Safety and risk reduction (ammunition processing operations)
Warning

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Foreword

Ageing, unstable and excess ammunition stockpiles pose the dual hazards of illicit proliferation and accidental explosion, which have caused destabilization and humanitarian disaster in all regions of the world.

Crucial for adequate stockpile management is the identification of surpluses – that is, the portion of weapons and ammunition that does not constitute an operational need. When surpluses are not recognized, the entirety of the stockpile may continue to be seen as of operational value. Although not used, weapons and ammunition surpluses thus continue to fill warehouses and can thus pose a significant risk to safety and security.

Defective stockpile management has been assessed as the norm rather than the exception in many countries. Often it is not only surplus stocks that should be the focus of attention, but the lack of appropriate policy for stockpile management. Governments remain unaware of surpluses; their national stockpiles remain a risk to public safety; and diversion from warehouses feed into crime and armed violence.

In 2011, the United Nations developed the International Ammunition Technical Guidelines (IATG) to ensure that the United Nations as a whole consistently delivers high-quality advice and support in ammunition management. Many stakeholders, including international organizations, non-governmental entities and national authorities, use these guidelines.

The IATG, along with other conventional ammunition issues, are managed through the United Nations SaferGaurd programme.

Taking into account the diversity in capacity of States, three levels of ascending comprehensiveness are offered in the IATG, referred to as “risk-reduction process levels” (RRPLs). These are indicated within each IATG as either LEVEL 1 (basic), LEVEL 2 (intermediate) or LEVEL 3 (advanced).

The aim of implementing partners should be to maintain stockpile management processes at RRPL 1 as a minimum. This will often reduce risk significantly. Ongoing and gradual improvements could then be made to the stockpile management infrastructure and processes as staff development improves and further resources become available. These additional actions would equate to RRPLs 2 and 3.

The RRPLs are determined by calculating a weighted score of questions about a particular ammunition stockpile. A checklist is available at: https://www.un.org/disarmament/un-saferguard/risk-reduction-process-levels/.

The IATG are reviewed on a regular basis to reflect developing ammunition stockpile management norms and practices, and to incorporate changes due to changing international regulations and requirements. The IATG are also available in multiple languages.

The latest version of each guideline, together with practical IATG implementation support tools, can be found at https://www.un.org/disarmament/un-saferguard/.
Introduction

Any task involving the repair, testing, modification, disassembly or breakdown of ammunition and explosives carries with it an increased risk of accidental initiation. It is therefore regarded as explosives processing and should be carried out in a facility suitable for the explosives process activity and normally in isolation from the storage of bulk stocks of explosives. This is generally known as an ammunition process building (APB).

Explosives may function accidentally due to stimuli such as impact, friction, spark, heat, electrostatic discharge, radio frequency induced current, reaction with another substance or inherent chemical instability. The inadvertent initiation of even small quantities of explosives can lead to death or serious injury and may, through subsequent events, lead to a major catastrophe. Ammunition processing operations range from simple visual inspections, through component replacement to full breakdown.

It is much more hazardous to disassemble or breakdown explosives items than it is to fill them. During manufacture the components that contribute the greatest potential hazards are assembled to the main charge as late as possible, but in items for breakdown such components will be present when operations are begun. In many items where there is a requirement for breakdown, deterioration and corrosion will have occurred; this may have affected the explosives as well as the mechanical parts and will tend to make disassembly much more difficult and potentially more hazardous than assembly.¹

This IATG provides guidance on the general safety aspects of ammunition and explosive processing, whilst other IATG provide more specific safety advice for storage and equipment.

¹ Specific safety precautions for the conduct of breakdown operations are contained in IATG 06.50 Specific safety precautions.
1 Scope

This IATG introduces and explains the specific requirements for safety and risk reduction during the processing of ammunition and explosives within explosive facilities. It complements IATG 06.10:2015[E] Control of explosive facilities, IATG 06.30:2015[E] Storage and handling and IATG 06.50:2015[E] Specific safety precautions which all provide further safety advice for the storage of ammunition and explosives and the overall safety control of an explosives facility. The requirements of these IATG shall also be applied, where appropriate, to the processing of ammunition and explosives.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

A list of normative references is given in Annex A. Normative references are important documents to which reference is made in this guide and which form part of the provisions of this guide.

A further list of informative references is given at Annex B in the form of a bibliography, which lists additional documents that contain other useful information on safety and risk reduction during the processing of conventional ammunition.

3 Terms and definitions

For the purposes of this guideline the following terms and definitions, as well as the more comprehensive list given in IATG 01.40:2015[E] Terms, definitions and abbreviations, shall apply.

The term ‘ammunition process building’ (APB) refers to a building or area that contains or is intended to contain one or more of the following activities: maintenance, preparation, inspection, breakdown, renovation, test or repair of ammunition and explosives.

The term ‘processing’ refers to the activities undertaken in a process facility that involves building, repair, refurbishment, breakdown, test and inspection of explosives articles and their components.

In all modules of the International Ammunition Technical Guidelines, the words ‘shall’, ‘should’, ‘may’ and ‘can’ are used to express provisions in accordance with their usage in ISO standards.

a) 'shall' indicates a requirement: It is used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

b) 'should' indicates a recommendation: It is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form, 'should not') a certain possibility or course of action is deprecated but not prohibited.

c) 'may' indicates permission: It is used to indicate a course of action permissible within the limits of the document.

d) ‘can’ indicates possibility and capability: It is used for statements of possibility and capability, whether material, physical or casual.
4 Risk assessment (LEVEL 2)

A risk assessment shall be carried out prior to starting any ammunition processing activity. This should be in accordance with the guidelines contained within IATG 02.10:2015[E] Introduction to risk management principles and processes and the specific requirements of this IATG.

The minimum information of the hazardous properties of the explosive article for processing should be available for the individual carrying out the risk assessment:

a) design drawings;
b) previous processing technical instructions for the type of explosive article;
c) sensitiveness data;
d) chemical stability information;
e) hazard classification codes; and
f) health hazards.

