

# Lettre du



# MSIAC

Munitions Safety Information Analysis Center

# Newsletter



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## BUNDESWEHR CENTER (WTD 91) - FIRST TO COMPLETE THE IM TESTING ORGANISATION'S SELF-AUDIT



The German Bundeswehr Technical Center for Weapons and Ammunition (WTD 91) has provided MSIAC with a self-audit of its IM testing Capabilities and Competences.

This was carried out using the MSIAC AUDIT PROCEDURE OF IM (Insensitive Munitions) & IM/HC (Hazards Classification) TESTING ORGANIZATIONS' CAPABILITIES & COMPETENCES, Ed. 3.

The purpose of this audit procedure is to establish and promote mutually acceptable testing capabilities and competences that will lead to internationally acceptable IM test results, reports and IM signatures, as well as internationally recognizing IM test organizations.

Carrying out the MSIAC self-audit is the first step towards certification by proper certifying organizations. It is aimed at certifying organizations' testing munitions for IM & IM/HC compliance and assisting them to carry out munitions safety testing.

WDT91 will be reported as a self-audited organization in the MSIAC DIRECTORY OF INSENSITIVE MUNITIONS TESTING FACILITIES (L-106). Audit data is available from MSIAC on request.

## MARKING INSENSITIVE MUNITIONS

Extract from MSIAC Publication O-137 by Thomas N. Taylor  
 t.taylor@msiac.nato.int - <https://sw.msiac.nato.int/SecureWeb>

Recent discussions about marking munitions that contain an insensitive high explosive fill appear to be gaining support in the U.S. Explosive Ordnance Disposal (EOD) personnel have expressed their desire to know if munitions contain an explosive fill that is less sensitive to detonate. Experience in the field by EOD technicians has shown that as much as twice the amount of explosive donor material is needed to successfully and cleanly destroy (detonate) insensitive high explosives than their legacy (e.g., TNT, Comp B) high explosive counterparts. EOD personnel at the Explosive Ordnance Disposal Technology Center (EODTC) have expressed a concern that not knowing the explosive fill leads to incomplete detonation, secondary detonation attempts, imprecise (over or under) application of donor material, and increased risk to EOD personnel in field applications. This concern appears to be shared throughout the US EOD community and therefore MSIAC was asked to express their opinion on the matter.



Figure 1. French PBXN-109 filled Bomb

By definition an Insensitive Munition is described as a munition that reliably fulfills its performance, readiness and operational requirements on demand, but minimizes the violence of a reaction when subjected to unplanned stimuli. In order for a munition to meet this definition, it must pass a series of tests designed to assess the IM response and hazard classify the item. Very few Tier II munitions (20mm and above) currently exist in the U.S. stockpile that are fully IM (HD 1.6), however the number of munitions that pass the Sympathetic Reaction (SR) tests are increasing.

Type VI [No Response] to the sympathetic detonation stimuli, then it appears that the munition passes at least one criterion from the EOD destruction viewpoint for marking it as insensitive. Therefore the question is; should munitions that pass the SR test receive a unique marking and/or color code to identify the explosive filler? Marking explosive ordnance as a function of their "IMness" is not in practice by the US.

The US EOD Community has ideas of their own to identify the munitions filler.

They have expressed their concerns and opinions that munitions they destroy on a regular basis do not have visible markings to indicate the fill or role of the item due to various reasons such as aging, environmental, or abrasion of the paint, therefore color coding the munitions may not be enough. They have expressed their opinion to have both a non-permanent (stenciled marking) such as the filler abbreviation plus a permanent marking (engraving) on the munitions' body.

France currently identifies the explosive fill abbreviation on all artillery munitions size 30mm and greater plus on missiles, rockets, bombs, grenades and mines. They also engrave the fill abbreviation, and the MURAT Level 1\*, 2\*\* or 3\*\*\* markings on the aft closure of Bombs (Figure 1).

