

# The Boobytrap Recognition Manual

Volume 6A1

Miscellaneous Boobytraps and Firing Devices



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2026

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Amendment 1 Sept. 2026

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## INTRODUCTION

This publication continues the series of “The Boobytrap Recognition Manual” originally created by Darryl Lynn and, as he said in his very first introduction, it is “a result of frustration trying to find those little tidbits of information that are spread throughout many books, manuals and papers.” The team that created this particular publication consisted of George Zahaczewsky, Bob Gravett, Darryl Lynn, as well as significant contributions by Jeff Osborne, Francis Caley, Ziv Livni, and Joe Vollenberg who were kind enough to share both photographs and technical information. We all hope that you will find the contents both informational, as well as potentially useful.

A commonly held definition of a boobytrap is, “A device designed, constructed or adapted to kill or injure, which functions when a person disturbs or approaches an apparently harmless object or performs an apparently safe act.” However, there is some discussion that a “boobytrap” is more of a function than an actual device. Although there are quite a few firing devices that have been manufactured whose sole purpose is to function as a boobytrap, there are many other objects that have been modified to serve in a boobytrap capacity - a wooden stake, or even a simple rock. Some fuse lighters/igniters, as well as hand grenade and mine fuzes, have also served a dual purpose as a boobytrap. So, the term “boobytrap” both describes function, as well as form. Some reader discretion may be required.

For the most part, this document covers those boobytraps and firing devices not covered in any of the previous volumes in this series. Some of the devices date back to the Second World War, and there are even some from the Great War. However, there are many others that are more current. We have deliberately chosen to limit this publication to only include officially manufactured mechanisms that can be used as boobytraps, or for sabotage. This excludes some mine and grenade fuzes but also includes those that can be used in a stand-alone mode as initiating devices for demolition/explosive charges. We will not, however, attempt to describe any improvised devices or methods. And, as always, we will not be discussing any neutralization or disarming techniques, as these require a specially trained and equipped skill set. The items are presented by country of origin.

It should also be noted that the photos and images are not all ours. We have collected photos from collectors, museums, and the internet for years. As a result of poor record keeping on our part the origin of many of these has been lost. If you find one of your photos in here without attribution, please accept our apologies for using it without prior permission.

Many readers will recognize some of the text and images from a variety of government and commercial sources. Through extensive research and discussions with private collectors and subject matter experts, we have attempted to include additional information that we hope will provide you, the reader, with a one-stop source for identifying many unique - and some little known - boobytraps and firing devices. Please let us know if we have met yours and our expectations.

On a final note, the reader will notice that some of the entries have the statement, “No other technical details are currently available.” This is our subtle request for assistance. In spite of exhaustive research, the authors of this document were unable to find reliable specifications or technical data to include with every entry. However, if there are readers who have information pertaining to a specific firing device that they would be willing to share, their input would be greatly appreciated. Likewise, if there are any readers who have information or images of any devices that are not included and would be willing to share those, please let us know so that we can include that information in future updates.

Finally, and most importantly, we apologize, in advance, for any mistakes, or omissions, which are solely ours.

August 2026

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# **BELGIQUE**

**(Belgium)**





Type - Pressure-Release  
Weight - 1.0 oz. (29 g)  
Length - 1.7 in. (45 mm)  
Width - 0.9 in. (24 mm)  
Height - 0.7 in. (18 mm)

The NR 2143 is a mechanically operated firing device. It functions upon pressure-release, and is similar in both function and appearance to the US M5 firing device. It can be used to boobytrap mines, or with various demolition charges.

The device consists of a hard plastic body, containing a metal pressure plate and spring-loaded striker assembly. Its primary safety pin is held in place by a small split pin. There is a secondary safety fork that prevents the device from functioning. The NR 2143 utilizes a primer adapter (detonator adapter) that screws into the bottom of the device. It is normally painted a khaki/tan colour, with black or yellow stenciled markings indicating designation and production data. Samples of this firing device that have been examined have a manufacturing date of 2009. These were encountered in munition stockpiles in Libya in 2011



*NR 2143 Firing Device  
Photo - G. Zahaczewsky*

To use the NR 2143, the small split pin is removed from the primary safety pin. A primer adapter, with an attached detonator (blasting cap), is screwed into the bottom of the device. The NR 2143 is then screwed into a mine or explosive charge and the safety fork removed. The device and mine (charge) are then carefully emplaced. If the NR 2143 is used to provide an anti-lift mechanism to an anti-tank mine, the device is normally screwed into the bottom of the mine. Once emplaced, the primary safety pin is slowly withdrawn. If the device is used to provide a pressure-release boobytrap, a demolition charge is emplaced with the NR 2143 on top. A weight of at least 5 lbs. (2.2 kg) is then placed on top of the device.



*NR 2143 Firing Device (disassembled)  
Photo - G. Zahaczewsky*

When an attempt is made to lift the mine, or the weight is removed from the pressure plate, the spring-loaded striker assembly pushes the pressure plate aside allowing the firing pin on the striker to impact the percussion cap in the primer adapter, initiating the detonator that fires the attached main explosive charge.

Totally inert versions of the firing device have been encountered. They are identical to the operational device in size and specifications, with the exception that they are made of clear plastic. This allows the operation of the device to be observed. Markings are in black giving the designation, lot number, and includes an “INERT” designation/markings.



*Inert NR 2143 Firing Device*

Type - Pull

Weight - 0.7 oz. (21 g)

Length - 3.2 in. (82 mm)

Diameter - 0.5 in. (13 mm)

The NR 2144 is a mechanically operated firing device. It functions upon pull and is almost a direct copy of the US M1 pull firing device. It can be used as a boobytrap with either mines or demolition charges.

The firing device has a hard plastic body with an internal, spring-loaded metal striker assembly. The striker assembly consists of a spring-loaded firing pin, and release pin. The release pin is secured in the head of the device by a safety pin, while a positive safety pin also passes through the device body. It utilizes a primer adapter (detonator adapter) that screws into one end of the device. It is normally painted a khaki/tan colour, with black or yellow stenciled markings indicating designation and production data. Samples of this firing device that have been examined have a manufacturing date of 2009. These were encountered in munition stockpiles in Libya in 2011.



*NR 2144 Firing Device  
Photo - G. Zahaczewsky*

To use the NR 2144, a primer adapter, with attached detonator (blasting cap), is screwed into the bottom of the device. The device, with both safety pins still in place, is screwed into the mine or demolition charge. The fuzeed mine or demolition charge is then emplaced and camouflaged. A trip wire is then attached to the pull ring in the head of the device. After the trip wire has been adjusted so that it is taut, both safety pins are removed, with the release pin safety being withdrawn first.



A direct pull of three to five lbs. (1-2 kg.) will cause the release pin to be drawn outward, allowing the firing pin to move forward striking the percussion cap in the primer adapter which, initiates the attached detonator and mine or demolition charge.

*NR 2144 Firing Device (disassembled)  
Photo - Fenix Insight*



Totally inert versions of the firing device have been encountered. They are identical to the operational device in size and specifications, with the exception that they are made of clear plastic. This allows the operation of the device to be observed. Markings are in black giving the designation, lot number, and includes an “INERT” designation/markings.



*Inert NR 2144 Firing Device*

# БЪЛГАРИЯ

(Bulgaria)



Type - Pull

Weight - 1.0 oz. (30 g)

Length - 2.6 in. (67 mm)

Diameter - 0.4 in. (12 mm)

The MUV is a pull-initiated firing device, that also has the potential to be used as a tension-release boobytrap. It appears, in appearance and function, to be a direct copy of the Soviet/Russian MUV firing device, which has also been copied by the Chinese (Type 59), and the former East Germans (MUW).

The body of the MUV appears to be aluminum, while the internal striker assembly is steel. The striker assembly consists of a striker (firing pin) and striker spring. The upper portion of the striker has a hole for a loop-shaped pull safety pin, as well as an additional hole for a safety bar. The end of the firing device is threaded and will accept either MD-2 or MD-5M detonators (blasting caps).

Some Bulgarian MUV firing devices are painted green. There are no discernible markings.



*MUV Firing Device w/safety bar  
Photo - G. Zahaczewsky*

To use the MUV, a detonator assembly is screwed into the base of the firing device. If used as a pull firing device, the striker is pulled back using the safety bar until the safety pin hole is revealed. At this point, a loop-shaped safety pin is inserted. The striker assembly in the MUV is now under spring-tension and ready for use. It is then inserted into the explosive charge. Both are emplaced and camouflaged. A tripwire is then attached to the safety pin and anchored. A pull on the tripwire will extract the safety pin and allow the striker (under spring tension) to hit the percussion cap in the detonator, initiating the attached charge/mine.

If the MUV is deployed as a tension-release boobytrap, the striker is pulled back using the safety bar until the safety pin hole is revealed. At this point, a loop-shaped safety pin is inserted. The striker assembly in the MUV is now under spring-tension and ready for use. It is then inserted into the explosive charge. Both are emplaced and camouflaged. A tripwire is then attached to the safety bar hole and sufficient tension is applied so that the loop-shaped safety pin can be easily removed. If the tripwire is broken or cut, the striker (under spring tension) is released to hit the percussion cap in the detonator, initiating the attached charge/mine.

## MUV-2M (non-metallic)

Bulgaria

Type - Pull

Weight - 1.0 oz. (29 g)

Length - 3.7 in. (95 mm)

Diameter - 0.5 in. (13 mm)

There are two versions of the MUV-2M - a Bakelite plastic body version and a metal body variation. Both resemble the Soviet/Russian MUV-2 series of firing devices. Whereas the Russian MUV-2 can function as a pressure or pull firing device, the MUV-2M (Bakelite) is solely a pull device and is intended primarily for use in anti-personnel mines. With some improvisation, it could be adapted for use as a boobytrap.



*MUV - 2M Firing Device*  
*Photo - G. Zahaczewsky*

As mentioned, one version of the MUV-2M body is primarily constructed of reddish-brown Bakelite plastic, with the internal striker assembly components being made of metal. The firing device has three basic components: the fuze head, which has a rubber cap covering a lead strip/metal fatigue arming delay assembly with a positive split-pin safety, as well as a loop-shaped pull pin that initiates the firing device; a cylindrical body that includes the spring-loaded striker assembly; and finally, the screw-in primer holder that contains a percussion cap. It should be noted that the Russian MD-2 or MD-5 detonator cannot be screwed into the MUV-2M Bakelite body to replace the primer holder.

To prepare the plastic version of the MUV-2M for use, the shipping cap is removed and the firing device is screwed into the anti-personnel mine (e.g., Bulgarian PSM-1). Both the mine and firing device are emplaced and camouflaged. A tripwire is then attached to the pull pin and secured. The split pin safety is then removed initiating the arming delay consisting of the lead strips in the fuze head.

Upon expiration of the arming delay, which is contingent upon ambient temperature, the striker assembly is solely held back by the pull pin. When tension is applied to the tripwire attached to the pull pin, it is withdrawn, which releases the striker into the percussion cap in the detonator assembly. This action, in turn, initiates the detonator assembly in the mine.



*MUV - 2M Firing Device (disassembled)*  
*Photo - G. Zahaczewsky*

A training version of the MUV-2M, designated U-MUV-2M, was also produced. After close examination, aside from a "U-MUV-2M" designation and a white band, no significant differences could be found with the MUV-2M.

## MUV-2M (metallic)

Bulgaria

Type - Pull

Weight - 1.0 oz. (31 g)

Length - 3.1 in. (81 mm)

Diameter - 0.4 in. (12 mm)

There are two versions of the MUV-2M - a Bakelite plastic body version and a metal body variation. Both resemble the Soviet/Russian MUV-2 series of firing devices. Whereas the plastic version is primarily used as an anti-personnel mine fuze, the metal-body version appears to be adaptable to other uses, such as boobytraps. The reason appears to be that the plastic-bodied MUV-2M has a primer holder that can only be screwed onto an anti-personnel landmine (i.e., PSM-1), while the metal-bodied MUV-2M can accept either MD-2 or MD-5 detonator (blasting cap) assemblies, making it more versatile.



*U-MUV-2M Firing Device (Practice)*  
*Photo - G. Zahaczewsky*

The metal-bodied firing device has two basic components: the fuze head, which has a rubber cap covering a lead strip/metal fatigue arming delay assembly with a positive split-pin safety, as well as a loop-shaped pull pin that initiates the firing device; and a cylindrical body that includes the spring-loaded striker assembly.

To prepare the metal-bodied version of the MUV-2M for use, an MD-2 or MD-5 detonator is screwed into the firing device. The firing device is then attached to a demolition charge. Both are then emplaced and appropriately camouflaged. A tripwire is then attached to the pull pin and secured. The split pin safety is then removed. This initiates the arming delay consisting of the lead strips in the fuze head.

Upon expiration of the arming delay, which is contingent upon ambient temperature, the striker assembly is solely held back by the pull pin. After a tension is applied to the tripwire attached to the pull pin, it is withdrawn, which releases the striker into the percussion cap in the detonator assembly. This action, in turn, initiates the demolition charge.

A training version of the metal variation of the MUV-2M was also produced. It is designated as U-MUV-2M and has a white band around the lower body. There are no other markings on the firing device.



# **Republika Hrvatska**

## **Republic of Croatia**



Type- Pull

Length- 2.05 in. (52 mm)

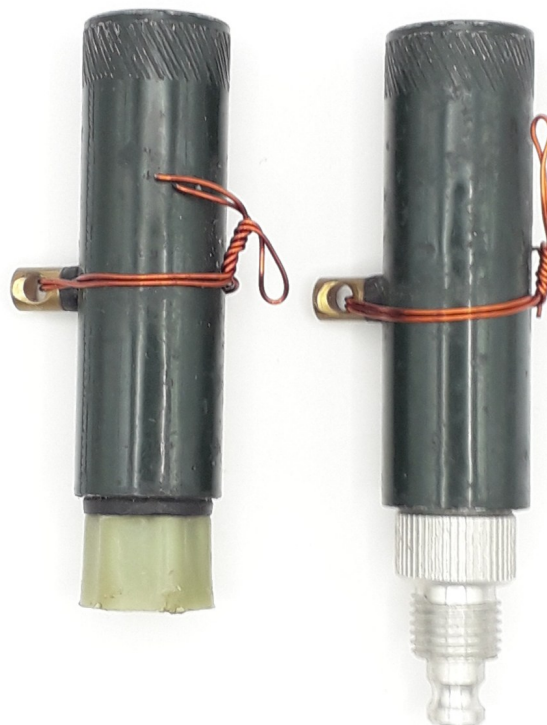
Diameter- 0.63 in. (16 mm)

This device was made in Croatia and used primarily in the PMR "Čapljinka" anti-personnel mine. It was a locally produced device widely used in the 1992-95 war in Bosnia and Herzegovina. It is a simple device well suited to being used as a pull activated boobytrap device.

The device consists of a closed end cylinder of aluminum internally threaded at the bottom end. A striker and striker spring are contained within the body. A brass pull pin fits through a hole in the centre of the body and a hole in the striker head. A plastic transit cap with washer closes the body.

The main body is finished in dark green. No other markings have been noted.

When assembled the striker and spring are inserted in the bottom and pushed up, compressing the spring, until the pull pin can be inserted to hold the striker in the cocked position. The pull pin has a washer to prevent water entering the device. A copper wire acts as the



*PMR-U Firing Device  
Photo— F. Caley*

safety passing through a hole in the pull pin and wrapping around the body. A detonator assembly closely resembling a Russian MD-5 detonator assembly is screwed into the bottom.

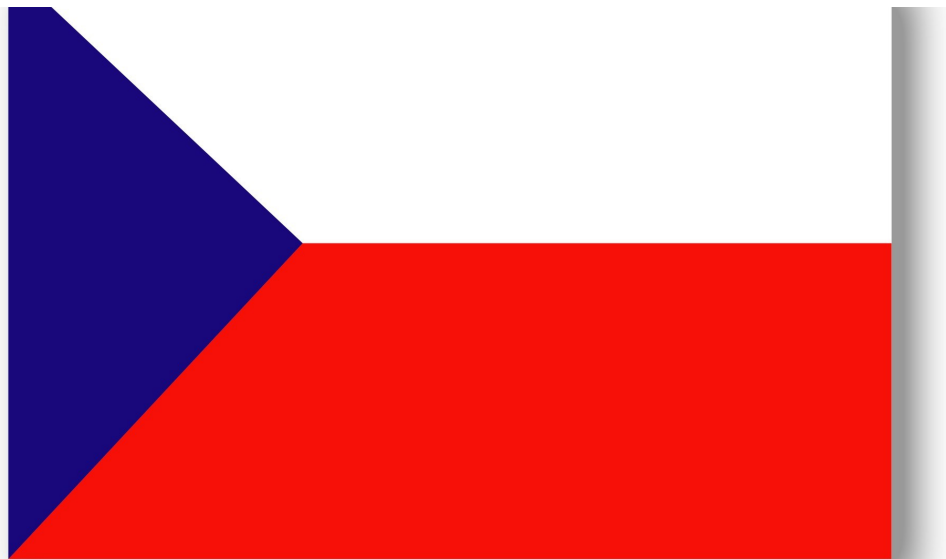
The device is either screwed into a mine, or it seem could be inserted into an explosive charge. A slack trip wire is attached to the pull pin and an anchor point at the other end. Once set in position the copper safety wire is carefully removed; arming the device. When pressure is applied to the trip wire it will withdraw the pull pin, releasing the striker to be driven down under spring pressure to hit the primer in the detonator assembly. The primer initiates the detonator and in turn the explosive charge or mine.



*PMR-U Firing Device disassembled  
Photo— F. Caley*

# ČESKOSLOVENSKO

(Czechoslovakia)



## Che Ro 1 and Che Ro 2 (Chemický Rozněcovač 1-2)

Czechoslovakia

Type - Delay

Weight - 1.1 oz. (34 g)

Length - 3.1 in. (81 mm)

Diameter - 1.2 in. (32.5 mm)

The Che Ro 1 and 2 are chemically-activated delay firing devices intended for use as boobytrap or sabotage mechanisms.

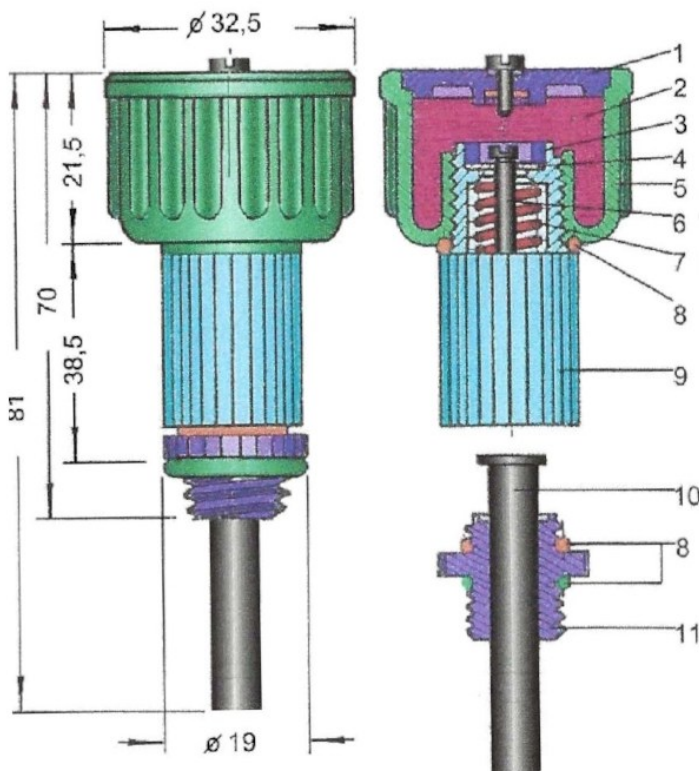
The difference between the two devices is that the Che Ro 1 has a 3 or 6-hour delay, while the Che Ro 2 has a one-hour delay. Both devices are issued with a SKA ZK detonator (blasting cap) assembly attached. The detonator assembly is threaded, allowing it to be screwed into a demolition charge.

The Che Ro 1 and 2 devices have either a either a brown or black Bakelite plastic body. The varying delay times depend on the concentration of the chemical solution inside the device, and will further vary depending on ambient temperature.

No other technical details are currently available.



*Ro 1 and 2 Firing Devices*



- |                  |                     |
|------------------|---------------------|
| 1 Deckel         | 7 Schlagbolzenfeder |
| 2 Lösungsmittel  | 8 Gummidichtung     |
| 3 Ringmutter     | 9 Zünderkörper      |
| 4 Haltescheibe   | 10 Sprengkapsel     |
| 5 Zünderoberteil | 11 Bodenschraube    |
| 6 Schlagbolzen   |                     |

*Ro 1 and 2 Firing Devices*



## ECHRO (Elektrochemický Rozněcovač)

Czechoslovakia

Type - Delay  
Weight - 31.8 oz. (904 g)  
Diameter - 4.5 in. (115 mm)  
Height - 4.0 in. (102 mm)

The ECHRO is an electro-chemical long delay firing device that can be set for a delay of one to 150 days.

The firing device is contained in a Bakelite plastic body. The top of the device has a screw-on Bakelite cap, and the bottom of the ECHRO has a fuze well for a detonator assembly. Inside the cap is a dial, used for inputting the time delay setting sequence. The body of the device also contains its power source, which is three No. 140K mono-cell batteries. These are rated at 1.5V, but do not contain any electrolyte while in storage. Removing the cap of the ECHRO reveals three covered battery compartments, a central compartment for the injection of electrolyte, as well as a series of sockets used to select the delay. Also visible is the Bakelite coupler used to select the time delay, a small compartment containing an electrolyte ampoule, as well as a small screwdriver and file.



*ECHRO Firing Device  
Photo - G. Zahaczewsky*

To use the ECHRO firing device, the small screwdriver is used to remove the mono-cell battery covers. The batteries are removed, unwrapped, cleaned, and then replaced within their compartments. The screwdriver is then used to remove two screws in the central compartment that reveal filler holes for the electrolyte. The small ampoule of electrolyte is then removed and the tip is filed off. The ampoule is inserted into one of the filler holes and the electrolyte is emptied into it. To ensure that all of the electrolyte is drained from the ampoule, the small screwdriver is used to puncture the bottom of ampoule. The empty ampoule is then discarded and the two screws are replaced in the filler holes. The ECHRO is then inverted to drain off any excess electrolyte.

Using the instructions inside the cap to select the desired time delay, the Bakelite coupler is used to connect the appropriate sockets. The shipping cap is then removed from the fuze well in the bottom of the firing device and an electrical contact plug is screwed in. An electric detonator (blasting cap) is then attached to the contact plug leads and the ECHRO is attached to the demolition charge. Once the

selected time delay has expired, a current is passed from the power source through the contact plug to the electric detonator, initiating the attached charge.



*ECHRO Firing Device  
left - top view; right -  
bottom view  
Photos - G.  
Zahaczewsky*

An accessory pack is normally found with the ECHRO and contains an extra electrolyte ampoule, a detonator holder, and an electrical contact plug.



*ECHRO accessory pack containing electrical initiation, mechanical initiation and chemical components*  
Photo - G. Zahaczewsky



*ECHRO Firing Device (top view)*  
Photo - G. Zahaczewsky



## Ro 1 (Rozněcovat 1)

Czechoslovakia

Type - Pressure/Pull  
Weight - 1.3 oz. (37 g)  
Length - 3.0 in. (76mm)  
5.0 in. (127 mm) (fully assembled w/  
prong adapter)  
Diameter - 0.5 in. (12.7 mm)  
Height - 4.4 in. (112 mm)

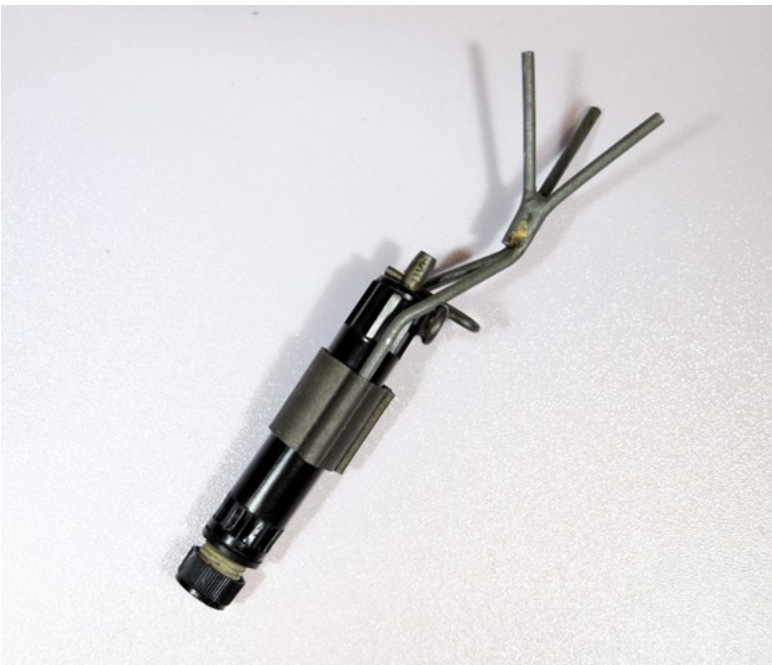
The Ro 1 is a versatile pressure or pull firing device. It is similar in both appearance and function to several other firing devices, including: the Danish M/47, the WW2 German Z.Z.42, the West German DM27, and the Former Yugoslavian UPM-1. It can be used as a boobytrap device in a mine (i.e., the Czech PT-Mi-D anti-tank mine) or a demolition charge. When utilized with an accessory prong adapter, it can be employed as a fuze for an anti-personnel mine.



*Ro 1 Firing Device with prong adapter  
Photo - G. Zahaczewsky*

The body of the Ro 1 is made of Bakelite plastic, while the internal striker assembly is steel. The striker assembly consists of a striker (firing pin), and a washer(s) that centralizes the striker in the body. Attached to the bottom part of the body is the primer holder, which contains a percussion cap and is covered by a Bakelite cap while in storage or transit. The upper portion of the striker has a hole for a T-shaped safety pin that has a loop for a tripwire.

To use the Ro 1, a detonator is inserted into the primer holder and screwed into the bottom of the firing device. When employed as a pull firing device in a demolition charge, a tripwire is attached to the loop in the safety pin. If used as an anti-personnel mine pressure fuze, the prong adapter is attached and screwed into the mine. When either 2.2 lbs. (1 kg) of pull, or 2.2-33 lbs. (2-15 kg) of pressure is



*Ro 1 Firing Device (configured as an AP mine fuze)  
Photo - G. Zahaczewsky*

**Ro 3**  
**(Rozněcovat 3)**

Czechoslovakia

Type - Pressure-Release  
Weight - 1.5 oz. (45 g)  
Diameter - 1.7 in. (45 mm)  
Height - 2.1 in. (54 mm)

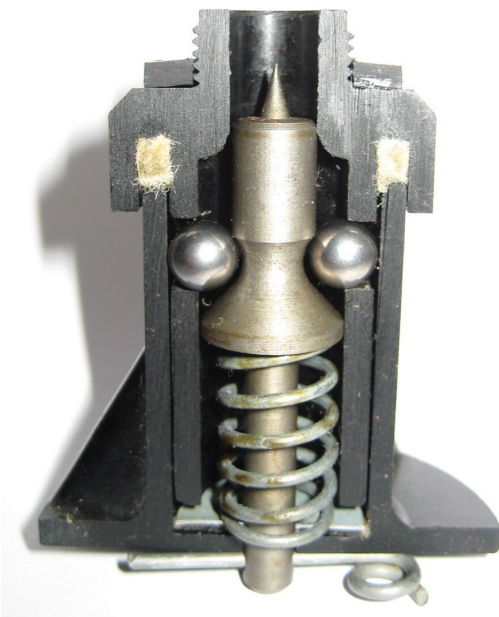
The Ro 3 is a pressure-release firing device. It is specifically intended to provide an anti-lift capability for the Czech PT Mi-K anti-tank mine.

The firing device consists of a two-piece, black or red, Bakelite plastic body composed of a cap and body. The body contains a sleeve with a cocked striker assembly, two detent balls, and a safety pin. The striker assembly (firing pin and spring) sits in a channel in the sleeve of the Ro 3 and is kept in a compressed state by the two detent balls. The Ro 3 itself contains no energetic components. The cap functions as the attachment point to the bottom of the mine.

To use the Ro 3, it is screwed into the bottom of a mine, or a demolition charge that already has a percussion primer and detonator attached. Both are then emplaced and the safety pin is withdrawn. The device is now armed.

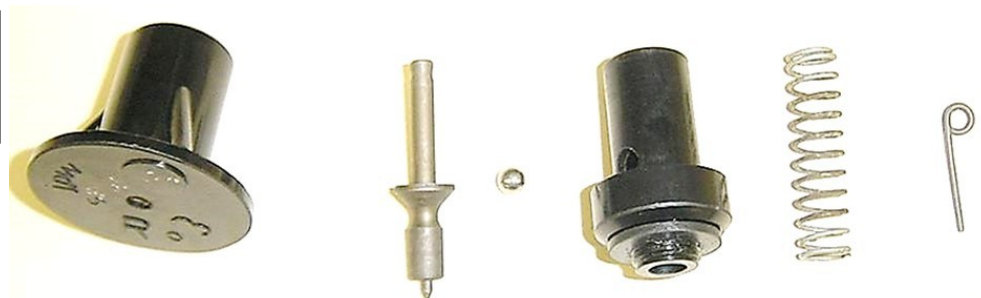


*Ro 3 Firing Device*  
*Photo - E. Koch*



Any attempt to lift the mine, or demolition charge, will allow the compressed striker spring to push against the cap forcing the body to travel upward. Once the holes in the body clear the cap the detent balls are forced outward releasing the striker to impact the percussion cap in the attached mine or demolition charge.

*Ro 3 Firing Device*  
*(sectioned)*  
*Photo - B. Gravett*



*Ro 3 Firing Device (disassembled)*  
*Photo - B. Gravett*



**Ro 4**  
**(Rozněcovat 4)**

Czechoslovakia

Type - Pressure-Release  
Weight - 2.3 oz. (67 g)  
Length - 3.0 in. (75 mm)  
Width - 0.9 in. (25 mm)  
Height - 2.0 in. (53 mm)

The Ro 4 is a pressure-release firing device intended for use as a boobytrap for mines or demolition charges. The device is issued with a SKA ZK detonator (blasting cap) assembly attached. The detonator assembly is threaded so it can be screwed into a landmine or demolition charge. Russian reports indicate that these firing devices have been used by Ukrainian Armed Forces in the Russia-Ukraine War.

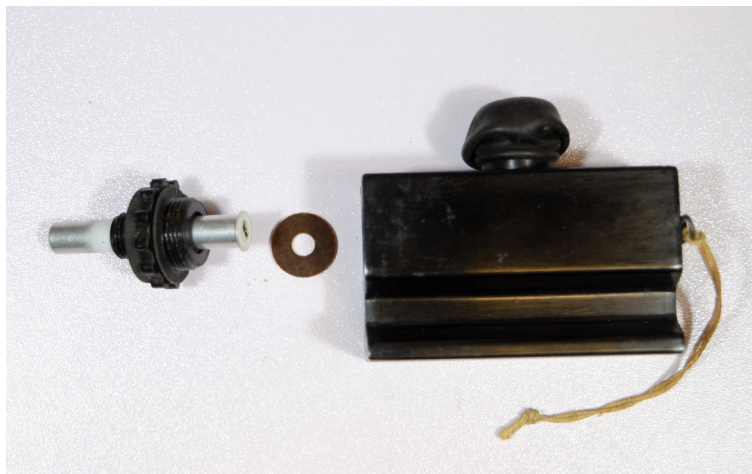


*Ro 4 Firing Device*  
*Photo - E. Koch*

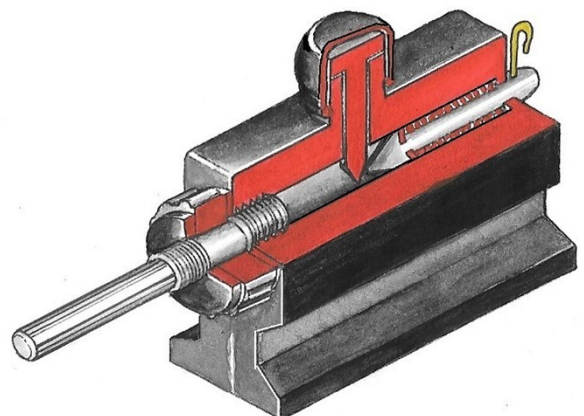
The Ro 4 consists of a black Bakelite plastic body with cocked striker (firing pin) assembly, which is held in check by a safety pin at the rear of the device. The detonator assembly is screwed into the front of the Ro 4. Finally, there is a rubber-coated plunger on top of the firing device.

To prepare the Ro 4 for use it is screwed into a mine or demolition charge. Both are then emplaced and a weight of at least 4.4 lbs. (2 kg) is placed on top of the Ro 4. Once in place and camouflaged, the cord attached to the safety pin is withdrawn, preferably remotely. When the safety pin is pulled, the striker spring inside the Ro 4 expands, moving the striker forward until it rests against the plunger.

The device will function if the weight is removed. This allows the plunger to be forced upward by the striker, releasing the striker to drive forward and impact the percussion cap, which initiates the detonator and, in turn, initiates the attached mine or charge.



*Ro 4 Firing Device partially (disassembled)*  
*Photo - G. Zahaczewsky*



*Ro 4 Firing Device (functioning)*  
*Image - B. Gravett*

**Ro 6**  
**(Rozněcovat 6)**

Czechoslovakia

Type - Pressure/Pressure-Release  
Weight - 2.3 oz. (67 g)  
Length - 3.0 in. (75 mm)  
Width - 0.9 in. (25 mm)  
Height - 2.0 in. (53 mm)

The Ro 6 is a pressure or pressure-release firing device intended for use against railroad targets, or as a general purpose boobytrap device. It is constructed of red/brown Bakelite plastic and metal components.

The Ro 6 has an intricate firing mechanism, which is somewhat difficult to explain. The device consists of a plastic body, a metal extension rod with a pressure button, and a metal housing mounted perpendicular to the body containing a cocked striker assembly and primer holder, details of which can be seen in the photo below.



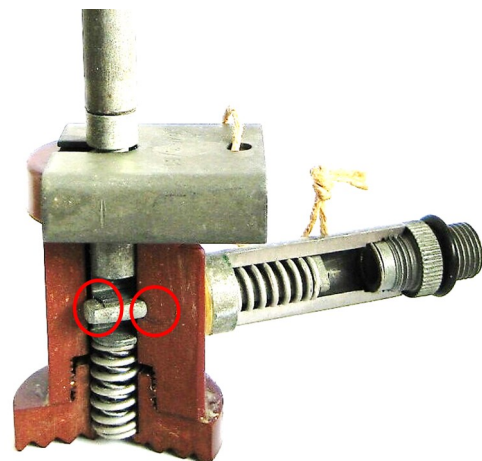
*Ro 6 Firing Device*  
*Photo - G. Zahaczewsky*

To use the Ro 6 firing device, the shipping cap is removed from the end of the striker assembly. A detonator (blasting cap) is then inserted into the end of the striker assembly housing. The device is then inserted into an explosive charge and both are emplaced against the intended target. The metal extension rod is then adjusted so that it rests as close as possible to the surface. To activate the pressure-release mechanism, the extension rod is adjusted so that sufficient weight or force is placed on the pressure button/plate to allow removal of the safety clip. This action also allows the firing device to function when pressure is applied to the pressure button/plate. The base of the device must be positioned on a stable flat surface, such as a board, since the lack of stability in emplacement would likely result in premature firing.

Once armed, the Ro 6 will function if pressure is either applied or removed from the extension rod, which will cause the central post of the firing device to move up or down respectively, and the notched striker to slip off the step and enter one of the two cavities, enabling the cocked firing striker to be released into the percussion cap.



*Ro 6 Firing Device (disassembled)*  
*Photo - G. Zahaczewsky*



*Ro 6 Firing Device initiation mechanism*  
*Photo - B. Gravett*

**Ro 10**  
**(Rozn covat 10)**

Czechoslovakia

Type - Pull/Anti-handling  
Weight - 1.3 oz. (37 g)  
Length - 3.1 in. (80 mm)  
Diameter - 0.5 in. (12.7 mm)

The Ro 10 is a pull firing device. Although it has the outward appearances to the Ro 1 firing device, it is deceptive as it is an anti-handling boobytrap device. The Ro 10 does not differ significantly in its external appearance or dimensions from the Ro 1, but it has an internal boobytrap function. Mines and demolition charges that utilize the Ro 10 cannot be disarmed.

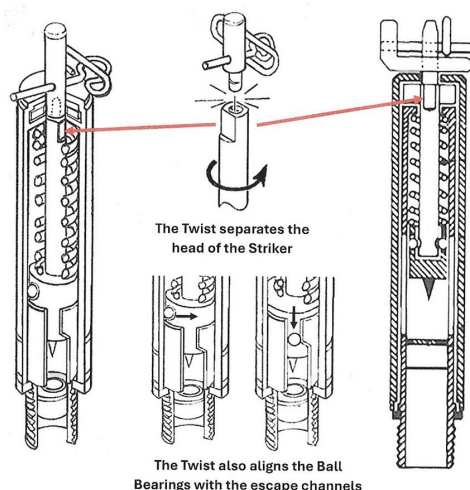


*Ro 10 Firing Device*  
*Photo - G. Zahaczewsky*

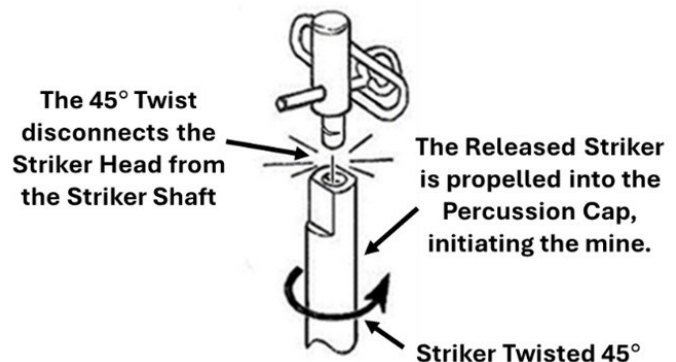
The Ro 10 has the normal, striker retaining pin (safety pin) fitted, just like the Ro 1, but it also has a second, larger U-shaped spacer feature fitted under the striker. This spacer keeps the top section of the striker assembly from rotating by keeping it locked into a sealing insert located in the top of the device.

In preparation for use, the device is inspected to ensure the striker and U-shaped spacer are both in place and the anti-twist mechanism has not been engaged. After inspection, a detonator (blasting cap) is fitted into the base of the device. The device is screwed into a mine or demolition charge and the striker positioned for either pressure or pull activation. The removal of the U-shaped spacer is the last step to arm the device as this engages the anti-twist mechanism in the Ro 10 and the device cannot be disarmed once it is removed. As long as the Ro 10 firing device retains the U-shaped spacer, it can be safely screwed in and out of the mine or demolition charge. Once the U-shaped Spacer is removed, any manipulation of the fuse is likely to function it. The U-shaped spacer is fitted with a small cord to enable a remote removal.

The Ro 10 anti-handling component is activated when any attempt is made to unscrew the device from the mine or demolition charge. A rotation of 45  is transferred from the outer device body to the striker where a ball bearing-retained cocked striker rotates until the ball bearings are released into vertical escapement channels. The striker rotates inside the inner sleeve and as the firing pin rotates 45  and the retaining ball bearings align with two channels in the inner case, the striker is released inside the shaft, which allows it to strike the percussion cap detonating the attached explosive charge.



*Ro 10 (internal diagram)*



The Anti-Twist mechanism in the Top of the fuse enables the striker head to separate from the firing pin and aligns the retaining Ball Bearings with the escape channels

*Ro 10 Firing Device (functioning)*



**Ro 30**  
**(Rozněcovat 30)**

**Czechoslovakia**

Type - Pressure  
Weight - 13.7oz (390 g)  
Length - 6.2 in. (160 mm)  
Diameter - 2.6 in. (68 mm)  
Height - 6.2 in. (160 mm)

The Ro 30 is a pressure-activated firing device designed to target railway lines. It incorporates a mechanical delay mechanism that can be set based on the number of depressions of the firing rod, enabling specific train carriages to be targeted. This fuze was in operational use between 1950-1970.

The entire device is of metal construction. The device consists of a Zamac body, a metal spring-loaded pressure rod assembly, a metal housing mounted perpendicular to the body that contains a cocked-striker assembly and, opposite it, a primer holder.



*Ro 30 Firing Device*  
*Photo - E. Koch.*

To prepare the Ro 30 for use, a detonator is inserted into the primer holder, which is then attached to a demolition charge. The assembled charge is then placed under a railway track, or sleeper. The pressure rod is adjusted so that it rests flush underneath the track or sleeper. The safety pin is then removed.

The Ro 30 is activated by the depression of the pressure rod by at least 0.07 in. (2 mm) as a train passes over the device. The deflection of the rail is transmitted by the pressure rod onto the friction clutch, which is pressed down, transmitting this onto a latch containing two detents. As the detents drop by 0.07 in. (2 mm), the first detent releases the tooth of the counting wheel. The counting wheel rotates by one tooth until the second tooth strikes the second detent on the counting wheel. As the rail moves back up, the pressure rod and the friction clutch are also pushed upwards by a spring, raising the detents again, so that the counting wheel rotates the second half of the cycle and the second tooth rests on the first detent.

This procedure is repeated each time the railway track is bent, and the counting device releases one detent at a time. The rotation of the counting wheel also turns the toothed cog directly below it. This toothed cog is engaged with teeth to the inner casing of the firing striker sleeve. The inner casing of the striker moves forward via the cog's teeth, moving the ball bearing retained cocked-striker towards the ball bearing escape hole. The first spring in the striker mechanism expands as the inner casing sleeve moves forward, pushing the striker spring forward at the same time. The inner casing sleeve with the firing pin keeps moving forward in increments as the cog winds. During the last rotation, the retaining balls are released through the escape holes in the inner casing sleeve. As the ball bearings are released, the striker is powered by the striker spring directly into the percussion cap initiating the detonator.



*Ro 30 Firing Device (cutaway)*  
*Photo - B. Gravett*

## UZO (Úderníkový Zapalovač Okamžitý)

Czechoslovakia

Type - Pull  
Weight - 1.3 oz. (37 g)  
Length - 3.5 in. (91 mm)  
Diameter - 0.8 in. (22 mm)

The cylindrical body is made of black plastic. A metal bracket is attached at the top and uses a wing nut and bolt to tighten down a small plate onto the main bracket. The bottom of the body has internal threading to allow attachment of a primer/charge holder. A striker and striker spring are contained within the body. The striker shaft protrudes from the top of the body and is held in place by a retaining plate that is secured with a safety pin to the metal bracket when in storage or transit. When issued a length of trip line (not wire) is attached to the safety pin wrapped on a cardboard spool. There is also a small red “button” on the safety pin whose function is undetermined. .



*UZO Firing Device  
Photo - E. Koch*

The primer/charge container is made of red plastic and is threaded to fit in the bottom of the firing device. A primer is inserted in the top and the ignition charge in the bottom. Threads on the bottom of the holder screw into the charge/ flare/ smoke generator.

To use the firing device, it is screwed into the charge, which is secured in place. A trip line is secured to an anchor point and then secured to the metal bracket. The safety pin, and “red button,” are then removed.

When pressure is applied to the trip line, it pulls the metal bracket out of place. This removes the downward pressure on the retaining plate, which releases the cocked striker to be driven down under pressure of its spring to hit the primer. The primer flashes into the ignition charge. There is no delay in the red primer base.

## UZC (Úderníkový zapalovač časovaný)

The UZC appears to utilize the same firing mechanism as the UZO. The main difference is in the primer/charge container. There is a six second delay in the UZC.

The primer/charge container is made of white plastic and is threaded to fit in the bottom of the firing device. A primer is inserted in the top and the ignition charge in the bottom with a delay element between them. Threads on the bottom of the holder screw into the charge/ flare/ smoke generator.

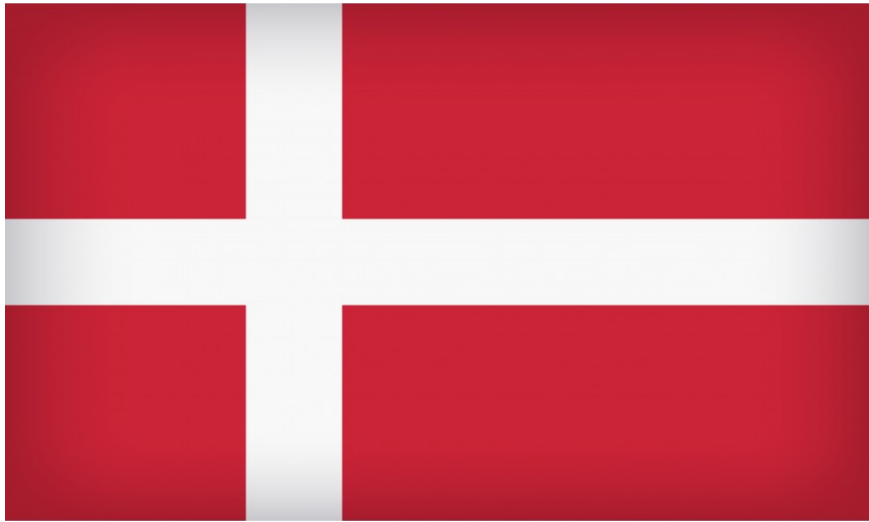


*UZC Firing Device*



# **DANSK**

**(Denmark)**



**M/47**  
**(Traektænder M/47)**

Denmark

Type - Pressure/Pull/Tension-Release  
Weight - 0.9 oz. (25.5 g)  
Length - 3.5 in. (91 mm)  
Diameter - 0.5 in. (12.7 mm)

The M/47 is a pressure, pull, or tension-release firing device used in both mines and demolition charges. It is similar in appearance and function to several other firing devices, to include: the Czechoslovakian Ro 1, the WW2 German Z.Z.42, the West German DM27, and the Former Yugoslavian UPM-1.

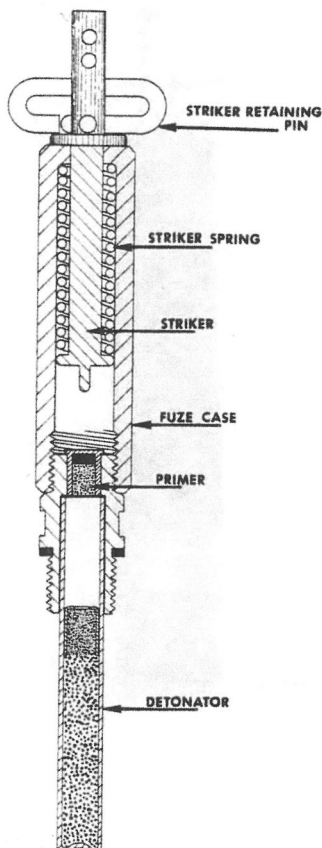
Two versions of the M/47 have been encountered: one with a Bakelite plastic body, and one with a steel body. The internal striker assembly is also steel. The striker assembly consists of a striker (firing pin), and a striker spring. Attached to the bottom part of the body is a primer holder that contains a percussion cap that is probably covered while in storage or transit. The upper portion of the striker has a hole for a T-shaped safety pin that also has a hole to attach a tripwire. There are also two additional holes in the upper part of the striker.

To use the firing device, a detonator (blasting cap) is inserted into the primer holder and the complete device is screwed into a mine or demolition charge. When employed as a pull firing device, a



*M/47 Firing Device*

slack tripwire is attached to the loop on the T-shaped safety pin. When 2.2 lbs. (1 kg) of pull is applied, the safety pin is withdrawn from the striker allowing it to impact the percussion cap in the primer holder. If used as a pressure firing device in the Danish M/47 anti-personnel mine, when a pressure is applied to the top of the mine, the T-shaped safety pin is forced out of the striker assembly allowing the striker to impact the percussion cap in the primer holder. To use the firing device in the tension-release mode, it is inserted into either a mine or demolition charge. An anchored tripwire is inserted into the top hole in the striker and then tightened until the T-shaped safety pin can be withdrawn. If the tripwire is cut or broken, it will release the striker to impact the percussion cap.



Two colour schemes have been encountered on the M/47 - unpainted, and a blue top. There is the possibility that the blue top is a practice version.



*M/47 Firing Device (disassembled)*  
*Photo - G. Zahaczewsky*

*M/47 Firing Device*

**M/47-II**  
**(Panserminetænder M/47-II)**

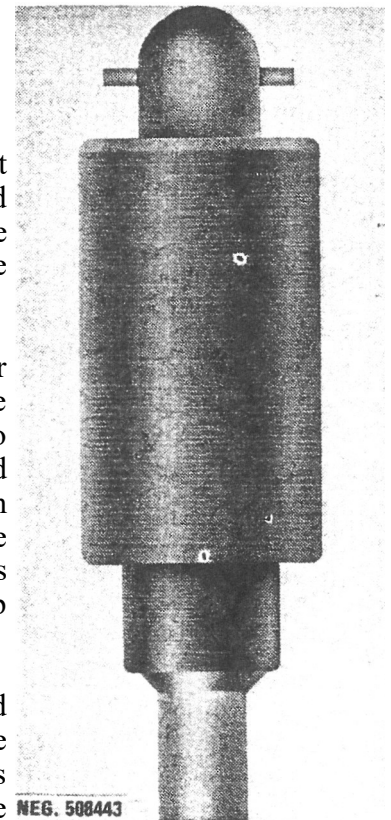
**Denmark**

Type - Pressure/Pressure-release  
Weight - 4.5 oz. (127.5 g)  
Length - 2.3 in. (58.4 mm)  
Diameter - 0.8 in. (20.3 mm)

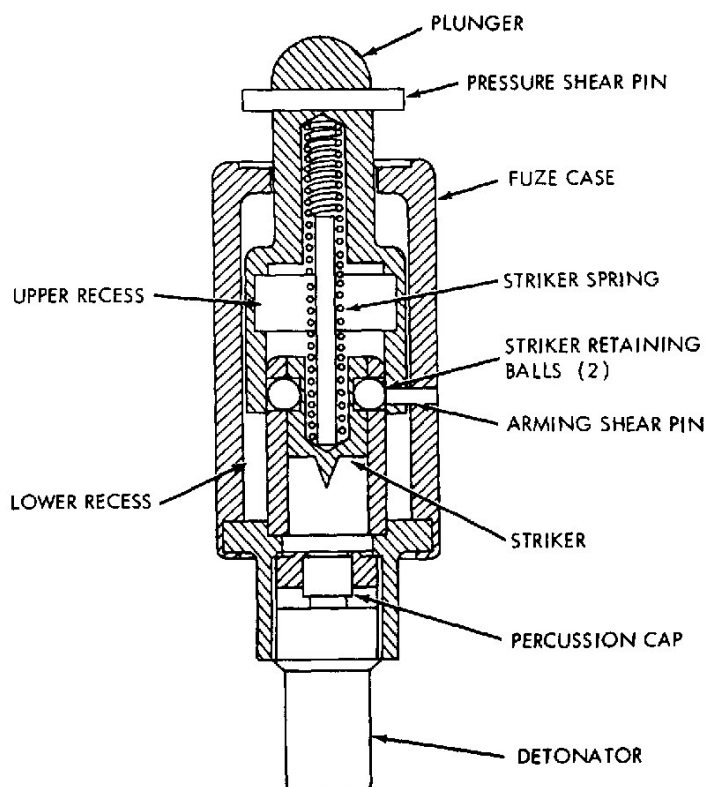
This fuze was designed to fit the M/47 and M/52 anti-tank mines. It closely resembles the Second World War German T.Mi.Z. 43 in form and function. It is an anti-handling fuze that is designed to operate if the pressure plate is unscrewed. Russian reports indicate that these fuzes have been used by Ukrainian Armed Forces in the Russia-Ukraine War.

The body is made of steel and contains a plunger, collar, striker, striker spring, two retaining balls, and a percussion cap. The plunger fits into the body with a rounded head protruding from the top. The collar fits into the plunger and has two holes for the retaining balls. The striker and striker spring fit into the plunger and collar assembly with the two balls in the holes in the collar and engaging a groove in the striker. The balls are retained by the walls of the plunger. A small arming shear pin fits through the body into the plunger. A larger shear pin fits through the top of the plunger. The percussion cap is mounted in the bottom of the fuze.

For use, a detonator assembly is screwed onto the bottom of the fuze and the entire assembly inserted into the fuze well of the mine. The pressure plate on the mine is screwed down onto the fuze. As the pressure plate is screwed down it forces the plunger down into the body, compressing the striker spring. As it is screwed down the arming shear pin shears off. The plunger is now free and the fuze armed.



*M/47-II*  
*Image - US Department of the Army*



If a weight of at least 550 lbs. (249 kg) is applied to the pressure plate it will push the plunger down, first shearing the shear pin and continuing until the retaining balls can escape into a recess in the plunger. This releases the striker to snap down onto the percussion cap and initiate the mine.

If an attempt is made to disarm the mine, the unscrewing of the pressure plate allows the plunger to rise under pressure of the compressed striker spring. Once the plunger has lifted enough the retaining balls will escape past the bottom of the plunger and release the striker to snap down into the percussion cap and initiate the mine.

**M66**  
**(Forsinkelsestænder M/66)**

**Denmark**

Type - Trigger Mechanism  
Weight - 4.3 oz. (122 g)  
Diameter - 1.5 in. (41.5 mm)  
Height - 2.7 in. (70 mm)

The M66 is a trigger mechanism almost identical to the German DM 67 as used with the Handflammpatrone DM 24A1B1 and are in fact made by the same firm. The Danish version has threading common to a number of Danish ordnance items.

The cylindrical body is made of heavy gauge sheet metal. Disks at the top and bottom hold a central tube that is a channel for the striker. The top of the tube has a small hole for the striker to fit through. The bottom of the tube is externally threaded to accept adapters and internally threaded to accept a primer holder. The primer holder is also internally threaded to accept a black powder delay tube. The striker is turned down to form a head and firing pin at the bottom end and has a groove at the top end. There is a firing trigger (painted red) that is simply a flat piece of metal bent down at the front forming a push button. There is a keyhole cut into the centre of the trigger plate and a notch cut into it near the trigger button. The cover of the device has a corrugated rim to provide a gripping surface. There is a section cut out of the rim to fit the firing trigger.

The device is painted brown with a red trigger button. The cover has embossed markings as well as a painted lot number.

When assembled the striker and striker spring fit up through the bottom until the striker shaft fits through the small hole in the central tube. The trigger plate fits over the top of the striker with the keyhole engaging the groove on the striker shaft. The cover fits the top of the device with the trigger button protruding from the cutout. The primer holder and delay tube screw together and into the bottom of the mechanism. The top is marked with an "A" (armed) and an "S" (safe). When the firing button is on "S", the notch in the firing button is engaged with the cover preventing the button from moving inward.

When ready to fire, the cover is rotated to the "A" position and the button firmly pushed in. When the button moves in, the keyhole will disengage from the striker. The striker is driven down by the compressed striker spring to hit the primer. The primer fires into the delay tube and ignites the six second delay.

Note: The purpose of the delay is unknown at this time.



*M66 Firing Device*  
*Photo - J. Osborne*



*Top of M66 (Note the markings)*  
*Photo - J. Vollenberg*

**M/66**  
**(Aflastningstænder M/66 )**

**Denmark**

Type - Pressure-Release  
Weight - 18 oz. (510 g)  
Diameter - 3.5 in. (90 mm)  
Height - 1.7 in. (43.8 mm)

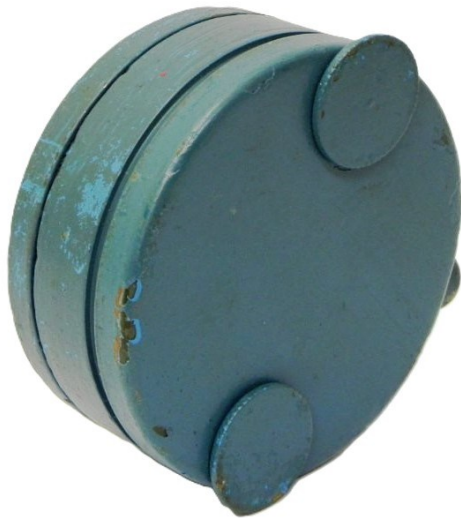
The Danish M/66 appears to be a copy of the West German DM49 pressure-release firing device.

There also appears to have been a practice version made that is painted blue with white markings.

No other technical details are currently available.



*M/66 Firing Device*  
*Photo - Collectie Junier*



*M/66 Firing Device*  
*Photo - Munitie*



Type - Pull

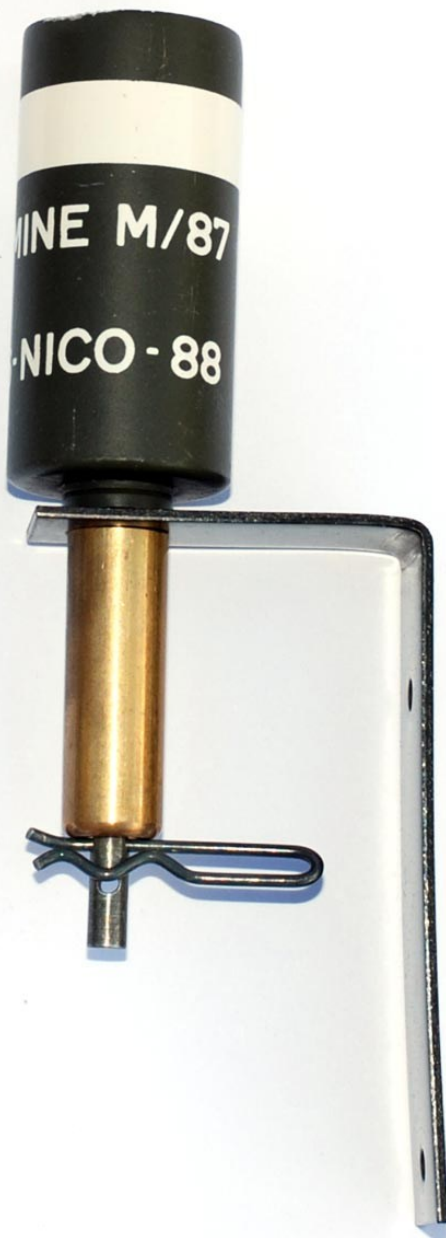
The M/87 is not technically a boobytrap mechanism, it is the igniter for the M/87 Alarm Mine.

The cylindrical body appears to be brass containing a cocked striker assembly. The bottom end of the body is internally threaded to screw onto the mine body. The striker shaft has two holes through it, one for a safety pin, the other for the arming pin.

The M/87 mine is supplied with the firing device, as well as a bracket and most likely the nails or screws required to fix it in place..



*M/87 Firing Device*  
*Photo - F. Caley*



*M/87 Alarm Mine*

When the bracket is in place, the mine is placed on top of the bracket and the firing device screwed onto the body with the bracket in the middle. The firing device acts to hold the body in place. A slack trip wire is anchored and attached to the arming pin. When ready for use, the safety pin is removed arming the mine. When tension is applied to the wire it will pull the arming pin out of the striker shaft freeing the striker to be propelled up into the primer in the body of the mine. The primer will instantly ignite the charge in the mine.

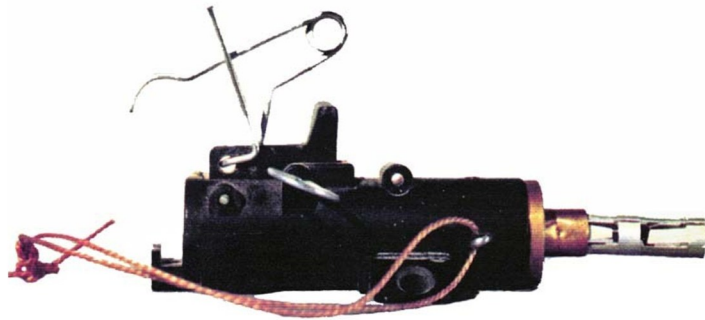
مصر  
(Egypt)



## Type - Multifunction

The Egyptian M338 firing device appears to be virtually identical to the Australian F1A1. The tension release device appears to be slightly smaller and of thinner material than the Australian device, and it seems to be used with a fuze adapter with spring clip rather than a coupling base.

The device is a compact unit capable of initiating a boobytrap via pressure, pull, pressure-release, or tension-release depending on how it is set. The device will operate under a pressure of 25 lbs. (11.3 kg), a pull of 7 lbs. (3.2 kg), or a release of pressure or tension of 2.4 lbs. (1.1 kg).



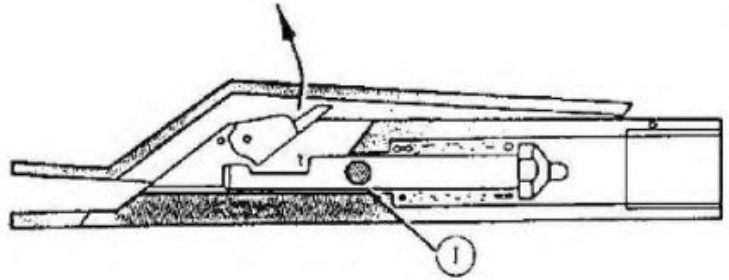
*M338 Firing Device*

The device is made of plastic in a basically cylindrical form. There are lugs and recesses molded onto the body that allows it to be screwed, nailed or wired in almost any position. A slot in the top of the body accepts a sear plate that is held in position by two pins, one with a round head and one with a square head. A positive safety pin fits through the barrel of the body preventing the striker from hitting the percussion cap. The striker is made of aluminum with a plastic four pronged guide and spring stop near the point. The rear portion of the striker has a groove that engages the sear. A striker spring fits over the striker. The striker and spring fit into the body compressing the spring until the sear on the bottom of the sear plate engages the groove in the striker.

The mode of use determines which pins are taken out to set the device. For use as a release device, the round headed pin is removed. For use as a pressure device, the square headed pin is removed, for use as a pull device, the square headed pin is removed, and for use in the tension-release mode it must be fitted with an attachment and have the round-headed pin removed. It should be noted that the two pins are not interchangeable as they are made from different gauges of wire with corresponding holes.

## Type - Pressure-release

The official designation of this device is unknown. It appears to be a direct copy of the British No. 6, Mk. I release switch. It is unknown if the Egyptians actually produced these devices or simply used British made devices. The No. 6 has been copied by at least eleven other countries, possibly making it the most copied boobytrap.



*Pressure-release Firing Device  
Image - US Department of Defense*

The firing device consists of a metal body threaded at one end to accept a primer holder and fuze adapter assembly. The other end is flattened to allow it to be inserted into narrow openings. A hole drilled in the flattened end enabled the switch to be fastened in position. A lid is hinged at the threaded end and fits over the body. A sear is hinged at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the striker. Markings are unknown at this point.

When assembled at the factory, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker. The safety pin must be in place or the device will operate.

When the device is set in position and a weight is applied (minimum required is unknown) to the lid, it forces down on the lid and sear forcing the striker back slightly to take pressure off of the safety pin. The safety pin can then be easily removed without force.

When the restraining weight is removed, the striker stem pushes against the sear causing it to rotate, which pushes up the lid. When the sear has rotated far enough, the striker is released to fly forward under pressure of the spring to strike the cap in the primer holder. The cap fires and either fires a detonator or ignites the attached fuse.

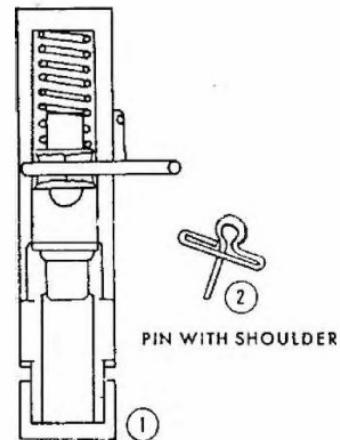
## Type - Pull

The official designation of this device is unknown. This device closely resembles the Yugoslavian UPM-2. Whether the Egyptians manufactured this item or simply bought them from Yugoslavia is unknown.

It is a simple cocked-striker firing device initiated by radial pull. It is commonly employed in mines but can be inserted into a demolition charge as a boobytrap.

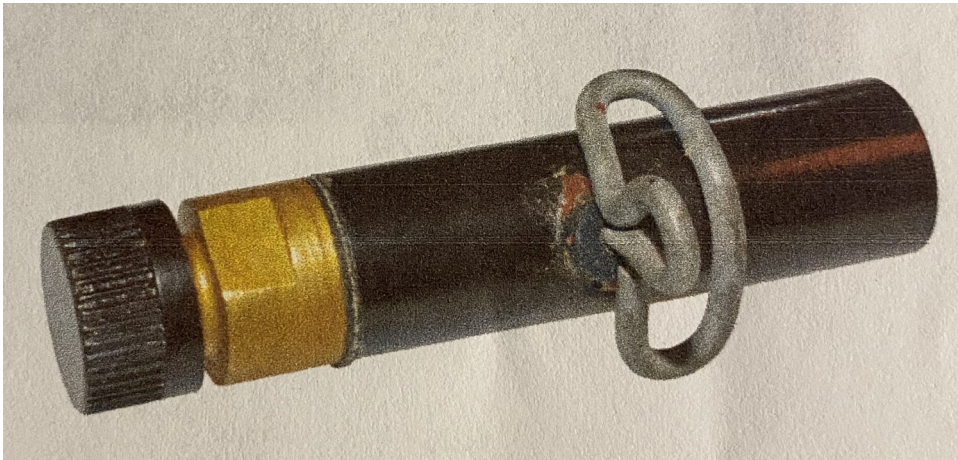
The firing device consists of a cylindrical body, striker assembly, and combination safety and pull pin. A plastic shipping and storage cap covers the end of the firing device.

To use the firing device, the shipping cap is removed, and a detonator is attached. The device is then inserted into a mine or demolition charge. A slack tripwire is employed with one end anchored and the other end attached to the safety pin. When the safety pin is withdrawn the striker is released and allowed to hit the percussion cap of the detonator assembly initiating the attached explosive charge or mine.



*Pull Firing Device*  
*Image - US Department of Defense*

No other technical details are currently available.



*Yugoslavian UPM-2*



Type - Tilt

Weight - 2.1 oz. (59.5 g)

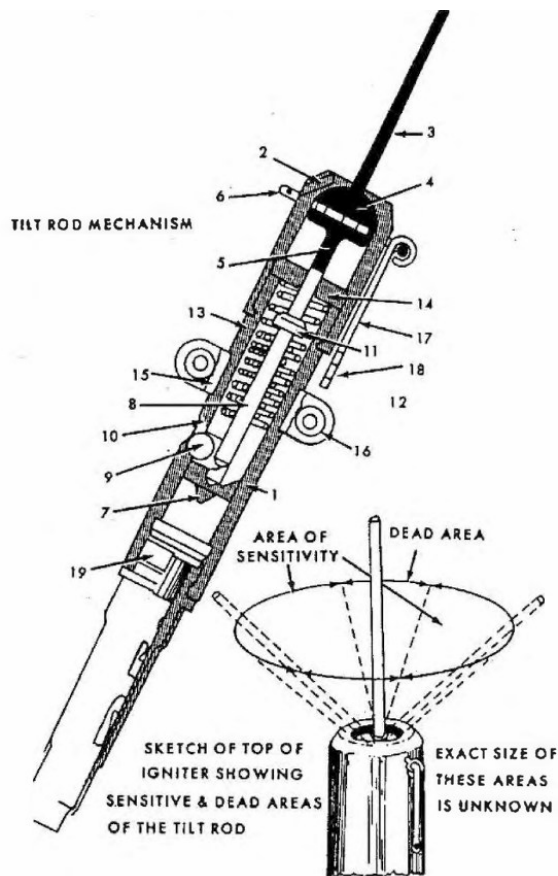
Length - 5.59 in. (141.9 mm)

Diameter - 0.47 in. (11.9 mm)

The official designation of this device is unknown. The Egyptian tilt-rod firing device is employed as both an antipersonnel and antitank mine fuze, primarily as a deterrent against the use of mine detectors. Employed with a tripwire, it could possibly be used as a boobytrap. It closely resembles the Yugoslavian UDZ-1 and may in fact be of Yugoslavian production.

The body of the device is a cylindrical brass casting (1). The internal components, consisting of a tilt-rod (3), a tilt-rod ball (4), and a tilt-rod ball projection (5) are made of steel.

The ball retaining rod (8) is held against the tilt-rod ball projection by means of the inner spring (12), which acts on the ball retaining shoulder (11). The striker retaining ball (9), which is held in a recess in the body of the device by means of the retaining rod, prevents the striker from flying forward under the pressure from the outer spring (2). If a lateral pressure of more than 1.5 lbs. (680 g) is applied to the tilt-rod, the tilt-rod ball projection acts as a gear. When the tilt-rod reaches an angle of 12-15 degrees from the vertical, the ball retaining rod is allowed to fly up, releasing the striker retaining ball, which is then forced into the centre of the hollow striker. The striker then flies forward and strikes the percussion cap.



*Tilt-rod Firing Device*  
*Image - US Department of Defense*



*Yugoslavian*  
*UDZ-1*

# SUOMI

(Finland)



## 8-Day Delay

Finland

Type - Delay

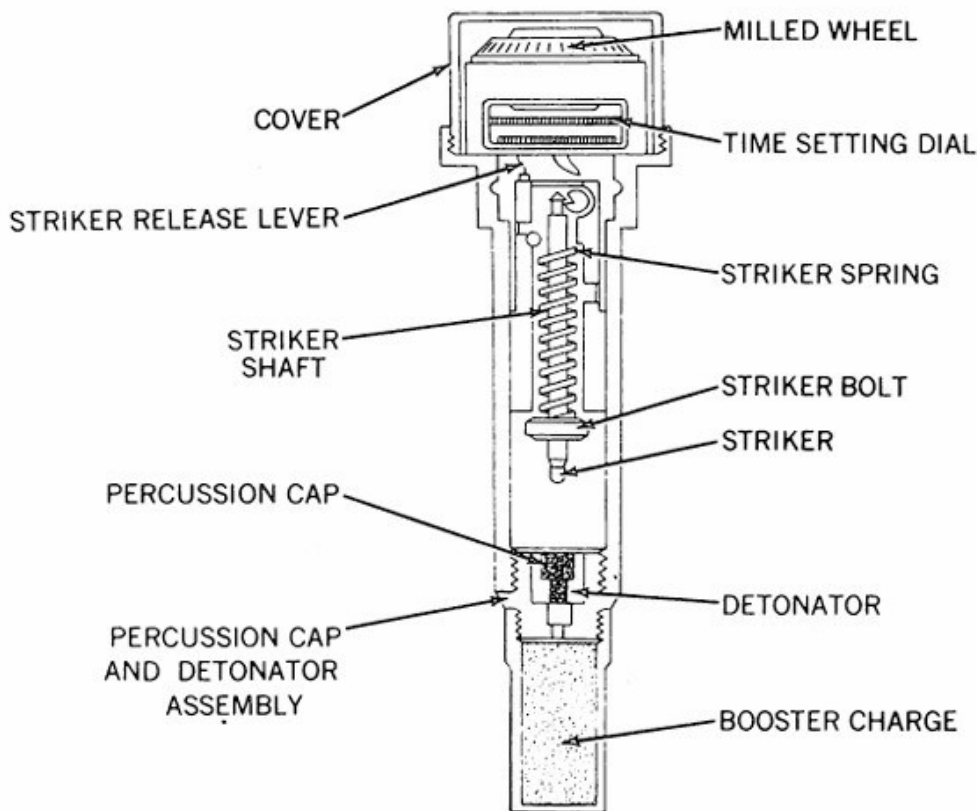
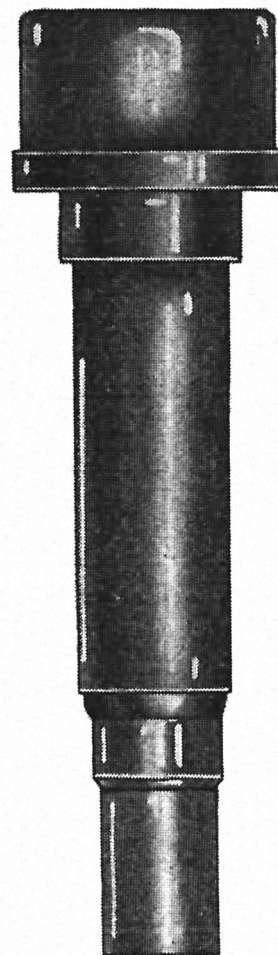
Length - 6 .375 in. (162 mm)

Diameter - 2 in. (51 mm)

The official designation of this device is unknown. The cylindrical body of this device is made of metal. It is a delay firing device with a spring-loaded striker that is released by a mechanical timer. The clockwork mechanism is contained in the upper part of the of the device and is enclosed by a threaded cover. Underneath the clockwork is the striker assembly, consisting of a striker, striker-release lever, a cam, and a trigger. The lower part of the device contains a detonator assembly made up of a percussion cap and a detonator assembly. This can be replaced by an electrical contact switch for use in an electrical firing circuit.

To prepare the firing device for use, the threaded cover is removed revealing a milled wheel on top of the clockwork mechanism. The wheel is turned clockwise until the desired firing time lines up with the indicator mark. Of note, the device should NOT be set for a delay of less than six hours. The cover is then replaced. A detonator assembly, or electrical contact switch, is then screwed into the lower part of the device. If a detonator assembly is used a booster charge should also be screwed on prior to inserting it into a demolition charge.

After the preset delay expires, a shaft extending from the clockwork mechanism engages the striker-release lever rotating the cam on the end of the striker-



*8-Day Delay Firing Device  
Image - US  
Department of  
Defense*

release trigger shaft. This disengages the striker shaft, after which the striker impacts the percussion cap and initiates the detonator, booster and main charge.

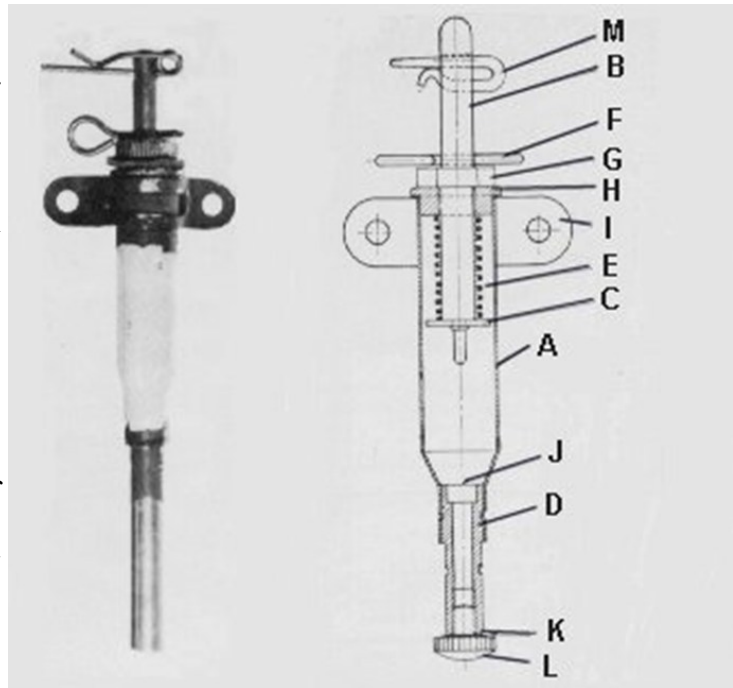
*8-Day Delay Firing Device (internal diagram)  
Image - US Department of Defense*

## Type - Pull

The M/40 firing device was designed and manufactured during the 1939-1940 "Winter War" with Russia. It appears to be a direct copy of the Russian UVG device.

The body of the M/40 consists of a 7.62x54R cartridge case. The base has been drilled out and threaded to accept a Bakelite plastic bushing. The body itself has three grooves pressed into the sides to form guides for the striker. A striker and striker spring are contained in the body with the shaft of the striker protruding through the bushing in the top (base of the cartridge case). The mouth of the body has a primer holder crimped in. A mounting bracket is soldered onto the body near the base of the cartridge casing. Some earlier versions did not have a mounting bracket.

The device was normally unpainted; however, training versions do exist and are painted yellow.

*M/40 Firing Device*

*A - Cartridge case, B - Striker shaft, C - Striker head, D - Primer Holder, E - Striker Spring, F - Safety Pin, G - Bushing, H - Cartridge base, I - Mounting bracket, J - Primer, K - Washer, L - Plug, M - Arming pin*



*M/40 Firing Device (Practice)*

## Type - Pull

The official designation of this device is unknown. This device is a simple mechanical fuze designed specifically for use as a boobytrap or fuse lighter.

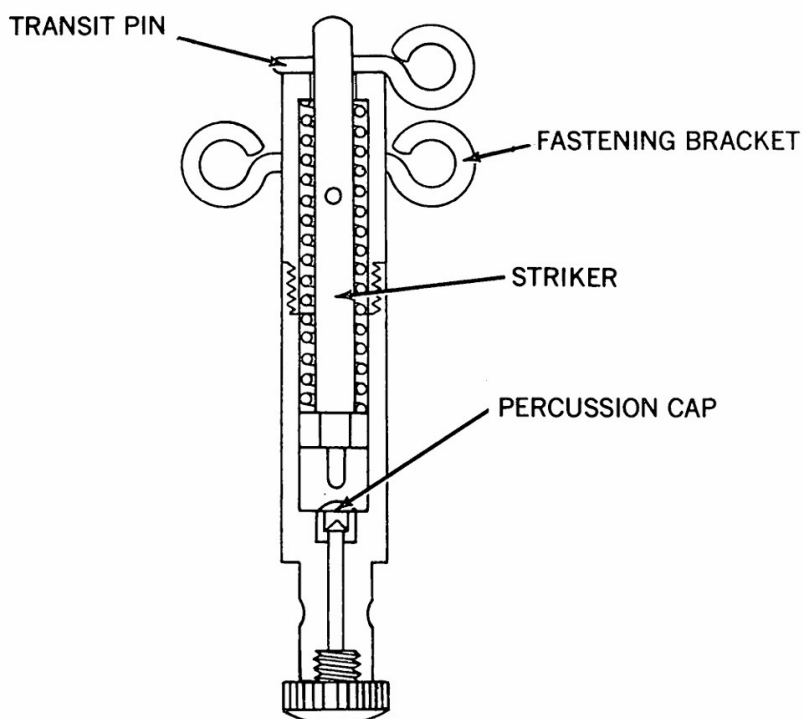
The cylindrical body is made in two parts. The upper body is a closed end tube with external threading on the bottom end and a mounting bracket of bent wire near the top. The top has a hole through the end for the shaft of the striker. The striker has a head and firing pin at the bottom and two holes through the shaft. The lower body is internally threaded at the top to accept the upper body. The bottom end is turned down to form a crimping seat with a primer cap inserted at the top. The hole in the bottom is closed by a knurled plug. A thin metal tube is used as a connector for the fuse or detonator.

When assembled the striker and striker spring are inserted into the upper body and pushed up until the transit safety pin can be inserted in the top hole. The upper body is then screwed into the lower body.

To prepare the firing device for use, the striker assembly is cocked using the transit pin, which is then placed in the lower retaining pin hole. The thin metal tube is crimped to the base of the firing device and a length of time fuze, or a No. 8 detonator (blasting cap), is then inserted into the tube and taped in place. The firing device is then anchored in place and a demolition charge attached to the firing device. A slack tripwire is attached to the striker retaining pin and anchored. The transit pin is then removed to arm the device.

