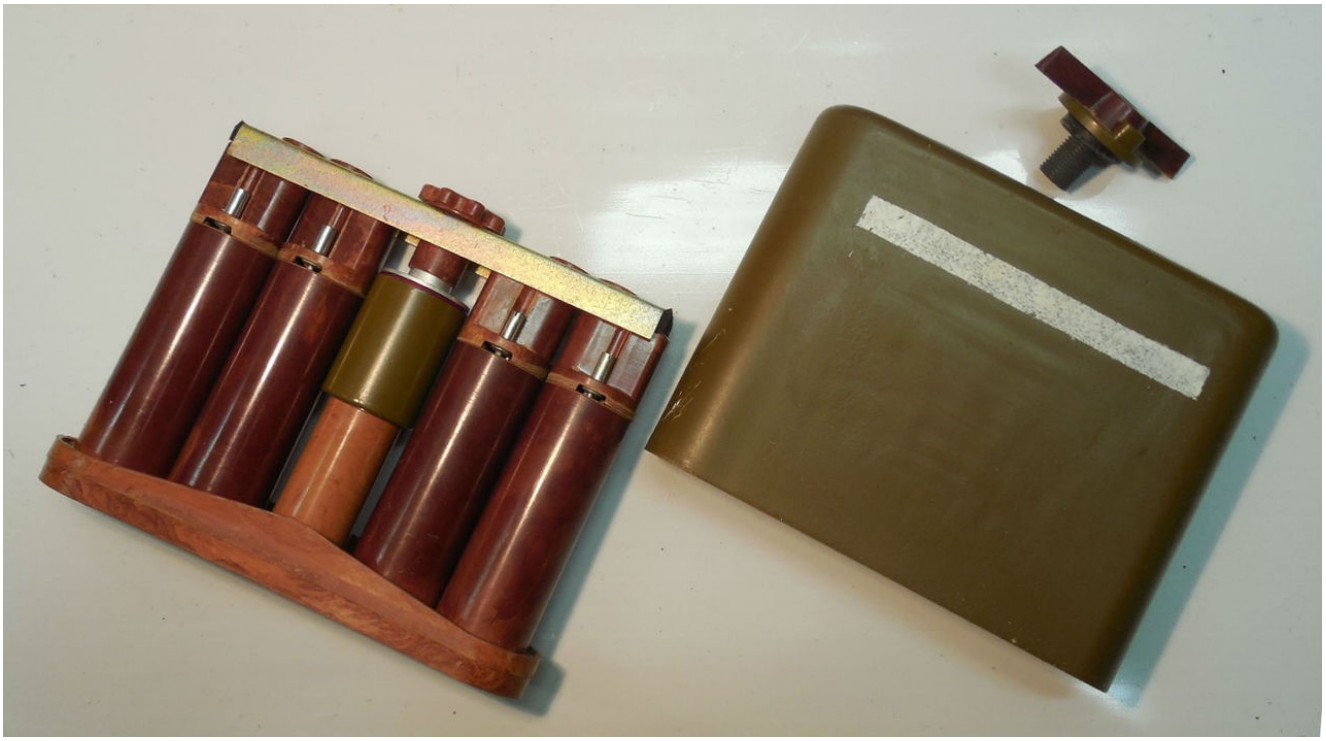
The device is marked on the metal portion of the generator capsule with the designation, manufacturer, lot number and year of manufacture.

For use, the generator is fixed at the firing site and the triggering devices stretched out to the charges. MD-5M detonators are screwed onto the triggering devices and inserted in the charges. The firing device is set and screwed onto the generator. The detachable contact is then connected.

When the firing device operates it fires the primer in the generator which fires the pyrotechnic charge. The gases formed within the generator press on the piezoelectric element causing it to generate an electric charge. The electric charge is passed down the wire to the triggering devices which then fire the MD-5M detonators and thus the main charges.

VUZ-4 (ВУЗ-4)

Type- Impulse Generator
Weight –
Length – 5.7 in. (145 mm)
Width – 0.98 in. (25 mm)
Height – 1.97 in. (50 mm)



VUZ-4 Firing Device

The VUZ-4 is an impulse generator intended to initiate up to four separate explosive charges. It can be cascaded to initiate more than four charges. It is used in conjunction with a delay firing device normally of the VZD series; however MUV-2, 3 or 4 devices may also be used in the delay mode. It can also be initiated by a blasting machine if necessary.

The device is mostly constructed from Bakelite. It consists of a base, with an attached electrical generator in the centre and four electrical ignition assemblies. In transit it is covered by a plastic cover held on by a thumb screw that screws into a bushing on top of the generator. The bushing also secures a bracket holding all the pieces together. The generator contains a primer, pyrotechnic charge and piezoelectric element. The ignition assemblies have 20 metres of fine copper wire and an electrically fired striker. Each of the ignition assemblies will fire an MD-5M detonator assembly.

When the firing device is initiated, it causes the generator primer to fire into the pyrotechnic charge. The gases formed by the charge press on the piezoelectric element causing it to produce an electric charge that is passed down the wires to the ignition assemblies. The ignition assemblies then fire the MD-5M detonator assemblies.

For use, determine an installation site within 20 metres of the charges to be fired. Remove the thumb screw and cover. Remove the bushing and bracket. Take the ignition assemblies out and fix the generator at the installation site. Take the ignition assemblies one at a time and lay the wires out to the charges ensuring the wires are not broken in the process. Screw the MD-5M detonator assemblies into the ignition assemblies and connect them to the charges. Finally, install the firing device onto the

generator. Once activated the firing device will initiate detonation of the four attached charges.

The device may also be used in a cascade if more than four charges are involved. To operate in a cascade one of the ignition assemblies from the first VUZ-4 is screwed onto the generator of the second VUZ-4. If more are required then the process is simply repeated with the second device. There is no limit to the number that can be connected. In this way the functioning of the first VUZ-4 will cause the functioning of all subsequent devices.

If it is to be fired with a blasting machine, one of the ignition assemblies is cut off and the wires insulated to prevent a short circuit. The ignition assembly is then wired to the blasting machine and screwed onto the generator. When the blasting machine is functioned, it causes the ignition assembly to fire the generator and initiate the device.

VUZ-4 Firing Device showing the ignition assemblies

VUZ-8 (ВУЗ-8)

Type- Electromechanical impulse generator
Weight- 60 oz. (1.7 kg)
Diameter- 4.375 in. (120 mm)
Height- 5.7 in. (145 mm)

VUZ-8 Firing Device

The VUZ-8 is similar in purpose to the VUZ-2 and VUZ-4 in that it is designed to simultaneously detonate a group of explosive charges using delayed action devices or blasting machines. The VUZ-8 will detonate up to 8 charges. It can also be cascaded (linked) if there are more than 8 charges. The device may be used underwater up to a depth of 10 metres.

The device consists of a pulse generator, eight electronic ignition assemblies and a cylindrical casing. Most of the device appears to be made of Bakelite, while the outer casing seems to be sheet metal. The outer casing is held onto the base with a thumb screw and is sealed against moisture. The generator is mounted in the centre of the base, the ignition assemblies surround the generator and are held in place by a sheet metal bracket. The bracket is held on by a bushing that screws onto the generator. The generator housing has a bushing at the top containing a primer at the top with a pyrotechnic charge immediately below that. The housing itself contains an annular permanent magnet, an induction coil, an armature with a rod and a contact device. A nylon tape is wound around the upper generator housing and is used to tie the generator in place. The electronic ignition assemblies are used to fire MD-5M detonator assemblies. The ignition assemblies each contain 20 metres of wire. While in storage the generator is shunted by a wire that passes through the bushing holding the bracket on. When the bushing is removed the wire breaks allowing the generator to operate normally.

When the delay device is triggered, it causes the primer to fire into the pyrotechnic charge. The gases formed push on the armature rod. The lower end of the rod closes the contact device connecting the ignition assemblies to the induction coil. With further movement it pushes on the anchor. When the armature moves it opens the magnetic circuit in the annular magnet causing a sharp change in the magnetic flux. As a result, an electromagnetic field is induced in the induction coil causing an electric charge to pass down the wires to the ignition assemblies. The ignition assemblies fire the detonator assemblies which causes detonation of the attached charges.

For use determine an installation site within 20 metres of the charges to be fired. Remove the thumb screw and casing. Remove the bushing and bracket. Take the ignition assemblies out and fix the generator using the attached tape at the installation site. Take the ignition assemblies one at a time and lay the wires out to the charges ensuring the wires are not broken in the process. Screw the MD-5M detonator assemblies into the ignition assemblies and connect them to the charges. Finally install the firing device onto the generator. Once activated the firing device will initiate detonation of the eight attached charges.

The device may also be used in a cascade if more than eight charges are involved. To operate in a

cascade one of the ignition assemblies from the first VUZ-8 is screwed onto the generator of the second VUZ-8. If more are required then the process is simply repeated with the next device. There is no limit to the number that can be connected. In this way the functioning of the first VUZ-8 will cause the functioning of all subsequent devices.