The US Navy currently marks their GB-

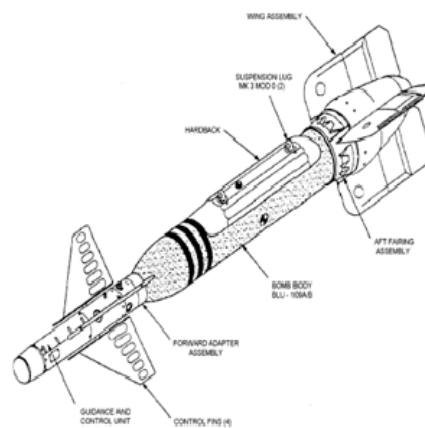


Figure 2. US GBU-24B/B PBXN-109 filled (PAVEWAY III)

(Continued on page 3)

(Continued from page 2)

24B/B PBXN-109 filled bombs with three yellow bands as depicted in Figure 2. However Table III of MIL-STD-709D does not mention this requirement. Separate loading ammunition and Bombs for shipboard will have one circumferential yellow band in addition to yellow markings, but Bombs that are thermally protected shall have two yellow bands.

MSIAC recommends assembling a cross-functional/service team to include acquisition, logistics, and EOD personnel to further review this marking (painting and/or metal stamping/engraving) issue and develop a change to both the US Military Standards (MIL-STD-709D and MIL-STD-129P). The change should require the item description of Tier II ammunition as described in reference 1 include the explosive fill by name, such as PBXN109 etc. The preferred color of the markings (paint) stenciled on the munitions per reference 4 is yellow, but suggest consideration be given to changing the color of markings for the insensitive fill if the munitions meet the SR criteria for an insensitive explosive as noted above. The color change will also help both the user and logistician quickly identify a legacy round (yellow markings) from a more insensitive (color TBD) round. If metal stamping/engraving is decided upon, the cross-functional/service team should recommend sizes and locations of the metal stamping/engraving, taking into consideration the vast size differentials of the total portfolio of Tier II munitions.

It is recommended that painting and/or metal stamping/engraving be considered for new production, but not repainting/marking existing stocks merely to comply with a new standard unless repair or maintenance is required. Moreover it is recommended, consistent with national security and releasability directives, that procedures or recipes to destroy specific munitions with insensitive fills, based on lessons learned or tests, be shared internationally among the MSIAC Nations and the NATO EOD alliance.

NATO Nations agreed, via the ratification process, that AOP-2 (C) will serve as a basis for national policy and storage, maintenance, and transport of ammunition on deployed missions or operations and their own respective national orders, manuals and instructions will be amended to include a reference to the NATO agreement. The agreement further states that no departure may be made from implementing the agreement unless reservations are made at time of ratifying the STANAG. Therefore National representatives and/or delegates who are responsible for writing National Policy and adopting International Agreements should consider changing both STANAG 2953 and AOP-2 to specifically identify the item description of the explosive fill be added to Table I-1-3 (Minimum Markings) for all Projectiles, Warheads, and Bombs.

For more information and/or to receive a copy of the MSIAC Open Report in its entirety, please contact MSIAC at [info@msiac.nato.int](mailto:info@msiac.nato.int) or telephone +32-2-707.54.16.

## REFERENCES

1. MIL-STD 709D, DoD Design Criteria Standard, Ammunition Color Coding, 16 Mar 2009
2. MIL-STD-129P w/Ch 2, DoD Standard Practice, Military Marking for Shipment and Storage, 10 Feb 2004
3. STANAG 2953, edition 3, The Identification of Ammunitions -AOP-2 (C), 11 Dec 2008
4. AOP-2(C), NATO, The Identification of Ammunition, Dec 2008


## A NEW BIRD FOR THE NEW YEAR

One of the stimuli specified in NATO STANAG 4439 on Insensitive Munitions (IM) requirements is bullet impact. While national and international policies request all up round tests to validate the response of a munition to this threat and in general to IM threats, a methodology using a combination of small-scale testing, modelling and expert analysis has emerged in recent years as best practice.