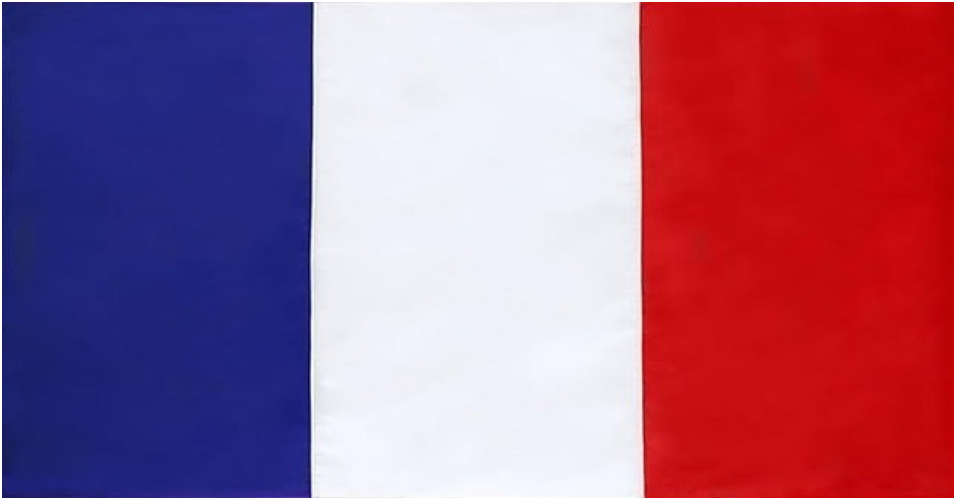
*Boobytrap Firing Device*  
*Image - US Department of Defense*

When a pull is applied to the trip wire, the striker retaining pin is pulled out releasing the striker to impact the primer cap initiating the firing sequence.



# FRANCE

(France)





## Friction Igniter Model 13

France

Type - Pull

These friction igniters were in use by the French from the turn of the 20th Century up until the Second World War. They were used to ignite safety (time) fuse and could also be used in a boobytrap as a pull firing device.

The body is made of brass. A heavy gauge wire fits through the end into a flash compound. The wire is coated in a friction compound that will react with the flash compound as it is withdrawn from the body. The reaction creates a flash of flame to ignite safety fuse.

No other technical details are currently available.



*Friction Fuse Igniter  
Model 13*

**Model 39**  
**(Allumeur á Traction Modèle 39)**

**France**

Type - Pull

The Model 39 is a pull firing device that was used with the anti-personnel mine Modele 1939, standard demolition charges and with the use of special adapters, as boobytraps in grenades and shells during the Second World War. Devices captured by the Germans were designated "Zugzünder 501(f)."

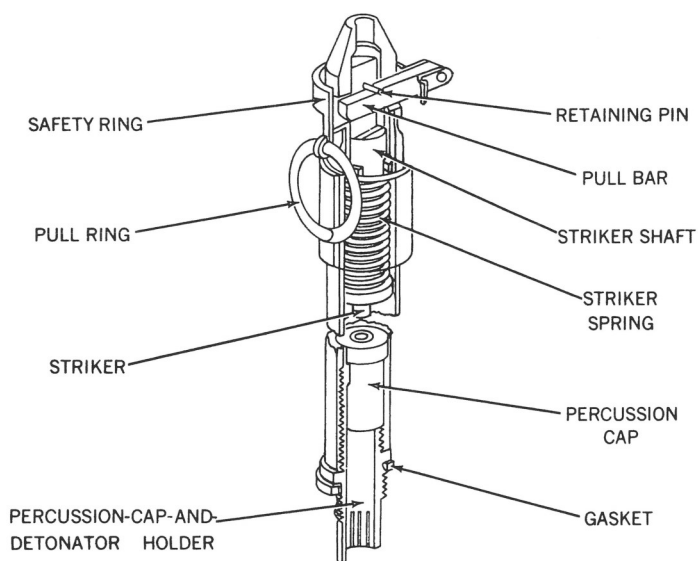
The cylindrical body is made of brass and is threaded at the bottom to accept a primer holder. A mounting bracket is soldered to the body just below the top mechanism. The top of the body contains the release mechanism. It is covered by a cap with a small slot in the side and can rotate 360 degrees. The body contains the striker and striker spring. The striker has a head with firing pin at the bottom end. The top of the striker has a slot cut into it. A retaining pin in the top portion of the striker runs through at 90 degrees to the slot. The release pin is a small piece of flat stock that has a safety ring hinged at one end and a pull ring attached to the opposite end of the safety ring. The primer holder contains a percussion primer in the top, and is threaded to screw into the bottom of the device. The bottom is externally threaded to fit French mines or demolition charges and a detonator can be pushed into the bottom.

The device is painted olive green, any other markings are unknown.

When assembled at the factory, the striker and striker spring are inserted through the bottom. The top end of the spring rests on a metal washer covering a packing washer in the top of the body. The striker is pushed up so the shaft fits up through the top until the release pin can be fitted through the slot in the cap and through the slot in the striker below the retaining pin. When the striker is released the retaining pin rests on the release pin holding the striker in the cocked position with the striker spring compressed. When fully assembled, the safety ring is flipped over the top of the body preventing the release pin from being removed.



*Model 1939 Firing Device*  
*Photo- F. Caley*



To use the Model 1939, the device is fitted with a detonator and screwed into a mine or demolition charge. Once emplaced, a slack trip wire is attached to an anchor point and the pull ring on the device. Flipping the safety ring off the top of the device arms the device. When pressure is applied to the trip wire it draws the release pin out of the body. Because the top will rotate, it does not matter which direction the pull comes from. When the release pin is removed the striker will drive down under pressure of the spring until it hits the primer. The primer flashes into the detonator which fires and causes the mine or demolition charge to detonate.

## Model 1951 (non-metallic)

France

Type - Pull

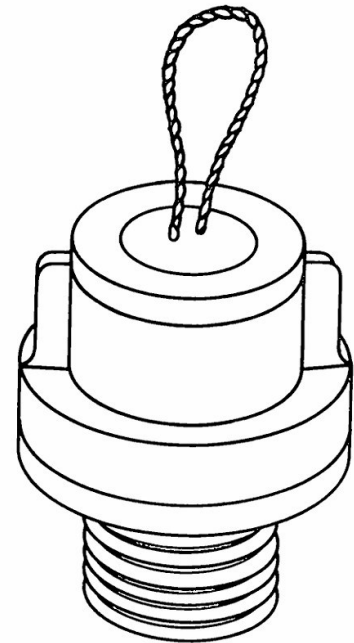
Diameter - 0.7 in. (18 mm)

Height - 0.7 in. (18 mm)

The Model 1951 is a pull-friction firing device that was specifically designed to detonate explosive charges and boobytraps.

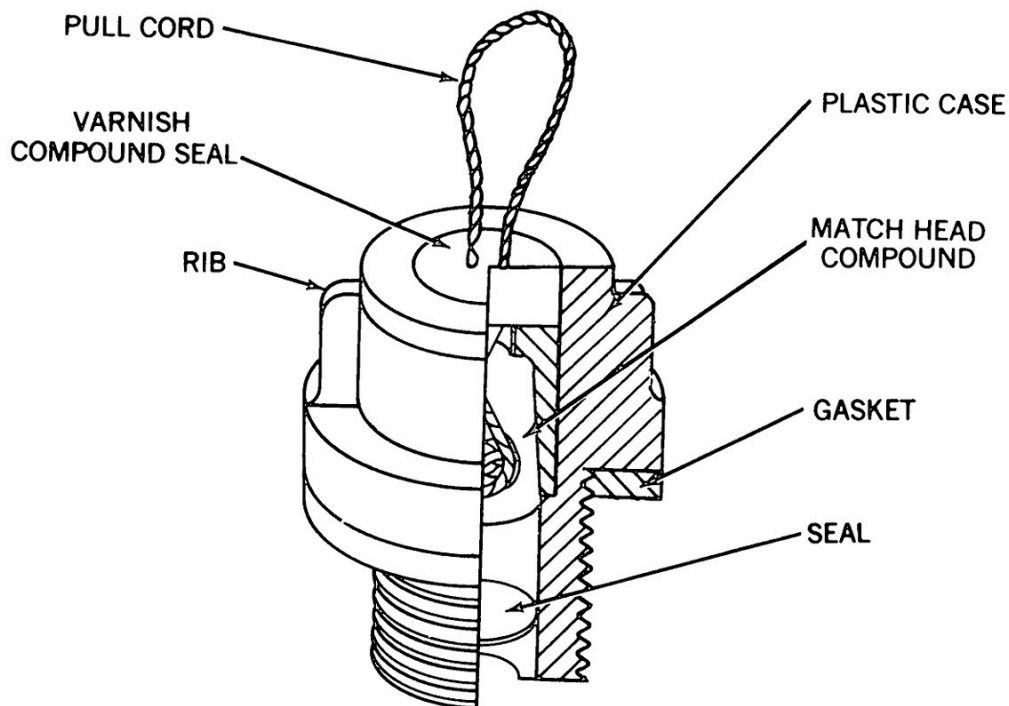
The firing device is constructed of plastic. The lower body is threaded to fit French demolition charges and the secondary fuze wells of anti-tank mines. The upper body has four strengthening ribs molded in. The top of the device contains a match-head composition into which a pull cord has been embedded. The exposed pull cord forms a loop for the attachment of a tripwire. A varnish like compound seals the joint where the loop protrudes from the body. The device should be handled carefully as there is no safety device.

To use the Model 1951, a detonator is inserted into the fuze well of the charge/mine. The transit cap is removed and the firing device screwed into the explosive charge, or secondary fuze well in a mine. An anchored slack tripwire is then attached to the loop in the pull cord.



*Model 1951 Firing Device*

A pull of 2.2-7.7 pounds (0.9-3.4 kg) on the pull cord will pull it through the friction compound creating enough heat to ignite it and initiating the detonator and in turn the main charge.



*Model 1951 Firing Device (internal diagram)*

**Model 1951 (metallic)**  
**(Allumeur á Traction Metallique Modèle 1951)**

**France**

Type - Pull  
Length - 2.7 in. (71 mm)  
Diameter - 0.6 in. (16 mm)

The Model 51 is a pull firing device utilizing a ball-release method of operation. It was primarily used for boobytrapping anti-tank mines and in the Model 1952 trip flare. The firing device was in French service for many years and may have been exported to other countries in the French sphere of influence.

The firing device body is composed of three parts. The bottom section closes the bottom of the device and holds the primer. It is threaded and is protected by a cap that also seals the body. The centre section is externally threaded at the top end and internally at the bottom. A lip is formed inside about ¼ the way down the body

with the central hole just large enough to permit the striker shaft to fit through. The section also contains the striker and striker spring. The striker has a head with firing pin at one end. The opposite end is hollow and has a hole drilled through it to accept retaining balls. The upper section is internally threaded to screw onto the centre section. The top is closed except for a hole to allow a pull cord to fit through. It contains a spring and pin with a collar. The pull cord is attached to the pin.

The striker and striker spring are fitted into the body through the bottom with the shaft fitting through the lip with the spring compressed. Two retaining balls are placed in the striker in the holes near the top. The pin with a collar fit into the hollow shaft of the striker pushing the balls outward above the lip. They hold the striker in the cocked position trapped between the body and pin. A spring fits over the pin and when the top section is screwed on presses on the collar to hold the pin in position. A safety pin fits through holes in the side of the body and a hole in the pin.

The Model 1951 will function when the safety pin is removed and a pull of 2.6-7.7 lbs. (1.1-3.5 kg) is applied to the cord. This pulls the pin out of the striker and allows the balls to move inwards. This is enough to allow the striker spring to pull the striker through the hole in the lip and drive it down onto the primer, which initiates an attached detonator.

A later version of the device is slightly modified by reducing the diameter of the top section of the body. Functioning is the same.



*Model 1951 Firing Device*  
*Photo - F. Caley*



*Model 1951 (late version)*  
*Photo - F. Caley*

## Model 1951 (metallic)

France

It appears that there was a practice version, as well as an inert version, produced.

The Model 1951 may be painted in several colours, to include dark brown, tan, olive green and even unpainted. The practice version is light blue, and the inert version is black. Other markings are unknown.



*Model 1951 Inert*

## Model 1952

France

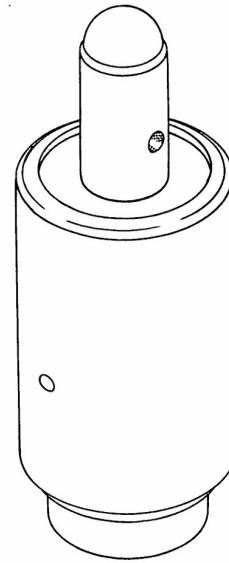
Type - Anti-handling  
Diameter - 0.9 in. (23 mm)  
Height - 2.2 in. (57 mm)

The Model 1952 is a copy of the Second World War German T.Mi.Z. 43 firing device. Both devices are instantaneous mechanically actuated by either pressure or pressure-release. The Model 1952 was specifically intended to be used with the French Model 1948 anti-tank mine.

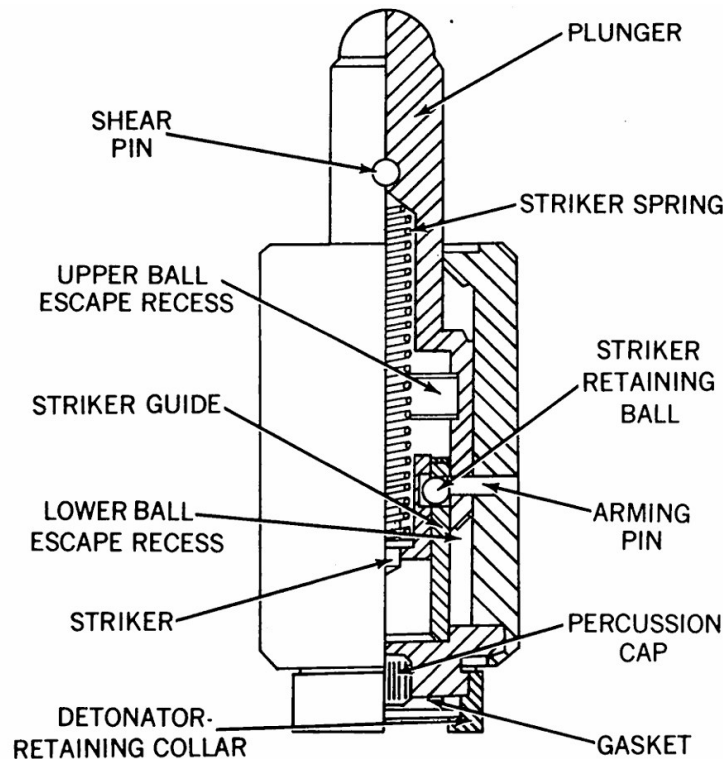
The Model 1952 has a steel body. The plunger of the firing device is held in check by both an arming shear pin and retaining balls.

To use the Model 1952, a detonator is attached to the firing device. The device is then inserted into the mine. It is automatically armed when the cover of the mine is screwed down and the arming pin is sheared. A distinct "click" is heard. The device is now fully armed and functioning. Any attempt to disarm the device will result in detonation.

Once armed, the device will function: (1) if pressure is applied to the plunger, which forces the striker assembly down, releasing the striker retaining balls allowing the striker to impact the percussion cap in the detonator; or (2) if an attempt is made to disarm the mine, the unscrewing of the pressure plate allows the plunger to rise under pressure of the compressed striker spring, which allows the retaining balls to escape past the bottom of the plunger and release the striker to snap down into the percussion cap and initiate the mine.



*Model 1952 Firing Device  
Image - US Department of  
Defense*



*Model 1952 Firing Device (internal diagram)  
Image - US Department of Defense*



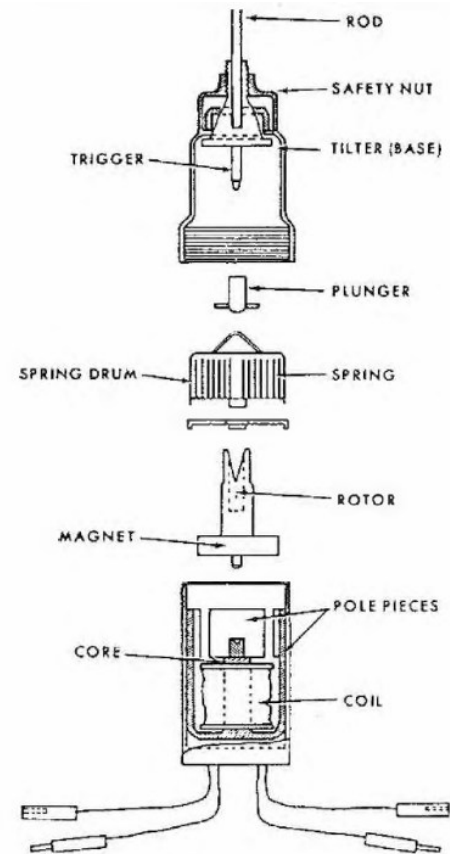
## Type - Tilt

The Model 1957 is a tilt-rod firing device that operates on a mechanical-electro-magnetic principle. It is primarily used as a fuze for the French Model 56 (Mi AC M OC 56) shaped charge anti-tank mine. However, when a tripwire is attached to the tilt-rod, it can also function as a boobytrap.

The Model 1957 has a two-piece metal body that contains a current generator assembly. The upper body contains: a tilt-rod, safety nut, tilter base, trigger, plunger, spring, spring drum, rotor, and magnet. The lower part of the device contains: magnetic pole segments, a core, coil, and firing leads. The intent of the device is to generate an electrical current, through mechanical action. The firing device itself contains no energetic material.

To use the Model 1957, it is emplaced and the tilt-rod is attached. The device is then connected to the Modele 56 AT mine, or to an electrical detonator (blasting cap) assembly in a demolition charge. The final step is to remove the safety nut that prevents the tilt-rod from moving.

Once armed, the device will function if pressure is applied to the tilt-rod. This action moves the tilter base, as well as the trigger located at the bottom of the latter. At a tilt of approximately 15 degrees, the trigger releases the plunger upward. The movement of the plunger, in turn, releases the main spring and the rotor and four-pole magnet. The rotation of the magnet creates an alternating magnetic field that generates alternating current in the coil and exit circuit. The current lasts from 0.2 to 0.4 seconds.



*Model 1957 Firing Device  
Image - US Department of Defense*

## Ollivier Snap Fuze

France

Type - Pressure

Length - 9.0 in. (228 mm)

Diameter - 1.7 in. (43 mm)

The Ollivier is an interesting firing device as it features a functional characteristic known as a “snap fuze,” or “rupture igniter.” It is an instantaneous, mechanical type that contains a cocked-striker. In application it functions as a pressure fuze and can be used in a variety of situations to boobytrap munitions, or create improvised mines. Stocks of these fuzes captured by the Germans were designated Stabzünder 585(f).

The firing device has a metal body and a spring-loaded striker with a snap release. The striker is held in the cocked position by the striker-retaining nut on the threaded end of the striker shaft that projects from the striker-retaining piece. The middle of the striker shaft is turned down to a much smaller diameter than the rest of the shaft to form a snap neck, coinciding with the

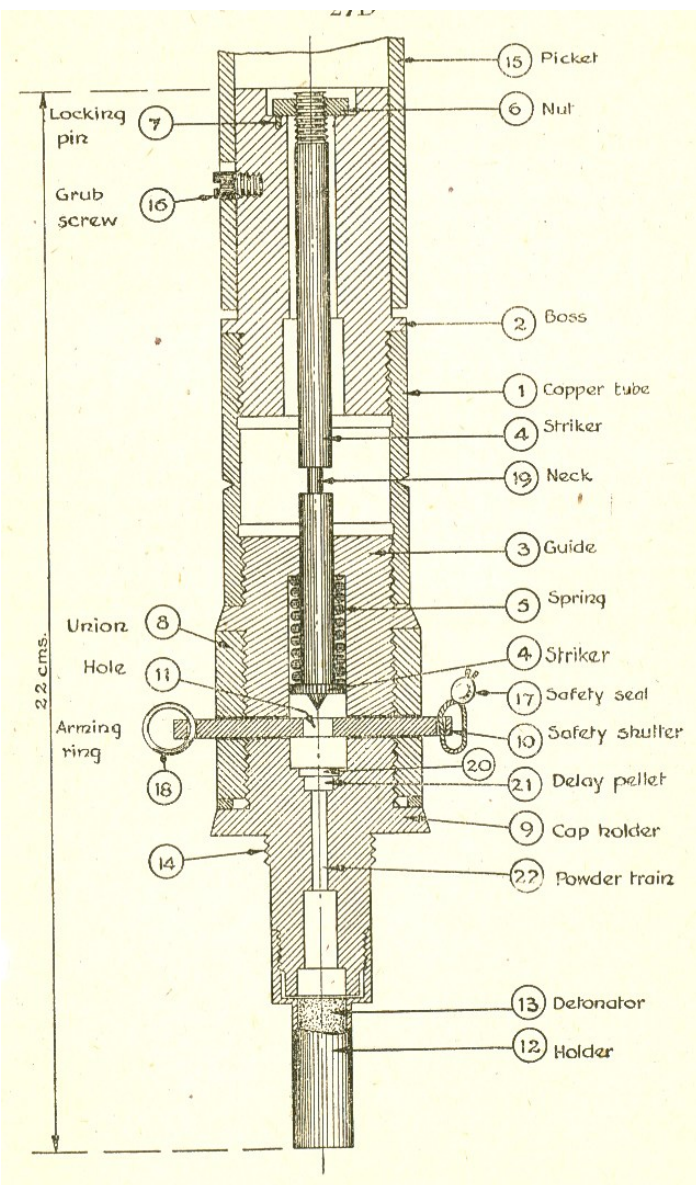
snap groove around the device body. A safety bar is inserted through the body between the striker and percussion cap. The base of the device is externally threaded to fit the nose of several French artillery projectiles. The detonator, separated from the percussion cap by a 3/4 second delay powder train, is screwed onto the base of the device.

To prepare the Ollivier for use it is inserted into an artillery shell, or an explosive charge. An extension tube is attached over the top of the device and secured with a locking screw. The safety bar is then withdrawn, and the Ollivier is ready for use.

A lateral pressure of 25 to 50 lbs. (11 to 22 kg) applied to the top of the extension tube will snap the firing device body at the snap groove, which releases the striker to impact the percussion cap. This, in turn, ignites a 3/4 second delay powder train and then the detonator.



*Ollivier Firing Device*  
Photo - J. Osborne



*Ollivier Firing Device (internal diagram)*

**Fuse Igniter AL MLEN F1  
(Allumeur de Mèche Lente Modèle F1)**

**France**

Type - Pull

This is a fuse lighter designed to ignite safety fuse, although it could be used for other purposes. Reports indicate that these have been used by Ukrainian forces in the Russia-Ukraine conflict.

The body of the device is plastic and contains a friction compound. At one end there is a fuse holder with a locking ring. A cap closes and protects the fuse holder until use. A flange in the centre of the body provides a finger grip. The opposite end has a cap covering a push button. The button has a head with a thinner shaft with the bottom end covered in a friction material. A safety collar fits over the shaft to prevent the button being pushed.

The device is olive green with markings in yellow. Other colours have been noted, light brown with white markings and blue (presumed to be practice) with white markings.

For use, a safety fuse is inserted in the fuse holder and the collar tightened down to hold it in place. When ready to fire, the cap is removed exposing the button, and the lighter gripped with two fingers below the flange with the thumb on the button. The safety collar is removed arming the device. When the button is pushed sharply down the friction material is pushed through the friction compound causing it to flash onto the end of the fuse, igniting it.



*Model F1 Fuse Lighter*

**Delay Detonator F1 5-55mn**  
**Delay Detonator F1 1-11h**

France

Type - Delay  
Weight - 2.5 oz. (70 g)  
Diameter - 2 in. (52 mm)  
Height - 1.77 in. (45 mm)

This is a clockwork delay device that will fire a primer capable of initiating a non electric detonator. There are two versions with different delay ranges. The first has a range from 5 minutes to 55 minutes, the second has a range of 1 to 11 hours.

The device is constructed of plastic in a cylindrical form. The bottom portion is made of clear plastic and has a primer holder in the centre of the bottom. There is an indicator arrow painted on the side. The upper body is constructed of either black or olive green plastic. The time delay increments are evenly divided around the circumference. The body contains a clockwork mechanism that will initiate the primer when it winds down. A safety clip fits around the centre of the device between the upper and lower bodies.

Markings on the top of the device give the designation, manufacturer, and delay range for the particular device.

The delay for the 5-55 version may be set for any time between 5 minutes and 55 minutes in 5 minute increments. For the 1-11 version the delay range is 1 to 11 hours in one hour increments.

For use, the delay is set by rotating the top portion until the desired delay is aligned with the indicator mark on the lower body. If being used with a charge that has a well, a detonator is inserted into the well. The device is then screwed into the well, the safety clip removed, and the delay started by pushing down on the top of the device. The device will wind down until the desired delay expires and the clockwork fires the primer into the detonator initiating the explosive train.

If using the firing device with explosives that do not have a well, the basic operations are the same, except that the detonator must be taped onto the primer holder before inserting the device into the explosive.

The device may be stopped by pulling up on the upper body which will stop the clockwork. It may be started again by pressing the top down again; however, the original delay time cannot be changed. The delay will start again from where it left off.

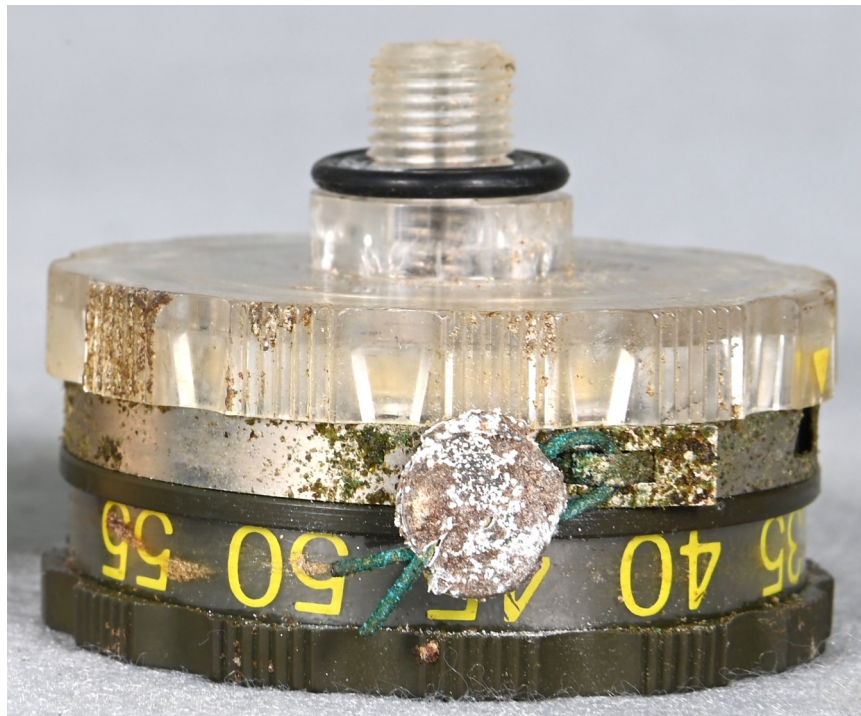


*Delay Detonator F1 5-55mn*  
*Photos - F. Caley*





*Delay Detonator F1 1-11h*



*Delay Detonator F1 5-55mn showing safety clip in position  
Photo - J. Osborne*

**Model F1 Pull Firing Device, Undetectable  
(Allumeur à Traction Indétectable Modèle F1)**

**France**

Weight - 0.7 oz. (20 g)  
Height - 2.8 in. (72 mm)  
Diameter - 1.14 in. (29 mm)

This is a pull fuze normally used in mines; however, it appears that it could be used as a boobytrap mechanism, if necessary.

The device is olive green plastic with markings in yellow. Markings give the designation and lot number. Manufacturers markings are molded directly onto the body.

No other technical details are currently available.



*Model F1 Pull  
Firing Device*



# DEUTSCHES REICH

(Imperial Germany)



## Automatic Detonating Device

Germany (Imperial)

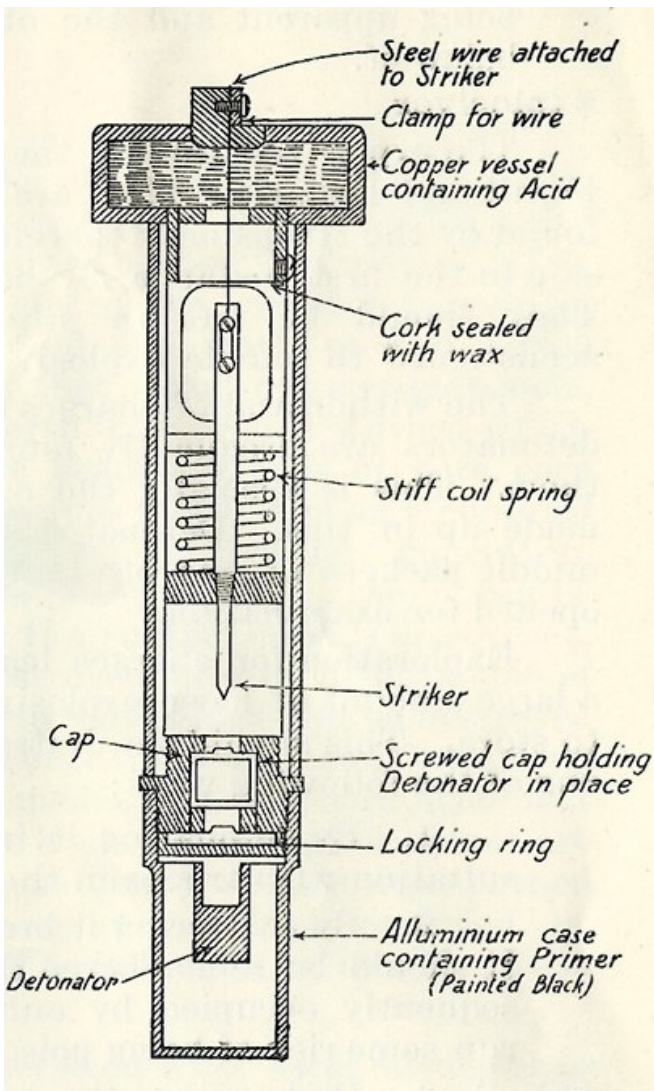
Type - Delay

Length - 6.0 in. (152 mm)

Diameter - 1.7 in. (44 mm)

The official designation of this device is unknown. This delay device was developed and used by the Germans during the First World War. The first example of these devices captured by the British was in March 1917. The resulting Technical Intelligence Bulletin was issued on April 5, 1917.

The device consists of a main cylindrical body made of tinned brass. There is a copper vessel attached to the top end. A copper filling plug is located off centre on the top of the vessel. A striker and spring are contained within the body and are retained in the cocked position by a steel wire that passes through the copper vessel to a clamp on top of the vessel. The wire passes through a cork sealed with wax that also closes the bottom of the copper vessel. The body is internally threaded at the bottom end to accept a detonator assembly. The detonator assembly consists of a percussion cap, small detonator and a primer contained within an aluminum case. The main device is unpainted. The detonator assembly is painted black.



*Automatic Detonating Device  
Photo - N. Bonney*

For use the filling plug on top was removed and the copper vessel filled with acid. The acid would eat away at the retaining wire until it was weakened enough that the striker spring could overcome it and release the striker into the percussion cap. The delay could be adjusted by varying the concentration of the acid. It was noted that the device was quite erratic and was seriously affected by ambient temperature.

This device was deemed to be exceedingly dangerous, and instructions were issued to handle it as little as possible as it was liable to explode at any moment after arming.

*Automatic Detonating Device (internal diagram)*

**SZ 09**  
**(Schlagzünder 09)**

Germany (Imperial)

Type - Pull  
Length - 3.5 in. (90 mm)  
Diameter - 0.4 in. (11 mm)

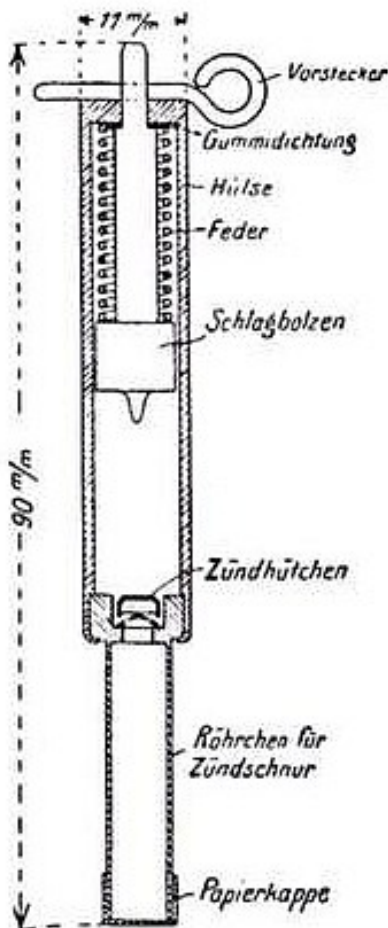
The SZ 09 is a First World War fuse lighter that was used for demolitions, improvised grenades, and could also have been used to create a boobytrap.

The firing device is made of brass. The main body is a simple tube with a closed top. The bottom end has a plug that has a fuse/primer holder of reduced diameter. The body contains a striker and striker spring with the shaft of the striker protruding through a hole in the top. A safety pin fits through a hole in the striker shaft and rests on top of the device. When in place the pin holds the striker in the cocked position with the spring compressed. The bottom plug has a percussion cap in the centre.

When the pin is pulled out, the striker spring reasserts itself and drives the striker down to hit the percussion cap. The percussion cap would either light a piece of safety (time) fuse or cause an attached detonator to fire.



*Schlagzünder 09 Firing Device*



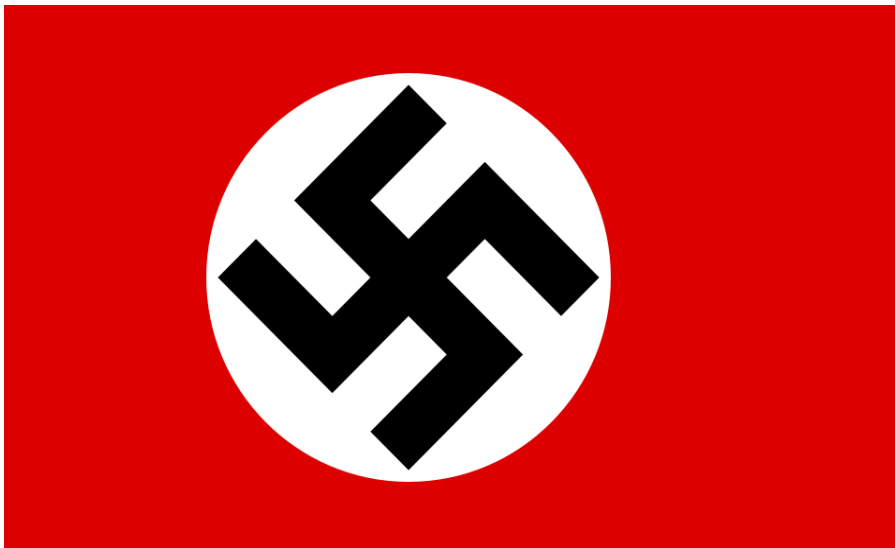
*Left - Schlagzünder 09 (internal diagram)*

*Right - Schlagzünder 09 with mounting bracket soldered on*



# **GROSSDEUTSCHES REICH**

**(WW2 Germany)**



## Introduction to German Boobytraps

When reviewing the following entries of boobytraps, it may be both informative and useful to understand the methodology used by the German Armed Forces during the Second World War when employing these firing devices. The following was extracted from US Department of the Army, Technical Manual 5-223C, German Mine Warfare Equipment, March 1952.

“The German Army developed and employed more mine fuzes than any other army in the world. Twenty-three of the 36 standard mines employed by the Germans in World War II used specifically designed fuzes. Twenty-eight fuzes were designed especially for use in mines. In addition, the Germans had at least 15 models of fuse lighters and grenade fuzes, 12 models of fuzes designed for the detonation of large charges but occasionally used with mines, and two remote-control detonating devices.”

Additionally, US War Department Technical Manual 5-325, Enemy Land Mines and Booby Traps, April 19, 1943, offers the following.

“Generally, German booby traps may be antipersonnel or antivehicle. They consist of a prepared charge operated by a standard pressure (push) or tension (pull) igniter. The charge may be a standard prepared charge ....., a standard land mine assembly, or a specially prepared (improvised) charge.”

“Booby trap charges are usually of Tolite or TNT, a German explosive, and often consist of from two to eight Tolite blocks, each measuring 2¾ by 2 by 1½ inches, each weighing 3¼ ounces; cylindrical Tolite cartridges, weighing 3½ ounces are also used. Most of the igniters ....., have been used in conjunction with an explosive charge, to produce a booby trap. Booby traps may consist of an igniter screwed into an explosive block (petard), a shrapnel mine, or a Tellermine to form the charge. Antipersonnel mines such as the antipersonnel bounding mine are well suited for employment as booby traps. Booby traps are frequently employed with Tellermines in the form of antilifting devices. The friction igniter Zdschn. Anz. 29 is then usually used to fire the trap as described. The pull igniter Z. Z. 35 is also used to fire Tellermines when set as a trap. The heavy antitank mine also employs the pull igniter Z. Z. 35 as a booby trap against lifting the lid.”

“The D. Z. 35 (smaller type with light spring) and the Z. D. Z. 29 (set for light pressure) are the igniters usually employed for pressure firing of traps.”



**Pressure Igniter SF 5, (Buck)**  
**(Druckzünder SF 5, (Buck))**

**Germany (WW2)**

Type - Pressure

Length - Type A -1.6 in. (40 mm)

          Type B - 1.375 in. (35 mm)

Diameter - 0.875 in. (22 mm)

These igniters are commonly known as “Buck” igniters after the manufacturer. The Buck Type A and B firing devices are pressure-activated, chemically-initiated firing devices primarily intended for use in the German anti-personnel “Pot” or “Mustard Pot” (Behles-Schutzen) mine. However, it is adaptable for any type of German boobytrap or demolition charge.

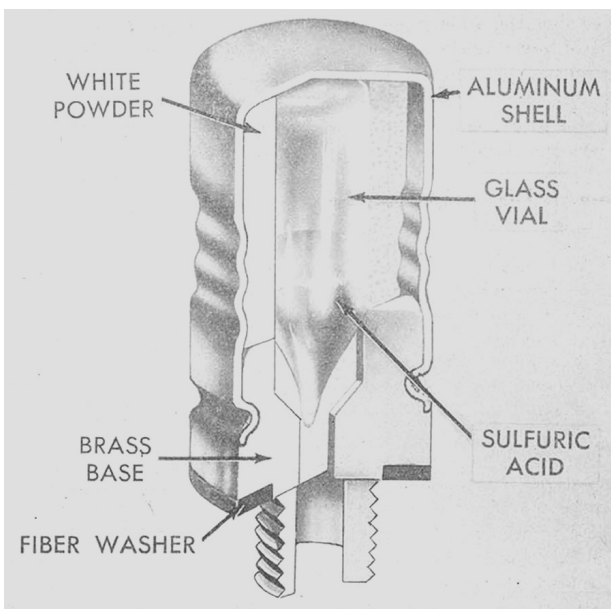
The devices consist of a brass base and aluminum foil body that contain a glass ampoule of sulphuric acid and a white powdered flash composition containing naphthalene. A waterproof paper disk confines the flash powder in the firing devices and prevents water entry. The bottom of the Buck body is threaded and can be screwed into a demolition charge. During the Second World War, Germany produced both the Type A and the Type B. In the Type A, the aluminum body has three corrugations and the glass ampoule stands on end surrounded by the white powder. In the Type B, the aluminum body has a single corrugation and the ampoule, containing a purple-coloured acid and protected by cotton, rests on its side with the white powder below it. There are no safety devices employed in the Buck and, since its body is somewhat fragile, care must be exercised when handling it.



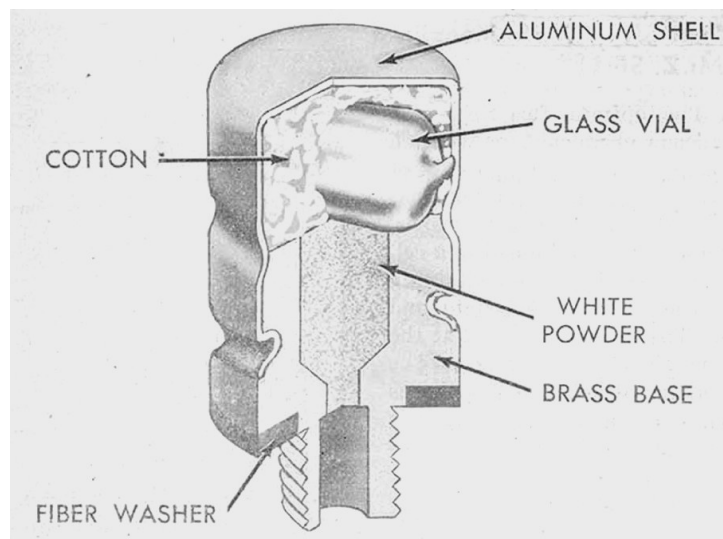
*D.Z. SF 5 Firing Device, Type A*  
*Photo - F. Masche*

To prepare the igniter for use, a detonator is inserted into the bottom of the device. The firing device is then screwed into the mine or demolition charge.

Approximately 5 lbs. (2.2 kg) of pressure on the top of the firing device deforms the body and breaks the glass ampoule. This allows the sulfuric acid to mix with the powdered flash composition. The result is a flash that initiates the attached detonator.



*Buck Type A (internal diagram)*  
*Image - US Department of Defense*



*Buck Type B (internal diagram)*  
*Image - US Department of Defense*

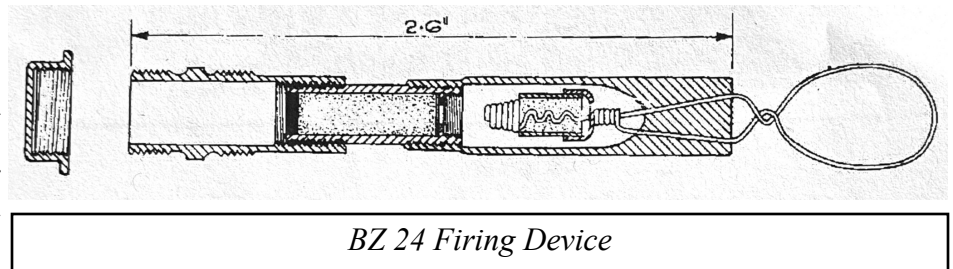
**Friction Igniter 24  
(Brennzünder 24 - B.Z. 24)**

Germany (WW2)

Type - Pull

Length - 2.6 in. (66 mm)

This friction igniter was normally used in the standard German Stielhandgranate 24, but could also be used for other purposes requiring a short delay (4.5 seconds).



The body has a brass adapter at the bottom end with standard igniter threading. A steel union containing the pyrotechnic delay element and primer screws into the brass adapter. The joints of the union are waterproofed by a black bitumastic. The upper body is a lead sheath screwed onto the steel union. The sheath contains a pellet of friction compound that has a wire running through it. The bottom end of the wire is tightly coiled to create friction when the wire is drawn through the friction compound. The upper end of the wire is twisted into a loop that protrudes from the top of the lead sheath. The top of the sheath is squeezed together to seal the top end. The delay is stamped into the lead sheath.

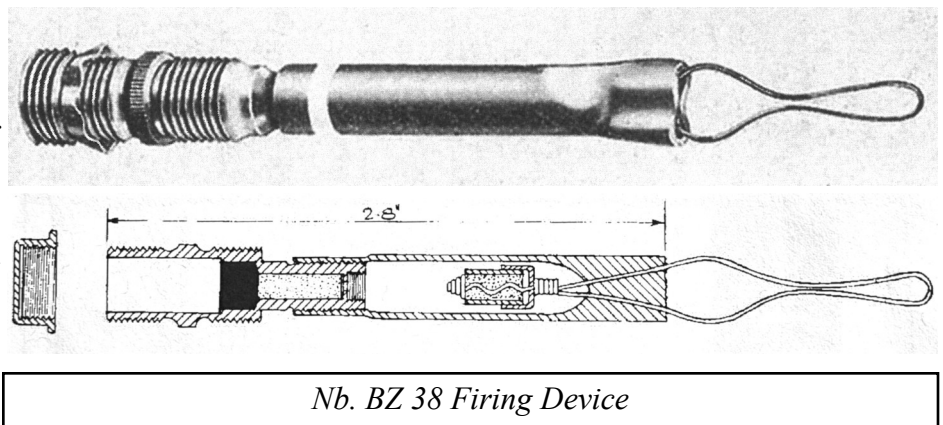
A detonator must be inserted into the bottom of the brass adapter. When a sharp pull is applied to the wire loop it draws the wire through the friction pellet causing enough friction to cause it to ignite. The friction compound flashes onto the primer causing it to fire into the delay pellet. The delay pellet burns down until it flashes into the detonator initiating the explosive train.

**Smoke Friction Igniter 38  
(Nebel Brennzünder 38 - Nb. B.Z. 38)**

Type - Pull

Length - 2.8 in. (71 mm)

This igniter is designed for ignition of smoke candles (charges).



The bottom end is a brass or aluminum adapter with standard igniter threading. The adapter contains the delay element and primer. The adapter screws directly into the lead sheath and the joint is waterproofed with a black Bitumastic. The sheath contains a pellet of friction compound that has a wire running through it. The bottom end of the wire is tightly coiled to create friction when the wire is drawn through the friction compound. The upper end of the wire is twisted into a loop that protrudes from the top of the lead sheath which is squeezed together to seal it. A white band is painted around the bottom of the lead sheath. The designation may be stamped into the lead sheath as well.

An igniter must be inserted into the adapter prior to use. When a sharp pull is applied to the wire loop it draws the wire through the friction pellet causing enough friction to cause it to ignite. The friction compound flashes onto the primer causing it to fire into the delay pellet. The delay pellet burns down until it flashes into the igniter causing ignition of the smoke compound.

**Friction Igniter 39  
(Brennzünder 39 - B.Z. 39)**

**Germany (WW2)**

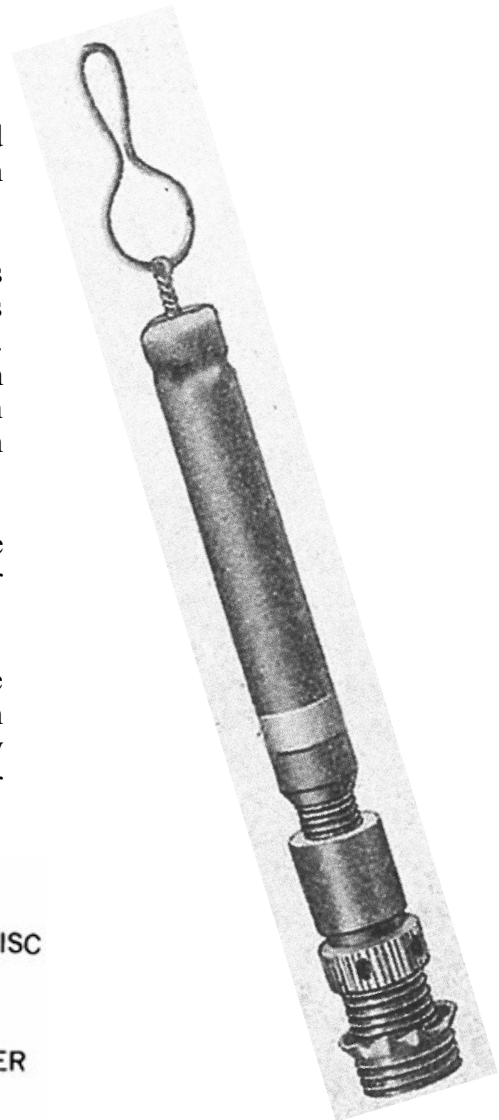
Type - Pull  
Length - 3.0 in. (76 mm)

The B.Z. 39 is a small friction igniter, primarily used in hand grenades, but can also be used in Tellermines, S-mines, or even in boobytraps.

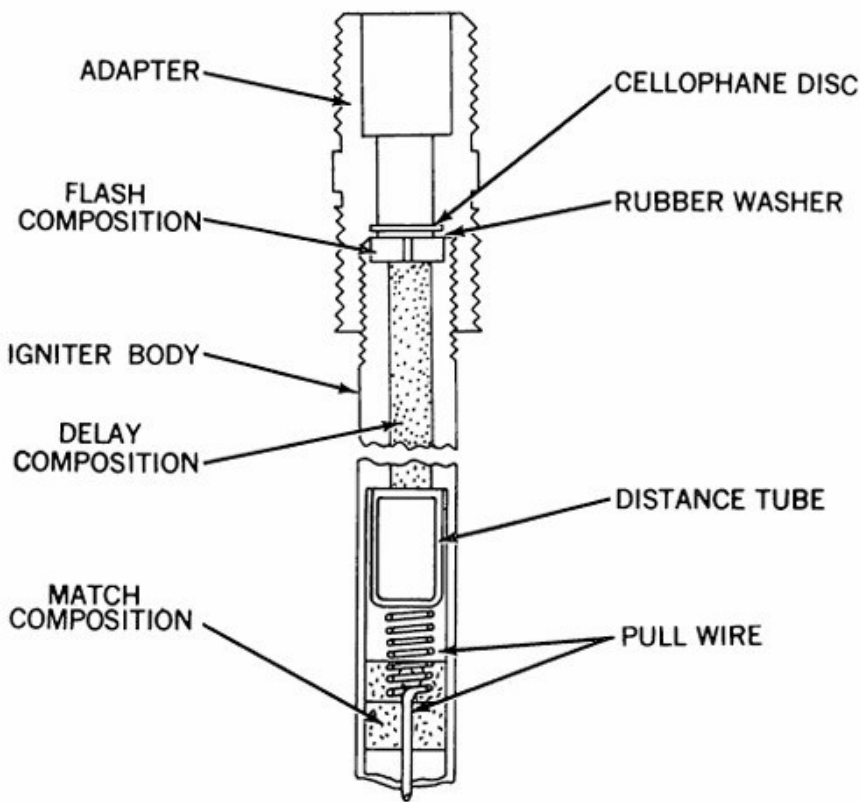
The cylindrical body of this device has a wall of two thicknesses forming a shoulder on which rests a distance tube that prevents the longitudinal movement of the coated part of the pull wire. The B.Z. 39 contains a seven-second delay composition consisting of black powder and a small quantity of a flash compound. The filling is protected by a cellophane disk held in place by a rubber washer.

To use the firing device, a detonator is inserted into its base. The assembled device is then inserted into the grenade, mine, or boobytrap.

When approximately 20 lbs. (9 kg) of pressure is exerted on the pull wire, the coiled part of the wire is drawn through the friction compound that produces a flash the ignites the delay composition. Approximately seven seconds later, the detonator is initiated setting off the grenade, mine, or boobytrap.



*B.Z. 39 Firing Device  
Image - US Department of  
Defense*



*B.Z. 39 Firing Device (internal diagram)  
Image - US Department of  
Defense*

**Friction Igniter 39  
(Brennzünder Eifer 39 - B.Z.E. 39)**

**Germany (WW2)**

Type - Pull  
Height - 2.1 in. (53 mm)

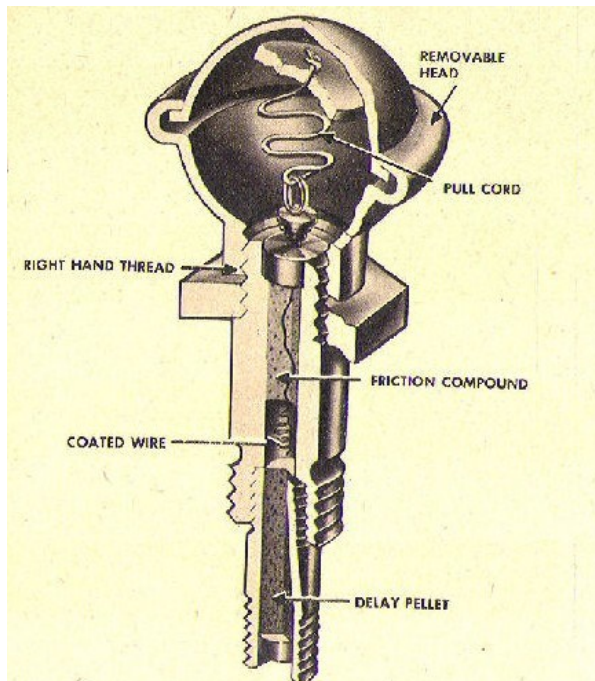
The B.Z.E. 39 is a small friction igniter, primarily used in the German Second World War Eihandgranate (Eihgr.) 39 and Stielhandgranate (Stg.) 43 hand grenades, as well as in smoke candles. It could also be used for demolitions or even in a boobytrap, if necessary.

The device closely resembles the Zdschn. Anz. 39 friction igniter. The body is a tube with standard threading on the bottom and at the top with a right-handed thread. The bottom of the body is internally threaded to accept a delay pellet which is simply a small tube threaded at both ends and containing a compressed powder that burns at a known rate. The main body contains a pellet of chemical friction compound with a pull wire passing through it. The bottom of the wire is coiled to provide resistance and is coated with friction compound. The upper end is attached to a pull cord. The pull cord is attached to the cap by a disc contained in the cap.



*B.Z.E. 39 Firing Device*

The device is provided in three different delays. The colour of the cap indicates the delay and use of the firing device - a red cap indicates a 1 second delay and is used in a message-box smoke flare; a deep blue or gray cap indicates a 4.5 second delay and is used in the Eihandgranate 39 and Stielhandgranate 43 hand grenades; and a yellow head indicates a delay of 7.5 seconds and is used in Haft Hohlladung 3kg shaped charges. The right-handed thread on this device serves to identify it at night from the Zdschn. Anz. 39 which has a left-handed threading.



*B.Z.E. 39 Firing Device*

When the cap is unscrewed (right-handed) the pull cord allows the cap to be pulled away a short distance. A sharp pull on the cap draws the wire through the friction compound causing it to ignite. The flash ignites the delay pellet which flashes down after the delay period to fire the detonator.



## Clockwork Timers (Uhrwerkszeitzünder)

German (WW2)

The official designations for these firing devices (if there is one) is unknown at this point. Designed more for sabotage rather than boobytraps these lesser-known clockwork timers all use standard sabotage igniters or detonators.

### Clockwork Timer 1 (Uhrwerkzeitzünder 1)

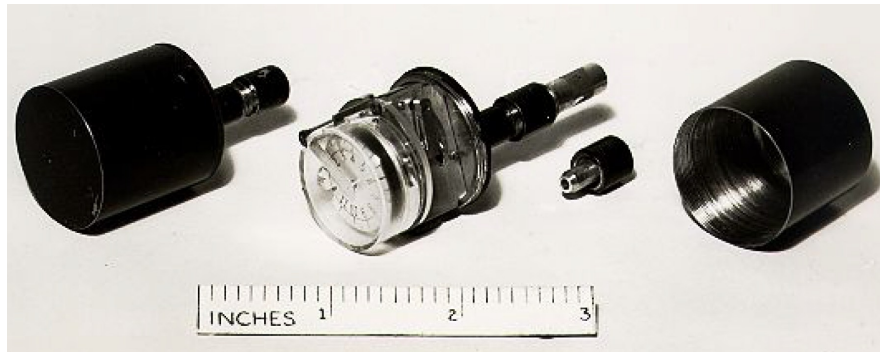
Type - Delay

Diameter - 1.25 in. (31.7 mm)

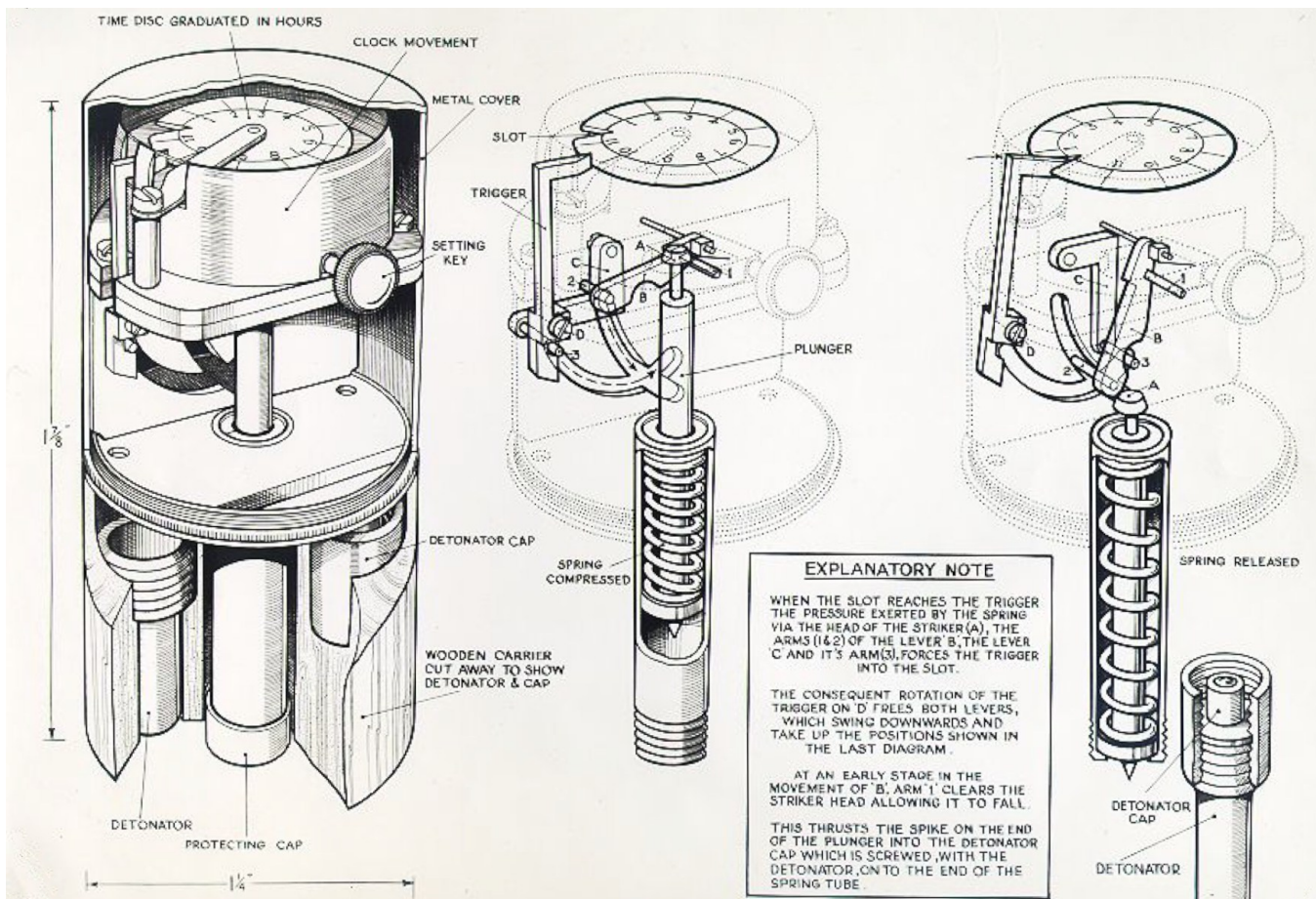
Height - 1.675 in. (40 mm)

This clockwork firing device provides a maximum delay of 12 hours. The clockwork mechanism is encased in what appears to be a brass body. When issued, the striker tube is protected by a wooden carrier that also holds the detonator and detonator cap in separate chambers in the carrier.

No other technical details are currently available.



*Uhrwerkzeitzünder 1*  
*Both photo and image - "Enemy Sabotage Equipment, Second Edition"*



## Clockwork Timer 2 (Uhrwerkzeitzünder 2)

Germany (WW2)

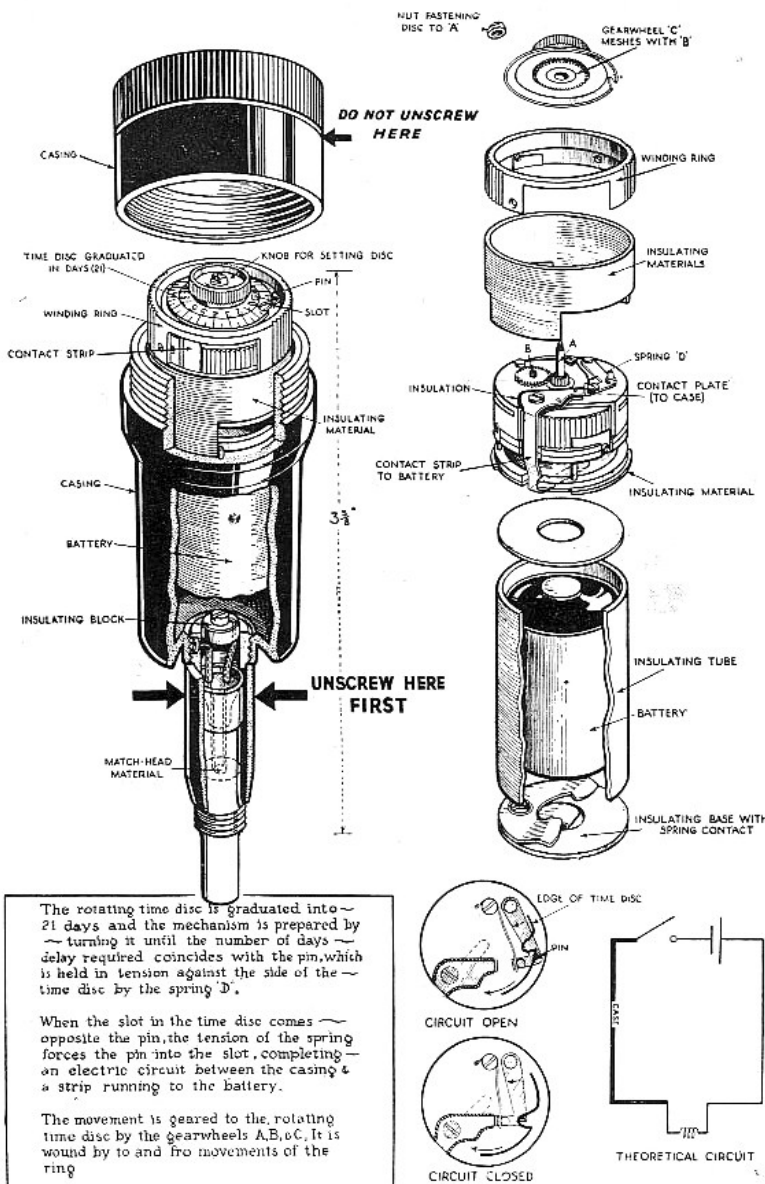
Type - Delay  
Diameter - 1.22 in. (31 mm)  
Height - 3.625 in. (92 mm)

This is an electrical firing device operating on a clockwork delay. The device will provide a delay of up to 21 days.

The Bakelite plastic body of the device contains the clockwork mechanism and a battery. The clockwork mechanism is not electrical and must be wound prior to setting the delay. Unscrewing the top cap exposes the clockwork and the winding ring. The top of the clockwork has a disc graduated into 21 days. The delay is set via a setting knob on top of the clockwork. The



*Uhrwerkzeitzünder 2  
Photo - N.Bonney*



*Image - "Enemy Sabotage Equipment, Second Edition"*

delay is set by turning the knob until the required delay lines up with the pin. The pin is held in tension against the side of the time disc by a spring. The battery is located below the clockwork mechanism and provides power for electrical initiation. A standard sabotage detonator screws onto the bottom of the device.

When the slot in the rotating time disc comes opposite to the pin, the spring tension on the pin forces the pin into the slot. The pin entering the slot completes an electrical circuit, which ignites a matchhead composition that causes the detonator to fire.



### Clockwork Timer 3 (Uhrwerkzeitzünder 3)

Germany (WW2)

Type - Delay

Diameter - 1.625 in. (40 mm)

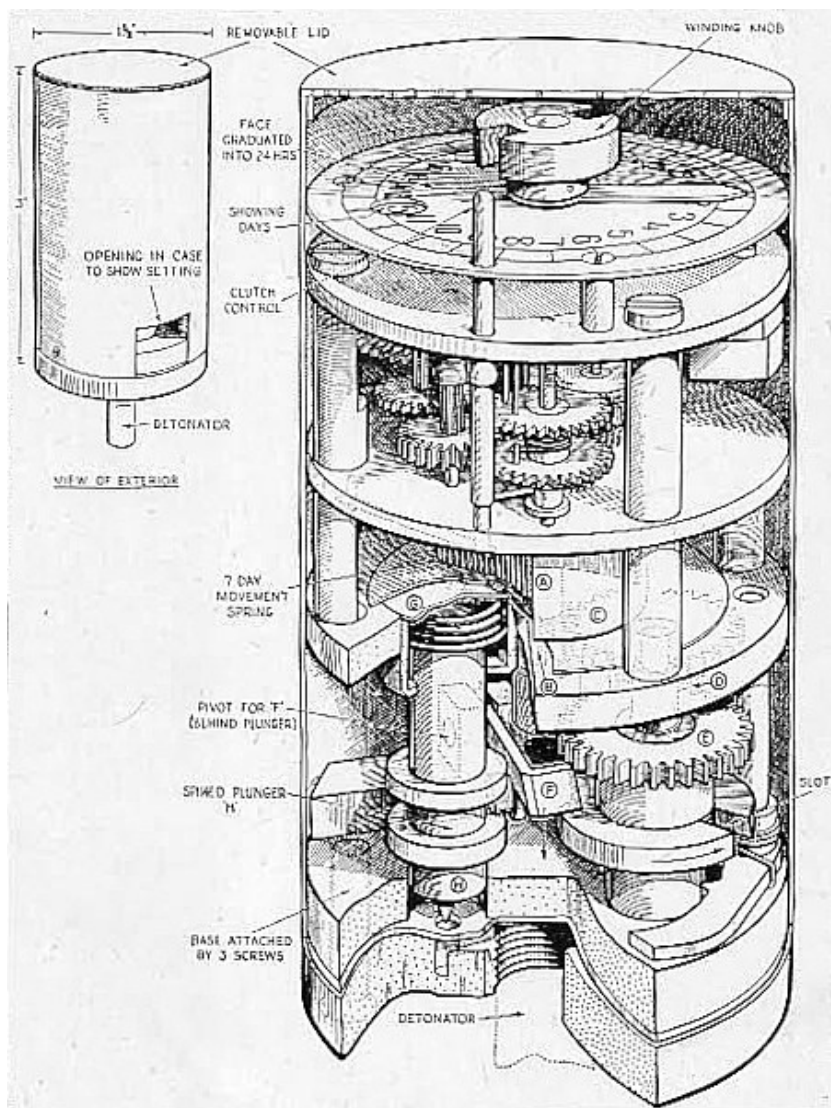
Height - 3 in. (76 mm)

This clockwork mechanism provided a delay of seven days in hourly increments.

The clockwork mechanism is housed in a metal casing that can be removed to both wind the clock and set the delay. There is a small opening in the case near the bottom of the device. A standard sabotage detonator screws into the bottom of the device.



*Uhrwerkzeitzünder 3  
Photo - F. Caley*



*Image - "Enemy Sabotage  
Equipment, Second Edition"*

## Clockwork Timer 4 (Uhrwerkzeitzünder 4)

Germany (WW2)

Type - Delay

Length - 3.3 in. (83.8 mm)

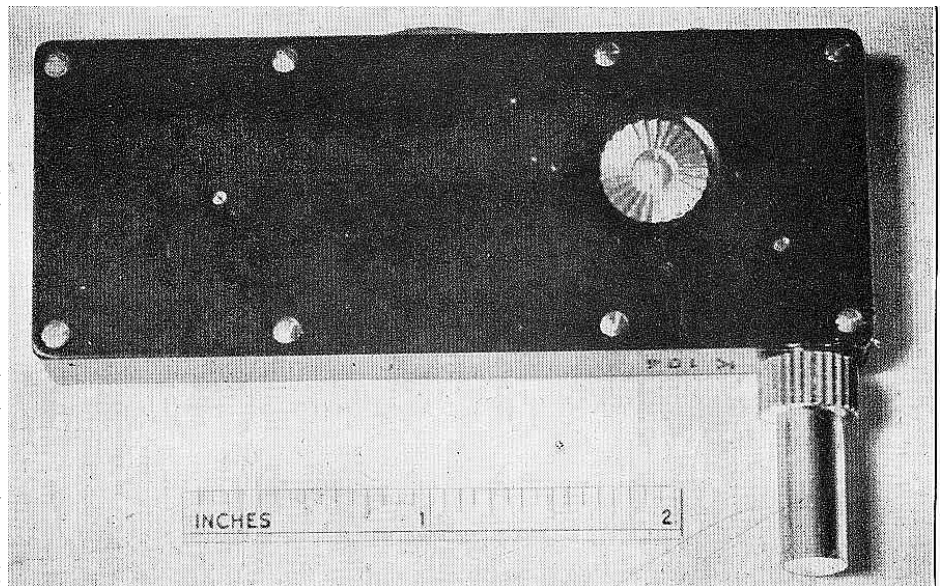
Width - 1.3 in. (33 mm)

Height - 0.75 in. (19 mm)

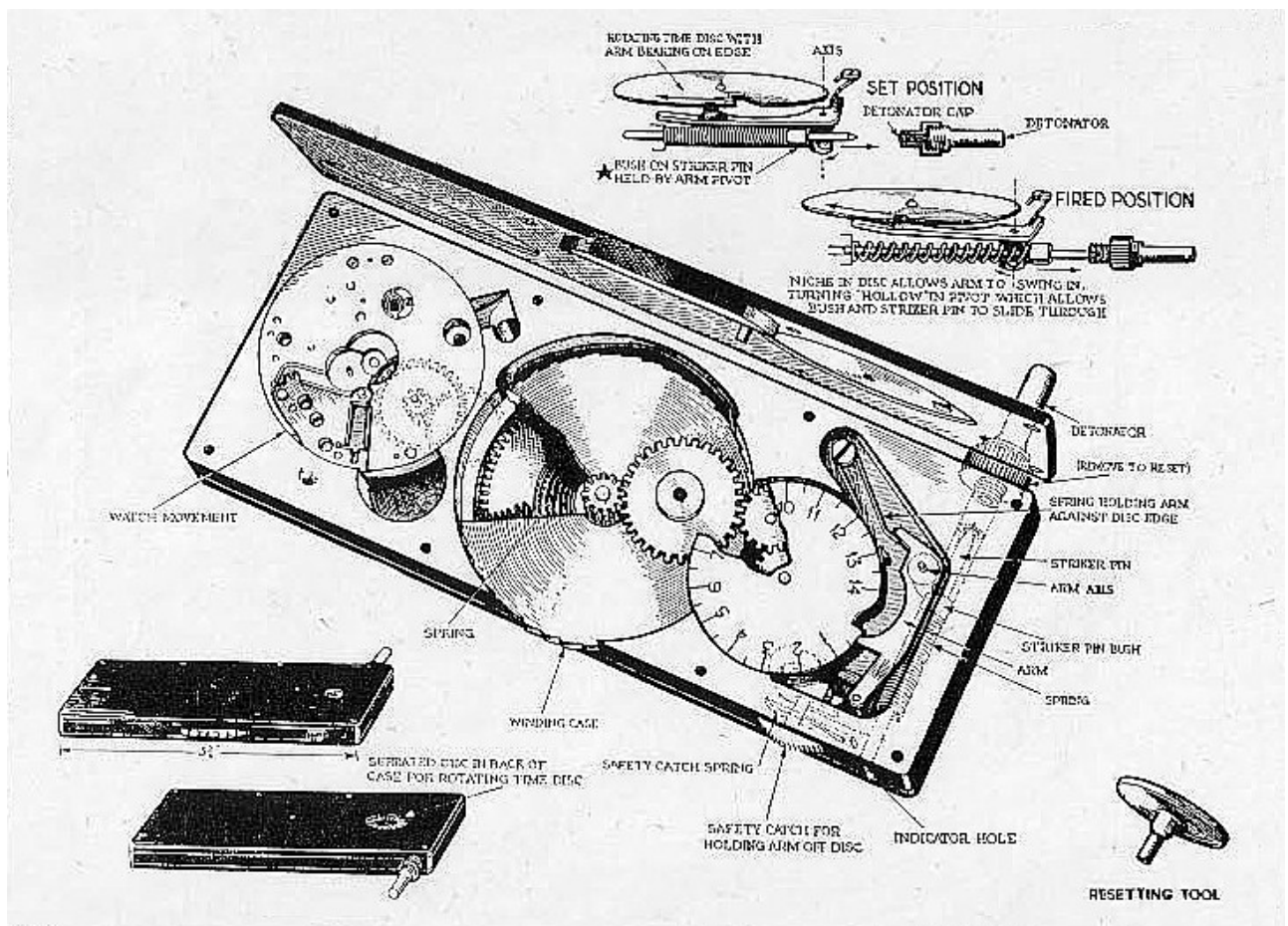
This is a flat device that would be easier to conceal than most of the other clockwork delays. It can be set for a delay of up to 14 days.

The clockwork is contained within the casing. There is a small aperture in one corner so the delay can be seen while setting. The delay is set by turning the serrated dial on the back of the case. After setting the delay, using a small tool provided, the striker is pushed in until held in place. The detonator and cap are then screwed into place on the edge of the device.

There is a safety catch on the side that will hold the arming lever off the time disk until ready to arm the device. No other information is currently available.



*Uhrwerkzeitzünder 4*  
*Both Photo and Image - "Enemy Sabotage Equipment, Second Edition"*





## Clockwork Timer 5 (Uhrwerkzeitzünder 5)

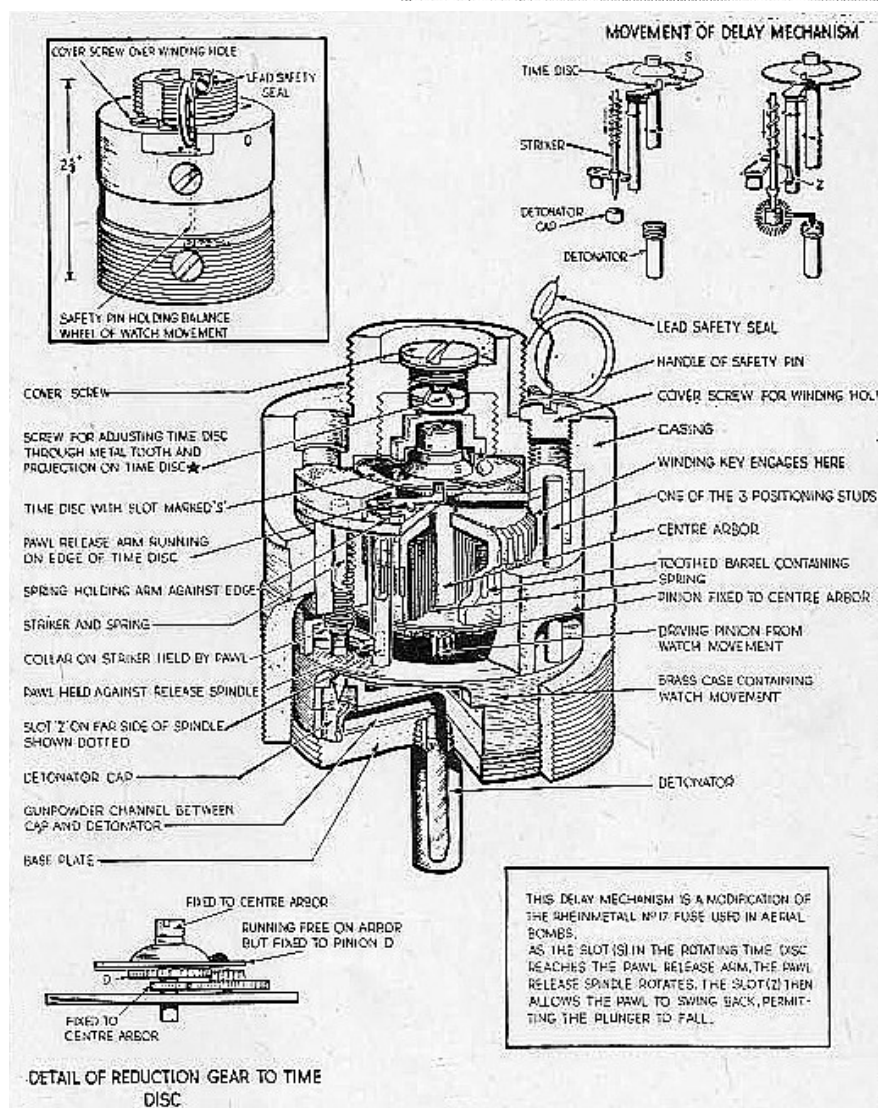
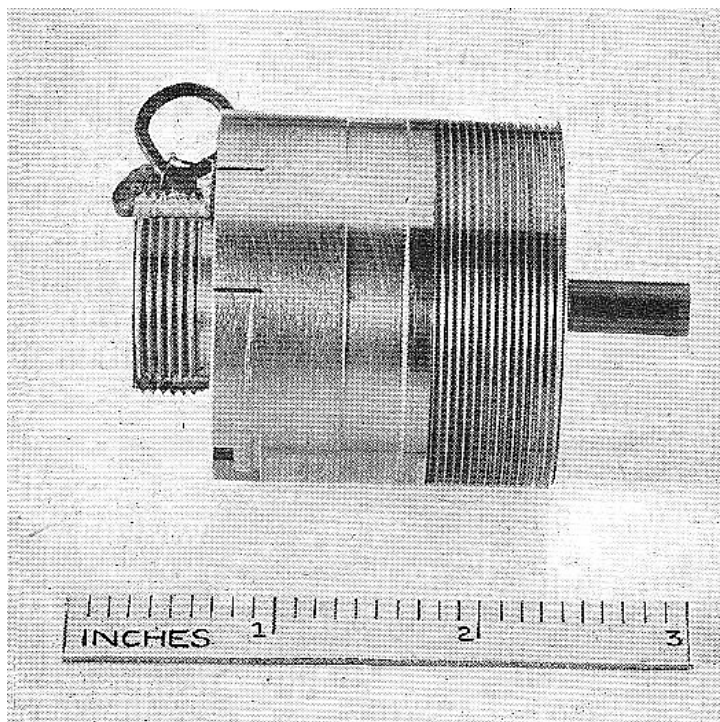
Germany (WW2)

Type- Delay  
Length- 2.125 in. (54 mm)

This is a modification of the Rheinmetall El.A.Z. 17 delay fuze used in aerial bombs. It has been modified for use as a sabotage clockwork delay providing a delay of up to 72 hours. A well in the bottom will accept the standard sabotage detonator.

No other technical details are currently available.

*Uhrwerkzeitzünder 5  
Both Photo and Image - "Enemy Sabotage  
Equipment, Second Edition"*



## Clockwork Timer 6 (Uhrwerkzeitzünder 6)

Germany (WW2)

Type - Delay  
Diameter - 1.625 in. (41 mm)  
Height - 3 in. (76 mm)

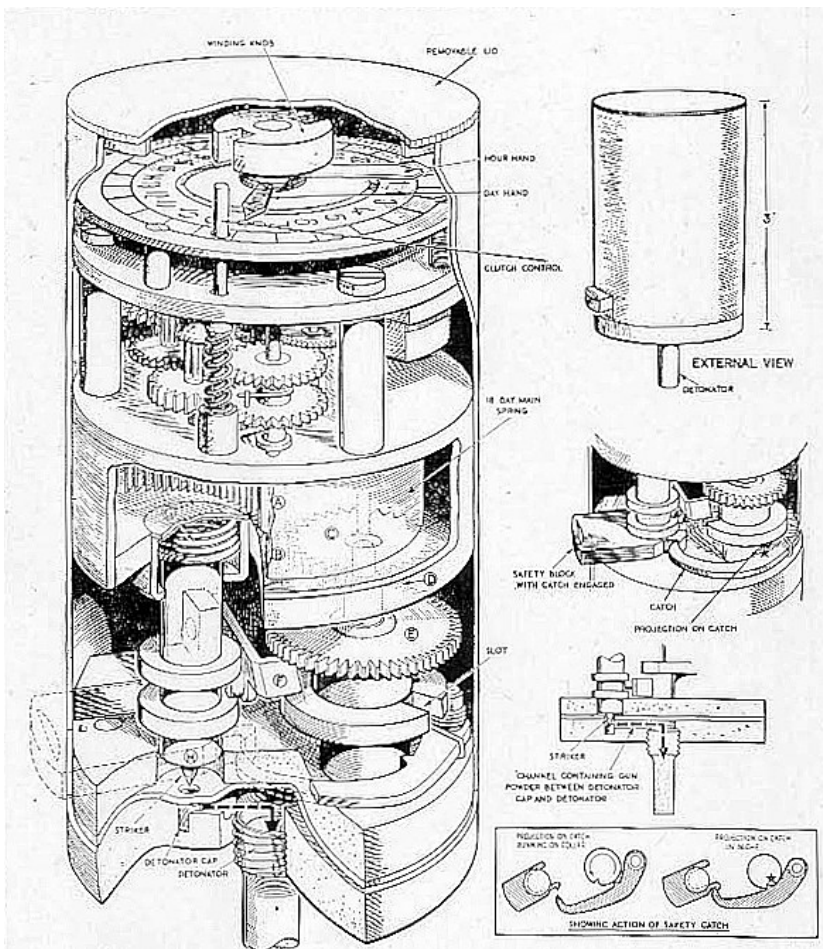
This clockwork mechanism is very similar to the Clockwork 3 mechanism. This version provides a delay of up to 18 days.