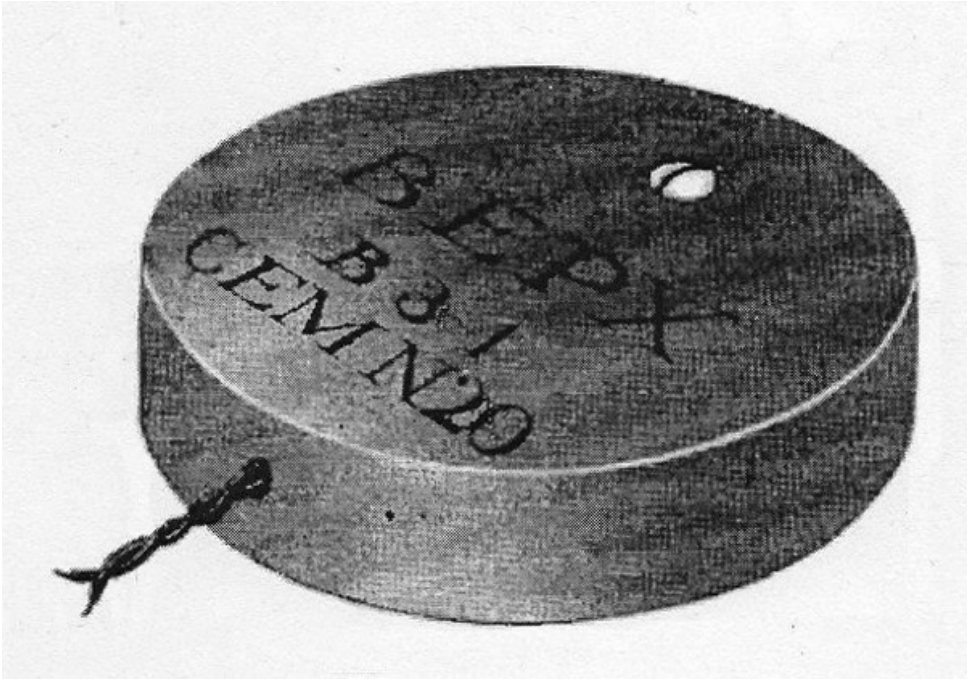
If it is to be fired with a blasting machine, one of the ignition assemblies is cut off and the wires insulated to prevent a short circuit. The ignition assembly is then wired to the blasting machine and screwed onto the generator. When the blasting machine is functioned, it causes the ignition assembly to fire the generator and initiate the device.

VUZ-8 with cover removed

VZ-1 (B3-1)

Type- Vibration
Weight-
Diameter- 3 in. (76 mm)
Height- 1.25 in. (32 mm)

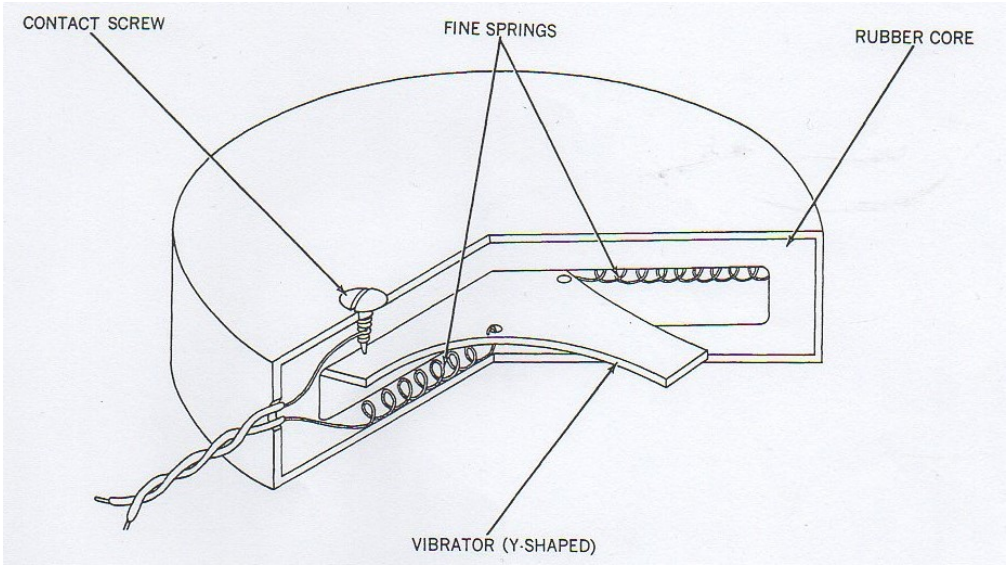
This is a simple device designed to operate by vibration to close an electrical circuit. Designed during the Second World War it is unlikely to still be in service. It was originally intended for use with some MZD delayed-action mines as well as a boobytrap.



VZ-1 Firing Device

The fuze consists of a circular cardboard casing containing a thick hollowed out rubber disc. A "Y" shaped vibrator is suspended in the centre of the disc by three fine spiral springs attached to the junctions of the legs of the "Y". The lead wires enter the device through the side of the casing. A contact screw is attached to one of the electrical leads and is screwed into the top of the casing so that it protrudes into the centre but does not contact the vibrator. The other lead is attached to one of the springs. There is no safety device.

The fuze is stenciled on the top with the word "BEPX" (TOP), the designation "B3-1" (VZ-1), and a manufacturers marking.



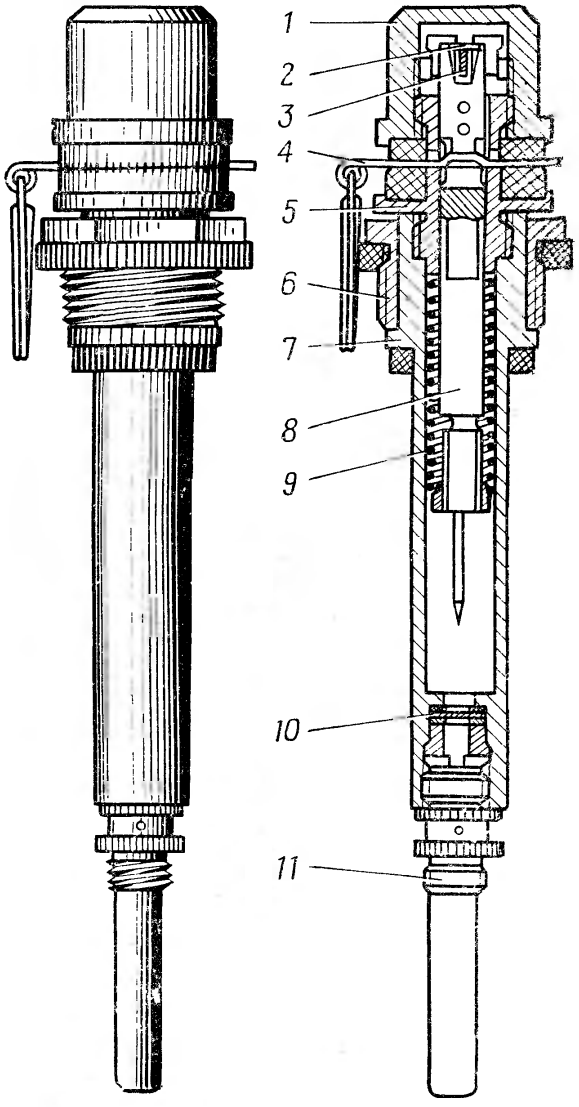
VZ-1 Internal diagram

When laid, the device is attached through the leads to a battery and an electrical detonator inserted into the charge. When nearby movement causes the device to vibrate, the vibrator comes into contact with the contact screw completing the circuit causing the detonator to fire and detonate the charge

VZD-1M (ВЗД-1М)

Type- Delay
Weight- 2.3 oz. (65 g)
Length- 4.4 in. (112 mm)
Diameter- 1 in. (24 mm)

This is a mechanical delay firing device primarily intended as a fuze for the Russian BPM, SPM and UPM limpet mines. However, it can be readily adapted for use with other demolition charges. Dependent upon the type of lead shear strip used, the firing device is capable of delays of 15 minutes to 373 hours. These delays are contingent upon the ambient temperature where the device is employed.



VZD-1M internal diagram

VZD-1M Firing Device

The firing device consists of a main body, striker assembly, safety pin, detonator assembly, and various rubber gaskets. The body is aluminum and has a threaded cap on top. Just below the top it is externally threaded to screw into the limpet mines. The bottom of the body shaft is internally threaded to accept the detonator assembly. The striker assembly screws into the top of the body. The striker has a shear wire in the top under which the lead shear strip is inserted. The striker spring surrounds the striker shaft held in place by a guide washer near the bottom end and the body of the

striker assembly at the top. A long, sharp and thin striker head is mounted at the bottom of the striker shaft. The striker is held in the cocked position by the safety pin. An MD-2 or MD-5M detonator assembly screws into the bottom of the body shaft. The various rubber gaskets ensure the device is waterproof for underwater use.