Any risk assessment should start from the perspective of remote processing or testing wherever possible, but if this is considered not to be necessary, or reasonably practicable, then established and tested processes should be used. The risk assessment should direct the selection of the most appropriate tools, equipment and processing to be used. Examples are shown in Table 1:

<table>
<thead>
<tr>
<th>Findings</th>
<th>Details</th>
<th>Appropriate tools, equipment or process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive dust risk</td>
<td>Bare, exposed explosive will be present during the process; hence explosive dust may be present.</td>
<td>Category C Ammunition Process Building required.</td>
</tr>
<tr>
<td>Low sensitiveness</td>
<td>The hazard data sheet suggests that the explosive is very vulnerable to initiation by static electricity.</td>
<td>Anti static measures required. Non-sparking tools. Anti-static floor. Personal earthing equipment.</td>
</tr>
<tr>
<td>Explosion risk</td>
<td>Disassembly requires high force to gain access to munition, hence the risk of explosion.</td>
<td>Remote process needed. Operator protected behind armoured screen.</td>
</tr>
<tr>
<td>Irritant fumes</td>
<td>The re-painting process requires the use of paint that produces irritant fumes.</td>
<td>Protective face masks to be worn.</td>
</tr>
</tbody>
</table>

Table 1: Example risk assessment findings

The findings of the risk assessment should be formally recorded and other documentation amended as necessary, for example:

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2 This should be available from an Explosives Hazard Data Sheet, which is available from the manufacturer.
3 This should be available from the records maintained in accordance with IATG 07.20:2015[E] Surveillance and in-service proof.
4 This should be available from the records initiated under IATG 03.10:2015[E] Inventory management.
5 See Footnote 6.
7 This is not the same as sensitivity. See definitions in IATG 01.40:2015[E].
a) the explosive limits licence\(^8\) may require a temporary reduction in permitted net explosive quantity (NEQ) during the period of the processing task; or

b) standard inspection and repair instructions (I&RI) may require amendment.

5 Safe systems of work (LEVEL 2)

The safe processing of ammunition and explosives shall be achieved through establishing and implementing safe systems of work (SSOW). These SSOW will be guided by the risk assessment and the guidance contained within this IATG. In summary they should cover:

a) trained and competent staff (see Clause 6.6);

b) appropriate levels of direct supervision and overall management (see Clause 6.6);

c) suitable written work instructions (I&RIs) (see Clause 6.5);

d) appropriate equipment; and

e) adequate work facilities.

6 Controlling the risk (management)

There are a range of ammunition management systems and techniques available for controlling the risk during the processing of ammunition and explosives. These should all be implemented prior to the commencement of work.

6.1 Explosive limits (LEVEL 1)

A major element of risk reduction shall be to limit the quantity of ammunition and explosives present in the APB (either being processed or in temporary storage). The guiding principle should be that if the task can be efficiently and effectively carried out by single explosive items it should be. Yet it is accepted that for minor tasks and lower calibre systems, operational efficiency will require the use of production line techniques. Technical judgement, combined with the results of the risk assessment, should be used to determine appropriate explosive limits for the APB during processing operations. These limits shall rarely be the maximum theoretical limit as determined in accordance with IATG 02.30:2015[E] Licensing of explosive facilities. The physical NEQ stored shall be the minimum necessary for the safe and efficient conduct of the processing task and shall never exceed the necessary quantity for one days work.

The total licensed content of NEQ at or in an APB shall include ammunition in ‘buffer stock’ awaiting processing, the ammunition being processed and ammunition post processing. The level of post-processed ammunition should be kept as low as possible by regular collections and return to normal storage.

6.2 Man limits (LEVEL 1)

A limitation on the number of staff and visitors present within the APB shall be applied. This is known as the Man Limit. There should be two levels of man limits:

a) normal. This is the man limit for personnel normally permanently located within the APB during the processing task; and

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\(^8\) See IATG 02.30:2015[E] Licensing of explosive facilities.
b) maximum. This is the man limit that includes personnel normally permanently present, transient staff involved in the delivery and collection of explosives, transitory supervisory staff and visitors.

Man limits shall be kept to the minimum necessary for the safe and efficient completion of the processing task.

6.3 Lower risk operations (LEVEL 2)

Separate processing tasks on different types of ammunition and explosives in a single location should not normally be permitted. Separate tasks may be permitted to be carried out simultaneously if the explosive risk is assessed as low (e.g. for Hazard Division 1.2 or 1.4 ammunition where there is no mass explosion hazard) and there is a low probability of initiation. Such tasks could include the visual inspection or marking of ammunition.

A processing task shall never be considered as a low risk operation where exposed explosives substances are present or could be exposed as a result of the process.

6.4 Restricted tasks (LEVEL 2)

Due to higher levels of inherent risk the following operations shall only ever be undertaken by named individuals who are specifically licensed for that particular processing task by the national technical authority. Assumption of an appointment previously occupied by a named individual shall not mean that authority is automatically transferred to the new incumbent. These operations are:

a) experiments to alter the type or size of charges in propellant or bursting charges;
b) breakdown operations on strange, unknown, unfamiliar or foreign ammunition and explosives;
c) the manufacture of home made explosives (HME); and
d) the manufacture of training or simulated improvised explosive devices.

6.5 Work instructions (LEVEL 2)

Formal, written work instructions shall be developed for each type of processing task. The level of detail in the work instruction should be determined by the risk involved, the complexity of the task and the competency levels of the staff. The work instructions shall be available in the APB for consultation during the processing task.

Work instructions should consist of:

a) general work instructions on basic explosive safety that are applicable to all processing tasks; and
b) specific work instructions applicable to a particular processing task.

An example general work instruction is at Annex C for information.

An example specific work instruction, in the form of an Inspection and Repair Instruction (I&RI), is at Annex D for information.
6.6 Supervision and competency (LEVEL 2)

Individuals shall be considered to be competent\(^9\) to supervise or undertake ammunition processing operations when:

a) they have been trained to an appropriate level on the specific task;

b) they have been educated to an appropriate level as to the risks inherent in the handling and processing of ammunition and explosives; and

c) they have gained sufficient experience of the task under direct supervision so as to be considered safe to work on the task.