**BIRD**

*Bullet Impact Results Database*

*Version 1.4*



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2011

DATABASE

↓

[5.56 mm](#)

[7.62 mm](#)

[12.7 mm](#)

[14.5 mm](#)

[20 mm](#)

[30 mm](#)

[Information on Test Vehicles](#)

Neither MSIAC nor the participating Nations can guarantee nor warrant the adequacy, accuracy, currency or completeness of the Technical Information contained in this

To assist the community in developing this methodology, MSIAC created in late 2005 a database gathering bullet impact test results. This database developed in electronic format under Excel2003 (figure 1) is called **Bullet Impact Results Database (BIRD)**.

Since 2005, the BIRD database has been maintained on a regular basis and a new BIRD version (v1.4) is now available.

**Table 1: Test Results Sorted by Bullet Calibres**  
(BIRD v1.1 and v1.3 are draft versions and are internal to MSIAC)

Version	5.56 mm	762 mm	12.7 mm	14.5 mm	20 mm	25 mm	30 mm	Total	References
v1.0	21	1,85	885	0	36	0	46	2,161	102
v1.2	21	1,194	1035	2	38	0	46	2,336	141
V1.4	21	1,210	1229	2	51	0	46	2,559	185

As shown in table 1, more than 180 open publications (proceedings of symposia, unclassified reports, magazine, scientific review, etc) have been used in this new version for a total of 2,559 bullet impact results, most of them being dedicated to 7.62 mm and 12.7 mm bullets.

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(Continued from page 4)

The information available in BIRD is twofold:

1. Information related to Systems - Threat - Test - Reaction Level (figure 2). The taxonomy is provided in the BIRD User Guide (MSIAC report L-170). The test results are split up into several datasheets, each of them being dedicated to one bullet calibre: 5.56 mm, 7.62 mm, 12.7 mm, 14.5 mm, 20 mm and 30 mm. A partial view of the datasheet related to 12.7 mm bullet is shown in figure 2.

12.7 mm bullet impact																							
TESTED SYSTEM									THREAT						TEST		REACTION LEVEL						
System Designation	Country of Test	Tested Item	Config	Aim point	Aim Point Design.	Energetic Material at Aim Point	Case thickness at Aim Point (mm)	Case Material at Aim Point	Design.	Vo (m/s)	Firing range (m)	V impact (m/s)	Burst or Single	Burst Timing (ms)	Proc.	Type I	Type II	Type III	Type IV	Type V	NR	Other	
Rheinmetall Steel Tube	GE	GTU	B	Center		P-32	4	Steel		353			S	-	-	1							
Rocket (103mm)	Israel	AUR	T	LQ		HEF-J5						850 +/- 60	S	-	STANAG 4241							1	
Sadam	US	V	B	Center	Sub-munition	PAX-2A		Steel	AP			840	S	-					1				
Spider	US	GP	P	Center	Cartridge	PAX-41			AP			840	S	-	STANAG 4241							2	
Storm Shadow	UK	V	B	Center	Precursor Charge	PB/N-10			AP			850	S	-	STANAG 4241				1				
Storm Shadow	UK	V	B	Center	FTB	PB/N-109		Steel	AP			850	S	-	STANAG 4241							1	
Storm Shadow	UK	AUR	T	Center	Missile				AP			850	S	-	STANAG 4241							1	
Swingfire	UK	RM	B	Center		CDB		Aluminium	AP			850	S	-	STANAG 4241							1	
TAURUS	GE	V	B	Air	Mephisto penetrator	KS-22a		Steel	AP			850 +/- 60	S	-	ML-STD-2305							1	
TAURUS	GE	V	B	Air	Mephisto precursor charge	KS-33		Steel	AP			850 +/- 60	S	-	ML-STD-2305							1	
TAURUS	GE	AUR	T						AP			850 +/- 60	S	-	ML-STD-2305							1	

Figure 2: Partial View of 12.7 mm Bullet Datasheet

2. Information related to Generic Testing Units (GTU) is gathered in a separate datasheet (figure 3). Here 26 GTU are dimensionally characterized and, when available, drawings or pictures are provided.