Before being placed into operation, the cap is removed and a lead alloy shear strip, suitable for the timing delay required, is inserted below the striker's cutter. Seven color-coded shear strips are available (unpainted, red, black, white, green, brown and one unknown), these covering average time delays at +20°C of 15 mins to 373 hours. Once the shear strip is installed and the cap replaced, the firing device is inserted into the mine or demolition charge. The explosive charge is then emplaced, and the safety pin removed. When the safety pin is removed, the shear wire contacts the shear strip and under pressure from the striker spring cuts through the strip. Once the strip is severed the striker is released to drive down under pressure of its spring, onto the percussion cap of the detonator assembly initiating it and the attached charge.

VZD-3 (ВЗД-3) and VZD-3M (ВЗД-3М)

Type- Delay
Weight- VZD-3- 0.6 oz. (17 g)
VZD-3M- 0.9 oz. (26 g)
Length- VZD-3- 2.6 in. (66 mm)
VZD-3M- 4.1 in. (104 mm)
Diameter- .5 in. (13 mm)

This device is primarily intended as a fuze for the Russian MPM limpet mine. However, it can be readily adapted for use with other demolition charges. It uses a shear principle to provide the delay. The delay times vary from 15 minutes to 360 hours and are very sensitive to the ambient temperature. The lower the temperature, the longer the delay.

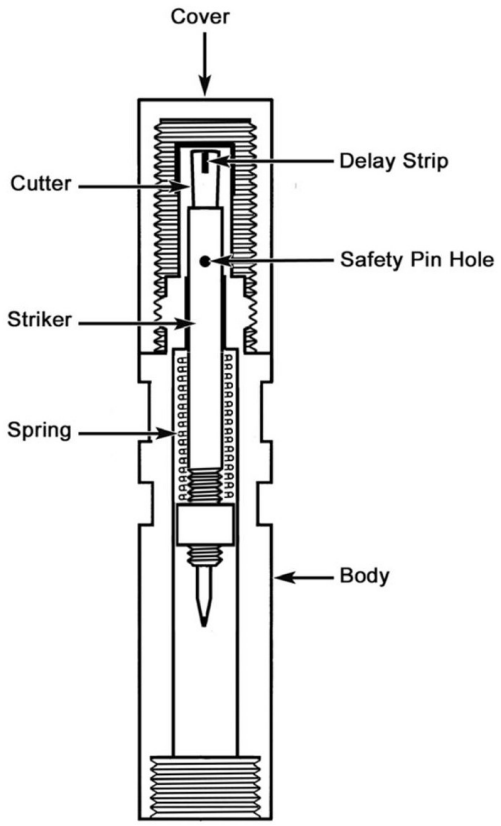
The main difference between the VZD-3 and VZD-3M appears to the be the length of the device. Other differences are unknown at this time.

This device consists of a body, cap, striker, delay strip and detonator assembly. The body is made of aluminum and is turned down at the top end to make a thin shaft. The body is drilled out with a larger section at the bottom end and smaller section in the upper end. It is not drilled through at the top. The bottom end is internally threaded to accept the detonator assembly. Just below the thin shaft at the top it is externally threaded to accept the closing cap. The shaft is slotted twice, one to fit the delay strip and the other to fit the shear wire on the striker. The cap is simply an aluminum threaded cap to close the top end of the fuze. The striker is made up of a thin shaft, threaded to accept a guide washer. It has a shear wire attached to the top end and a very sharp striker point mounted in the bottom end. The delay strips come in four colours each corresponding with a delay period. They are made of a lead alloy with varying hardness. A set is issued with each device. The detonator assembly is either the standard MD-2 or MD-5M.

VZD-3 Firing Device

When assembled the striker and spring are inserted from the bottom with the shaft fitting up into the smaller section at the top of the body. As it is pushed up, compressing the spring, the shear wire fits into the slot at the top of the body shaft. A safety pin fits through a hole in the shaft and through a corresponding hole in the striker shaft. The safety pin is bent to fit through the shaft and up the side of the shaft with a small ring on the top end to cover the top of the shaft. The delay strip fits into the opposing slot fitting under the shear wire. A small press fit cap covers the top of the body shaft and holds the delay strip in position. The shape of the safety pin assists in holding the press fit cap in place. The body cap is then screwed on.

For use the appropriate strip for the time delay is chosen and put in place in the device. The detonator assembly is then screwed in place. When the device has been inserted in the charge the cap is removed and the safety pin withdrawn. This allows the striker spring to assert pressure downwards



VZD-3 internal diagram

bringing the shear wire in contact with the delay strip. The cap is then screwed back on. The shear wire slowly cuts through the delay strip until it severs it. At that point the striker is free to be driven downward under pressure of the spring until it hits the percussion cap in the detonator assembly. The cap fires causing the detonator to fire and detonate the main charge.

VZD 6Ch (ВЗД-6Ч)

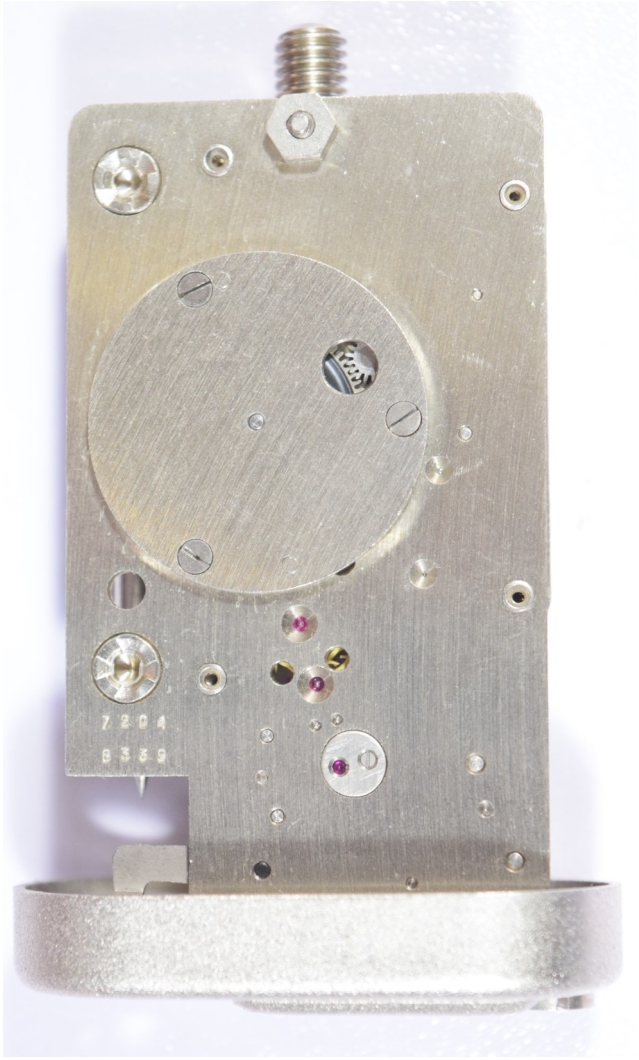
Type- Delay
Weight- 8 oz. (230 g)
Length- 3.5 in. (90 mm)
Width- 2 in. (50 mm)
Depth- 1 in. (25 mm)

This is a simple mechanical clockwork delay mechanism. It is normally used in conventional demolition operations; however, it can also be used as a boobytrap or sabotage device. It will provide a delay of 15 minutes to 6 hours.

The device consists of a casing, clockwork mechanism, striker mechanism and uses either an MD-2 or an MD-5M detonator assembly. The casing is made of steel and has a knurled nut on the top. The bottom of the casing is a cap that has the clockwork and striker mechanisms mounted to it. The upper casing fits over the entire device and fits into the lower casing cap. When assembled the nut on the upper casing is screwed onto a threaded stud on the clockwork mechanism. The bottom cap also has a threaded well to screw the detonator assembly into. The well is closed by a threaded plug. The clockwork mechanism has a dial in the centre with two small studs on it. There are two arrows around the dial, one black and one white pointing in opposite directions. A small window and indicator are located just below the dial. The time delay disc shows through the window. The striker mechanism is located to the side of the clockwork mechanism.