Records of training and qualifications shall be maintained throughout the career of the individual. These should be used as the basis for the written authorisation of individuals as to their competency to supervise or undertake specific ammunition processing tasks. No individual may process ammunition within an APB without written authorisation unless under the direct supervision of a qualified individual; this allows for ‘on the job’ training.

7 Controlling the risk (processes)

7.1 Processing facility (LEVEL 2)

Ammunition processing tasks should ideally take place in a building designed specifically for that purpose, although it may take place in a temporary location as long as all safety requirements can be met.

7.2 Exposed ammunition and explosives (LEVEL 1)

The quantity of exposed explosives (e.g. those unpacked) shall be kept to a minimum. Ideally only one container should ever be open at one time. All explosives that are not being worked on should be appropriately covered to minimise the risk of initiation by spark.

7.3 Remote operations (LEVEL 2)

Remote or semi-remote operations shall be the first choice wherever possible.

Remote operations shall always take place where:

a) the explosive composition is sensitive; or

b) the operation is considered more likely than normal to result in a fire or explosion.

The type of remote operation and the protection level required shall be determined by the type and quantity of explosive present. For example:

c) for small quantities of sensitive explosives or small devices adequate explosives guards,\(^{10}\) protective gloves and tweezers may be all that is necessary; or

d) for larger quantities of explosives an armoured barrier with remotely operated tools may be required.

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\(^9\) An individual’s ‘competence’ to undertake any task is determined by a combination of his/her training, education and practical experience specific to that task. Just because someone has been doing the same ammunition related task for 20 years does not necessarily mean he/she is ‘competent’; the person may just be extraordinarily lucky!

\(^{10}\) Explosives guards or armoured barriers should be engineered to be resistant to 125% of the normal explosive load of the ammunition being processed.
### 7.4 Personal protective equipment and clothing (LEVEL 1)

There may be a need for personal protective equipment or protective clothing (PPEC) during some ammunition processing tasks. The aim of PPEC should be to:

a) provide a degree of protection against the effects of accidental fire or explosion;

b) provide protection from health hazards; and

c) reduce hazards such as static electricity.

The risk assessment should determine the need for PPEC and the type required should be stated in the work instruction for the task (Clause 6.5).

A suitable material for PPEC during processing tasks is probanised cotton\(^\text{11}\) as this provides some protection from fire. Other types of PPEC may include face masks,\(^\text{12}\) disposable gloves, eye protection or personal static electricity dischargers.

### 7.5 Authorised tools and equipment (LEVEL 2)

A formal system should be put in place to ensure that only tools and equipment that are intrinsically safe to use in process facilities are used; a list should be maintained. It should be the responsibility of the national technical authority to advise on appropriate tools and equipment for use during processing tasks. The use of iron or steel tools should be discouraged and non-sparking equivalent materials used instead. Further guidance is at Annex E.

The tools and equipment authorised for each process task should be stated in the work instruction (Clause 6.5 and Annex D).

### 7.6 General procedures (LEVEL 1)

General procedures should be implemented that are common to every processing task as shown in Table 2.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rationale</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| Pre and Post Work Inspection | This ensures that the APB, tools and equipment are clean and in good working order. It also ensures that tools etc are not left inside machinery or a munition. | • This should be the responsibility of the task supervisor.  
• 100% check of all tools.  
• Cleanliness check.  
• Unserviceable tools replaced. |
| Clear Exits                | Unobstructed exits ensure that emergency evacuation and emergency service access is unimpeded. | • All doors and windows unfastened and unlocked.  
• Security bolts and bars removed. |

\(^{11}\) Probanised cotton is cotton that is specially treated to improve fire resistance.

\(^{12}\) A requirement for face masks should not be used as a substitute for forced air extraction if fume levels are hazardous to health.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Rationale</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| Minimise Flammable Material      | Reduces fire risk.                             | • These include cotton rags, paints and solvents.  
• Only the minimum required for each task should be in the APB.  
• After use they should be stored in metal containers outside the APB and at least 1m from the wall.  
• Rags with oil are susceptible to spontaneous combustion. These should be removed immediately from the APB. |
| Explosive Waste                  | Reduces fire and/or explosion hazard.          | • This should be segregated from all other waste.  
• Explosively contaminated cleaning materials should be treated as explosive waste.  
• Explosive waste should be disposed of in accordance with IATG 10.10:2015[E] Demilitarization and destruction of conventional ammunition. |
| Temperature in APB               | Reduces fire and/or explosion hazard.          | • The temperature within the APB should be maintained at a level consistent with the comfort of staff and the safety of the explosives.  
• A temperature range of 13°C to 24°C should be optimum. |
| Humidity in APB                  | Reduces initiation risk due to static electricity. | • The humidity within the APB should be damp enough to reduce the risk of initiation due to static electricity. |
| Clean Area                       | Reduces the risk of dirt and grit being introduced into ammunition and explosives.  
Reduced the risk of contaminated PPEC leaving the APB. | • A separate room (normally a cloakroom) should be provided within the APB to allow staff to change into work clothes.  
• This room should be accessible from the outside.  
• Within the room a ‘clean line’ should be established. |
| Electrostatic Discharge          | Minimises the risk of ignition of primary explosives and electro-explosive devices (EED) from electrostatic discharge. | • See IATG 06.50:2015[E] Special safety precautions. |
### Activity | Rationale | Requirement
---|---|---
Spark Prevention | Reduces initiation risk due to sparking. | • Use soft soled footwear and clothing without metal fasteners.  
• Use non-ferrous authorised tools and equipment.  
• Floors, fittings and finishes susceptible to sparking should not be used (e.g. ceramic floor tiles). |
Radio Frequency Hazards | Minimises the risk of ignition of electro-explosive devices (EED) from induced electrical current. | • Prohibit mobile telephones within the APB.  
• The location of radio transmitters should be controlled. |