Generic Testing Vehicle Database									
Designation	Acronym	Country	Shot Line	Impact Case Material	Impact Case thickness (mm)	Overall length (mm)	External diameter (mm)	Internal Diameter (mm)	Ref
3.2 inch Generic Shaped Charge Test Unit	GSCTU	USA	Radial	Aluminium	7	193	95	81	149
Chinese Generic Test Unit	CGTU	China	Axial	Steel	tbd	127	56	-	
GEMO 3 liters thick wall Test Unit	GEMO 3 I KW	France	Radial	Steel	10	260	143	123	
GEMO 3 liters thin wall Test Unit	GEMO 3 I NW	France	Radial	Aluminium	1	252	125	123	
GEMO Poudre CC	GEMO Poudre C2	France	Radial	Comb. Case	4.275	741.8	160	155.65	
Heavy Wall Penetrator	HWP	USA	Radial	Mild Steel	12.7	406.4	203.2	177.8	185
Underwater Test Unit	UTU	USA	Radial	Aluminium	4.1	570	254	245.8	184

Figure 3: Partial View of Datasheet on GTU in BIRD v1.4

The BIRD database can be used to compare or predict the bullet impact response of systems, sub-components or energetic materials. It has also been designed to provide statistics in order to increase the confidence in the test result.

BIRD v1.4 is now available and is downloadable on the MSIAC Secure Website. For any additional information, please contact MSIAC or Pierre-François Péron.

**CONTACT INFORMATION**

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## IM TECHNOLOGY GAPS WORKSHOP

### “Reducing Effects from Shaped Charge Jets, Fragments and Explosively Formed Projectiles”



#### Overview

The workshop will address how to reduce or mitigate the sensitivity of munitions (packaged and unpackaged) to fragments, shaped charge jets (SCJ) and explosively formed projectiles (EFP).

Discussions will include both existing munitions and new/upgraded or proposed munitions in development. The workshop will examine shortfalls in technology and potential remediation options. It will also address issues encountered to reduce the munitions response to these threats in operational theatres, related mitigation shortfalls based on credible aggression scenarios and potential remediation options.

The participation of warfighters and people dealing with munitions in operations is essential to bring their experience from the field, orientate and focus workshop discussions on their issues. Areas where contributions will be highly beneficial are:

- Threats and aggression scenarios in operational theatres:
  - The types of threats encountered in operational theatres, the potential targets (munition/weapon platform, etc) and operational issues of concern;
  - The aggression scenarios during the different operational phases (especially tactical logistics, munitions transportation) and the consequences on the munitions management;
- Issues and achievements to reduce munitions response to unplanned stimuli in the field;
- Benefits/drawbacks of IM munitions in operational theatres, i.e. situations where IM munitions have eased or complicated warfighters' mission.

We encourage those with experience in these areas, or people known to you, to contact us and participate if possible.

#### Location and Dates

The workshop will be held in the Instituut Defensie Leergangen (IDL), a Dutch Defence Academy located in The Hague, The Netherlands from 20 to 24 June 2011. A "Workshop Announcement" providing more information on clearances, accommodation and transport, as well as a draft agenda will be issued by 15 February 2010 and will be available on the MSIAC website in the section "IM Technology Gaps Workshop".

Deadline for Pre-registration:	29 April 2011
Papers due to MSIAC:	29 April 2011
Presentations due to MSIAC:	31 May 2011

#### Participants

The workshop is open to Government and Industry from MSIAC nations (Australia, Canada, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, UK and USA).

#### Registration & Accommodation

There is no registration fee. In order to facilitate the organization of the workshop, you are requested to pre-register by 29 April 2011 via the form provided on the next page or on the workshop webpage on the MSIAC website.