The clockwork mechanism is housed in a metal casing that has a removable lid to both wind the clock and set the delay. There is a small opening in the case near the bottom of the device where a safety block can be operated. A standard sabotage detonator screws into the bottom of the device.

No other technical details are currently available.



*Uhrwerkzeitzünder 6  
Photo - N. Bonney*



*Image - "Enemy Sabotage Equipment, Second Edition"*

**Chemical-Mechanical Time Igniter 41W**  
**(Chemisch-Mechanischer Zeitzünder 41W - C.M.Z. 41W)**

Germany (WW2)

Type - Delay  
Length - 5.5 in. (139 mm)  
Diameter - 1.25 in. (31 mm)

The C.M.Z. 41W was copied from the Russian EKhV electro-chemical delay firing device. It was intended to be used with delayed-action demolition charges that would detonate after an area had been conceded to opposing forces. It was one of several firing devices copied from Soviet Forces during the Second World War. The devices were found attached to explosive charges in militarily significant buildings, as well as ammunition depots. There were a variety of these devices available to the German Armed Forces, and all incorporated a clockwork or chemical delay initiation mechanism that were encased in a Bakelite plastic container.

The C.M.Z. 41W was a chemical-mechanical delay firing device that contains a cocked striker with a corrosive neck release. It consists of a cylindrical Bakelite plastic body with a threaded arming cap, as well as brass primer holder with a percussion cap in the base. The upper part of the device contains an acid-filled glass ampoule. The ampoule rests on a Bakelite striker retaining disk that has four seep holes, which pass through to the reaction chamber below. The spring-loaded striker is made of white metal and is fastened to the striker-retaining disk by a small set screw. Only the upper portion of the striker shaft is exposed to the chemical reaction by the acid after it seeps into the reaction chamber. All other parts of the striker are protected from the acid by rubber washers.

To use the firing device, the threaded arming cap was removed and a glass ampoule of acid was inserted (neck down) into the top of the device. The arming cap was screwed down until contact with the glass ampoule was felt. A detonator (blasting cap) was then inserted into the base of the device and inserted into a demolition charge. Once the demolition charge and attached device were assembled, they were emplaced and camouflaged as necessary. The final step was to screw down the arming cap until the glass ampoule was broken, which caused the acid to seep down into the reaction chamber. The firing device was then functioning, even though it was believed to be safe to handle for at least five hours.

The higher the temperature the more rapid the chemical reaction on the striker shaft. The chemical reaction in the firing device ceases below -40 degrees F, but resumes as soon as the temperature rises above that point. The following temperatures and corresponding delay period until chemical reaction completely corrodes the striker shaft are as follows:

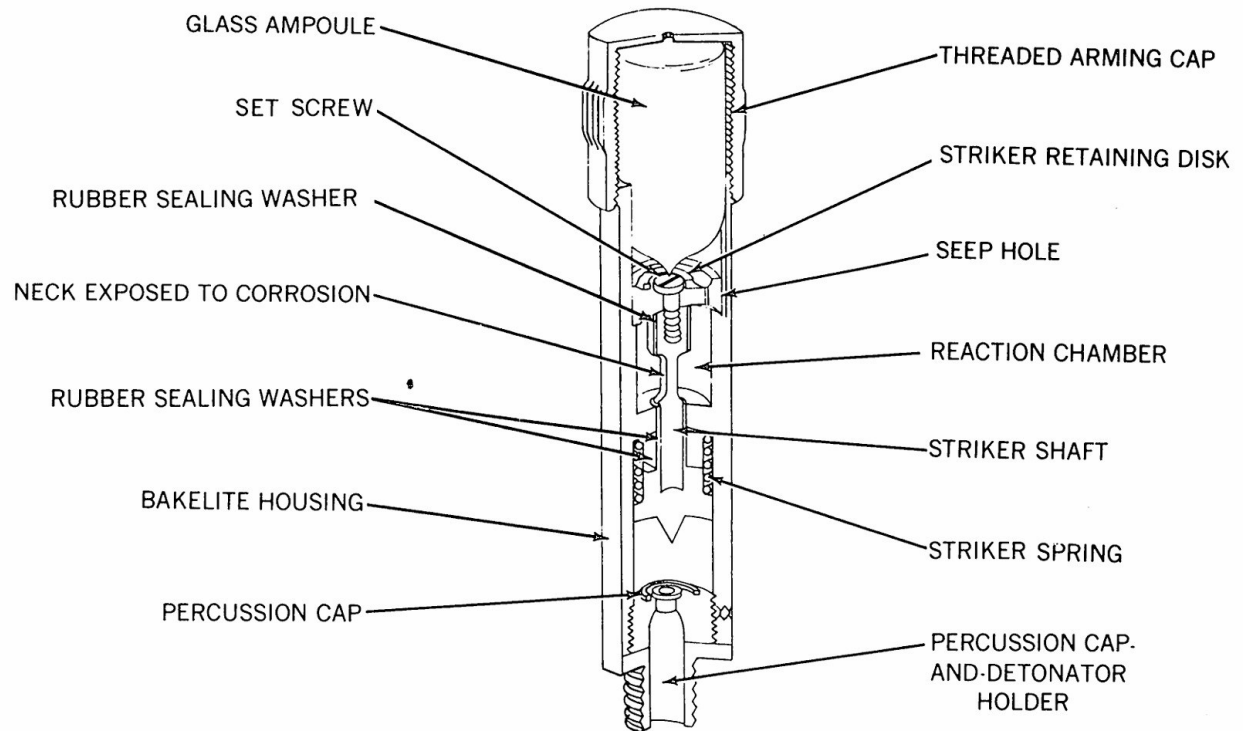
- 68 degrees F                      3 to 5 1/4 days
- 32 degrees F                      21 to 31 days
- -31 degrees F                    96 to 167 days

The C.M.Z. 41W will function when the acid corrodes the exposed part of the striker shaft in the reaction chamber and the striker shaft breaks, which releases the spring-loaded striker to impact the percussion cap in the primer holder that initiates the attached detonator and demolition charge.



*C.M.Z. 41W Firing  
Device  
Photo - F. Caley*





*C.M.Z. 41W Firing Device (internal diagram)*  
*Image - US Department of Defense*

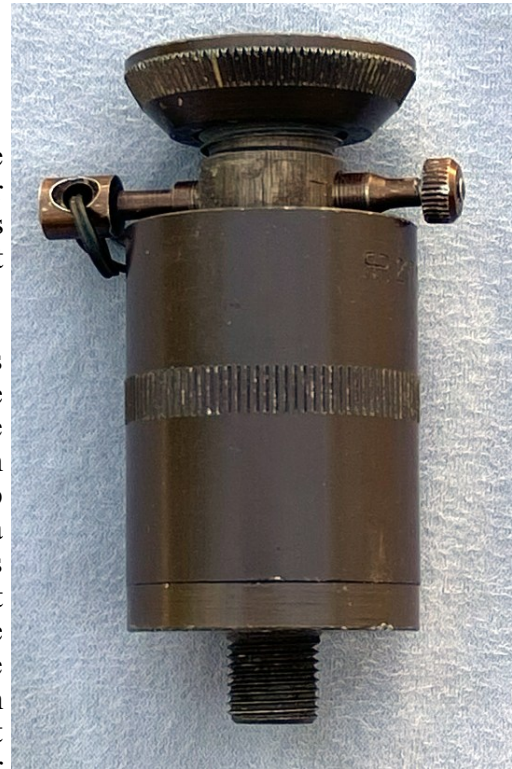
**Pressure Igniter 35A**  
**(Druckzünder 35A - D.Z. 35A)**

Germany (WW2)

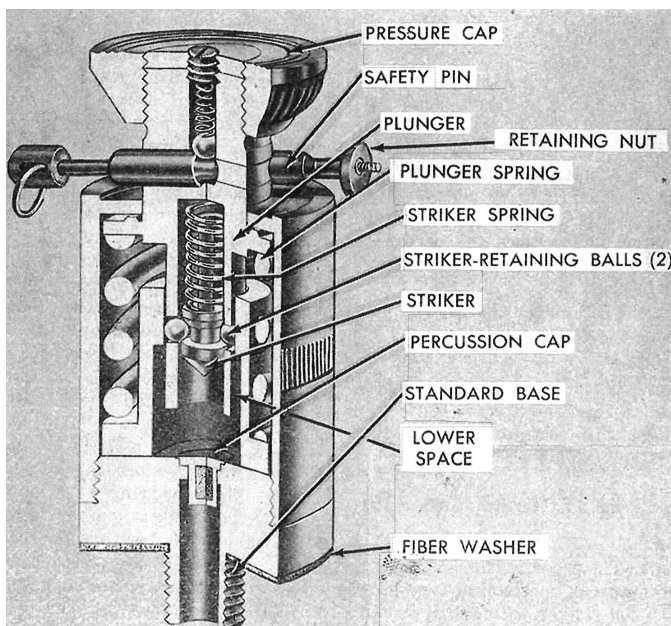
Type - Pressure  
Diameter - 1.25 in. (32 mm)  
Height - 2.75 in. (70 mm)  
Weight - 3.96 oz. (112 g)

This is a standard German firing device designed prior to the Second World War that continued in use for many years after the war. It is primarily an anti-tank landmine fuze since its operating pressure of 125-165 lbs. (57-75 kg) made it impractical for use as a boobytrap.

The body is made of aluminum in two parts. The main body is simply a closed end cylinder that is internally threaded at the bottom and has a large hole drilled centrally in the top. The base plug is threaded to fit the main body and has a nipple on the bottom threaded to form a standard base. A percussion cap fits into the base plug. The main body contains three parts, a plunger spring, a plunger, and a sliding ring. The sliding ring is simply turned on the outside to allow the plunger spring to fit over and rest on a flange. Internally it has a channel for the plunger and a slightly larger chamber in the bottom half. The plunger is quite complex. The body is drilled out on the bottom end about 2/3 the way up. Holes are drilled in the sides about 1/3 the way up to fit retaining balls. The striker and striker spring fit up into the plunger. The upper third is drilled from the top to fit a retaining catch for the safety pin. A retaining ball and spring fit into the hole and are held in place by a small set screw that closes the hole. The top is threaded to fit a pressure head. The safety pin fits through a hole drilled through the side and connecting to the top hole. The safety pin is also quite elaborate, it is turned out of a short piece of rod leaving a large head, then down to a thinner portion, then up to a thicker centre portion, then down again to an even thinner end section. The thin end is threaded to take a safety nut. The centre section has a groove in the



*DZ 35A Fuze*  
*Below- DZ 35 series safety pin*



centre that engages with the spring-loaded ball in the head of the plunger. When assembled, the striker is held in the cocked position in the plunger by two retaining balls that fit through the sides of the plunger and engage a lip on the striker. The balls are held in place by the plunger fitting into the top channel of the sliding ring.

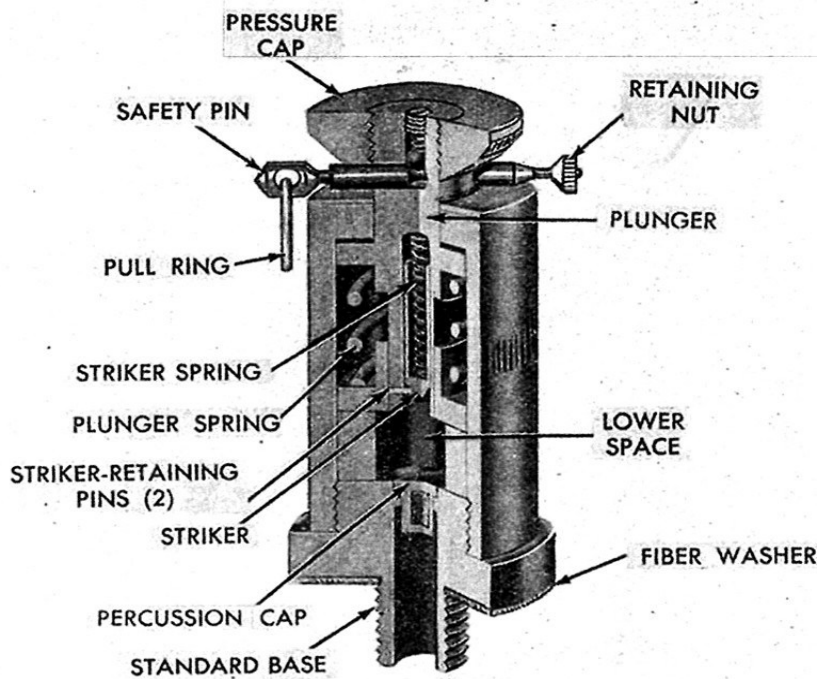
When pressure is applied to the pressure cap the plunger is forced down. When it has moved enough the holes containing the retaining balls move into the larger chamber of the sliding ring. This allows the retaining balls to be pushed outward and release the striker. The striker under pressure of the spring is driven down into the percussion cap firing the device.

**Pressure Igniter 35B  
(Druckzünder 35B - D.Z. 35B)**

Germany (WW2)

Type - Pressure  
Diameter - 2.75 in. (70 mm)  
Height - 1.0 in. (25 mm)

The D.Z. 35B is very similar to the larger D.Z. 35A version, which is primarily a landmine fuze. Along with size, it also differs in that it is made of brass rather than aluminum. It operates on less pressure (65 lbs./30 kg.) and is more commonly used in anti-personnel mines and boobytraps. The plunger spring is smaller than the one in the D.Z. 35A and the striker is held in position by small pins rather than balls. Otherwise, construction and operation is identical.



*D.Z. 35B Firing Device (internal diagram)*



*D.Z. 35B Firing Device  
Photo - F. Caley*

**Pressure Igniter 35C  
(Druckzünder 35C - D.Z. 35C)**

Type - Pressure  
Height - 2.75 in. (70 mm)  
Diameter - 1.25 in. (32 mm)

This version used a Bakelite body. Otherwise, similar to the D.Z. 35A and often used in wooden AT mines. It could be used as a boobytrap but the high operating pressure of 125-165 lbs. (57-75 kg) required would be less effective than the D.Z. 35B.



*D.Z. 35C Firing Device*



**Pressure Igniter SF 6  
(Druckzünder SF 6 - D.Z. SF 6)**

**Germany WW2**

Type - Pressure  
Height - 1.2 in. (31 mm)  
Diameter - 0.47 in. (12 mm)

This D.Z. SF 6 firing device was designed for use with the Glaßmine 43 (f) and improvised mines and charges. It was often used when mines or charges were laid underwater on beaches or at river crossings.

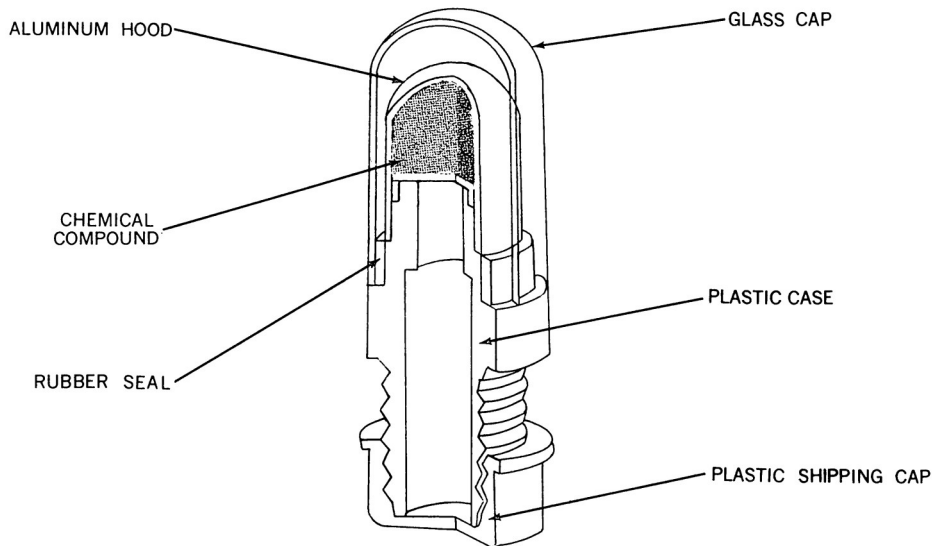
The body is plastic (probably Bakelite) and has standard threading on the bottom. A hemispherical aluminum hood containing the friction/flash compound is crimped onto the top of the body. The aluminum hood is then covered by a glass dome held onto the body by a rubber seal. Prior to use the bottom of the device is closed by a plastic cap. There is no safety device. The chemical compound is very sensitive, producing a flame when crushed.

To use the D.Z. SF 6, a detonator must be inserted in the bottom of the device and both screwed into the mine or explosive charge. Care must be taken to put no pressure on the glass dome. When assembled the mine or charge is emplaced and concealed.

When pressure is applied to the firing device, the glass dome breaks and the aluminum hood is crushed. The friction produced during the crushing causes the chemical compound to flash into the detonator to initiate it and in turn the main explosive charge.



*D.Z. SF 6 Firing  
Device  
Photo - F. Caley*



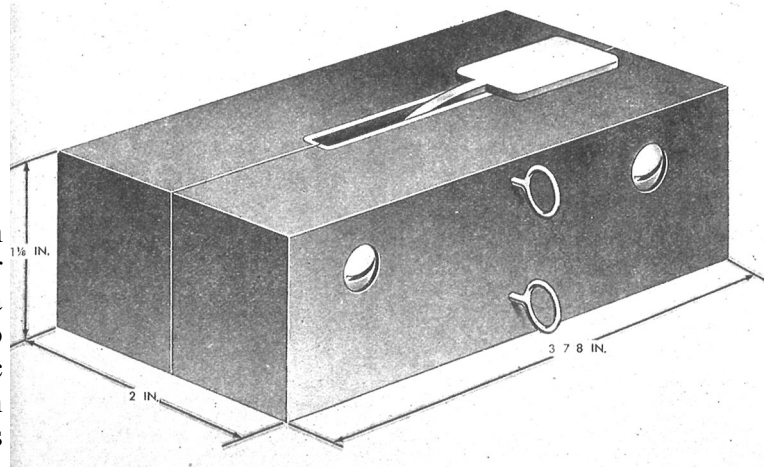
*D.Z. SF 6 Firing Device (internal diagram)  
Image - US Department of Defence.*

## Pressure-Release Igniter Nipolit (Entlastungzünder Nipolit)

Germany (WW2)

Type - Pressure-Release  
Weight - 7.0 oz. (200 g)  
Length - 3.8 in. (98 mm)  
Width - 1.9 in. (50 mm)  
Height - 1.1 in. (28 mm)

One of the more innovative German inventions during the Second World War was the use of the explosive Nipolit as a munitions casing. According to Wikipedia, it is a thermoplastic explosive developed in 1942 by the German chemist Erich von Holt at WASAG. It is composed of 34% Nitrocellulose, 30% Diethylene Glycol Linitrate, 35% Nitropenta, and several other minor



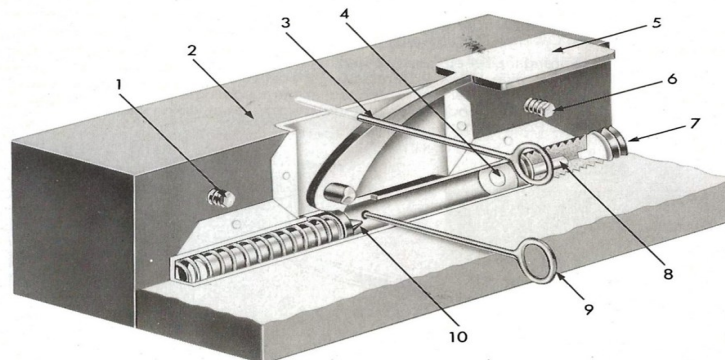
*Nipolit Firing Device*

compounds and stabilizers. Many items of ordnance utilized Nipolit in their construction including egg-style hand grenades and a magnetic charge. A pressure-release firing device was also produced using the explosive as the body of the device, specifically designed to be a hard-to-detect boobytrap.

The body of the firing device consisted of two correspondingly hollowed out blocks of Nipolit connected with two brass bolts. An arming and firing mechanism was placed within the cavity in the Nipolit blocks. A cocked striker assembly consisting of a striker and striker spring was located at one end of a channel inside the mechanism. It was held in check by a pressure-release lever, as well as a lower safety pin. An upper safety pin prevented release of the lever. The detonator assembly consisting of a percussion cap and detonator (blasting cap) was located at the opposite end of the mechanism. This assembly was kept separate and not inserted into the device until just before use. The device was grayish-green in colour.

To use the Nipolit firing device, the percussion cap and detonator assembly was inserted into the device. An object that was at least 1 lb. (450 g) to depress the pressure-release lever was then placed on top of the device. German manuals during the Second World War suggested items ranging from mines to fuel containers. The upper safety pin was removed first, followed by the lower safety pin. The Nipolit firing device was then fully armed.

When the weight on the firing device was removed, the pressure-release lever moves upward freeing the spring-loaded striker to initiate the detonator assembly.



***Pressure-Release Firing Device, Nipolit.*** (1) Brass Connecting Bolt, (2) Nipolit body, (3) Upper Safety Pin, (4) Primer, (5) Pressure-Release Lever, (6) Brass Connecting Bolt, (7) Detonator Assembly Closure Plug, (8) Booster, (9) Lower Safety Pin, (10) Striker Assembly.



**Pressure-Release Igniter SF 3**  
**(Entlastungszünder SF 3 - E.Z. SF 3)**

Germany (WW2)

Type - Anti-handling  
Weight - 12.75 oz (360 g)  
Diameter - 3.1 in. (79 mm)  
Height - 3.0 in. (76 mm)

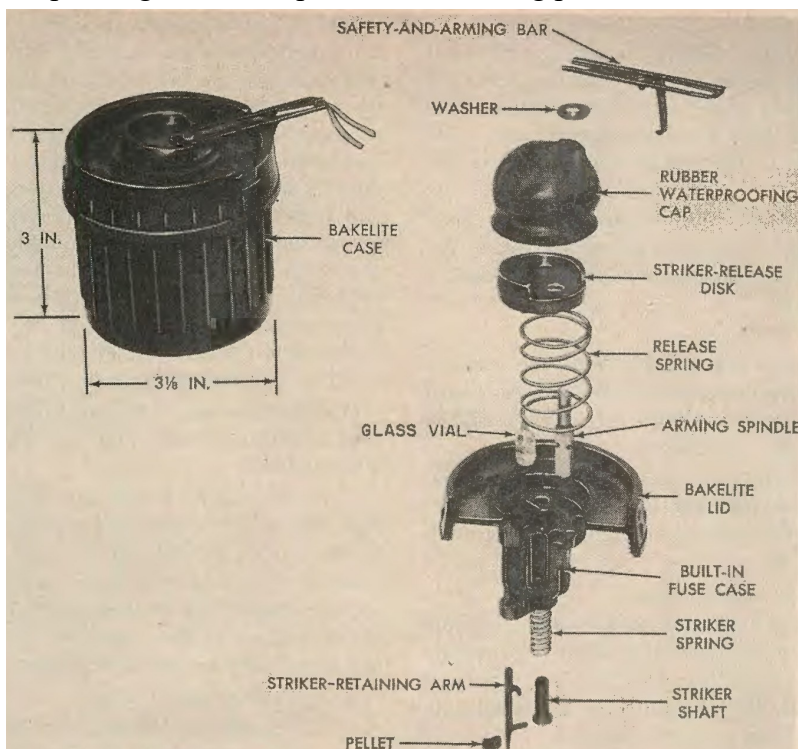
The E.Z. SF 3 firing device was designed to provide an anti-lift/anti-removal feature for Second World War German anti-tank mines. The device can also be used as a boobytrap in other applications.

The firing device consists of a Bakelite plastic body with a screw-on lid. The body contains an integral fuze normally covered by a rubber waterproof cap. It contains a cocked striker that has a release disk held down by a flat metal safety/arming bar, a striker retaining arm, a glass chemical vial, a soluble pellet, an arming spindle that, when turned, crushes the chemical vial, and an attached percussion cap with detonator. An arming cord is attached to the safety/arming bar. There is also an integral seven-ounce (200 g) explosive charge.



*SF 3 Firing Device*

To use the SF 3, loosen the arming cord before emplacing the device on a firm base in a hole. Fill in the hole, ensuring that the top of the device is clear and the safety/arming bar is free to rotate. Place a mine on top of the device. Camouflage and conceal both mine and firing device. Lightly pull on the arming cord, rotating the safety/arming bar approximately 90 degrees. This causes the arming spindle to crush the glass chemical vial that will dissolve the safety pellet, which will fully arm the firing device. Depending on the temperature the arming procedure will take between 2 to 40 minutes.



The SF 3 will function when the retaining weight (mine) is lifted. This allows the striker release disk to ride upward, 0.25 in. (6 mm) is sufficient, under the force of a compressed release spring until the top of the striker retaining arm is no longer held in place by a projection on the under side of the striker release disk. The spring-loaded striker then forces the bottom of the striker retaining arm to tilt outward, releasing the striker against the percussion cap in the integral detonator.

*SF 3 Firing Device (disassembled)*  
*Image - US Department of Defense*

**Pressure-Release Igniter SM 2 (E.Z. 44)**  
**(Entlastungszünder SM 2 - E.Z. SM 2 or E.Z. 44)**

**Germany (WW2)**

Type - Anti-handling  
Diameter - 5 in. (127 mm)  
Height - 1.5 in. (40 mm)

The E.Z. SM 2 (formerly E.Z. 44) firing device was designed to provide an anti-lift/anti-removal feature for Second World War German anti-tank mines. It is a mechanical-clockwork arming device with a pressure-release striker. The device can also be used as a boobytrap in other applications.

The firing device consists of a flat, circular body that contains two semicircular 4 oz. (113 g) blocks of explosive, a clockwork arming mechanism, and a detonator assembly. An externally located safety bar passes through the striker-release plunger and engages a rotor wheel. An internal safety pin engages the striker shaft.

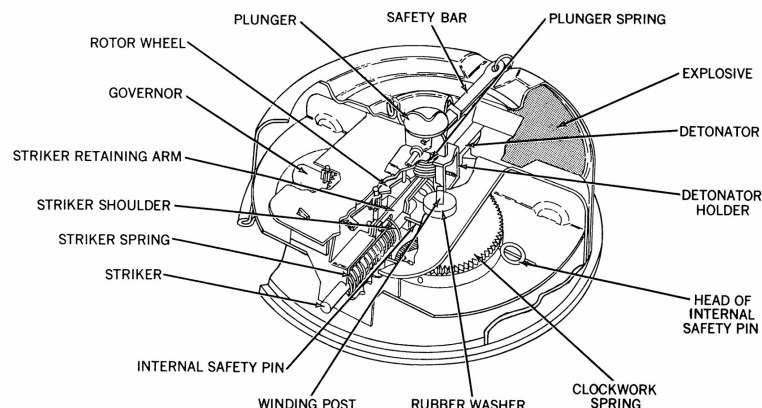


*E.Z.SM 2 (E.Z. 44) Firing Device*

To use the E.Z. SM 2, the clockwork mechanism is wound with a winding key. The firing device is then emplaced under a mine, or demolition charge. The safety bar is then removed utilizing a cord. This action frees the rotor within the clockwork mechanism and allows the clock to function. The clockwork mechanism will run for approximately 1 to 1.5 minutes with a loud buzzing sound, during which the expanding main spring gradually forces the safety pin ring outwards, eventually withdrawing it. The firing device is now fully armed and cannot be disarmed.

The E.Z. SM 2 will function when the mine or demolition charge is lifted from the pressure-release assembly. This allows the striker-release plunger and striker retaining arm to move upward, releasing the striker to impact the percussion cap in the detonator assembly initiating the internal explosive charges. This in turn initiates the mine or demolition charge.

Since the E.Z. SM 2 contains 0.5 lbs. (226 g) of explosive, it can be used as a standalone boobytrap that can inflict significant injury or damage. After the firing device is emplaced, an object weighing 4 to 6 lbs. (1.8 to 2.7 kg) can be placed on top of the device. Once the device is armed, it will detonate when that object is removed.



*E.Z. SM 2 (E.Z. 44) Firing Device (internal diagram)*  
*Image - US Department of Defense*

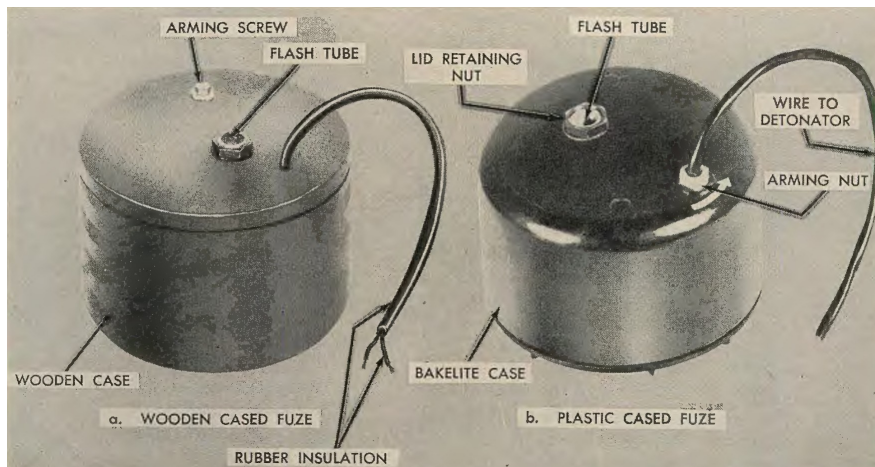


**Frequency Induction Igniter SM 12**  
**(Frequenzinduktionzünder SM 12 - F.I.Z. SM 12)**

**Germany (WW2)**

Type - Frequency Induction  
Weight - 2.5 lbs. (1.1 kg)  
Diameter - 6.7 in. (170 mm)  
Height - 3.7 in. (94 mm)

The F.I.Z. SM 12 was an instantaneous, electrical boobytrap firing device in which frequency induction closes an electrical circuit. The device was designed to detonate a landmine or demolition charge to which it was connected, by picking up the signal emitted by an electronic mine detector.



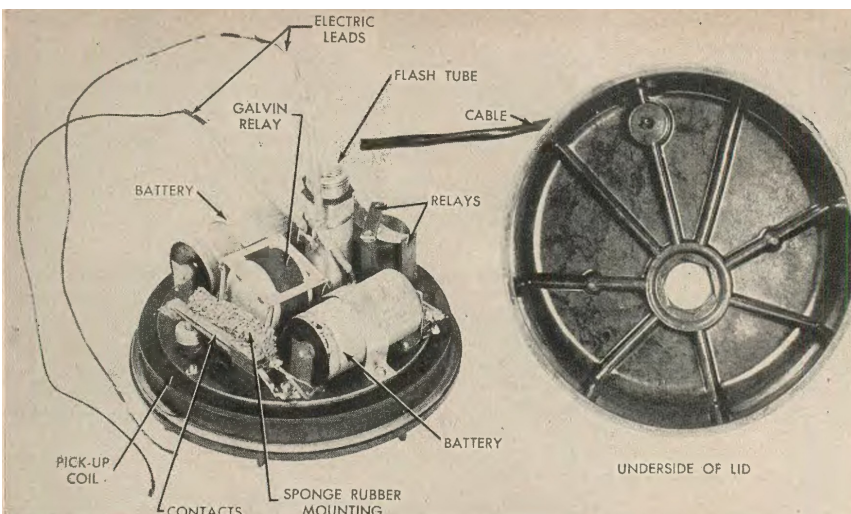
*F.I.Z. SM 12 Firing Device*  
*Image - US Department of Defense*

The F.I.Z. SM 12 was adapted from the Second World War

Russian SM 12. After much testing, the German Armed Forces perfected this type of fuze, and produced a modified and simplified model at the end of the war. Two models were made. The earlier model was housed in a black, cylindrical, laminate-wood case, while the later model had a black, cylindrical Bakelite plastic body. However, none of these devices were known to have actually been employed in combat.

The contents of the firing devices consisted of sensitive relays, dry-disk rectifiers, pick-up coils, condensers, resistors, leaf type arming-delay switches, electrolytic-delay arming switches, and 1.5-volt dry-cell batteries. The internal elements of the firing device are mounted on sponge-rubber pads and are bolted to the case.

To prepare the SM 12 for use, an electric detonator (blasting cap) was attached to a mine or demolition charge and the leads on the SM 12. The arming nut on the top of the case was then turned in the direction of the arrow. This action closed the initial leaf-type arming switch and completed the circuit to the delay switch, which became armed after a delay of 1.5 to 2 hours. When the search coil of a frequency-bridge type mine detector, operating in the frequency range of between 800 and 2000 cycles,



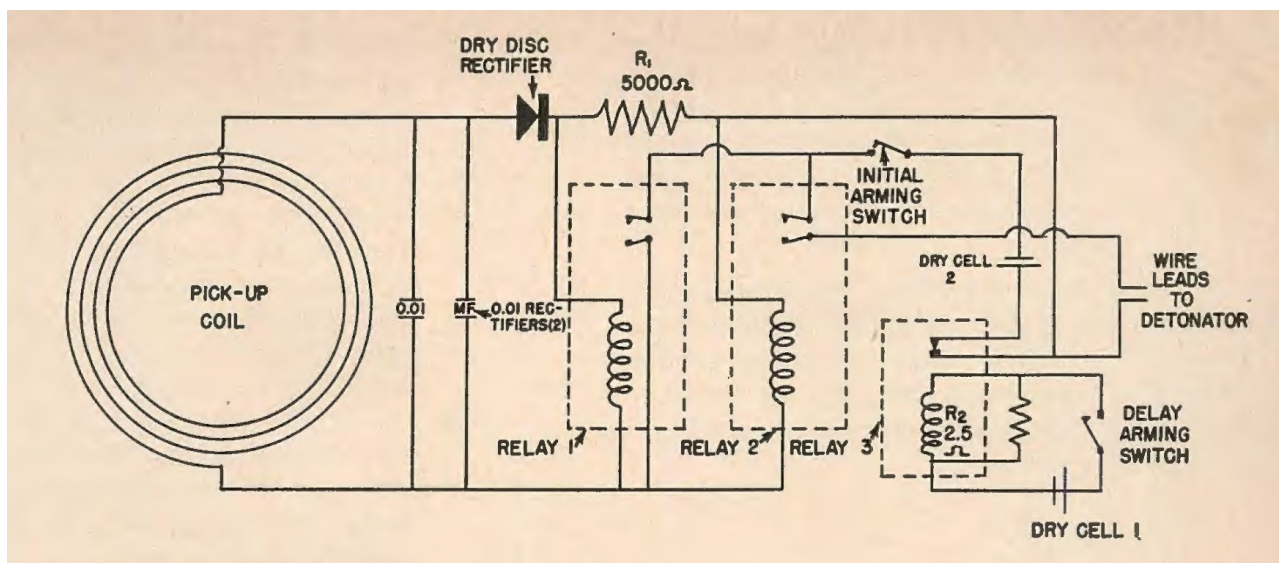
is passed over an armed SM 12 within a maximum distance of 17 in. (43 cm), its signal is picked up by the pickup coil in the fuze. This closes the secondary or safety arming switch, completing the circuit and firing the detonator. The details of the internal functioning of both models are as follows:

*F.I.Z. SM 12 Firing Device*  
*Image - US Department of Defense*

**Wood-cased model.** The circuit is made up of three stages: the arming circuit, the pickup or receiver circuit, and the firing circuit. However, certain components are included in more than one of these circuits.

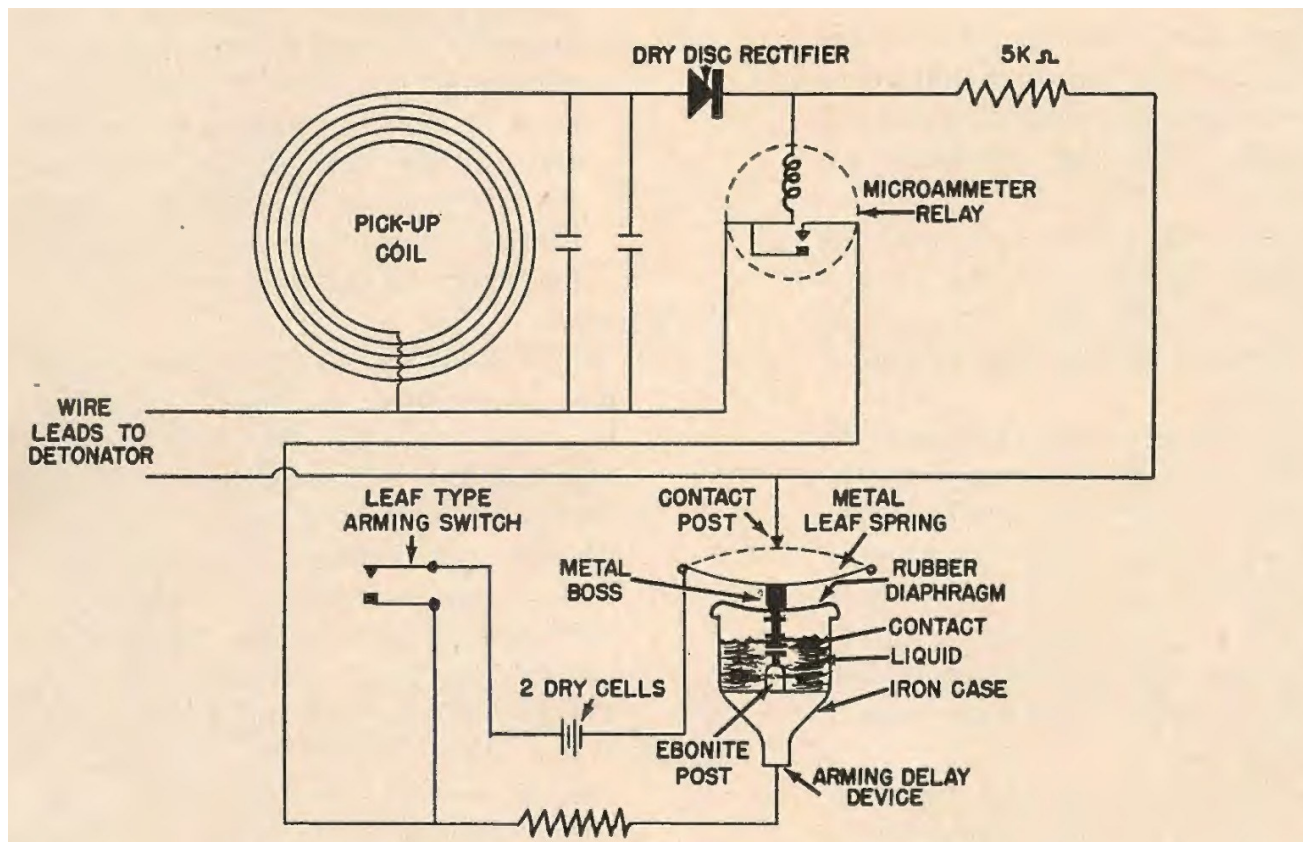
(a) The arming circuit comprises the initial and the delay arming switches, dry cell 1, and relay 3. Relay 3 is normally closed. When the external arming screw is unscrewed, the delay arming switch No. 2 is closed and the circuit from dry cell No. 1 through relay No. 1 is closed opening the firing circuit. The firing circuit will remain open until cell 1 has discharged to such an extent that it can no longer hold relay 3 open. This should occur fairly rapidly since the coil of relay 3 is short-circuited by resistance 2, a short spiral of wire of 2.5 ohms resistance. The reclosing of relay 3 completes the arming of the device.

(b) The receiver circuit comprises the pickup coil (which is tuned by two fixed 0.01-farad condensers), the dry-disk rectifier, and the coil of relay 1 (the microammeter relay). A signal picked up by the coil is rectified. If sufficiently strong, it causes relay 1 to close. This completes the circuit (cell 2 through the contacts of relay 3, the coil of relay 2, contacts of relay 1, initial arming switch) and causes relay 2 to close. At the same time, since the coil of relay 1 is in parallel with that of relay 2, an additional current, limited by the resistance R1, will pass through the coil of relay 1 and tend to keep its contacts closed. The closing of relay 2 also completes the firing circuit (the contacts of relays 2 and 3, the initial arming switch, and cell 2) and fires the electric detonator. The pickup coil has an inductance of 750 microhenries and a resistance of about 1000 ohms. The resonant peak of the tuned circuit occurs at about 1050 cycles per second. Relay 1 closes at a current of about 10 microamperes.



*F.I.Z. SM 12 Firing Device (Wood-case)  
Image - US Department of Defense*

**Bakelite-cased model.** The internal components and layout of this later model are generally similar to those of the earlier model, with the exception that the leaf type arming-delay switch has been replaced by an electrolytic-delay switch that eliminates the firing relay. The circuit is much simpler than that of the earlier model. The arming-delay device holds the firing circuit open, after the arming nut has been unscrewed, for about 2 hours. The device consists of a small iron case partially filled with liquid, with a rubber diaphragm over the otherwise open end of the container. A central metal boss protrudes from the top of the diaphragm and continues underneath as a screw, ending in a sharp point which rests in a recess in the top of an Ebonite post attached to the base of the case. Above the case and contacting the boss (when in the unarmed position) is a metal leaf spring supported between two copper strips. Above this leaf spring is a contact post. When current passes through the device, electrolysis takes place, and the gases released force up the rubber diaphragm and cause the leaf spring to snap up, striking the contact post and completing the arming circuit of the device.



*F.I.Z. SM 12 Firing Device (Bakelite-case)  
Image - US Department of Defense*



## Celluloid Acetone Delay Igniter (G.A.C. Igniter) (C.A Zeitzünder)

Germany (WW2)

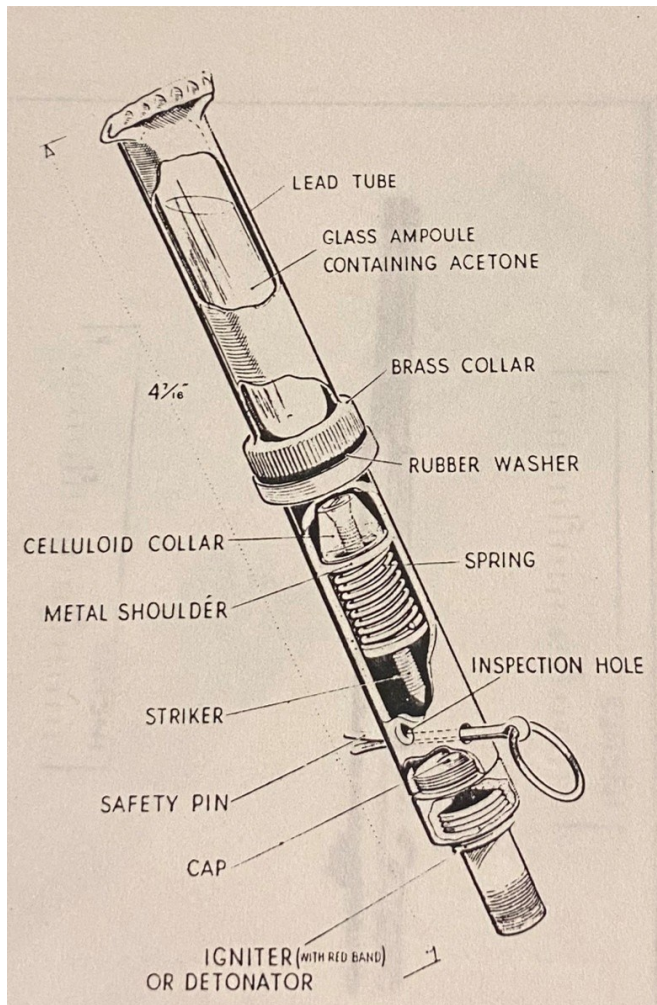
Type - Delay  
Length - 4.4 in. (115 mm)  
Diameter - 0.5 in. (12.7 mm)

The G.A.C. igniter is a chemical-delay firing device. It has a 1, 2, 3, 4, or 5 hour firing delay. Its primary use was for sabotage.

The device consists of two sections, the lower section is made of aluminum and is internally threaded at the bottom end to accept either an igniter or detonator (blasting cap). The opposite end is externally threaded to accept a brass collar and rubber washer. Internally there is a shoulder near the top end with a hole in the centre. A striker and striker spring are inserted through the bottom end and are pushed up with the shaft of the striker fitting through the internal shoulder. A truncated conical celluloid washer fits over the shaft holding it in position. There is a safety pin through the body near the bottom end. The upper section is made of lead containing an ampoule of acetone and is held to the lower section by the brass collar and rubber washer.

To prepare the G.A.C. for use, an igniter (or detonator) is screwed into the lower end of the device. The upper tube is then crushed, breaking the ampoule and allowing the acetone to flow into the bottom section. The acetone begins to dissolve and weaken the celluloid washer. When it is

weakened enough the striker spring will overcome it and drive the striker down into the igniter (or detonator). If necessary, once the upper section has been crushed and the acetone has flowed into the bottom section, the upper section can be unscrewed and thrown away. A cap would be screwed on in its place.



*G.A.C. Igniter  
Photo— D.J. Harms*

The device is grey in colour. There are white rings painted around the bottom section. One ring indicates a delay of one hour, two indicates a delay of two hours and so on. Devices with up to four rings have been documented.

A red band around the igniter/detonator screwed into the bottom indicates it is an igniter. The absence of a band indicates a detonator.

## J-Feder 504 (Jungans-Feder 504)

Germany (WW2)

Type - Delay  
Weight - 33 oz. (938 g)  
Diameter - 3.5 in. (89 mm)  
Height - 7.1 in. (180 mm)

The J-Feder 504 is a large clockwork, long delay firing device used for demolition and boobytrap operations. The device could be set for delays of 15 minutes to 21 days. These devices were manufactured between 1943 and 1945.



*J-Feder 504 Firing Device  
Photo - G. Zahaczewsky*

The body of the J-Feder 504 is constructed of aluminum, although there are reports that some Bakelite plastic bodies were also produced.

The upper portion of the body houses the clockwork mechanism, while the lower body contains a cocked-striker assembly. The top of the firing device has a large screw cap and rubber gasket. Just below the cap are red and a white arrows. Below the arrows is a movable circular ring above the words "Steht" (Stop) in white, and "Geht" (Go) in red letters. Rotating this ring will activate, or stop, the clockwork mechanism in the device. Adjacent to a large circular window in the J-Feder 504 is the serial number of the device in white. Visible through the window is the mechanism for setting the firing delay of the device. Red numerals indicate days, while black numbers indicate hours. The long shaft attached to the bottom of the firing device contains the striker assembly, which is retained in the firing device body by four screws. The striker (firing pin) itself is held in the cocked position by a trip lever. There is also a transport safety device that is replaced by a screw marked "Scharf" (Armed) when the device is readied for use.

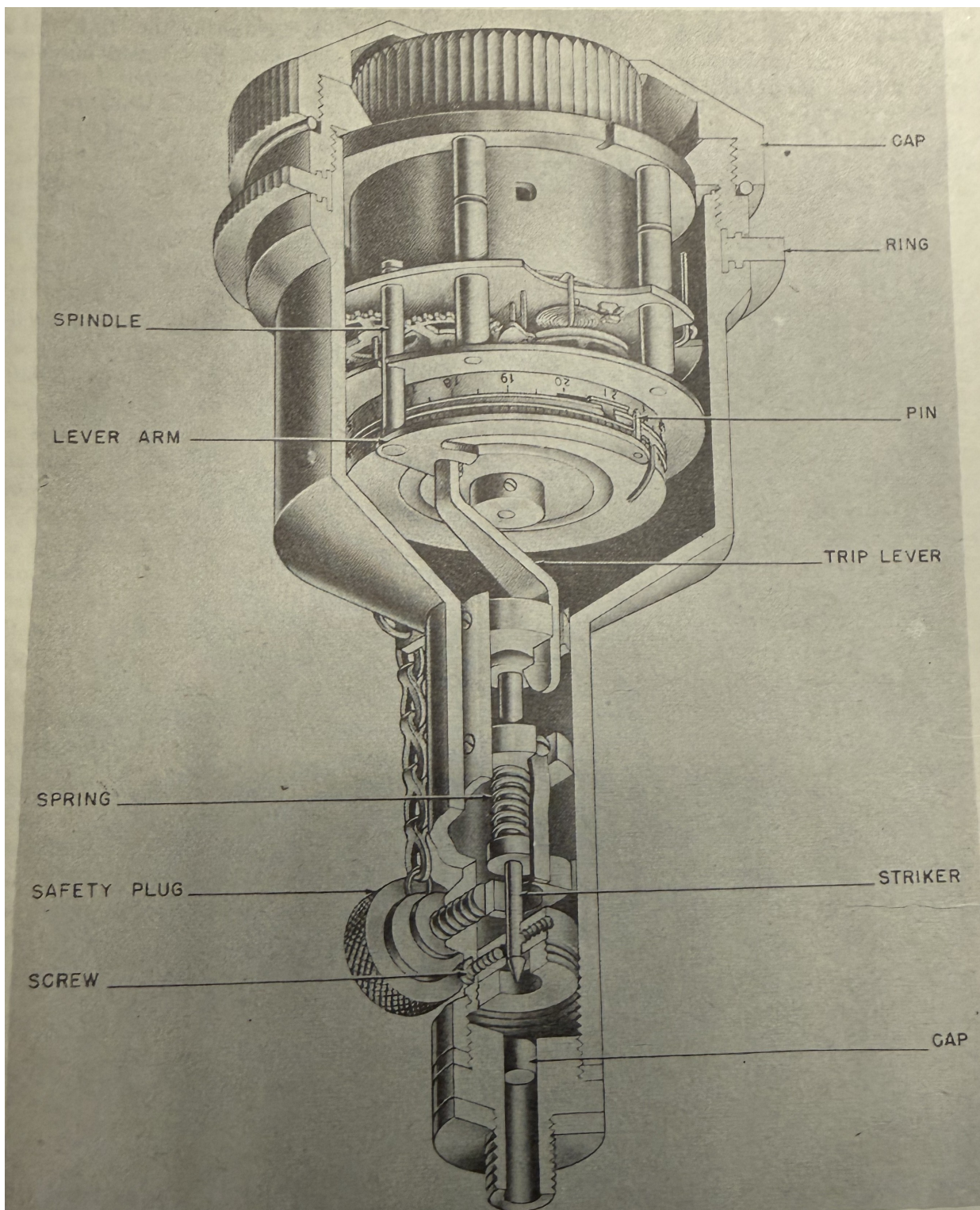


*J-Feder 504 Firing Device  
components  
Photo - josfow-2011*

To prepare the J-Feder 504 for use, the screw cap is removed, revealing the clock setting and winding mechanism. The large, knurled cylinder is provided to wind the clock, while the centre knob - stamped with "Zt." - is used for setting the desired time delay. The time delay settings are visible through the large, circular window in the device body. A detonator assembly is then screwed into the lower portion of the body. The transport safety device is removed and replaced with the "Scharf" screw. The J-Feder 504 is then inserted into a demolition charge, and the circular ring is rotated to "Geht" (Go).

At the end of the selected time delay, the trip lever releases the striker that, driven by the striker spring, impacts the percussion cap in the detonator.





*J-Feder 504 Firing Device  
Image - US Department of Defense*

**J-Feder 504/6**  
**(Jungans-Feder 504/6)**

Germany (WW2)

Type - Delay

A modified version of the J-Feder 504 clockwork, long delay firing device, designated as the Ausführung (Model) 6, was also produced in very limited quantities (hundreds rather than thousands).

The improvements in the Model 6 included an 8.7 yds. (8 m) pull-cord that allowed the device to be fully deployed, camouflaged and armed with enhanced safety. The device was also better sealed against moisture. The Model 6 also had an arrangement for electrical firing consisting of a two-wire adapter plug with contacts that were closed when the striker fired.



*J-Feder 504/6 Firing Device*

Reportedly once initiated, the device cannot be stopped by turning the narrow milled ring; nor can the striker be prevented from striking the detonator (blasting cap) by unscrewing the screw in the lower part of the casing. As in the J-Feder 504, a detonator can be screwed into the base. However, a switch made by the descent of the striker can be substituted. The two leads from this switch are included in a circuit containing an electric detonator and battery.

No other technical details are currently available.



*J-Feder 504/6 Firing Device*  
*Showing the side (left) and top (right)*



**Tilt Igniter 43A**  
**(Kippzünder 43A - Ki.Z. 43A)**

Germany (WW2)

Type - Tilt

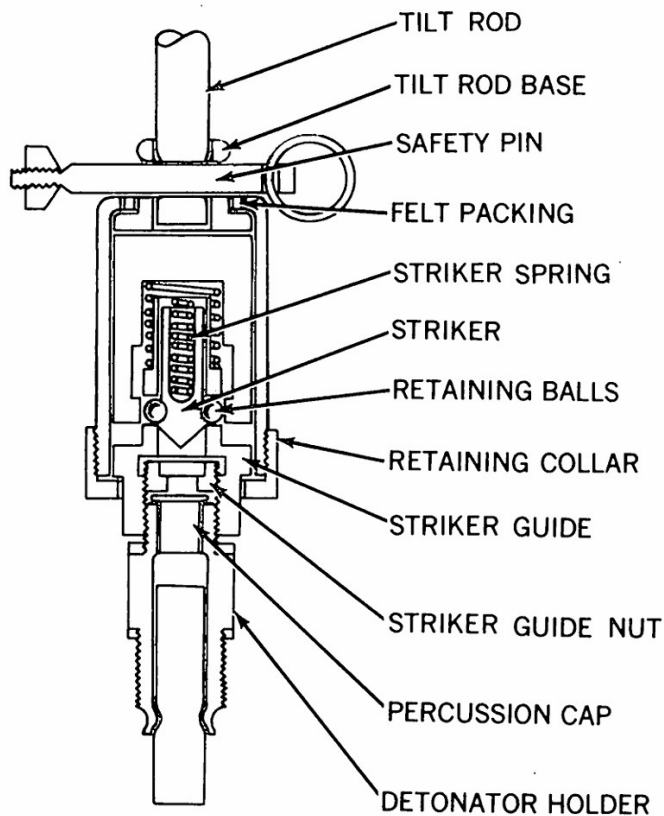
Length - 28 in. (71.1 cm) (with tilt rod attached)

The Ki.Z. 43A is a tilt rod firing device intended to be used in bushy or snowy areas with anti-personnel mines and boobytraps.

The firing device contains a cocked-striker held by two retaining balls, a pressure piece, a pressure spring, and a primer holder with a percussion cap. The tilt rod projects from the top of the firing device. It is held in place by a safety pin that has a retaining nut. A 24 in. (0.6 m) tilt rod extension and a metal retaining sleeve are provided for use in deep snow or high grass.

To use the Ki.Z. 43A, a mine (or demolition charge) is staked down so that it will not tilt when pressure or pull is applied to the tilt rod. A primer holder is screwed into the firing device, which is then inserted into the mine or demolition charge. If a low pressure -functioning is desired, then the retaining sleeve and tilt rod extension are attached to the tilt rod. The retaining nut is removed from the safety pin and it is withdrawn, preferably remotely using a cord.

The firing device will function when 15.5-24 lbs. (7-11 kg) of lateral pressure is applied to the tilt rod.



*Ki.Z. 43A Firing Device*  
*Photo - F. Caley*

*Ki.Z. 43A Firing Device (internal diagram)*  
*Image - US Department of Defense*

**Tilt Igniter 43B**  
**(Kippzünder 43B - Ki.Z. 43B)**

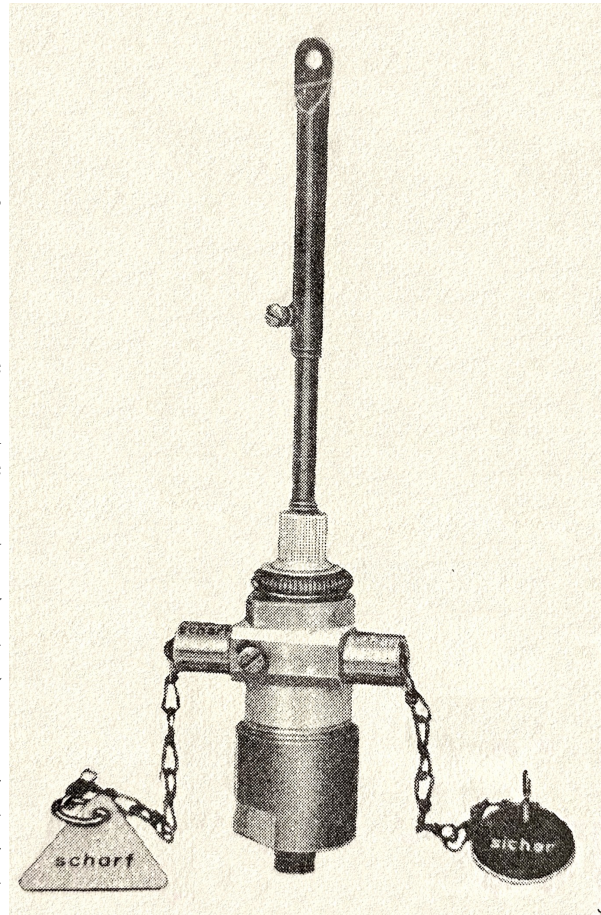
Germany (WW2)

Type - Tilt  
Length - 5.1 in. (130 mm)  
Diameter - 0.9 in. (25 mm)

The Ki.Z. 43B is a tilt rod firing device intended to be used in bushy or snowy areas with anti-personnel mines and boobytraps.

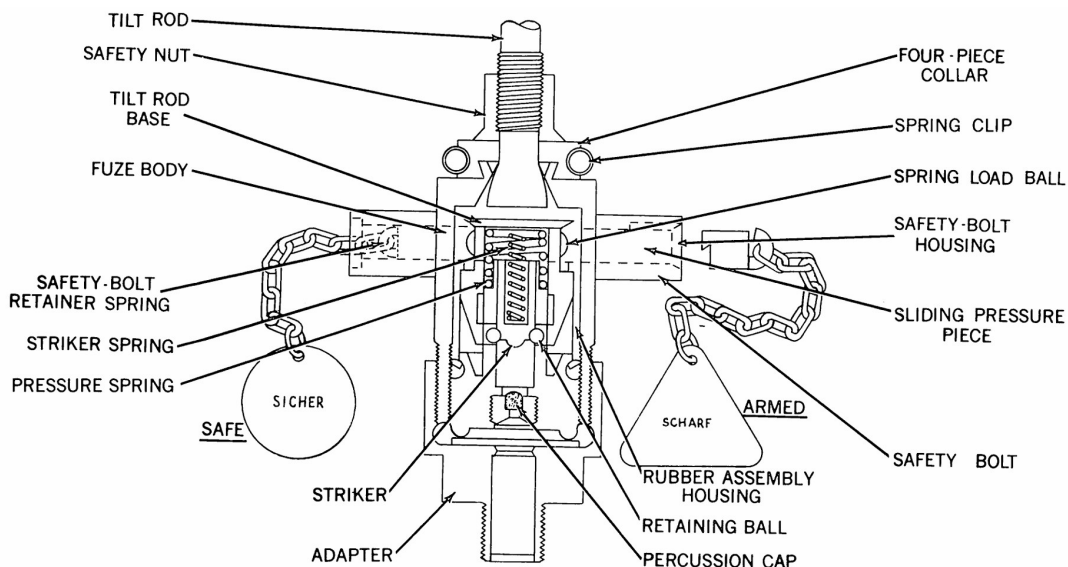
The basic principles of this firing device are the same as those of the Ki.Z. 43A. Also, the striker, striker guide, striker spring, pressure spring, and tilt rod base are all the same. However, the safety device is different and there is only one retaining ball. A safety nut is screwed down tightly against a four-piece collar that is retained in place by a spring to prevent movement of the tilt rod. There is also a safety bolt that fits under one side of the tilt rod base. Movement of the safety bolt is controlled by two detachable chains connected to each end of the bolt by scarfed (angled) joints. One chain has a round identifying tag marked "Sicher" (Safe) and the other, a triangular identifying tag marked "Scharf" (Armed).

To use the Ki.Z. 43B, a primer holder containing a percussion cap is screwed into the base of the device, and a detonator is attached. The device is then inserted into a mine or demolition charge. If desired, an anchored tripwire is attached to the tilt rod. The safety nut is unscrewed and removed from the base of the tilt rod. The arming chain (marked "Scharf") is then removed. The device is now fully armed and functioning.



*Ki.Z. 43B Firing Device*  
*Photo - D.B. McLean*

The firing device will function when 10-20 lbs. (4.5-9 kg) of lateral pressure is applied to the tilt rod.



*Ki.Z. 43B Firing Device (internal diagram)*  
*Image - US Department of Defense*



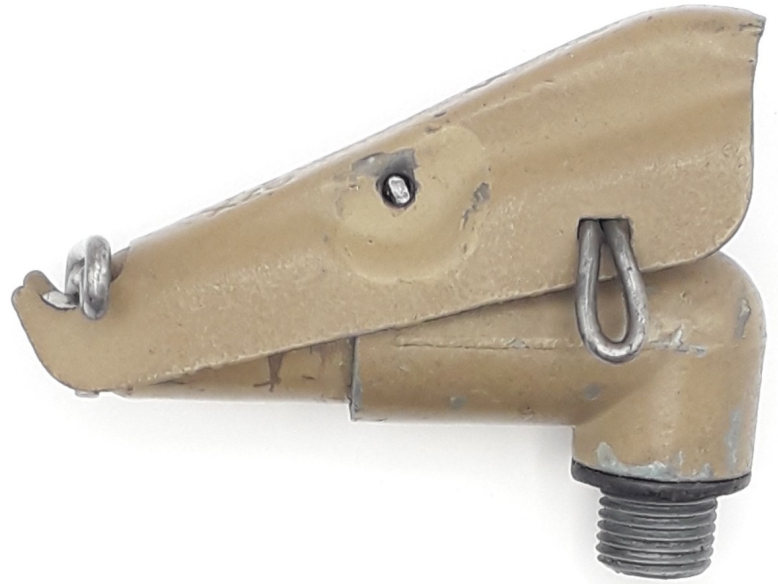
**Lever Igniter 44, Schuko  
(Hebelzünder 44, Schuko)**

**Germany (WW2)**

Type - Pressure  
Length - 2.375 in. (60 mm)  
Height - 1.5 in. (38 mm)

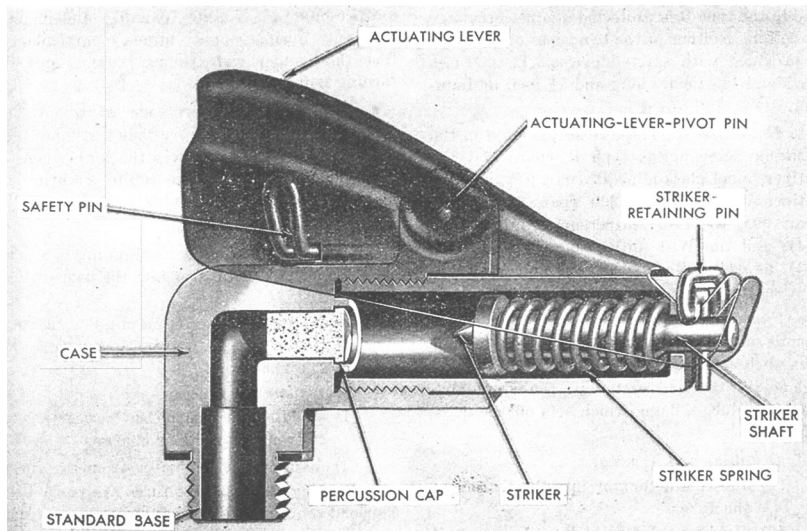
These igniters are often known as the "Schuko" igniter after the company that manufactured it. This is a lever action firing device designed primarily for use in the German Glaßmine 43 (f) anti-personnel mine, but could also be used in improvised mines and boobytraps.

The device consists of a cast L-shaped body, striker chamber, striker, striker spring, striker retaining pin, safety pin, and actuating lever. The body is cast with a lug on top and a hollow channel from end to end. The bottom is turned down and threaded with standard igniter threading. The upper end is bored out to create a primer chamber and is internally threaded to fit the striker chamber. The striker chamber is closed on one end and threaded on the other end to screw into the body. The striker is simply made with a head and firing pin at one end and a smaller diameter shaft at the other. The shaft has a hole to fit the "winged" striker retaining pin. The actuating lever is stamped out of sheet metal and is formed with two hooks on the bottom end. It is attached to the body with a pivot pin that fits through the lever and a hole through the lug on the body. The safety pin is simply bent wire that fits through holes in the actuating lever over top of the body.



*Hebelzünder 44  
Photo - F. Caley*

When assembled, the striker and spring fit into the striker chamber with the shaft fitting through a hole drilled in the closed end. When compressed the striker retaining pin is put through the hole in the striker holding it in the cocked position. The chamber is screwed into the main body. The actuating lever is attached with the hooks under the wings on the striker retaining pin. When fitted the safety pin prevents the lever from moving down.



When the safety pin is removed and pressure applied to the top of the lever, the lever pivots on the pivot pin. As one end of the lever pivots down, the other end rises. The hooks engage with the striker retaining pin withdrawing the pin to free the striker. The striker, under pressure of its spring, impacts the primer causing it to fire and flash down into the detonator. The detonator will fire and cause the attached explosive charge to detonate.

*Hebelzünder 44 (internal diagram)  
Image - US Department of Defense*

## Lever Igniter, Buck (Hebelzünder, Buck)

Germany (WW2)

Type - Pressure  
Length - 2.3 in. (60 mm)  
Width - 0.75 in. (19 mm)  
Height - 1.1 in. (28.5 mm)

The official designation of this device is unknown. Several boxes of these lever igniters were found in Engineer stores in Paris after it was liberated. Each igniter was packed in a small cardboard box within a larger box with a hand lettered label "Buck". The German mine and igniter expert Buck had an office in Paris and was responsible for this and other igniters produced in France. These were designed for use in the Glaßmine 43 (f), but could be adapted for use as a boobytrap in any situation in which pressure would be applied to the top.

The main frame is made of 0.0625 in. (1.5 mm)

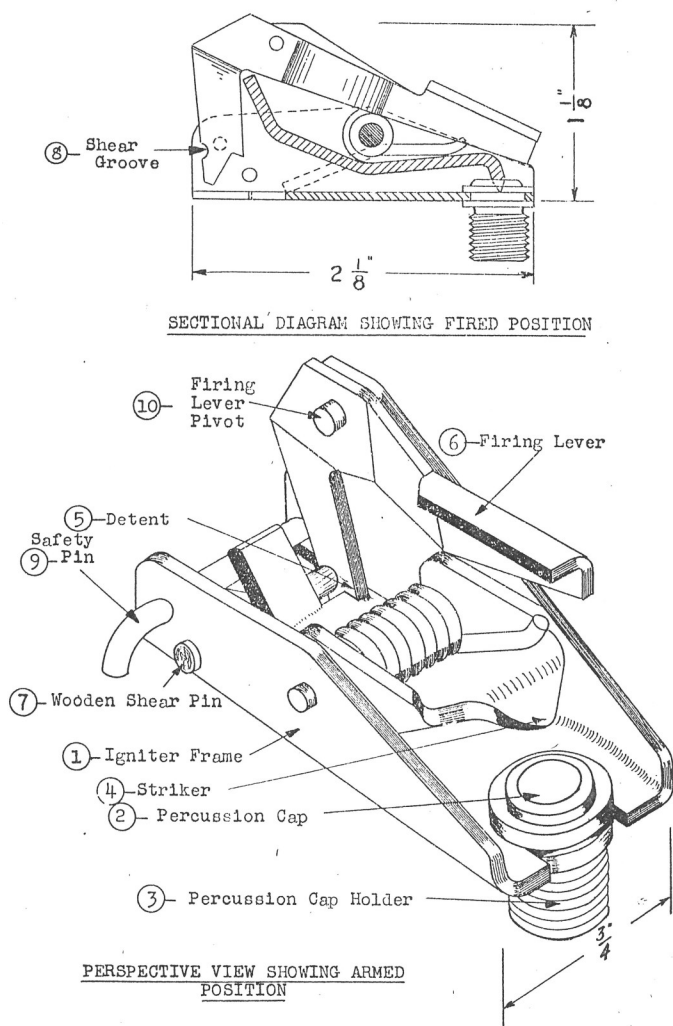


*Hebelzünder*

thick sheet steel. The front end has a primer holder with standard firing device threading and a primer fitted in top. A spring-loaded striker with striker point is set in the centre of the frame on an axis pin. The firing lever is attached to one side of the frame through a pivot point near the back end. Two sets of holes near the back end fit a wooden shear pin and a safety pin.

The striker is held in the cocked position by a detent in the firing lever. The wooden shear pin fits through the holes in the frame and contacts a semi-circular notch in the firing lever which holds it in the cocked position. A safety pin fits through the other set of holes in the frame above the shear pin and prevents the lever from moving down.

When the safety pin is removed and 10 lbs. (4.5 kg) of pressure is applied to the lever, it first shears the wooden pin allowing further downward movement of the lever. As the lever moves down, the detent disengages from the striker, which rotates down under spring pressure to hit the primer and initiate the explosive firing train.



*Hebelzünder (internal diagram)*

*Image - War Office Int Summary 179*

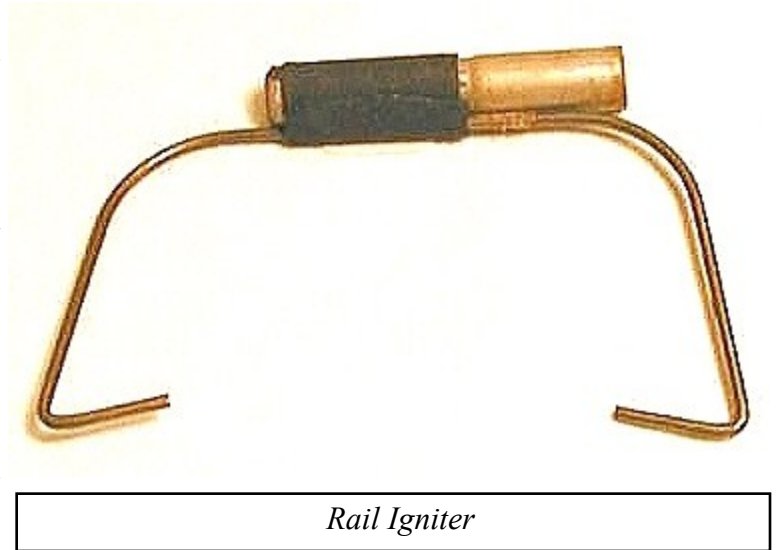


## Rail Igniter (Schienenzünder)

Germany (WW2)

Fog signals are a standard railway item used to warn engineers of a danger or obstruction on the tracks ahead. They are placed on the rail and initiated by the wheels of the engine when they are run over. The signals explode with a loud bang that can be heard by the engineer. They were modified during the war to act as an igniter for sabotage on rail lines.

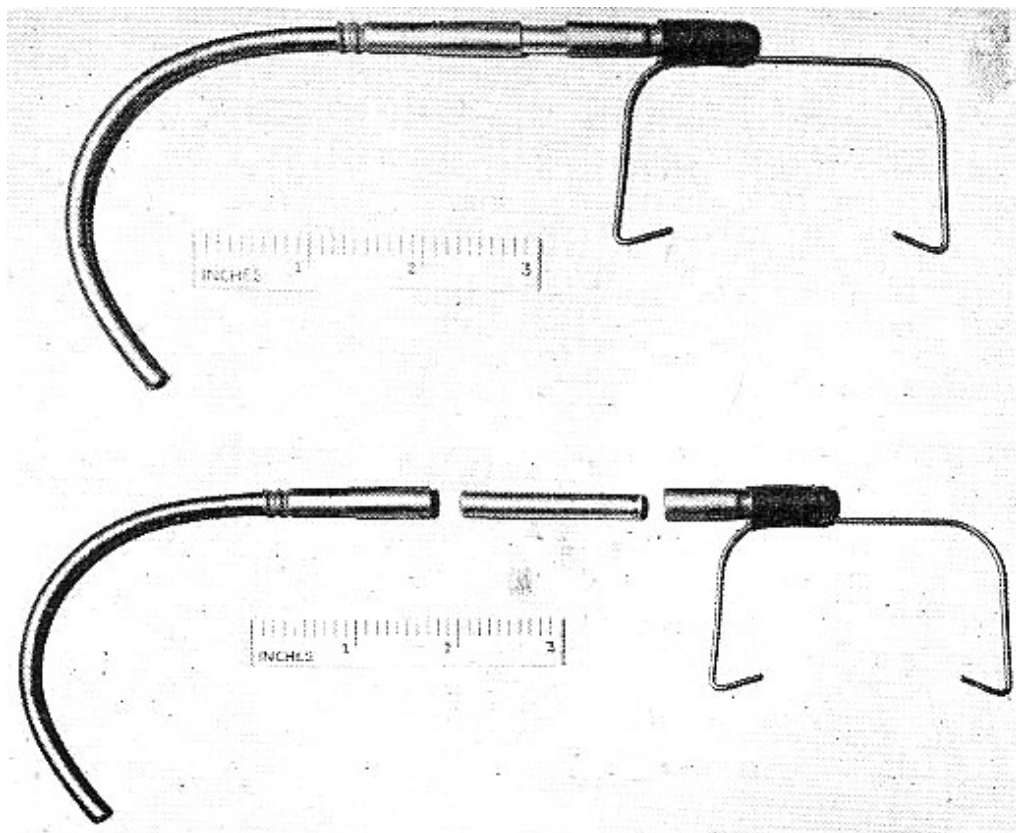
The device consists of a metal tube attached to a wire clip with adhesive tape. The clip fits over a rail holding the signal in place. The tube contains potassium chlorate and an ampoule of sulphuric acid.



*Rail Igniter*

For use, the signal is clipped onto a rail facing out. If placed facing in the rim on the wheel could cut the cord and prevent detonation. A detonator is inserted into the signal tube and a detonator adapter that has been crimped onto a length of detonating cord is slipped over the protruding end of the detonator. The detonating cord is connected to the main explosive charge.

When the wheel of a train crushes the device, the chemical reaction between the potassium chlorate and acid produces a flame which initiates the detonator and in turn the main charge.



*View showing rail igniter, detonator, and detonator adapter*

## Friction Igniter, West (Reißzünder Westen)

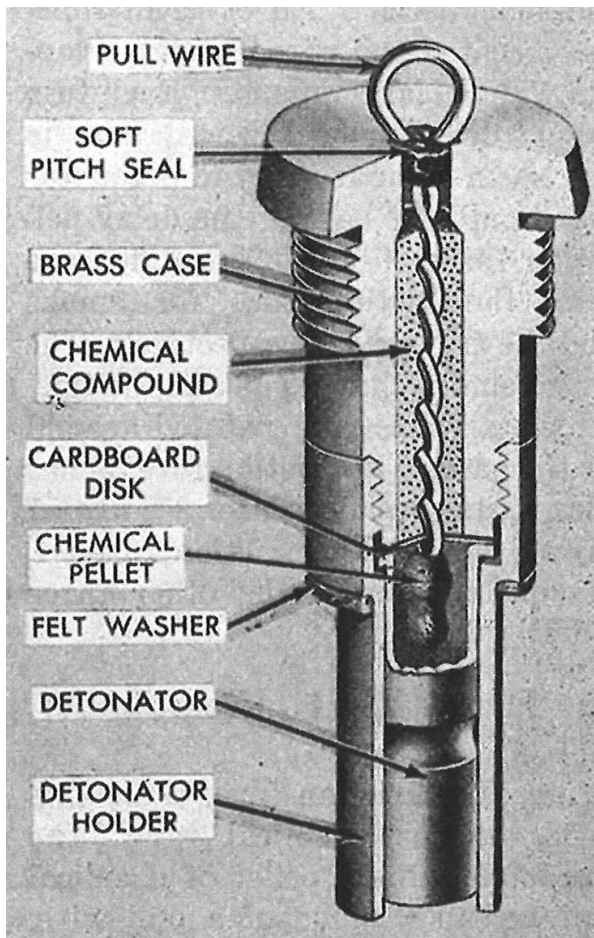
Germany (WW2)

Type - Friction  
Diameter - 1.2 in. (31mm)  
Height - 2.8 in. (73mm)

This was a German firing device made from French artillery fuze bodies. They were designed to be used with French artillery projectiles repurposed as demolition charges or mines.

The entire firing device is made of brass. Threading on the outside matches French artillery shell threading. The body unscrews in the centre. The bottom portion is a detonator holder. The upper portion contains a friction lighter in the central hole. The friction lighter consists of a twisted pull wire that passes through a friction compound. The end of the wire protrudes through the compound and through a cardboard disc. The end of the wire is coated with a chemical pellet, the cardboard disc separating the two chemicals. The upper end of the wire is held in place by a plug of soft pitch which also seals the upper portion of the fuze. A detonator fits into the detonator holder.

There is no delay, when the wire is pulled it draws through the cardboard disc bringing the two chemicals together. The friction between the two chemicals causes a flash that strikes the detonator causing it to fire.



*Reißzünder West internal diagram*



*Reißzünder West*

**S. Mine Igniter 44**  
**(S. Minenzünder 44 - S.Mi.Z. 44)**

Germany (WW2)

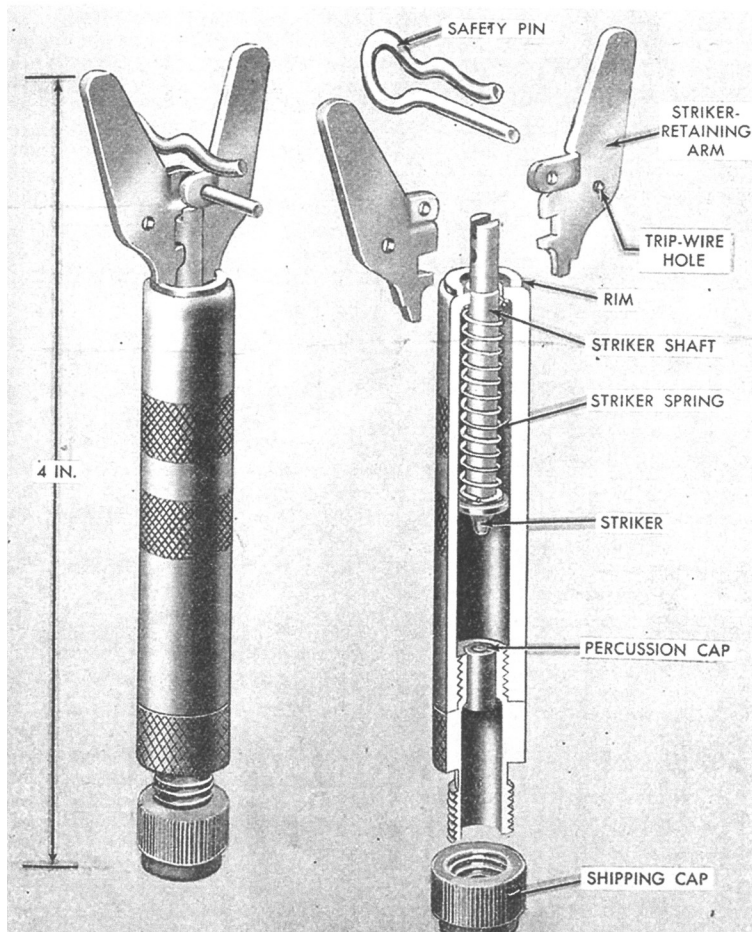
Type - Pressure/Pull  
Length - 4 in. (101 mm)  
Diameter - 0.5 in. (12.7 mm)

This firing mechanism was designed for use with the S. Mine 44. It was very sensitive making it dangerous to set and arm so was seldom used. Its construction would suggest it could also be used as a boobytrap, but it is unlikely that it ever was.