VZD-6Ch Firing Device
Photo- G. Zahaczewsky

VZD-6Ch Front with casing removed
Photo- G. Zahaczewsky



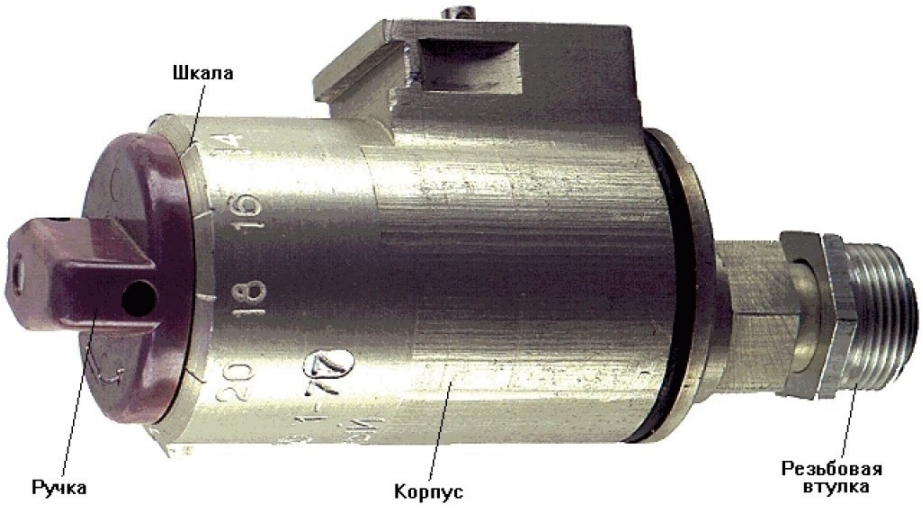
VZD-6Ch Back with casing removed
Photo- G. Zahaczewsky

For use, the upper casing is removed by unscrewing the knurled nut. The clockwork mechanism is wound by turning the dial in the direction of the black arrow. When wound, and while pushing up on the collar on the striker turn the dial in the direction of the white arrow until the desired delay is displayed by the numbers on the time delay disc. The device is reassembled and the plug closing the detonator well removed and replaced by the detonator assembly. Shake the device to ensure the mechanism starts. When started, a ticking sound should be heard. Once the delay has expired the clockwork mechanism trips the striker mechanism allowing the striker under pressure of its spring to stab down into the primer in the detonator assembly.

VZD-20M (ВЗД-20М)

Type – Delay
Weight – 19.4 oz. (550 g)
Length – 6.125 in. (155 mm)
Diameter – 2 in. (50 mm)

This is a mechanical clockwork delay firing device primarily intended as a fuze for the Russian SPM and UPM limpet mines. However, it can be readily adapted for use with other demolition charges. It can be set for delays of 1, 2.5, 4, 6, 8, 10, 12, 14, 16, 18, and 20 hours. Accuracy of the delay is 12% for shorter periods and 2% for longer periods of time.



VZD-20M Firing Device

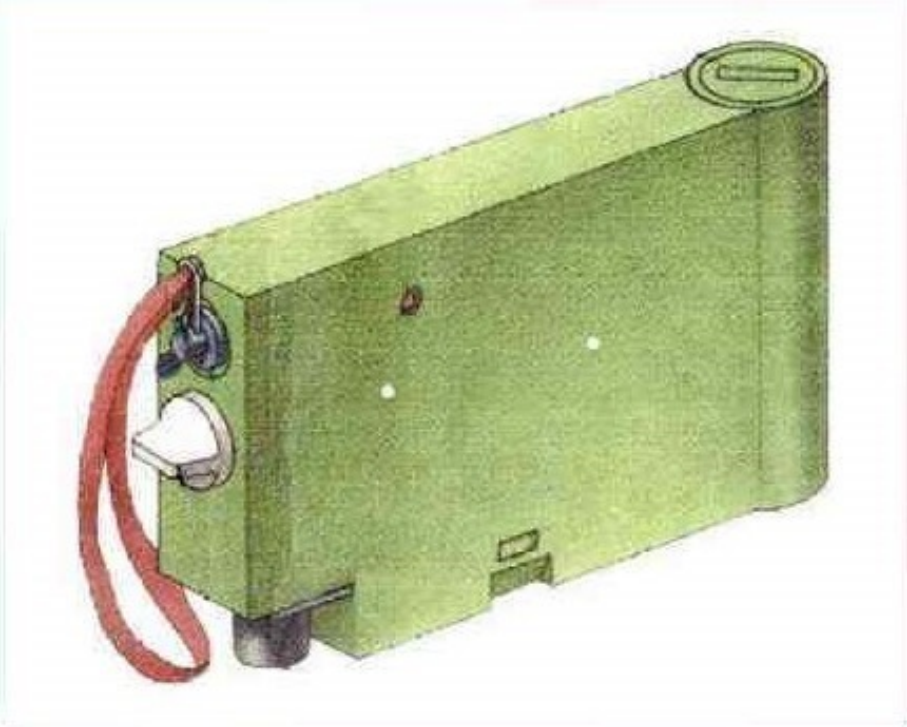
The device consists of a main body (корпус), which includes a rotating time setting dial (ручка), a built-in safety mechanism, a clockwork delay mechanism, and a striker assembly. The firing device normally utilizes an MD-5M detonator assembly, which is screwed into a threaded plug (резъбовая втулка) to initiate the attached mine or demolition charge. The main body of the firing device has a square appendage that contains part of the arming and safety mechanism of the device.

To place the firing device into operation, the setting dial is rotated to the desired setting using the scale (шкала) engraved into the body of the device. The MD-5M is then screwed into the threaded plug, and the firing device inserted into the mine or demolition charge. The safety is removed from the appendage on the device initiating the clockwork delay. While the device is operating the setting dial will rotate. When the firing device reaches its preset time, an internal lever is tripped, which initiates the firing sequence.

This firing device utilizes the same clockwork delay mechanism as found in the Russian VZD-144 series. An inert training version, U-VZD-20M, is known to have been produced.

VZD-100Ch (ВЗД-100Ч)

Type – Electronic Delay
Weight – 4 oz. (113 g)
Length – 4.6 in. (117 mm)
Width – 2.6 in. (66 mm)
Height – 0.86 in. (22 mm)

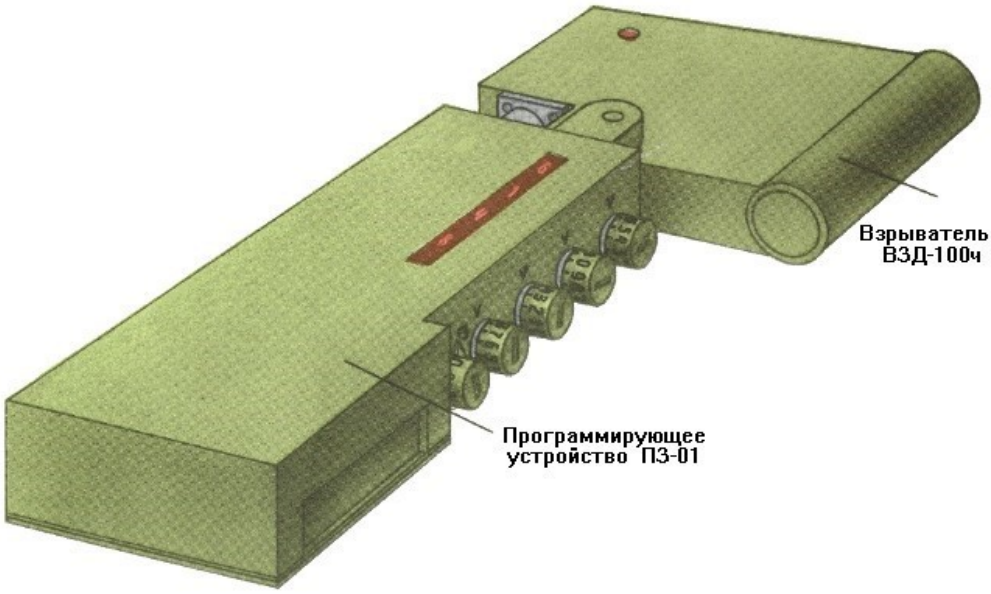


VZD-100Ch Firing Device

The VZD-100Ch is a programmable, battery-powered, electronic delay firing device that can be set for a delay of 16 minutes up to 99 hours and 59 minutes. The firing device is used with the MD-5M detonator, and can be employed in mines or demolition charges.

The firing device is actually a two-part system. One part is the firing device itself, while the second part is the PZ-01 programing device that electronically sets the time delay in the VZD-100Ch. Both components have polymer plastic bodies. The firing device includes a positive safety pin, a battery compartment, and the electronic circuitry to arm and initiate the device.

To place it into operation a 7RTS53U battery is inserted into the firing device. A red LED will indicate if a fully charged battery is properly installed. The firing device is then plugged into the programming unit with the battery powering both components. The desired time delay is then selected on the PZ-01. The firing device is then disconnected from the programming unit. The positive safety pin is removed. If the firing device is ready for use, the LED will flash. An MD-5M detonator is then screwed in and the firing device connected to the mine or demolition charge. An arming delay of eight minutes is built into the firing device before the desired time delay is initiated.



The VZD-100Ch coupled with the PZ-01 programming unit

If a PZ-01 programming device is not available, a default delay time will be initiated as soon as the positive safety is removed from the VZD-100Ch.