Table 2: General procedures for processing tasks

# 8 Contingency planning

## 8.1 Accident procedures (LEVEL 1)

Procedures shall be established that state the action to be taken in the event of an accident. These should be in accordance with IATG 11.10:2015[E] Ammunition accidents: reporting and investigation. As a guide, the following actions should be considered:

a) cease all processing tasks and make safe any ammunition or explosives that may present a future hazard;

b) give immediate first aid to any injured personnel. In the case of fatal accidents, bodies should not be touched except to confirm death. Out of respect, bodies should be covered until they can be removed from the scene;

c) summon medical assistance if required;

d) immediately report the accident and await guidance from the nominated technical investigator, (IATG 11.10:2015[E] Ammunition accidents: reporting and investigation);

e) cordon off the area to preserve evidence for the investigating authority. Nothing should be moved and everything should remain as it is in situ; and

f) record the names of potential witnesses.

## 8.2 Thunderstorms (LEVEL 1)

Thunderstorms potentially contain a massive build up of static electricity within the atmosphere and thus present a serious hazard to ammunition and explosive processing. Work on electro-explosive devices (EED) and primary explosive is to cease immediately when there is a thunderstorm in the vicinity. Where it is safe to do so, ammunition and explosives being worked on are to be made safe and all ammunition and explosives are to be repackaged.

The APB should then be evacuated and made secure until the thunderstorm has passed by.

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13 They should be prohibited from the entire explosives area anyway.
14 Photographs should be taken prior to moving the casualty for medical treatment if at all possible.
15 It may be possible to get prior warning from the national meteorological office.
8.3 Unsafe ammunition (LEVEL 1)

Procedures should be developed to deal with any spillage of explosives or any ammunition that is found to be in an unsafe condition (e.g. the exudation of explosives or if ammunition is inadvertently dropped).

Work should stop immediately until the situation has been resolved. If it is safe to do so all remaining ammunition and explosives should be repacked prior to evacuation of the APB.

These types of incidents may require the need for explosive ordnance disposal (EOD) support.

9 Heating explosives during processing (LEVEL 3)

Equipment for heating explosives will incorporate features designed to avoid overheating. There are special requirements for electrical appliances used for heating explosives during processing. Whatever medium is used for heating or cooling explosives in processing it should be essential to consider at the design stage how to control the temperature within safe limits. The provision of an independent overriding protection feature to cover failure of primary controls should normally be essential.

10 Breakdown of explosive items (LEVEL 2)

It is much more hazardous to break down explosives items than to fill them. During initial filling and assembly, components that contribute the greatest potential hazards are assembled to the main charge as late as possible. Items undergoing breakdown will have these components present when breakdown operations begin. In many items where there is a requirement for breakdown, deterioration and corrosion will have occurred and this may have affected the explosives as well as the mechanical parts and will thus make disassembly much more difficult and potentially more hazardous than assembly.

10.1 The requirement for breakdown (LEVEL 2)

Ammunition shall only be broken down if there is a definite advantage to be gained by so doing. However, there are instances where it is necessary to be broken down for disposal or for inspection. If a safe system of working cannot be determined the explosives should be destroyed by enclosed incineration or by detonation of the complete item.

10.2 Inspection of stocks awaiting disposal (LEVEL 2)

Explosives awaiting breakdown should be regularly inspected. Such an inspection, with special reference to the onset and progress of corrosion, will assist in ensuring that explosives items are broken down before they become dangerous.

10.3 Risk assessing and planning breakdown of ammunition (LEVEL 2)

Explosive items shall not be broken down until the risks have been assessed, the operation has been planned and a layout and system of work, with appropriate safety measures, has been approved.

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10.3.1. Plan of operation (LEVEL 2)

Preparation and approval of working instructions for operatives shall be completed before the breakdown commences. The training of operatives in the operations they will carry out should include an explanation of the safety rules applicable to that work. It may be necessary to institute a system of accounting for the arisings from explosives breakdown so that the likelihood of explosives or their components being overlooked, stolen or mistakenly disposed of is minimised. The possibility of hazards arising from incompatibilities not present in the original item as manufactured should be provided for.

In preparing the plan of operation the following data should be obtained:

a) drawings and specifications from the manufacturer;

b) safety information from the manufacturer;

c) explosives hazard data sheets; and

d) history of the stores including such aspects as rough handling, temperature cycling, seawater contamination etc.

10.3.2. Breakdown under precautions (LEVEL 3)

Where the risk assessment determines the need, breakdown operations considered to have an unacceptable hazard shall be carried out by remote control. The supply of filled items to the breakdown process and the removal of the components after breakdown should be so arranged that there is no accumulation of exposed explosive compositions and filled components beyond the approved limits.

10.4 Machinery and tools for breakdown operations (LEVEL 2)

Consideration should be given to the design of machinery and tools so that they cannot be wrongly used. For example, the leverage which is possible with tools should be related to the amount of work, generation of heat by friction, etc that the item can safely tolerate. Any tool which is hollow and which could conceivably be used to fit over the handle of another tool and so increase the leverage obtainable should either be excluded from the breakdown area or be modified to prevent its misuse. Adjustable tools should not be prescribed for breakdown operations.

The number and type of tools permitted for the operation should be listed in sufficient detail to preclude any likelihood of doubt. The unauthorised entry into the breakdown area of any tool not on the permitted list or modification of any machine or tool to alter its mode of operation shall not take place. The marking, colour coding of tools or use of a tool board are examples of good practice and facilitate checking.