*S.Mi.Z. 44 Firing Device*

The overall construction is similar to a Z.Z. 42 except for the actuating mechanism. Most documentation has the cylindrical body made of steel, although there are examples with a Bakelite plastic body. The body is threaded at the bottom for a primer holder. The top of the body has a rim. The striker has a hole near the top and a slot across the top. There are two striker retaining arms shaped like wings. There are three projections on the inner side of the arms. The top projection is the longest and is offset to fit over each other. The middle one is shorter and squarish. The bottom one is the smallest. There is also a small projection at the bottom. A hole through each arm is for the attachment of tripwires.



When assembled the striker and striker spring are pushed up from the bottom. The wings fit with the small projection on the bottom inside the rim on the body. They then rotate up so the bottom projection fits into the hole in the striker and the middle projection fits into the slot on top of the striker. The safety pin fits through both wings through the top projection.

When the safety pin is removed a pressure of 20 lbs. (9 kg) on the top of the firing mechanism will force the wings outward to release the striker. If set with tripwires, a pull of 14 lbs. (6.3 kg) on the wire will pull the wings out and release the striker to hit the percussion cap to fire the mine or demolition charge.

*S.Mi.Z. 44 (internal diagram)*  
*Image - US Department of the Army*



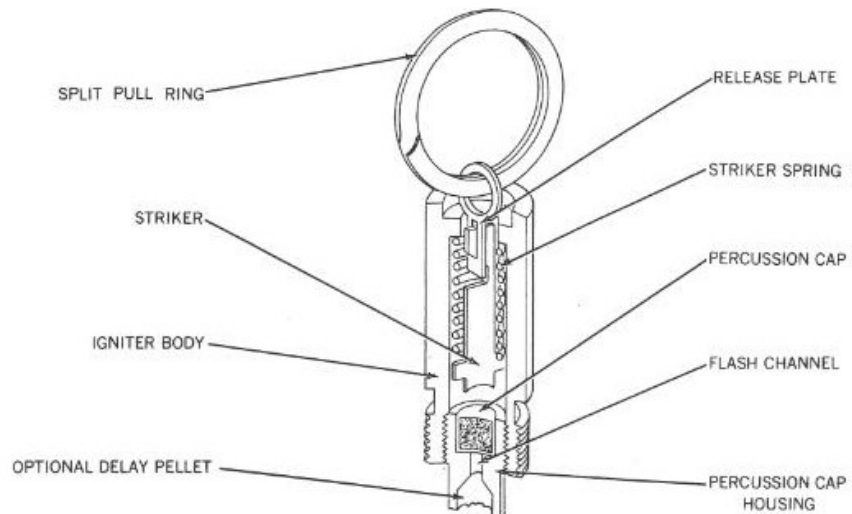
## Type 2 Igniter (Schlagzünder ziehen)

Germany (WW2)

Type - Pull  
Length - 2 in. (51 mm)  
Diameter - 0.375 in. (9.5 mm)

The official designation of this device is unknown. This igniter was initially designed for a parachute anti-personnel bomb, but was found to be suitable for use with mines and boobytraps.

The body is cylindrical brass. It is bored out to a point 0.125 in. (3 mm) from the top. The bottom end is internally threaded to fit a primer holder. It is also externally threaded to attach to the bomb it was designed for. The body contains the striker assembly consisting of a



*Percussion Igniter (Type 2)*  
*Image - US Department of Defense*

striker, striker spring and release plate. The striker is made of steel plate 0.031 in. (0.7 mm) thick. It has two shoulders at the head forming a seat for the striker spring. A recess in the stem with an inclined surface at the top allows the release plate to engage it. The release plate is key shaped and made of the same steel plate. There is a slot in the stem to engage the striker and a hole in the top end to fit a split ring. The primer holder is brass and threaded to fit into the body. The primer is inserted in the top and a recess in the bottom will accept a delay pellet of either two or four seconds.

When assembled, the striker and striker spring are inserted into the bottom and pushed up, compressing the spring, until the striker stem protrudes through the top of the body. The release plate then engages through the slot into the recess in the striker. Allowing the spring to draw the assembly back down into the body utilizes the walls of the hole to prevent disengagement. The primer holder is then screwed into the bottom of the body. There is no safety pin.

A sharp pull on the split ring will draw the release plate and attached striker upwards further compressing the striker spring. When the release plate fully exits the body, it will slide on the inclined surface and disengage from the striker. The striker will then be propelled downwards by the spring to hit the primer causing it to fire.

If being employed as a boobytrap, the delay pellet would be removed and replaced by a detonator.



**Tellermine Igniter 43  
(Tellerminen Zünder 43 - T.Mi.Z. 43)**

**Germany (WW2)**

Type - Anti-handling  
Length - 2.2 in. (56 mm)  
Diameter - 0.8 in. (22 mm)  
Weight - 3.1 oz. (90 g)

The T.Mi.Z. 43 was an antidisturbance firing device intended to boobytrap the German Anti-tank Tellermine 35, 42 and 43. It was used in lieu of the T.Mi.Z. 42 fuze, which it closely resembles. The only noticeable differences are that the plunger of the device projects higher above the top than the end of the striker on the 42 fuze, and the shear pin of the device does not rest flush on top of the body as it does on the 42 fuze. The firing device will function on pressure or pressure-release.

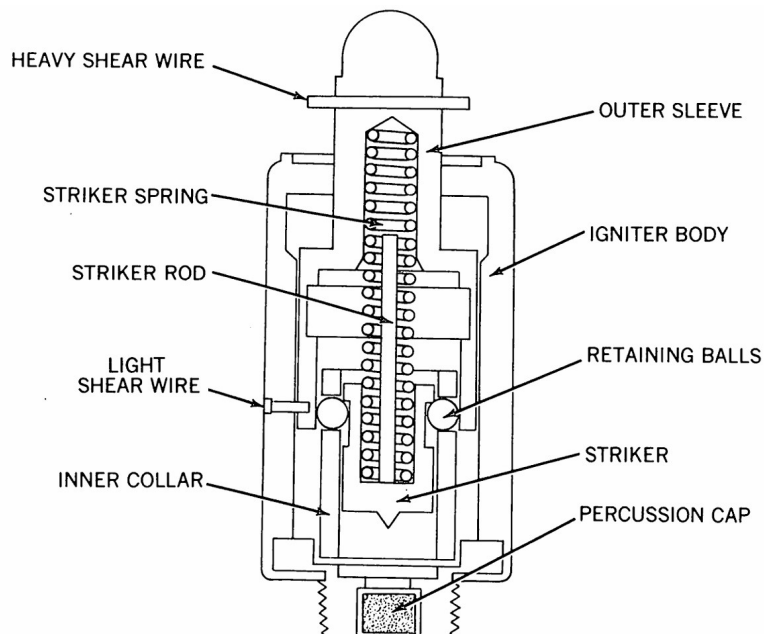
The firing device consists of metal body inside of which is an inner sleeve that extends through the top of the body, as well as a spring-loaded striker and striker rod that are retained in place by both shear pins and retaining balls. The device also contains an integral primer holder containing a percussion cap in its base.

To use the T.Mi.Z. 43, a detonator (blasting cap) is attached to the device by screwing it into the base with a detonator retaining collar. The device is then inserted into the mine. To arm the fuze, the pressure plug of the mine is screwed down so that it bears on the end of the plunger, pressing against it until a click is heard. The click indicates that the arming shear pins that hold the plunger to the case have been sheared off. The plunger is now free to move upward under pressure-release, or downward under approximately 400-lbs. (181 kg) of pressure.



*T.Mi.Z. 43 Firing Device*

The firing device will function when pressure is applied to the top of the plunger that moves it downward, compressing the striker spring until the pressure pin bears on the top of the body. The plunger then shears the shear pin and depresses further until the retaining balls drop into their recesses, releasing the striker to impact the percussion cap that initiates the detonator.



*T.Mi.Z. 43 Firing Device (internal diagram)  
Image - US Department of Defense*

The T.Mi.Z. 43 will also function when pressure is removed from the top of the plunger, which causes it to rise up under the force of the compressed striker spring until the retaining balls are free to fall into recesses, releasing the striker to impact the percussion cap that initiates the detonator.

**Tellermine Igniter 44**  
**(Tellerminen Zünder 44 - T.Mi.Z. 44)**

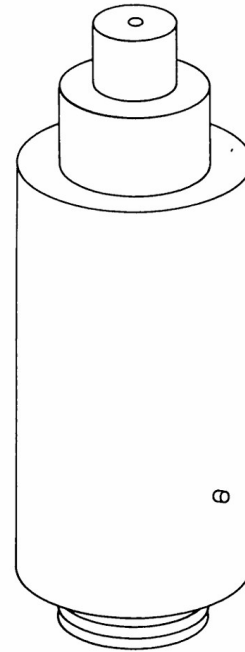
Germany (WW2)

Type - Anti-handling  
Length - 2.2 in. (58 mm)  
Diameter - 0.8 in. (22 mm)

The T.Mi.Z. 44 was an antidisturbance firing device intended to boobytrap the German Anti-tank Tellermines 35, 42 and 43. It was intended to be used in those mines in lieu of the T.Mi.Z. 42. It resembles the T.Mi.Z. 43, except that it has two telescoping flat-topped plungers instead of a round-ended one. This device was a pilot model and never fielded during the Second World War.

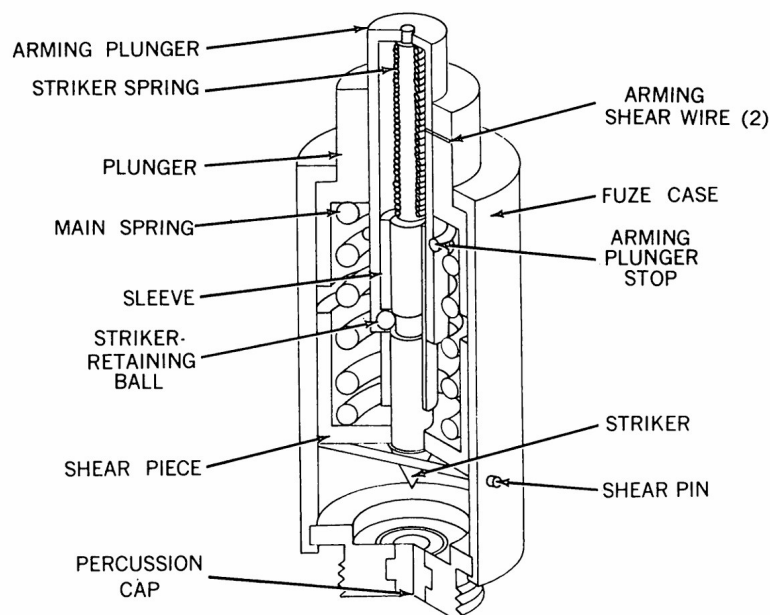
The firing device consists of metal body inside of which are an arming plunger that is contained within the plunger assembly. The arming plunger contains the cocked-striker and striker spring. The device also contains an integral primer holder containing a percussion cap in its base.

To use the T.Mi.Z. 43, a detonator (blasting cap) is attached to the device by screwing it into the base with a detonator retaining collar. The device is then inserted into the mine. To arm the fuze, the pressure plate of the mine is screwed down until a click is heard. This indicates that the arming shear wires have been sheared off and the device is fully armed. The plunger is now free to move upward under pressure-release, or downward under approximately 250-lbs. (113 kg) of pressure.



*T.Mi.Z. 44 Firing Device*  
*Image - US Department of Defense*

Pressure on the pressure plate forces the main plunger down, shearing the shear pins and forcing the striker down into the percussion cap, which initiates the attached detonator. Under pressure release, unscrewing the pressure plate permits the arming plunger to rise until it releases the retaining balls, which allows the spring-loaded striker to impact the percussion cap initiating the detonator.



*T.Mi.Z. 44 Firing Device (internal diagram)*  
*Image - US Department of Defense*

## UFA G.A.C.

Germany (WW2)

Type - Delay

Length - 3.3 in. (83 mm)

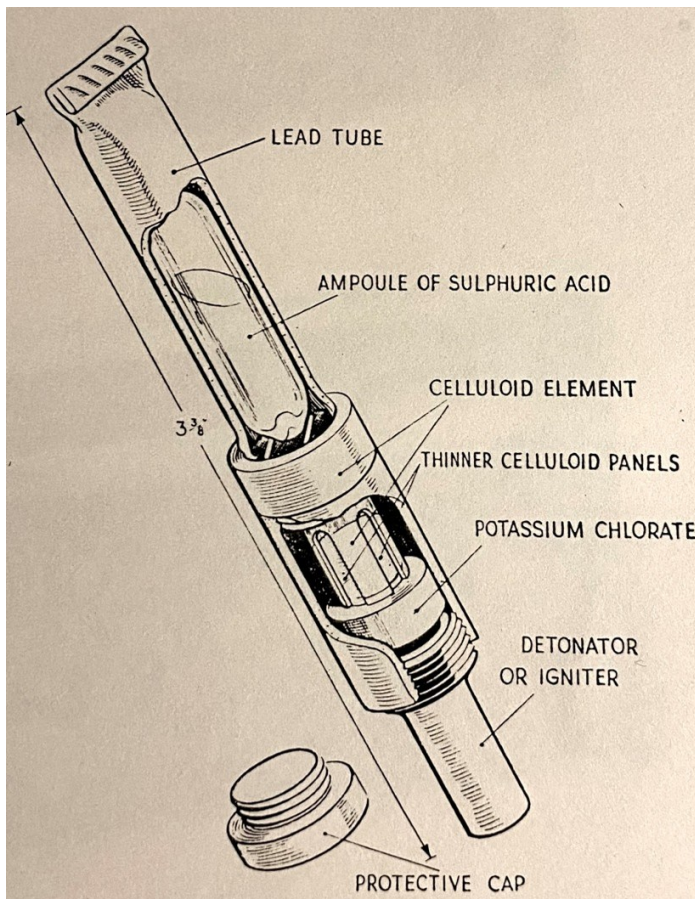
Diameter - 0.5 in. (12.7 mm)

The UFA G.A.C. delay device was a chemical-delay firing device primarily intended for sabotage operations.

It consists of two main sections. The lower section is most likely made of steel and is internally threaded at the bottom end to accept a detonator (blasting cap) or igniter. Just above the threading is a pellet of Potassium Chlorate. Above that is an element made of celluloid that closes the top of the section. The celluloid element is in the form of a cup that has portions of thinner celluloid that controls the delay times. The upper section is made of lead and contains a glass ampoule of sulphuric acid. It is attached to the lower section by a celluloid ring.

To use the UFA G.A.C., a detonator or igniter is screwed in. The top section of the device is then crushed, and the acid released to flow into the celluloid element. The acid begins to dissolve the celluloid. After a delay, the acid is able to pass through the celluloid and come into contact with the Potassium Chlorate. The chemical reaction between the two causes a flash which initiates the attached detonator or igniter.

The overall colour of the device is grey. The lower section has a black band painted around the centre. It can be assumed that the number of rings indicate the delay times.



When issued the device is contained within a glass test tube with cotton wool padding at both ends. It is sealed with Paraffin wax that has two metal strips embedded into it to help in removal.



*UFA G.A.C. Firing Device*

*UFA G.A.C. Firing Device (internal diagram)*



**Fuse Igniter 29**  
**(Zündschnuranzünder 29 - Zdschn.Anz. 29)**

Germany (WW2)

Type - Pull  
Weight - 0.9 oz. (27 g)  
Length - 1.5 in. (39 mm)  
Diameter - 0.5 in. (14 mm)

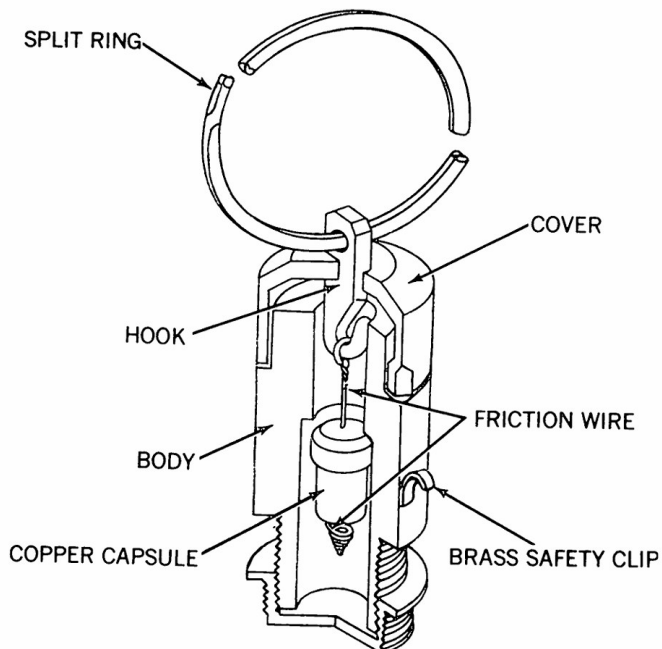
The Zdschn.Anz. 29 is a pull friction fuse igniter/lighter commonly used by German forces in the Second World War.

The brass body of the device is a single piece that is drilled through lengthwise. There is a slightly larger portion to the chamber at the bottom end. The body is threaded on the bottom to fit standard German ordnance. The body contains a small copper capsule containing friction compound. The coated friction wire passes through the capsule and is tightly wound at the bottom to provide resistance to a pull. The other end (top) of the wire is attached to a brass hook. The hook protrudes through a slot in a brass cap and is soldered to it. The brass cap closes the top of the device and is indented into a recess in the body preventing it from rotating. A split ring is attached to the top end of the brass hook. A protective cap closes the bottom. When issued the split ring is held against the body by a brass clip. The device is unpainted with the designation stamped into the side of the body.



*Zdschn.Anz. 29 Firing Device*  
*Photo - G. Zahaczewsky*

To use the Zdschn.Anz. 29 in a boobytrap configuration, an adapter incorporating a detonator, is screwed on to the lower end of the device. The firing device is then inserted into an explosive charge. An anchored tripwire is attached to the split ring. The brass safety clip is then disengaged.



A sharp pull of approximately 10 lbs.(4.5 kg) on a tripwire attached to the safety ring will draw the coated friction wire through the friction compound in the capsule and ignite it, initiating the attached detonator.

*Zdschn.Anz. 29 Firing Device (internal diagram)*  
*Image - US Department of Defense*



**Fuse Igniter 39**  
**(Zündschnuranzünder 39 - Zdschn.Anz. 39)**

Germany (WW2)

Type - Pull  
Weight - 0.55 oz. (15.6 g)  
Length - 1.37 in. (35 mm)  
Diameter - 0.75 in. (20 mm)

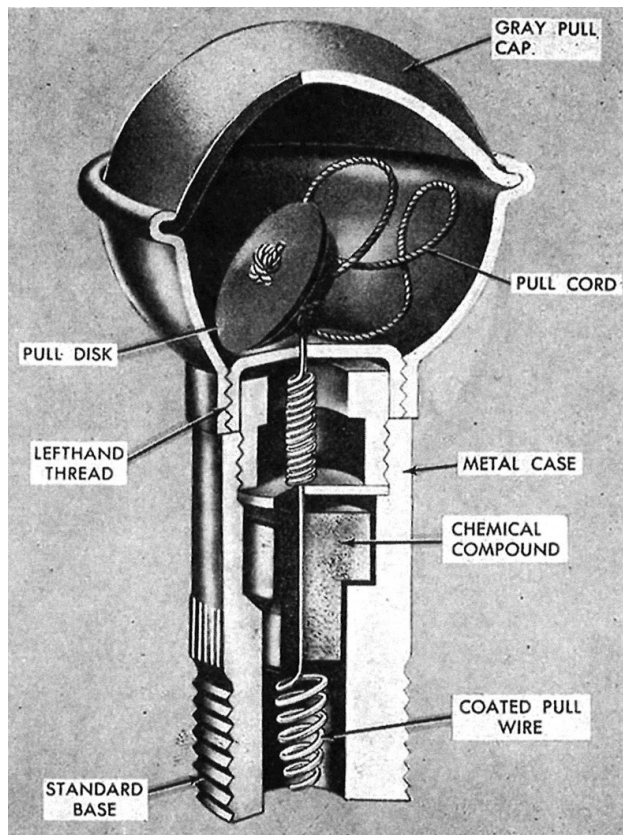
The Zdschn. Anz. 39 is a pull friction fuse igniter/lighter used by German forces to ignite safety (time) fuse in demolition charges. It could also be utilized as a boobytrap mechanism.

The device closely resembles the pull fuze used in egg grenades but has no delay pellet. The body is a tube with external threading on the bottom and at the top with a lefthanded thread. The body contains a pellet of chemical friction compound that has a pull wire passing through it. The bottom of the wire is coiled to provide resistance and is coated with friction compound. The upper end is attached to a pull cord. The pull cord is attached to the cap by a disc contained in the cap. The device is painted grey. A manufacturers marking and year of manufacture are stamped on the top of the cap. No other markings have been noted.

When the cap is unscrewed (left-handed) the pull cord allows the cap to be pulled away a short distance. A sharp pull on the cap draws the wire through the friction compound causing it to ignite. The flash travels down to ignite the fuse, or detonator if used as a boobytrap.



*Zdschn. Anz. 39 Firing Device*



The left-handed thread serves to ensure it is not mistaken for a B.Z.E. 39 fuze that has a right-handed thread.

*Zdschn.Anz. 39 Firing Device (internal diagram)*  
*Image - US Department of Defense*

**Pull and Pressure Igniter 29**  
**(Zug und Druckz nder 29 - Z.D.Z. 29)**

Germany (WW2)

Type - Pressure/Pull  
Length - 2.5 in. (63 mm)  
Diameter - 1.8 in. (47 mm)

The Z.D.Z. 29 is a pressure or pull firing device. It was intended for use in the German Tellermine 29. However, according to US intelligence reports, it was commonly used as a pressure activated boobytrap in demolition charges. It can be set to be initiated by a heavy load (in excess of 275 lbs./125 kg), a light load (approximately 100 lbs./45 kg), or by pull.

The Z.D.Z. 29 consists of a two-piece brass body that has a screw-in primer holder in the bottom containing a percussion cap. The body contains a cocked-striker assembly held in check by a pull pin and two shear pins. There is a pressure-setting device on the top and a safety bar and the pull pin extending from its side. The pull pin is marked with the letters "ZUG" (pull) beneath it, and the safety bar is marked with the letters "SICH" (safe) beneath it. When the safety bar is in place, it is between the striker and the percussion cap. The pressure-setting device consists of a slotted disk with the letters "DRUCK" (push) on it and an indicator mark on the rim. Three notations are on the head of the Z.D.Z. 29: "ZUG" (pull), "125 KG" (275 lbs. of pressure for anti-tank use), and "45 KG" (100 lbs. of pressure for anti-personnel use). Variations of this firing device have been found with the letter "Z" for pull function, "S" for heavy (275 lbs. pressure), and "L" for light (100 lbs. of pressure). When set to operate by pull (ZUG), the striker assembly is held in the cocked position by the pull pin. When set to operate by pressure, it is held by one shear pin in the anti-personnel mode, and by two shear pins in the anti-tank mode.

To use the firing device in the pull mode, a detonator (blasting cap) is inserted into the primer holder. The slotted disk is rotated to the "ZUG" position. The device is then attached to the mine or demolition charge. Both are then emplaced and camouflaged. A tripwire is then attached to the pull pin on the side of the device. Pressure on the tripwire will withdraw the pull pin, allowing the striker assembly to bypass the two shear pins and initiate the percussion cap and detonator.

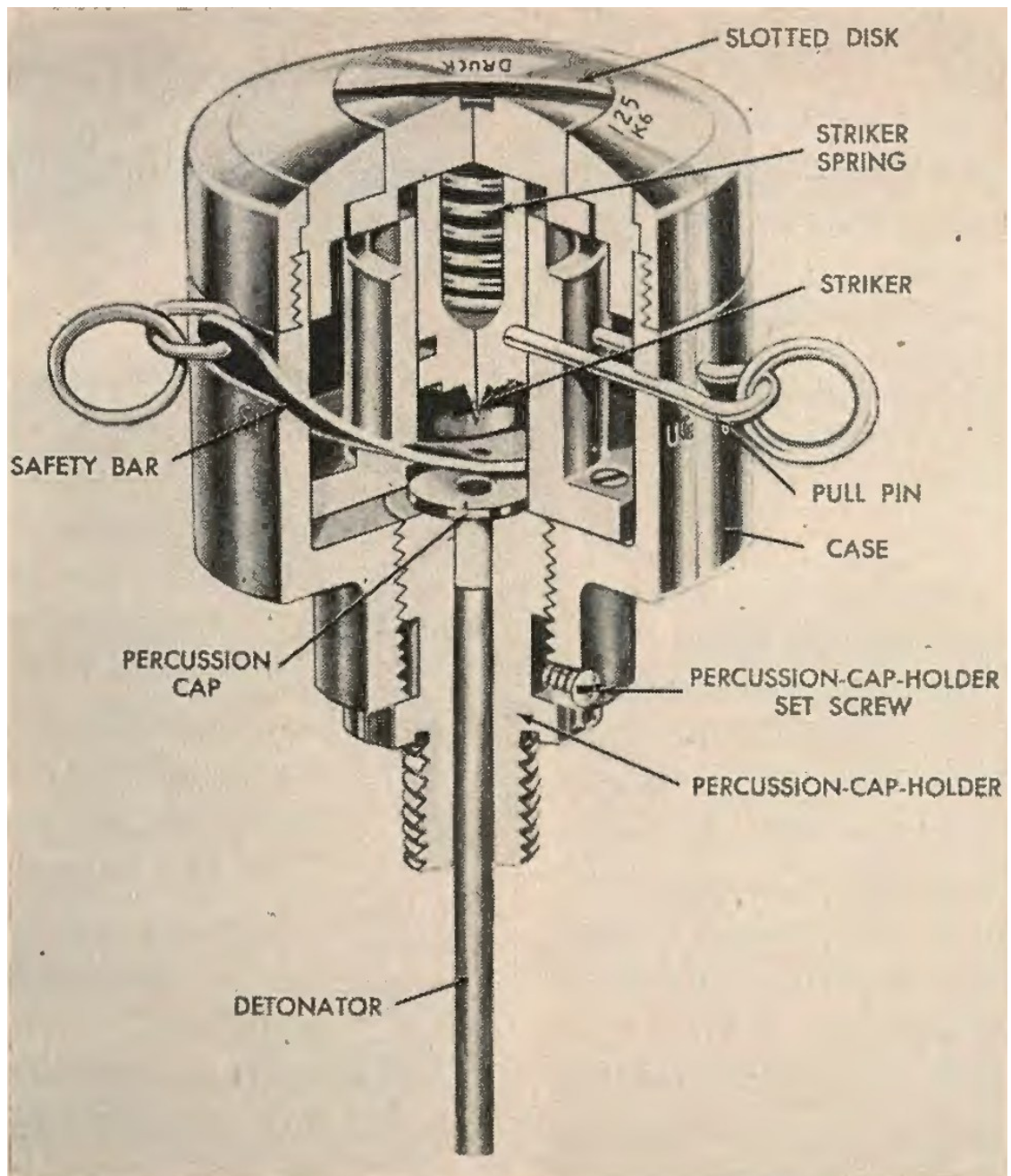
To use the Z.D.Z. in the anti-personnel, pressure mode, a detonator is inserted into the primer holder. The slotted disk is rotated to the "45 KG/L" position and the device is attached to a mine or demolition charge. The side-mounted pull pin is then withdrawn, leaving the striker assembly held in the cocked position by one shear pin, while the second one is bypassed. A pressure of at least 100 lbs. (45 kg) to the top of the firing device will cause the striker assembly to override the shear pin retaining it allowing the striker assembly initiate the percussion cap and detonator.



*Z.D.Z. 29 Firing Device*  
*Photos - F. Caley*



To use the Z.D.Z. in the anti-tank, pressure mode, a detonator (blasting cap) is inserted into the primer holder. The slotted disk is rotated to the "125 KG/S" position and attached to the mine or demolition charge. The side-mounted pull pin is then withdrawn, leaving the striker assembly held in the cocked position by two shear pins. A pressure of at least 275 lbs. (125 kg) to the top of the firing device will cause the striker assembly to override the shear pins retaining it allowing the striker assembly to initiate the percussion cap and detonator.



*Z.D.Z. 29 Firing Device cutaway  
Image - US Department of Defense*

**Time Igniter 9 and 55**  
**(Zeitzünder 9 und Zeitzünder 55 - Zt.Z. 9 und Zt.Z. 55)**

Germany (WW2)

Type - Delay  
Length - 5.5 in. (137 mm)  
Diameter - 2.8 in. (72.5 mm)

Technically, the Zt.Z. 9 and Zt.Z. 55 were not specifically designed to be boobytrap mechanisms. They were clockwork time-delay firing devices that were primarily intended for use in scuttling charges on German U-boats to prevent capture during the Second World War. They could however, be used for other purposes requiring a time delay.

The body of the firing device appears to be constructed of black Bakelite plastic. Other parts were made of steel or aluminum. There are two leaf springs attached to the lower portion of the body that serve to fasten the device into the charge. When issued in a cardboard box the bottom stem of the device is protected by a wooden sleeve.



*Zt.Z. 9 Firing Device*

The body contains a clockwork mechanism, cocked striker assembly and a percussion cap in the bottom. There is no other explosive content contained in the fuze. The top of the device has a graduated scale around the circumference. The centre of the top has a setting disk with pointer and a small handle. An arming pin (painted red) is located in the side of the device with a seal attached. There is a cardboard tag attached to the seal giving basic instructions for use.



*Zt.Z. 55 Firing Device with wooden sleeve and packing box.*

For use, a detonator must be inserted into the bottom and the device inserted in the charge. The seal is removed and the time set by rotating the setting dial to point at the required time as seen on the graduated scale.



When ready, the arming pin is removed and the setting dial pulled up as far as possible. This starts the clockwork. At the same time an internal pin engages in a hole in the setting disk to prevent rotation. The time can no longer be changed.

When the time elapses, the clockwork mechanism rotates a release wheel to free two retaining balls that were holding the striker in the cocked position. When the balls are released the striker is free to be driven down to hit the percussion cap. The percussion cap fires into the detonator causing it to fire and detonate the main charge.

The Zt.Z 9 provides a delay of 1-9 minutes and the Zt.Z 55 provides a delay of between 5 and 55 minutes.



Zt.Z. 55 Firing Device with wooden sleeve and arming pin

**Time Igniter 37**  
**(Zeitzündler für 10 Liter Sprühbüchse 37 - Zt.Z.f.SpBü. 37)**

Germany (WW2)

Type - Delay  
Weight - 3.2 oz. (93 g)  
Length - 3.2 in. (83 mm)  
Diameter - 1.2 in. (32 mm)

The Zt.Z.f.SpBü. 37 was a five-minute clockwork-time delay firing device designed for one express purpose, although it could be used for sabotage or as a time delay boobytrap. There were three versions of the device produced - Type I, Type II, and Type III. They all functioned in a similar manner differing only in certain external configurations, such as a longer length for the Type III. The differences are shown below.

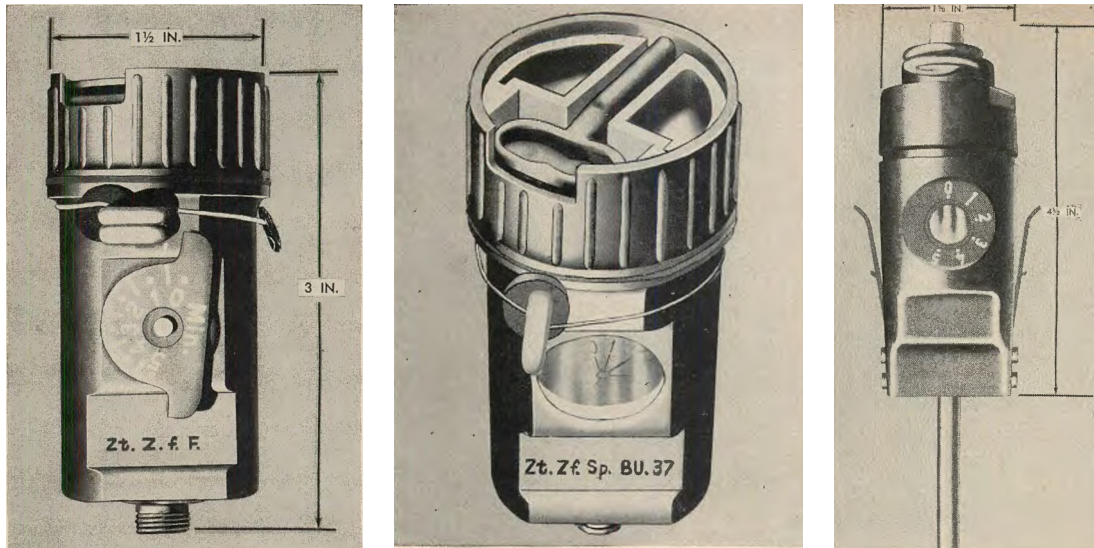


*Zt.Z.f.SpBü 37 Firing Device - Type II*  
*Photo - G. Zahaczewsky*

The primary purpose of the Zt.Z.f.SpBü. 37 was to provide a fuzeing mechanism to initiate a special chemical weapon - the "Sprühbüchse 37." This was considered a bounding gas mine, but basically it was a tin can containing 2 gal. (10 liters) of toxic gas: "Gelbkreuz," or in English, "Yellow Cross," which was a formulation similar to mustard gas. This weapon was used in a number of the Nazi Second World War concentration/extermination camps. The timer could be set for a maximum of five minutes, and as soon as it initiated, the container spread a cloud of gas, contaminating an area between 180-575 yds<sup>2</sup> (150-480 m<sup>2</sup>) with a maximum height of 50 feet (15 m). The size of contamination was dependent upon how the fuze was fitted to the can - on top of the container resulted in a large area, but lower density; however, fitted in the base of the container, the contaminated area was smaller, but the gas fumes were more concentrated.

The Zt.Z.f.SpBü. 37 Type II consisted of three components: a screw-on cap; a black Bakelite plastic body that had an integral primer holder with a percussion cap; and a key-wound clockwork mechanism. The cap contained a key that was used to wind the clockwork mechanism. The body of the device had a clear plastic window on one side with hash marks and the numbers 1 to 5, which represented minutes. There is also a safety pin hole that can be used to stop the clockwork mechanism by inserting a 0.07 in. (2 mm) pin into it. The body of the Zt.Z.f.SpBü. 37 was also marked with the nomenclature, as well as the manufacturer's code. There were also white markings that are believed to have represented lot numbers and year of manufacture.

To use the firing device, the clockwork mechanism was wound and the desired delay was set. The clockwork mechanism has a spring-driven striker (firing pin) attached to a plate that slides up and down on the outside of the clockwork mechanism. Once the clockwork mechanism was wound to the desired time delay, a detonator (blasting cap) was inserted into the primer holder on the bottom of the device. The clockwork mechanism was then initiated by removing the safety pin. The Zt.Z.f.SpBü. 37 was then attached to the Sprühbüchse 37. If, for whatever reason, the time delay was to be interrupted, a 0.07 in. (2 mm) pin could be inserted into the safety pin hole. After the time delay expires, the spring-driven striker plate was released and impacted the percussion cap in the primer holder that, in turn, initiated the container of gas.

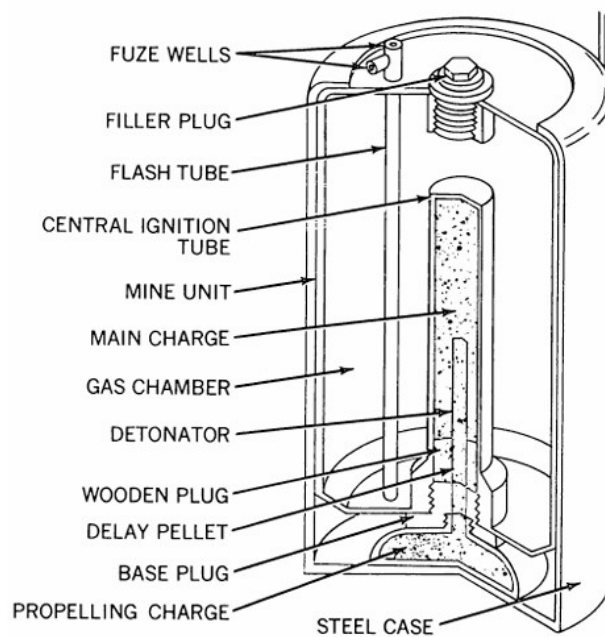


*Zt.Z.f.SpBü 37 Firing Devices  
left to right - Type I, Type II, Type III  
Images - US Department of Defense*



*Zt.Z.f.SpBü 37 Firing Device components - Type II  
Photo - G. Zahaczewsky*





*Sprühbüchse Chemical Charge/Container*



**Pull Igniter 35**  
**(Zugzünder 35 - Z.Z. 35)**

Germany (WW2)

Type - Pull  
Weight - 1.4 oz. (41 g)  
Length - 2.8 in. (72 mm)  
Diameter - 0.4 in. (12 mm)

The Z.Z. 35 was normally employed with tripwires as the fuze for German anti-personnel mines. It was also one of the most commonly encountered boobytrap mechanisms when used with German anti-tank mines, or attached to demolition charges.

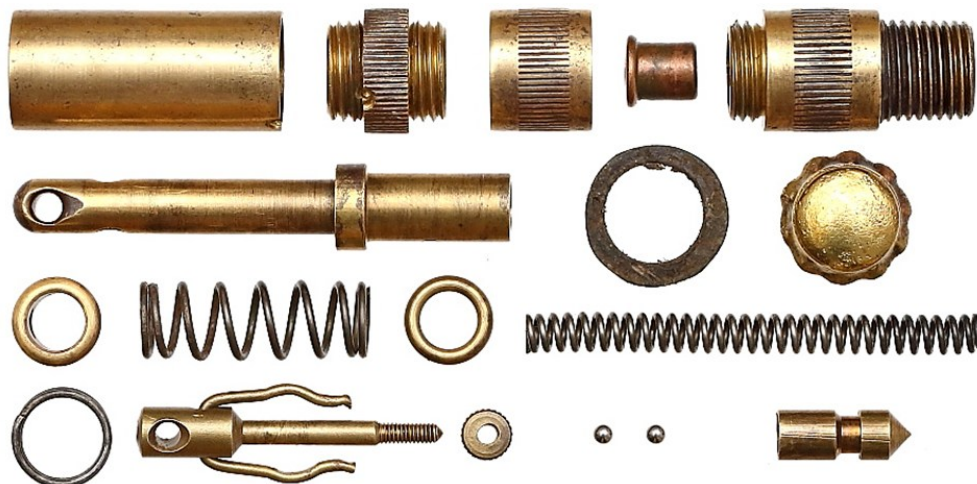


*Z.Z. 35 Firing Device*  
*Photo - G. Zahaczewsky*

The device is made of brass and is constructed as follows. The upper body has a brass collar on top and contains the striker spring, striker housing spring, and striker housing. A striker housing guide screws into the bottom of the upper body and contains the striker and two striker retaining balls. A spacer screws onto the bottom of the striker housing guide and below that a primer holder with a percussion cap. The striker housing contains the striker spring and has the striker fitted into the bottom with the spring compressed. The two retaining balls fit into a groove in the striker and hold it in place retained by the walls of the striker housing guide. The housing spring, under slight compression, holds the striker housing down against the striker housing guide to ensure it does not move out of place. The safety pin incorporates a spring clip and retaining nut. It fits through the brass collar and striker housing. The spring clip will hold the safety pin in place once the retaining nut has been removed preventing it from dropping out.

The device is prepared for use by inserting a detonator (blasting cap) directly into the primer holder if being used in something with a fuze well or by use of an adapter if there is no fuze well. A slack tripwire is attached to an anchor point and the hole in the top of the striker housing. The safety pin is then removed and the device is fully armed.

The Z.Z. 35 will function when a pull of 15-20 lbs. (7-9 kg) on the tripwire will pull the striker housing outwards. When the housing draws back, the striker retaining balls can escape into the upper body and release the striker. The striker is then driven down under pressure from the striker spring to impact the percussion cap that initiates the detonator.



*Z.Z. 35 Firing Device (disassembled)*

**Pull and Tension-Release Igniter 35**  
**(Zug und Zerschneidezünder 35 - Zu.Z.Z. 35)**

Germany (WW2)

Type - Pull/Tension-Release  
Weight - 2.0 oz. (60 g)  
Length - 4.3 in. (110 mm)  
Diameter - 0.4 in. (12 mm)

The Zu.Z.Z. 35 was the only pull, or tension-release firing device employed by the German Armed Forces in the Second World War. It proved to be too dangerous and was eventually modified. It employed tripwires as either a mine fuze, or in a demolition charge intended as a boobytrap.

The Zu.Z.Z. 35 closely resembles the Z.Z. 35 but is longer and operates differently. The device is mainly brass construction with some steel components. The main (upper) body is cylindrical and contains the main spring, pull cylinder, and striker spring. Screwed on the bottom is a guide housing containing the striker and striker retaining pins. A spacer and finally a primer holder containing a percussion cap, screws onto the bottom of the housing. The safety pin fits through slots in the collar at the top of the body, through the pull cylinder and rests on top of the main body, holding it in position. The safety pin has a retaining nut and spring clip that prevents the pin falling out when the retaining nut is removed. The main spring is slightly compressed and pushes down on a band around the pull cylinder. The firing pin is inserted into the end of the pull cylinder compressing the striker spring and is held in place by two pins that are in turn held in place by the walls of the housing.

To prepare the firing device for operation, a detonator is inserted into the primer holder. The firing device is then screwed into a mine or demolition charge and emplaced. A tripwire attached to a solid anchor is then attached to the hole in the striker assembly and placed under tension so that the safety pin is positioned in the centre of the elongated slot in the brass collar. The tension relieves the pressure on the safety pin. The retaining nut is then removed from the safety pin with the spring clip holding the pin in position. The safety pin is withdrawn overcoming the spring clip, preferably utilizing a long cord for safety. The firing device is now armed and ready.

When the tripwire is pulled, which requires 9-13 lbs. (4-6 kg) of force, it draws the pull cylinder outwards. When it draws upward the pins holding the firing pin are freed from the guide housing to be pushed out into the upper chamber and release the firing pin to impact the percussion cap. If the wire is broken or cut, it releases the pull cylinder to be pushed down out of the housing by the main spring until the pins can be pushed out into the lower chamber and release the striker to impact the percussion cap and initiate the attached detonator.



*Zu.Z.Z. 35 Firing Device*  
*Photo - F. Caley*

**Pull and Tension-Release Igniter Modified 35  
(Zug und Zerschneidezünder Umgeändert 35 - Zu.Z.Z. 35 )**

**Germany (WW2)**

Type - Pull  
Weight - 2.0 oz. (59 g)  
Length - 4.0 in. (104 mm)  
Diameter - 0.4 in. (12 mm)

The Zu.Z.Z. 35 firing device was developed because the original Zu.Z.Z. 35 proved to be dangerous to handle. It was modified by cutting off the hole for the taut trip wire at the end of the pull cylinder thus making it solely a pull device. The bodies of some of the devices were marked "NUR-ZUGZÜNDER" (Only Pull Fuze). It was normally employed - utilizing tripwires - as either a mine fuze, or in a demolition charge intended as a boobytrap.

The device is mainly brass construction with some steel components. The main (upper) body is cylindrical and contains the main spring, pull cylinder, and striker spring. Screwed on the bottom is a guide housing containing the striker and striker retaining pins. A spacer and finally a primer holder containing a percussion cap, screws onto the bottom of the housing. The safety pin fits through slots in the collar at the top of the body, through the pull cylinder and rests on top of the main body, holding it in position. The safety pin has a retaining nut and spring clip that prevents the pin falling out when the retaining nut is removed. The main spring is slightly compressed and pushes down on a band around the pull cylinder. The firing pin is inserted into the end of the pull cylinder compressing the striker spring and is held in place by two pins that are in turn held in place by the walls of the housing.



*Zu.Z.Z. 35 Modified Firing Device*

To prepare the Zu.Z.Z. 35 for operation, a detonator (blasting cap) is inserted into the primer holder and the device is screwed into a mine or demolition charge. A slack tripwire is attached to the safety pin ring and an appropriate anchor. The retaining nut is then removed from the safety pin and the spring clip rotated off the collar of the device. The firing device is now armed and ready. When the tripwire is pulled (approximately 40 lbs./18 kg is required), the safety pin is withdrawn, releasing the striker assembly to impact the percussion primer, which initiates the attached detonator.



*Zu.Z.Z. 35 Firing Device Modified  
markings*



*Zu.Z.Z. 35 Firing Device Modified (disassembled)  
Photo - G. Zahaczewsky*



**Pull Igniter, model unknown  
(Zugzünder)**

**Germany (WW2)**

Type - Pull  
Length - 3.4 in. (86 mm)  
Diameter - 0.5 in. (12.7 mm)

The official designation of this firing device is unknown. It was found being used as an anti-lift device attached to a Tellermine. It was noted at the time that the threading did not fit the igniter well of the Tellermine and an adapter was required. It is a simple device easily adapted for use in other applications.

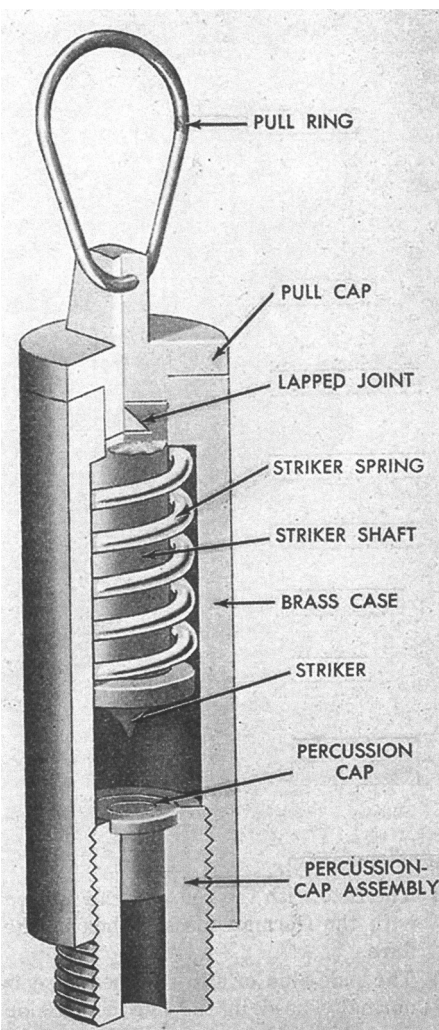
The device has a cylindrical brass body. It is bored out leaving a flange at the top with a smaller hole through it. The bottom is internally threaded to accept a percussion cap assembly, consisting of a threaded

piece bored out to fit a percussion cap. At the top a pull cap with pull ring fits into the small hole. The striker is made with a head and firing pin at the bottom end and a lap joint at the top end. The other half of the lap joint is on the bottom of the pull cap.

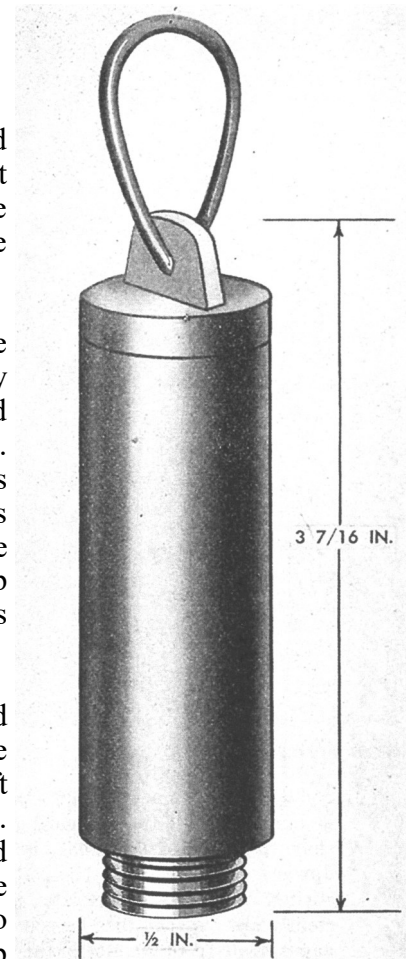
When assembled, the striker and striker spring are inserted from the bottom and pushed up until the shaft protrudes from the top of the body. The lap joint on the pull cap is mated with the other half on the shaft and the striker released to be pulled back into the body. The pull cap closes the top of the body and is held down by spring tension from the striker pin. There is no safety pin for this device. The percussion cap holder is screwed into the bottom of the body. The outside of the percussion cap holder is threaded for its entire length. That allows it to screw into the body with the primer in a safe position (away from the striker) or an armed position (primer toward the striker).

For use, a detonator would be inserted into the bottom of the device and the entire assembly screwed into a mine or explosive charge. A slack wire should be attached from the pull ring to an anchor point.

A pull of approximately 3 lbs. (1.3 kg) on the trip wire will draw the pull cap out of the body. When the lap joint is free from the body it will separate and release the striker to drive down under spring pressure to hit the percussion cap. The percussion cap fires initiating the detonator and causing any explosive charge attached to it to fire.



*Pull Igniter (internal diagram)  
Image - US Department of the Army*



*Pull Igniter  
Image - US Department of the Army*



**Pull Igniter 31**  
**(Zugzünder 31 - Z.Z. 31)**

Germany (WW2)

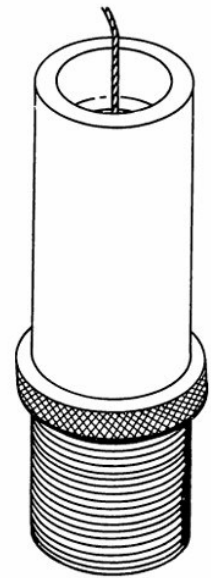
Type - Pull  
Length - 3.6 in. (92 mm)  
Diameter - 0.9 in. (25 mm)

The Z.Z. 31 firing device was specifically designed for initiating anti-personnel mines and boobytraps.

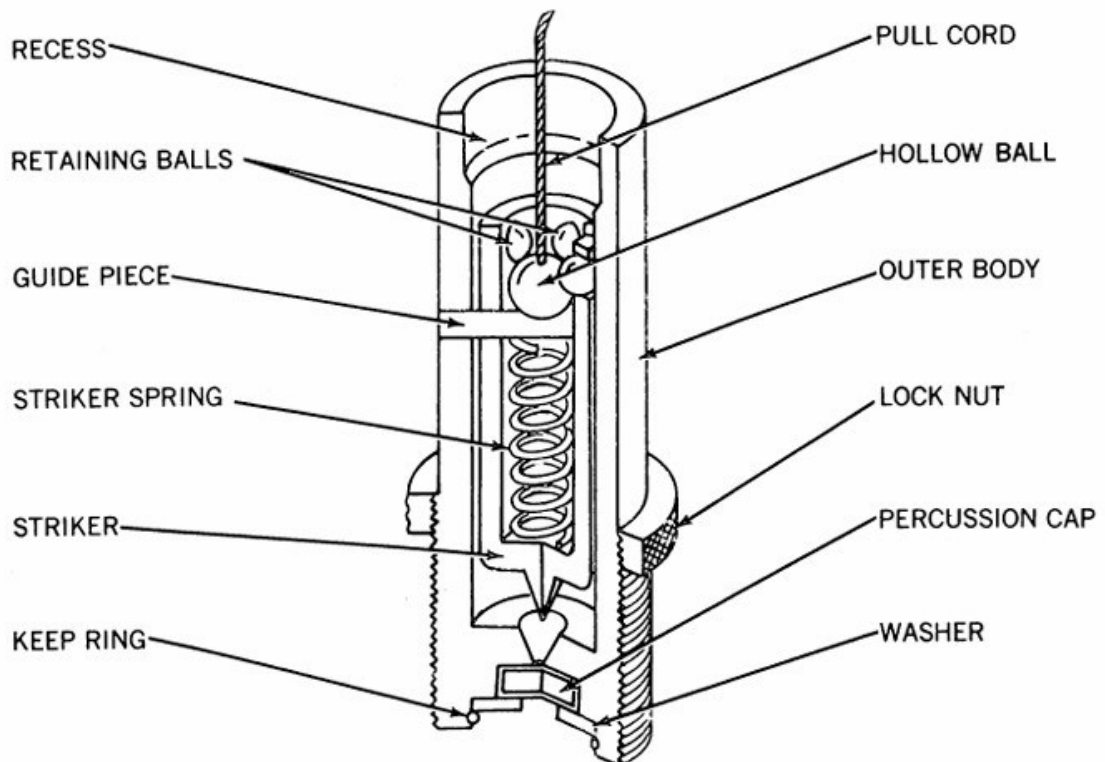
The firing device consists of a cylindrical brass body, a hollow striker, a striker spring, four steel balls, a guide piece, a percussion cap. and a hollowed ball to which a pull cord is attached.

The Z.Z. 31 must be employed with a mine or demolition charge that has a detonator installed. The device itself has no safety pin, and is simply inserted, or screwed, into the mine or charge. A slack tripwire is then attached to the pull cord.

A pull on the pull cord will move the striker up and compress the striker spring. When the striker has moved up to a certain point, the steel balls fall into a recess, the hollow ball and pull cord pull free, and the tension of the firing spring drives the striker against the percussion cap initiating the detonator assembly in the attached mine or demolition charge.



*Z.Z. 31 Firing Device*  
*Image - US Department of*  
*Defense*



*Z.Z. 31 Firing Device (cutaway)*  
*Image - US Department of Defense*

**Pull Igniter 42**  
**(Zugzünder 42 - Z.Z. 42)**

Germany (WW2)

Type - Pressure/Pull/Tension-Release  
Weight - 0.8 oz. (24 g)  
Length - 3.3 in. (86 mm)  
Diameter - 0.5 in. (13 mm)

The Z.Z. 42 firing device can be employed as a mine fuze, or utilized as a boobytrap in a demolition charge or antitank mine. It is the only multifunction firing device employed by the German Armed Forces during the Second World War that can be used as either a pressure, pull, or tension-release device. It was adapted from the Russian MUV, and has been copied by several other countries, to include: the Danish M/47, the West German DM27, and the Former Yugoslavian UPM-1.



*Z.Z. 42 Firing Device*  
*Photo - G. Zahaczewsky*

The body of the Z.Z. 42 is Bakelite plastic, while the internal striker assembly is steel. The striker assembly consists of a cocked striker (firing pin), spring, and a T-shaped striker-retaining pin that also serves as a safety pin. The upper portion of the striker assembly has a hole for a tripwire. Attached to the bottom part of the body is a brass primer holder, which contains a percussion cap and is covered by a Bakelite cap while in storage or transit. Markings identifying the manufacturer and year of manufacture are normally found stamped into the top end of the striker.

To use the firing device, a detonator (blasting cap) is inserted into the primer holder and the complete device is screwed into a mine or demolition charge. When employed as a pull firing device, a tripwire is attached to the loop on the T-shaped safety pin. When 2.2 lbs. (1 kg) of pull is applied, the safety pin is withdrawn from the striker allowing it to impact the percussion cap in the primer holder. If the Z.Z. 42 is used as a pressure firing device in the German anti-personnel Schützenmine 42, when 2.2 - 33 lbs. (2-15 kg) of pressure is applied to the top of the mine, the T-shaped safety pin is forced out of the striker assembly allowing the striker to impact the percussion cap in the primer holder. To use the firing device in the tension-release mode, it is inserted into either a mine or demolition charge. A tripwire is inserted into the top hole in the striker and then tightened until the T-shaped safety pin can be withdrawn. If the tripwire is cut or broken, it will release the striker to impact the percussion cap.

An interesting note in an Allied field report states that, using the Z.Z. 42 to boobytrap mines, “does not appear satisfactory, as in all cases the Bakelite body of the igniter had snapped (apparently when wires were tripped by cows) and the pin had not been pulled out of the striker head.” This apparently prompted the development of a Z.Z. 42 with a lower body made of metal.



*Z.Z. 42 Firing Device (disassembled)*  
*Photo - G. Zahaczewsky*

**Pull Igniter 42 (steel body)**  
**(Zugzünder 42 - Z.Z. 42)**

**Germany (WW2)**

Type - Pressure/Pull/Tension-Release

As mentioned in the previous Z.Z. 42 entry, a need apparently arose for Second World War German industries to produce a steel-bodied version of the firing device.

Very little technical information exists regarding the steel-bodied Z.Z. 42, except that its primary use was in the Riegelmine 43. Reportedly the Bakelite plastic bodied igniters were breaking, causing mines to misfire. The German solution was a steel body, even though that material was a strategic asset in the later stages of the war. The steel bodied Z.Z. 42, was capable of being used in exactly the same manner as the Bakelite plastic firing device.



*Zu.Z.Z. 42 Firing Device*  
*(steel body)*

**Pull Igniter 42 (Norwegian production)**  
**(Zugzünder 42 - Z.Z. 42)**

**Germany (WW2)**

Type - Pressure/Pull/Tension-Release

In 1943 the Germans had the company Raufoss in Norway produce a version of the Z.Z. 42 pressure/pull/tension-release firing device. The device was, to the best of our knowledge, identical in construction and operation except for the composition of the main body.

The body of Norwegian production Z.Z. 42 is brass, with a steel striker assembly. The striker assembly consists of a striker, striker spring, and a T-shaped release pin that also serves as a safety pin. A hole in the top of the striker can be used for tension release. The release pin has wings for use with a box mine and has a loop for use with a trip wire. The bottom of the body has a brass primer holder containing a percussion cap.



*Zu.Z.Z. 42 Firing Device*  
*(Norwegian production)*



**Pull Igniter, model unknown  
(Zugzünder)**

**Germany (WW2)**

Type - Pressure/Pull  
Length - 2.8 in. (72 mm)  
Diameter - 0.4 in. (11 mm)

The official designation of this device is unknown. It is believed to be a version of the Z.Z. 42. Examples have been found with German manufacturing codes “dyz 43” (Gustav Schortmann & Sohn, Leipzig) and “cyz 43” (Anton Flettner Flugzeugbau GmbH, Berlin).

The body is steel and has a brass cap on top with a hole in the centre to allow the striker shaft to protrude through. The bottom of the body is internally threaded to accept a primer holder. With the exception of a shorter striker shaft with only one hole, it is similar to the Z.Z. 42. It is perhaps a version for use in the Riegelmine 43, but is not confirmed.



*Z.Z. Unknown shown disassembled and on the right assembled for use*

## Adapter (Spannmutter)

Germany (WW2)

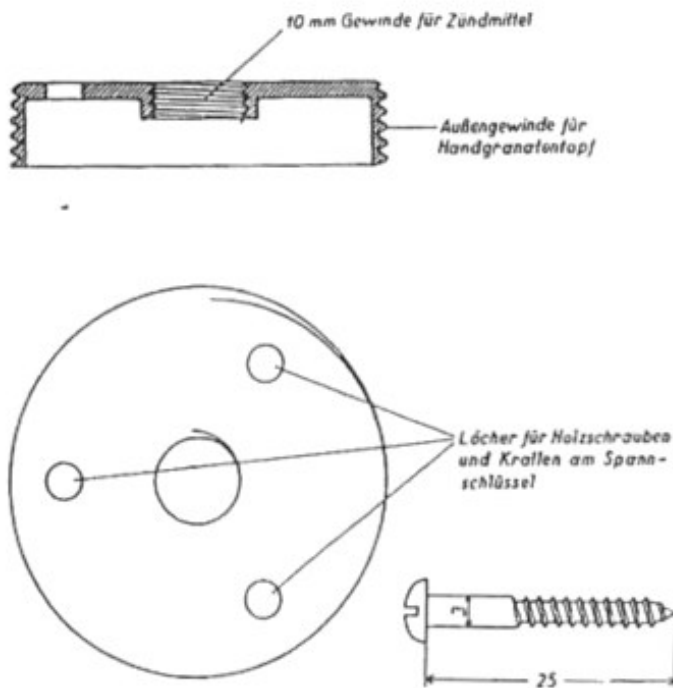
Type- Adapter

This adapter was included in a box of accessories for demolitions. It is a multipurpose item to attach igniters to explosive charges and devices. There is a threaded hole in the centre to fit the standard threading on various firing devices. The three holes surrounding the centre hole are designed for screws, which are supplied with the adapter, so that it can be screwed onto a wooden crate of explosives or other containers. It is threaded on the outside to screw into the head of a Stielhandgranate 24 so they could be used as charges for boobytraps.

They are marked with a manufacturers mark and year of manufacture.



*Spannmutter*



Spannmutter und Halbrundholzschraube



*Stielhandgranate 24 head with  
Spannmutter and Z.Z. 35 Igniter*



## Adapters

## Germany (WW2)

During the Second World War the Germans captured huge amounts of ammunition from countries all over Europe. Rather than destroy the ammunition they could not use, they utilized shells and bombs as demolition charges, mines, and even boobytraps. Much of the threading on the shells was different among countries. To solve that problem, they created adapters specific to countries and even individual items depending on the amount captured. Adapters were made of brass, aluminum, steel, and Bakelite plastic. They varied in size and shape.



*Aluminum adapter fitted with Z.Z.42*



*An adapter for French shells made from French fuze bodies. Similar to a Reibzünder West it is threaded on top to fit standard German firing mechanisms.*

*Left - Adapter*

*Right - Adapter with Z.Z.35*

**Connection sleeve  
(Klemmhülse)**

**Germany (WW2)**

Type - Adapter

Weight - 0.13 oz (3.75 g)

Length - 1.5 in. (38 mm)

Diameter - 0.5 in. (13 mm)

This adapter was used to connect a fuse lighter or a standard firing device to either safety fuse or a detonator.

It is made of light gauge brass. One end has threads formed to fit the threading on standard devices. The opposite end is threaded to fit a collet (Verbindungs) that fits over the fuze and would be crimped on. A hole in the side of the device allows smoke to escape if using safety fuse. It was commonly found associated with the Second World War German Zdschn.Anz. 29 pull-friction firing device.



*Connection sleeve and collet  
Klemmhülse and Verbindungs*





## Igniters and Detonator Assemblies

### Standard Sabotage Igniters

There were two types of detonator assemblies used in sabotage firing devices. They were used in a number of firing devices and igniters including delay clocks, UFA G.A.C delays, and LZZ G.A.C. delays. They included detonators (Sprengkapsel) and igniters filled with an incendiary material (Brandkapsel). Igniters were painted red to differentiate them from detonators.

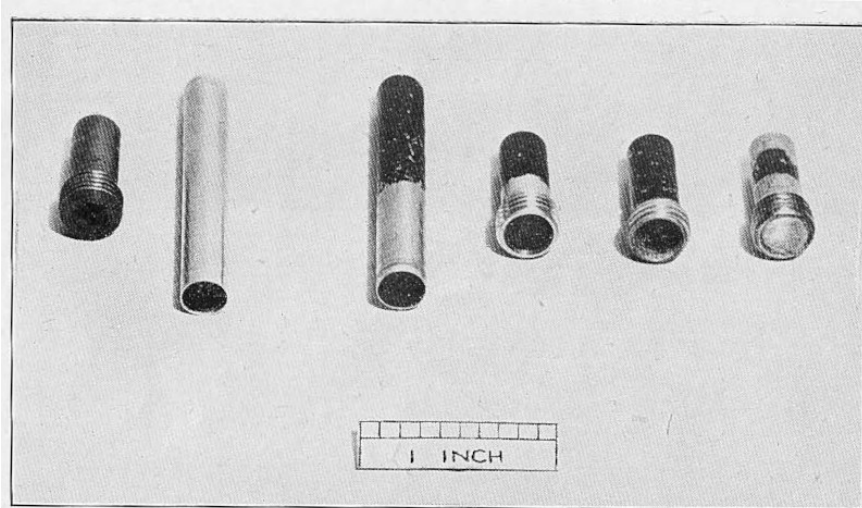


FIG. 117.—Detonators and igniters, G. Left to right: standard sabotage detonator; ordinary detonator (German: Sprengkapsel or S-Kapsel); ordinary detonator filled with incendiary mixture and painted red to show it is an igniter; three standard sabotage igniters with different red markings. (German: Brandkapsel).



Above - Standard Sabotage Igniter  
Left - Page from "Enemy Sabotage Equipment, second edition, 1945"

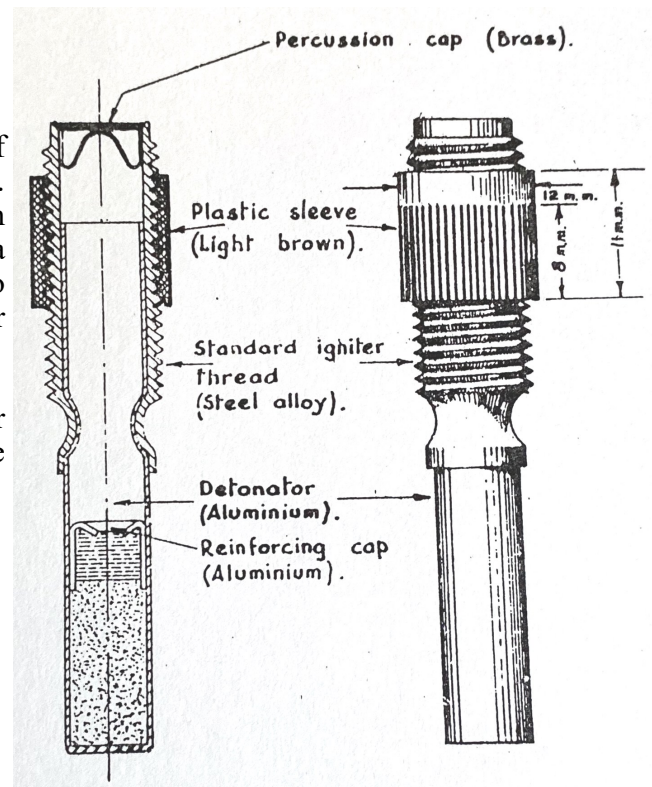
### Zündersprengkapsel 43

Type - Detonator assembly

Length - 2.0 in. (52 mm)

This is a factory produced watertight assembly of percussion cap, cap holder, and Nr. 8 detonator. The cap holder is made of metal but has a brown plastic sleeve with milled portion to provide a gripping surface. The cap holder is threaded to screw into an igniter (top portion) and into a mine or demolition charge (bottom portion).

Often found in use with the Kippzünder 43 or Knickzünder 43. It is also incorporated in the Entlastungszünder 44 (E.Z. 44) anti-lift device.



Zündersprengkapsel 43

# **DEUTSCHE DEMOKRATISCHE REPUBLIK**

**(German Democratic Republic)**



**Pull and Pressure Igniter, MUW  
(Zug und Druckz nder MUW)**

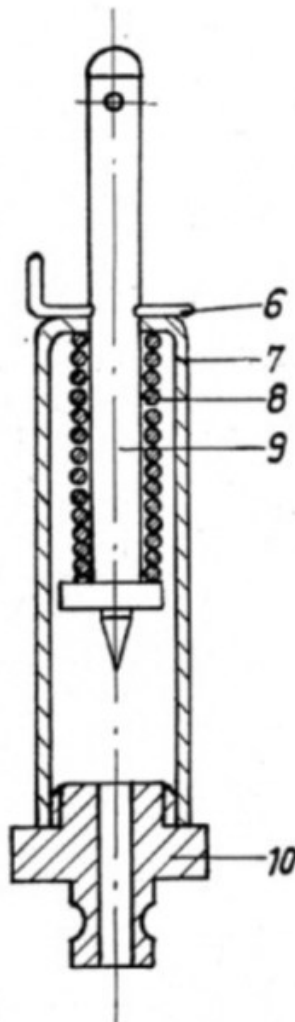
**Germany (East)**

Type - Pull/Tension-Release  
Length - 3.6 in. (92 mm)  
Diameter - 0.4 in. (12 mm)

The MUW is a pull-initiated firing device, that can also be used as a tension-release boobytrap. It appears to be a direct copy of the Soviet/Russian MUV firing device in appearance and function, and which has also been copied by the Bulgarians (MUV) and Chinese (Type 59).

While no other technical details are currently available regarding the construction or markings of the East German MUW, we can speculate on its functioning due to its resemblance to the Russian MUV.

To use the MUW, a detonator assembly is screwed into the base of the firing device. If used as a pull firing device in either a mine or demolition charge, the striker is pulled back using the safety bar until the safety pin hole is revealed. At this point, a T-shaped safety pin is inserted. The striker assembly in the MUW is now under spring-tension and ready for use. It is then inserted into the explosive charge, emplaced, and camouflaged. A tripwire is then attached to the safety pin and anchored. A pull on the tripwire will extract the safety pin and allow the striker (under spring tension) to hit the percussion cap in the detonator, initiating the attached charge/mine.



*MUW Firing Device*

If the MUW is deployed as a tension-release boobytrap, the striker is pulled back using the safety bar until the safety pin hole is revealed. At this point, a T-shaped safety pin is inserted. The striker assembly in the MUW is now under spring-tension and ready for use. It is then inserted into the explosive charge, emplaced, and camouflaged. A tripwire is then attached to the safety bar hole and tension is applied so that the T-shaped safety pin can be easily removed. If the tripwire is broken or cut, the striker (under spring tension) is released to hit the percussion cap in the detonator, initiating the attached charge/mine.

*MUW (internal diagram)*

*6 - T-shaped pin, 7 - body, 8 - Striker spring, 9 - Striker,  
10 - Primer holder*

**Pull and Pressure Igniter, MUW-2  
(Zug und Druckz nder MUW-2)**

**Germany (East)**

Type - Pressure/Pull  
Weight - 1.1 oz. (33 g)  
Length - 3.7 in. (95 mm)  
Diameter - 0.4 in. (12 mm)

The MUW-2 is a pressure/pull firing device that is almost an exact copy of the Soviet/Russian MUV-2. It can be used as a fuze in an anti-personnel mine, or as a firing device in a demolition charge or boobytrap.



*MUW-2 Firing Device  
Photo - G. Zahaczewsky*

The MUW-2 body and the internal striker assembly components are made of metal. The firing device has three basic components: the fuze head, which has a rubber cap covering a lead strip/metal fatigue arming delay assembly with a positive split-pin safety, as well as a T-shaped pull pin that initiates the firing device, although there is also a loop-shaped safety pin attached that can be substituted; a cylindrical body that includes the spring-loaded striker assembly; and finally, the primer holder that includes a percussion cap. The primer holder, and separate crimped-on detonator (blasting cap), can be replaced by either the Russian MD-2 or the MD-5 screw-in detonator (blasting cap) assemblies.

To prepare the MUW-2 for use, a detonator (blasting cap) assembly is screwed into the bottom of the firing device. The appropriate initiating pin (T-shaped for pressure-activation, or loop-shaped for pull initiation) is then selected and inserted into the fuze head. The firing device is then inserted into a mine or demolition charge. Both the mine and MUW-2 are emplaced and camouflaged. If used in the pull-activation mode, a tripwire is attached to the loop-shaped pull pin and secured. The split pin safety is then removed. This initiates the arming delay consisting of the lead strips in the fuze head. The arming delay mechanism (metal fatigue/lead shear, time delay) is similar to the Russian MUV-2, MUV-3, MUV-4, VPZ-1, VZD-1M, VZD-3, VZD-3M, VZLS firing devices, as well as PMN antipersonnel mines.

Upon expiration of the arming delay, which is contingent upon ambient temperature, the striker assembly is solely held back by the pull pin. After a tension is applied to the tripwire attached to the pull pin, it is withdrawn, releasing the striker into the percussion cap in the detonator assembly. This action, in turn, initiates the detonator assembly in the mine.



*MUW-2 Firing Device (disassembled)  
Photo - G. Zahaczewsky*

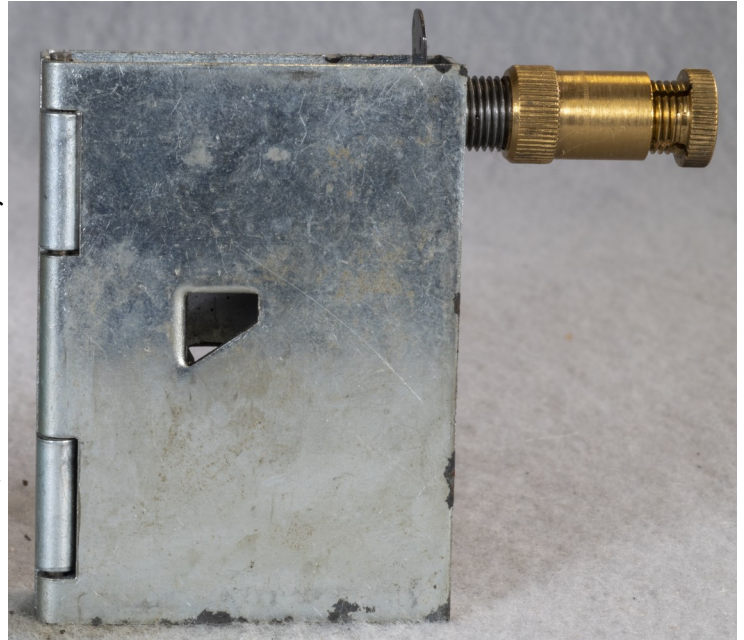


Type - Pressure-Release  
Weight - 4.5 oz. (128 g)  
Length - 3.0 in. (75 mm)  
Width - 2.1 in. (55 mm)  
Height - 0.6 in. (15 mm)

The official designation of this device is unknown. It appears to be a modified copy of the British No. 3, Mk I release switch and is similar in appearance and function to the Italian RP 1 and the Former Yugoslav UPP firing devices.

It consists of a two-piece, hinged steel body. The device has a five-hinged body, while the British device may have five or six. The body has two tabs, one in the bottom that is bent up to form an anchor point for a safety pin. The other is angle-shaped in the lid of the device and functions as part of the release mechanism. The body has a spiral spring with a hammer head at the end mounted in line with the anchor point tab. The spiral spring provides sufficient force to initiate the percussion cap in the primer holder that is screwed onto the firing device body. There is also a piece of spring steel incorporating a protruding striker (firing pin). The hammer head has a hole drilled through it to correspond to a hole in the side of the body and the tab that accepts a safety pin for the device. There is a threaded adapter attached in the top corner opposite the hinge.

The body of the firing device is unpainted, with no visible markings.



*No. 3 Copy Firing Device  
Photo - J. Osborne*



*No. 3 Copy Firing Device  
Photo - G. Zahaczewsky*

To use the firing device, it is cocked by drawing back on the hammer head until the safety pin can be inserted into the body to retain it in a cocked position. A fuse adapter is then screwed onto the device body and attached to an explosive charge. An object weighing at least 1.5 lbs (0.7 kg) is placed on top of the firing device. The applied weight presses down on the lid and allows the safety pin to be withdrawn. If there is resistance in removing the pin, there is insufficient weight on top of the device.

The device operates when the weight on it is removed. This allows the cocked hammer head to press against the inclined surface on the tab forcing the lid up and out of the way. The hammer head continues forward until it impacts the firing pin and drives it into the attached percussion cap firing it and initiating the explosive train.

## Ro 1 Copy

Germany (East)

Type - Pressure/Pull

Weight - 0.62 oz. (18 g)

Length - 2.75 to 2.95 in. (70-75 mm)

Diameter - 0.5 in. (12.7 mm)

The East German copy of the Ro 1 is a versatile pressure or pull firing device. It is similar in both appearance and function to several other firing devices, including: the Danish M/47, German Z.Z.42, West German DM27, and Yugoslavian UPM-1. It can be used as a fuze in an anti-personnel mine, or as a boobytrap device in a demolition charge.

The body of is made of Bakelite plastic, while the internal striker assembly is made of steel and the primer holder of aluminum. The upper portion of the striker has a hole for a T-shaped safety pin that has a loop for a tripwire. The striker assembly consists of a striker (firing pin), and a washer(s) that centralize the striker in the body. The aluminum primer holder, which contains a percussion cap is screwed into the bottom of the body. There is another version that has a primer holder with a nipple on the end to which a detonator (blasting cap) can be crimped.

To use the firing device, a detonator is either inserted into a primer holder and then screwed into the bottom of the firing device, or crimped on to the end of a nipple on the alternative primer holder. When employed as a pull firing device, a tripwire is attached to the loop in the safety pin.

When either a pull of 2.2 lbs. (1 kg), or pressure of 2.2-33 lbs. (2-15 kg) is applied to the firing device, it will function by withdrawing the T-shaped safety pin from the striker allowing it to strike the percussion cap and initiate the detonator and charge.



*Ro 1 Firing Device East German Copy  
(Note the difference in the primer holders)*



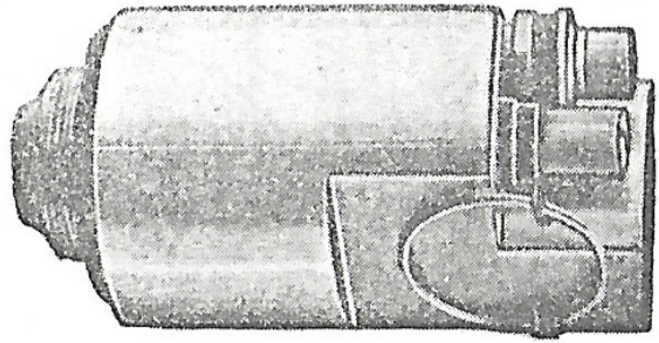
Type - Concussion

Weight - 33.5 oz. (950 g)

Length - 5 in. (130 mm)

Diameter - 2.6 in. (68 mm)

This is a concussion-initiated firing device that appears to be a direct copy of the Soviet VPZ-1, which was introduced into 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.

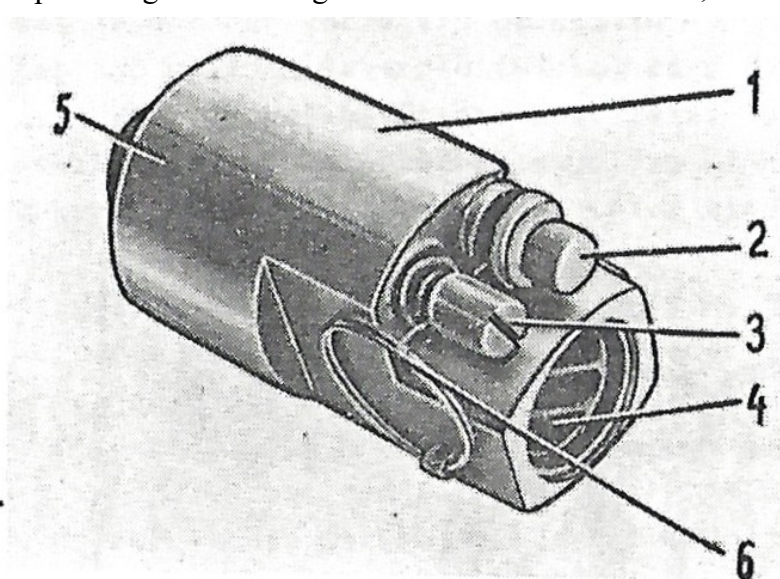


*WPZ-1 Firing Device*

The WPZ-1 would normally be employed in an 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 adjacent charges equipped with the WPZ-1 firing device would be sympathetically detonated. As a corollary concern, any WPZ-1 demolition charge in close proximity to any underwater detonation will explode, regardless of the time delay on the initiation charge.

Like the Soviet VPZ-1, the WPZ-1 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 device has an integral (26 g) explosive charge. The 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 WPZ-1.

To place the WPZ-1 into operation, the screw-on cover from the arming delay mechanism is unscrewed, and the appropriate time delay lead strip is 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. This frees up the



safety plunger, and initiates the arming delay. Once the arming delay has expired (arming delay strip severed), the device will overcome the safety plunger and initiate the integral detonator and booster charge once it senses an acoustic wave against the rubber diaphragm in the top part of the fuze. In turn, this detonates the attached explosive charge.