#### Contact Information

- ✦ [www.msiac.nato.int](http://www.msiac.nato.int) (Section IM Technology Gaps Workshop)
- ✉ Technical Coordination - Dr Pierre-François Péron [p-f.peron@msiac.nato.int](mailto:p-f.peron@msiac.nato.int)
- ✉ Administration - Valérie Cousens [info@msiac.nato.int](mailto:info@msiac.nato.int)

## IM Technology Gaps Workshop

### Pre-Registration Form

Please complete and return this pre-registration form by 29 April 2011

e-mail: [info@msiac.nato.int](mailto:info@msiac.nato.int) or fax: +32-2-707-5363

Participant			
<b>Name</b>		<b>Phone</b>	
<b>Organisation name and address</b>		<b>Fax</b>	
		<b>Email</b>	
		<input type="checkbox"/> Government <input type="checkbox"/> Industry	
<b>Do you intend to present a paper?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(Deadline for submission 15 November 2010)</i>			
<b>Paper title:</b>			
<b>Areas of expertise (please tick one or several boxes)</b>			
Fragment Impact Threat			<input type="checkbox"/>
Shaped Charge (SC) Threat		<input type="checkbox"/> Design	<input type="checkbox"/> Mitigation
Explosively Formed Projectile (EFP) Threat		<input type="checkbox"/> Design	<input type="checkbox"/> Mitigation
Gun Propellant Charge Systems			<input type="checkbox"/>
Rocket Motors			<input type="checkbox"/>
Anti-Armour Warheads (SC, EFP, etc)			<input type="checkbox"/>
Blast Fragmentation and General Purpose Warheads			<input type="checkbox"/>
Initiation/Ignition Systems			<input type="checkbox"/>
Energetic Materials			<input type="checkbox"/>
Packaging			<input type="checkbox"/>
Munitions in Operations			<input type="checkbox"/>
Design			<input type="checkbox"/>
Testing			<input type="checkbox"/>
Procurement			<input type="checkbox"/>

## ACCIDENTS REPORTING

18 October 2010 - 9 December 2010

*(Re-printed with the permission of ility engineering ([www.saunalahti.fi/ility](http://www.saunalahti.fi/ility))  
from their Hazards Intelligence (Hint) Journal)*

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### 18 October - China

101018-02 Qiaoxi Village, Dongxiang County, Jiangxi Province. Xinshan Explosive Fuse Plant. Three women died and six people were injured in an explosion at a fuse plant in east China. The explosion occurred at about 13:00 at the legally operated Xinshan Explosive Fuse Plant. All the injured had been taken to hospital. County work safety authorities were investigating.

### 2 November - Cambodia

101102-10 Phnom Prek district, Battambang province. One died and three others were severely injured when a tractor they were riding ran over several concealed anti-tank mines. Rith Sophorn, a police official in Chak Krey commune, said the mines exploded when the driver, a soldier, swerved to avoid a pothole. The other three casualties were bean farmers who were hitching a ride home on the tractor. Rith Sophorn said: "The tractor was completely damaged, and the people lost legs, hands and suffered head injuries. One of the bean farmers died on the way to hospital due to serious injuries".

Two of the casualties were taken to a hospital in Thailand, while the third was being treated at the local referral hospital in Chak Krey commune and was soon to be taken to Battambang provincial hospital for further treatment. Phnom Prek district governor Soun Kien said that two other concealed anti-tank mines were found around four metres from the scene of the accident, adding: "There are many land mines in this area because it used to be a theatre of war. People know that but it is very hard for them to avoid farming on the land".

### 3 November - USA

101103-05 Austin, TX. A man was injured in a small explosion while "cooking pyrotechnics inside his home in Southwest Austin at about 04:00", police said. Police said a man was experimenting with pyrotechnic chemicals in his kitchen in preparation for a World War II re-enactment when the explosion occurred, causing a fire. The kitchen suffered minimal damage.

The man's wife called the emergency services, and Austin fire-fighters, police, EOD squad, and officials with Alcohol, Tobacco, Firearms and Explosives responded. He was taken to University Medical Center Brackenridge, where he remained with critical injuries.

Police spokesman Cpl. Anthony Hipolito said the man had a valid license to work with pyrotechnic chemicals and had the chemicals legally: "He was cooking the chemicals on the stove and something went wrong and it went off. This was purely an accident". Hipolito said the man will not face any charges.