10.4.1. Use of water flushing equipment and autoclaves

Steaming out and water flushing shall only be carried out in a facility specially designed and provided for the purpose. Care shall be taken to avoid the mixing of incompatible explosives and also the contamination of explosives with any harmful materials. Therefore the use of the same facility for steaming or flushing out explosives and items filled with inert ingredients should be avoided. Steaming out requires that special precautions be taken to prevent contamination of the surrounding area and of aquifers in particular. Operatives are at particular risk from the toxic effects of TNT. Appropriate risk assessments shall be made and personal protective equipment and medical surveillance may invariably be required.
10.5 Items not to be heated (LEVEL 1)

Items containing explosives shall not be heated to release the tightness of screw threads unless this operation has been authorised in the operating instructions. It is important to ascertain that such authorised heating will not cause migration of the filling into screw threads with subsequent increase in potential hazard during unscrewing operations. A trial designed to test this possibility should be carried out in advance and it should cover such ranges of temperature and time as may be used during normal working conditions. Unless a fail-safe system of automatic temperature control is used, there shall be a considerable margin of safety in the limits prescribed.

10.6 Sensitive components (LEVEL 2)

In breakdown operations, parts that are susceptible to initiation by light blows, friction etc shall be protected during handling operations and this protection will only be removed at the latest practical stage. An example of this is the use of clips to cover primers in cartridge cases.

10.7 Difficult items (LEVEL 1)

Operatives engaged in the breakdown of explosive items shall be given precise and detailed instructions on the action to take if a situation arises which is not covered by the procedure laid down. Provision shall be made for the identification, collection and removal of all explosive items that cannot be broken down by the accepted procedure. Special consideration should be given to their storage and subsequent disposal.

10.8 Breakdown procedures (LEVEL 2)

The following examples of breakdown are not detailed procedures but should be used as an indicator of what should be included in working instructions.

10.8.1 Fixed ammunition

The order in which component parts of a complete round of gun ammunition undergoing breakdown should be removed will be decided after consideration of the nature and condition of the filling and in particular of the propellant in the cartridge. Normally the first operation will be the separation of the projectile from the cartridge case. It is sound practice to sub-divide the quantity of explosives at risk as soon as practicable. Separation of the projectile from the cartridge case is an example. Components should usually be disassembled in order of decreasing sensitivity and for the projectile this will normally be as follows:

a) initiating devices such as fuzes;
b) gaines or exploders; and

c) the main filling.

Having segregated the projectile for later disassembly, the propellant charge should be removed and placed in a suitable receptacle. If the propellant is single base, provision shall be made to guard against the generation of static and its potential discharge by earthing and the use of anti-static or full conducting conditions as necessary. The cartridge primer should be removed using the appropriate tool and placed in a suitable container.

Fuzes removed should be suitably packed and segregated for later breakdown and disposal. Where there is any doubt as to the safety of manual removal of fuzes they should be removed by remote operation. If possible fuze magazines should be removed and packaged for later disposal. Further breakdown of fuzes should only be undertaken if essential for trials or test purposes and shall be carried out under strict control using approved tools and procedures. Exploders and any other internal components should be removed and separately packaged for later disposal.
Projectiles shall have the fuze well plugged with suitable paper and be taped closed, then suitably packaged for later disposal.

10.8.2. Aircraft bombs

Aircraft bombs shall not be broken down until it has been confirmed that they do not contain detonators or fuzes. Aircraft bombs should be broken down singly in isolation. The degree of isolation should be no more than is necessary to prevent the propagation of explosion to other explosives stores and to arrest fragments. The following technique described applies to all bombs completed to specifications that call for liners to the exploder cavity and sealing compositions to the filling. If the bombs being processed are not to this specification great care should be taken as exposed explosive will be present and may have migrated into screw threads etc.

a) the plug representing pistol or fuze should be unscrewed and the exploder cavity examined to ensure that there is no detonator present;

b) exploders should be removed by means of lifting hooks or failing this by using kit sticks (a dowel rod with a rubber suction cap fitted to one end). Any exploders not removable by these methods shall be left and the bombs plugged for disposal; and

c) the exploder container and base plate should be removed by unscrewing the base plate.

The component parts shall be separated at a later process.

10.8.3. Rocket tails and motors

The work instruction for the breakdown of rocket tails and motors shall be designed to prevent damage to the igniter and to ensure the protection of operatives against fire. It is particularly important to keep the igniters that have been removed from items away from the recovered propellant. This shall be achieved by a good working place layout and constant supervision.

10.8.4. White phosphorus (WP) and red phosphorus (RP) ammunition

WP or RP ammunition shall be broken down in two locations that are well separated from one another. The explosive components present shall be removed in the explosives area and the phosphorus on an area of the site reserved for work of this nature. If ammunition containing explosives does find its way to the WP or RP section of the breakdown operation it shall be removed immediately. All explosives are strong oxidants and violent reactions can occur if they come into physical contact with phosphorus. It is only by 100 per cent examination for the absence of explosive before the removal of white or red phosphorus is begun that freedom from accidents due to the presence of explosive can be ensured. During the removal of white or red phosphorus from ammunition special precautions shall be taken against fire hazards.
Annex A
(normative)
References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the guide. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the guide are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO maintain registers of currently valid ISO or EN:

a) IATG 01.40:2015[E] Terms, glossary and definitions. UNODA. 2015;
b) IATG 02.10:2015[E] Introduction to risk management principles and processes. UNODA. 2015;
d) IATG 06.10:2015[E] Control of explosive facilities. UNODA. 2015;
e) IATG 06.30:2015[E] Storage and handling. UNODA. 2015;
f) IATG 06.50:2015[E] Specific safety precautions. UNODA. 2015;
g) IATG 06.80:2015[E] Inspection of ammunition. UNODA. 2015;
h) IATG 07.20:2015[E] Surveillance and proof. UNODA. 2015; and

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UN ODA) holds copies of all references used in this guide. A register of the latest version/edition of the International Ammunition Technical Guidelines is maintained by UN ODA, and can be read on the IATG website: www.un.org/disarmament/un-safeguard/. National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

18 Where copyright permits.
Annex B
(informative)
References

The following informative documents contain provisions, which should also be consulted to provide further background information to the contents of this guide:19

a) AASTP-1, Edition 1 (Change 3). *Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives*. NATO. 04 May 2010; and


The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UN ODA) holds copies of all references20 used in this guide. A register of the latest version/edition of the International Ammunition Technical Guidelines is maintained by UN ODA, and can be read on the IATG website: [www.un.org/disarmament/un-safeguard/](http://www.un.org/disarmament/un-safeguard/). National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

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19 Data from many of these publications has been used to develop this IATG.
20 Where copyright permits.
Annex C
(informative)
Example General Work Instruction

GENERAL WORK PROCEDURES FOR AMMUNITION PROCESS BUILDINGS

C.1 General. This procedure is designed to provide general information on the daily operating of Ammunition Process Buildings (APBs). Specific information on technical functions may be found in the relevant Inspection and Repair Instruction (I&RI) appropriate to the task in hand. For the purpose of this procedure the term APB is to be taken to mean any location where an ammunition process, (with the exception of disposals), is carried out.