*WPZ-1 Firing Device*

*1 - Housing; 2 - Delay mechanism; 3 - Locking mechanism;  
4 - Membrane; 5 - Explosives; 6 - Safety pin with ring*

# **BUNDESREPUBLIK DEUTSCHLAND**

**(Federal Republic of Germany)**





**DM 26**  
**(Firing Device, Demolition, DM 26 , Pressure type, Metallic)**

**Germany (West)**

Type - Pressure  
Height - 2.8 in. (71 mm)  
Diameter - 1.26 in. (32 mm)  
Weight - 4.4 oz. (125 g)

In the post Second World War era, it appears the Germans simply resumed manufacturing the DZ 35A firing device and redesignated it as the DM 26. It was produced by Diehl Ordnance Division.

It is visually identical to the DZ 35A except for markings. It has an operating pressure of 176 lbs. (80 kg). Any internal differences are unknown at this time.

It is noted in company literature that it is used to initiate landmines and demolition charges of all types.



*DM 26 Firing Device*

**DM 27**  
**(Firing Device, Demolition, DM 27, Pull Type, non-metallic)**

**Germany (West)**

Type - Pressure/Pull  
Weight - 1.2 oz. (35 g)  
Length - 3.4 in. (87 mm)  
Diameter - 0.5 in. (14 mm)

The DM27 appears to be a West German copy of the Second World War German Z.Z. 42 firing device. It is a pressure or pull firing device that can be used in mines such as box or stake mines. It can also be used as a boobytrap with standard demolition charges. It is similar in appearance and function to the Czech Ro 1, Danish M/47, and the Former Yugoslavian UPM-1.



*DM27 Firing Device*

The cylindrical body of the DM 27 appears to be made of Bakelite plastic, although a more modern plastic with the same properties may have been used. What appears to be a brass primer holder is fitted in the bottom end and is threaded externally. There is an internal striker assembly that is steel. The striker assembly consists of a striker and striker spring that are contained within the body with the shaft of the striker protruding through a hole in the top end of the body. The striker is held in the cocked position by a special safety/arming pin. The pin is formed so that it can be used as a safety pin with the shank fitting through a hole on the striker. It is bent in such a manner to form two wings on either side of the central shank and a ring in the centre of the wings. The shank also has a “bump” formed at about the centre. When the pin is pushed fully home so that the “bump” is forced through the striker shaft it requires a good force to pull it out. If, however, when setting the device, the pin is pulled out enough so that the “bump” is on the opposite side, the force required to pull the pin is greatly reduced.

To use the firing device, a detonator (blasting cap) is inserted into the primer holder and screwed into the bottom of the firing device. The DM 27 is then inserted into a demolition charge. When employed as a pull firing device in a mine or demolition charge, an anchored tripwire is attached to the looped safety pin. When a pull is applied, the safety pin is withdrawn from the striker releasing it to impact the percussion cap in the primer holder. If the DM 27 is used as a pressure fuze in the West German DM 1010 anti-personnel mine, when pressure is applied to the top of the mine, the safety pin is forced out of the striker, which allows it to impact the percussion cap in the primer holder.

**DM 39**  
**(Sprengkörper DM 39)**

Germany (West)

Type - Pressure-Release  
Weight - 17 oz. (480 g)  
Diameter - 4 in. (100 mm)  
Height - 1.5 in. (40 mm)

The Sprengkörper (explosive charge) DM 39 is a cylindrically-shaped anti-handling device primarily intended for emplacement under the DM 11 and DM 21 anti-tank mines, although it has potential for use as a boobytrap with other demolition charges. Four variants of this firing device were produced: the DM 39 (plastic body), the DM 39A1 (metal body), and the DM 68 and DM 68A1, both smoke-producing training versions. It was removed from German service in 2002.

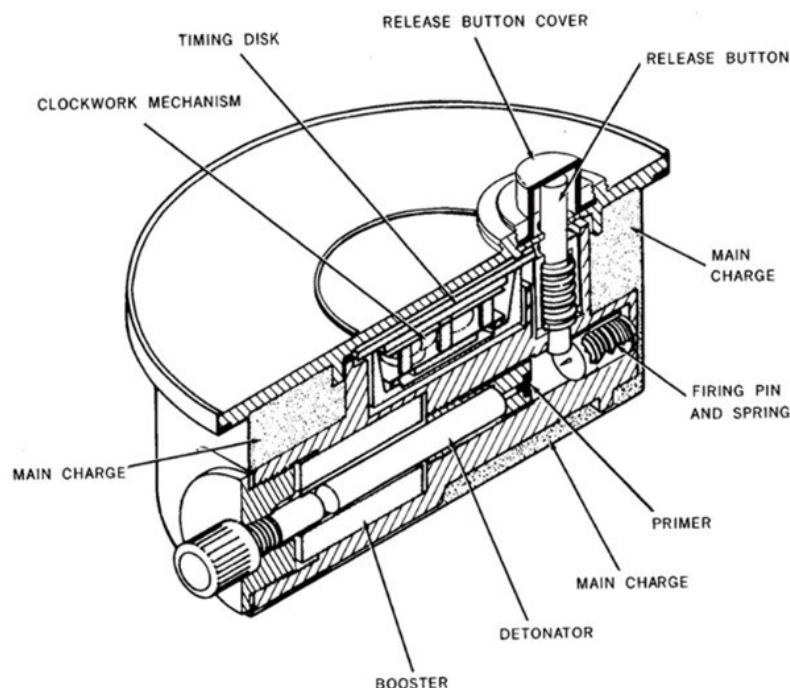


*DM 39 Firing Device*  
*Photo - B. Gravett*

The DM 39 body contains a clockwork arming delay. Uniquely, it incorporates a secondary fuze well on the lower side of the device, thus allowing for a secondary anti-disturbance firing device. It contains a 10.5 oz. (300 g) TNT/RDX (Composition B) explosive charge. Once armed it cannot be disarmed.

The DM 39 has a metal body and is painted olive-drab with yellow stencilled markings, as well as a yellow band encircling the body indicating that has a high-explosive fill.

No other technical details are currently available.



*DM 39 Firing Device*  
*Image - US Department of Defense*

**DM 49**  
**(Sprengkörper DM 49)**

Germany (West)

Type - Pressure-Release  
Weight - 18 oz. (510 g)  
Diameter - 3.5 in. (90 mm)  
Height - 1.4 in. (37 mm)

The Sprengkörper (explosive charge) DM 49 is a firing device primarily intended for emplacement under the DM 11 and DM 21 anti-tank mines as an anti-handling device, although it also has the potential for use as a boobytrap with other demolition charges. It is a clockwork-delay armed, pressure-release device that replaces the DM 39 firing device in the German Armed Forces. A Danish copy, the M/66, is known to also exist.

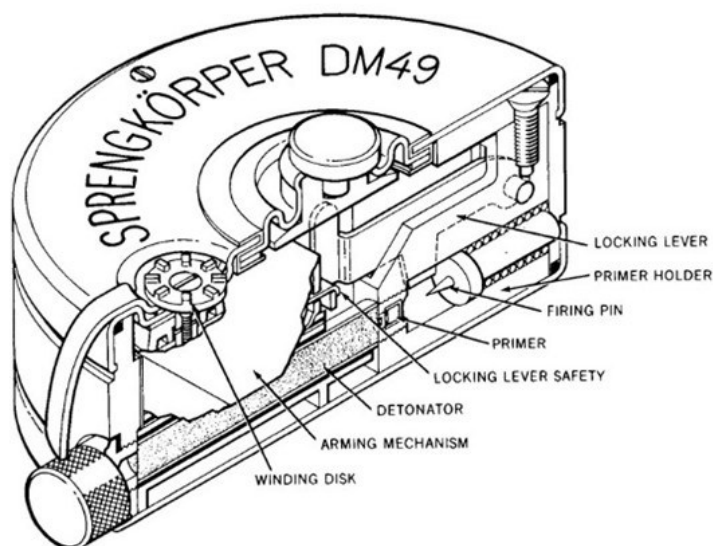


*DM49 Firing Device*  
*Photo - B. Gravett*

The DM 49 has an aluminium body and is painted olive-drab with yellow stencilled markings, as well as a yellow band encircling the body indicating that it has a high-explosive fill. In this case, the fill is 5.2 oz. (150 g) of RDX/TNT (Composition B). The upper and lower caps of the device are spotwelded to the body of the DM 49.

There is a practice version of the DM 49 that is painted blue with white markings and a brown band around the lip of the top cap that indicates a low-explosive fill. The lower cap is secured to the firing device body by screws. It is identical to the HE version with the exception of the fill, primer holder, and the removable lower cap.

No other technical details are currently available.



*DM 49 Firing Device*  
*Image - US Department of Defense*



*DM 49 Firing Device (Practice)*



**DM 67**  
**(Treibladungsanzünder DM 67)**

**Germany (West)**

Type - Trigger Mechanism  
Weight - 3.3 oz. (96 g)  
Diameter - 1.4 in. (37 mm)  
Height - 3.3 in. (84 mm)

Although it does appear to be, the DM 67 is not a boobytrap mechanism. It is an ignition device used with the Handflammpatrone DM 24A1B1. The DM 24A1B1 was declared obsolete in the 1970's being replaced by the DM 34 which used a different type of ignition device.



*DM 67 Firing Device, (missing firing button)*  
*Photo - J. Osborne*

The main body is cylindrical made of heavy gauge sheet metal. Disks at the top and bottom hold a central tube that is a channel for the striker. The top of the tube has a small hole for the striker to fit through. The bottom of the tube is externally threaded to accept a DM 12B1 propellant charge (Treibladung) and internally threaded to accept a primer holder. The striker is turned down to form a head and firing pin at the bottom end and has a groove at the top end. There is a firing trigger (painted red) that is simply a flat piece of metal bent down at the front forming a push button. There is a keyhole cut into the centre of the trigger plate and a notch cut into it near the trigger button. The cover of the device has a corrugated rim to provide a gripping surface. There is a cutout in the rim to fit the firing trigger.

The device is painted brown with a red trigger button. The cover has embossed markings as well as a painted lot number.

When assembled the striker and striker spring fit up through the bottom until the striker shaft fits through the small hole in the central tube. The trigger plate fits over the top of the striker with the keyhole engaging the groove on the striker shaft. The cover fits the top of the device with the trigger button protruding from the cutout. The primer holder screws into the bottom of the mechanism. The top is marked with an "A" (armed) and an "S" (safe). When the firing button is on "S", the notch in the firing button is engaged with the cover preventing the button from moving inward.

When ready to fire, the cover is rotated to the "A" position and the button firmly pushed in. When the button moves in the keyhole will disengage from the striker. The striker is driven down by the compressed striker spring to hit the primer. The primer fires into the propellant charge which fires, both igniting and expelling the projectile.

# MAGYARORSZAG

(Hungary)



Type - Pressure/Pull

Weight - 18 oz. (510 g)

Length - 4.4 in. (112 mm)

Diameter - 0.59 in. (15 mm)

The M42 fuze is normally used in SchtzMi M49 and M62 anti-personnel mines. The firing device appears to be derived from the Russian MUV and, as such it can possibly be used as a boobytrap mechanism.

The body is constructed of metal in a cylindrical form. The body has a slightly rounded top with a hole to allow passage of the striker shaft. The lower end is



*M42 Fuze*

internally threaded to accept a detonator (blasting cap) assembly. The body contains a striker and striker spring. The striker has a striker point at the bottom end and just above that a washer that acts as a guide to keep the striker point in the centre of the body. The safety/arming pin is stamped out of and formed from heavy gauge sheet metal. It has a pin on one side with two wings protruding at 90 degrees from the pin. An eyelet formed in the centre will allow attachment of a trip wire.

When assembled, the striker and striker spring are pushed up from the bottom with the shaft of the striker fitting through the top of the body. As it is pushed up it compresses the striker spring. When the hole for the arming pin emerges from the body the arming pin is inserted to hold it in the cocked position. Another hole through the striker can be used to aid in the assembly.

To prepare the M42 for use, a detonator assembly containing a primer/percussion cap is screwed into the bottom. The armed firing device is then inserted in a box mine or a demolition charge. If used in a mine, the lid of the mine will straddle the striker shaft and engage the wings on the arming pin. Pressure applied to the lid of the mine will force the lid down pushing the arming pin out. If used as a pull device, a slack trip wire would be attached to the eyelet. Pressure on the wire will pull the arming pin out. When the pin is removed, the striker spring will reassert itself and drive the striker down into a percussion cap that fires into the detonator.

# **Bhārat Gaṇarājya**

**(Republic of India)**





## **Indian Boobytrap Mechanisms**

India's Ordnance Factory Board is known to have produced at least three different boobytrap mechanisms. All three are copies of British switches. Differences from the British mechanisms are unknown.

### **Switch, No. 4 Pull Mk. 1**

Weight— 1.25 oz. (35.44 g)  
Length— 3.75 in. (95.30 mm)  
Diameter— 0.44 in. (11.20 mm)

### **Switch, No. 5 Pressure Mk. 1**

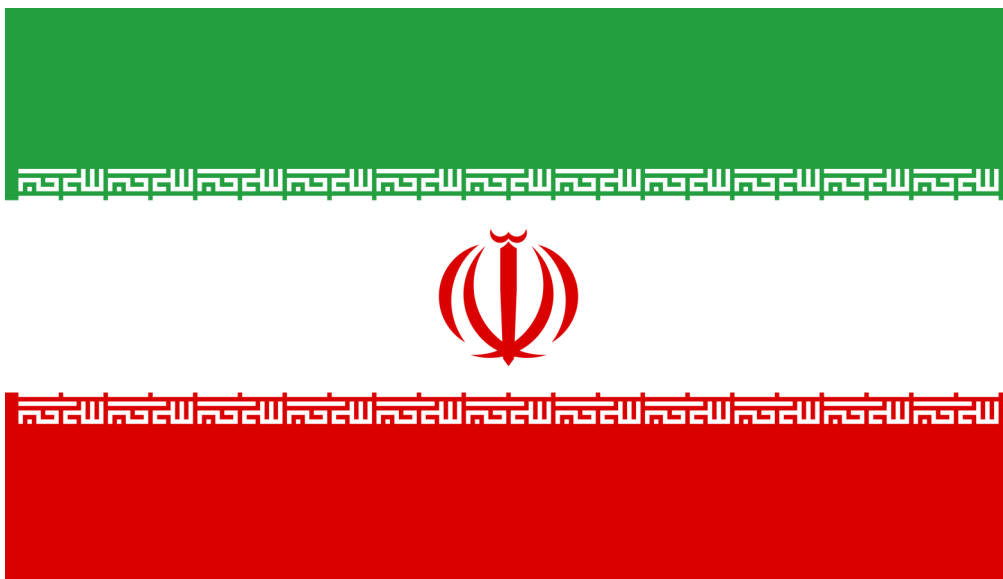
Length— 3.75 in. (95.30 mm)  
Width— 1.25 in. (31.8 mm)  
Height— .75 in. (19.1 mm)

### **Switch, No. 6 Release Mk. 1**

Weight— 3.5 oz. (99.23 g)  
Length— 4.53 in. (115 mm)  
Width— 0.63 in. (16 mm)  
Height— 0.56 in. (14.2 mm)

Details on the British switches may be found in "The Boobytrap Recognition Manual, Volume 1."

جمهوری اسلامی ایران  
(Islamic Republic of Iran)



## Iranian Boobytrap Mechanisms

The Iranian Defense Industries Organization (DIO), founded in 1987, is a conglomerate of companies run by the Iranian Government. It produces the majority of materiel for the Iranian Armed Forces. Among their products are the following copies of US boobytrap firing devices:

M1 Pull Firing Device

M1A1 Pressure Firing Device

M3 Pull/Tension-Release Firing Device

M5 Pressure-Release Firing Device

No other technical details are currently available.



*Photo - Defense Industries Organization (DIO) literature*

Type - Pressure

Length - 3.2 in. (83 mm)

Diameter - 0.5 in. (14 mm)

The No. 4 is a pressure fuze normally used in the Iranian copy of the Israeli No. 4 anti-personnel mine. However, it could be utilized in a slightly modified form as a boobytrap mechanism, either pull or pressure. Samples of the Iranian No. 4 have been encountered in Afghanistan.

The cylindrical body is made of brass with a reduced section (spigot) at the top end. The bottom is internally threaded to accept a primer holder or detonator assembly. The spigot on top has a hole for the striker and is slightly chamfered in toward the centre. A striker and striker spring are contained in the body. The striker has a head with a firing pin at the bottom and the shaft has two holes through it. The top hole is for the safety pin. The bottom hole fits a special arming pin. The arming pin is constructed of a sheet metal bracket bent at 90 degrees. The lower end of the bracket is cut out to fit around the spigot on the body. The pin itself is attached to the upper portion of the bracket. The pin has a shaft to fit through the hole in the striker and directly below that, a cone shaped washer that engages with the chamfered hole in the spigot.

When assembled the striker and spring are forced up from the bottom of the body until the shaft of the striker protrudes out far enough to fit the arming pin. The cone shaped washer engages in the chamfered hole preventing the pin from simply dropping out. The safety pin then ensures that the striker cannot travel far enough to hit the primer.

*No. 4 Firing Device*

When used in the Iranian No. 4 “shoebox” type of antipersonnel mine, the lid of the mine fits on either side of the spigot. When a weight is applied the lid forces down on the arming pin overcoming the resistance of the cone shaped washer. This forces the pin out of the striker releasing it to drive down under pressure from the striker spring to hit the primer and initiate the detonator and charge. If used as a trip device the arming pin can be replaced by a straight pin or can be used by itself. A trip wire can be attached to the pin so that pressure on the wire will draw the pin out.

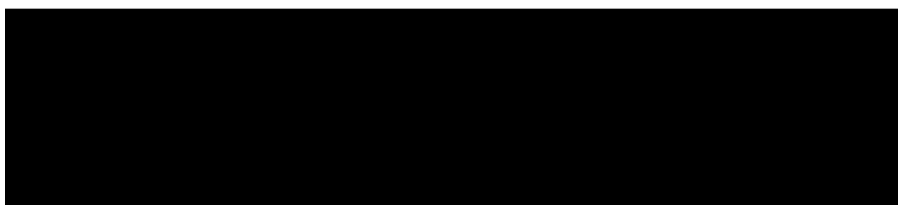




جُمْهُورِيَّةُ الْعِرَاقِ  
(Republic of Iraq)



الله أكبر



Type - Pull

Weight - 2.1 oz. (60 g)

Length - 3.8 in. (98 mm)

Diameter - 0.6 in. (16 mm)

The No. 4 is a pull-type firing device similar in appearance to the US M1 pull firing device, but operates differently. It also resembles the Belgian NR2144. It was manufactured for the Iraqi armed forces by the Portuguese company Sociedade Portuguesa de Explosivos, SA (SPE) and is a copy of their T252 firing device.



*Switch, No. 4*

The firing device is of aluminum construction. The main body is cylindrical with the interior divided into two chambers. There is a fastening lug cast onto the body about one third the way from the top. The lower chamber is internally threaded at the bottom end to accept a primer holder and contains the striker and striker spring. The striker has a head with firing pin on the bottom end and a groove around the top. The upper chamber has a small portion at the bottom and larger portion at top containing the striker release assembly. The release assembly consists of a shaft with a cup at the bottom end and a small ball bearing. There is a hole in the side of the cup to fit the bearing. A pull ring fits through a hole at the end of the shaft. A positive safety pin fits through the lower body just above the threading. The safety pin fits through the head and pull shaft at the top of the device. The No. 4 is normally painted olive green with markings in yellow giving the designation, manufacturer, and lot number.

When assembled, the striker and striker spring are inserted from the bottom with the striker shaft fitting through a hole between the upper and lower chambers. The striker is pushed up, compressing the spring, until the cup on the release assembly can fit over the end. The ball bearing is placed in the hole in the side of the cup and engages the groove in the striker shaft. The striker is allowed to move down, drawing the cup into the smaller portion of the upper chamber. The wall of the chamber holds the ball in place in the hole and groove preventing the striker from releasing.

To use the firing device, a primer holder with an attached detonator (blasting cap) is inserted into a mine or demolition charge. Both are then emplaced and camouflaged. A slack tripwire is then laid and attached to the pull ring on the No. 4. The two safety pins are removed to fully arm the device. When a pull of 7.7 lbs. (3.5 kg) is applied to the wire, it pulls the shaft of the release assembly outwards. This also pulls the striker up further compressing the spring. When the cup is pulled free of the small portion of the upper chamber, the ball can escape into the larger portion of the chamber. When the ball escapes the striker under pressure from the spring is driven down into the primer in the primer holder. The primer flashes into the detonator to fire the main charge.

Type - Pressure

Weight - 2.8 oz. (80 g)

Length - 3.3 in. (86 mm)

Width - 0.5 in. (12.7 mm)

Height - 1.1 in. (29mm)

The No. 5 is a pressure-type firing device that is almost identical to the US M1A1, as well as the Dutch Nr. 16, pressure firing devices. Its primary use is as a boobytrap. It was manufactured for the Iraqi armed forces by the Portuguese company Sociedade Portuguesa de Explosivos, SA (SPE) and is a modified copy of their T251 firing device.

The device consists of a body, spring-loaded pressure plunger, and a primer holder. It is tubular in shape with a flattened base for about half the length. Protruding from the base are three tabs used to fasten the device in place. A hole in the top of the body fits the pressure plunger. The pressure plunger has a flat top with a shaft on the bottom and a threaded hole in the top that accepts a permanently-mounted extension rod and three-pronged adapter. There is a keyhole in the lower portion of the shaft. The striker has a firing pin head at one end and a groove in the shaft at the opposite end.



*Switch, No. 5*

When assembled, the striker and spring are inserted into and pressed into the body so that the shaft of the striker passes through a small hole in the back that connects with the hole in the top of the body. The pressure plunger with spring are pushed down so the shaft of the striker fits through the large upper hole in the keyhole. Once the shaft of the striker has pushed through, the pressure head is released so that the small portion of the keyhole engages in the groove in the striker shaft. This holds the striker back in the cocked position. The safety is a collar that fits between the head of the pressure plunger and body, preventing it from being depressed. There is also a positive safety pin through the front part of the firing device body. The primer holder is similar to a US base coupler, but the threading is different.



*No. 5 Firing Device (disassembled)  
(Note the broken threads on the extension rod)  
Photo - G. Zahaczewsky*

To use the firing device, a primer holder with an attached detonator (blasting cap) is screwed into the end of the No. 5. The device is then attached to a demolition charge, and both are emplaced and camouflaged. The safety collar and then the positive safety are then carefully removed, preferably remotely. The No. 5 is then fully armed. A pressure in excess of 22 lbs. (10 kg) will force the pressure plunger down, which releases the spring-loaded striker assembly that initiates the percussion cap in the primer adapter. This, in turn, initiates the detonator and the attached demolition charge.

## Switch, Release, No. 6

Iraq

Type - Pressure-Release

Weight - 1.2 oz. (35 g)

Length - 4.2 in. (107 mm)

Width - 0.6 in. (16 mm)

The No. 6 is a pressure-release firing device intended for use as a boobytrap and very similar in appearance and function to the British No. 6 Mk I, as well as firing devices in at least eleven other countries. It was manufactured for the Iraqi armed forces by the Portuguese company Sociedade Portuguesa de Explosivos, SA (SPE) and is a copy of their T254 firing device.

The firing device consists of an aluminum alloy body threaded at one end to receive a primer holder. The other end has a flat tab so it can be inserted into narrow openings. A hole drilled in the tab enables the switch to be fastened in position. A steel pressure plate hinged at the threaded end fits over the body. The sear is hinged in a channel at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the shaft of the striker. The primer holder is similar to the US primer adapter, but threading is different.

The device is painted olive green with markings in yellow giving the designation, manufacturer, and year of manufacture.

To use the firing device, a primer holder with an attached detonator (blasting cap) is screwed into the end of the No. 6. The device is then inserted into a demolition charge, and both are emplaced and camouflaged. A weight of at least 3.3 lbs. (1.5 kg) is placed on top of the pressure plate. The safety pin is then carefully withdrawn, preferably remotely. The No. 6 is then fully armed. If the weight is removed the hinged pressure plate moves upward, releasing the firing pin to impact the percussion cap in the primer holder, which then initiates the attached detonator and demolition charge.



*Switch, No. 6*  
*Image - G. Zahaczewsky*



ישראל  
(Israel)



## Type - Pressure-Release

This device was manufactured prior to the establishment of the State of Israel. They were made in underground factories and were likely supplied to the Israeli Defense Forces (IDF) during the 1948-49 War of Independence and used until more official production of military equipment was established. It is a copy of the British No. 6 Mk. 1 release switch. It appears to be almost identical with the exception of the snout adapter. It is similar in appearance and function to pressure-release firing devices from at least eleven other countries.



Release Mechanism 104

The main body is rectangular and made from a solid block of metal. There is a small tab at one end with a hole through it so the device can be fixed in position. The other end is drilled out to form a channel for the striker and striker spring. The end is internally threaded to accept a fuse adapter. A small cutout on the upper side fits a rotating sear. The lid is formed from sheet metal to fit over the main body and is hinged at one end. The striker has a head with firing pin at one end and a notch to engage the sear at the other. A safety pin fits through a hole in the side of the body and a corresponding hole in the striker.

When assembled the striker and striker spring fit into the channel in the body. The striker is pushed in, compressing the spring, until the safety pin can be inserted. The striker is then positioned to engage the sear. When laid, the sear is rotated into position and the lid closed on top of it. A weight placed on top should fully press down the lid. The lid pushes down on the sear which pulls the striker back slightly and allows the safety pin to come out without resistance. If there is resistance it is not emplaced correctly.

When the weight is removed the pressure of the striker spring on the striker pushes against the sear causing it to rotate and push the lid up. Once the sear has rotated out of the way the striker is released and driven forward to strike the percussion cap that then either ignites a fuse or causes a detonator to fire.



Release mechanism 104 internal diagram (From Israeli manual)

**Type- Pressure**

This is the pressure igniter normally used with the Israeli No. 4 anti-personnel mine. It could be utilized in slightly modified form as a pull boobytrap mechanism. The Iranian No. 4 firing device is believed to be a copy of this igniter.

The body is cylindrical with a hole in the top for the striker shaft to fit through. The bottom is internally threaded to accept a primer holder or detonator assembly. A striker and striker spring are contained in the body. The striker has a head with firing pin at the bottom and the shaft has a groove around it near the top. There is a lead shear wire arming delay around the top of the shaft with the safety pin fitting through it and the striker shaft. The groove fits a special retaining plate. The retaining plate is constructed of sheet steel bent into shape. There is a slot in the centre that fits over the striker shaft and engages the groove.

When assembled the striker and spring are forced up from the bottom of the body until the shaft of the striker protrudes out far enough to fit the retaining plate on to hold the striker in the cocked position. The safety pin then ensures that the striker cannot travel far enough to hit the primer. All parts of the fuze are plated to resist corrosion.



*No. 4A Igniter*

When used in the Israeli No. 4 “shoebox” type anti-personnel mine, the lid fits on either side of the fuze. When weight is applied, the lid forces down on the retaining plate. This forces the plate down out of the groove in the striker shaft to release it to drive down under pressure from the striker spring to hit the primer and initiate the detonator and charge. If used as a boobytrap, a slack trip wire could be attached to the retaining plate so that pressure on the wire will draw the plate out.

Type - Pressure-Release

Length - 4.65 in. (118 mm)

Height - 0.78 in. (20 mm)

Height- 0.625 in. (16 mm)

This device is an Israeli manufactured device copied from the British No. 6, Mk. 1 release switch. At least eleven other countries have copied that firing device, possibly making it the most copied boobytrap mechanism. It is similar to and replaced the Israeli Release Mechanism 104.

The main body is rectangular and made from a solid block of metal. There is a small tab at one end with a slot. There are four tabs on the sides of the body that form small “feet” and have holes through them so the device can be fixed in position. The other end is drilled out to form a channel for the striker and striker spring. The end is internally threaded to accept a primer holder. A small cutout on the upper side fits a rotating sear. The lid is formed from sheet metal to fit over the main body and is hinged at one end. The end opposite the hinge has a hole through the tab. The striker has a head with firing pin at one end and a notch to engage the sear at the other. A safety pin fits through a hole in the side of the body and a corresponding hole in the striker.



Three views of Igniter No. 9 - side, top, and bottom

The device appears unpainted but likely has some type of protective coating. There are markings in black on the bottom of the body giving the designation and date of manufacture. Devices designated for training use are painted blue.

When assembled the striker and striker spring fit into the channel in the body with the notch facing up. The striker is pushed in, compressing the spring, until the safety pin can be inserted. The striker is then positioned to engage the sear. When laid, the sear is rotated into position and the lid closed on top of it. A weight placed on top should press the lid fully down. The lid pushes down on the sear which pulls the striker back slightly and allows the safety pin to come out without resistance. If there is resistance it is not emplaced correctly.

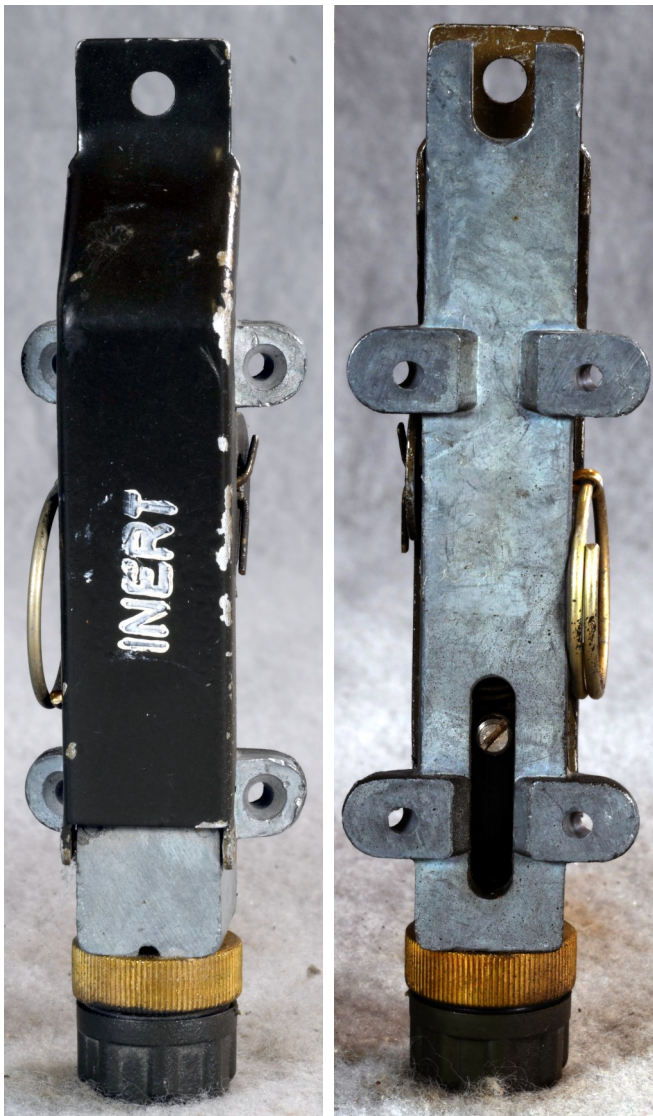
When the weight is removed the pressure of the striker spring on the striker pushes against the sear causing it to rotate and push the lid up. Once the sear has rotated out of the way the striker is released and driven forward under spring pressure to strike the percussion cap which then either ignites a fuse or causes a detonator to fire, whichever is fitted.





*Training Igniter No. 9 with primer holder fitted*

There appears to be a specially made training version of the No. 9. This device has a slot in the bottom with a set screw showing in the slot. It seems that this is a method so that the device may be reset easier and quicker than trying to reset an operational device. Presumably the set screw is attached to the striker, preventing its loss, and allowing a tool of some type to be used to push it back against the striker spring so the safety pin can be put in, in effect resetting the device so it will operate as normal for training.



*Top and bottom view of the training model of the No. 9 Igniter. (Note the slot showing in the bottom.)*

## Igniter No. 10

Israel

Type - Pressure

Length - 3.54 in. (90 mm)

Height - 2.68 in. (68 mm)

This is an Israeli-manufactured pressure activated firing device.

The main body is a casting incorporating a heavy base with a cylindrical body tube on top. There is a socket cast onto the main body tube. The main body contains a striker and striker spring and is internally threaded at the end to accept a primer holder. The striker has a head with firing pin and at the opposite end a groove is cut into the shaft. The socket is designed for the pressure head. The socket is drilled out from the bottom to form a chamber and has a smaller diameter hole through the top. The bottom of the chamber is threaded to fit a closing plug. The pressure plunger is made from a rod turned down to fit the chamber and the upper end turned down to fit through the smaller hole at the top of the chamber. A



*Igniter No. 10*

A pressure plate is attached to the top. The larger base has a keyhole cut into it. There is also a plunger spring and closing plug. The safety pin fits through a hole in the plunger shaft.

The device is normally painted green with white markings indicating designation and lot number.

When assembled, the plunger is put into the chamber and the striker and striker spring are put into the main body. The striker is pushed in compressing the spring and ensuring the shaft fits through the keyhole in the plunger. The groove in the striker shaft engages with the keyhole to hold the striker in a cocked condition. Finally, the plunger spring is inserted and the closing plug screwed into the bottom of the device. Screwing the plug in will slightly compress the spring that presses against the plunger to hold it at the top of the chamber. The safety pin ensures the plunger cannot move down to release the striker.

After being laid and the safety pin removed, a pressure applied to the pressure head will force the plunger down against the pressure of its spring. As it moves down the keyhole disengages from the groove in the striker shaft. Once released the striker spring drives the striker into the primer.



*Packaging for Training Igniter No 10.*



Type - Pressure/Pull

Length - 3.75 in. (96 mm)

Diameter - 0.75 in. (19 mm)

This firing device is designed for pressure or pull operation. It is manufactured by Israeli Military Industries (IMI).

The device has a cylindrical brass body. The main body has a lip at the top end and an externally threaded primer holder at the other. The body contains a striker and striker spring. The striker has a head with firing pin at the bottom end and the top end has a groove turned into it and a hole for the safety pin. A firing head is located on top of the device. The firing head has a small pressure head on top attached to a hollow socket. The side of the socket has an inclined slot in the side and a small hole opposite the slot. The safety pin hole is slightly higher and at 90 degrees to the other hole. There is an activating fork attached to a small ring. The safety pin has a larger ring.

The device is unpainted but markings in black on the side provide the designation and lot number of the device.

When assembled, the striker is pushed up in the body compressing the striker spring. The grooved shaft fits up into the pressure head and the activation fork inserted through the pressure head. The activation fork fits with one fork through the small hole and the other in the inclined slot engaging the slot in the striker. This holds the striker in a cocked condition. The safety pin fits through to ensure the device cannot activate.

For use as a pull device, it is laid in place with a slack trip wire attached to the small ring on the activation fork. When the safety pin is removed and a pressure applied to the trip wire it will pull the activation fork out and release the striker. The striker spring reasserts itself and drives the striker down onto the primer.

For use as a pressure device, the device is attached to a demolition charge, emplaced, and the safety pin is removed. When pressure is applied to the device, it forces down on the pressure head which moves down into the body. As the pressure head moves down the inclined slot causes the fork to split apart to release the striker. The striker spring then reasserts itself and drives the striker down onto the primer.



*Igniter No. II*  
*Photo - J. Vollenberg*

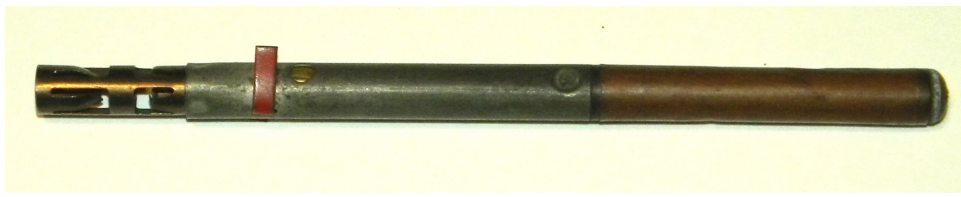
Type - Delay

Weight - 1 oz. (28.5 g)

Length - 5.1 in. (129 mm)

Diameter - 0.3 in. (7.6 mm)

This delay firing device appears to be the same as the British No. 10, Mk I delay switch. Whether it is in fact a British manufactured device or Israeli manufactured is uncertain at this time.

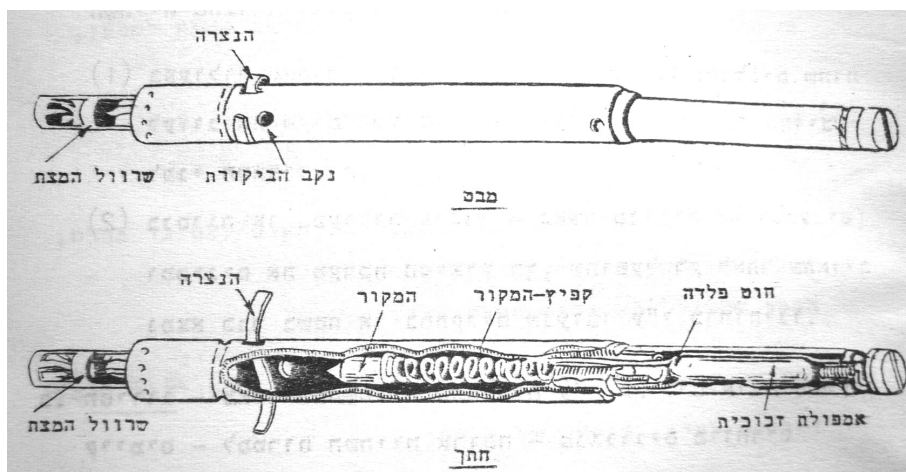


*Igniter No. 12 (British No. 10 Mk. 1)*

The device is of the chemical delay type. It consists of a two-part cylindrical case, the upper section being copper, and the lower section brass. A spring snout with percussion cap is attached at the bottom end. The lower section contains a spring-loaded striker held in the cocked position by a wire running from the striker through the top section to a retaining screw at the top. There is an inspection hole drilled through the lower end of the bottom section. Below the inspection hole is a rectangular hole to fit a safety strip. The top end contains a glass ampoule containing a corrosive liquid (Cupric Chloride) and two pieces of cotton wicking. The top portion of the igniter is sealed by plugs and by a lead washer on the retaining screw.

The safety strip is colour coded according to the nominal delay of the igniter. The delay times are affected by ambient temperatures. No further information is currently available regarding safety strip colours and associated delay times.

When the device is to be used, either a detonator can be fitted to the spring snout or a piece of safety fuse. Before use the igniter must be examined by looking through the inspection hole to ensure the striker is still held in position. If not, the igniter is discarded. When emplaced the upper copper portion of the casing is crushed from both sides causing the glass ampoule to break and release the corrosive liquid. The corrosive liquid acts on the retaining wire eventually weakening it enough to break under the pressure of the striker spring. When the wire breaks, the striker, under pressure from the striker spring is forced down into the percussion cap. The percussion cap fires igniting either the safety fuse or detonator.



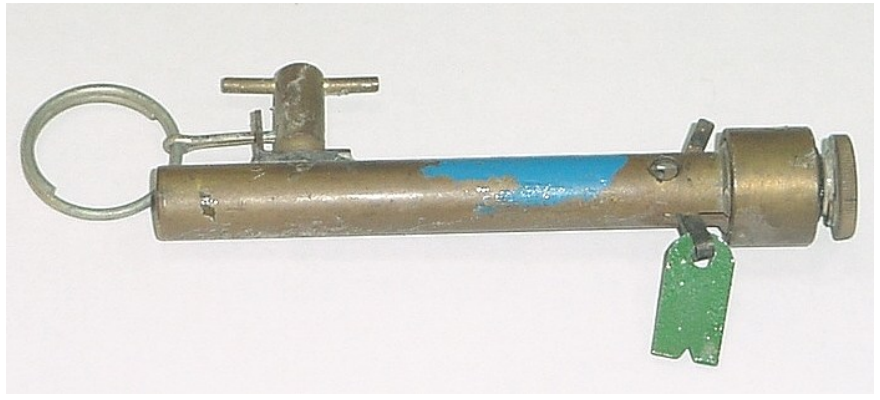
*Igniter No. 12  
Image - from Israeli manual*



Type - Delay

This chemical delay firing device was produced in limited numbers in the 1960's. There were only a few thousand units produced. It was used for sabotage operations behind enemy lines.

The main body is a brass cylinder with a closed end. There is a larger section at the opposite end internally threaded to accept a detonator assembly. In storage or transit the end is closed by a screw cap. At the other end there is a



Igniter No. 13  
Photo - Z. Livni

small "L" bracket attached that has an operating screw through it into the main body. The operating screw is a piece of brass rod turned down and threaded at the bottom with a rod through the top end to give leverage for screwing it down. A safety pin fits through a hole in the bracket and a hole in the operating screw. In transit the operating screw is unscrewed enough so it doesn't protrude into the main body. The safety pin ensures it cannot be screwed down. There is a positive safety strip through the main body just in front of the detonator socket. In fact, the body contains a No. 12 igniter. The outer casing was designed to strengthen the original device and prevent damage during storage or transportation. The operating screw served as a more positive and efficient method of crushing the glass ampoule in the No. 12 igniter that contained a corrosive liquid. A coloured tag on the safety strip indicated the nominal delay time. As with the No. 12 igniter, the delay times are affected by ambient temperature. No further information is currently available regarding safety strip colours and associated delay times.

For use, the device is prepared by removing the cap in the detonator socket and screwing in a detonator assembly. The safety cap is removed and the device inserted in an explosive charge. When ready to initiate the delay, the safety pin must be removed and the operating screw turned fully down. This will penetrate the main body and crush the ampoule of acid. The positive safety would then be removed. The acid will begin to weaken the thin wire. When the delay period ends the striker spring will eventually break the weakened wire and drive the striker forward into the detonator assembly.

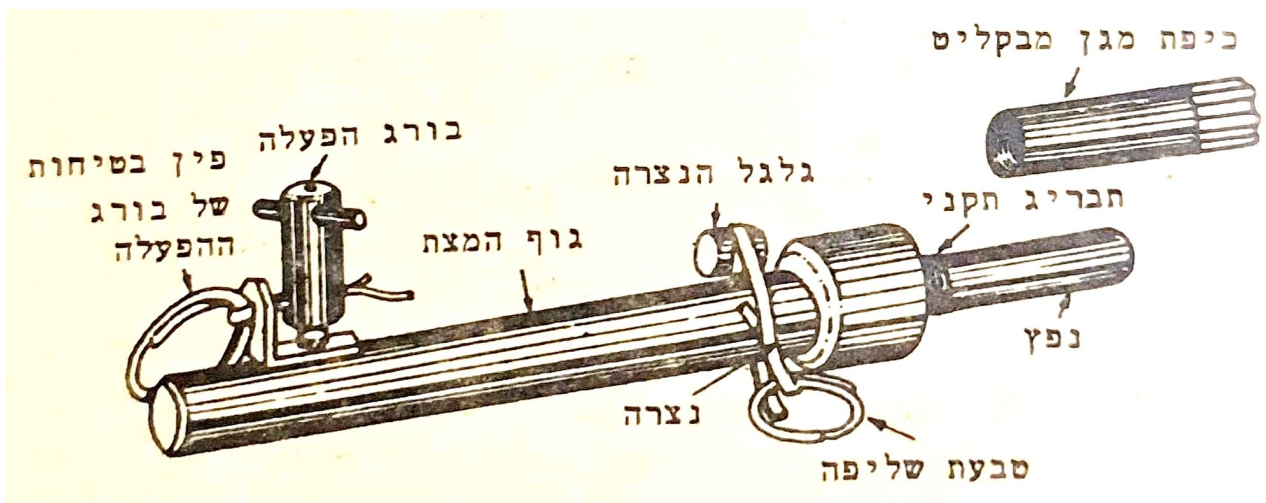


Diagram from Israeli manual

Type - Tilt

Width - 1.5 in. (38 mm) (Bracket)

Diameter - 1.25 in. (31.5 mm)

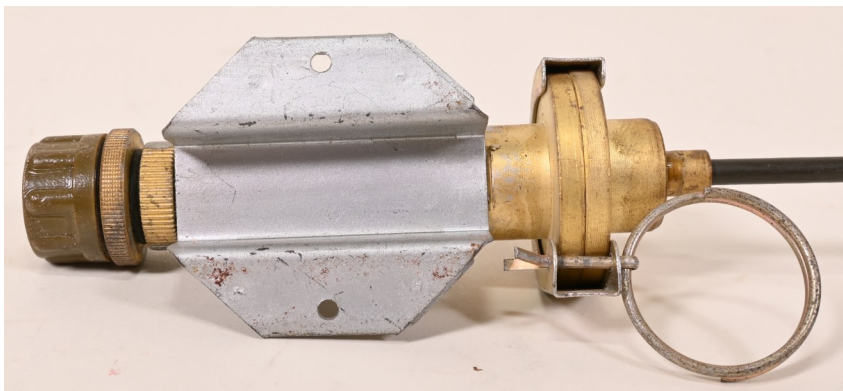
Height - 3.6 in. (92 mm) (Mech)

7.8 in. (200 mm) (Rod)

This device can be emplaced anywhere that allows the tilt rod to be concealed but still allow activation. A trip wire can be attached to the tilt rod, if required.



The main body is a brass cylinder with a threaded adapter on the bottom end. The upper end is fitted with the activation head. The body contains a striker and striker spring. The striker has a head with firing pin on the bottom and there is a groove at the top end. A sheet metal mounting bracket is fitted around the middle of the body. The activation head consists of a base, top, safety ring, and tilt rod. The base is attached to the top of the body. The upper surface has a depression in the centre and a hole for the striker in the centre of the depression. A groove for a washer surrounds the depression. The top has a stud on the bottom to match the depression in the base. The stud is hollow but has an inclined surface flange at the bottom. The upper side of the top has a socket for the tilt rod.



*Igniter No. 15, side and bottom views  
Photo - J. Vollenberg*

When assembled, the striker is pushed up in the body to compress the spring and force the striker head up into the depression. The top is then placed on with the stud fitting into the depression and turned so the inclined flange engages the groove in the striker to hold it in place. The safety ring fits over the edge of the base and top to hold them together. A safety pin fits through one end of the ring so it cannot be removed. The tilt rod is inserted in the socket.

When assembled, the striker is pushed up in the body to compress the spring and force the striker head up into the depression. The top is then placed on with the stud fitting into the depression and turned so the inclined flange engages the groove in the striker to hold it in place. The safety ring fits over the edge of the base and top to hold them together. A safety pin fits through one end of the ring so it cannot be removed. The tilt rod is inserted in the socket.

For use, a detonator assembly is screwed into the base and the device and charge are emplaced, ensuring the device is firm. When the safety pin is removed the safety ring can be removed, which arms the device. At this point the striker engaged with the inclined flange hold the device together. When pressure is applied to the tilt rod it will cause the top to tilt pulling on the striker, which will disengage from the inclined flange. Once disengaged the striker will drive down onto the primer initiating the explosive train.



*Igniter No. 15  
Photo - J. Vollenberg*



Type - Pull

Length - 3.5 in. (88 mm)

Diameter - 0.75 in. (19 mm)

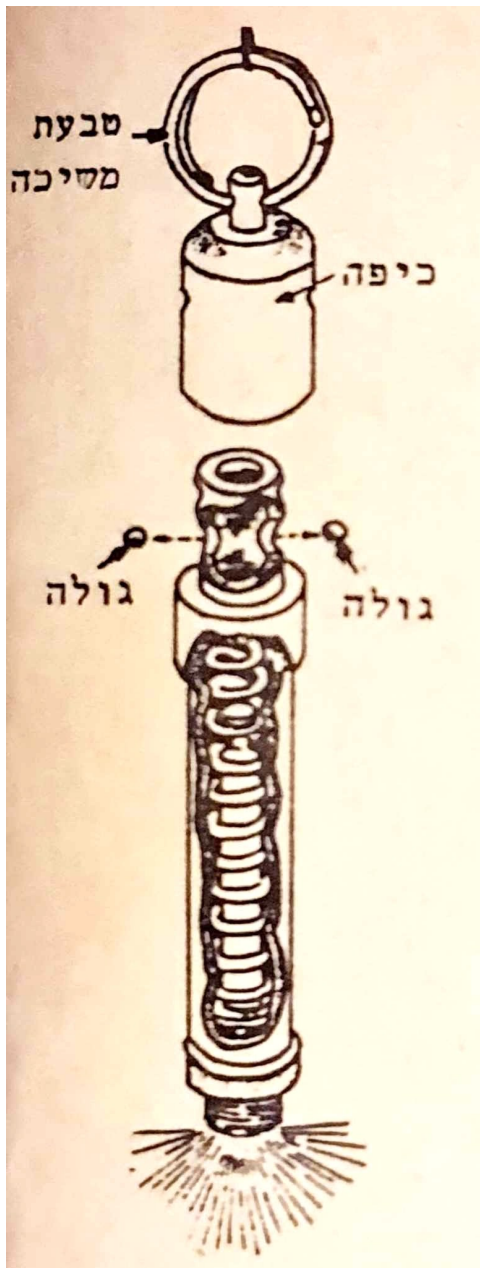
This pull firing device closely resembles the British "Switch, No. 1, Pull, Mk. 1", but operates on a different principle.

The main body is a brass cylinder with internal threading on the bottom end to fit a primer holder and external threading at the top to fit a head. The head has a thicker band and a hollow spigot on top. The spigot has two holes opposite each other to fit retaining balls. Above those holes are holes to fit the safety pin.

A cap fits over the top of the body and has a pull ring attached to the top. The body contains a striker and striker spring. The striker has a head with firing pin at the bottom end and a groove around the top end.

When assembled, the striker and striker spring fit up through the body with the shaft of the striker fitting through the spigot compressing the striker spring. There are two retaining balls (ball bearings) that fit through the holes in the spigot and engage the groove in the striker. The cap fits over the top holding the balls in to hold the striker in the cocked position. A safety pin fits through the cap and the holes in the spigot to prevent removal. A primer holder with percussion cap fitted screws into the bottom of the body.

When the safety pin is removed the device is armed. An axial pull on the top cap will pull it off the body and release the retaining balls. The striker spring will begin to reassert itself, forcing the retaining ball outwards releasing the striker. The striker will be driven downwards by the striker spring to hit the percussion cap.



No. 16 Igniter (operation)  
Image - from Israeli manual



Igniter No 16  
Photo - J. Vollenberg

**Type- Pull**

This is a fuse lighter that remained in IDF service from the 1960's to the early 2000's. It has since been withdrawn from service due to safety concerns and has been replaced by US M60 and M81 fuse lighters.

It is a simple pull friction lighter. The safety fuse is inserted in the top end until it stops. To activate the lighter, grasp the red plastic handle and give it a sharp tug. This draws a friction wire through a friction compound that will flash down onto the fuse to ignite it.

The top end is normally protected by a cardboard tube. The bottom end is olive green and the pull tab is red plastic. No other markings have been noted.

No other technical details are currently available.



*Igniter No. 17*  
*Photo- Ziv Livni*



## Demolition Igniter No. 41

Israel

Type - Pull-Delay

Length - 6.25in. (158 mm)

Diameter - 0.9 in. (22 mm)

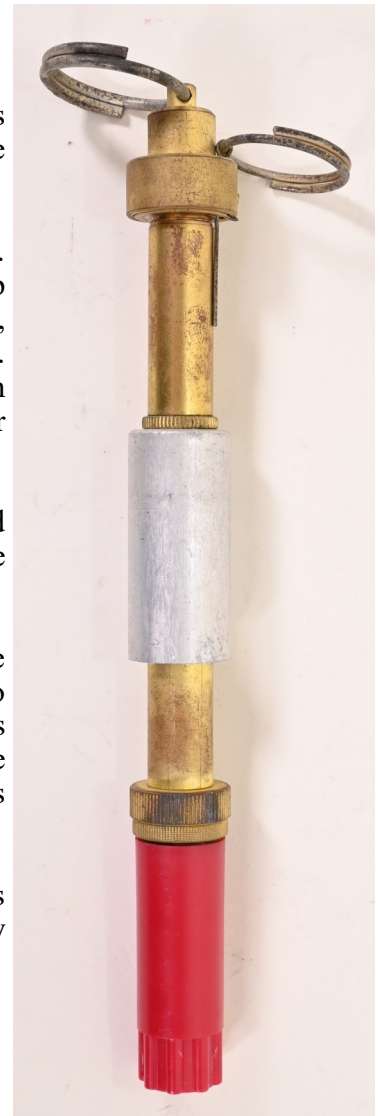
This device was initially designed to ignite Bangalore torpedoes and has since been expanded to other functions. The No. 41 was produced by the Israeli Military Industries (IMI).

The device has a cylindrical brass body. At the top end there is a pull ring. Just below the top is a mechanism with a safety pin fitting through the lip in line with the body. The body contains a striker, striker spring, primer, and delay element. There is a shield over the centre portion of the body. The bottom end has an adapter attached so that a detonator assembly can be screwed in. There is a red plastic protective cap covering the detonator in storage and transport.

The operational device has a brass coloured body with a silver coloured shield in the centre of the body. Markings on the shield in black provide the designation, lot number and manufacturer.

The device is initiated by first pulling the safety pin out to fully arm the device. When the pull ring on the end is pulled, it releases the striker into the primer. When the primer fires it ignites the delay element that provides a 17.5 second delay. Once the delay expires, the primer flashes into the detonator causing it to fire. The detonator initiates whatever charge it has been attached to.

There is a practice version of the device which is also made of brass. It is coloured blue with markings stamped into the centre section of the body and coloured in black. The protective cap over the detonator is also blue.



*Demolition Igniter No. 41*  
*Photo - J. Vollenberg*



*Demolition Igniter No. 41, Practice*  
*Photo - Z. Livni*

# ITALIA

(Italy)



## Chemical Delay Igniter

Italy

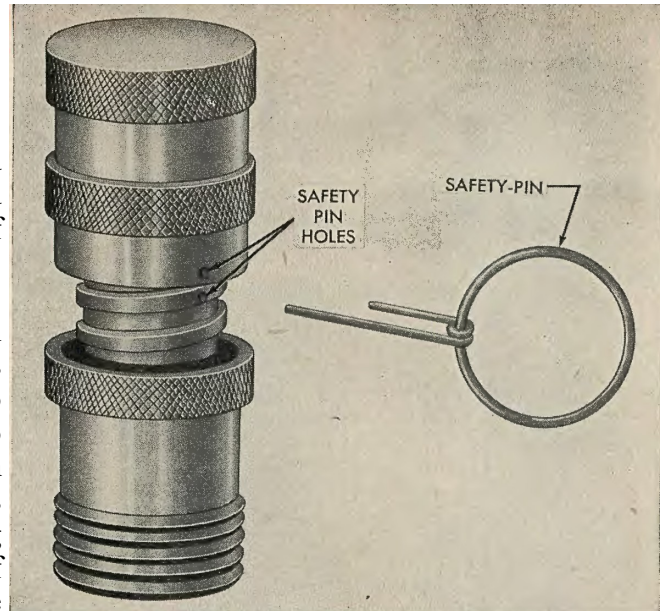
Type - Delay

Length - 2.4 in. (61 mm)

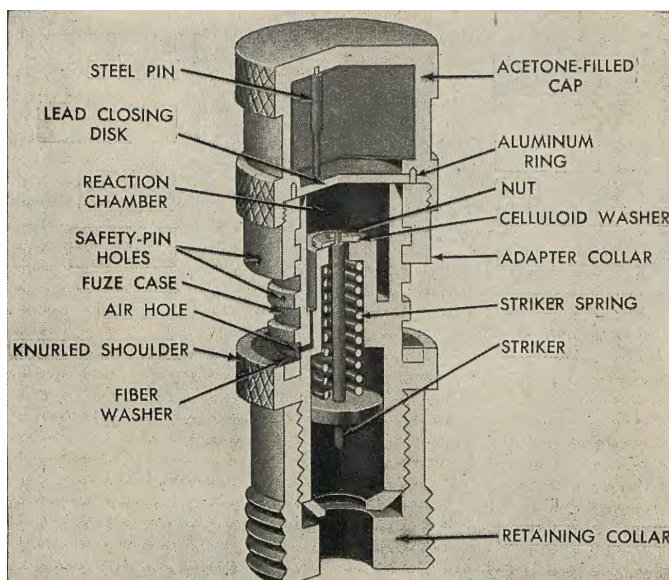
Diameter - 1.0 in. (26 mm)

The official designation of this device is unknown. This firing device is of the delay, chemical type and contains a spring-loaded striker with a celluloid washer. It used for the delayed detonation of demolition charges.

The body is made from a light aluminum alloy in three main sections. The main section ( centre) has a large pitch square thread on the outer surface to accept an adapter collar. Internally, it has two chambers, one at the top and one at the bottom connected by a channel for the striker. The striker is held in the striker channel, with the striker spring compressed by celluloid discs and a nut at the top of the striker shaft. There is a small air escape hole leading from the upper chamber to a point below the threads. A hollow stud on the bottom is threaded to accept a retaining collar. The top section is the cap made of two main pieces. The upper piece is a closed end cup threaded at the bottom with an internal lip at the top of the threading. A steel piercing pin is mounted off centre in the cap. The adapter collar is externally threaded to fit the cap and internally has a large square threading to match the main body section. The cap is filled with acetone sealed in by a lead disc and aluminum ring held in place by the bottom piece being screwed tightly onto the lip. The bottom section of the body is a retaining collar internally threaded to fit the bottom stud and externally threaded to fit demolition charges. A percussion cap and detonator assembly is held to the base of the fuze by the retaining collar. A double-pronged safety pin is inserted in the adapter collar and the fuze case. The colour of the square threads denotes the delay period. Unpainted threads indicate a 1-hour-and-45-minute delay, gray threads a 2-hour-and-20-minute delay, and red threads a 3-hour delay. These threads are not visible when the device is armed.



*Chemical Delay Igniter  
Image - US Department of Defense*



*Chemical Delay Igniter  
Image - US Department of Defense*

To use the device, the safety pin is withdrawn. When ready to initiate the delay, the item must be turned on its side with the air escape hole upwards. The cap is then screwed down using the large square threading. As the cap screws down it brings the lead disc in contact with the steel pin mounted in the upper cap. The pin cuts through the lead to allow the acetone to escape into the centre section and come into contact with the celluloid discs. The cap must be fully screwed down to cover and seal the air escape hole to prevent the acetone leaking out. A detonator assembly is screwed into the bottom of the igniter. The device can then be inserted in the charge. The acetone will weaken the celluloid discs until they are overcome by the striker spring, which then drives the striker into the detonator assembly and initiates the main charge.

## DA 40 and DA 60 Detonators (Miccia DA 40, DA 60)

Italy

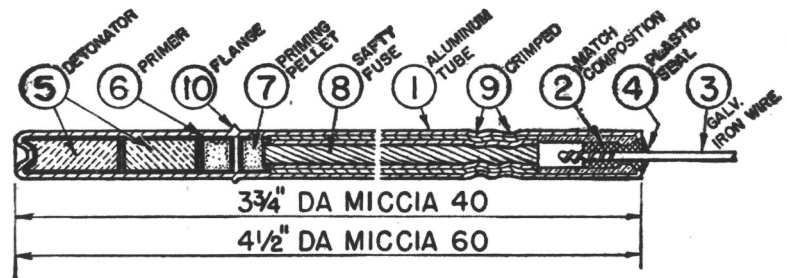
Type - Pull

Length - 3.75 in. (95 mm) - DA 40

4.5 in. (114 mm) - DA 60

Diameter - 0.25 in (6.5 mm)

These are pull-friction igniters with detonators that are used when a short delay is required. The DA 40 gives a delay of 10 seconds, the DA 60 a delay of 15 seconds.



The devices are closed-end aluminum tubes with a flange near the closed end designed to provide a resistance to pull. The tube contains a detonator filling at the closed end, a primer, a priming pellet followed by a small piece of safety fuse that is crimped in near the open end. The open end has a small block of match compound with a galvanized iron wire running through it. The end of the wire is coated to create friction as it is withdrawn. The end is sealed by a plastic compound.

*DA 40 and DA 60 Detonators*

To use the devices, the detonator end is inserted into an explosive charge. When a sharp tug or pull on the wire draws the wire through the match compound, it ignites it. The match compound ignites the safety fuse, which burns down to the priming compound and ignites that. The priming compound initiates the primer, which causes the detonator to fire and in turn initiates the main explosive charge.



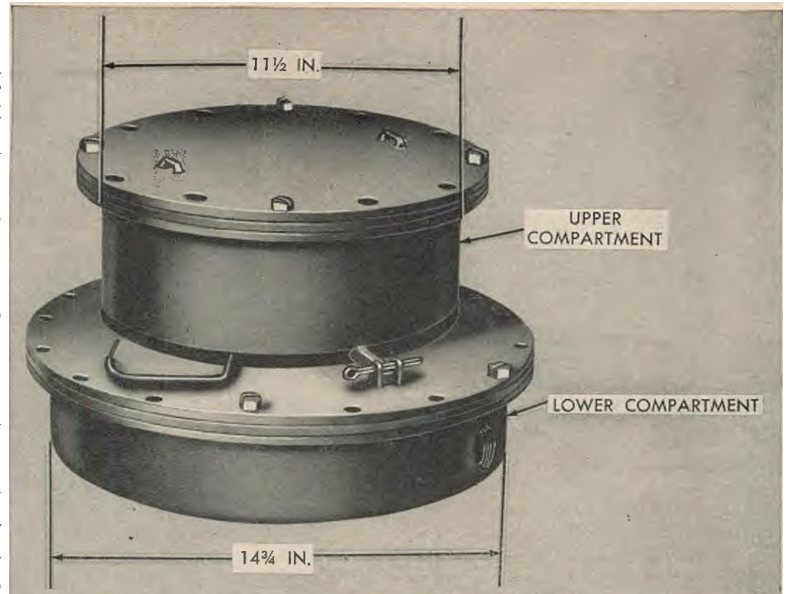
## Naval Firing Device

Italy

### Type - Delay

The official designation of this device is unknown. This is a clockwork delay firing device with an electrical contact circuit closer and an integral booster and main charge. The primary use of this device was to fuze depth charges that were used to destroy port facilities.

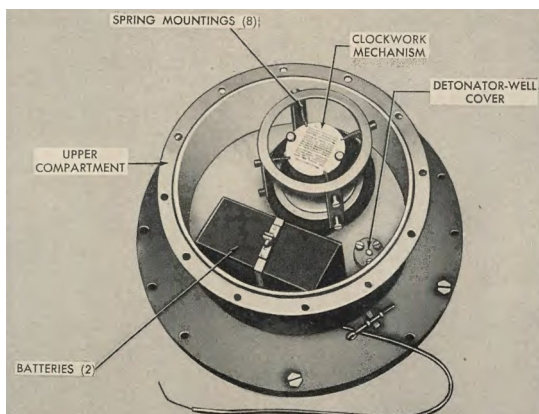
The device is divided into two compartments. The upper compartment, which is 11.5 in. (29.2 cm) in diameter, contains an electric clockwork mechanism that can be set for a delay of up to 50 days, two batteries; and the actuating mechanism consisting of a time-setting disk with a recess at the 50 mark, a lever arm with a metal pointer along one side, and two contacts wired into a series circuit with the batteries and an electric detonator. One contact is fixed in place the other is attached to one end of the lever arm. The opposite end of the lever arm is hinged. The metal pointer, which is near the hinged end, is made to bear against the time-setting disk by an actuating spring fastened to the lever arm near the contact end. The lower compartment, 14.75 in. (37.4 cm) in diameter, contains the electric detonator, a booster charge, and a main charge of 28 lbs. (13 kg) of explosives.



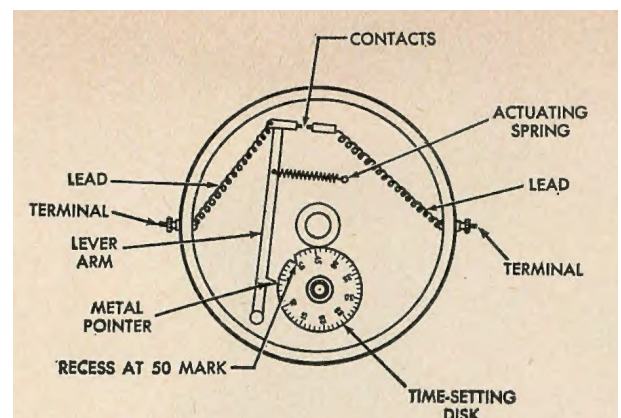
*Naval Clockwork Delay Device  
Image - US Department of Defense*

To use the firing device, the upper compartment cover is removed and two batteries, as well as an electric detonator, are installed. The clockwork mechanism is then set for the desired delay time (measured in days) by turning the time-setting disk until the metal pointer is opposite the appropriate mark. The terminals of the clockwork mechanism are connected in series with the batteries and the electric detonator. The compartment cover is then relaced. The device is now armed and functioning.

As viewed from above, the time-setting disk rotates with the clockwork mechanism in a counterclockwise direction. When the recess at the 50 mark reaches the metal pointer, the actuating spring pulls the pointer into the recess, pivoting the lever arm about the hinged end and bringing the contacts together, closing the circuit and firing the electric detonator, the booster charge, and the main charge.



*Naval Clockwork Delay Device  
Image - US Department of Defense*



*Activating Mechanism  
Image - US Department of Defense*

## P 1 (Pressione 1)

Italy

Type - Pressure

This is an Italian copy of the British No. 5, Mk. I pressure switch. It is virtually identical in appearance, operation, and use to the British switch.

The firing device consists of a steel case with a hinged steel lid fitting inside the case. An alloy body is fixed inside the case by a countersunk bolt. The end of the body is threaded to accept a brass bushing. There are two holes in the bottom of the case for use in securing the device. Two studs on the bottom of the case keep the sear springs in position. The lid has a centre threaded hole for an extension rod. The striker is formed with a shoulder and firing pin on one end and a detent on the other. The sear is made of steel and has two riveted studs 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.

The extension rod is made in two parts - a brass socket that screws into the top of the lid, and a steel rod that screws into the socket. The rod is adjustable in height by about 1 in. (25 mm) 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. The extension differs from its British counterpart in the knurling on top of the brass socket. British versions have knurling in a diamond pattern whereas the Italian knurling is only in one direction.

The devices are painted dark green. Other markings are unknown.



*P 1 Firing Device*

When the P-1 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 holes in the side of the body to make the device safe. Once assembled, the bushing is removed to insert a "Percussion detonator, Model OTO" into the bushing and is then screwed back in to hold it in position.



The pressure necessary to function the device varies with where the pressure is applied on the lid. When pressure is applied to the device, the lid presses down on the sear. When 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 strikes the percussion cap and initiates the charge.

*End of P 1 device showing bushing*

## PMC 43 Fuze

Italy

Type - Pressure

Diameter - 1.2 in. (30 mm)

Height - 1.4 in. (35 mm)

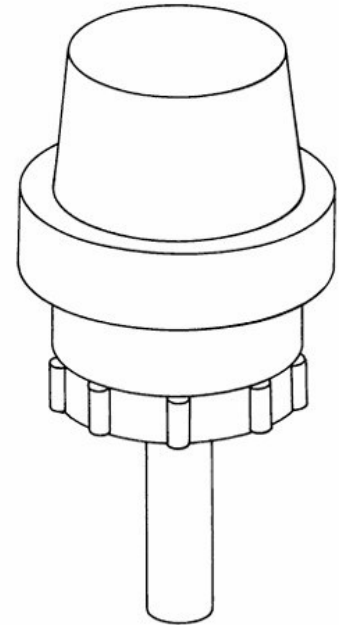
The PMC 43 is a pressure-activated fuze that is an integral part of non-metallic, undetectable mines or demolition charges. It is undetectable by electronic methods, the only metallic parts being the striker point and the aluminum detonator tube.

It consists of a Bakelite plastic body, pressure head, plunger, striker (firing) pin, plunger guide, and a detonator retaining ring.

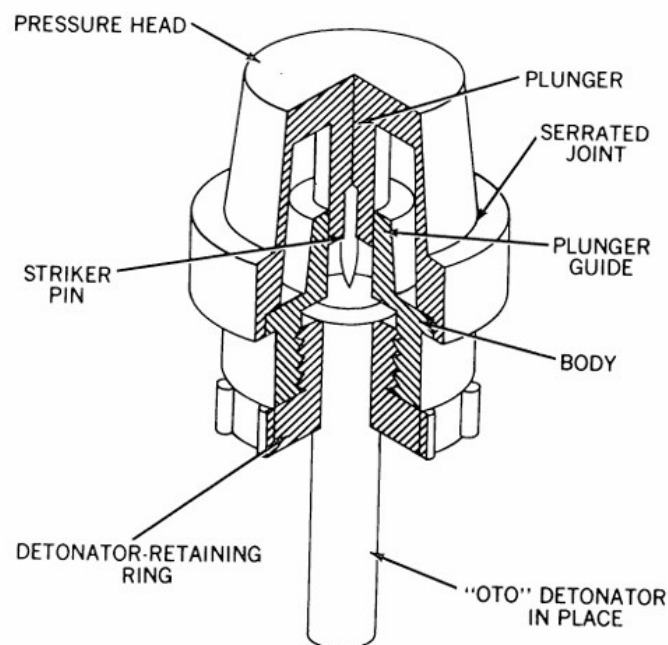
To use the PMC 43, a demolition charge or improvised mine is emplaced. The detonator retaining ring is unscrewed and an "OTO" detonator assembly inserted. The assembly is screwed back in and the device is then inserted into the mine or demolition charge. Once armed the mine is covered or camouflaged.

The PMC 43 is initiated when pressure is applied to the top of the device. This ruptures the serrated joint of the fuze and forces the striker into the detonator assembly initiating the detonator and in turn the main charge.

Note: some references state the operating pressure is 30 lbs. (13.6 kg). Other references state the operating pressure is 220 lbs. (100 kg).



*PMC 43 Fuze  
Image - US Department of Defense*



*PMC 43 Fuze  
Image - US Department of Defense*

## R and Rm Fuzes

Italy

Country - Italy

Type - Pressure/Pull

Length - 2.6 in. (65 mm)

Diameter - 0.6 in. (15 mm)

The R fuze was primarily used with the Italian Model R or Model V anti-personnel mines. It could also be used in improvised mines or boobytraps.

The body is a metal cylinder with a collar around the top end. The bottom end is internally threaded to take a brass bushing. A striker and striker spring are contained within the body with the shaft of the striker protruding out the top. The striker has a head with firing pin at the bottom end and three holes through the shaft at the opposite end. The top hole has a large pull ring (cocking ring) and the bottom one is for the arming pin. The arming pin is T-shaped. The brass bushing at the bottom of the body allows attachment of a Model "OTO" percussion detonator assembly.

When assembled at the factory, the striker and striker spring are inserted into the body and pushed up, slightly compressing the spring, until the arming pin can be inserted into the middle hole in the striker shaft and the cocking ring is installed in the top hole.

To prepare the R fuze for use, the cocking ring is pulled until the lowest hole in the striker shaft appears, compressing the striker spring. The T-shaped arming pin is then moved from the centre hole to the lowest hole. The cocking ring is then removed from the uppermost hole and inserted into the middle hole to act as a safety pin. The brass bushing is then unscrewed, an "OTO" detonator is inserted, and the ring screwed back on. The firing device is then inserted into the mine or demolition charge. The final step is to remove the cocking ring from the middle hole.

If used in a mine, the striker retaining pin is pushed out by pressure on the lid of the mine. If used as a pull device, a trip slack wire can be attached to the striker retaining pin and pressure on the wire will pull the pin. When the retaining pin is removed the striker is released and is driven down under pressure from the striker spring to strike the percussion cap in the detonator assembly. The percussion cap fires and causes the detonator to initiate any explosive charge it is inserted in. The operating pressure of this device is 4.4 - 6.6 lbs. (2 - 3 kg).

The Rm fuze is similar to the R fuze except it is normally used with Rm anti-personnel mines. It can be identified by the two collars around the body to help in positioning the device within the mine. There is also a ring on the striker retaining pin to attach a trip wire. In all other respects it is identical.



*R Fuze*



**RP 1**  
**(Rilascio di Pressione 1)**

Italy

Type - Pressure-Release  
Weight - 1.5 oz. (42.5 g)  
Length - 3 in. (76 mm)  
Width - 2 in. (51 mm)  
Height - 0.6 in. (15 mm)

The RP 1 was adopted shortly after the Second World War and is a direct copy of the British No. 3, Mk. 1 release switch. It may be Italian made or it might simply be a device supplied to Italy from British stocks. It is also similar in appearance and function to the Yugoslav UPP.

The device resembles a small open ended box with a hinged lid. The main casing is constructed of sheet steel and has a lid, hinged on the long side of the box. There are two tabs in the body, one in the bottom that is rectangular and bent up to form an anchor bracket for the safety pin. The other is in the lid and has an angled side forming part of the release mechanism of the device.

There is a hole drilled through the base to allow it to be screwed or nailed in position. A strong leaf spring with a hammer head mounted on the free end is attached on the side opposite the hinge. An additional half-length leaf spring is attached on top to provide a stronger spring. The springs are retained in position by two small bolts that screw into a small rectangular plate over the end of the springs. The hammer head attached to the end of the longer spring has a large hole drilled through the head to correspond with a hole in the side of the case and a hole in the anchor tab. The safety pin fits through the case, the hammer head, and finally the tab to retain it in the cocked position. The opposite end of the box has a hole to accept the detonator assembly. A short piece of spring steel with a striker is riveted in position so that the striker is positioned over the hole where the percussion cap of the "Model OTO percussion detonator" would sit. This piece also serves to keep the detonator assembly in position after it is fitted.



*RP 1 Firing Device*

To use the RP 1, it must be set by drawing back on the hammer head until the safety pin can be inserted to retain it in the cocked position. At this point the pressure placed on the safety pin makes it very difficult to remove. A detonator assembly is then inserted in the hole at the end of the box under the firing pin. The device is placed in position and the charge attached. An object weighing at least 1.5 lbs. (0.7 kg) is then placed on the top of the lid. This forces the lid closed, which causes the inclined tab on the lid to push the spring back slightly. This action removes pressure from the safety pin allowing it to be easily removed. When removing the safety pin, if there is any resistance, the device is not laid properly and must be reset. If the safety pin comes out without resistance, it is laid correctly.

Once the device is laid, if the restraining weight is removed, the cocked hammer will push against the inclined surface on the tab in the lid. This will force the lid up until the striker is released. The hammer head will fly forward under pressure of the spring until it hits the striker, which then impacts the percussion cap. The cap then initiates the detonator.

**RP 2**  
**(Rilascio di Pressione 2)**

Italy

Type - Pressure-Release

In the post Second World War era, Italy used several firing devices that were developed from British switches. The RP 2 was developed from the British No. 6, Mk. I release switch. It is a pressure-release firing device used in boobytraps similar in appearance and function to other devices copied from the British switch by at least eleven other countries.

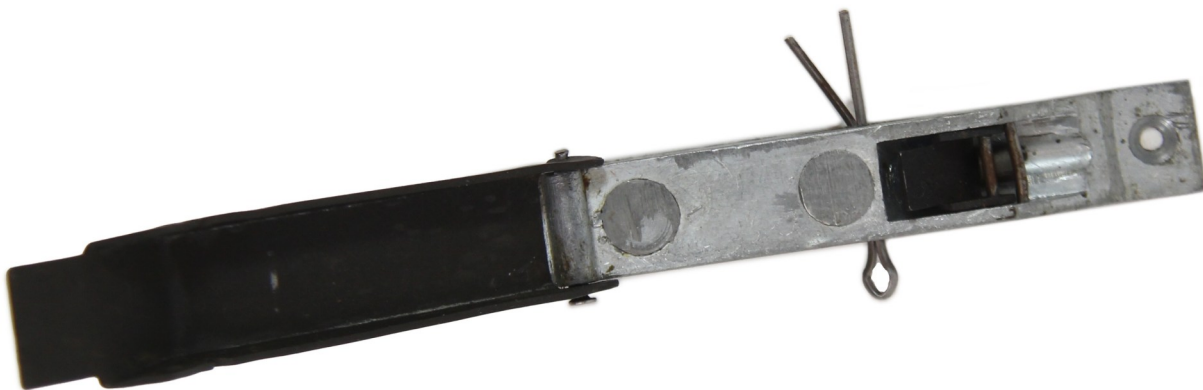


*RP 2 Firing Device*

The body is made of Zamac (also referred to as Zamack), a zinc alloy that includes aluminum, copper, and magnesium. The device is very similar to the British device, but has a distinctive hump on top where the hinge pin fits. The lower end of the body is threaded to fit a bushing designed to hold a "Percussion Detonator, Model OTO".

When assembled, the striker and striker spring in the RP 2 are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker. The safety pin must be put in place or the firing device will operate, the safety pin is the only thing holding the device in the cocked position at this point. When the RP 2 is set in position and a weight of 3.5 lbs. (1.6 kg) minimum is applied to the lid, it forces down on the lid and sear forcing the striker back slightly releasing the safety pin. The safety pin can then be withdrawn without force. A 7 lbs. (3 kg) weight is the minimum recommended to prevent the device from functioning.

When the restraining weight is removed, the striker detent pushes against the sear causing it to rotate, pushing up the lid. When the sear has rotated enough, the striker is released to fly forward under pressure of its spring to strike the cap in the detonator assembly. The cap fires and either fires the detonator or ignites the an attached fuse.



*RP 2 Firing Device - top, with the lid open*

## Shear Delay Igniter

Italy

Type - Delay

Length - 3.5 in. (88 mm)

Diameter - 0.6 in. (15 mm)

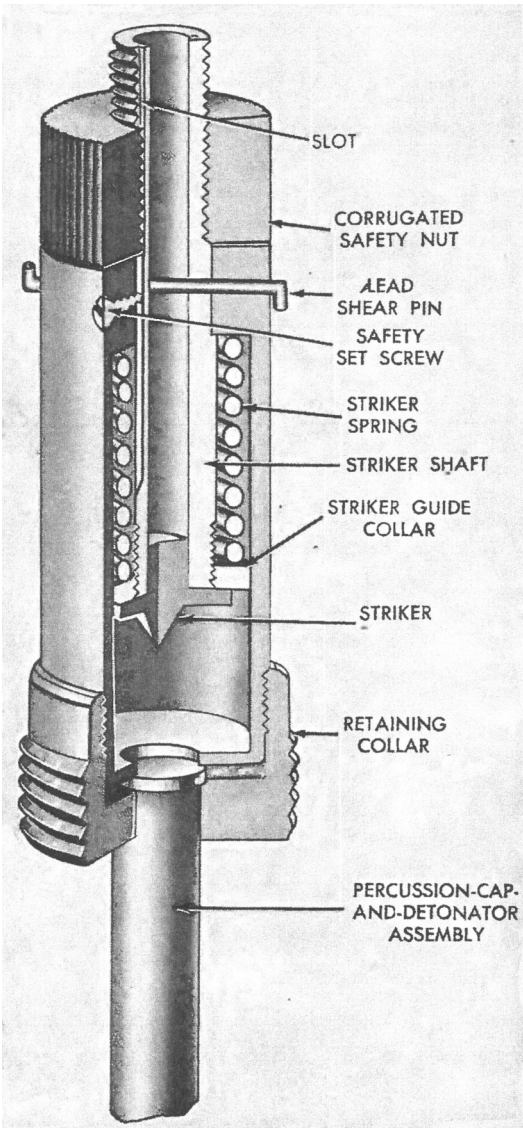
The official designation of this item is unknown. This firing device was designed for the delayed detonation of demolition charges. It operates on the metal fatigue principle. In 1943 tests on four of these devices gave widely varying delays, ranging from 7.5 minutes to 26 hours 7 minutes. It was noted that the devices may have been tampered with prior to testing.

The body is made of galvanized mild steel externally threaded at the bottom end for an retaining collar. The upper end has an internal flange. The body contains a striker assembly made up of a mild steel tube threaded at both ends. The bottom end has a striker point fitted and a threaded flange. The top end protrudes out of the body and has a milled nut screwed on. There is a groove lengthwise on the side of the striker tube. The retaining collar is externally threaded to fit into demolition charges.