VZD-135 (ВЗД-135)

Type – Electronic Delay
Weight – 8.8 oz. (250 g)
Length – 4.8 in. (124 mm)
Width – 2.6 in. (68 mm)
Height – 1.1 in. (29 mm)

The VZD-135 is a battery-powered, electronic delay firing device manufactured prior to 2012. It can be set for an initiation time of 60, 180, or 300 seconds with an arming delay of 30 seconds. The firing device has a plastic body, and uses an A316 battery as a power source. The VZD-135 uses an MD-5M detonator and can be employed in either mines or demolition charges.

VZD-135 Firing Device

Further technical and operational details of the VZD-135 are unknown.

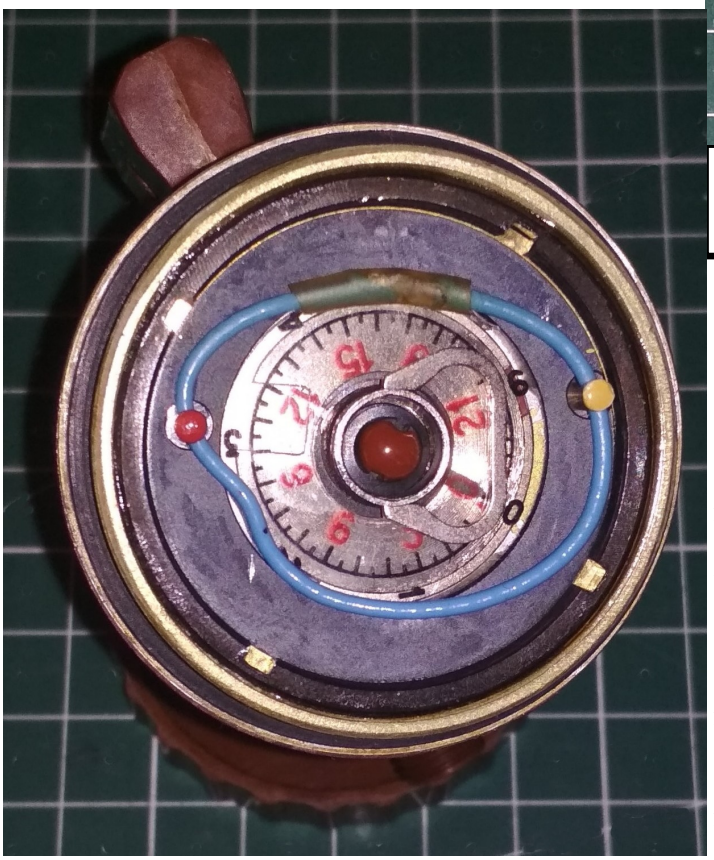
VZD-144 (ВЗД-144) and VZD-144Ch (ВЗД-144Ч)

Type – Clockwork delay
Weight – 12.3 oz. (349 g)
Length – 4.8 in. (122 mm)
Diameter – 2 in. (50 mm)

The VZD-144 is a spring-wound, delayed action firing device used to initiate an MD-5M detonator, or to close an electrical firing circuit when fitted with an appropriate adapter. It can be set for a delay of 30 minutes, or up to 144 hours (six days) with a 10% accuracy. It is similar in operation to the VZD-144Ch, but differs in the body material (the VZD-144Ch is all-metal construction), physical dimensions (the VZD-144Ch is 3 in. (76 mm) long), as well as the additional clamps used to attach the device to a target (the VZD-144Ch has none). These firing devices can be used in a conventional demolition role, or as boobytraps, and have been encountered in Afghanistan.

The VZD-144 is constructed mainly of Bakelite, with some metal components. One end of the Bakelite body contains a cap-covered clockwork mechanism, a winding key, and two safety pins. The other end contains a receptacle for the MD-5M detonator, or the adapter for the electrical firing circuit. On the side of the body is a clamp for securing the firing device to a target.

VZD-144 Firing Device
Photo- Oleksandr Mariash



Top of VZD-144 with cover off
Photo- Oleksandr Mariash

The first step in using the VZD-144 is to remove the closure cap and wind the clockwork mechanism. The next step is to set the delay initiation time utilizing the time-setting tool that is provided with each firing device. While viewing the face of the firing device, there are two sets of numerals visible – red numbers indicating hours (in 30-minute increments), and black numbers indicating days. Using the fuze setting tool, the dials are rotated until the desired number is positioned over the arrow indicator on the face of the firing device. Once this has been accomplished, the closure cap is replaced, and an MD-5M detonator (or electrical circuit

VZD-144Ch Firing Device

adapter) is attached. The firing device is then inserted into the demolition charge, and the two safety pins are removed. The VZD-144 is now armed and functioning.

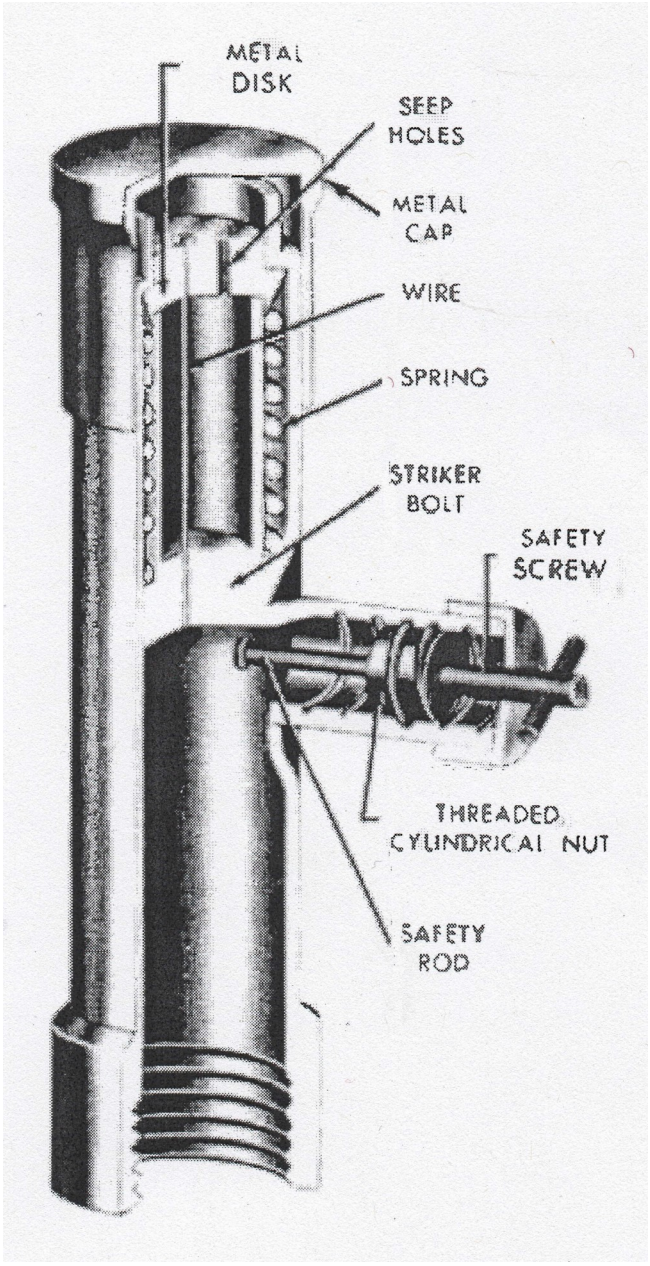
VZD-144Ch with cover off and showing time setting tool.

VZDKh (ВЗДХ)

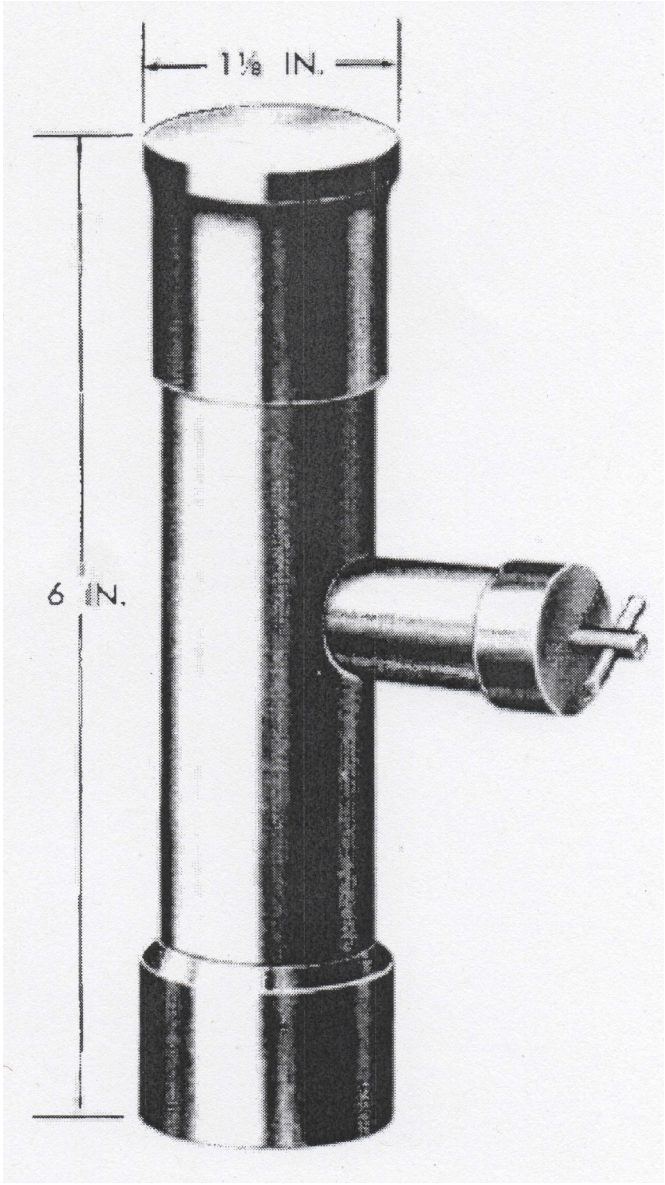
Type- Mechanical-Chemical Delay
Weight-
Height- 6 in. (157 mm)
Diameter- 1 1/8 in. (25 mm)