### 11 November - Mexico

101111-05 San Miguel Zacaola, Municipality of Santo Tomás Hueyotlipan, Puebla. A clandestine gunpowder store exploded in the town of San Miguel Zacaola. Authorities confirmed the death of the owner of the place, his wife and son, and four people injured, including two minors who were referred for initial attention to Tepeaca General Hospital. The mayor of Hueyotlipan, Fernando García Aguilar, said the security forces were still in place determining the extent of the damage. It was reported that due to the explosion a large amount of smoke was seen throughout the town.

### 16 November - Cambodia

[http://english.ntdtv.com/ntdtv\\_en/ns\\_asia/2010-11-18/271437906148.html](http://english.ntdtv.com/ntdtv_en/ns_asia/2010-11-18/271437906148.html)

101116-05 Battambang province, 250 km (155 miles) northwest of Phnom Penh. Fourteen people died in western Cambodia when their homemade tractor ran over an anti-tank mine left over from the country's civil war in the

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1980s. The incident occurred while the farmers were on their way back home from harvesting chillies. Police Maj. Buth Sambo said 12 of them were killed instantly, including a one-year-old girl, and the two others died on the way to a hospital. The police officer said the area was the site of intense battles between the Khmer Rouge and government forces in the 1980s and early 1990s and thus was seeded with numerous mines.

### 20 November - India

101120-02 Binnaguri, Jalpaiguri district, West Bengal state. A major fire broke out in an ammunition depot of the Army at Binnaguri, causing some damage. Fire brigade officials said: "Two blasts were heard in the godown [warehouse] where the fire was suspected to have originated from stored chemicals". The fire was noticed at about 17:00, and six fire tenders, including two of the defence, put out the fire at about 21:00. A defence ministry spokesman said in Kolkata that there was no loss of life or any damage to serviceable ammunition, adding: "The extent of damage, if any, and the cause of the fire is being assessed by a court of inquiry".

### 25 November - India

101125-01 Azhavangadu in Coonoor division of Nilgiris district, 12 km from Udagamandalam (Ooty), Tamil Nadu. Indian Defence Ministry: Indian Ordnance Factories, Cordite Factory. Five workers at the Cordite Factory were killed, and two seriously injured, in an explosion at 15:15. The incident occurred when a group of employees were engaged in mixing chemicals for the manufacture of propellants used in firearms and artillery. The explosion led to the collapse of the entire structure at building No 2 of the 106-year-old establishment, in the high-security area at Aruvankadu.

The General Manager of the factory G Ashok Kumar said: "An accident occurred in the dough making unit in Building No 2 causing an explosion. There were six employees inside. Of them, Ilango ran out suffering injuries. He is undergoing treatment in our hospital and is safe. Of the remaining, one body has been recovered but we are unable to identify as it is heavily mutilated. Ten more employees have suffered minor injuries. Some of them have been treated as outpatients. They are all safe. This is an accident not sabotage. Enquiries will be conducted by Defence Ministry's ballistic and chemical experts. There will also be multi-disciplinary enquiries. Only after that, the cause will be known".



Situated at an altitude of 1,890 metres above sea level, the plant was the first smokeless propellant factory in India. It was opened on January 19, 1904. Cordite Factory manufactures nitrocellulose, nitroglycerine, propellants for small arms and ammunition for guns and artillery ammunition as well as propellants for engine starters for aircraft.

### 9 December - Spain

101209-05 Eskoriatza (Guipúzcoa). Adif. A worker died and two others were injured in an explosion on a high-speed railway construction site in Eskoriatza. The accident happened at 14:20, when explosive material left, over from controlled explosions carried out earlier at the site, was ignited accidentally, causing the death of a Ukrainian man. The explosion also caused severe injuries to another Ukrainian man working on the site. A woman, who was working as a security officer at the site, was also injured, although less severely. She was also taken to hospital.



The incident was being investigated by experts from the Basque Institute of Workplace Safety, along with explosives experts from the Ertzaintza (Basque police force). Police opened an investigation into the causes of the accident and another independent investigation will be carried out by Adif, the company responsible for the high-speed rail link to and from Vizcaya and Álava.