C.2 APB Supervisor. The APB Supervisor is responsible to the Technical Officer in Charge (TOIC)\(^2\) for the technical efficiency and supervision of all personnel in the APB.

C.3 Commencement of Work. Prior to commencement of work each day, or on taking over an APB, the APB Supervisor is to ensure that:

a) the APB is searched for any suspicious objects;

b) that all tools, equipment and expendable stores are inspected for serviceability;

c) the required number and grade of staff are present and that all members of the staff are conversant with the duties detailed in the relevant I&RI;

d) the staff are fully briefed as to the task in hand with particular emphasis on fire and accident procedures, and any special safety precautions to be implemented;

e) the staff are correctly dressed in the approved protective clothing and footwear;

f) the correct Fire Division Symbols are displayed with any Supplementary Symbols where necessary;

g) all doors are unlocked or unbolted and panic bolts fitted to exits are functioning correctly; and

h) the task board within the APB is completed to show:

- TOIC;
- APB Supervisor;
- Nature and type of ammunition being processed;
- Details of task;
- Hazard Division, Compatibility Group and Fire Division Symbol of the ammunition;
- Persons nominated for the fire party;
- Man and Explosive Limits, (shown as total rounds in APB and rounds exposed);
- Location of First Aid Post;
- Overall explosive limits of the APB;
- Emergency telephone numbers for TOIC, Senior Fire Officer (SFO), Fire and Medical services; and

\(^2\) The TOIC should normally be the senior ammunition qualified officer responsible for overall explosive safety at the facility.
• Copy of the relevant I&RI, Fire Orders, Explosive Limit Licence for the APB and the relevant COSHH\textsuperscript{22} Assessment Sheets.

C.4 Supervision. The APB Supervisor is to maintain constant supervision of the following points:

a) discipline, control and guidance of all APB staff;
b) Explosive and Man Limits within the APB and correct segregation of Compatibility Groups;
c) adherence to the instructions for the task detailed in the relevant I&RI; and
d) observance of working hours as detailed by the TOIC.

The APB Supervisor is not to leave the APB whilst work is in progress.

C.5 Cessation of Work.

a) the APB Supervisor is directly responsible for the security and safety of the APB;
b) the APB Supervisor is to ensure that on the cessation of work at break periods:
   • all personnel are checked out of the APB;
   • that no ammunition filling is left exposed. For example all shells are to be plugged or fuzed;
   • that electricity and machinery, with the exception of alarm circuits, is turned off; and
   • all external doors and windows are secured.

c) Additionally on cessation of daily work he/she is to ensure that:
   • all paints, solvents, cleaning cloths and other inflammable materials are removed from the APB and returned to the Paint Store;
   • that ammunition is repacked and grounded; and
   • the security guards are to be informed if ammunition is to be left in an APB overnight. TOIC approval must be sought to leave ammunition in an APB overnight.

C.6 APB Maintenance.

a) a high standard of cleanliness is to be maintained at all times. Floors are to be kept clean by washing with water and soap or detergent. The use of floor polish on conducting floors is prohibited;
b) tools and equipment are only to be retained for the task in hand and for imminent tasks. All other tools and equipment are to be returned to storage;
c) rubbish and waste materials are to be kept to a minimum and placed in the receptacles provided. Appropriate Free From Explosive (FFE) Procedures are to be followed as laid down in \textit{insert unit document reference}\textsuperscript{23};
d) outside areas and roadways are to be kept free of all nails, tape banding etc which could cause damage to vehicle tyres; and

\textsuperscript{22} Control of Substances Hazardous to Health.
\textsuperscript{23} The relevant document reference should be inserted here by anyone choosing to use these general work instructions.
e) the APB Supervisor is to ensure that a weekly check is carried out on the interior and exterior fabric of the APB. Particular attention is to be paid to front doors, transit doors, windows, pneumatic and electrical installations including security lights, lightening conductors, drains and concrete traverse supports. Any defects are to be reported to the Ammunition Storage Officer (ASO) for inclusion in the APB defects diary. Defects involving safety or operation of the APB are to be reported immediately.

C.7 Fire Precautions.

a) smoking is strictly prohibited within the APB and NO SMOKING signs shall be displayed at all important places in the APB. Individuals shall be prohibited from possessing or carrying smoking materials;

b) the APB Supervisor is to acquaint him/herself and his/her staff with the regulations governing fire precautions and action to be taken in event of a fire;

c) fire orders, including the location of the APB Assembly Point, are to be prominently displayed. Personnel are to be instructed as to their specific duties in event of fire, and the fire party nominated on the APB process board;

d) fire doors and escape routes are to be clearly marked and kept clear of obstructions at all times. All personnel are to be provided with an unimpeded escape route at least 1m wide, and are not to be enclosed by Conveyor Gravity Rollers (CGR), benches or other equipment. Lift up sections of CGR do not constitute an escape route. All doors, (including transit doors), are to be kept unbolted or unlocked whilst the APB is occupied;

e) approach roads are to be kept clear at all times to permit access to emergency services; and

f) fire practices are to be held monthly.