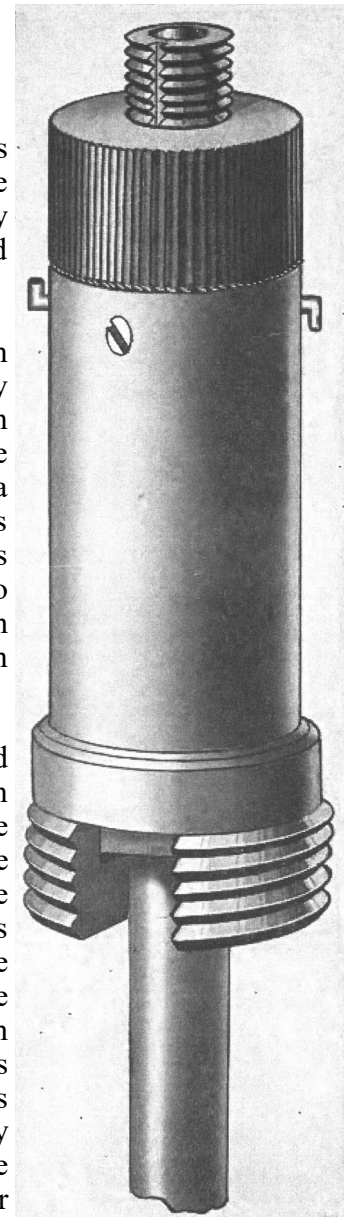
A slot in the collar allows an "OTO" detonator assembly to slide in. Screwing the adapter on fully holds the detonator assembly in place.

When assembled, the striker and striker spring are inserted through the bottom end. The striker tube will protrude through the top of the body so the milled nut can be screwed on. A set screw is screwed in through the side of the body and engages the slot in the striker tube to prevent it from turning. When the milled nut is screwed down tight, it compresses the striker spring. When fully screwed down, a hole through the body and one through the striker tube will line up allowing a 0.03 in. (1 mm) lead shear pin to be inserted and the ends turned down to retain it in place.

For use, a detonator assembly is inserted and tightened down. The firing mechanism is inserted into a charge. When ready, the milled nut is unscrewed and removed entirely, leaving the striker and its compressed spring held only by the lead shear pin. The compressed spring exerts pressure on the pin, which will eventually fail allowing the striker to drive down and impact the detonator assembly.



*Shear Delay Igniter (internal diagram)*  
Image - US Department of Defense



*Shear Delay Igniter*  
Image - US Department of Defense

## Special Chemical Delay Igniter

Italy

Type - Delay

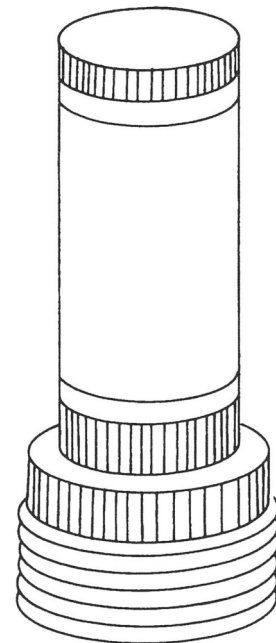
Length - 2.25 in. (56 mm)

Diameter - 0.75 in. (18 mm)

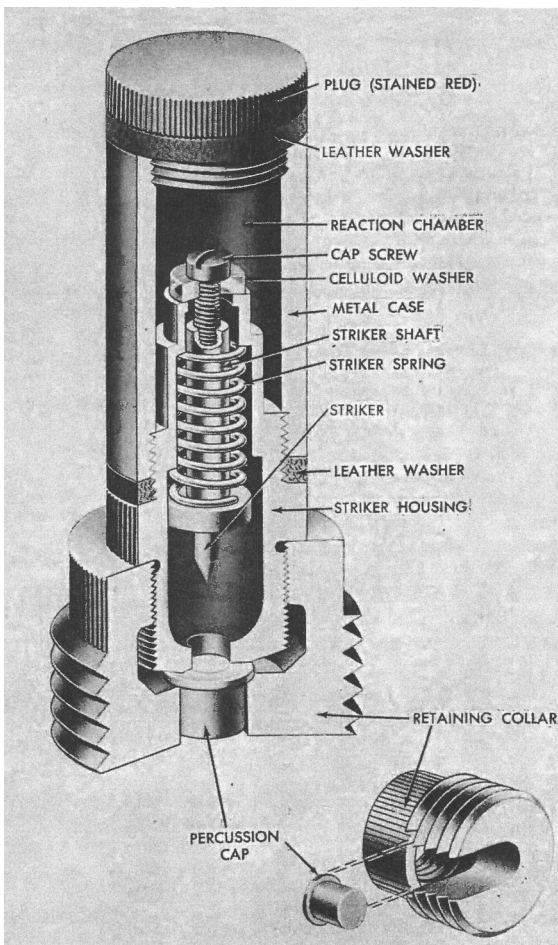
The official designation of this device is unknown. This firing device is used for the delayed detonation of demolition charges.

The casing is a cylindrical metal tube internally threaded at both top and bottom. The top fits a threaded closing plug with a leather washer. The bottom fits the firing mechanism consisting of a striker housing, striker, striker spring, celluloid washer, and cap screw. The housing is threaded on top to fit the bottom of the body and on the bottom to fit a retaining collar. The retaining collar is externally threaded to fit demolition charges and has a slot cut into it so a primer or more likely an OTO detonator assembly can be installed.

When assembled the striker and striker spring are inserted in the bottom of the housing. The cap screw with the celluloid washer are inserted into the top of the housing and screwed into the top of the striker, which draws it up and compresses the striker spring. The cap screw head is smaller than the hole in top of the housing, the celluloid washer is larger. The assembled firing mechanism then screws into the casing utilizing a leather washer. The chemical required to dissolve the celluloid washer is supplied in a small bottle with the device.



*Chemical Delay Igniter  
Image - US Department  
of Defense*



*Chemical Delay Igniter (internal  
diagram)  
Image - US Department of Defense*

To use the device, a detonator must be installed in the retaining collar. The device with detonator is inserted into an explosive charge and concealed. The top plug is removed, the chemical poured into the device, and the top cap replaced. Over time, the chemical will erode the celluloid until the cap screw can be pulled by spring pressure through the top of the housing. This allows the striker to hit the primer and set off the detonator. The detonator initiates the main explosive charge.



## ST-1 (Strappo 1)

Italy

Type - Pull

In the post Second World War era, Italy used a number of firing devices that were developed from British switches. The ST-1 was developed from the British No. 4, Mk. I pull switch.

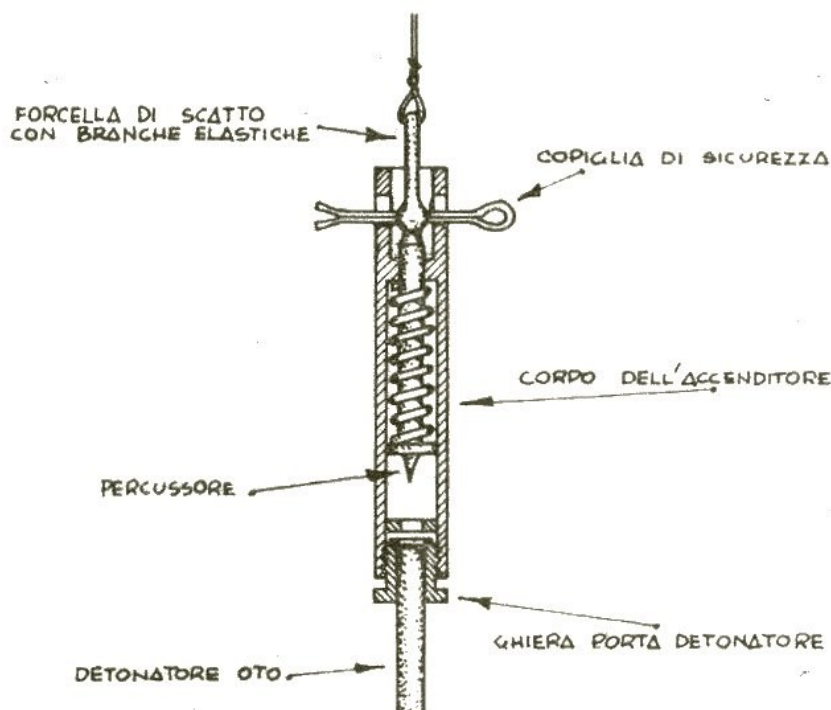
The cylindrical body is made of Zamac. There are two mounting tabs cast onto the lower body. Internally the body has a constriction near the top end, just below the slots. The body contains a striker and striker spring. The striker has a head and firing pin at the bottom end and a ball at the opposite end. The striker is held in a U-shaped clip that fits over the ball on the end of the striker shaft. The safety pin fits through slots in the side of the body and through a hole in the ball. The lower end of the body is threaded to fit a bushing designed to hold a "Model OTO percussion detonator".

When assembled, the striker and striker spring are put in through the bottom end of the body and forced up through the constriction far enough so the head protrudes past the top end of the body. The U-shaped clip is put over the head of the striker and the striker allowed to move back into the body. At this point the clip will not open enough to release the striker to pass back through the constriction. A safety pin is pushed through the slots in the side of the body and through the hole in the striker head to ensure the device remains safe.

When the firing device is set with a tripwire, a tension is put on the line to pull back on the U-shaped clip so the safety pin will come



ST-1 Firing Device



out easily. At this point the safety pin will be somewhere near the centre of the elongated slots. With the safety pin out, a pressure or pull of 6 - 8 lbs. (2.7 - 3.6 kg) applied to the trip wire will pull the "U" shaped clip and the striker with it, out of the body. When the clip clears the top end of the body, it will release the striker to move forward under pressure of the striker spring. The firing pin then strikes the percussion cap and initiates the device and attached charge.

ST-1 (internal diagram from Italian manual)

Type - Anti-handling  
Diameter - 3.1 in. (80 mm)  
Height - 1.7 in. (45 mm)

The VS AR-4 is a firing device developed by the Italian Company Valsella (VS) to provide an anti-handling feature to both Italian anti-personnel and anti-tank landmines. It is a mechanical and electronic delay-armed device that will function when tilted. It is specifically designed to prevent a landmine from being lifted or cleared by manual or mechanical methods.

The firing device is constructed of either olive green or tan plastic. The body of the device contains twin safe and arm, mechanical delay switches, as well as an electronic arming delay. It also has a priming circuit with a Mercury tilt switch.

There is an electric M84 primer attached to a detonator, and a power source consisting of two 1.5v batteries. Reportedly, the VS AR-4 can remain active for approximately 12 months. When used with the compatible adapter and detonator, the firing device can be attached to the entire range of Italian VS and TS landmines. This includes: VS-50, TS-50, V-69, VS-1.6, VS-2.2 and VS-3.6 landmines.

To prepare the VS AR-4 for use, the appropriate adapter is selected for the mine that is to be booby-trapped. It is attached via insertion into the detonator fuze well on the side or bottom of the mine. Once attached, the body safety pin is removed and the bottom half of the firing device is rotated, which initiates the arming sequence by compressing two springs.

The first step in the arming sequence is a 10-40 minute mechanical delay due to metal fatigue/deformation caused by two spring-loaded stems pushing through two lead discs. The amount of time to perforate the lead discs is dependent upon ambient temperature. Once the lead discs have been perforated, the two penetration stems actuate two microswitches that cause a steel safety barrier,

located between the primer and the mine detonator, to rotate moving the VS AR-4 from 'Safe' to an 'Armed' condition. There are two microswitches - one powers the electronic circuit, the other microswitch removes a short-circuit from the M84 primer. Upon completion of the mechanical delay, an additional 30-minute electronic arming delay is triggered. Once that delay expires, the firing device is fully armed.

After arming, any movement (i.e., tilting) of the mine (with attached VS AR-4) will cause the Mercury tilt switch to send a pulse to the electronic primer initiating the detonator and the attached landmine.



*VS AR-4 Firing Device*



*VS AR-4 Firing Device (partially disassembled)*

## 42/2 Fuze

Italy

Type - Pressure

Diameter - 1.46 in. (37 mm)

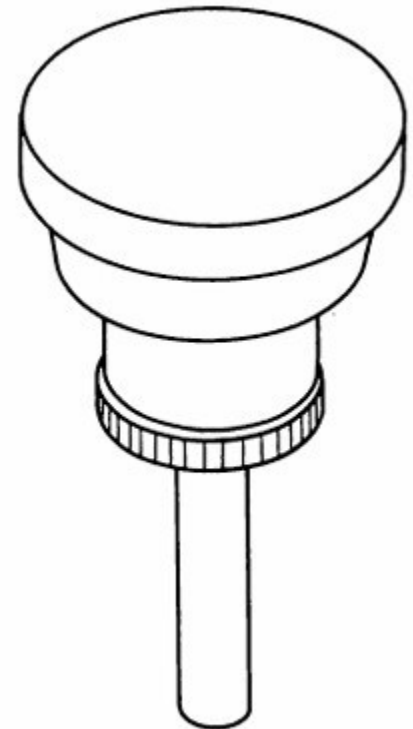
Height - 1.2 in. (30 mm)

The 42/2 is a small, pressure-activated firing device. It serves as the primary fuze for the CS 42/2, CS 43/3, and CC 48 anti-tank mines. It can also be used in boobytraps, although this is somewhat impractical due to the pressure required 220 lbs. (100 kg) to initiate the device.

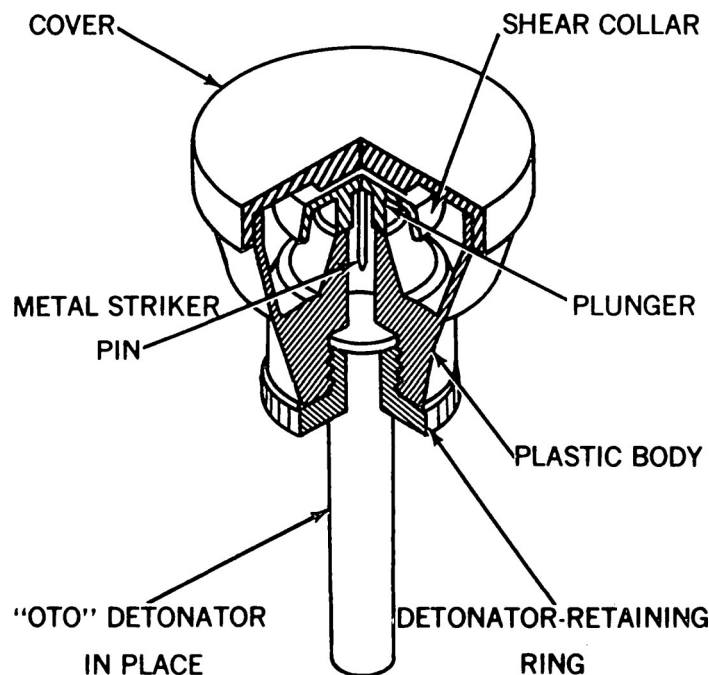
It consists of a Bakelite plastic body, cover, plunger, striker, and a detonator retaining ring. The striker is the only metallic part other than the detonator assembly. The plunger is held in place by a shear collar. The upper end of the body is closed by a cap; the lower end has the detonator retaining ring screwed in..

For use, the detonator retaining ring is unscrewed and an "OTO" model detonator assembly inserted. It is then screwed back into the fuze and the assembly inserted into the mine or explosive charge.

When a pressure of approximately 220 lbs. (100 kg) is applied to the top of the fuze, the cover will shatter. The pressure is then applied to the plunger forcing the shear collar down over its supporting tip, and driving the firing pin into the detonator assembly to initiate the attached mine or charge.



42/2 Fuze  
Image - US Department of Defense



42/2 Fuze (internal diagram)  
Image - US Department of Defense

日本  
(Japan)





## Pull Igniter

Japan

Type - Pull

Weight - 38 oz. (1 kg)

Length - 5.3 in. (135 mm)

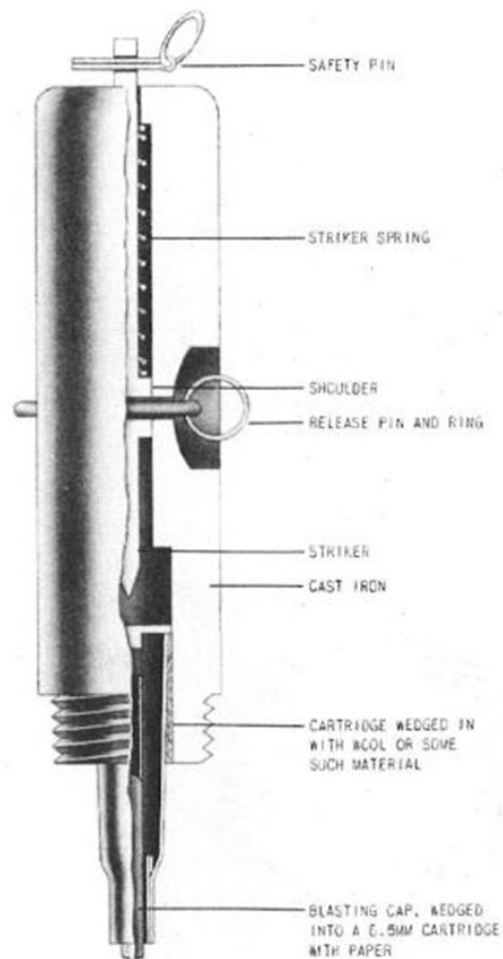
Diameter - 1.5 in. (38 mm)

The official designation of this device is unknown. These pull igniters were specifically designed to use a British 20 lb. bomb as an explosive charge. However, it could probably be used as a boobytrap in other demolition charges.

The device is turned out of a 1.5 in. (38 mm) cast iron rod. The bottom end is externally threaded to fit the fuze well of a British 20 lb. bomb. A chamber at the bottom is sized to fit a 6.5 mm cartridge casing. The body is drilled out to fit a striker and striker spring with the shaft of the striker fitting through a hole on top. The striker is turned so there is a shoulder about 1/3 the way up. The shoulder forms a seat for the striker spring and has a hole drilled through it to fit a release pin. A hole drilled through the side of the body matches with the hole in the striker. The device is normally black in colour.

When assembled, the striker and striker spring are inserted through the bottom and pushed up, compressing the striker spring, until the release pin can be inserted. A safety pin fits through a hole in the striker at the top end. A 6.5 mm cartridge, with the bullet and powder removed, has a non-electric detonator wedged in, with the open end of the detonator facing the primer. The assembly is then inserted into the bottom of the igniter. The assembly can then be screwed into the bomb being used as a charge.

For use, the device and bomb are placed in position and concealed. A slack tripwire is attached from the release pin to an anchor point. When the safety pin is removed it allows the striker to move down and put pressure on the release pin to prevent it coming out too easily. When approximately 10 lbs. (4.5 kg) of pressure is applied to the tripwire it pulls out of the body, releasing the striker. The striker is driven down by the compressed spring to hit the primer in the cartridge case. The primer fires into the detonator causing it to function. The detonator will then cause the bomb to explode.



*Pull Igniter*  
*Image - US Department of Defense*

## Chemical Delay Firing Device

Japan

Type - Delay

Length - 10 in. (254 mm)

Diameter - 2.5 in. (64 mm)

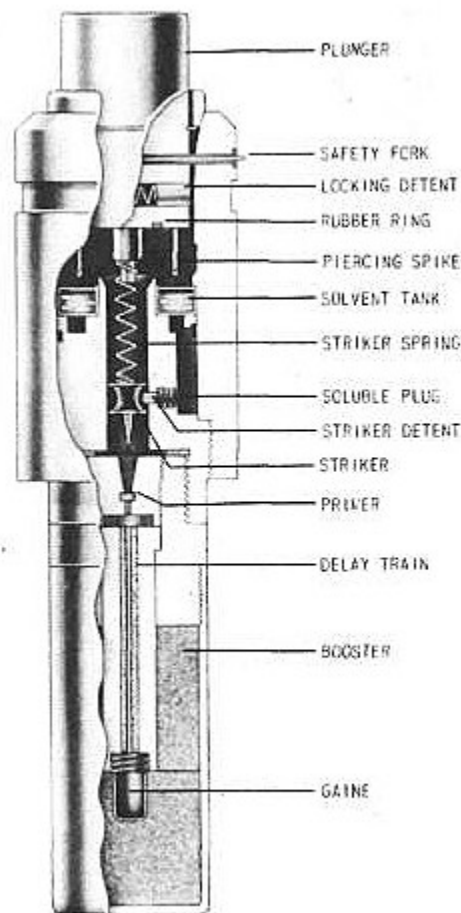
The official designation of this device is unknown. This is a rather large device that uses a chemical reaction to delay firing. Internally it closely resembles a Japanese Navy C1 bomb tail fuze.

The casing is made of black Bakelite plastic. Internally it is divided into three sections. The upper section contains the plunger, which has a locking detent in the side, a stud in the centre of the bottom, and has two spikes mounted on the bottom. A safety fork fits through the device body and the plunger. The centre section contains a solvent tank, striker, striker spring, striker detent, and a soluble plug. The bottom section contains a primer, black powder delay, a gaine from a 25 mm projectile fuze, and a tetryl booster.

When assembled, the plunger fits into the top of the casing with the safety fork fitting through preventing the inadvertent pressing of the plunger. The striker and striker spring are central within the casing with the striker spring bearing against the stud on the plunger at one end and the striker at the other. The striker is held in position by the striker detent that is held in by the soluble plug. The ring-shaped solvent tank fits around the top of the section. The firing train in the bottom section has a primer at the top, followed by a delay train and ending with the gaine. A Tetryl booster surrounds the firing train.

When ready for use, the device is inserted into an explosive charge and then placed against the intended target. When the safety fork is removed and the plunger pushed down it compresses the striker spring and the spikes pierce the solvent tank. The plunger is held down by the locking detent. This allows the solvent to drain into the centre section and come into contact with the soluble plug. The solvent dissolves the plug that releases the striker detent to be cammed out of the way and release the striker. The striker is driven down into the primer, which fires to ignite the delay train. The delay train burns for six seconds before it causes the gaine to explode, igniting the tetryl booster and in turn the main charge.

The delay time of the device, as well as the purpose of the six-second delay, are unknown.

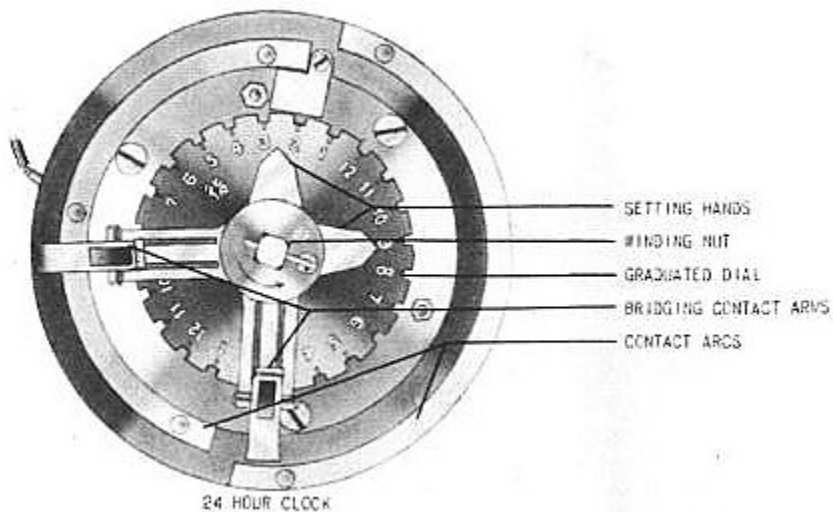


*Chemical Delay Firing Device  
Image - US Department of Defense*

## Type - Delay

In addition to the two Type 92 mechanical clockwork-delay firing devices, there were three other devices with time delays of 24 hours, 7.5 days, and 10.5 days. The clockwork mechanisms were of sound design and construction, but the devices were rarely used.

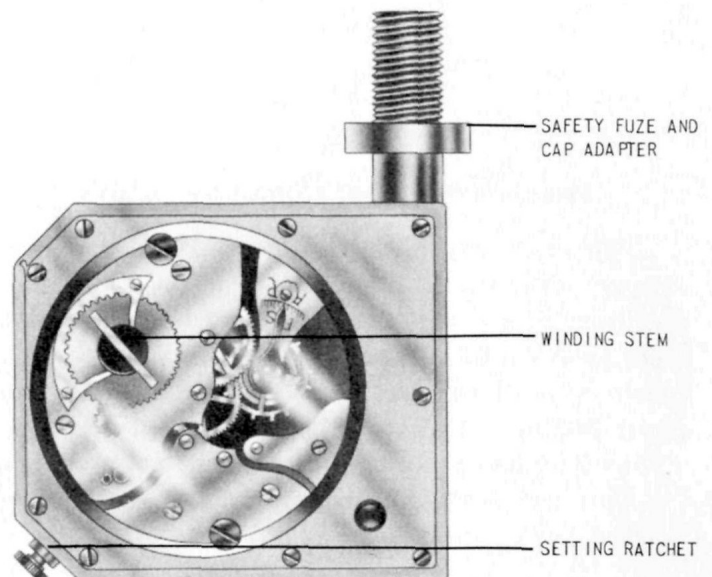
The **24-hour Demolition Clock** is graduated up to 24-hours in one-hour intervals. It is spring-driven and its dial rotates clockwise. The dial has two bridging contact arms that close a circuit upon completion of the set time delay.



*24-Hour Demolition Clock  
Image - US Department of  
Defense*

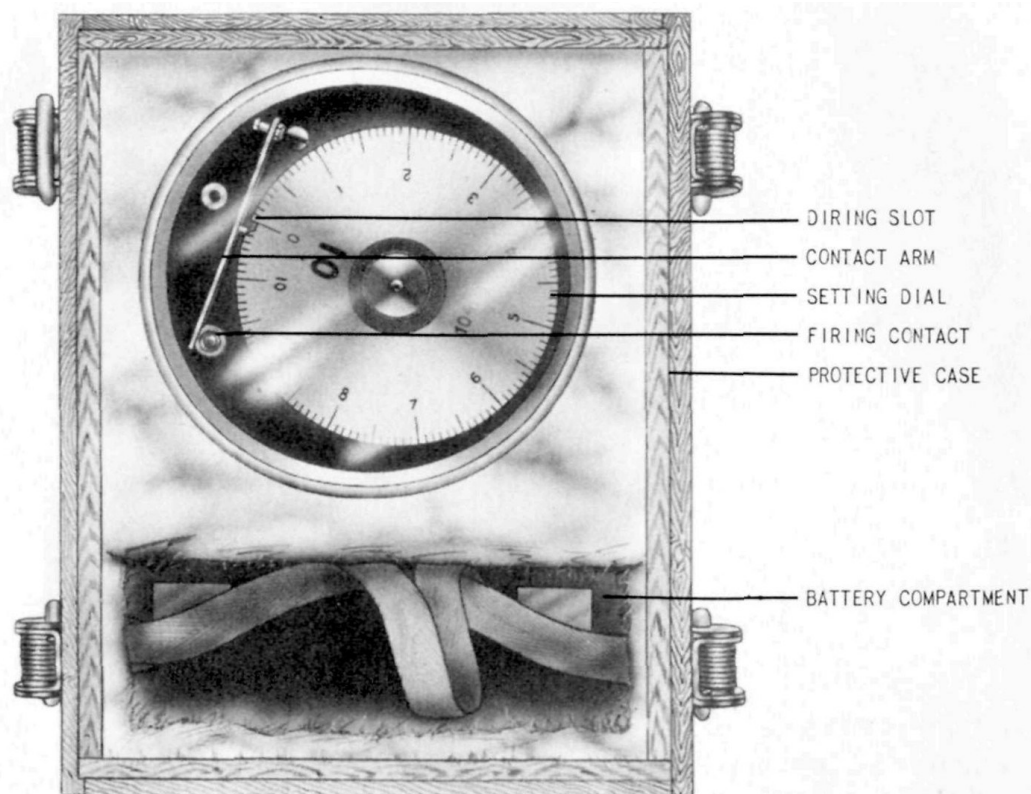
The **7.5-day Demolition Clock** is housed in a brass case measuring 2.7 in. (68 mm) long, 2.3 in. (58 mm) wide, and 0.9 in. (23 mm) thick. The edges of one end of the case are beveled and both sides are covered by thick celluloid plates. The clock appears to be a well-made, jeweled mechanism driven by a main spring and has a winding stem protruding through the back cover plate. The face of the clock is a disc graduated from 0 to 7 days and 12 hours, in one-hour intervals. The figures 1 through 7, and after each figure, the Japanese character for day are engraved on the disc. An index line for setting the delay is engraved on the case and on the celluloid face. The edge of the disc has a continuous raised lip in which a slot has been cut. The setting arm engages a knurled shoulder on the disc, which can be rotated in order to set the clock.

The igniter assembly consists of a striker, striker retainer, retainer arm, and release arm. The striker has a groove around the rear end and the striker retainer has a slot that engages this groove. The retainer arm rests against the release arm that has a small pin protruding from the lower side. This pin bears against the lip of the disc. When the set time has elapsed, the slot in the lip allows the pin to pass through. The release arm moves out freeing the retaining arm. The striker retainer turns, freeing the striker, and the striker is driven, under pressure of its spring, against the detonator.



*7.5-Day Demolition Clock  
Image - US Department of Defense*

The **Type 99 Long Delay Clock** is a 10.5-day demolition timer. It is electrically wound and spring-driven. The clockwork runs off approximately every 4 minutes, 45 seconds closing a solenoid circuit that rewinds the spring. The dial is graduated from 0 to 10 days, 12 hours. Setting is possible up to 10.5 days in two-hour intervals. A six-volt battery is reported to have been used.



*10.5-Day Demolition Clock  
Image - US Department of Defense*



## 24-Hour Timing Mechanism

Japan

Type- Delay

Length - 4.75 in. (121 mm)

Width - 4.5 in. (114 mm)

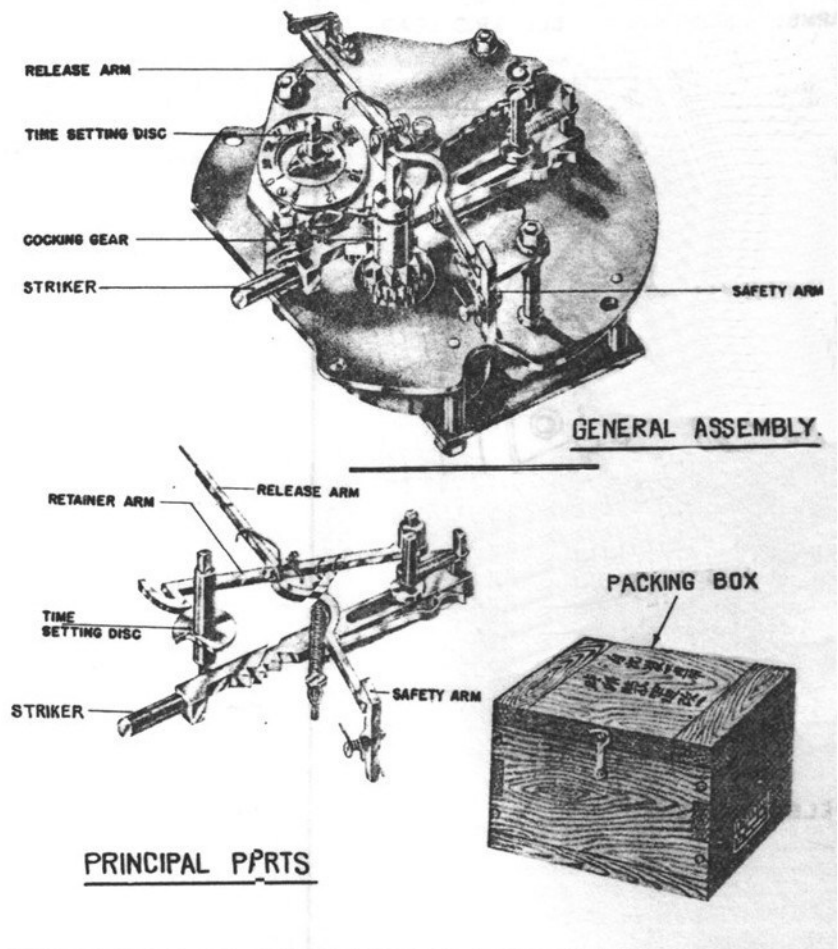
Depth - 2.75 in. (70 mm)

The official designation of this device is unknown. This device is separate from the 24-hour demolition clock.

The mechanism consists of a clockwork, striker, retaining arm, release arm, safety arm, and the time setting disk. The striker can be cocked by turning the cocking gear that engages teeth on the striker. A key is provided for cocking the striker and is also used to set the time. One end of the retaining arm holds the striker in a cocked position while the other end bears against the time setting disk. The retaining arm will not allow the clockwork to operate until the safety arm is released.

The clockwork allows a delay of up to 24 hours shown on a time scale on the face of the mechanism. When the desired time is set, the clockwork is started by detaching the release arm from the safety arm. When the time expires, a slot on the time setting disk moves opposite the retaining arm. The retaining arm can then pivot inward to release the striker. The clockwork can be stopped prior to the time expiring by engaging the release arm with the safety arm.

The mechanism and key are issued in a wooden box measuring 6.5 in. X 5.75 in. X 2.75 in. (165x146x70 mm)



### JAPANESE 24 HOUR TIME FIRING MECHANISM.

*24-Hour Time Firing Mechanism*  
*Image - Chief Inspector of Ammunition, Kirkee*

## Pull Igniter

Japan

Type - Pull

Length - 3.0 in. (78 mm)

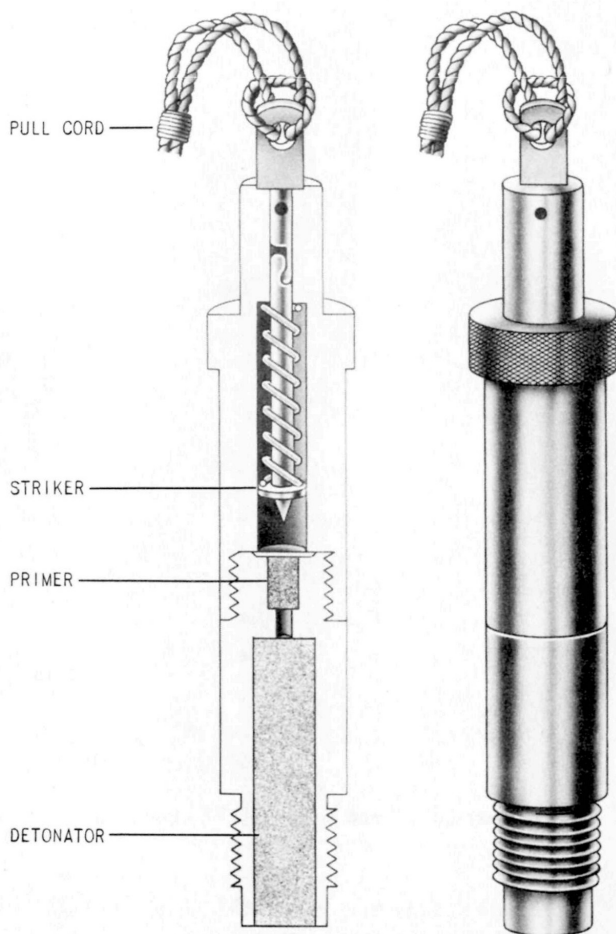
Diameter - 0.5 in. (13.5 mm)

The official designation of this device is unknown. This is a well-manufactured mechanical pull firing device used by Japan during the Second World War. Based upon official reports, this device could have been used as a boobytrap.

The steel device body is made in two sections. The lower section, which contains the primer cap and a black powder relay, threads into the upper section and is staked in place. The upper section houses the firing assembly whose components are a release pin, striker, striker spring, safety pin, and pull cord. The juncture of the release pin and striker is effected by a notched joint. The striker spring bears against the igniter body and the striker flange. The safety pin is inserted through holes in the device body and release pin to which the pull cord is attached. The device is gray in colour.



*Pull Igniter*



When assembled, the striker and striker spring fit up through the bottom with the striker shaft fitting through a hole in the top. The striker is pushed up until it protrudes out the top compressing the spring. The release pin is engaged in the notch and the striker released to be drawn back into the body. The walls of the hole prevent the notches from disengaging. A safety pin fits through the top and through the hole in the release pin. At this point the striker spring is slightly compressed.

Prior to use, the safety pin is removed. The device will then function when a sharp pull exceeding 20 lbs. (9 kg) is applied to the pull cord. This draws the release pin out of the body, pulling the striker with it and further compressing the striker spring. When the notch on the release pin is drawn fully out of the body it will disengage from the striker which is then driven down under pressure of the spring to hit the primer. The primer flashes and ignites the relay.

*Pull Igniter*  
*Image - US Department of Defense*

## Time Firing Device, Mk. 1

Japan

Type - Delay

Length - 3.75 in. (95 mm)

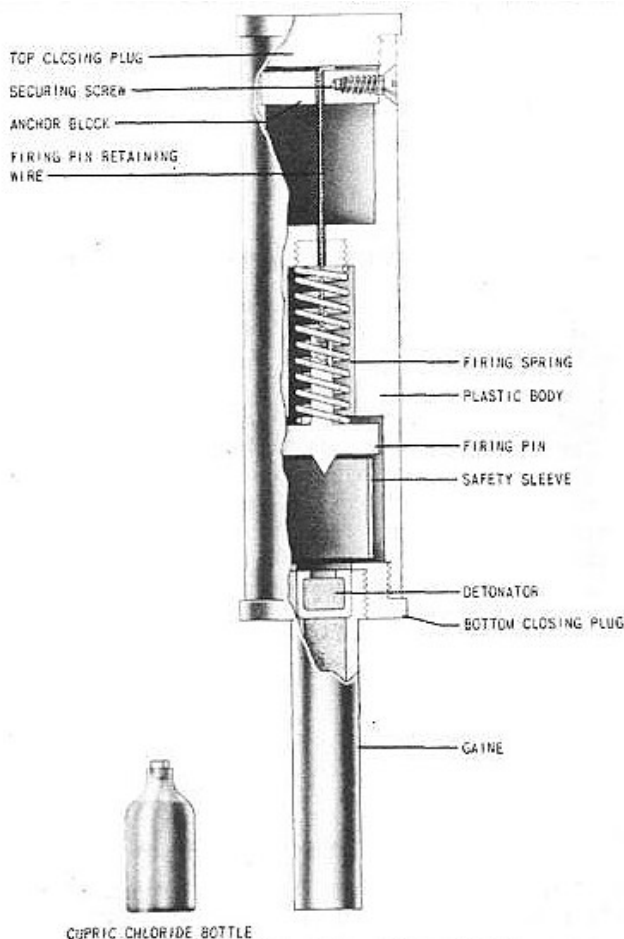
Diameter - 1.0 in. (25 mm)

The official designation of this device is unknown. This is a chemical delay firing device used by the Japanese during the Second World War. There were two variations: one with an opaque brown casing and a retaining wire of 0.035 in. (0.89 mm) in diameter, and one with a transparent casing and a retaining wire of 0.042 in. (1 mm) in diameter.

The device is made of plastic internally divided into three sections. Both ends are threaded to accept closing plugs. The top section is a chemical tank with an anchor block just below the threading. A small screw through the side of the casing holds the anchor block in position. The centre section contains the striker and striker spring. The striker is held in the cocked position by the retaining wire attached to the anchor block in the upper section. The hole for the wire is sealed with a gum-like material to prevent chemical leakage. The bottom section has a light metal safety sleeve between the firing pin, detonator and gaine (booster) assembly, which is screwed into the bottom. A small bottle of cupric chloride is supplied with the device.



*The only known photo of the Mk. 1 showing the small bottle of Cupric Chloride  
Image - US Department of Defense*



To use the device, the metal safety sleeve is removed. The

gaine is inserted into the explosive charge and the top closing plug is removed. The Cupric Chloride is poured into the top section of the device and the closing plug replaced. The firing device is then armed and functioning. The chemical reaction between the retaining wire and Cupric Chloride will weaken the wire until it eventually fails and allows the striker to drive down to impact the detonator.

Tests during the war on a transparent version indicated that the delay could be adjusted slightly by reducing the amount of chemical in the tank. A full tank gave a delay of 45 minutes while a quarter full tank gave a delay of 63 minutes. The brown version would give a shorter delay.

*Mk. 1 Time Firing Device  
Image - US Department of Defense*

## Trigger-Type Igniter

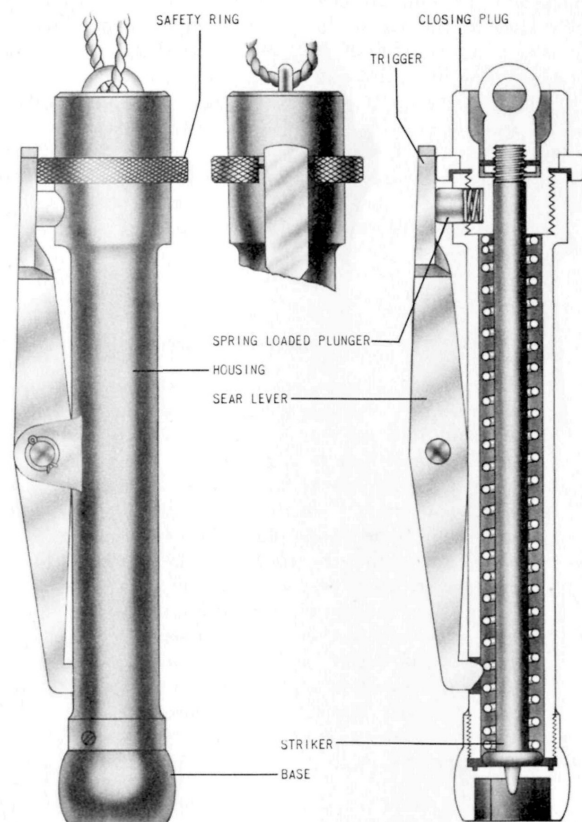
Japan

### Type - Pull

The official designation of this device is unknown. The Trigger-Type firing device was used to ignite safety (time) fuse and, according to Allied reports from the Second World War, could possibly have been used as a pressure-type initiator for boobytraps.

The device consists of a housing, striker assembly, and a sear lever. The housing is a brass body that has a steel base screwed and soldered to a bayonet joint for locking a primer cap and fuse (or detonator) to the assembly. The opposite end of the body is internally threaded to take a hollow closing plug. This closing plug fits over and secures the knurled safety ring and a spring washer that prevents the safety ring from slipping. The safety ring has an internal and external cut-away section. The internal section engages a grub screw on the closing plug, and so limits the distance through which the safety ring can be turned. The external section is beneath the trigger of the sear when it is properly positioned for cocking or firing.

The striker assembly consists of a striker and striker spring within the housing, and a lanyard eye that is threaded onto the after end of the striker. A lanyard is normally attached to the lanyard eye. The sear lever is a steel bar that is pivoted on a double supporting lug attached to the device body. One end of the lever bears the sear that passes through a rectangular hole in the igniter body to engage the striker flange when the striker is retracted. The opposite end of the lever is flattened to form a trigger. A spring-loaded plunger is set into a round hole in the body and closing plug. This plunger bears against the trigger keeping the sear depressed. The plunger and spring also lock the closing plug and the body together.



*Trigger-Type Igniter*  
*Image - US Department of Defense*

To prepare the Trigger-Type device for use, rotate the safety ring until the external cut-away portion is opposite the trigger. A pull on the lanyard will then retract the striker and striker spring. The sear rides over the flange on the striker and is forced to drop in front of the flange by the plunger and spring. The sear then holds the striker and spring in the cocked position. By rotating the safety ring so that its solid portion is beneath the trigger, the firing device is on "Safe" and the trigger cannot be depressed. The device is connected to the primer cap and fuse (or detonator) by means of the bayonet joint in the base.

To function the device, the safety ring is turned so that the cut-away section is beneath the trigger. Depressing the trigger disengages the sear from the striker flange allowing the cocked striker to move forward and impinge upon the primer.



## Type 1 Fuse Igniter

Japan

Type - Pull

Weight - 0.3 oz. (9 g)

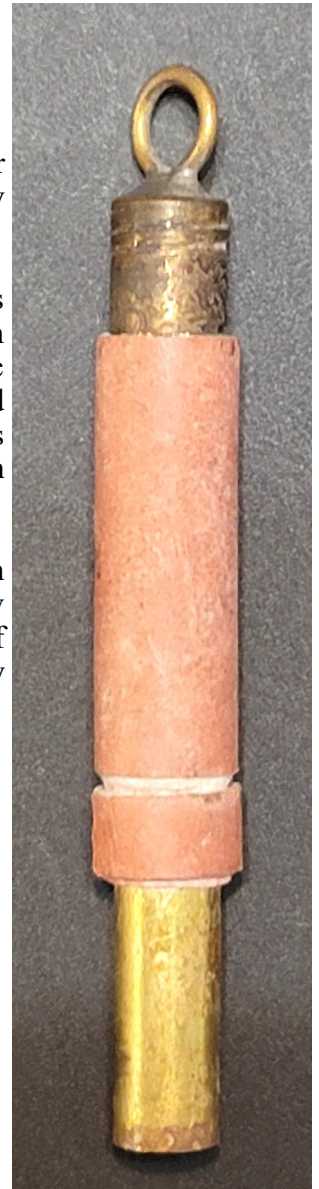
Length - 2.4 in. (61 mm)

Diameter - 0.3 in. (8 mm)

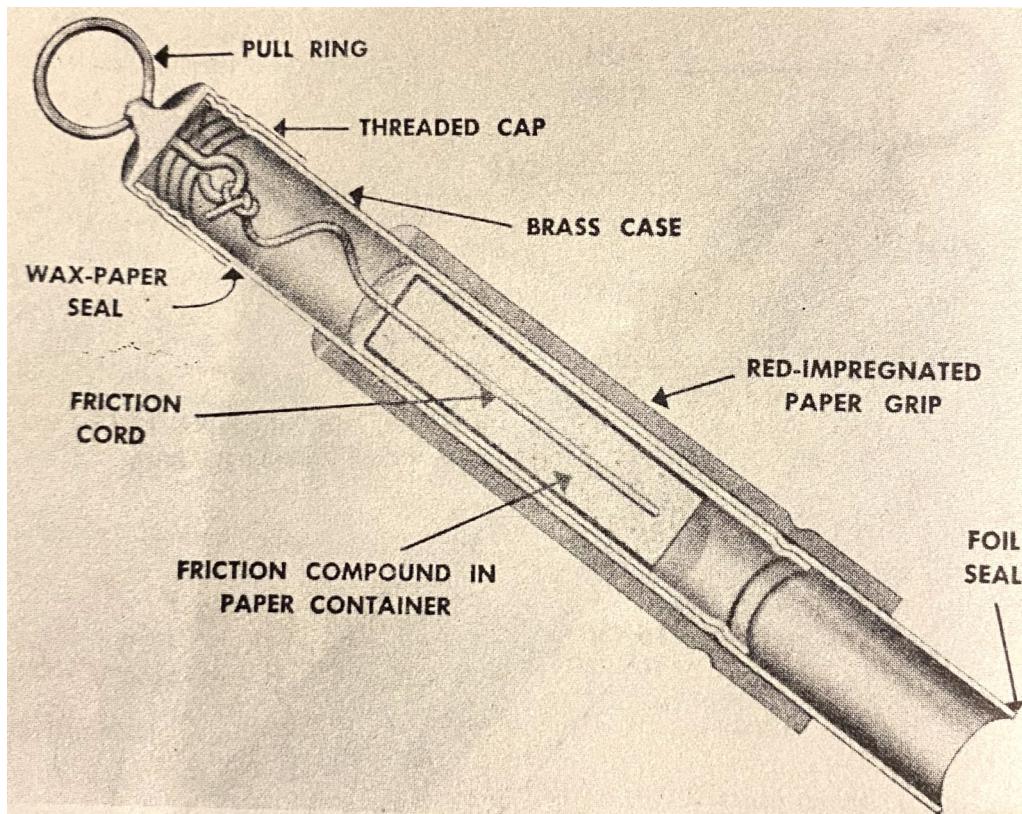
The Type 1 (also referred to as the “Red Type”) is a pull-friction fuse igniter that was often employed as a boobytrap, although it was easily damaged by moisture.

The main body is made of a thin brass cylinder. The upper end of the tube is roll threaded to accept a cap. The cap has a pull ring attached to the top and an eyelet inside to attach to a friction cord. The main body has a thick red plastic or impregnated paper sleeve to protect the users hand. A paper container filled with friction compound is contained in the body. The friction cord protrudes from the container and is tied to the eyelet in the cap. When issued the bottom end is covered by a foil seal and the cap is closed by a wax paper seal.

For use, a fuse is inserted into the bottom end and crimped or taped in. When the cap is removed a sharp pull of about 10 lbs. (4.5 kg) on the cap will draw the cord through the friction compound causing it to ignite the fuse. If employed as a boobytrap a non-electric detonator can be used instead of safety (time) fuse.



*Type 1 Fuse Igniter*



*Type 1 Fuse Igniter (internal diagram)*  
*Image - US War Department*



## Type 2 Fuse Igniter

Japan

Type - Pull

Weight - 0.3 oz. (8.8 g)

Length - 3.5 in. (89 mm)

Diameter - 0.47 in. (12 mm)

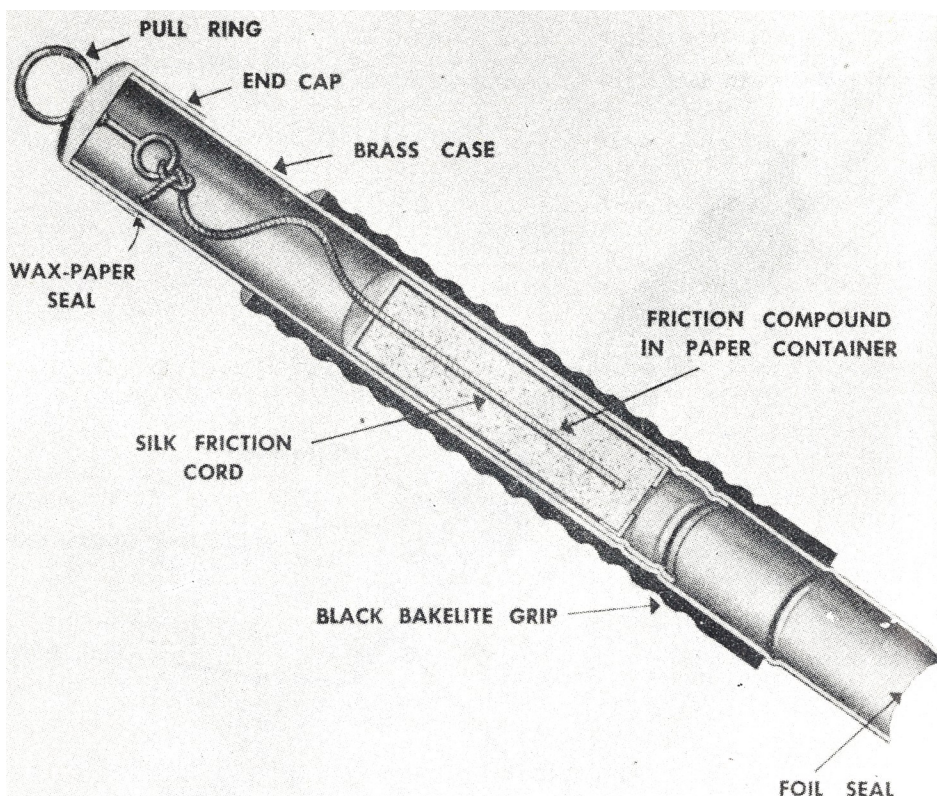
The Type 2 (also referred to as a “Black Type”) is a pull-friction fuse igniter used for demolitions. Reports from the Pacific Theater of Operations in the Second World War indicated that they were often used with detonators as pull firing devices for boobytraps.

The body is made of brass with a corrugated black hard rubber sheath over most of the body to help in gripping the device and protecting the users hand. The top of the body is covered with a press fit cap that has a pull ring attached. The body contains a brass or paper capsule filled with a friction ignition compound. A friction cord with a sanded end runs through the capsule and is attached to the cap. A heavy cotton cord is attached to the pull ring. Both ends of the device are closed with tinfoil to resist moisture in storage.

For use, either safety (time) fuse or a detonator is inserted in the bottom end of the device and crimped or taped in. When a sharp pull exceeding 10 lbs. (4.5 kg) is applied to the pull cord, it pulls the cap off the device. The friction wire attached to the cap gets pulled through the ignition pellet and causes it to ignite and flash down to the fuse or detonator. It should be noted that these devices were seriously affected by moisture.



*Type 2 Fuse Igniter  
Photo - J. Osborne*



*Type 2 Fuse Igniter (internal diagram)  
Image - US Department of Defense*

## Type 92 Demolition Timer

Japan

Type - Delay

Weight - 3.0 lbs. (1.4 kg)

Length - 3.8 in. (99 mm)

Diameter - 2.7 in. (69 mm)

The Type 92 is a mechanical clockwork-delay firing device containing a spring-driven clock that has settings for up to eight days in 5 minute increments. It is normally used for sabotage and is capable of initiating a charge either electrically or mechanically. It was of sound design and construction, but rarely used.

The device appears to be made mainly of brass. When the top of the device is removed it reveals the clockwork mechanism. A spring winding key is located on top centre of the mechanism indicating that the device must be wound prior to setting. The safety device is also located on the top of the mechanism off to the side. Electric contacts on the bottom connect the device to an explosive charge through a battery. Also located on the bottom is a groove for safety (time) fuse leading to a primer connection for mechanical initiation. Mechanical firing is accomplished by a spring-loaded firing pin being released by the clockwork mechanism to strike a primer at the bottom of the device. The primer ignites the safety fuse in the groove. Electrical functioning is accomplished by the firing pin forcing the ignition switch down to complete the electrical circuit.

Markings are engraved on the top of the device. A graduated ring is located at the base of the device for the purpose of setting the delay time. Two arrows are engraved into the side near the graduated ring. One arrow points in the direction to turn the ring, the other is to indicate the setting using the graduated scale. A small opening towards the top of the body shows the number of days and the graduated scale on the ring indicates the number of hours. References on the device conflict somewhat. Some indicate that the setting shows the time remaining until detonation while others indicate that they show the time it was set for initially so that the time remaining is unknown.



*Type 92 Firing Device  
Photo - J. Osborne*

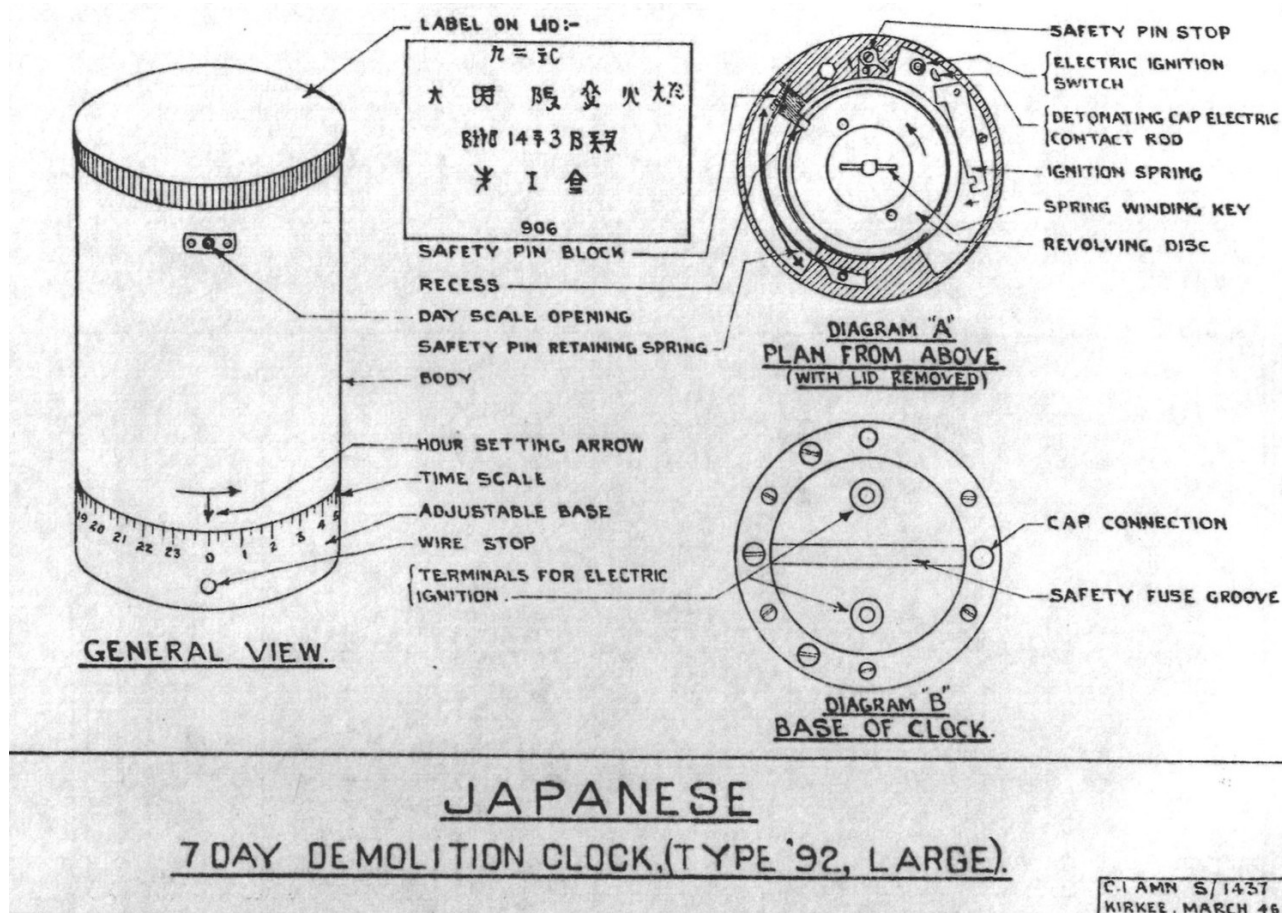


*Type 92 Firing Device  
Photo - J. Osborne*

## Type 92 Demolition Timer

Japan

Apparently a seven-day firing device designated, Demolition Clock, Type 92, Large, was also produced. It is visually similar to the eight-day clock, except that it is 5.5 in. (140 mm) long and 3.5 in. (89 mm) in diameter.



*Type 92 Large, Firing Device*  
*Image - Chief Inspector, Ammunition, Kirkee*



## Waterproof Igniter

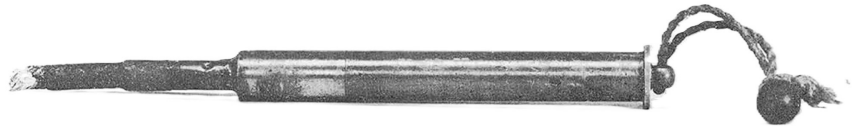
Japan

Type - Pull

Length - 4.5 in. (114 mm)

Diameter - 0.3 in. (7.6 mm)

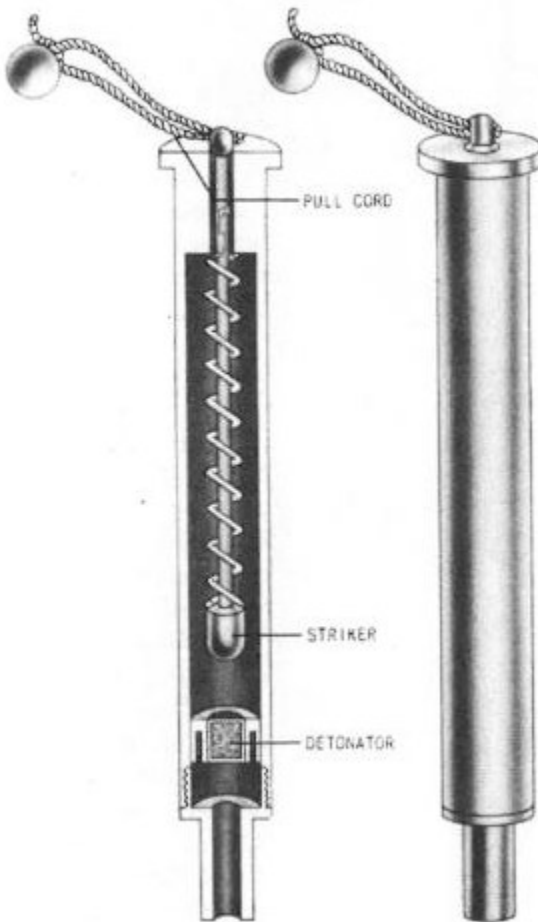
The official designation of this device is unknown. This percussion operated fuse lighter was more waterproof than other Japanese Second World War friction igniters and was capable of being used as a boobytrap pull device.



*Waterproof Igniter*  
*Photo - US Department of Defense*

The body is cylindrical with a rim at the top end and is made of brass. It is threaded at the bottom end to accept a primer adapter. The top end has a solid portion with a small hole through the centre. The body contains a striker, striker spring, and release pin. The striker has a head at the bottom end and is notched at the top end to engage the release pin. The release pin has a rounded head with a hole through it and is notched to engage the striker. A pull cord is tied through the hole in the release pin. They were most likely issued already assembled. There is no safety pin.

When assembled, the striker and striker spring are inserted from the bottom. The striker shaft fits into the small hole in the top. When the striker is pushed up through the hole the release pin can be engaged and the striker allowed to move back into the body under pressure of the striker spring. The release pin and striker are held together by the walls of the small hole. At this point the striker spring is lightly compressed, only enough to hold the striker and release pin down.



For use, safety (time) fuse or a detonator is crimped into the nipple on the bottom of the primer adapter. When the pull cord is given a sharp pull it draws the striker back further compressing the striker spring. When the notched portion on the release pin is drawn out of the body it releases the striker. The striker under pressure of the now compressed spring is driven down to impact the percussion primer. The primer fires to ignite the fuse or cause the detonator to fire.

*Waterproof Igniter*  
*Image - US Department of Defense*

**NEDERLAND**

**(Netherlands)**



## Netherlands Boobytrap Mechanisms

At the end of the Second World War, the Dutch adopted many of the British switches/firing devices that had been supplied to the Dutch resistance. The devices were initially adopted without change and were in fact supplied by the British.

These firing devices were given Dutch designations as follows:

|                                              |                                  |
|----------------------------------------------|----------------------------------|
| Switch, No. 1, Pull, Mk.1                    | <b>Trekontsteker NR 1</b>        |
| Switch, No. 2, Pressure, Mk. 1               | <b>Drukontsteker NR 1</b>        |
| Switch, No. 3, Release, Mk. 1                | <b>Ontlastingsontsteker NR 1</b> |
| Switch, No. 4, Pull, Mk. 1                   | <b>Trekontsteker NR 2</b>        |
| Switch, No. 5, Pressure, Mk 1                | <b>Drukontsteker NR 2</b>        |
| Switch, No. 6, Release, Mk. 1                | <b>Ontlastingsontsteker NR 2</b> |
| Switch, No. 7, Pull Pressure, Mk 1           | <b>Electrischeontsteker NR 1</b> |
| Switch, No. 9, L Delay, Mk. 1                | <b>Tijdontsteker NR 1</b>        |
| Switch, No. 10, Delay, Mk. 1                 | <b>Tijdontsteker NR 2</b>        |
| Switch, No. 12, Release, Mk. 1               | <b>Ontlastingsontsteker NR 3</b> |
| Switch, No. 13, Pull/Pressure/Release, Mk. 1 | <b>Combinatieontsteker NR 1</b>  |

Details on these devices may be found in “The Boobytrap Recognition Manual, Volume 1.”

**NR 3**  
**(Vuurkoordveerontsteker NR 3)**

**Netherlands**

Type - Pull  
Weight - 1.4 oz. (40 g)  
Length - 2.4 in. (61 mm)  
Diameter - 0.5 in. (12.7 mm)

The NR 3 is a fuse lighter capable of being used as a pull-actuated firing device in a boobytrap. It is visually similar to the NR 17 firing device. It was adapted from the British Mk. III percussion igniter.



*NR 3 Firing Device*  
*Photo - E. Koch*

The firing device has a brass body that is internally threaded at both ends. One end accommodates a threaded plug with a hole in the centre and a knurled lip at the top. A striker and striker spring fit in through the bottom with the shaft of the striker fitting up through the hole in the plug. A safety pin fits through a hole near the top of the striker shaft and holds the striker in the cocked position with the striker spring compressed. The other end of the device body accepts a screw-in primer adapter. The NR 3 also has a positive safety pin through the centre of the firing device body preventing the striker from impacting the percussion cap. It has a brass mounting strap, with two holes, mounted on the upper part of the body. The device is not painted but has the designation stamped into the mounting bracket. There is a version specifically used for training that has the additional marking of "EXC" stamped into the body near the mounting bracket. The NR 3 can use any of the priming adapters, the NR 2, NR 2C1, or the NR 42 crimping adapter.

For use as a fuse lighter, any of the available primer adapters can be used. A length of safety fuse is inserted into the adapter, the positive safety pin removed and finally the safety pin is pulled out, releasing the striker to impact the primer and ignite the fuse.

To use as a boobytrap, a detonator (blasting cap) is inserted into the priming adapter. A tripwire is attached to the striker safety pin and anchored to a suitable object. The NR 3, with attached demolition charge, is emplaced and camouflaged. The positive safety pin is then withdrawn, preferably remotely. When tension is applied to the tripwire, the striker safety pin is withdrawn, releasing the striker into the percussion cap in the priming adapter that, in turn, initiates the attached detonator and demolition charge.



*NR 3 Firing Device components*  
*Photo - B. Gravett*



**NR 16**  
**(Drukontsteker NR 16)**

**Netherlands**

Type - Pressure  
Weight - 3.9 oz. (113 g)  
Length - 3.6 in. (92 mm)  
Diameter - 0.6 in. (14 mm)

The NR 16 appears to be a very close copy of the US M1A1 pressure-activated firing device, although the pressure plunger/trigger is slightly larger. Another difference is that the NR 16 will not accept US primer adapter devices. The Portuguese T251 firing device is also similar. This device is primarily intended for use as a boobytrap.



*NR 16 Firing Device*

The device consists of a body, pressure head and priming adapter.

The body is die cast alloy made in a single piece. It has a basically tubular body with a flattened base for about half the length. Protruding out from the base are three tabs used to fasten the device in place. A hole in the top of the body fits the pressure head. The striker, which has a firing pin head at one end and a groove in the shaft at the other, fits with the striker spring inside the body. The pressure head has a flat top with a shaft on the bottom and a threaded hole in the top. There is a keyhole in the lower portion of the shaft. When assembled, the striker and spring are put into the body and forced into the body so that the shaft of the striker fits into a small hole in the back that connects with the hole in the top of the body. The pressure head with spring are pushed down so the shaft of the striker fits through the large upper hole in the keyhole. Once the shaft of the striker is pushed through, the pressure head is released so that the small portion of the keyhole engages in the groove in the striker shaft. This holds the striker back in the cocked position. A safety clip fits over the spring on the pressure head preventing downward movement. A positive safety pin is fitted through holes in the side of the body in front of the striker.

To use the firing device, a NR 2, NR 2C1 priming adapter, or the NR 42 crimping adapter is attached along with a detonator (blasting cap). The device is then attached to a demolition charge, and both are emplaced and camouflaged. The safety pin is then carefully removed, preferably remotely. The NR16 is then fully armed. A pressure in excess of 22.5 lbs. (10.2 kg) will force the pressure plunger down, releasing the spring-loaded striker assembly that initiates the percussion cap in the primer holder. This, in turn, initiates the detonator and the attached demolition charge.

The NR 16 is painted olive green with the designation embossed on the top. Devices designated for training (i.e., exercise) are painted black and have "EXC" stamped into the top of the device. "EXC" may also be painted in white on the bottom.



*NR 16 Firing Device (Exercise/Training)*

**NR 17**  
**(Trekontsteker NR 17)**

**Netherlands**

Type - Pull  
Weight - 1.5 oz. (44 g)  
Length - 2.8 in. (72 mm)  
Diameter - 1.3 in. (35 mm)

The NR 17 is a simple pull firing device that outwardly resembles the NR 3 device, but functions differently. Its operation shows that it was adapted from the British No. 4, Mk. I pull switch and is primarily intended for use as a boobytrap.

The firing device has a brass body that is drilled partially through from both ends. The bottom end is a larger diameter hole drilled about  $\frac{3}{4}$  the way in. The mouth of the hole is internally threaded to accept the fuze adapter. The top end is a smaller diameter drilled down so that a shoulder is left separating the two holes. Finally, an even smaller hole is drilled to join the two holes and allow passage of the striker shaft.

A slot is formed through the sides of the body at the top chamber. The striker is made with a striker head with firing pin at one end and a ball at the opposite end. A "U" shaped clip is made so that the ends are cupped to fit around the ball on the striker. The striker and striker spring are inserted from the bottom end and pushed up through the body until the ball protrudes out of the body. The "U" clip is fitted over the ball and the striker allowed to move back into the body. The safety pin is inserted through the slot and through a hole in the ball of the striker. It has a brass securing strap, with two holes, mounted on the lower part of the body. The device is unpainted but has the designation stamped into the mounting bracket.

To use the firing device, a detonator (blasting cap) is inserted into the primer holder. The NR 17, with an attached demolition charge, is then emplaced and camouflaged. A trip wire is attached to the "U" clip at the protruding end of the striker assembly, while the opposite end is attached to a firm anchor point. To set the device the wire must be taught and fixed so that the safety pin ends up in about the middle of the slot. When set properly the safety pin will be easy to remove, if set improperly it will be difficult to remove. The sides of the body hold the "U" clip closed at this point. When at least 5.6 lbs. (2.5 kg) of tension is applied to the tripwire, the safety pin is withdrawn and the "U" clip is drawn out of the body, releasing the firing pin into the percussion cap initiating the attached detonator and demolition charge.

According to Dutch manuals, the NR 17 has been produced and released in two forms:



NR 17/2C1, which is issued with the NR 2C1 adapter.

NR 17/42, which is issued with the crimping adapter NR 42.



*NR 17 Firing Device*

*NR 17/2C1 Firing Device packaging*

**NR 18**  
**(Ontlastingsontsteker NR 18)**

**Netherlands**

Type - Pressure-Release  
Length - 3.5 in. (91 mm)  
Width - 0.7 in. (18 mm)  
Height - 0.7 in. (18 mm)

The NR 18 is a pressure-release firing device primarily intended for boobytraps. It was developed post war (WW2) from the British No. 6, Mk I release switch, which has been copied by at least eleven other countries, possibly making it the most copied boobytrap.

The firing device consists of an alloy body threaded at one end to receive a primer holder. The opposite end is flattened to allow it to be inserted into narrow

openings. A hole drilled in the flattened end enabled the device to be fastened in position. A steel lid is hinged at the threaded end and fits over the body. The sear is hinged near the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the striker. When assembled, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker. The safety pin must be put in place or the device will operate.

*NR 18 Firing Device with NR 2 snout adapter*

The differences from the British switch are several. The threading on the primer holder is much finer than the British snouts. The body of the NR 18 is different in that there is a slight taper from the threaded end to the flattened end, while the British switch is not tapered. There is a second set of holes through the body in front of the cocked striker for a positive safety pin..

The device is painted olive green with the designation embossed on the bottom of the device. If the device is designated for training use, an "O" is stamped on the lid and filled with red paint.

To use the firing device, a primer holder with a length of instantaneous fuse and detonator attached is inserted into a demolition charge, and both are emplaced and camouflaged. A weight of at least 9 lbs. (4.1 kg) is placed on top of the pressure plate to ensure that it remains closed when the safety pins are removed. The safety pin holding the firing pin in check is withdrawn first, followed by the positive safety. The NR 18 is then fully armed. If the weight is removed, the hinged pressure plate moves upward, releasing the firing pin to impact the percussion cap in the snout adapter, which then initiates the attached detonator and demolition charge.



## NR 18C1 (Ontlastingsontsteker NR 18C1)

Netherlands

Type - Pressure-Release  
Weight - 2.1 oz. (60 g)  
Length - 3.5 in. (89 mm)  
Width - 0.6 in. (15 mm)

The NR 18C1 is a modification of the NR 18 pressure-release firing device. Primarily intended for use as a boobytrap. It was developed from the British No. 6, Mk I release switch, which has been copied by at least eleven other countries.



*NR 18 C1 Firing Device  
Photo - LEXPEV*

This device is a modified version of the NR 18 firing device. The basic operation of the NR 18C1 is identical; however, there are several differences between the two devices. The lid of the

NR18C1 has a groove pressed into it where the sear contacts the lid. This reduces the friction between the lid and sear. Internally there is a brass disc in the end screwed down as far as possible to the bottom of the threading. It is retained in that position by the hinge pin of the lid. The disc has three holes, one in the centre to allow the striker point to protrude past the disc and two others to allow gas/air escape. There are two safety pins, one through the striker and a positive safety that blocks the striker from hitting the percussion cap.

The body is anodized green, while the lid is painted brown with markings in black giving the designation and lot number.

To use the firing device, an NR 2C1 primer holder with an attached detonator (blasting cap) is inserted into a demolition charge, and both are emplaced and camouflaged. A weight of at least 9 lbs (4.1kg) is placed on top of the pressure plate to ensure that it remains closed when the safety pins are removed. The safety pin holding the firing pin in check is withdrawn first, followed by the positive safety. The NR 18C1 is then fully armed. If the weight is removed, the hinged pressure plate moves upward, releasing the firing pin to impact the percussion cap in the primer adapter, which then initiates the attached detonator and demolition charge.



*NR18/2C1 Firing Device packaging*

There were two versions of this device that were fielded: the NR 18C1/2C1, which utilized the NR 2C1 adapter holder, and the NR 18C1/42 that utilized the NR 42 crimping adapter.



**NR 328**  
**(Firing Device, Demolition, Underwater, Mechanical time, NR328)**

**Netherlands**

Type - Delay

The NR 328 is a mechanical clockwork-delay time firing device. It is intended for underwater use and requires a screw-on booster charge NR 329.

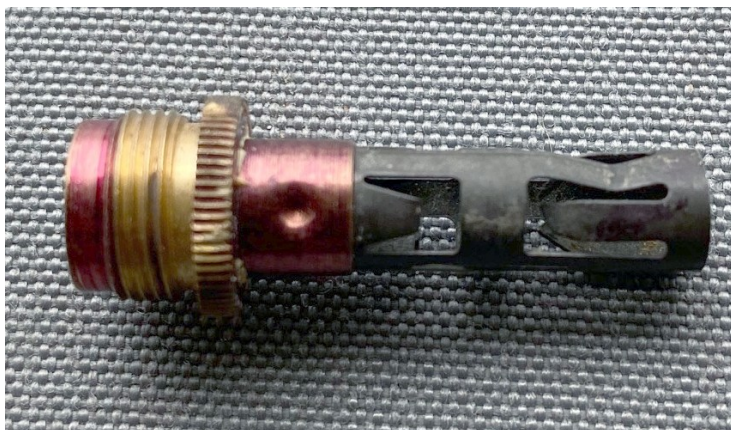
No other technical details are currently available.



*NR 328 Firing Device*  
*Photo - LEXPEV*

### NR 2 (Slaghodeje NR 2)

Similar to the British snout adapters, this one is threaded to fit Dutch mechanisms. When initially issued these had a rubber sleeve to cover the holder and provide a water-resistant joint. The rubber sleeves were often missing. Once a fuse has been pushed into the holder it cannot be easily removed.



*NR 2 Adapter (Note that the rubber sleeve is missing)*

### NR 2C1 (Slaghodeje NR 2C1)

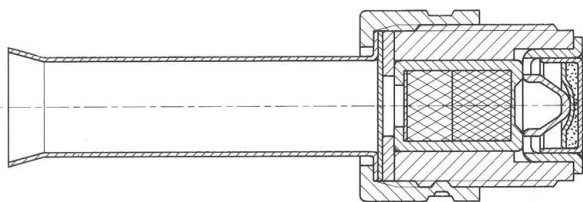
Internally the same as the NR 2, this adapter has a non-removable plastic sleeve covering the holder providing a water-resistant joint. Once a fuse has been pushed into the holder it cannot be easily removed.



*NR 2 C1 Adapter*

### NR 42 (Slagpipje NR 42)

This adapter does not have a self-gripping holder. Instead the fuse or detonator must be crimped onto the holder.



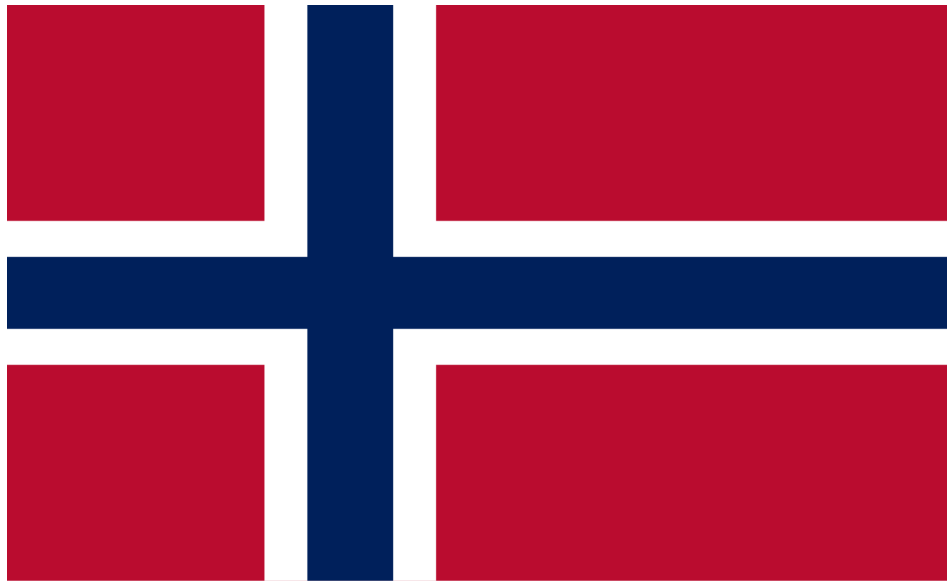
*NR 42 Internal diagram*



*NR 42 Crimping Adapter as issued in plastic bag*

# NORGE

(Norway)



## Wooden Pressure Device

Norway

Type - Pressure

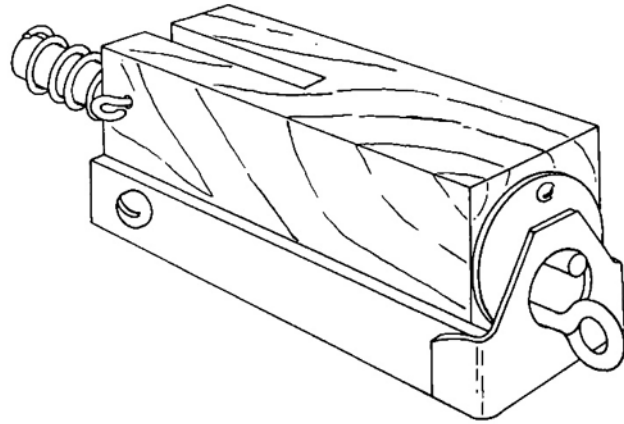
Length - 2.5 in. (64 mm)

Width - 1.25 in. (32 mm)

Height - 1 in. (25 mm)

The official designation of this device is unknown. It was designed and produced in Norway during the Second World War on orders from the German authorities. It was designed to use as few critical materials as possible.