## PROCUREMENT ISSUES PRESS REVIEW

*If you have information you consider of relevance to this section please do not hesitate to contact MSIAC at [info@msiac.nato.int](mailto:info@msiac.nato.int)*

### BOEING RECEIVES SMALL DIAMETER BOMB CONTRACT EXTENSION FROM US AIR FORCE

[www.indiandefencereview.com](http://www.indiandefencereview.com) – 10/11/2010)

Boeing has received a \$106 million contract extension from the U.S. Air Force for nearly 2,700 Small Diameter Bomb Increment I (SDB I) munitions and approximately 380 BRU-61 carriages.

Boeing will deliver the munitions and carriages starting in January 2012. The Lot 7 production order is the seventh option exercised by the Air Force's Air Armament Center since 2003 and contains the most SDB I weapons ordered in a single lot. Lots 1 through 7 comprise a total of 12,379 munitions and 2,059 carriages.



Rack of Four Small Diameter Bombs (SDB I) on a F-15 Aircraft

SDB I is a 250-pound class, low-cost and low-collateral-damage precision strike weapon. The SDB bomb is 1.8 m long with a 19 cm diameter. It incorporates a steel case containing approximately 23 kg of AFX-757 explosive. It could perforate more than 1 m thick steel reinforced concrete. The weapon's smaller size, coupled with its four-place carriage, enables more weapons to be carried on each aircraft to improve mission effectiveness and reduce the number of sorties required per mission.

SDB I is the second US munitions to be assigned a 1.2.3 Hazard Storage SubDivision (SsD 1.2.3.). This classification shows the high IMness as its reaction must be at the most burning (type V) to fast cook-off, slow cook-off and bullet impact and explosion (type III) to sympathetic reaction aggression.

### FRANCE ORDERS 200 METEOR LONG RANGE AIR-AIR MISSILES

[www.defenseindustrydaily.com](http://www.defenseindustrydaily.com) – 05/01/2011)

The French DGA made France the 4th customer nation to place production orders for MBDA's ramjet-powered Meteor missile, after Britain, Spain, and Sweden. The 200 missile order was placed through the multinational program lead, Britain's MoD Defence Equipment & Services (DE&S), to MBDA-UK. Price was not mentioned. The first French Meteor missile deliveries are expected in 2018.

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MBDA's Meteor missile was conceived as a longer-range competitor to popular weapons like the Russian R77/AA-12, and American AIM-120 AMRAAM. Its ramjet propulsion is intended to offer the missile a head-on closing range of 120 km, with a 2-way datalink and full powered performance at Mach 4+ throughout its flight.

The Meteor missile will be equipped with a blast/fragmentation warhead (pre-formed fragments) produced by TDW. The Meteor warhead and rocket motor have been required to be fully IM compliant.



Meteor Missile



A French Navy Rafale M lands onboard the carrier Charles de Gaulle during Meteor trials

## ACQUISITIONS

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### RHEINMETALL REINFORCES ITS POSITION IN THE EUROPEAN DEFENCE INDUSTRY

([www.rheinmetall-defence.com](http://www.rheinmetall-defence.com) – 03/12/2010)

First announced several months ago, the takeover by Rheinmetall of the business operations of SEI SpA (Società Esplosivi Industriali), an Italian subsidiary of France's EPC Group, came into effect on 1 December 2010, having secured the approval of all the relevant competition authorities.

SEI is a manufacturer of aircraft weapons like the Mk 80 series aircraft bombs and underwater weapons at the Domusnovas plant in Sardinia. The site includes test facilities and a firing range.

In the fiscal year 2009 SEI SpA's 115 employees generated sales of around €20 million. The company headquarters are in Ghedi (BS) in northern Italy and has a production plant in Sardinia at Domusnovas.

The Italian company will henceforth be known as RWM Italia Munitions S.r.l.