This is an older delay type firing device developed during the Second World War.

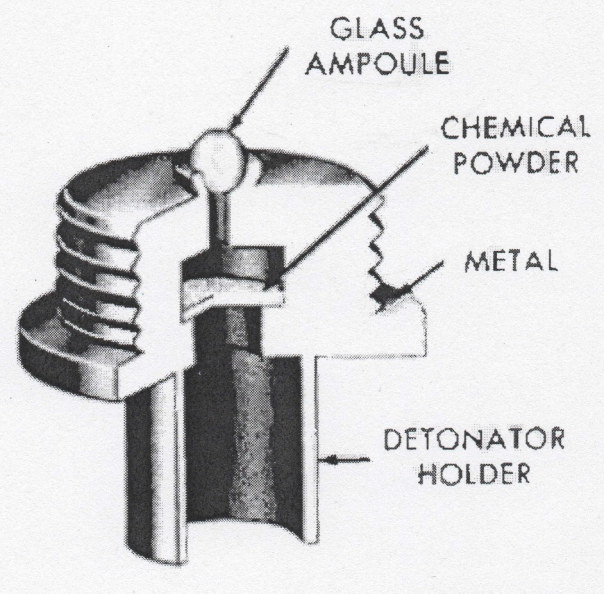
This fuze has a cylindrical body with a smaller tube located in the side of the cylinder. The top of the body is closed by a threaded cap. The bottom of the body is internally threaded to accept either an electrical or chemical base. The safety screw assembly is located in the smaller tube on the side of the body. The tube is internally threaded to accept a threaded nut with a safety rod on the inner end and a turning shaft on the outer end. The turning shaft protrudes through a threaded cap. The spring-loaded striker assembly is located in the upper half of the body. The striker assembly consists of a striker bolt, striker spring, retaining wire and metal disc. The striker bolt is hollow and has a head to fit the inside of the tube. Just above the head the diameter is reduced to allow the striker spring to fit between the bolt and body tube. The metal disc has a flange on the top to fit over the top of the tube and a reduced section to fit inside the striker bolt. There are seep holes through the disc. The striker spring is compressed between the flange on the disc and striker head. A wire



VZDKh internal diagram



VZDKh Firing Device



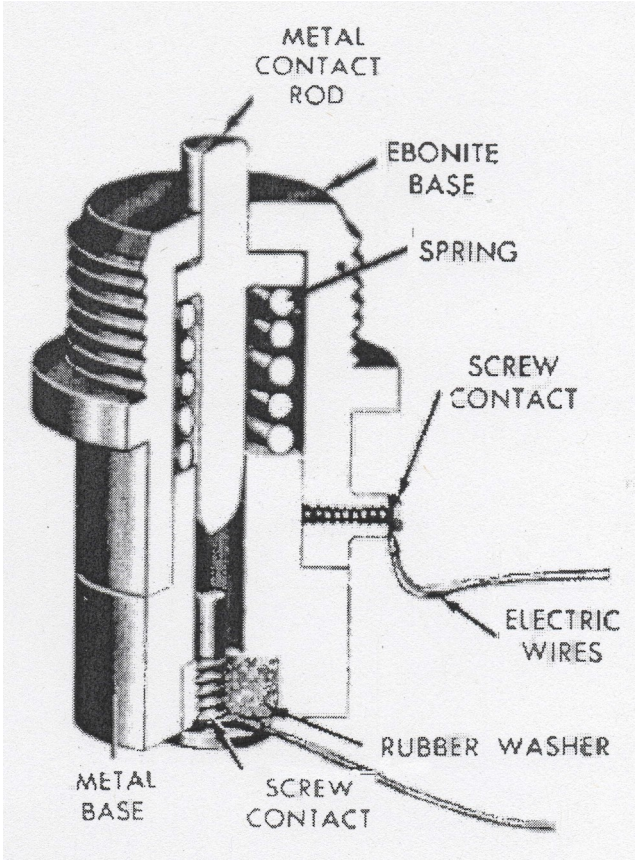
Chemical base for VZDKh

between the striker head and disc holds the assembly together. When assembled the safety screw is fully screwed in so that the safety rod fits into the tube blocking travel of the striker bolt.

There are two bases that can be used with this device. The first is a chemical base made of metal and threaded to fit the threads in the bottom of the body. A detonator holder is attached to the bottom of the base. Internally there is a chemical powder. Mounted to the top is a glass ampoule containing acid with a hole under it. A nonelectric detonator is used with this base.

The second type of base is an electrical contact type with the main body made of Ebonite. A metal base the same diameter of the Ebonite section has a reduced diameter on top to fit up into the Ebonite base. Contained within the Ebonite portion is a striker and spring. The top of the striker protrudes out the top of the base and is held in that position by the spring. A screw through the side of the Ebonite base serves to fasten the metal base in position and acts as an electrical contact. A wire is attached to the screw. The bottom centre of the metal base has a rubber washer fitted. A screw contact through the rubber washer acts as a second electrical contact and has a wire attached to it. The rubber washer insulates the bottom contact from the metal base.

For use ensure the safety screw is screwed in. Screw in the appropriate base and place the fuze in the charge or connect it to an electrical detonating circuit. Unscrew the top cap and pour sulfuric acid into the hole in the cylinder. Replace the top cap and unscrew the safety screw. The sulfuric acid seeps into the hollow striker bolt and begins to corrode the striker retaining wire. Eventually the wire will break and free the striker bolt to move downward under pressure of the striker spring until it hits the base. If the chemical base is used the striker bolt breaks the ampoule of acid allowing the acid to drip onto the chemical powder. A reaction between the two causes a flash that travels into the nonelectric detonator causing it to fire. If the electrical base is used the striker bolt hits the top of the striker and drives it down against the pressure of its spring. The striker will contact the screw contact in the bottom of the base and close the electrical circuit.



Electrical base for VZDKh

MD-2 (МД-2) Detonator Assembly

Length- 2.375 in. (60 mm)
Diameter- Adapter .625 in. (15 mm)
Detonator- .25 in (6.85 mm)

This non-electric detonator assembly was used with many of the Russian mines and firing devices. It is an older assembly and has been replaced by the newer MD-5M detonator assembly. While unlikely, it may still be found in use.

The assembly consists of an adapter, KV-11 stab sensitive primer, and TAG 8A or TAT-8 detonator. The adapter is either metal or plastic. The upper end is threaded to screw into various firing devices and mine fuzes. The upper end has the primer mounted in the centre. There is a raised and knurled band around the adapter just below the upper threaded section used as a gripping ring. Below the ring is a stud for the detonator to be crimped on. Once crimped on the detonator is sealed with a black sealing compound.

Inert training versions have a white band around the detonator and are designated as "U-MD-2". A red band indicates a practice detonator with a small pyrotechnic charge and are designated UI-MD-2.

MD-2 Detonator Assemblies

MD-5 (МД-5) Detonator Assembly

Length- 2 in. (50 mm)
Diameter- .5 in. (13 mm)

This non-electric detonator assembly replaced the MD-2 assembly in the late 1950's or early 1960's. It is used with many of the Russian firing devices and mine fuzes.

The assembly consists of an adapter, KV-11 stab sensitive primer and TAG-8A or TAT 8A detonator. The adapter has two threaded ends with a wide knurled band in the centre. The upper end is threaded to screw into various firing devices and mine fuzes. The lower end of the adapter to screw into charges. The primer is mounted in the centre of the top end and the detonator mounted in the bottom end.

Inert training versions have a white band around the detonator and are designated as "U-MD-5". A red band indicates a practice detonator with a small pyrotechnic charge and are designated UI-MD-5.