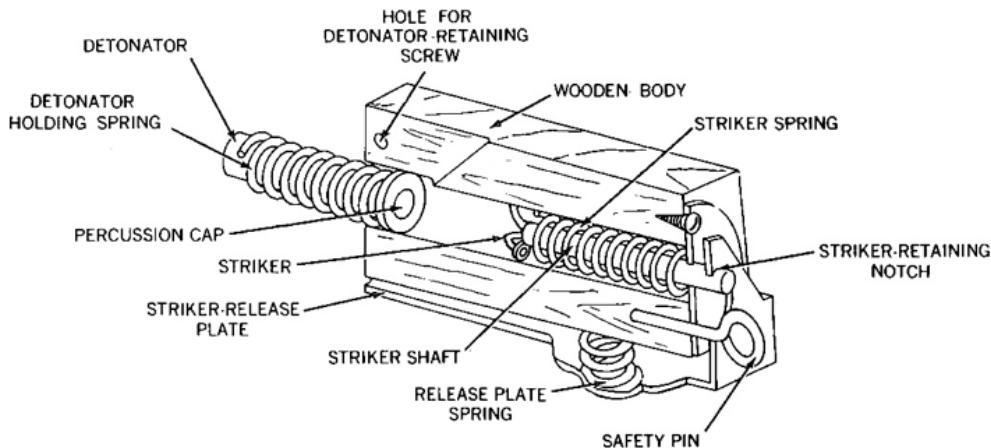
The main body is made of wood (Ash) which has been waterproofed with lacquer. There is a 0.35 in. (9 mm) hole drilled lengthwise through the body. There is a slot cut partway through the body to join with the hole. A metal washer is screwed onto the end opposite the slot in the body. The pressure plate is bent out of sheet metal and has a hole through the endpiece acting as a striker release and has two dimples formed in the top. The striker has a striker head and a notch in the opposite end.



*Wooden Pressure Device  
Image - US Department of Defense*

When assembled the pressure plate fits over the body and is hinged by two small screws at one end. There are two springs under the plate. The striker and striker spring fit into the hole and are pushed through so the shaft fits through the washer and the hole in the endpiece of the pressure plate. The endpiece engages the notch in the striker to hold it in the cocked position. The two springs under the pressure plate provide spring pressure to hold the plate in position. A safety pin fits through the endpiece into the main body to prevent the pressure plate from being pushed down. The detonator and primer holding spring is wound on two diameters, 0.21 in. (5.3 mm) and 0.25 in. (6.4 mm). The primer fits in the small end and the detonator in the large end to form a detonator assembly. The small end fits into the body. It is retained in position by a threaded retaining screw through the side of the body that when screwed in contracts the slot in the body slightly.

When the safety pin is removed and pressure of about 20 lbs. (9 kg) is applied to the pressure plate it moves down against the pressure of the two springs under the plate. When it moves down the endpiece disengages from the notch in the striker. The striker under pressure from its spring, drives forward to hit the primer, firing it into the detonator and initiating the explosive train.



*Wooden Pressure Device (internal diagram)  
Image - US Department of Defense*



## Wooden Pull Device

Norway

Type - Pull

Length - 2.5 in. (64 mm)

Width - 0.875 in (22 mm)

Height - 0.875 in. (22 mm)

The official designation of this device is unknown. It was designed and produced in Norway during The Second World War on orders from the German authorities. It was designed to use as few critical materials as possible.

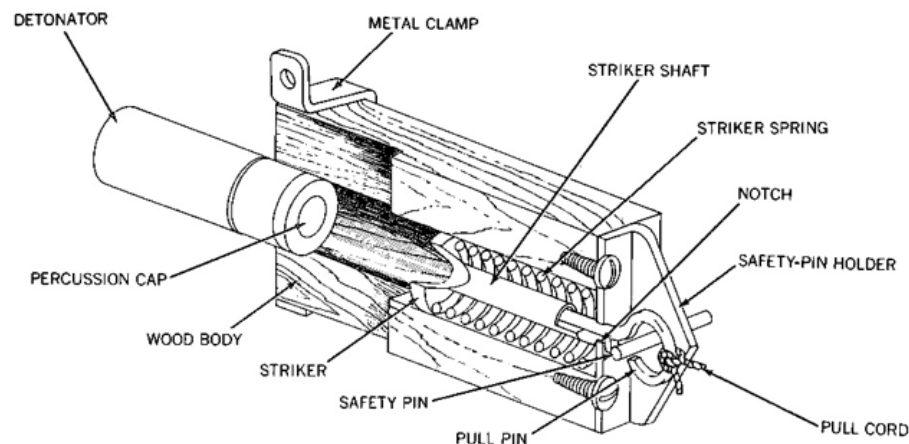


*Wooden Pull Device*  
*Photo - Digitalmuseum.se*

The main body is made of wood (Ash) that has been waterproofed with lacquer. There is a 0.35 in. (9 mm) hole drilled lengthwise through the body. Both sides on the bottom end are slotted. A strap fits around the bottom end and acts as a clamp. The upper end has a plate screwed onto it with a hole in the centre. A brass U-shaped safety pin holder is screwed on top of the plate. The striker has a head at the bottom end and a detent at the other. The end with the detent is ground away on the side opposite the detent for 0.5 in. (12 mm). A pull pin is bent out of a heavy gauge wire while the safety pin is simply a cotter pin. The detonator and primer holding spring is wound on two diameters, 0.21 in. (5.3 mm) and 0.25 in. (6.4 mm). The primer fits in the small end and the detonator in the large end to form a detonator assembly.

When assembled the striker and striker spring are inserted in the hole from the bottom end. The striker is pushed through the hole in the plate, compressing the striker spring, until the detent engages the plate. The pull pin fits into the hole in the plate on the ground down side of the striker ensuring the striker detent cannot disengage the plate. The safety pin fits through holes in the safety pin holder and through the eye in the pull pin to hold it in position. The small end of the detonator assembly fits into the lower end of the body and the clamp tightened to compress the slotted end of the body.

For use, the device is fixed in place and connected to an explosive charge. A slack wire is attached to the pull pin. When the safety pin is removed and a tension of 15 to 25 lbs. (6.8 to 11.3 kg) is applied to the trip wire, it will pull the pin out providing enough room for the detent to disengage and release the striker. The striker drives down into the primer, initiating the detonator, as well as the explosive train.



*Wooden Pull Device*  
*Image - US Department of Defense*

**nr. 6**  
**(Avlastningstenner nr. 6)**

Norway

Type - Pressure-Release

The nr. 6 appears to be a very close copy of the British No. 6 Mk I release switch. It is primarily intended to be used as a boobytrap mechanism, and closely resembles in design and function to pressure-release firing devices in at least eleven other countries.



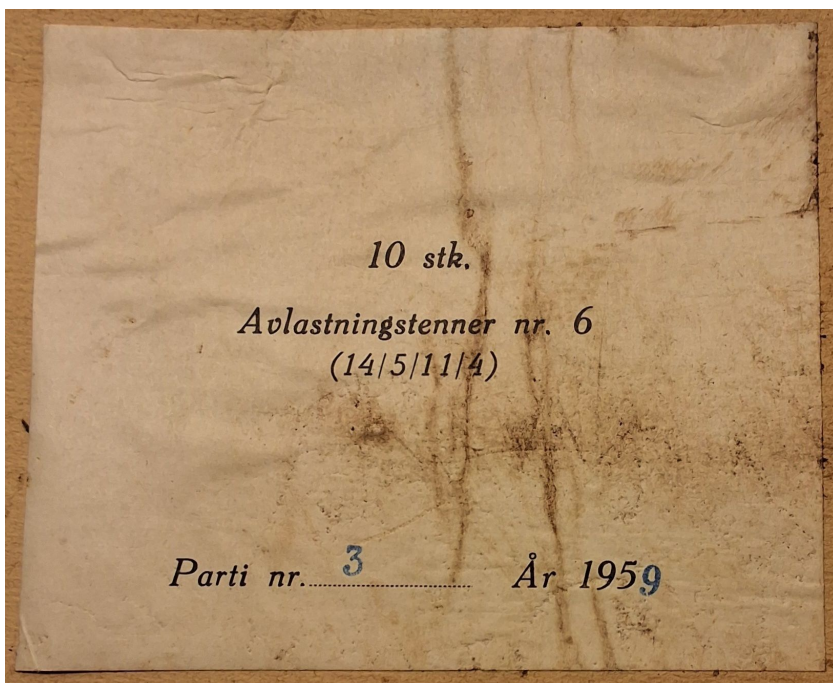
*nr. 6 Firing Device (Practice)*  
*Photo - Skjulestad artillerimuseum*

The firing device consists of a metal body threaded at one end to accept a primer holder, while the other end is flattened to allow it to be inserted into narrow openings. A hole drilled in the flattened end enabled the switch to be fastened in position. A lid is hinged at the threaded end and fits over the body. A sear is hinged at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the striker. When assembled, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker. The safety pin must be in place or the device will operate.

The nr. 6 is painted olive drab, while practice firing devices are painted blue. Other markings are unknown.

To use the firing device, a primer holder is screwed in and a detonator (blasting cap) is attached. The device is then inserted into a demolition charge, and both emplaced and camouflaged. A weight is placed on top of the pressure plate to ensure that it remains closed when the safety pin is removed. The safety pin is then carefully withdrawn, preferably remotely. The nr. 6 is then fully armed.

When the restraining weight is removed, the striker stem pushes against the sear causing it to rotate, which pushes up the lid. When the sear has rotated far enough, the striker is released to fly forward under pressure of the spring to strike the cap in the primer holder. The cap fires and initiates the attached detonator and demolition charge.



*Packing label for Avlastningstenner nr. 6 firing devices*  
*Photo - Skjulestad artillerimuseum*

**nr. 41**  
**(Trek-avlastningsmekanisme nr. 41)**

Norway

Type - Pull/Tension-Release  
Weight - 2.8 oz. (80 g)  
Length - 3.9 in. (100 mm)  
Diameter - 0.6 in. (15 mm)

The nr. 41 appears to be a very close copy of the US M3 pull or tension-release firing device, although there are some slight differences in construction, such as in the winch assembly. It is primarily intended for use as a boobytrap.

The nr. 41 consists of a metal alloy body, head, firing pin, release pin, and winch assembly. A removable primer adapter can also be found on this device. (A US primer adapter appears to be compatible with the nr. 41.) The head, which is crimped to the body, acts as a guide for the release pin. The body contains a spring-loaded (cocked) firing pin (striker assembly) in which the knob end of the release pin is installed. The outer end of the firing pin is slotted longitudinally to form four jaws and grooved internally to receive the knob on the inner end of the release pin. The slotted end of the firing pin passes through a cylindrical opening in the body, where it is held by the knob of the release pin when the release pin is in its normal axial position and the safety pin is in place. The safety pin has a short length of cord attached and passes through an elongated opening in the head and a hole in the release pin. A cotter pin, which passes through a hole in the end of the safety pin, prevents accidental removal of the safety pin during transportation and handling. The safety pin, when in position, prevents forward or rearward movement of the release pin (beyond the slight movement permitted by the elongated slot in the head), thus preventing release of the firing pin. The winch assembly, consisting of a bracket, spool with a knurled knob, and a pawl, is attached to the outer end of the release pin. A positive safety pin passes through a hole in the body between the firing pin and the primer and prevents the firing pin from striking the primer should the pin be accidentally released. There are two cords: one is attached to the positive safety, while the other is attached the an eyelet on the device body and is used to anchor the nr. 41 firmly during installation.



*nr. 41 Firing Device (Practice)*  
*Photo - G. Zahaczewsky*

To use the firing device, a detonator (blasting cap) is crimped onto the primer adapter. The nr. 41, with attached detonator, is then inserted into a demolition charge and both are emplaced. A tripwire is then securely anchored, and unspooled back to the firing device where it is attached to the winch assembly. Using the knurled knob, all slack is removed from the tripwire until the safety pin is in the central part of the elongated slot. The small cotter pin is then removed and the safety pin is withdrawn using the attached cord. When final camouflage and concealment actions have been completed, the positive safety pin is carefully withdrawn using the attached cord. The nr. 41 is now fully armed and ready.

When a pull exceeding 6 to 10 lbs. (2.7 to 4.5 kg) is applied to the tripwire, the release pin and firing pin are pulled outward until the jaw end of the firing pin passes beyond the constricted opening in the device body. In this position, the jaws spread, releasing the firing pin from the knob of the release pin. The jaws then close allowing the firing pin to impact the primer in the primer adapter.



When the nr. 41 is employed in a tension-release mode, cutting or removing the tripwire allows the release pin and cocked striker (firing pin) to move inward. When the end of the firing pin clears the constricted opening in the device body, the jaws spread, freeing the firing pin from the release pin and allowing it to impact the primer in the primer adapter.



*Top - US M3 Firing Device  
Bottom - Norwegian nr. 41 Practice Firing Device  
Photo - G. Zahaczewsky*



**M142F1 and M142N  
(Tennmekanisme Kombinasjon M142F1 M/Tennhette)**

Norway

Type - Multifunction  
Length - 2.25 in. (57 mm)  
Width - 1.6 in. (40 mm)  
Height - 1.1 in. (30 mm)

The M142F1 is a Norwegian version of the Australian F1A1. It is a compact unit capable of initiating a boobytrap via pull, pressure, pressure-release, or tension-release. The device will operate under a pressure of 25 lbs. (11.3 kg), a pull of 7 lbs. (3.2 kg), or a pressure, or tension-release of 2.4 lbs. (1.1 kg.).



*M142F1 Firing Device*

The device is made of plastic in a basically cylindrical form. There are lugs and recesses molded onto the body that allow it to be screwed, nailed or wired in almost any position. A slot in the top of the body accepts the sear plate that is held in position by two pins, one with a round head and one with a square head. A positive safety pin fits through the barrel of the body preventing the striker from hitting the percussion cap. An alternative set of holes for the positive safety are located at 90 degrees from the normal holes. The safety pin has a plastic cord attached to help in removing it. The striker is made of aluminum with a plastic four pronged guide and spring stop near the point. The rear portion of the striker has a groove that engages the sear. A striker spring fits over the striker. The striker and spring fit into the body compressing the spring until the sear on the bottom of the sear plate engages the groove in the striker.

The desired mode of use determines which pins are taken out to set the device. For use as a pressure-release device, the round headed pin is removed. For use as a pressure device, the square headed pin is removed, for use as a pull device, the square headed pin is removed, and for use as tension-release it must be fitted with an attachment and have the round headed pin removed. It should be noted that the two pins are not interchangeable as they are made from different gauges of wire with corresponding holes.

The firing device is used with a coupling base. The coupling base can be used with either safety fuse, instantaneous fuse, NONEL shock tube, or a detonator. It will fit US style demolition blocks and grenades with the same threading. The coupling is fitted with an M42 primer but no detonator, which reduces the hazards involved with transit and storage. There are two types of primer adapters, one sized to fit normal sized fuse, the other sized to fit shock tube. They are identified by a white dot on the coupling indicating use with normal fuse, the other is marked "NONEL" indicating use with shock tube.



*M142F1 Firing Device primer  
adapters*

The device is made of olive-green plastic, as are the coupling bases. The device is issued in a round tin (or plastic) case with white markings that contains everything required to set the device in any mode. Contained within the case is the device, roll of steel trip wire containing 16 yards (15 m) of wire, a strip of tape containing screws and nails, a tension-release attachment, and an instruction sheet.

## M142F1 and M142N

Norway

The M142N is the practice version of the M142F1. It is made of very dark blue plastic that appears almost black. It is issued with inert coupling bases. In all other respects, it is identical to the M142F1.

The M142N container is also made of very dark blue plastic, which appears to be black and has markings in white.

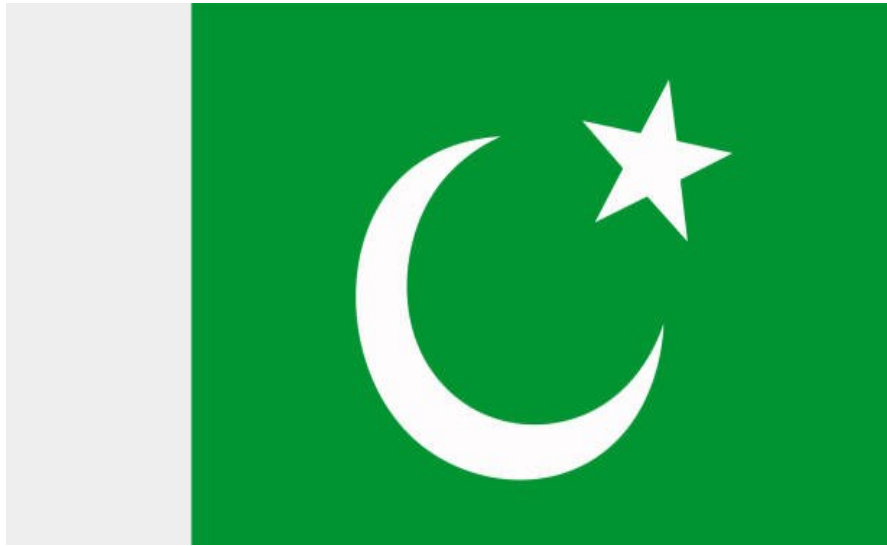


*Top- M142N Firing Device (Practice)  
Bottom- Packing container for M142N*



**اسلامی جمہوریہ پاکستان**

**(Islamic Republic of Pakistan)**

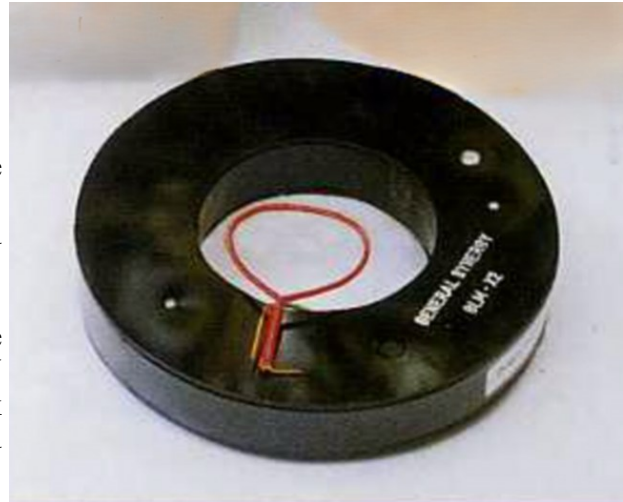


Type - Anti-Handling  
Weight - 15.8 oz. (450 g)  
Width - 7.25 in. (185 mm)  
Height - 1.46 in. (37 mm)

The GLM-2 is an electronic anti-disturbance device designed for use with the P2 and P3 series AT mines. It is manufactured by the Armament Research and Development Establishment (Pakistan).

The device consists of a P4 Mk I anti-personnel mine as the explosive charge, electrical circuitry and a 9V lithium PP3 battery for power - all encased in a black plastic annular casing that fits beneath the round pressure plate of the AT mine.

To use the GLM-2, a battery is inserted into the casing and a signal light will indicate if there is a fault in the system before arming commences. The device then initiates a 30-minute arming delay. Once fully armed, the GLM-2 operates when the mine is lifted or disturbed. However, it is claimed to be resistant to electromagnetic interference and vibration caused by vehicles. Once the device has been incorporated into the AT mine, there is no visual indication that the mine has been boobytrapped.



*GLM-2 Firing Device  
Photo – Armament Research and  
Development Establishment (PAKISTAN)*



Type - Pull

The MK 3 appears to be a direct copy of the British Mk III fuse lighter. It is normally used to initiate safety (time) fuse. It can also be used as a pull firing device to initiate a detonator (blasting cap), or instantaneous fuse in a boobytrap.

The firing device consists of a brass cylindrical body that is threaded on both ends. On the top end it has a cap with a hole through the centre for the shaft of the striker. On the other end is a threaded cap to retain the snout adapter. A striker with a spring is inserted with the shaft protruding out the top and a safety pin fitting through the shaft. The safety pin holds the striker in the cocked position with the striker spring compressed.

To use the MK 3 as a pull firing device, it was fixed in position with a demolition charge connected by instantaneous fuse or by a detonator fixed in the adapter. A trip wire was attached to the safety pin, which was withdrawn slightly. A further pull on the trip wire would fully withdraw the safety pin and release the striker to impact the percussion cap in the adapter, thus initiating the attached demolition charge.



*MK 3 Firing Device  
Photo - J. Wattenberg*

Type - Pull

Weight - 1.25 oz. (35 g)

Length - 2.2 in. (57 mm)

Diameter - 0.47 in. (12 mm)

This is a copy of the British No. 4, Mk. I pull switch, and appears to be identical in appearance, functioning and use.

The firing device consists of a cylindrical brass body with a mounting bracket attached near the bottom end. The bottom end is internally threaded to accept a primer holder. The top end has two slots opposite each other and has an internal constriction formed at the bottom end of the slots. The striker has a shoulder and firing pin formed at one end and a rounded head at the other. A safety pin hole is drilled through the rounded head. A U-shaped clip is formed in such a manner that the ends conform to the rounded head of the striker.

When assembled, the striker and striker spring are put in through the bottom end of the body and forced up through the constriction far enough so the head protrudes past the top end of the body. The U-shaped clip is put over the head of the striker and the striker allowed to move back into the body. The wall of the body prevents the clip from opening enough to release the striker. A safety pin is pushed through the slots in the side of the body and the hole in the striker head to ensure the device remains safe.

The body is unpainted. Any other markings are unknown

When the device is set with a trip wire, a fuse adapter is screwed in. Tension is then placed on the line to pull back on the U-shaped clip so the safety pin can be easily withdrawn. At this point the safety pin will be somewhere near the centre of the elongated slots. With the safety pin out, a pressure or pull of 6-8 lbs. (2.7-3.6 kg) applied to the trip wire, will pull the U-shaped clip and the striker with it, out of the body. When the clip clears the top end of the body it will release the striker to drive forward under the pressure of the striker spring. The firing pin strikes the percussion cap in the fuse adapter that ignites the fuse, which then initiates the attached detonator.



No. 4

## Type - Pressure-Release

The No. 6 is a pressure-release firing device primarily intended for use as a boobytrap. It is very similar in appearance and function to the British No. 6 release switch, as well as pressure-release devices in at least eleven other countries.

The firing device consists of a metal body threaded at one end to accept a primer holder. The opposite end is flattened. A hole drilled in the flattened end enabled the switch to be



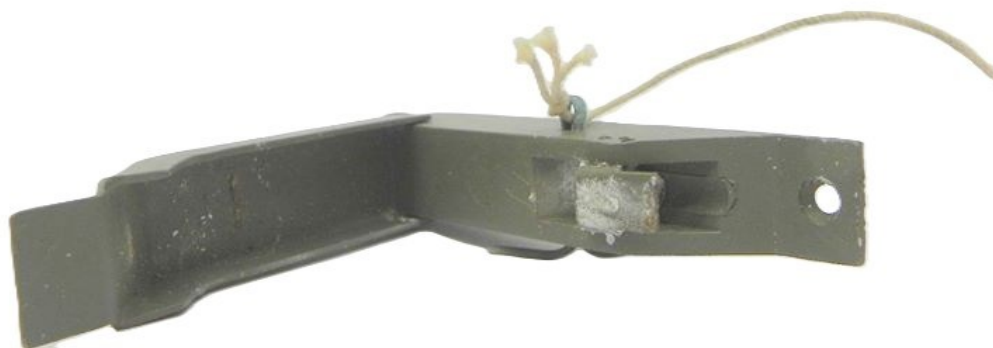
*No. 6 Firing Device*  
*Photo - B. Junier*

fastened in position. A lid is hinged at the threaded end and fits over the body. A sear is hinged at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the striker. When assembled, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker. The safety pin must be in place or the device will operate.

To use the firing device, a primer adapter is screwed in and a detonator (blasting cap) attached. The device is then inserted into a demolition charge, emplaced and camouflaged. An appropriate weight is placed on top of the pressure plate to ensure that it remains closed when the safety pin is removed. The safety pin is then carefully withdrawn, preferably remotely. The No. 6 is then fully armed.

When the restraining weight is removed, the striker stem pushes against the sear causing it to rotate, which pushes up the lid. When the sear has rotated far enough, the striker is released to fly forward under pressure of the spring to strike the cap in the primer adapter. The cap fires and initiates the attached detonator and demolition charge.

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*No. 6 Firing Device*  
*Photo - B. Junier*

# **POLSKA**

**(Poland)**





Type - Delay

Weight - 2.4 lbs. (1.1 kg)

Length - 4.9 in. (125 mm)

Width - 4.3 in. (110 mm)

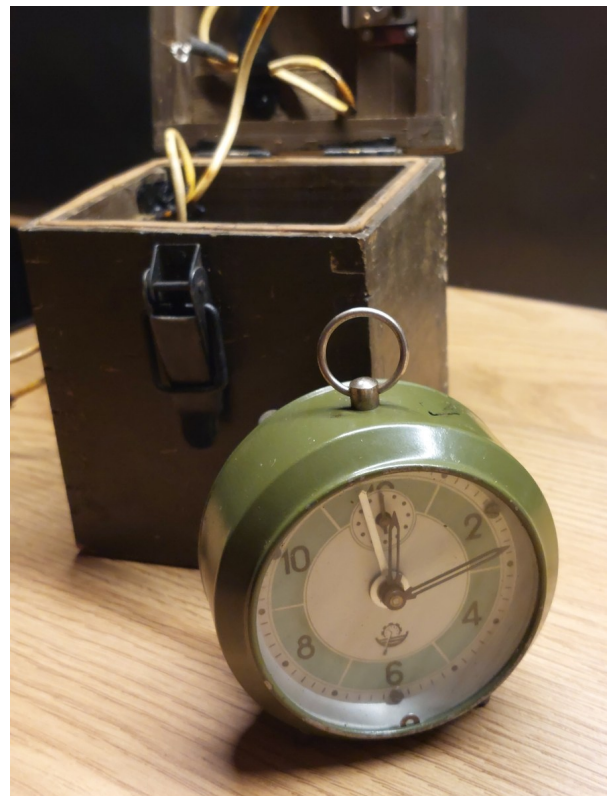
Height - 6.4 in. (165 mm)

The AL-1 is a mechanical clockwork-delay firing device. It was manufactured by Łódź (later Mera Poltik) Clock Factory in Łódź, Poland in the 1950s. It is housed in a wooden box and is capable of a 12-hour delay. It can be used as a time delay in conjunction with other firing devices and boobytraps. The required accessories appear to be: a battery, an electric detonator (blasting cap), and a demolition charge.

No other technical details are currently available.



*AL-1 Firing Device  
Photo - Pipalabutana*



*AL-1 Firing Device  
Photos - Pipalabutana*

Type - Delay

Weight - 31.6 oz. (897 g)

Diameter - 3.8 in. (99 mm)

Height - 3.4 in. (87 mm)

This is a mechanical clockwork-delay firing device. It was manufactured by Łódź (later Mera Poltik) Clock Factory in Łódź, Poland in the 1950s. It is capable of a ten day delay, and is similar to several of the Soviet ChMV and ChZ series of firing devices. It is designed to initiate an electrical circuit. The required accessories appear to be: a battery, an electric detonator (blasting cap), and a demolition charge.



*ZD-10 Delay Firing Device  
Photo - M. Salamonowicz*

The device consists of a round body constructed of steel. There are two electrical leads that protrude from the body. There is also a removable steel lid that is secured to the body by a clamp assembly. It has a rubber "O" ring, which may indicate a certain degree of water resistance. A winding key is normally found secured to the clamp assembly by a cord. The bottom of the device has a clock-winding port covered by a screw cap. The device is painted an olive green, very similar to other munitions from the Warsaw Pact era.

To use the ZD-10, the clamp assembly is removed along with the lid. The delay time is adjusted according to the notations on the clock face that translate as follows: "Press the dial and adjust the pointer using the sharp edges" (upper note), and "Clear the disc by moving it in the direction of the arrow" (lower note). Once the delay time has been set, the lid is replaced and clamped down. The screw cap on the bottom is removed and the key used to wind the internal clock mechanism. A ticking sound should immediately be heard, otherwise the device is defective. The ZD-10, along with attached demolition charge and power source, are then emplaced and camouflaged. 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 attached explosive charge.



*ZD-10 Delay Firing Device (clock face)  
Photo - G. Zahaczewsky*



*ZD-10 Delay Firing Device (bottom view)  
Photo - G. Zahaczewsky*



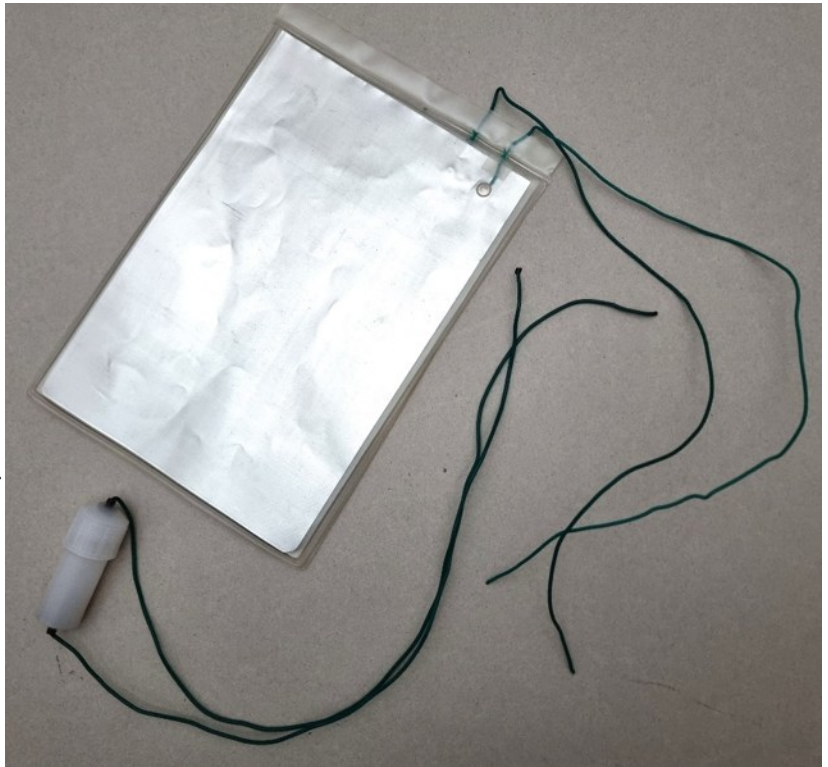
**ZPe-1**  
**(Zwieracz Plytkowy ZPe-1)**

**Poland**

Type - Anti Handling  
Weight - 5.3 oz. (150 g)  
Length - 12.6 in. (322 mm)  
Width - 8.75 in. (222 mm)  
Height - 0.083 in. (1.5 mm)

The ZPe-1 is designed to discourage the clearance of minefields by prodding (probing) for mines.

It consists of two aluminum foil sheets, a plastic bag, sheet of paper, battery with container, and wire. Each aluminum foil sheet has a 2 ft. (600 mm) piece of wire attached to it. One wire is attached to the moisture proof battery container, the other is loose. A sheet of paper placed between the two sheets of aluminum foil acts as an insulator. Once assembled the sheets are inserted in a plastic bag with the wires protruding and sealed against moisture.



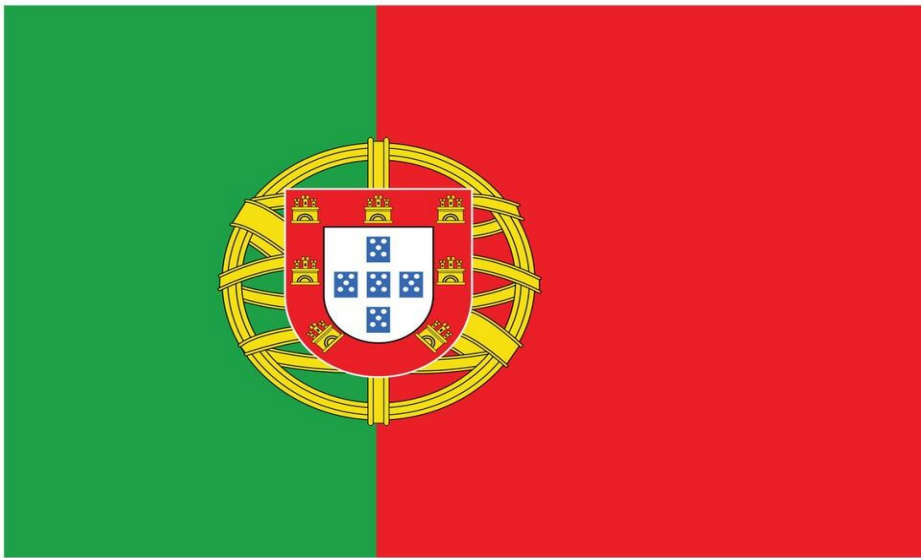
*ZPe-1 Firing device*  
*Photo - D.J. Harms*

The device can be used with a bounding mine or any other type of charge that can be detonated by an electric detonator. For use a 1.5 volt battery is inserted into the battery container. The wires are connected to an electrically fired flash tube if used with the bounding mine, or an electric detonator for any other explosive charge. The charge and ZPe-1 are then buried and concealed just like any other mine.

If the minefield is being cleared by prodding (probing), a mine prod (probe) will penetrate the plastic cover and the aluminum sheets to complete the electrical circuit and initiate the charge.

# PORTUGAL

(Portugal)





Type - Pressure

Weight - 2.8 oz. (80 g)

Length - 3.3 in. (86 mm)

Height - 1.1 in. (29mm)

Width - 0.5 in. (12.7 mm)

The T251 is a pressure-type firing device that is very similar to the US M1A1 and Dutch Nr. 16 pressure firing devices. Its primary use is as a boobytrap. A modified version was exported to Iraq and designated as "Switch, Pressure, No. 5."

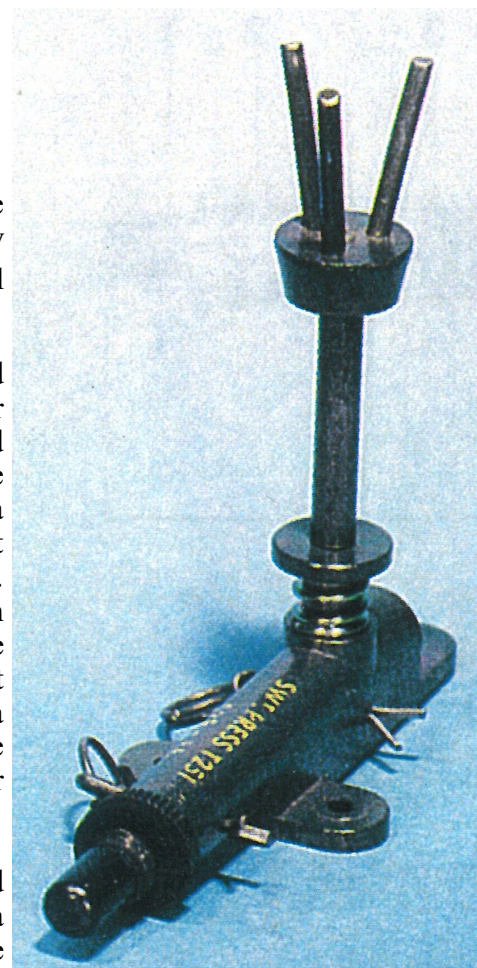
The device consists of a body, spring-loaded pressure plunger, and a primer holder. It is tubular in shape with a flattened base for about half the length. Protruding from the base are three tabs used to fasten the device in place. A hole in the top of the body fits the pressure plunger. The striker has a firing pin head at one end and a groove in the shaft at the other end. The pressure head has a flat top with a shaft on the bottom and a threaded hole in the top. There is a keyhole in the lower portion of the shaft. The safety pin fits through the body and through a hole in the bottom of the pressure head. There is also a positive safety pin through the front part of the firing device body. The primer holder is similar to a US base coupler, but threading is different. Alternatively, the primer holder can be replaced by a complete percussion detonator assembly.

When assembled, the striker and spring are inserted into and pressed into the body so the shaft of the striker passes through a small hole in the back that connects to the hole in the top of the body. The pressure head with spring are pushed down so the shaft of the striker fits through the large upper hole in the keyhole. Once the shaft of the striker has pushed through, the pressure head is released so that the small portion of the keyhole engages in the groove in the striker shaft. This holds the striker back in the cocked position. A safety pin fits through a set of holes in the body and through a hole in bottom of the pressure head shaft. A positive safety pin is fitted through holes in the side of the body in front of the striker.

The device is supplied with an extension rod and three-pronged adapter. The rod is externally threaded on the bottom to fit the pressure head and internally at the top to fit the adapter. The three-pronged adapter has a base with threaded nipple on the bottom and three prongs protruding from the top. The adapter can be screwed directly onto the pressure head or can be attached to the extension rod which is then screwed onto the pressure head.

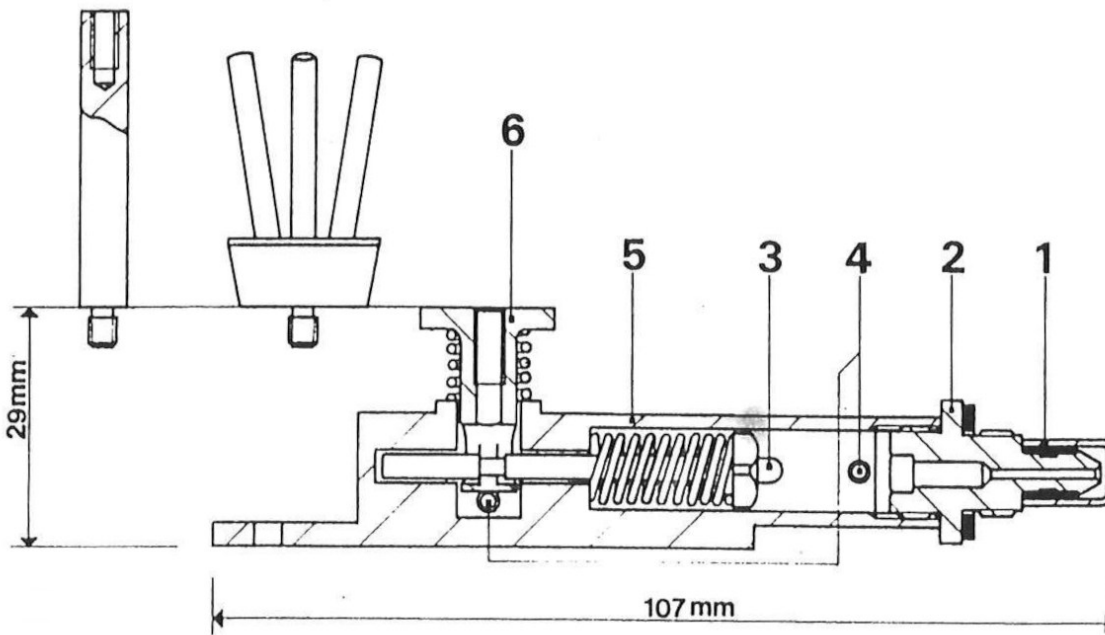
The device is painted Olive green with markings in yellow. Markings give the designation, manufacturer, and lot number.

These devices could also be supplied with adapters to replace the primer holder and allow the use of safety or instantaneous fuse.



*T251 Firing Device  
Photo - Sociedad Portuguesa de  
Explosivos, SA (SPE)*

To use the firing device, a primer adapter with an attached detonator (blasting cap) is screwed into the end of the T251. The device is then attached to a demolition charge, and both are emplaced and camouflaged. The safety pin and the positive safety pin are then carefully removed, preferably remotely. The T251 is then fully armed. A pressure in excess of 22 lbs. (10 kg) will force the pressure plunger down, releasing the spring-loaded striker to initiate the percussion cap in the primer adapter. This, in turn, initiates the detonator and the attached demolition charge.



*T251 (internal diagram)*

*1 - Protective Cap, 2 - Primer adapter, 3 - Striker, 4 - Safety Pin, 5 - Body, 6 - Pressure Head*

Type - Pull

Weight - 2.1 oz. (60 g)

Length - 3.8 in. (98 mm)

Diameter - 0.6 in. (16 mm)

The T252 is a pull-type firing device used in boobytraps similar in appearance to the US M1 pull firing device, but operating differently. The T252 was also manufactured for export to Iraq and were designated "Switch, Pull, No. 4."



*T252 Firing Device*

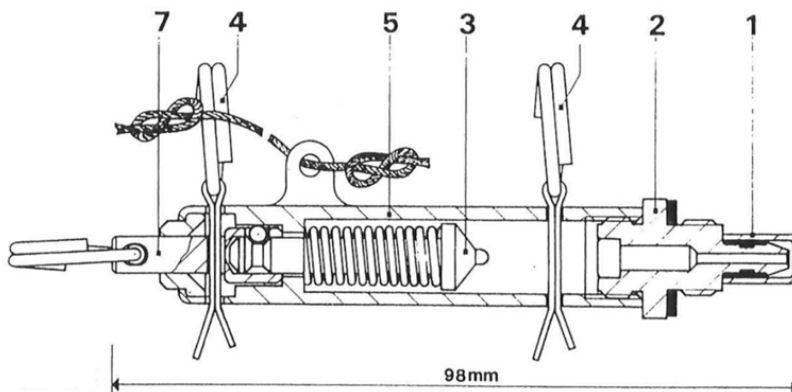
*Photo - Sociedad Portuguesa de Explosivos, SA (SPE)*

The firing device is of aluminum construction. The main body is cylindrical with the interior divided into two chambers. There is a fastening lug cast onto the body about one third the way from the top. The lower chamber is internally threaded at the bottom end to accept a primer adapter and contains the striker and striker spring. The striker has a head with firing pin on the bottom end and a groove around the top. The upper chamber has a small portion at the bottom and larger portion at top containing the striker release assembly. The release assembly consists of a shaft with a cup at the bottom end and a small ball bearing. There is a hole in the side of the cup to fit the bearing. A pull ring fits through a hole at the end of the shaft. A positive safety pin fits through the body just above the threading. The safety pin fits through the head and pull shaft at the top of the device. The primer holder is similar to a US base coupler, but threading is different. Alternatively, the primer holder can be replaced by a complete percussion detonator assembly. The T252 is normally painted olive green with markings in yellow giving the designation, manufacturer, and year of manufacture.

When assembled, the striker and striker spring are inserted from the bottom with the striker shaft fitting through a hole between the upper and lower chambers. The striker is pushed up, compressing the spring, until the cup on the release assembly can fit over the end. The ball bearing is placed in the hole in the side of the cup and engages the groove in the striker shaft. The striker is allowed to move down, drawing the cup into the smaller portion of the upper chamber. The wall of the chamber holds the ball in place in the hole and groove preventing the striker from releasing.

To use the firing device, a primer holder with an attached detonator (blasting cap) is inserted into a mine or demolition charge. Both are then emplaced and camouflaged. A slack tripwire is then laid and attached to the T252. The two safety pins are removed to fully arm the device. When a pull of 7.7 lbs. (3.5 kg) is applied to the wire, it pulls the shaft of the release assembly outwards. This also pulls the striker up further compressing the spring. When the cup is pulled free of the small portion of the upper chamber, the ball can escape into the larger portion of the chamber. When the ball escapes the

striker under pressure from the spring is driven down into the primer in the primer holder. The primer flashes into the detonator to fire the main charge.



*T252 Firing Device*

*1 - Protective cap, 2 - Primer holder, 3 - Striker, 4 - Safety pin, 5 - Body, 7 - Pull Pin*



## Switch, Release, T254

Portugal

Type - Pressure-Release  
Weight - 1.2 oz. (35 g)  
Length - 4.2 in. (107 mm)  
Width - 0.6 in. (16 mm)

The T254 is a pressure-release firing device intended for use as a boobytrap. It is very similar in appearance and function to the British No. 6, Mk I release switch, as well as pressure-release

devices from at least eleven other countries. The T254 was also manufactured for export to Iraq as a "Switch, Pressure, No. 6."

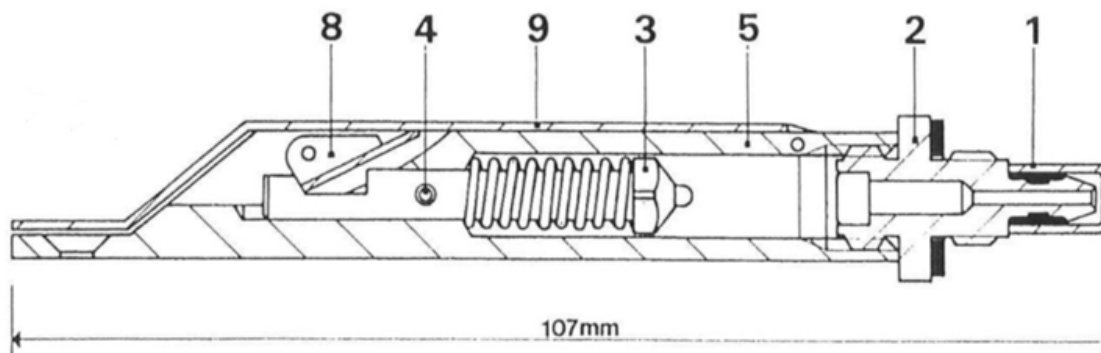


*T254 Firing Device*  
*Photo - Sociedad Portuguesa de Explosivos, SA (SPE)*

The firing device consists of an aluminum alloy body threaded at one end to receive a primer holder. The other end has a flat section so it can be inserted into narrow openings. A hole drilled in the flattened end enables the switch to be fastened in position. A pressure plate hinged at the threaded end fits over the body. The sear is hinged at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and another through the striker. The primer holder is similar to a US base coupler, but threading is different. Alternatively, the primer holder can be replaced by a complete percussion detonator assembly. These devices could also be supplied with adapters to replace the primer holder and allow the use of safety or instantaneous fuse.

When assembled, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker in the cocked position. The safety pin must be put in place or the switch will operate.

To use the firing device, a primer adapter with an attached detonator (blasting cap) is screwed into the end of the T254. The device is then inserted into a demolition charge, and both are emplaced and camouflaged. A weight of at least 3.3 lbs. (1.5 kg) is placed on top of the pressure plate. The safety pin is then carefully withdrawn, preferably remotely. The T254 is then fully armed. If the weight is removed the hinged pressure plate moves upward, releasing the firing pin to impact the percussion cap in the primer adapter, which then initiates the attached detonator and demolition charge.



*T254 Firing Device (internal diagram)*  
*1 - Protective cap, 2 - Primer holder, 3 - Striker, 4 - Safety pin, 5 - Body, 8 - Sear, 9 - Cover*



# RHODESIA

(Rhodesia)



## Mk I Switch

Rhodesia

Type - Pull

Weight - 1.2 oz. (36 g)

Length - 2.8 in. (72 mm)

Diameter - 0.4 in. (11 mm)

The Mk I is a pull-type firing device primarily designed for use as an antipersonnel mine fuze. It is similar in appearance and function to the British No. 4 pull firing device. It can also be used as a boobytrap in a mine or demolition charge.

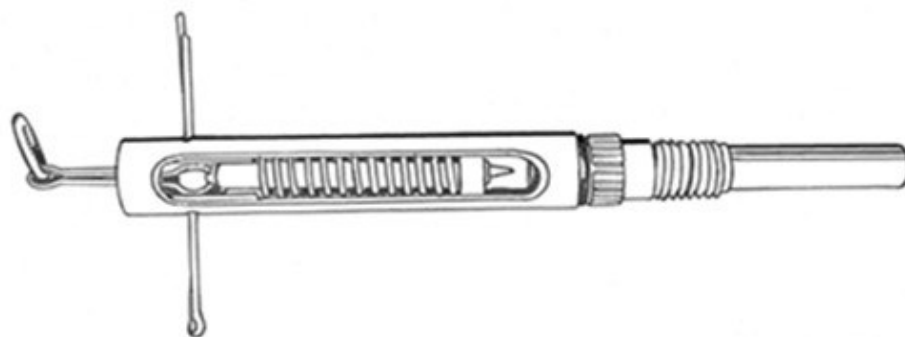
The firing device consists of a one-piece, cylindrical brass or aluminum body, which is painted a matte black. There are no markings on the Mk I. One end is threaded externally to accept a screw-on detonator assembly, while the other end has a hole to accept the striker assembly. There are two holes in the body to accept the primary safety pin (that holds the striker assembly in position) and the secondary safety pin that blocks the firing pin from striking the percussion cap of an attached snout assembly. An earlier version of the device did not have a secondary safety pin. The body contains the striker assembly, which consists of a striker (firing pin), a striker spring, and a clasp that protrudes from the top of the device.

To use the Mk I, a snout adapter is screwed into the threaded end of the firing device. According to Rhodesian practices at the time, the device was then anchored to a stake and a tripwire was attached to the clasp at the top of the Mk I. The tripwire was pulled tight until the safety pin in the primary hole was loose and easy to remove. A detonator (blasting cap) was then inserted into the open end of the snout adapter, and it was then inserted into a mine or demolition charge. In later versions of the Mk I, the secondary safety pin was examined to ensure freedom of movement. If it was free to move, it was removed and the device was then fully armed. (If the secondary safety pin was difficult to remove, it meant that the tension on the tripwire had slackened causing the striker assembly to move forward. Removal of the pin in this state could have resulted in a premature detonation.) The device and attached mine, or demolition charge, were then carefully camouflaged.

When a pressure of 9-13 lbs. (4-6 kg) was applied to the tripwire, the striker assembly would move rearwards, compressing the striker spring. The striker was restrained by means of a clasp that fit around a ball at the top of the striker. When the striker assembly moved sufficiently rearward, the clasp exited the confines of the firing device body and immediately opened, releasing the ball secured to the end of the striker, allowing it to move forward under spring compression and impact the percussion cap in the snout assembly, thereby initiating the attached mine or demolition charge.



*Mk I Firing Device  
Photo - B. Gravett*



*Mk I Firing Device (cutaway)  
Image - B. Gravett*

Type - Pull/Tension-Release  
Weight - 0.9 oz. (26 g)  
Length - 4.5 in. (115 mm)  
Diameter - 0.4 in. (11 mm)

The Mk II is a pull or tension-release type firing device primarily designed for use as an antipersonnel mine fuze. It was designed to replace the Mk I firing device, which had become easy to defeat. It can also be employed as a boobytrap in a mine or demolition charge.



*Mk II Switch*

The firing device consists of a one-piece, cylindrical aluminum body, which is painted a matte black. There are no markings on the Mk II. One end is threaded internally to accept a snout adapter, while the other end has a hole to accept the striker assembly. There are two holes in the body to accept two safety pins. In the case of the Mk II, the primary safety consists of a pin inserted through an elongated slot in the middle of the body that retains the device under spring tension by means of a hole through the head of the striker (firing pin). The secondary safety consists of a pin inserted into a second hole in the body of the device. This safety pin prevents the striker from reaching the percussion cap in the snout adapter should the device activate. The body contains the striker assembly, which consists of a striker, a striker spring, and a clasp that protrudes from the top of the device.

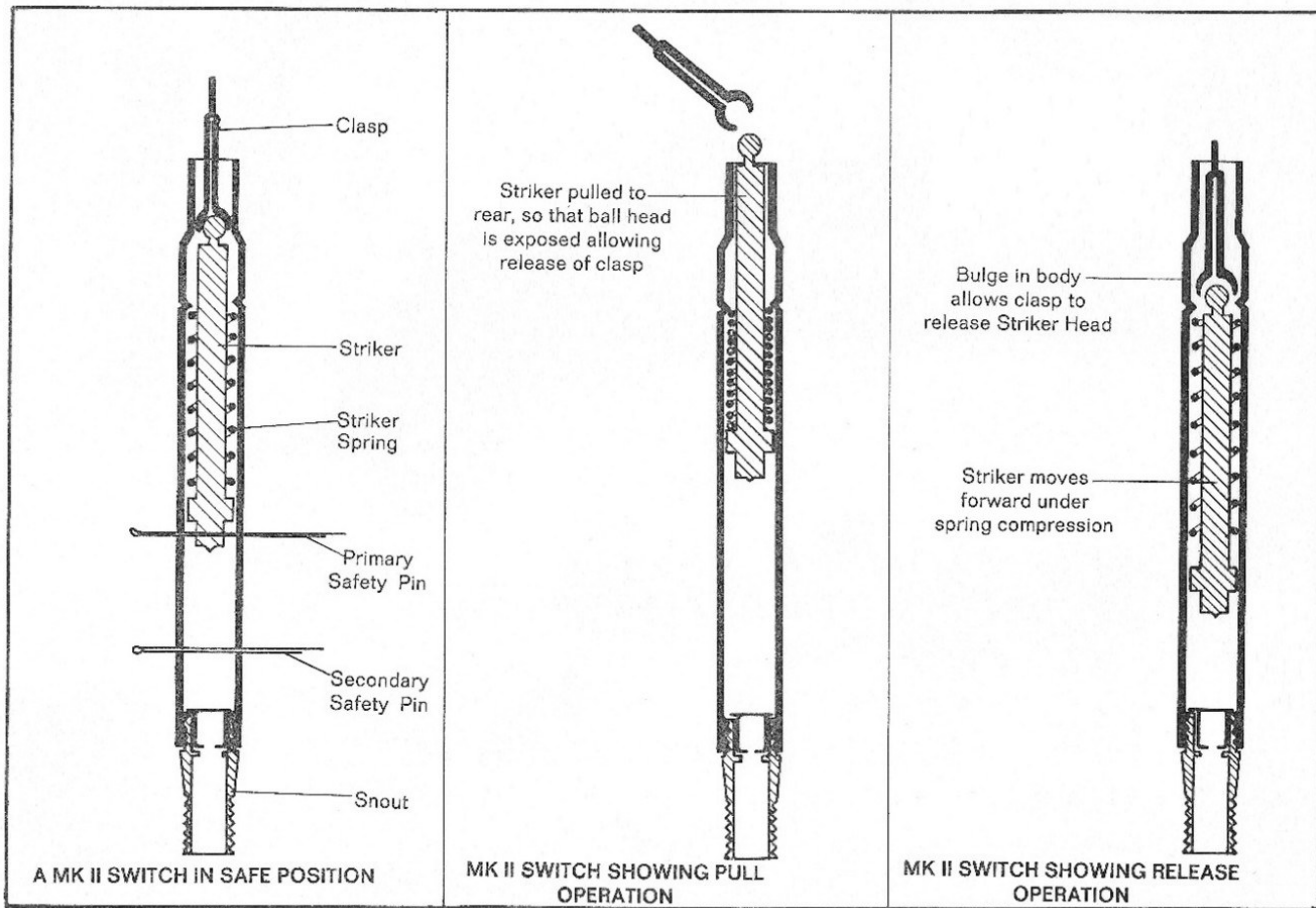
To use the Mk II, a snout adapter was screwed into the threaded end of the firing device. According to Rhodesian practices at the time, the device was then anchored to a stake and a tripwire was attached to the clasp at the top of the Mk II. The tripwire was pulled tight until the primary safety pin was in the centre of the elongated slot. The primary safety pin was then removed. A detonator (blasting cap) was then inserted into the open end of the snout assembly, and the Mk II was inserted into a mine or demolition charge. The firing device was then examined to ensure the firing pin was visible in the elongated slot. If the striker spring was visible, the tension-release had functioned and the secondary safety pin was not removed. If the firing pin was visible, the device was ready to be emplaced. The Mk II and attached mine, or demolition charge, were then carefully camouflaged. The final step was to check the secondary safety pin and, if loose, it was removed, preferably remotely.

When a pressure of 9-13 lbs. (4-6 kg) was applied to the tripwire, the striker assembly would move rearwards, compressing the striker spring. The striker was restrained by means of a clasp which fit around a ball at the top of the firing pin. When the striker assembly moved sufficiently rearward, the clasp exited the confines of the firing device body and immediately opened, releasing the ball secured to the end of the striker. This allowed it to move forward under spring compression and impact the percussion cap in the snout adapter, thereby initiating the attached mine or demolition charge.



*Mk II Switch*

Alternatively, once the tripwire is attached and taut, any slackening of the trip wire exceeding 0.2 in. (6 mm) will cause the clasp to release the striker resulting in a detonation. This occurs because the clasp retaining the ball of the striker is housed in the rear of the barrel. When the Mk II is armed, there is an expansion cavity 0.2 in. (6 mm) in front of the ball held by the clasp. Upon release of the tripwire (either gradually or suddenly) the striker moves forward under spring compression. At the same time, the clasp retaining the striker reaches the expansion cavity and the washer on the clamp reaches the end of the mechanism. The clasp is held in that position by the washer and releases the ball of the striker, allowing it to move forward and strike the percussion cap in the snout adapter, which initiates the attached mine or demolition charge.



*Mk II Firing Device (functioning)*  
*Image - B. Gravett*



# ROMÂNIA

(Romania)



Type - Pressure-Release  
Weight - 22.2 oz. (630 g)  
Diameter - 4.3 in. (110 mm)  
Height - 2.5 in. (65 mm)

The Romanian MS-3 pressure-release firing device is an exact copy of the Soviet MS-3, which the Russians classified as a “surprise mine” that, in more practical terms, means boobytrap. It was manufactured by the Romanian company ROMTECHNICA in Bucharest.

The Russian MS-3 was specifically designed to serve as an anti-lift device for the 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.



*MS-3 Firing Device*

It is believed that the Romanian MS-3 has virtually the same configuration as the Russian PMN antipersonnel mine. It consists of a Bakelite plastic body, with a black rubber cover with a truncated cone in the centre 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 12 oz. (340 g) Trotyl (TNT) explosive charge. The firing device is normally brown in colour with a black rubber cap.

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 lbs. (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.

# **SUID-AFRIKA**

**(South Africa)**



Type - Anti-handling  
Weight - 4.2 oz. (120 g)  
Diameter - 3.9 in. (100 mm)  
Height - 3.1 in. (80 mm)

The Anti-lift Firing Device (ALD) is an add-on munition intended for the South African No. 8 antitank mine to provide an additional initiation, or antiremoval, feature. However, the ALD can also be used as a simple anti-lift boobytrap by simply initiating the arming process and then placing a 17.6 oz. (500 g) weight on top of it.



*ALD Firing Device*  
*Photo - C. King*

The ALD is mainly constructed of brown thermoplastic. Only the springs, ball bearings and the locking plate are metal. It contains a main explosive charge of 2.0 oz. (57 g) of PE-9. The fuzing mechanism (contains components similar to South African No. 8 AT mines and R2M2 AP mines) is positioned horizontally in the device and contains two lead shear wires that provide an arming delay when arming the device. The firing device contains the following explosive components:

Main Charge - 1.9 oz. (56 g) PE-9  
Booster Assembly - 0.1 oz. (3.0 g) Tetryl  
LZY Detonator - 0.02 oz. (0.65 g) Lead Azide and Tetryl

To prepare the firing device for operation, the split pin and arming key are removed, and the fuzing mechanism is rotated 90°, which compresses the spring on the striker assembly via a cam action and brings the detonator in line with the booster. This action cannot be reversed. This action also initiates the shear wire arming delay, which can be 20 minutes and up to 6 hours. This starts the arming process for the ALD, and it is now ready for emplacement.

To use the firing device, it is attached to the bayonet fitting in the base of the No. 8 antitank mine. The mine, with the ALD attached, is then emplaced and camouflaged. After the expiration of the lead shear wire arming delay, the firing device is fully armed. A minimum load of 17.6 oz. (500 g) is required to retain the ALD in the armed condition. Once the ALD is armed, it cannot be neutralized.



**M8926A1 DEV A  
(Device A Handling, M8926A1)**

**South Africa**

Type - Anti-handling  
Weight - 8.1 oz. (230 g)  
Diameter - 4.3 in. (110 mm)  
Height - 1.9 in. (50 mm)

The full designation of the M8926A1 is Device Anti-handling (DEV A). It is an add-on device that can be attached to antitank mines to provide an additional initiation, or antiremoval, feature. As such, it falls into the category of a boobytrap, or as the Russians are fond of saying, a “surprise mine.”

The M8926A1 is constructed of brown ABS plastic. The device incorporates an anti-handling sensor that will detonate the DEV A if it is tilted through an angle of 40°. The firing device contains the following explosive components:

Main Charge - 1.6 oz. (50 g) CH6  
ADFP 12 T)10 Electric Detonator - 0.003-0.004 oz.  
(110-117 mg) PETN



*M8926A1 Firing Device (fitted underneath a  
S. African No. 8 AT Mine)  
Photo - Mechem Consultants*

To prepare the firing device for operation, the plastic lid of the body housing is unscrewed. This exposes compartments for three AAA batteries, the centrally positioned main charge assembly, and the Self-Neutralize/Self-Destruct switch. The main charge has an electric detonator assembly (ADFP 12 TO10) directly below it. The operator then selects either Self-Neutralize or Self/Destruct by moving the switch to that option. Either feature will function when the battery reaches a low voltage level. The final step is to move the arming switch to ON. This initiates a five-minute arming delay to allow for safe handling. However, there is an additional 17 minutes to clear the area before the M8926A1 fully activates and is functional.

To use the firing device, a paper disc on top of the device is removed, which exposes a section of double-sided tape that is used to attach the M8926A1 to mines or other explosive devices. If the firing device is to be attached to the South African No. 8 AT mine, an M12A1 booster is secured to the lugs in the top centre of the device.

Once the M8926A1 is armed, it cannot be neutralized. The life expectancy of the batteries in the device is approximately 24 months after being deployed.

A later version of the DEV A was also produced and designated the M8943A1 Device Electronic Mine Initiator (DEMI). The two items differ in that the M8926A1 requires physical interaction with the device; i.e., tilting or lifting, while the M8943A1 contains a proximity (influence) sensor that detects a target and then detonates the device at the appropriate time.



*M8926A1 Firing Device  
Photo - Mechem Consultants*

**M8943A1 DEMI**  
**(Device, Electronic Mine Initiator, M8943A1)**

South Africa

Type - Anti-handling  
Weight - 17.6 oz. (500 g)  
Diameter - 4.7 in. (120 mm)  
Height - 3.1 in. (79.5 mm)

The full designation of the M8943A1 is the Device Electronic Mine Initiator (DEMI). It is an add-on device that can be attached to antitank mines to provide an additional initiation, or antiremoval, feature. As such, it falls into the category of a boobytrap, or as the Russians are fond of saying, a “surprise mine.”

The M8943A1 is constructed of brown ABS plastic and can be initiated without direct contact. The firing device incorporates a seismic feature that “wakes up” the DEMI and activates a magnetic sensor upon detection of an approaching vehicle. The magnetic sensor then detonates the mine under the vulnerable underbelly of the vehicle. However, the device also incorporates anti-handling sensors that will detonate the DEMI if detecting any tilting, movement, or magnetic field disturbance.

This includes the use of most mine detectors and is intended to be a deterrent to demining or mine clearance. The firing device contains the following explosive components:

M24A1 Main Charge - 1.6 oz. (45.5 g) CH6  
M12A1 Booster Charge - 0.1 oz. (3.0 g) Tetryl  
ADFP 12 T)10 Electric Detonator - 0.003-0.004 oz. (110-117 mg) PETN

To prepare the firing device for operation, the plastic lid of the body housing is unscrewed. This exposes compartments for four batteries, the centrally positioned M24A1 main charge assembly, an ON/OFF arming switch, a green light emitting diode, and the Self-Neutralize/Self-Destruct switch. The M24A1 booster has an electric detonator assembly (ADFP 12 TO10) directly below it. The ADFP 12 TO10 is connected to the electronics section that contains the vibration sensor.

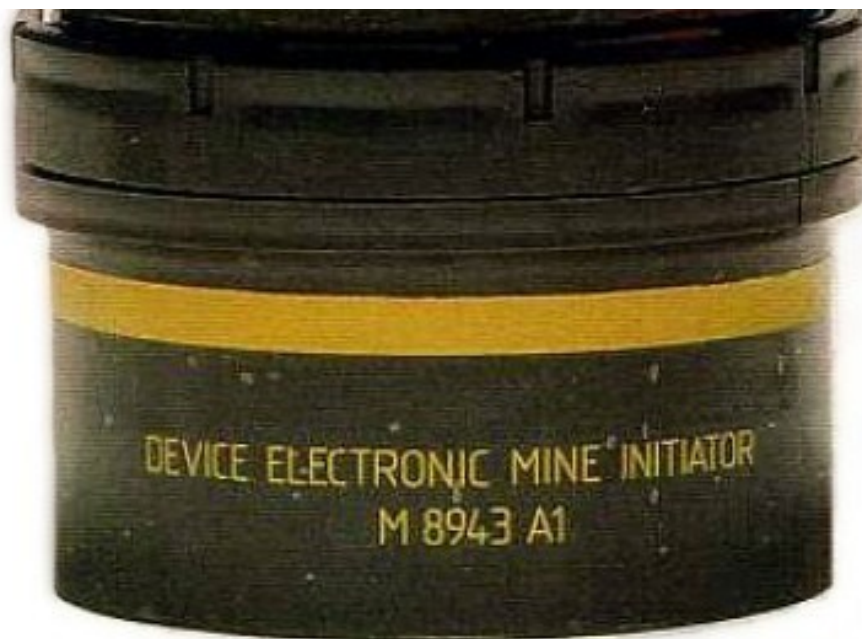
To use the firing device, a paper disc on top of the device is removed, which exposes a section of double-sided tape that is used to attach the M8943A1 to mines or other explosive devices. Four 6LR61 9V batteries are placed in their respective wells and secured by a plastic locking ring. The operator then selects either Self-Neutralize or Self/Destruct by moving the switch to that option. Either feature will function when the battery reaches a low voltage level. The final step is to move the arming switch to ON. This initiates a five-minute arming delay to allow for safe handling. However, there is an additional ten minutes to clear the area before the M8943A1 fully activates and is functional. If the firing device is to be attached to the South African No. 8 AT mine, an M12A1 booster is secured to the lugs in the top centre of the device.

Once the M8943A1 is armed, it cannot be neutralized. The life expectancy of the batteries in the device is approximately 24 months after being deployed. The device is waterproof to a depth of 8 in. (20 cm).



*M8943A1 Firing Device (fitted underneath a S. African  
No. 8 AT Mine)  
Photo - Mechem Consultants*

An earlier version of the DEMI was also produced and designated the M8926A1 Device Anti-handling (DEV A). The two items differ in that the M8926A1 requires physical interaction with the device; i.e., tilting or lifting, while the M8943A1 contains a proximity (influence) sensor that detects a target and then detonates the device at the appropriate time.



*M8943A1 Firing Device  
Photo - Mechem Consultants*



## Type - Pull

This is a direct copy of the British No. 4, Mk I switch. Other than the markings, they appear identical. The primary use of the device is as a boobytrap.

The device consists of a brass body with a mounting bracket attached near the bottom end. The bottom end is internally threaded to accept a fuse adapter. The top end has two slots opposite each other and has an internal constriction in the body at the bottom end of the slots. The striker has a shoulder and firing pin formed at the bottom end and a rounded head at the top. A safety pin hole is drilled through the rounded head. A U-shaped clip is made so that cups at the ends of the "U" can close over the rounded head. The safety pin has a cord attached.



*No. 4 Mk I Firing Device*

When assembled, the striker and striker spring are inserted through the bottom of the body and forced up through the constriction so the head protrudes past the top of the body. The striker spring is compressed at the same time. The U-shaped clip is put over the head of the striker and the striker allowed to move back into the body. The wall of the body will hold the clip closed restraining the striker in the cocked position. A safety pin is inserted through the slots in the side of the body and through the hole in the striker head to ensure the device remains safe. The body is unpainted with what appears to be a label giving the designation and lot number applied to the side.

When the device is set with a trip wire, tension is put on the line to draw back on the clip until the safety pin is near the centre of the elongated slots and can be removed easily. With the safety pin removed, a pressure of 6 - 8 lbs. (2.7 - 3.6 kg) applied to the trip wire will draw the U-shaped clip and striker with it, out of the body. When the clip clears the top end of the body it will open enough to release the striker. The striker under pressure of the striker spring is driven down to strike the percussion cap and initiate the device.

It appears that there is a variant of the No. 4 device believed to be South African. The variant is longer and does not have the slot for the safety pin. There is a positive safety pin at the opposite end and the mounting bracket is located in the centre of the body.

No other information on this variant is currently available.



*No. 4 Mk. I (possible variant)*

*(Note the location of the mounting bracket, positive safety pin and lack of a slot for the safety pin.)*



## Type - Pressure

This firing device appears to be a direct copy of the British No. 5, Mk. I switch. Any differences between the devices appear to be minor. It is primarily intended to be used as a boobytrap.

The device consists of a steel case with a hinged steel lid fitting inside the case. The lid has a hole in the centre that is threaded to screw an extension into. There are two holes in the bottom of the case for use in securing the device. Two studs on the bottom of the case keep the sear springs in position. A body is fixed inside the case by a countersunk bolt. The end of the body is threaded to accept a primer holder. 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 used 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.



*No. 5 Firing Device*

An extension rod is made in two parts, a socket that screws into the top of the lid and a steel rod that screws into the socket. The extension 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. The device is painted green with markings in black. Markings provide the designation and lot number.

When the firing 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 with the position the pressure is applied on the lid. When pressure is applied to the device the lid presses down on the pressure points of 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.

## Type - Pressure-Release

This appears to be a direct copy of the British No. 6 Mk I release switch, No. 6. It is very similar in appearance and function to pressure-release firing devices from at least eleven other countries. Its primary use is as a boobytrap mechanism.

The switch consists of a body threaded at one end to receive a fuse adapter. The other end is flattened to allow it to be inserted into narrow openings.

A hole drilled in the flattened end enabling it to be fastened into position. A steel pressure plate is hinged at the threaded end and fits over the body. A sear is hinged in a pocket at the opposite end. The striker is formed with a shoulder and firing pin at one end and a detent cut on the other. A safety pin hole is drilled through the body and a corresponding hole through the striker. The safety pin has a cord attached.



*No. 6 R1M1 Firing Device*

The device is painted olive green with black markings indicating the designation and lot number.

When assembled, the striker and striker spring are inserted in the threaded end with the detent facing up. The striker is pushed back until the sear engages in the detent and holds the striker in position. The safety pin must be put in place or the switch will operate.

To prepare the device for use, it is attached to a demolition charge and a weight is placed on the pressure lid. That forces the plate and sear down, which moves the striker back slightly and takes pressure off the safety pin. The safety pin can then be easily removed without force. If the safety pin cannot be removed easily the device is not properly set. When the weight is removed, the striker stem pushes against the sear causing it to rotate pushing up the pressure plate. When the sear has rotated enough, the striker is released to fly forward under pressure of its spring to strike the cap in the fuse adapter. The cap fires and either initiates a detonator (blasting cap) or ignites an attached fuse.

## **South African - UNITA Firing Devices**

UNITA was the second-largest political party in Angola. Founded in 1966, UNITA fought alongside the People's Movement for the Liberation of Angola (MPLA) and the National Liberation Front of Angola (FNLA) in the Angolan War for Independence (1961–1975) and then against the MPLA in the ensuing civil war (1975–2002).

The war was one of the most prominent Cold War proxy wars, with UNITA receiving military aid initially from the People's Republic of China from 1966 until October 1975 and then later from the United States and South Africa, while the MPLA received material and technical support from the Soviet Union and its allies, especially Cuba. UNITA fought against the MPLA, the ruling party after Angola's independence from Portugal in 1975, supported by the United States and South Africa during the Cold War.

In addition to other support, South Africa supplied the following six firing devices to UNITA.

## PRANK

South Africa

Type - Pressure/Pressure-Release

Weight - 0.7 oz. (20 g)

Length - 2.7 in. (70 mm)

Diameter - 1.5 in. (40 mm)

Height - 1.5 in. (40 mm)

The PRANK (also nicknamed “Toe Popper”) is a boobytrap mechanism designed to initiate mines and demolition charges by either pressure or pressure-release. These were supplied by South Africa to UNITA forces operating in Angola.

The PRANK consists of a molded black/brown/red plastic body with a pressure plunger (“Poppet”), spring-loaded striker housed in a plastic tube, a lead-shear (metal fatigue) delay mechanism, and an “Apex” screw-in detonator. The device base has a continuous channel in which the plastic striker sleeve the cocked striker, the delay to arm mechanism and the detonator are fitted. The sleeve has a thin groove that accommodates the retaining pin. The detonator assembly has a hole through it where Cordtex (detonating cord) is threaded through. The detonator is screwed into the threaded fuze well on one side of the sleeve while the other end of the sleeve accommodates the arming delay, lead shear mechanism. The pressure plate has a continuous deep groove which accommodates the continuous plastic sleeve. The retaining pin is fitted into one of two notches in the body. There are two pairs of slots. If the pin is fitted in the upper slot, the device is prepared as a pressure device, if the pin is fitted in the lower slot, the device is prepared as a pressure release device. The two parts of the “Toe Popper” are kept apart with two steel springs. The role of these springs is to press the pressure plate upwards. A safety pin is fitted through a hole in both upper and lower parts of the body and the fuze sleeve. When the safety pin is inserted, it prevents the spring loaded striker from moving forward into the armed position where it rests against one of the two the retaining pins.



*PRANK Firing Device*

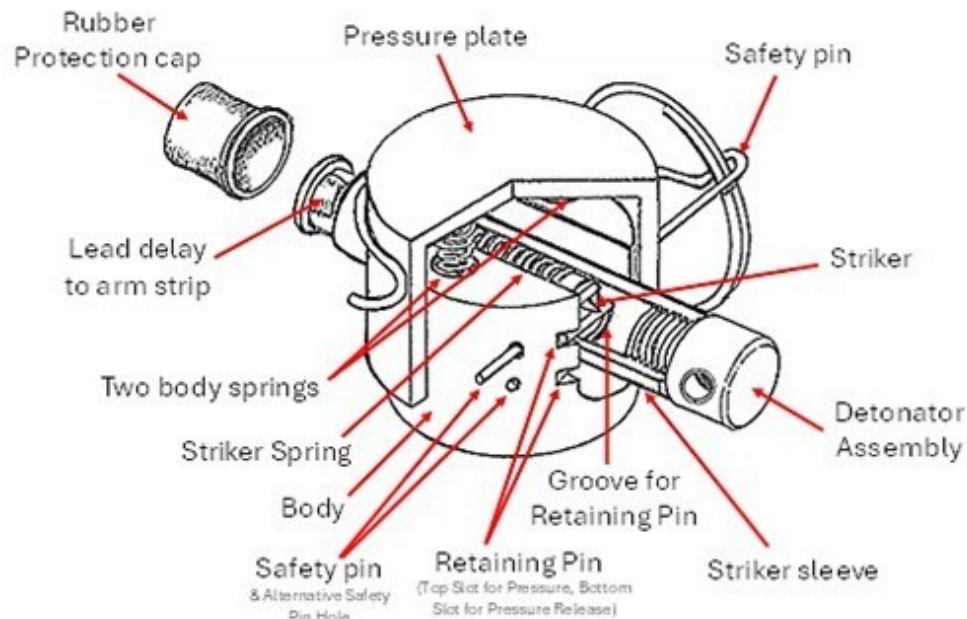
The delay mechanism consists of a thin steel wire which has a lead strip through it. The steel wire is attached to a spring loaded striker and when the arming pin is pulled out, it allows the striker to be forced forwards followed by the wire which is slowly shearing/cutting through the soft lead strip (same as in the PMN landmine).

To prepare the device for use, the “Apex” detonator is installed and connected to a length of Cordtex, if desired. The PRANK and charge are emplaced and camouflaged. The safety pin is removed from the side of the assembly that will initiate the lead-shear delay mechanism, which will last at least five minutes. Once the lead strip has been sheared, the face of the striker will be solely held in check by the retaining bar. When used by UNITA forces in Angola, the PRANK was connected to other firing devices by using Cordtex.

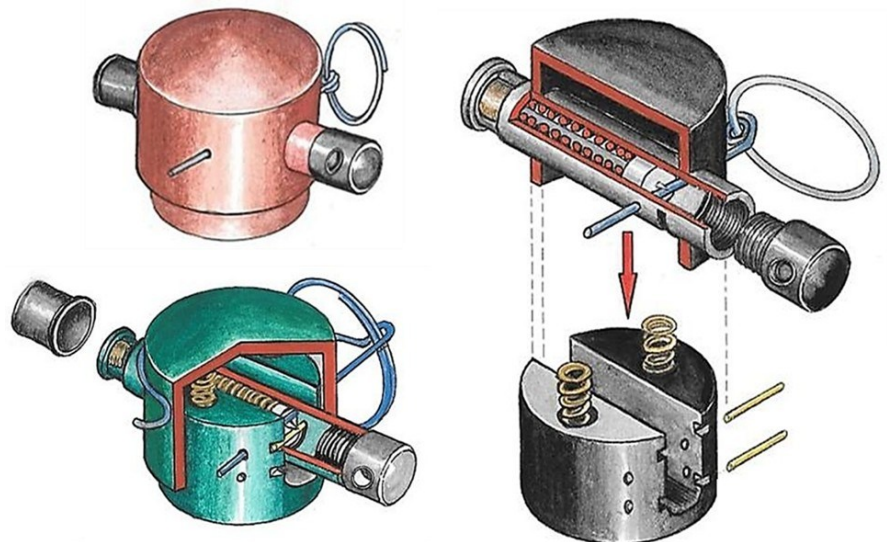
In the pressure mode, when a minimum of 11 lbs. (5 kg) is applied, it depresses it, moving the central sleeve downwards until the retaining pin drops off the face of the striker and the cocked striker is released. The striker functions the detonator that then initiates the Cordtex attached to the detonator assembly.



The device can also be used in the pressure-release mode by first unscrewing and removing the detonator assembly. The safety pin is then removed to allow the lead-shear delay mechanism to function. After the lead delay has been sheared, the pressure plate is depressed, which allows the striker to shoot through the open detonator well and out of the device. This then makes it possible to separate the pressure plate from the body. After separating the pressure plate from the body, it is now possible to remove the retaining pin from the lower slot and fit it in the upper slot inside the device. When the spring-loaded pressure plate is replaced, the cocked striker can be inserted through the detonator well by pushing it in with a pencil, or similar instrument. When the striker is loaded, the safety pin should be re-inserted. When arming the "Toe Popper" in this mode, and removing the safety pin again, the depressing of the pressure plate with a weight will result in the striker being locked by the newly positioned upper retaining pin. When the pressure on the pressure plate is released, the sleeve with the retaining pin moves upwards releasing the striker and initiating the device.



*PRANK Firing Device (internal diagram)  
Image - US Department of Defense*



*PRANK Firing Device  
Image - B. Gravett*

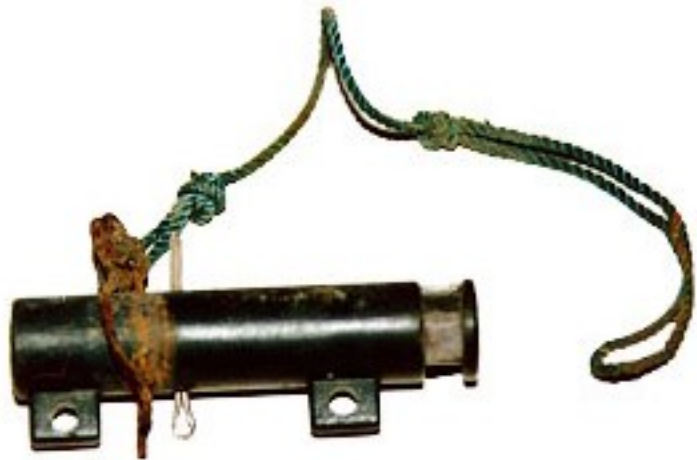
Type - Pull

Length - 2.7 in. (70 mm)

Diameter - 0.6 in. (15 mm)

The PUFF is a boobytrap mechanism designed to initiate mines and demolition charges by pull. These were supplied by South Africa to UNITA forces operating in Angola.

The PUFF consists of a cylindrical molded plastic body with a spring-loaded striker housed, a lead-shear (metal fatigue) delay mechanism, and an "Apex" screw-in detonator assembly. The "Apex" has a hole through it where Cordtex (detonating cord) is threaded through. The detonator is screwed into the threaded fuze well on one side of the sleeve while the other end of the sleeve accommodates the arming delay, lead shear mechanism. The device body has both an arming pin, as well as a pull (firing) pin. The delay mechanism consists of a thin steel wire which has a lead strip through it. The steel wire is attached to a spring loaded striker and when the arming pin is pulled out, it allows the striker to be forced forwards followed by the wire which is slowly shearing/cutting through the soft lead strip (same as in the PMN landmine). The PUFF also has two lugs on its body that are used to fix the device in place.