C.8 Accidents. The APB Supervisor is to ensure that all personnel are conversant with the action to be taken in the event of an accident involving ammunition. When in the opinion of the APB Supervisor there is any possibility of an explosion occurring as a result of an accident involving ammunition, the APB is to be immediately evacuated to the nearest Assembly Point. TOIC and the ASO are to be informed by the fastest possible means. No person is to re-enter the APB until authorised to do so by TOIC.

C.9 First Aid.

a) First Aid boxes are to be held in each APB and Transit Area. The location of the nearest first aid trained persons is to be displayed on the APB task board, these persons being responsible for the administration of first aid to the ‘walking injured’. Serious cases are to be reported immediately to the TOIC and Medical Centre;

b) injuries are to be recorded in the APB Accident Register. In the event of serious injuries, written statements regarding the circumstances of the accident should be obtained from any witnesses as soon as practicable by the senior present person;

c) the APB accident register is an accountable document; and

d) when ammunition containing white phosphorus (WP) is held in an APB, a supply of clean water or copper sulphate solution (CuSO₄) and gauze is to be readily available. All personnel are to be aware of the immediate action to be taken for the treatment of phosphorus burns and a copy of the procedure to be followed is to be displayed in the APB. A large container of water capable of holding a full container of WP ammunition shall also be available.
C.10 Health and Safety.

a) The APB Supervisor is directly responsible for the health and safety of all staff whilst employed in the APB. The health regulations contained in insert unit document reference are to be followed at all times. Particular attention is to be paid to the correct use of protective clothing and gloves, respirators and barrier cream whenever these are required. Compressed air equipment is to be operated in accordance with insert unit document reference;

b) general safety precautions to be observed during movement and handling of ammunition and safety precautions specific to the nature involved are contained in insert unit document reference and the I&RI appropriate to the task in hand respectively. The APB Supervisor is to ensure that these precautions are rigorously observed by all APB staff;

c) the APB Supervisor is to take immediate action to halt any dangerous practice within the APB, whether or not it involves ammunition;

d) the APB Supervisor is to ensure that the relevant Data Safety Sheets for hazardous materials in use are displayed within the APB; and

e) the correct safety shoes are to be worn by all personnel employed within an APB.

C.11 Free From Explosive (FFE) Procedure.

a) the FFE procedures are contained in insert unit document reference;

b) waste material and rubbish is to be bagged and have a FFE Certificate completed and taped to the outside of the bag. The APB Supervisor is to ensure that no bagged waste or rubbish is permitted to leave the APB without this certificate; and

c) staples and other sharps are not to be bagged. They are to be kept in a rigid container, marked and disposed of as at Sub Paragraph 11b.

C.12 Thunderstorms.

a) during thunderstorms all personnel are to be evacuated from buildings containing ammunition. When conditions indicate that thunderstorms are approaching the APB all work on ammunition requiring anti-static precautions is to cease and the ammunition is to be re-packed and grounded. The APB is to be evacuated until the threat has passed; and

b) when thunderstorms are sudden or imminent, the repacking and grounding of ammunition is to be carried out at the discretion of the APB Supervisor, subject to the evacuation of personnel being of prime importance. Ammunition not requiring anti-static precautions need not be re-packed.

C.13 Visitors.

a) any visitor entering the APB is to report immediately to the APB Supervisor. Work may proceed in the presence of authorised visitors provided that such visits are transitory and do not impede any person in the performance of his or her duties;

b) the man limit for the APB may exclude such visitors; and

c) the limit may also exclude not more than two supervisory personnel for periods of not more than 30 minutes at a time.
C.14 Anti-Static Precautions. The procedure to be followed when anti-static precautions are required is detailed in *insert unit document reference*.

C.15 Working Categories. The APB Supervisor is to ensure that the correct category is to be applied to the process in hand. The procedures specified in *insert unit document reference* are to be strictly adhered to. Particular attention is to be paid to APB cleanliness when special working categories are in force.

C.16 Prohibited Articles. The APB Supervisor is to ensure that all APB staff are aware of the regulations concerning prohibited articles. A list of these articles should be displayed at the entrance to each Explosives Area.

C.17 Accounting. The APB Supervisor is to ensure that all ammunition and components entering or leaving the APB are strictly controlled and accounted for. Checks are to be carried out frequently to ensure that ammunition cannot leave the APB incorrectly assembled. These checks should be carried out at least four times daily. On discovery of an apparent discrepancy all work is to cease until the matter is resolved and the appropriate TOIC is to be informed immediately.

C.18 APB Transit Areas.

a) whenever ammunition is being loaded or unloaded in an APB Transit Area the engines of all non Cat C protected vehicles\(^\text{24}\) are to be switched off; and

b) the maximum safe stacking heights for ammunition are not to be exceeded.

C.19 Foreman. The Foreman of the team employed within the APB may carry out the duties of the APB Supervisor if appropriately qualified. He/she is responsible to the APB Supervisor for the following, and must carry them out him/herself if acting as APB Supervisor:

a) control of all ammunition and components passing through the APB;

b) calling forward of ammunition to ensure a regular flow of work and collection of processed ammunition;

c) maintenance of all tools and equipment within the APB to ensure availability and serviceability;

d) maintenance of an adequate supply of expendable stores;

e) general cleanliness of the APB and surrounding areas and roadways;

f) adherence to all regulations;

g) checking of the interior and exterior fabric of the APB and surrounding area and reporting of all defects;

h) direct supervision of staff employed on non-technical tasks within the APB;

i) ensuring that all rubbish and waste materials have been inspected to ensure they are FFE before removal from the APB, and that a completed FFE Certificate is attached; and

j) instruction of all workers employed in the APB in the performance of their foregoing duties.

C.20 Documentation. The procedures contained within *insert unit document reference* are to be adhered to.

\(^{24}\) See IATG 05.50 *Vehicles and mechanical handling equipment (MHE) in explosives facilities*. 