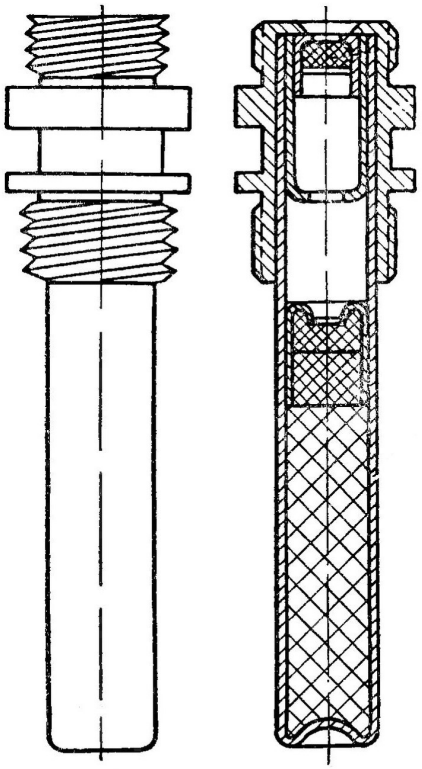
MD-5 Detonator Assemblies

MD-5M (МД-5М) Detonator Assembly

The differences between the MD-5 and MD-5M are difficult to determine and may simply come down to the sealing lacquer used on the joint between the adapter and detonator.

It appears that earlier versions of the MD-5M had a slightly different adapter that has two raised knurled rings rather than the one larger one. These have been changed to the one larger ring for later versions.

Inert Training versions have a white band around the detonator. Inert training versions are designated "U-MD-5M". A red band indicates a practice version containing a small pyrotechnic charge and are designated UI-MD-5M.



MD-5M Detonator Assembly

EDP (ЭДП) and EDPr (ЭДП-р) Detonator Assemblies

Length- EDP- 1.875 in. (47 mm)
EDPr- 2.25 in. (54 mm)
Diameter - Adapter .5 in. (12 mm)
Detonator body .25 in. (7 mm)

The EDP and EDPr detonator assemblies are the standard electric detonators used in Russian mines and firing devices. The EDPr is the newer version and differs from the EDP in that it has a knurled adapter that can be screwed into various explosive charges. The TAT-8A detonator body is constructed of aluminum, and is filled with Tetryl as the main charge. Each strand of the firing wires is 1 metre long.

The detonator assemblies are unmarked and the colour of wire is unregulated. Inert training versions (U-EDP and U-EDPr) have an annular white band around the middle.

EDPr Detonator Assembly
Photo- G. Zahaczewsky

NM (HM) Initiator

Weight – 1.4 oz. (40 g)
Length – 2.1 in. (53 mm)
Diameter – 1.1 in. (25 mm)

The NM initiator is an electro-pyrotechnic device to allow electrical initiation of non-electric detonators, such as the MD-5M. It can also be screwed directly onto the detonators contained in various Russian antipersonnel mines. The NM initiator is a component of the MVE-72 firing device, but can be incorporated into any electric firing system to detonate mines, boobytraps and other explosive charges.

It is of one-piece construction, with the body made of Bakelite. Inside the body there is an electric squib and a pyrotechnic composition that, once electrically initiated, will drive an internal firing pin into the primer of a non-electric detonator. Each of the electrical leads is 12 inches (30.5 cm) in length.

NM Initiator with MD-5M detonator

VZD (ВЗД) Contact Switch

Type – Electronic Circuit Closer
Weight –
Length –
Diameter –

The VZD contact switch is used to allow the delayed completion of an electrical circuit to initiate a mine or an explosive charge. The switch is screwed into an appropriate firing device, such as the EKhV-7, or MUV-2, MUV-3, or MUV-4. It is most commonly used with an electric detonator such as the EDPr.

It is of one-piece construction, and the knurled body is made of Bakelite. The body is externally threaded, which allows it to be screwed into a firing device. The top part of the switch has an open contact switch that is closed when the striker of the attached firing device is released into it. The bottom part of the switch has two wires protruding from it that are attached to the electric detonator.

VZD Contact Switch

VZD contact switch with EKhV-7

VZD contact switch with MUV-2

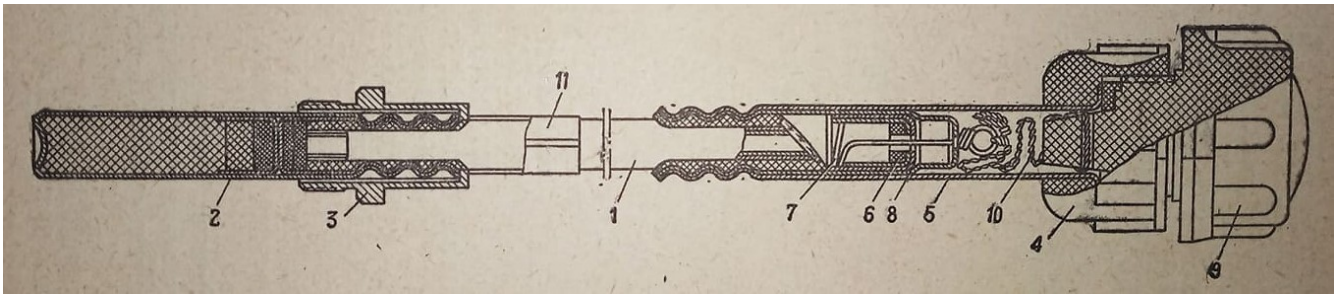
ZTP-50 (ЗТП-50), ZTP-150 (ЗТП-150), ZTP-300 (ЗТП-300)

These are manufactured ignition sets complete with fuse lighter and detonators. They are fitted with either a friction lighter or a mechanical percussion lighter.

The friction lighter has a Bakelite body mounted on a brass tube. The body has a threaded cap screwed into the bottom portion. The brass tube contains a pyrotechnic friction pellet with a wire passing through a hole in the centre of the pellet. The bottom end of the wire is coated in a friction compound and coiled into a spiral. The top end of the wire is attached to a nylon thread that is attached at the other end to the body cap. The bottom end of the brass tube is crimped onto the fuse.

When the cap is uncrewed and pulled, it pulls the friction wire through the pyrotechnic pellet causing it to flash and burn to ignite the fuse.

Friction Ligher
Photo- Oleksandr Mariash



Internal diagram of Friction Ligher on ZTP-50
1- Fuse, 2- Detonator, 3- Adapter, 4- Body, 5- Brass sleeve, 6- Ignition pellet, 7- Friction Wire, 8- Ignition pellet body, 9- Cap, 10- Nylon cord, 11- Marking sleeve

The manual percussion lighter has a tubular metal body internally threaded at the bottom end. The body contains a striker and striker spring. The striker spring is compressed by the striker and held in place by a flat release pin through a slot in the striker. A pull ring is fitted into a hole in the release pin. The top of the body has two slots, one deep one and a shallow one. When the release pin is in the deep slot it cannot be removed, when in the shallow slot it can. A threaded fuse adapter must be crimped onto the fuse. The fuse adapter has a percussion cap mounted in the centre.

Mechanical Percussion Lighter

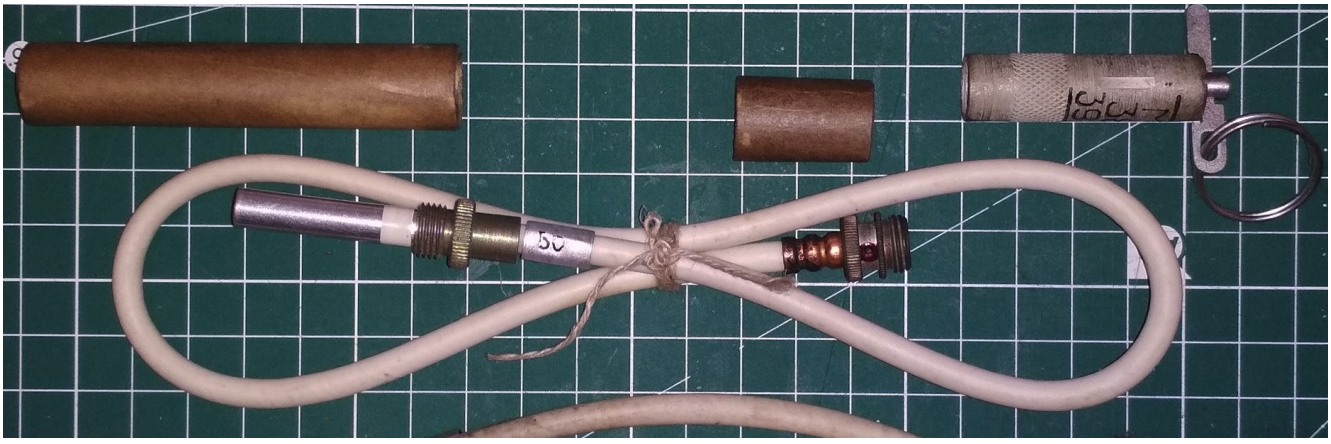
For use the fuse adapter is screwed onto the lighter mechanism. The release pin must be lifted and rotated 90 degrees until it disengages the deep slot and engages the shallow slot. The pin can then be pulled out, releasing the striker to drive down onto the percussion cap. When the percussion cap fires it ignites the fuse.