BLU-117 General Purpose Bomb Being Filled with Cast-cured Explosive PBXN-109



Murena Target Detection Device Assembly

## LATEST PATENTS OF INTEREST



US 20100294156A1

(19) **United States**

(12) **Patent Application Publication**  
**Berlin et al.**

(10) **Pub. No.:** US 2010/0294156 A1  
 (43) **Pub. Date:** Nov. 25, 2010

(54) **METHODS AND APPARATUS FOR HIGH-IMPULSE FUZE BOOSTER FOR INSENSITIVE MUNITIONS**

**Publication Classification**

(51) **Int. Cl.**  
*C06C 5/06* (2006.01)  
*C06B 21/00* (2006.01)  
 (52) **U.S. Cl.** ..... 102/275.11; 86/1.1  
 (57) **ABSTRACT**

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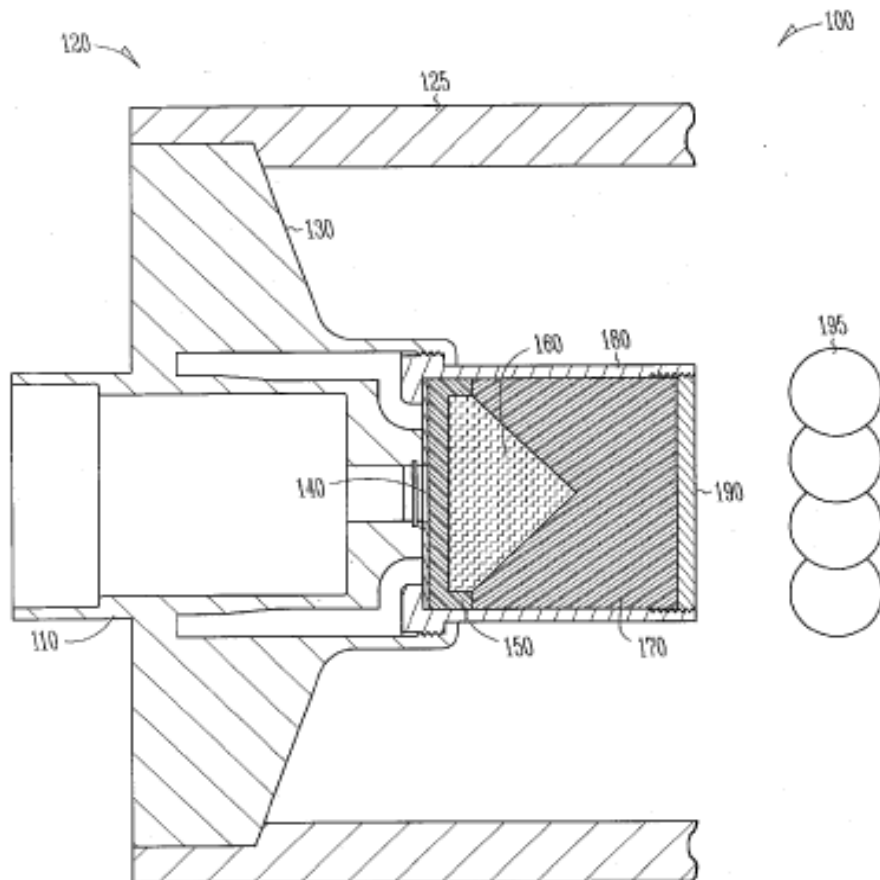
A method for initiating a low-sensitivity explosive charge includes initiating a booster explosive charge within an explosive charge cavity in a booster housing, and generating a planar detonation wave. Generating the planar detonation wave includes directing a detonation wave through the booster housing along a first waveshaper surface of a detonation waveshaper. The detonation wave is directed around the first waveshaper surface toward a second tapered waveshaper surface. After progressing around the first waveshaper surface, the detonation wave is directed along the second tapered waveshaper surface. The detonation wave changes into a planar detonation wave as the detonation wave moves along the second tapered waveshaper surface, the planar detonation wave includes a planar wave front. The planar detonation wave strikes a flyer plate coupled over the explosive charge cavity of the booster housing, and the planar wave front makes planar contact along an inner face of the flyer plate.

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**Related U.S. Application Data**

(60) Provisional application No. 61/048,110, filed on Apr. 25, 2008.



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