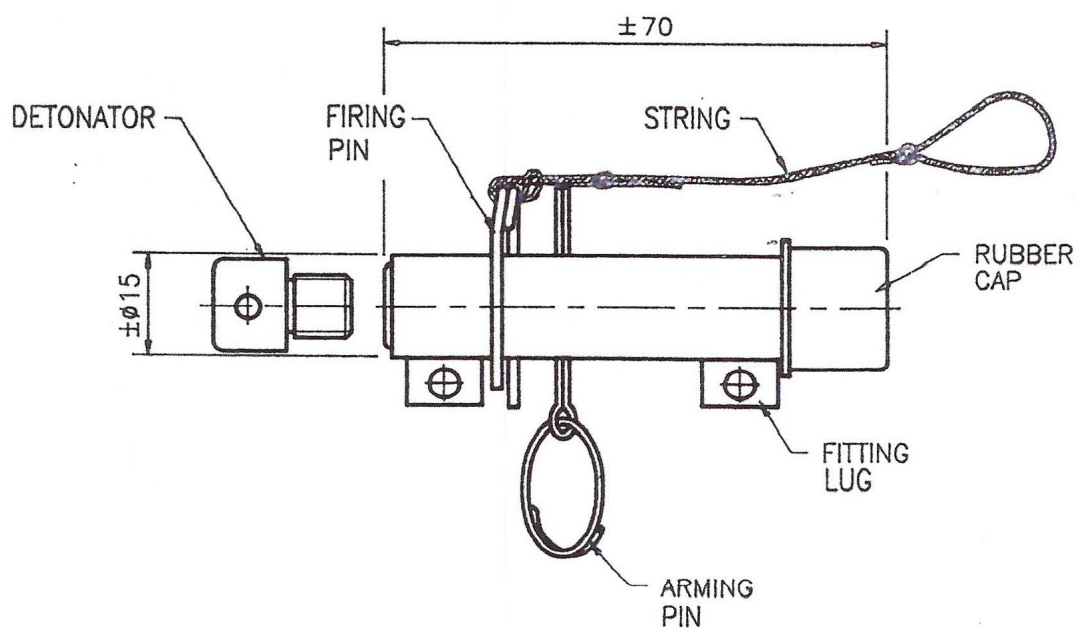


*PUFF Firing Device*

The delay mechanism consists of a thin steel wire which has a lead strip through it. The steel wire is attached to a spring loaded striker and when the arming pin is pulled out, it allows the striker to be forced forwards followed by the wire which is slowly shearing/cutting through the soft lead strip (same as in the PMN landmine). The PUFF also has two lugs on its body that are used to fix the device in place.

To prepare PUFF for use, a length of Cordtex (detonating cord) is laid out between a demolition charge and the firing device. One end of the Cordtex is attached to a booster and inserted into the charge. The rubber cap covering the end of the lead-shear delay mechanism is removed and a check is made to ensure that the lead strip is properly installed. The cap is then replaced and the pull (firing) pin is checked for ease of removal. The Puff and attached demolition charge are then carefully emplaced and camouflaged. A slack tripwire is then attached to the pull pin and the tension is carefully adjusted. An Apex detonator is screwed into the end of the device body, and the end of the Cordtex is inserted. The arming pin is removed from the side of the assembly that will initiate the lead-shear delay mechanism, which will last at least five minutes. Once the lead strip has been sheared, the face of the striker will be solely held in check by the pull pin. When used by UNITA forces in Angola, the PRANK was connected to other firing devices by using Cordtex.

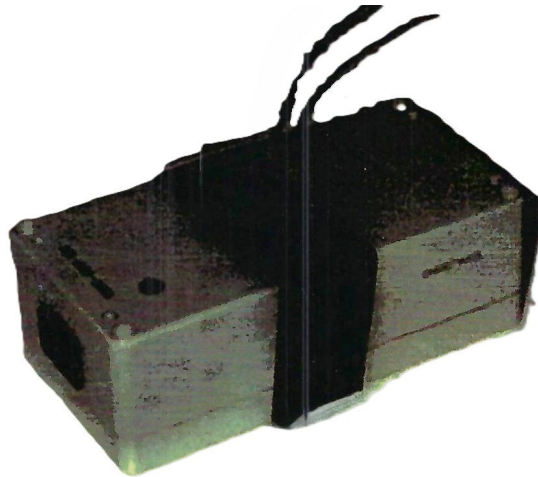
The device will function if the tripwire is pulled with enough force to withdraw the pull pin. The striker is then free to move forward to impact the "Apex" detonator, which will initiate the attached demolition charge.



*PUFF Firing Device*  
*Image - Mechem Consultants*

Type - Magnetic Influence/Anti-handling

The MANGO is a boobytrap mechanism designed to function on electronic or magnetic influence, as well as tilt. These were supplied by South Africa to UNITA forces operating in Angola and used primarily to target trains.



*MANGO Firing Device  
Photo - Mechem Consultants*

The MANGO consisted of a rectangular plastic container made up of a lid and a body. The internal electronics - contained in a firing circuit - were potted (encased) in resin inside the body. The firing circuit incorporated the primary sensor, an electronic safe timer, at least one mercury tilt switch, and a self-destruct timer. An O-ring was used to ensure a watertight seal between the body and the lid. Additionally, a heavy rubber band was provided to ensure that the body and lid could be made to maintain a watertight seal when emplaced. There was a "TEST-ON-OFF" switch located on one end of the device. A sensor switch for both "STEAM," or "DIESEL" locomotives was located inside the body of the device. When set to "STEAM," the MANGO would detect the metal in the locomotive. If the switch were moved to "DIESEL," the sensor in the device would seek out the magnetic field emitted by the traction motor in the locomotive. Two detonator (blasting cap) leads protruded from one side of the device body. Only a 9V Duracell or Varta battery were cleared for use in the firing device. A fresh battery was supplied with each MANGO and was installed just prior to use. The battery could be tested by depressing the "TEST-ON-OFF" switch to "TEST." A red light indicator on the body would glow if the battery was functional. The red light had a secondary function - it would glow whenever a sensor recorded a detection, to include the first time that the MANGO was turned "ON."

Within the firing device's circuitry was the electronic safe timer, which was activated as soon as the device was turned "ON." The duration of the safe timer was three minutes, eight seconds (plus/minus three seconds). During that time, the tilt, sensor, and self-destruct timer features were electronically disconnected.

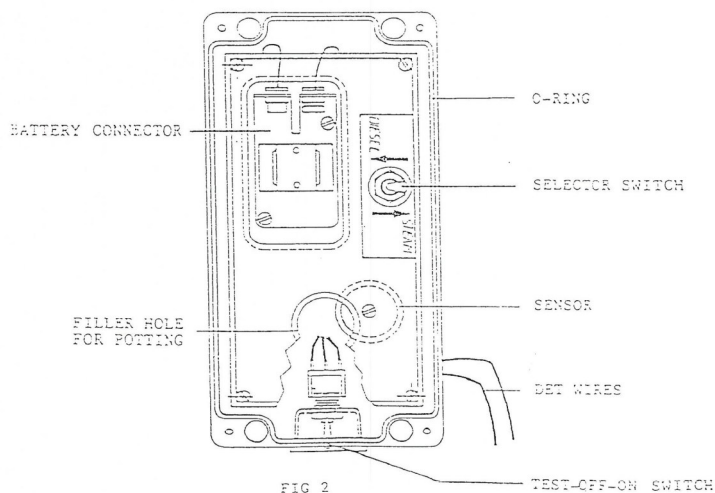
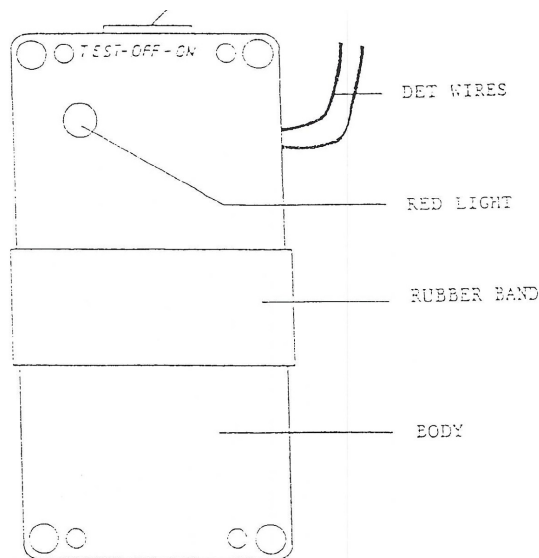
To prepare the MANGO for use, the device was inspected for serviceability. The lid was removed and an appropriate 9V battery was installed. The battery was tested by moving the "TEST-ON-OFF" switch to "TEST." The red light should glow. The sensor switch was then moved to either "STEAM," or "DIESEL." The lid was then replaced, and the rubber band was attached. An electric detonator was then attached to the leads. The MANGO was then emplaced underneath a wooden sleeper in the rail line. The lid of the device had to be flush with the sleeper, as well as in the middle of the two tracks. That position proved to be the most sensitive for the MANGO mechanisms. The "TEST-ON-OFF" switch was then moved to "ON," at which time the red indicator glowed and the electronic safe timer disconnected all sensors and timers until expiration of the safe time. The device was now fully armed and functioning, once the electronic safe timer had expired.

The MANGO will function if "DIESEL" had been selected on the sensor switch, which detected the electro-magnetic emissions from the traction motor in a diesel locomotive. If the sensor switch had been turned to "STEAM," the sensor would detect any ferrous-metal objects (such as the locomotive body) in its immediate vicinity and initiate the detonation sequence. After the expiration of the electronic safe time, which in this case was 34 minutes, 8 seconds (+/- 3 seconds), the Mercury



switches inside the MANGO become arranged so that any bump or lateral movement ( $\pm 15$  horizontal degrees) would send a signal to the firing circuit to initiate the attached electric detonator.

A self-destruct timer was also initiated when the MANGO is turned on. After approximately 12 days, a signal would be sent to the firing circuit to initiate the attached electric detonator, as well as the demolition charge.



*MANGO Firing Device*  
*Images - Mechem Consultants*

Type - Anti-handling  
Length - 4.7 in. (121 mm)  
Width - 2.6 in. (66 mm)  
Height - 1.7 in. (44 mm)

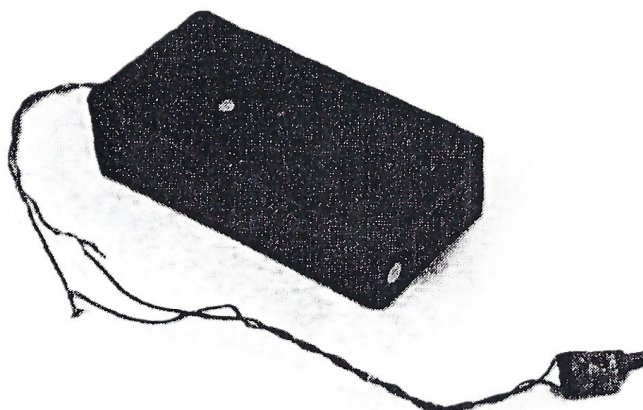
The SUNSPY is a boobytrap mechanism designed to initiate mines and demolition charges by light sensitivity. These were supplied by South Africa to UNITA forces operating in Angola. It was a variation of the SWEEPSPY.

The SUNSPY was a battery-operated firing device that was developed by South African Defence Industries. It incorporated a light-sensitive "eye" as an anti-disturbance feature. The electronics and 9V battery were potted (encased) in resin, so replacing a battery was practically impossible. The original battery was intended to remain operational for 12 months

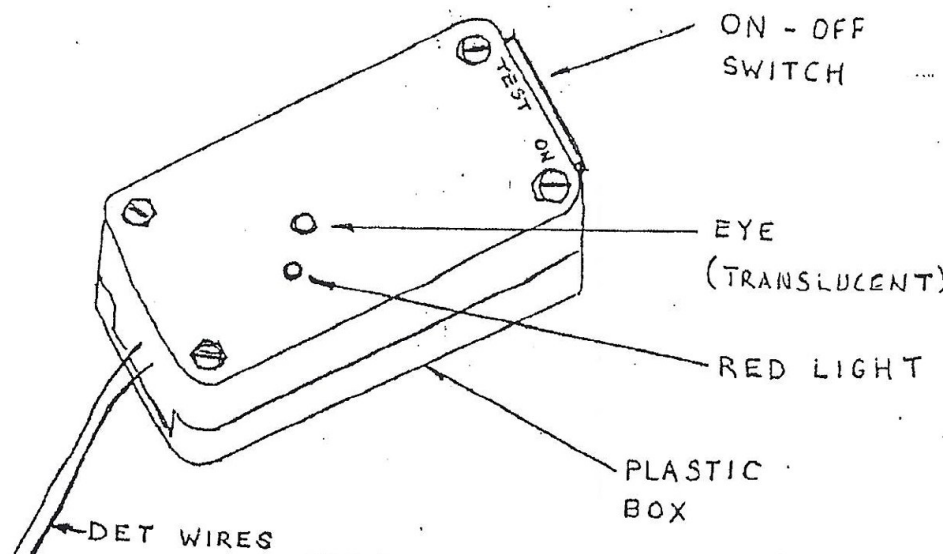
after the device was activated. It was contained in a sealed rectangular plastic casing. On the top of the device was a small red power light, as well as a light sensitive sensor indicator light. On one side of the device was a "TEST" and "ON" toggle switch. A pair of detonator leads for a electric detonator (blasting cap) protruded from the other end of the device.

To prepare the device for use, the toggle switch was moved to "TEST," which turned on the forward (small) red light to indicate that power was on and the battery was usable. The switch was then moved to the "ON" position, and the red light should go off. If it is still on, the firing device is faulty and should not be used. If the SUNSPY is functioning properly, a detonator (blasting cap) is connected and inserted into the demolition charge. Both were placed in a hole and covered ensuring that the light sensor was on the top. There was a built-in electronic safe time of 20 to 40 minutes.

Any attempt to uncover the device will cause the firing device to function once exposed to daylight.



*SUNSPY Firing Device*  
*Photo - Mechem Consultants*



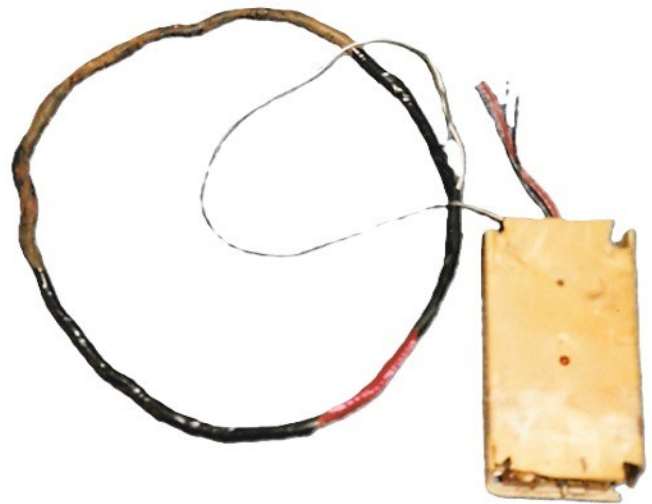
*SUNSPY Firing Device*  
*Image - Mechem Consultants*

Type - Anti-handling  
Length - 4.7 in. (121 mm)  
Width - 2.6 in. (66 mm)  
Height - 1.7 in. (25 mm)

The SWEEPSPY is a boobytrap mechanism designed to initiate mines and demolition charges by either magnetic influence or light sensitivity. These were supplied by South Africa to UNITA forces operating in Angola.

The SWEEPSPY was a battery-operated firing device that was developed by South African Defence Industries. It was initially designed to be activated by the presence of the Soviet stick ("probe") mine detector used by the Cubans during the early years of the Angolan conflict. It also incorporated a light-sensitive "eye" as an anti-disturbance feature. The electronics and 9V battery were potted (encased) in resin, so replacing a battery was practically impossible.

The original battery was intended to remain operational for 12 months after the device was activated.



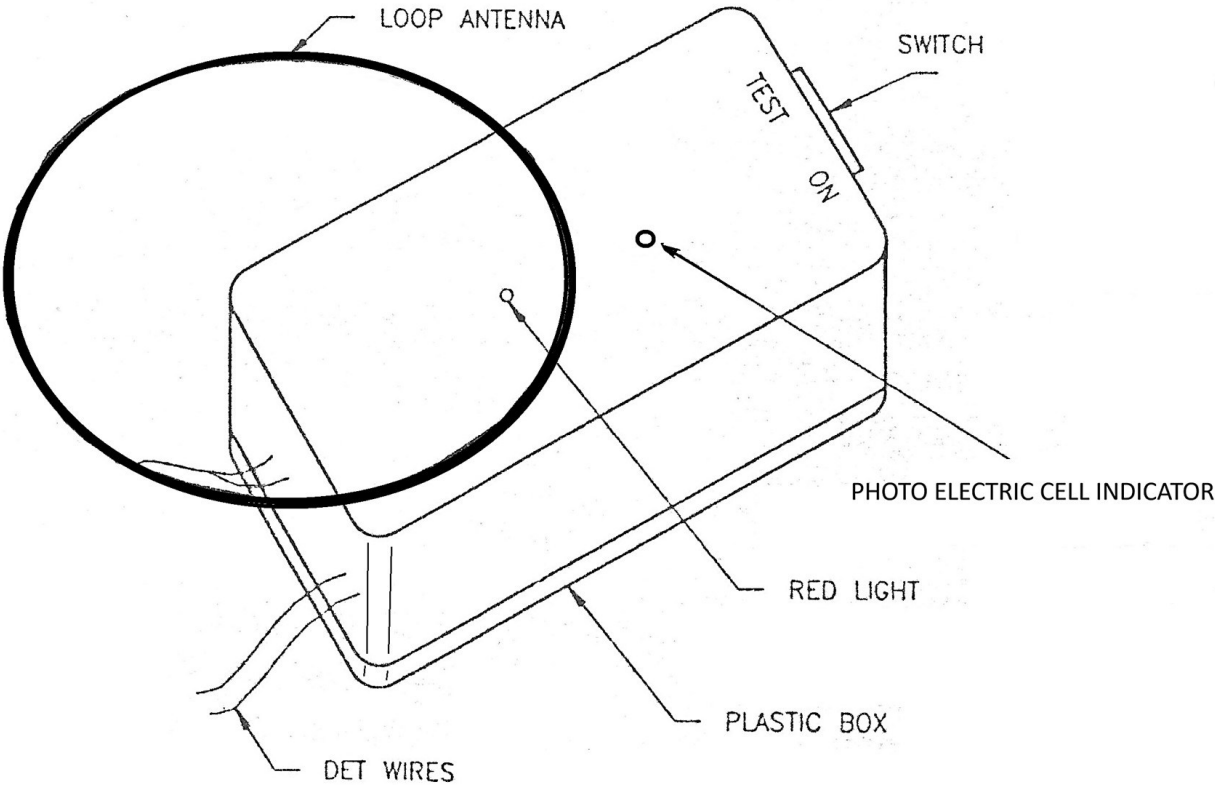
*SWEEPSPY Firing Device*

The SWEEPSPY was contained in a sealed rectangular plastic casing that was either grey or beige in colour. On the top of the device was a small red power light, as well as a light sensitive sensor indicator light. A pair of detonator leads for electric detonators (blasting caps), as well as the leads to the magnetic induction coil/loop, protruded from one end of the device. The leads were generally coloured red, white and black and were usually between 6 - 8 inches (150 - 200 mm) in length. The magnetic coil/loop was ring shaped with a diameter of 8 - 10 inches (200-250 mm). On the other end of the device was a "TEST" and "ON" toggle switch that had three settings with only "TEST" and "ON" being marked, while the middle (neutral) position was the default "OFF" setting. "TEST" and "ON" were often embossed above the toggle switch on the top face of the device.

To prepare the device for use, the toggle switch was moved to "TEST," which turned on the forward (small) red light to indicate that power was on and the battery was usable. A series of tests were then run to ensure that the device was functioning properly. Once successfully accomplished, an electric detonator (blasting cap) was attached to the detonator leads from SWEEPSPY and the device was then attached to a demolition charge. Both were placed in a hole and covered ensuring that the light sensor was on the bottom. The toggle switch was then moved to the "ON" setting and a red light flashed indicating that the detonator attachment was dangerous and the magnetic influence and light sensitive features were receiving power.

Once armed, the device would function when either the light sensor was exposed to white light or a strong magnetic field passed near the magnetic coil/loop.

There was a variation of the SWEEPSPY, designated as SUNSPY, which was produced by the South African Defence Industries that eliminated the magnetic induction coil, and functioned solely on a battery-operated light sensor.



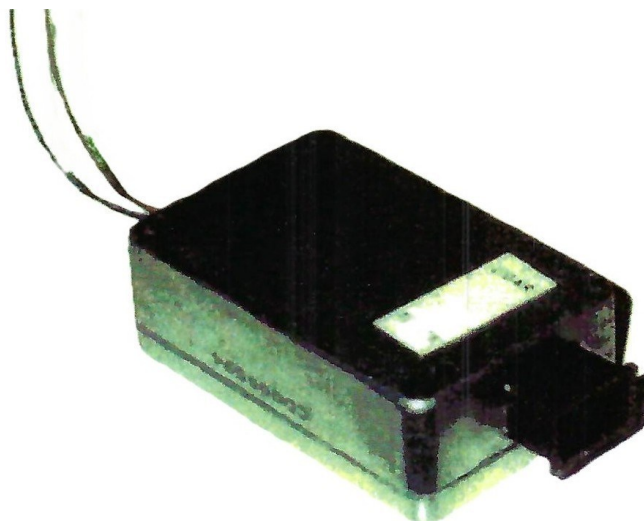
*SWEEPSPY Firing Device*



## Type - Delay

The TINSEL is a boobytrap mechanism designed to function on a delay of 34 minutes to over 97 days. These were supplied by South Africa to UNITA forces operating in Angola.

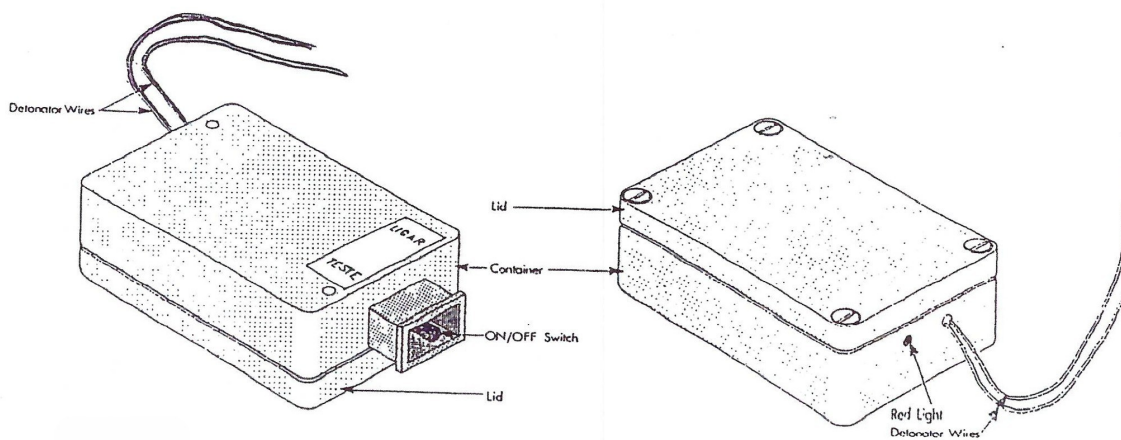
The TINSEL consists of a metal box with a screw-on lid on the bottom of the device. The inside of the body contains an electronics compartment, as well as a battery. On top of the firing device body is a red test light. Protruding from one end are two detonator (blasting cap) leads, while the other end contains an "ON/OFF/TEST" switch in a protective enclosure.



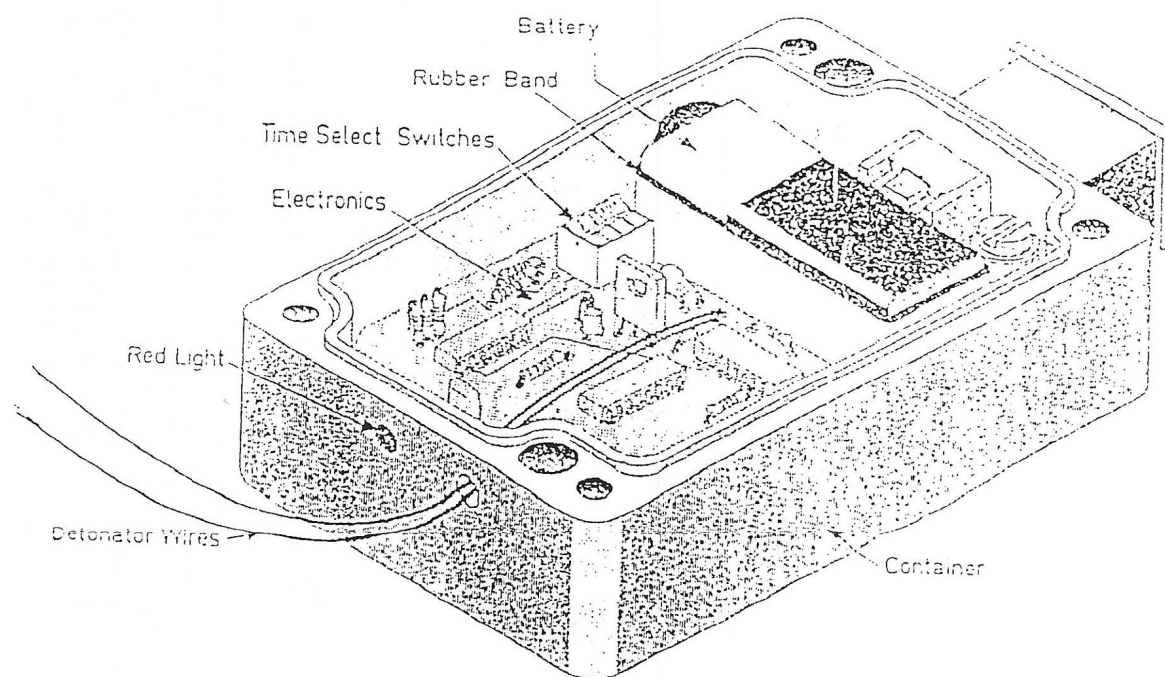
*TINSEL Firing Device*  
*Photo - Mechem Consultants*

To prepare the TINSEL for use, the lid is removed from the bottom of the device. The desired firing delay time is selected using the "TIME SELECT SWITCHES" inside the electronics compartment. A pointed object is needed as the selection buttons are quite small. There is a time selection chart on the inside of the lid to assist in selecting the desired time. The device is capable of firing in as little as 34 minutes, or as long as 97 days, 2 hours, and 10 minutes. The "ON/OFF/TEST" switch on the outside of the device is moved to "TEST." If the red test light glows, the battery is properly connected and functional. If it does not, the battery should be replaced. The lid is then screwed back on. The "ON/OFF/TEST" switch is then moved to the "ON" position that initiates a preset arming delay time of 17 minutes at the same time as the selected firing delay is initiated. The red test light should not come on. An electric detonator is then connected to the device and insulated. The detonator is then inserted into a booster (if necessary) and then into the main charge.

At the expiration of the selected delay time, an electronic circuit is closed inside the TINSEL and the detonator - and attached charge - are initiated.



*TINSEL Firing Device*



*TINSEL Firing Device*

한국

(South Korea)



Type - Multifunction

Length - 2.25 in. (57 mm)

Width - 1.6 in. (40 mm)

Height - 1.1 in. (30 mm)

The KM142 is the Korean version of the Australian F1A1 multifunction firing device. It is manufactured by Koryu Pyrotechnics Co. Ltd. It is identical to the Australian firing device with the exception of a notch in the sear plate platform that is not present in Australian firing devices.

The KM142 is a compact unit capable of initiating a boobytrap via pull, pressure, pressure-release, or tension-release depending on how it is set. The device will operate under a pressure of 25 pound (11.3 kg), a pull of 7 lbs. (3.2 kg), or a pressure, or tension-release of 2.4 lbs. (1.1 kg).



*KM142 Firing Device*

The device is made of plastic in a basically cylindrical form. There are lugs and recesses molded onto the body that allow it to be screwed, nailed or wired in almost any position. A slot in the top of the body accepts the sear plate that is held in position by two pins, one with a round head and one with a square head. A positive safety pin fits through the barrel of the body preventing the striker from hitting the percussion cap. An alternative set of holes for the positive safety are located at 90 degrees from the normal holes. The safety pin has a plastic cord attached to help in removing it. The striker is made of aluminum with a plastic four pronged guide and spring stop near the point. The rear portion of the striker has a groove that engages the sear. A striker spring fits over the striker. The striker and spring fit into the body compressing the spring until the sear on the bottom of the sear plate engages the groove in the striker.

The desired mode of use determines which pins are taken out to set the device. For use as a pressure-release device, the round headed pin is removed. For use as a pressure device, the square headed pin is removed, for use as a pull device, the square headed pin is removed, and for use as tension-release it must be fitted with an attachment and have the round headed pin removed. It should be noted that the two pins are not interchangeable as they are made from different gauges of wire with corresponding holes.

The device is made of olive-green plastic, as are the coupling bases. The device is issued in a round plastic case with yellow markings containing everything required to set the device in any mode. Contained within the case is the device, roll of steel trip wire containing 16 yards (15 m) of wire, a strip of tape containing screws and nails, a tension-release attachment, and an instruction sheet.

The firing device is used with a coupling base. The coupling base can be used with either safety fuse, instantaneous fuse, or detonators. It will fit US style demolition blocks and grenades with the same threading.



The K471 is the practice version of the Australian F2A1. It is manufactured by the Koryu Pyrotechnics Co. Ltd. It is identical to the Australian firing device with the exception of a notch in the sear plate platform that is not present in the Australian device.

It is made of blue plastic. It is issued with inert blue plastic coupling bases that have a brown band indicating that it has a live primer.

The K471 container is also made of blue plastic and has markings in white.



*KM471 Firing Device (Practice)*

# ESPAÑA

(Spain)



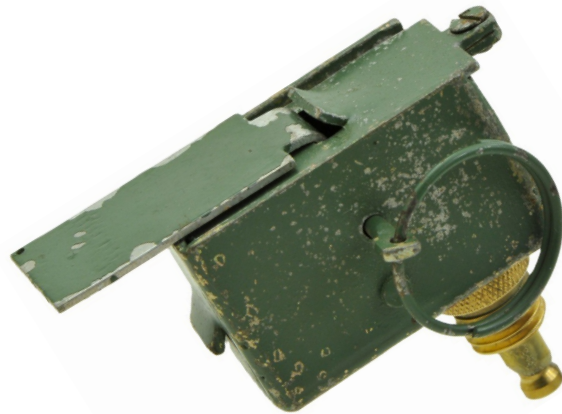
## “Mouse Trap”

Spain

Type - Pressure-Release  
Length - 1.7 in. (45 mm)  
Width - 1.0 in. (26 mm)  
Height - 1.1 in. (29 mm)

The official designation of this device is unknown. It is similar in function to the US M1 pressure-release firing device.

The body is a simple open box made of a heavy gauge sheet metal. The top of the box is made separately. The front of the box has a small tab to enable the top to be screwed on. The bottom of the box has a hole with a threaded adapter fastened in to accept a primer adapter. The back of the box has a slot punched out and the flap bent outward. The top has a tab to match the tab on the body and also has a slot punched out with the flap bent outward. The striker, also formed out of sheet metal, is basically an L-shaped with both legs the same length. The striker fits into the body with one leg facing the back and the other straight up. The striker and its spring are hinged on an axis pin that fits through the body at the centre. The striker point is on the upper leg. A safety pin fits through the body above the axis pin and blocks the striker. The last part of the firing device is the release plate which has one end reduced in width to fit the slots in the body.

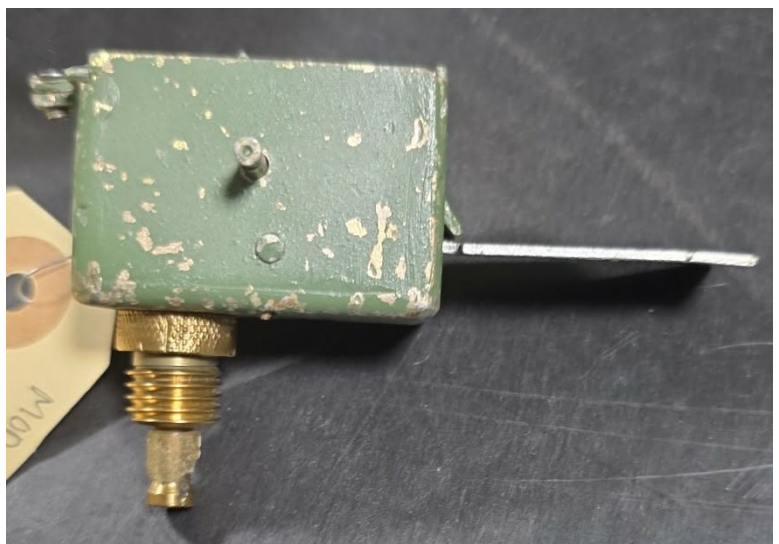


*“Mouse Trap” Firing Device*  
*Photo - E. Koch*

The device may be used in two orientations. It can be laid with the release plate in the top slot, where the tail of the release plate engages the leg of the striker with the striker point. It can also be laid with the release plate in the back slot where the tail of the release plate engages the other leg. In either orientation the release plate prevents the striker from rotating under spring pressure.

For use, a detonator is crimped onto the primer adapter, which is screwed into the bottom of the device. After determining the desired orientation, the release plate is inserted and the device inserted into an explosive charge with the release plate on top. Both are then carefully emplaced with a weight on top of the release plate. This firing device is very sensitive so final arming should be done remotely, if at all possible. Once the safety pin has been removed the device is fully armed.

The device will function when the weight is removed. This allows the striker, under spring pressure, to push the release plate out of the way and continue to rotate until the firing pin strikes the primer. The primer then initiates the explosive train.



*“Mouse Trap” showing alternative location of release plate*  
*Photo - J. Vollenberg*

## Type- Pull

This firing device is an integral fuze supplied with the PS 1 bounding anti-personnel mine. It could possibly be adapted for use in a boobytrap. The fuze is manufactured by the Spanish company Explosivos Alaveses S.A. (EXPAL), and is somewhat similar to the West German DM56A1B1 anti-personnel mine fuze.

The body is a brass cylinder internally threaded at the bottom to fit a primer holder. The main body contains a striker and striker spring. The striker has a firing head at the bottom and a striker shaft at the top end with two holes in the shaft to accommodate the safety pin. The safety pin is U-shaped with a longer arm on one side and threading on the short arm. A safety nut fits on the threaded arm. A length of braided cable may or may not be attached to the safety pin.

When assembled the striker and striker spring are inserted through the bottom and pushed up so the striker shaft protrudes out the top until both holes are exposed. The safety pin is inserted in the holes with the shorter arm on top. The safety pin holds the striker in a cocked position and the safety nut prevents inadvertent removal. A primer holder screws into the bottom of the body.

To use the device, it is inserted into a mine or an explosive charge and emplaced. A trip wire is attached to the safety pin. When the safety nut is removed and tension is applied to the trip wire, it draws the pin out of the striker, releasing it to impact the primer. The primer will either ignite a fuse or initiate a detonator depending on how the device is used.



*PS 1 Pull Fuze*



# **SVERIGE**

**(Sweden)**



## Anti-tank Mine Fuze m/4 (Stridsvagsmintändare 4)

Sweden

Type - Pressure

Weight- 17.6 oz. (0.5 kg)

Height- 3.6 in. (92 mm (above mine))

4.8 in. (122mm (above mine, with adapter))

Diameter- 3.9 in. (100 mm)

This is a pressure-activated anti-tank mine fuze incorporating a motion activated anti-withdrawal function. It is primarily intended for use in the "Stridsvagsmina 5". A connector can be fitted to adapt it for use in the "Stridsvagsmina m/41-47 or m/52B". The device can also be inserted into a demolition charge and used as a pressure or motion activated boobytrap. Russian reports indicate that these firing devices have been used by Ukrainian



*m/4 Mine Fuze (armed)*

Armed Forces in the Russia-Ukraine War.

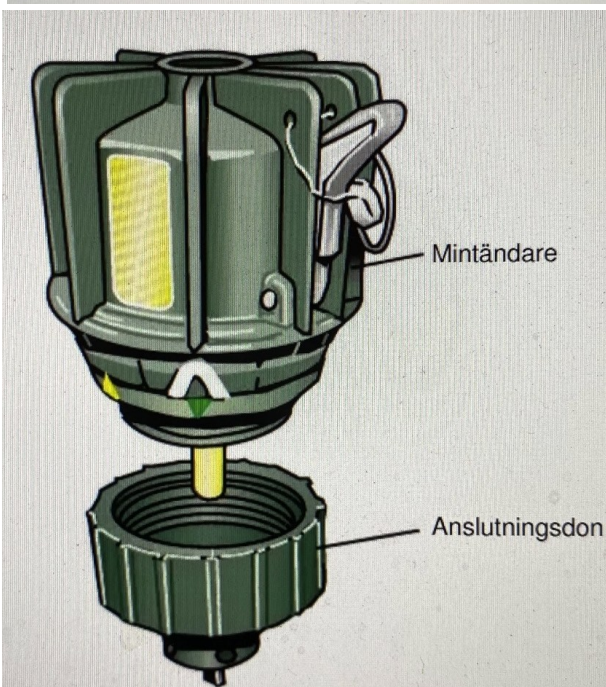
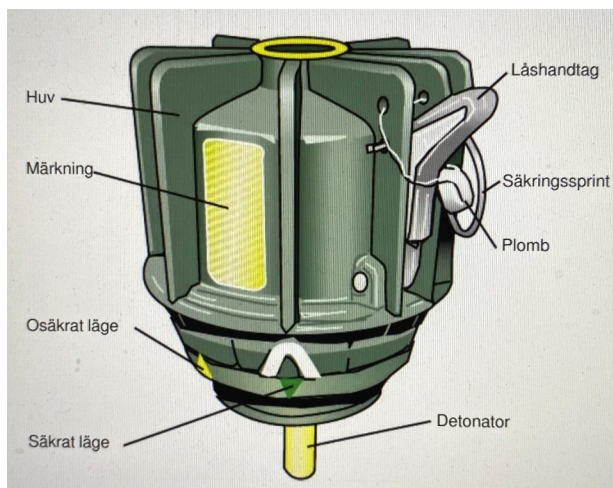
The fuze has a plastic body containing the igniter and a clockwork arming delay. At the top it has a movable hood, locking handle, and safety pin.

When installed in a mine or demolition charge the safety pin can be removed. The locking handle is then folded down and the hood turned clockwise until it stops. The 5-minute clockwork delay begins. When the delay period ends the firing pin is unblocked, the fuse activated, and the motion sensor engaged. Once armed the device cannot be disarmed. The fuze incorporates a function that prevents it being triggered by nearby explosive detonations such as mine clearing charges.

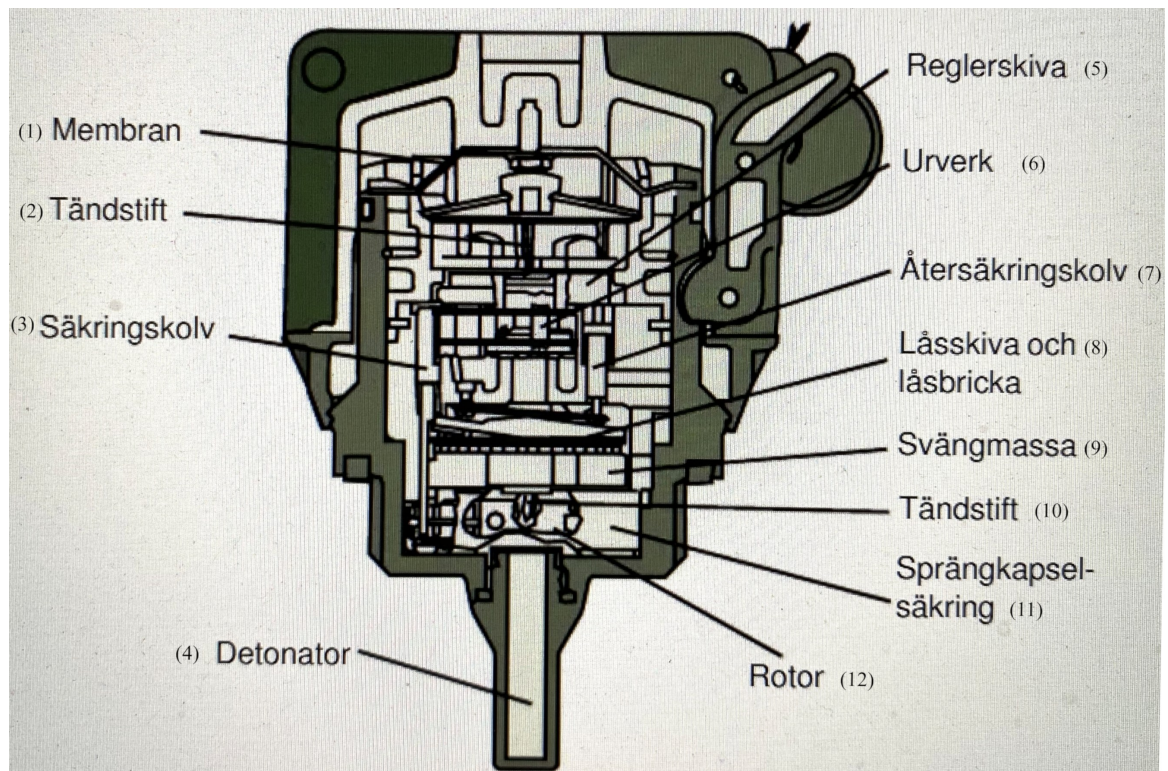
The device will operate when pressure of 220 lbs. (100 kg) is applied or it is displaced from its position. If a mine plough or mine rollers are used, it will detonate. If an attempt is made to lift it, it will detonate upon being moved.

If used as a boobytrap a significant amount of pressure must be applied or it can be emplaced so it will be inadvertently moved to trigger the motion sensor.

There is a training version of this fuze "Blind Stridsvagsmintändare 4". It is marked with "Blind" on the body beside the locking handle.



*m/4 Mine Fuze (safe)  
Images from Swedish manual*



*Stridsvagnsmintändare 4 Internal diagram from Swedish manual*  
 1– Membrane, 2– Spark plug, 3– Safety piston, 4– Detonator, 5– Disc, 6– Clockwork,  
 7– Plunger, 8– Locking disc and washer, 9– Swing mass, 10– Primer, 11– Detonator  
 ring, 12– Rotor



**m/41**  
**(Slagtändare m/41)**

**Sweden**

Type - Pull  
Weight - 0.8 oz. (25 g)  
Length - 3.3 in. (84 mm)

The m/41 is a pull firing device normally used in m/41, 42, 42 P and 48 anti-personnel mines, as well as the m/48 fragmentation mine and m/48 trip flare. It can also be used in improvised mines and boobytraps.

The body is made of sheet metal and is roll-threaded on both ends. It contains a liner that appears to be a cardboard tube. The top end fits a roll threaded cap that holds the striker. The bottom end is closed by a primer holder that holds a percussion cap. There is a nipple on the bottom that is used to crimp a detonator onto. A straight split pin (cotter pin) fits through a hole in the striker shaft acting as both the safety and arming pin.

The striker fits into the body with the shaft fitting through a hole in the top cap. As the shaft is forced up through the cap it compresses the striker spring. The safety pin fits through a hole in the striker shaft to hold the striker and spring in the armed position.

The operating force required to pull the pin is 4-11 lbs. (2-5 kg). When the pin is removed, the striker spring reasserts itself driving the striker down onto the percussion cap. When the percussion cap fires it initiates the attached detonator.

This device was issued only with straight split pins but could be fitted with other types, such as the wing-shaped striker-retaining pin in the images.



*m/41 Firing Device*



*m/41 Firing Device (disassembled)*



**m/42**  
**(Slagtändare m/42)**

Sweden

Type - Pull  
Weight - 1.6 oz. (46 g)  
Length - 3.5 in. (90 mm)

The m/42 is a pull firing device normally used in m/41, 42, 42 P and 48 anti-personnel mines, as well as the m/48 fragmentation mine and m/48 trip flare. It can also be used in improvised mines and boobytraps.

The body is made of an iron cylinder threaded on both ends. The top end is threaded to fit a new design of top cap. The top cap holds the striker. The bottom end is closed by a primer holder that contains a percussion cap. A nipple on the bottom of the base is used to crimp a detonator onto. A split pin (cotter pin) fits through a hole in the striker shaft acting as both the safety and arming pin.

The striker fits into the body with the shaft fitting through a hole in the top cap. As the shaft is forced up through the cap it compresses the striker spring. The split pin fits through a hole in the striker shaft to hold the striker and spring in a cocked position. This device was issued only with straight split pins but could be fitted with other types.

The operating force required to pull the pin is 4-11 lbs. (2-5 kg). When the pin is removed, the striker spring reasserts itself driving the striker down into the percussion cap. When the percussion cap fires it initiates the attached detonator.



*m/42 Firing Device*  
*Photo— F. Caley*



*m/42 with different release mechanism. Unknown how it operates.*  
*Photo— Digitalmuseum.se*

**m/42 P**  
**(Slagtändare m/42 P)**

Sweden

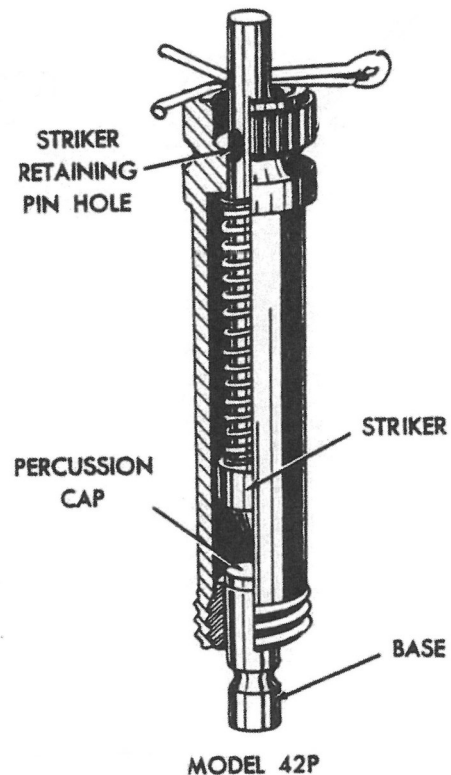
Type - Pull  
 Weight - 1.9 oz. (55 g)  
 Length - 3.5 in. (89 mm)

The m/42 P is a pull firing device normally used in m/41, 42, 42 P and 48 anti-personnel mines, as well as the m/48 fragmentation mine and m/48 trip flare. It can also be used in improvised mines and boobytraps.

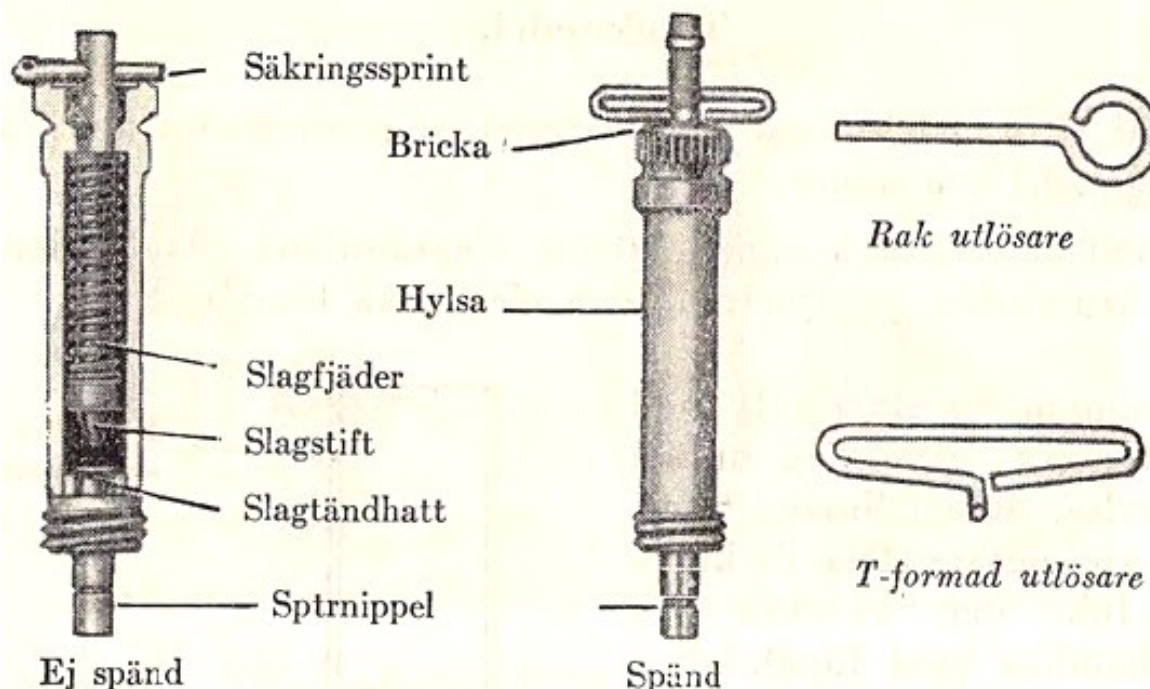
The cylindrical body is made of zinc that is threaded only on the bottom end. The top end is cast onto the body and has a hole in the centre for the striker shaft. The bottom end is closed by a primer holder that holds a percussion cap. A nipple on the bottom of the holder is used to crimp a detonator onto. A split pin (cotter pin) fits through a hole in the striker shaft acting as both the safety and arming pin.

The striker fits into the body with the shaft fitting through a hole in the top cap. As the shaft is forced up through the cap it compresses the striker spring. The split pin fits through a hole in the striker shaft to hold the striker and spring in the cocked position. This device was issued with straight trigger pins and fork shaped trigger pins. T-shaped trigger pins were issued separately.

The operating force required to pull the pin is 4-11 lbs. (2-5 kg). When the safety pin is withdrawn, the striker spring reasserts itself driving the striker down into the percussion cap. When the percussion cap fires it initiates the attached detonator.



*m/42P Firing Device*



*Slagtändare m/42 P diagram from Swedish Manual*

**Friction Igniter m/46  
(Rivtändare m/46)**

Sweden

Type- Pull- friction

This firing device is a friction igniter that has the capability of being utilized as a firing device with instant ignition or can be used as a delay detonator with delays of 10, 20, or 30 seconds.

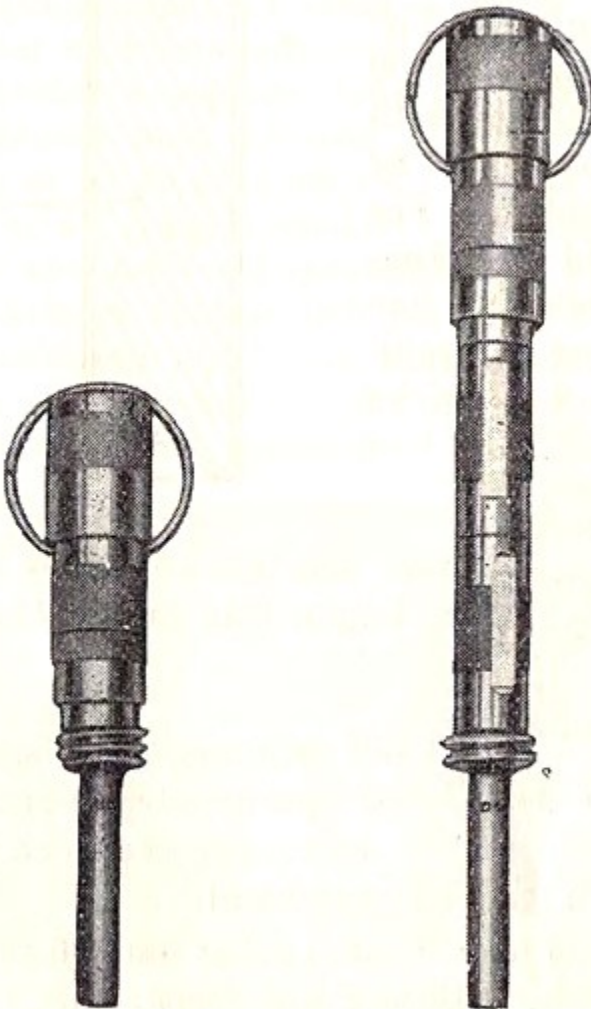
The main body is made of brass and contains a friction lighter mechanism. The pull ring appears to be inserted through the middle of the body but is retained in place by a threaded cap that screws down onto it preventing the ring from being pulled. The bottom is internally threaded to accept either a detonator assembly or delay element.

The device may be used as a delay detonator by inserting a delay element between the main body and detonator assembly. The delay elements (Fördröjningsskruv 10 s) are externally threaded to screw into the body and internally threaded at the bottom to accept the detonator assembly. Washers are provided to ensure moisture resistance. Up to three delay elements can be screwed together to give the desired delay with each

element  
providing a 10  
second delay.

For use as a pull igniter no delay elements are used. The device is fixed in place with an explosive charge. A slack trip wire is attached to the pull ring and an anchor point at the other end. To arm the device, the pull ring is rotated out of the way and the cap unscrewed and removed. At that point a pull on the wire will pull the ring out causing the friction lighter to operate and flash down onto the detonator assembly.

*Rivtändare m/46  
Photo- digitalmuseum.se*



*Rivtändare m/46 ö*

*Rivtändare m/46 20 s*

*Diagram from Swedish Manual*

For use as a delay detonator, the required number of delay elements are screwed onto the body before the detonator assembly. The device is then inserted into an explosive charge. When ready to fire, the pull ring is rotated out of the way and the cap removed to arm the device. The ring is then sharply pulled causing the friction lighter to flash onto the delay element and ignite it. When the delay expires it then flashes onto the detonator assembly initiating the explosive train.



## Friction Igniter m/46

Sweden

There is a practice version (Ovnrivtändare m/46) of the device that is identified by blue bands around the device.

There are also inert training versions (Blind rivtändare m/46) that are identified by being painted bright green.



*Blind rivtändare m/46*



**m/48**  
**(Slagtändare m/48)**

Sweden

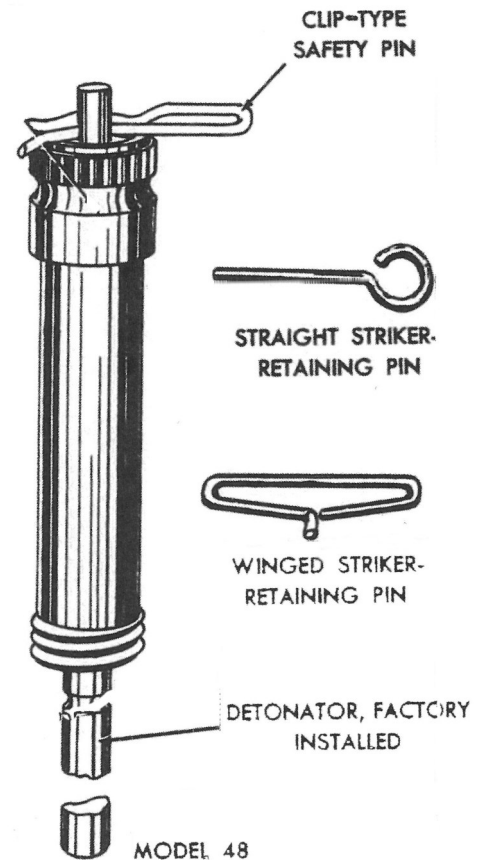
Type - Pull  
Weight - 1.9 oz. (56 g)  
Length - 4.5 in. (115 mm)

The m/48 is a pull firing device normally used in m/41, 42, 42 P and 48 anti-personnel mines, as well as the m/48 fragmentation mine and m/48 trip flare. It can also be used in improvised mines and boobytraps. It is a modification/new design of the m/42 P firing device and differs from previous versions in that it has a factory-installed detonator. Reports indicate that these fuzes have been used by Ukrainian Armed Forces in the Russia-Ukraine War.

The device has a cylindrical zinc body threaded only on the bottom end. The top end is cast onto the body and has a hole in the centre for the striker shaft. The bottom end is closed by a primer holder with attached factory installed detonator. A clip-type safety pin fits through a hole in the striker shaft acting as both the safety and trigger.

The striker fits into the body with the shaft fitting through a hole in the top cap. As the shaft is forced up through the cap it compresses the striker spring. The safety pin fits through a hole in the striker shaft to hold the striker and spring in the cocked position. This device was issued with and clip and straight type retaining pins. Wing-shaped retaining pins were issued separately.

The operating force required to pull the pin is 4-11 lbs. (2-5 kg). When the pin is withdrawn, the striker spring reasserts itself driving the striker down into the percussion cap. When the percussion cap fires it initiates the attached detonator.



*m/48 Firing Device*

## U1 (Övntändare U1)

Type - Pull/Tension-Release  
Weight - 2.7 oz. (79 g)

The U1 is similar to the US M3 pull/tension-release firing device.

No other technical details are currently available.

## U2 (Övntändare U2 )

Type - Pressure  
Weight - 2.9 oz. (84 g)

The U2 is similar to the US M1A1 pressure firing device.

No other technical details are currently available.

## U3, 1 1/2 tim and U3 6 tim (Övntändare U3)

Type - Delay  
Weight - 1.0 oz. (29 g)

The U3 1 1/2 tim and U3 6 tim are similar in all respects to the US M1 delay with the exception of the shield covering the copper portion of the device. The purpose of the shield is unknown. The U3 1 1/2 tim has a nominal delay of 1.5 hours, while the U3 6 tim has a delay of six hours.

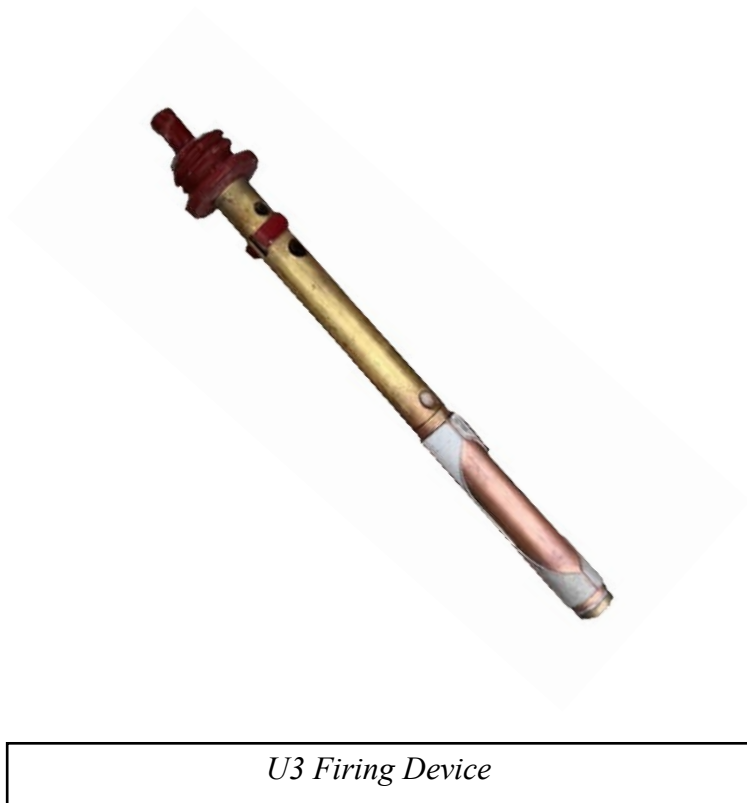
No other technical details are currently available.

## U6 (Övntändare U6)

Type - Pressure-Release  
Weight - 4.0 oz. (115 g)

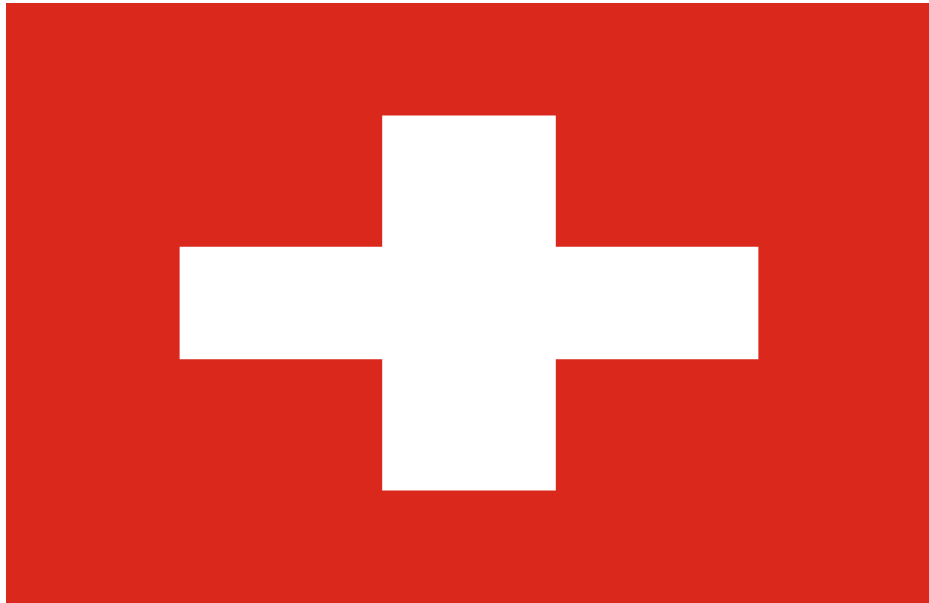
The U6 is similar to the British No. 6 release switch, but utilizes an American-style primer holder (base coupler).

No other technical details are currently available.



**SCHWEIZ**

**(Switzerland)**



## DkZ.b and DkZ.G Fuzes (Druckzünder b und Druckzünder G)

Switzerland

Type - Pressure

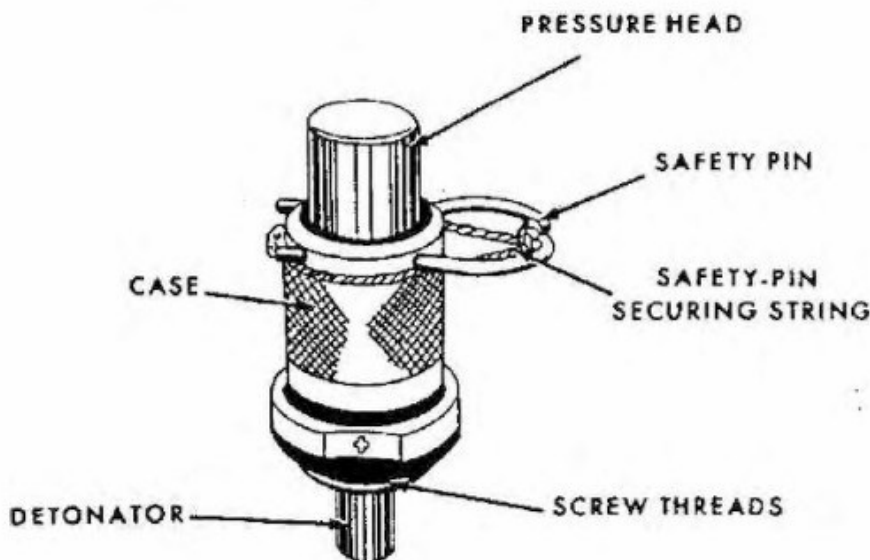
Length - 3.3 in. (84 mm)

Diameter - 1.34 in. (34 mm)

The primary use for the DkZ.b and the DkZ.G are as fuzes for the Swiss Streumine 37 light anti-tank mine. They are spring-loaded (cocked striker) firing devices. If required, they can be used in improvised mines or as boobytraps.

Both devices have a cylindrical metal body. The pressure head extends into the body and houses the striker, striker spring and striker-retaining balls. A safety pin passes through the body as well as the plunger assembly. The DkZ.G

has an additional threaded collar around the pressure head to accept an extension rod and requires more pressure to initiate than the DkZ.b.



*DkZ.b Fuze*

To use these firing devices, the knurled sleeve is unscrewed lowering the pressure head and compressing the striker spring. It also shortens the travel of the pressure head. A detonator assembly is then screwed into the base of the fuze. The assembled device is then inserted into a mine or demolition charge. A long cord is attached to the safety pin, which is then withdrawn from a safe distance. The device is now armed.

When 24 - 33 lbs. (11 - 15 kg) of pressure is applied to the DkZ.b pressure head (46 lbs./21 kg for the DkZ.G), it is forced down, further compressing the striker spring. After a travel of about 0.2 in. (6 mm) the four striker-retaining balls can move laterally freeing the striker. The striker impacts the percussion cap, which initiates the attached detonator and explosive charge.

There is also a practice version (Übungs - Druckzünder) which uses a black powder detonator designed to initiate a black powder charge in a training mine. The practice version is marked with a black stripe.

There is an inert training version (Blinder - Druckzünder) that has an empty detonator. There is a hole through the striker that can be used to recock the device using a cocking mandrel. The inert version is painted white with a red band.

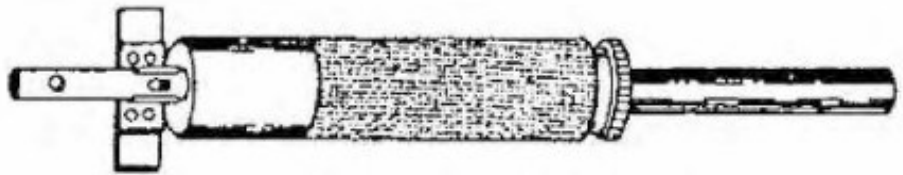


## SpZ 43 Fuze (Spannzünder 43)

Switzerland

Type - Pull  
Length - 5.25 in. (133 mm)  
Diameter - 0.6 in. (15 mm)

The SpZ 43 is similar to the German Z.Z. 42 and Soviet MUV, style fuzes. It is primarily used in the Swiss Tretmine 43 anti-personnel mine.



*SpZ 43 Fuze  
Image - US Department of Defense*

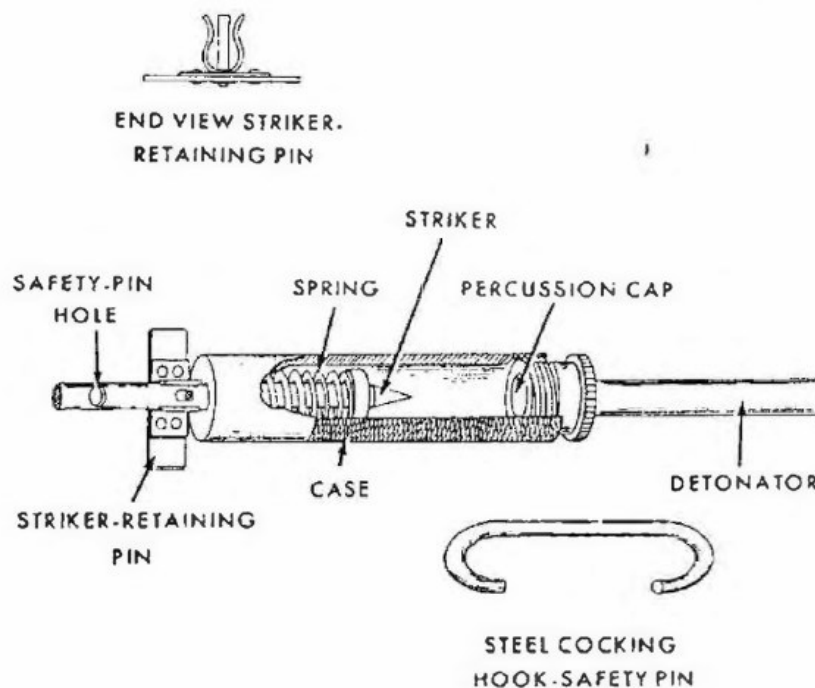
The device has a cylindrical metal body with knurling on the lower 75 percent of the body. It contains a spring-loaded (cocked striker) assembly. An internally threaded section at the bottom accommodates a percussion cap and detonator assembly. The striker retaining pin has an additional clip that fits over the striker shaft to ensure the pin does not fall out prematurely.

The SpZ 43 is painted olive green. Other markings are unknown.

To use these firing devices, a steel cocking hook is provided with the fuze. The hook is used to pull the striker shaft until a T-shaped striker retaining pin can be inserted. The percussion cap and detonator assembly are screwed into the bottom of the fuze. The firing device is then inserted into the mine, or demolition charge. The cocking hook is then carefully removed from the striker shaft.

When 8.8 lbs. (4 kg) of pressure or more is applied to the T-shaped retaining pin, it is forced out of the striker shaft, releasing the spring-loaded striker to impact the percussion cap, initiating the attached detonator and explosive charge.

There is a practice version (Übungs - SpZ 43.60) with a practice charge that is painted black. There is also an inert training version (Blinder - SpZ 43.90) painted white and red.



*Spz 43 Fuze (internal diagram)  
Image - US Department of Defense*

## SZ 15 (Schlagzünder 15)

Switzerland

Type - Pull  
Length - 3.4 in. (88 mm)  
Diameter - 0.4 in. (12 mm)

The SZ 15 is a series of fuse igniters that were developed during WWI and were used for many years afterward. The series consists of the SZ 15, SZ 15.25, SZ 15.01, SZ 15.02, and SZ 15.03. The differences among the various devices are minor and described below. If required, these devices can be used as boobytraps.

The main body is cylindrical with earlier versions being made of brass, and later versions made of steel. The lower end is internally threaded to accept a primer holder containing a percussion cap. The body is pinched near the top to form a groove on the outside and a constriction on the inside. There is a mounting bracket made of wire twisted into the groove. The body contains a striker, striker spring and a safety spring. The top of the body is covered by a cap that has a double eyelet in it. The striker has a head with firing pin at the bottom and a groove turned into the top end. The safety spring is wire and formed to have an eyelet at top and gripping claws at the bottom.

When assembled the striker and striker spring are inserted through the bottom. The striker is pushed up into the body compressing the striker spring until the top end protrudes out the top of the body. The safety spring is attached with the gripping claws engaged in the groove in the striker. The striker is then released to draw back into the body drawing the safety spring with it. The safety spring stops when it hits the constriction in the body and holds the striker in place with the striker spring partially compressed. A pull cord is attached from the inner eyelet in the cap to the eyelet on the safety spring. The primer holder is screwed into the bottom of the body. The holder includes gas escape holes to prevent the fuse being blown out by the pressure of the exploding primer. The fuse must be crimped into the holder. For use as a boobytrap the fuse is replaced by a Nr. 8 detonator (blasting cap) and the device used like any other pull device.

When issued the device has a safety cord wound through the three exposed eyelets. For use insert and crimp either the fuse or detonator into the holder. Cut and remove the safety cord. When the cap is pulled off it becomes a small handle to use when operating the pull cord. When the cord is pulled it draws the safety spring outwards which also pulls the striker along, further compressing the striker spring. When the top of the striker is pulled out of the body the safety spring will open and detach from the striker. The striker is then driven down by the striker spring to hit the percussion cap and either ignite the fuse or fire the detonator.

### Differences:

- |                   |                                                            |
|-------------------|------------------------------------------------------------|
| <b>SZ 15</b> -    | Brass body, 3.4 in. (88 mm) long, 0.4 in. (12 mm) diameter |
| <b>SZ 15/25</b> - | Brass body                                                 |
| <b>SZ 15.01</b> - | Steel body                                                 |
| <b>SZ 15.02</b> - | Steel body, 3.7 in. (96 mm) long                           |
| <b>SZ 15.03</b> - | Steel body, has permanently attached primer holder         |



*SZ 15.02 Firing Device*

## **Manufacturers in this volume**

|                       |                                                                                                                                                                                                                                                           |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Belgium -</b>      | PRB (Poudreries Reunies de Belgique, SA, Belgium)                                                                                                                                                                                                         |
| <b>Bulgaria -</b>     | State Factory 211                                                                                                                                                                                                                                         |
| <b>Germany -</b>      | WASAG (Westfälisch-Anhaltische Sprengstoff-Actien-Gesellschaft, Goswig, Germany, 1891-2001)<br>RR (Richard Rinker, GmbH, Menden/Iserlohn, Germany)<br>RhS (Rheinmetall-Borsig AG, Werk Sommerda, Germany)<br>Diehl Ordnance Division, Rothenbach, Germany |
| <b>France -</b>       | MAT (Manufacture Nationale d'Armes de Tulle)<br>LIP, Besancon, France ( watch manufacturer)                                                                                                                                                               |
| <b>Iran-</b>          | Defense Industries Organization                                                                                                                                                                                                                           |
| <b>Israel -</b>       | IMI (Israel Military Industries)                                                                                                                                                                                                                          |
| <b>Italy -</b>        | VS (Valsella, Italy)                                                                                                                                                                                                                                      |
| <b>Pakistan -</b>     | Armament Research and Development Establishment (Pakistan)                                                                                                                                                                                                |
| <b>Poland -</b>       | Łódź (later Mera Poltik) Clock Factory (Łódź, Poland)                                                                                                                                                                                                     |
| <b>Portugal -</b>     | SPE (Sociedade Portuguesa de Explosivos, SA, Portugal)                                                                                                                                                                                                    |
| <b>Romania -</b>      | ROMTECHNICA (Bucharest, Romania)                                                                                                                                                                                                                          |
| <b>South Africa -</b> | Denel<br>South African Defense Industries                                                                                                                                                                                                                 |
| <b>South Korea -</b>  | Koryu Pyrotechnics Co. Ltd                                                                                                                                                                                                                                |
| <b>Spain -</b>        | Explosivos Alaveses S.A. (EXPAL)                                                                                                                                                                                                                          |

## Consolidated list of Manufacturers

|          |     |                                                                      |
|----------|-----|----------------------------------------------------------------------|
|          | USA | A. C. Gilbert Co.                                                    |
|          | USA | Automatic Temperature Control Co. Philadelphia, PA                   |
| ADI      | AUS | Australian Defense Industries                                        |
| B&P      | GBR | Boon & Porter Ltd.                                                   |
| BUCK     | DEU | Buck Chemisch-Technische Werke GmbH & Co.                            |
| BUL      | USA |                                                                      |
| CMZ      | USA | Whittaker Corp, Columbus Milpar Div.                                 |
| cqx      | DEU | Friemann & Wolf GmbH, Zwickau                                        |
| cyz      | DEU | Anton Flettner Flugzeugbau GmbH, Berlin                              |
| CRC      | GBR | Cravens Railway Carriage and Wagon Co. Ltd. Darnall, Sheffield       |
| CY       | GBR | Chorley                                                              |
| D over B | GBR | Blackwood Trading Co., Kingston-on-Thames                            |
| Denel    | ZAF | Denel, South Africa                                                  |
| Diehl    | DEU | Diehl- Ordnance Division, Rothenbach, Germany                        |
| dyz      | DEU | Gustav Schortmann & Sohn, Leipzig                                    |
| EA       | GBR | Electric Apparatus Co., Vauxhall Works, London                       |
| EMI      | GBR | Electric and Musical Industries                                      |
| ESS      | GBR | ESS Signs Ltd., Edgeware Road, Hendon                                |
| FFV      | SWE | Forsvarets Fabriks Verken                                            |
| FHH      | GBR |                                                                      |
| GHG      | GBR | G. H. Garland & Co. Ltd, Nibthwaite Road, Harrow, Middlesex, England |
| gzx      | DEU | Schreyer & Co., Spielwarenfabrik, Nuremberg                          |
|          | USA | Geometric Stamping Co. Euclid, OH                                    |
|          | GBR | Gladhills                                                            |
|          | USA | John W. Hobbs Corp.                                                  |
| IMI      | ISR | Israel Military Industries                                           |
| iwk      | DEU | Industrie Werke Karlsruhe AG                                         |
|          | KOR | Koryu Pyrotechnics Co. Ltd.                                          |
| KYC      | USA | Keystone Alloys Co. Ltd.                                             |
| Kynoch   | GBR | Kynoch Ltd.                                                          |
| LNO      | USA |                                                                      |
| L over G | GBR | Gledhill                                                             |
| LIP      | FRA | LIP, Besancon, France ( watch manufacturer)                          |
| Łódź     | POL | Łódź (later Mera Poltik) Clock Factory Łódź, Poland                  |
| LP       | GBR | Lang Pen Company Ltd., Aubrey House, Ely Place, Holborn Circus EC1   |
| MAI      | USA | Maryland Assemblies Inc.                                             |
| MAT      | FRA | MAT (Manufacture Nationale d'Armes de Tulle                          |
| MD1      | GBR | Ministry of Defence 1                                                |
| MDSL     | GBR | Mondial Defence Systems Limited.                                     |
| ME       | AUS | Maribyrnong Explosives                                               |
| MMC      | USA | Marquette Corp.                                                      |
| MRP      | NLD |                                                                      |
| MTL      | USA | Mast Technology Inc. Independence MO                                 |
| NJD      | USA | Navajo Army Depot                                                    |
| OPI      | USA | Ordnance Prod Inc.                                                   |
| PA       | USA | Picatinny Arsenal                                                    |
| POF      | PAK | Pakistan Ordnance Factories                                          |
|          | PAK | Armament Research and Development Establishment                      |
| PRB      | BEL | Poudreries Reunies de Belgique, SA Belgium                           |
| PTR      | NLD | PyroTechniek Rotterdam                                               |
| PXC      | USA | Ambac Ind Inc, Pace Co. Div.                                         |
| RHN      | USA | United States Army Ammo Depot.                                       |
| RhS      | DEU | Rheinmetall-Borsig AG, Werk Sommerda, Germany                        |
| RM LTD   | GBR |                                                                      |



|          |     |                                                                    |
|----------|-----|--------------------------------------------------------------------|
| RM       | DEU | Richard Rinker, Menden                                             |
|          | ROU | ROMTEHNICA                                                         |
| RR       | DEU | Richard Rinker, GmbH, Menden/Iserlohn, Germany                     |
|          | RUS | State Factory K                                                    |
|          | RUS | State Factory 12                                                   |
|          | RUS | State Factory 55                                                   |
|          | RUS | State Factory 60                                                   |
|          | RUS | State Factory 121                                                  |
|          | BGR | State Factory 211                                                  |
|          | RUS | Scientific Engineering Institute in Balashikha (State Factory 582) |
|          | RUS | Saranskiy Mechanical Plant (State Factory 583)                     |
|          | RUS | Scientific Research and Engineering Institute                      |
|          | RUS | Scientific Research Engineering Institute (AO NIII)                |
|          | RUS | Scientific Research Technological Institute, P.I. Snegireva        |
| SGK      | USA | Security Signals Inc.                                              |
| Schuco   | DEU | Schreyer & Co., Spielwarenfabrik, Nuremberg                        |
| SND      | USA | Seneca Army Depot                                                  |
| SNL      | USA |                                                                    |
| SPE      | POR | Sociedade Portuguesa de Explosivos, SA                             |
|          | USA | H.A. Sward Co. Inc.                                                |
| S over J | GBR | J Lucas                                                            |
|          | ZAF | South African Defense Industries                                   |
| TGCo     | GBR | The Gramophone Co.                                                 |
| TGSR     | GBR | The Gramophone Co. Springfield Road                                |
| T over T | GBR | Tecalamit Ltd., Brentford                                          |
| UDD      | USA |                                                                    |
| VS       | ITA | Valsella, Italy                                                    |
| WASAG    | DEU | Westfälisch-Anhaltische Sprengstoff-Actien-Gesellschaft, Goswig    |
| WWE      | USA |                                                                    |
|          | GBR | Wembley Electric Appliances                                        |
|          | USA | Universal Match Corp. Ferguson Mo.                                 |
| Y over B | GBR | Bryant and May                                                     |
|          | UKR | Donetsk (State Factory 107)                                        |
|          | YUG | Rudi Cajavec Defence Electronics, Banja Luka,                      |

## **Credits for all books in the TBRM series**

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Milan Dupal  
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Zdenek Horak  
ITO OMON "Sibir," Rosgvardia Directorate, Novosibirsk Region, Russia  
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State Emergency Service of Ukraine  
Colin MacGregor Stevens  
CAT-UXO  
Ukrainian 8th Special Forces Regiment, Explosives Service  
Joe Vollenberg  
Mike Weber

## 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                       |
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| 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 |
| Die Zünder der Schweizer Armee, 1848-2000 | Peter Jaeggi                        |
| Illustrated Arsenal of the Third Reich    | Donald B. McLean                    |

### Websites

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<http://www.millsgrenades.co.uk/>  
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