ZTP-50 (3ТП-50)

Weight- 1.75 oz. (50 g)
Length- 21.7 in. (55 cm)
Diameter- Fuse 0.25 in (5-6 mm)

The ZTP-50 can be found with either of the two fuse lighters. The fuse is crimped on the lighter at one end and onto a threaded nipple at the other. The detonator (No. 8A) is crimped onto the nipple. Use of the threaded nipple ensures that it can be screwed into TNT charges with ignition wells with the same threading. This device has a length of fuse to give a delay of 50 seconds (+/- 2.5 seconds). It can be used for charges underwater to a depth of 5 metres, but the burning time is reduced to 40 seconds (+/- 2.0 seconds). It should be noted that the lighter should be activated above water.

The detonator set is marked with an aluminum sleeve on the fuse near the detonator with “50” stamped into it and filled with black paint. The fuse is grayish white.



ZTP-50
Photo- Oleksandr Mariash

ZTP-150 (ЗТП-150)

Weight- 2.65 oz. (75 g)
Length- 61 in. (155 cm)
Diameter- Fuse 0.25 in (5-6 mm)

The ZTP-150 can be found with either of the two fuse lighters. The fuse is crimped on the lighter at one end and onto a threaded nipple at the other. The detonator (No. 8A) is crimped onto the nipple. Use of the threaded nipple ensures that it can be screwed into TNT charges with ignition wells with the same threading. This device has a length of fuse to give a delay of 150 seconds (+/- 7.5 seconds). It can be used for charges underwater to a depth of 5 metres, but the burning time is reduced to 100 seconds (+/- 5.0 seconds). It should be noted that the lighter should be activated above water.

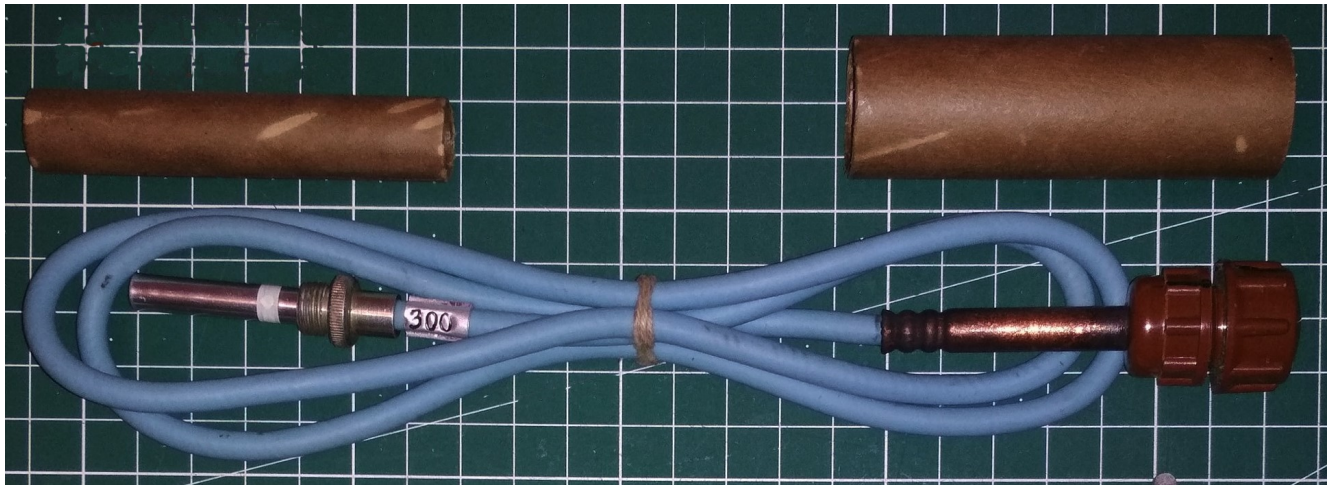
The detonator set is marked with an aluminum sleeve on the fuse near the detonator with “150” stamped into it and filled with black paint. The fuse is grayish white.

ZTP-300 (ЗТП-300)

Weight- 2.3 oz. (65 g)
Length- 39.5 in. (100 cm)
Diameter- Fuse 0.25 in. (5-6 mm)

The ZTP-300 can be found with either of the two fuse lighters. The fuse is a slower burning type than that used on the ZTP-50 or ZTP-150. It is crimped on the lighter at one end and onto a threaded nipple at the other. The detonator (No. 8A) is crimped onto the nipple. Use of the threaded nipple ensures that it can be screwed into TNT charges with ignition wells with the same threading. This device has a length of fuse to give a delay of 360 seconds (+/- 18 seconds). It can be used for charges underwater to a depth of 5 metres, but the burning time is reduced to 300 seconds (+/- 5.0 seconds). It should be noted that the lighter should be activated above water.

The detonator set is marked with an aluminum sleeve on the fuse near the detonator with “300” stamped into it and filled with black paint. The fuse is blue.



ZTP-300
Photo- Oleksandr Mariash

Manufacturers

	US	A. C. Gilbert Co.
	US	Automatic Temperature Control Co. Philadelphia, PA
ADI	AUS	Australian Defense Industries
B&P	UK	Boon & Porter Ltd.
BUL	US	
CMZ	US	Whittaker Corp, Columbus Milpar Div.
CRC	UK	Cravens Railway Carriage and Wagon Co. Ltd. Darnall, Sheffield
CY	UK	Chorley
D over B	UK	Blackwood Trading Co., Kingston-on-Thames
EA	UK	Electric Apparatus Co., Vauxhall Works, London
EMI	UK	Electric and Musical Industries
ESS	UK	ESS Signs Ltd., Edgeware Road, Hendon
FHH	UK	
GHG	UK	G. H. Garland & Co. Ltd, Nibthwaite Road, Harrow, Middlesex, England
	US	Geometric Stamping Co. Euclid, OH
	UK	Gladhills
	US	John W. Hobbs Corp.
KYC	US	Keystone Alloys Co. Ltd.
Kynoch		UK Kynoch Ltd.
LNO	US	
L over G	UK	Gladhill
LP	UK	Lang Pen Company Ltd., Aubrey House, Ely Place, Holborn Circus EC1
MAI	US	Maryland Assemblies Inc.
MD1	UK	Ministry of Defence 1
MDSL	UK	Mondial Defence Systems Limited.
ME	AUS	Maribyrmong Explosives
MMC	US	Marquette Corp.
MRP	NL	
MTL	US	Mast Technology Inc. Independence MO
NJD	US	Navajo Army Depot
OPI	US	Ordnance Prod Inc.
PA	US	Picatinny Arsenal
PTR	NL	
PXC	US	Ambac Ind Inc, Pace Co. Div.
RHN	US	United States Army Ammo Depot.
RM LTD	UK	
SGK	US	Security Signals Inc.
SND	US	Seneca Army Depot
SNL	US	
SPE	POR	Sociedede Portuguesa de Explosivos
	US	H.A. Sward Co. Inc.
S over J		UK J Lucas
TGCo	UK	The Gramophone Co.
TGSR	UK	The Gramophone Co. Springfield Road
T over T	UK	Tecalamit Ltd., Brentford
UDD	US	
WWE	US	
	UK	Wembley Electric Appliances
	US	Universal Match Corp. Ferguson Mo.
Y over B	UK`	Bryant and May
107	UKRAINE	Donetsk
583	RUS	Saransky Mechanical Plant

Credits for all books in TBRM series

This is by no means a complete list of credits or references. Many other people and institutions have helped in the production of these publications. Apologies to anyone I have missed.

Australian War Memorial
Darrol Vincent Bowlzer
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Leo Monkivitch
Jeff Osborne
Drew Prater
Dave Sampson
A, Skrobot
T. Mathew Smith
Colin MacGregor Stevens
George Zahaczewsky

References

Many Official Documents, Military Manuals, Training Circulars, notes and reports.

Commercial Books

Tombe Du Ciel	Eric Pierret
SOE Equipment Air dropped in Europe	Anders Thygesen & Michael Sode
Malice Aforethought	Ian Jones MBE
The British Spy Manual	IWM
Winston Churchills Toyshop	Stuart Macrae
Station 12, SOE's Secret Centre	Des Turner
Secret Agents Handbook of Special Devices	Mark Seaman
The Plumber's Kitchen	Donald B. McLean
OSS Weapons II, Second Edition	Dr. John W. Brunner, Ph.D.
SOE, The Scientific Secrets	Frederick Boyce and Douglas Everett

Websites

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