19
C.21 Ammunition Locations ex-APB. Ammunition leaving an APB after processing, that is, ammunition, which has been subject to a change in Configuration, Condition or Hazard Division, may require a new storage location to be allocated. The ammunition accountant is to be contacted prior to the ammunition leaving the APB to obtain a receipt location for the adjusted ammunition.
Annex D  
(informative)  
Example Specific Inspection and Repair Instruction (I&RI)

TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001  
Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Serial No: IATG 07.10/001  
Copy No: 1 of 1  
Date: 18 February 2010

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TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 1 - General

1. **Designation of Ammunition.** Launcher, Rocket, Aircraft, Matra, Type 116M.

2. **Task.** Removal of Rocket 68mm HEAT.

3. **Location.** A5 Process Area.

4. **Personnel.**
   a. Supervisory: Ammunition Technician (Class 2)
   b. Operatives:
      (1) Leading Hand (LH) - 1
      (2) Range Workers (RW) - 9
      (3) Range Quality Service (RQS) Worker - 1
      (4) RW (MHE Operator) - 1

5. **Hazard Classification Code.**
   a. Filled Launcher, Rocket, Aircraft, Matra, Type 116M - 1.1F
   b. Rocket 68mm HEAT (unpackaged) - 1.1F

6. **Man and Explosive Limits.**
   a. Processing Area - As per ELL
   b. Task: Rocket 68mm HEAT within launcher or unpackaged - 190 Kg
   c. Man Limit - As per ELL

7. **Publications.**
   a. Ammunition Container Assembly (ACA) A824 Mk 1
      - AP110A-0401-1C-Chap 10-8.
   b. ACA No A 484 Mk 1 - AP 110A-0401-1C Chap 10-1 and 10-3.
   d. Launcher, Rocket, Aircraft, Matra, Type 116M - AP 110G-0505-125 FNQ.
   e. 68mm Rocket Heads and Associated Fuzes - AP 110C-0203-12.
   f. Motor, Rocket, Aircraft, 68mm, Type 25 - AP 110C-0102-1.
## TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

### Part 2 – Special Safety Precautions

<table>
<thead>
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<th>Item</th>
<th>Precautions</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>The Rocket 68mm HEAT warhead is fitted with a piezo-electric fuze mounted in the nose cap. Care must be taken at all times when handling these rockets out of the launcher.</td>
</tr>
<tr>
<td>2</td>
<td>The Rocket 68mm HEAT fuze contains electro-explosive devices (EED). Anti Static Precautions are to be taken when handling the rockets in accordance with insert unit document reference.</td>
</tr>
<tr>
<td>3</td>
<td>Pallets containing Rockets 68mm HEAT are to be moved under control at all times. Additionally pallets containing Rockets 68mm HEAT are to be correctly banded before lifting or movement.</td>
</tr>
<tr>
<td>4</td>
<td>ACA No 824 Mk 1 are to be stacked no more than two high.</td>
</tr>
<tr>
<td>5</td>
<td>Launchers are to be aligned with rockets directed towards a safe area.</td>
</tr>
<tr>
<td>6</td>
<td>Personnel are not to stand in front or to the rear of launchers at any time, particularly when removing Rockets from launch tubes.</td>
</tr>
</tbody>
</table>
TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 3 – Sequence of Operations

<table>
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<th>Item</th>
<th>Operation</th>
<th>Operative</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>RQS</td>
<td>BKI/Lot No and quantity checked against documentation.</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>RW 10</td>
<td>Launcher moved to process site.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>RW 1 &amp; 2</td>
<td>Unpackage Launcher.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>RW 1 &amp; 2</td>
<td>Remove Nose Fairing.</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>RW 1 &amp; 2</td>
<td>Remove Tail Fairing.</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>RW 1 &amp; 2</td>
<td>Earth Launcher and fit personal earthing equipment.</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>RW 1 &amp; 2</td>
<td>Remove Retention Plate.</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>LH</td>
<td>External Inspection.</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>RW 1 &amp; 2</td>
<td>Remove Intervalometer Housing Cover (if Intervalometer Fitted).</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>RW 1 &amp; 2</td>
<td>Remove Intervalometer (if present).</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>LH</td>
<td>Inspect Launcher.</td>
</tr>
<tr>
<td>7</td>
<td>29</td>
<td>RW 1 &amp; 2</td>
<td>Remove Earthing.</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
<td>RW 10</td>
<td>Move empty Launcher to Out Transit.</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>RQS</td>
<td>Inspect Launcher.</td>
</tr>
<tr>
<td>10</td>
<td>31</td>
<td>RQS</td>
<td>FFE Launcher.</td>
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<tr>
<td>10</td>
<td>32</td>
<td>RW 9</td>
<td>Refit Nose Fairing.</td>
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<tr>
<td>11</td>
<td>33</td>
<td>RW 9</td>
<td>Refit Tail Fairing.</td>
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<tr>
<td>11</td>
<td>34</td>
<td>RW 9</td>
<td>Refit Retention Plate.</td>
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<td>11</td>
<td>35</td>
<td>RQS</td>
<td>Remove Markings.</td>
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<tr>
<td>12</td>
<td>36</td>
<td>RQS</td>
<td>Seal and Stencil.</td>
</tr>
<tr>
<td>12</td>
<td>37</td>
<td>RW 9</td>
<td>Repackage Launcher.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>INTERVALOMETER (if present)</strong></td>
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<td>13</td>
<td>9</td>
<td>LH</td>
<td>Remove Puffer Unit from Intervalometer Pawl Unit (if present).</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>LH</td>
<td>Repack Puffer Unit for Disposal.</td>
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<tr>
<td>14</td>
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<td>Seal and Stencil.</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>RQS</td>
<td>Inspect Intervalometer.</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>RQS</td>
<td>FFE Intervalometers, Housing Covers and Intervalometer Housing Cover Retention Screws.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>ROCKET LAUNCHER TUBE</strong></td>
</tr>
<tr>
<td>15</td>
<td>13</td>
<td>RW 1 &amp; 2</td>
<td>Bend back Metal Fin Retaining End Caps.</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>RW 1 &amp; 2</td>
<td>Cut First Igniter Lead.</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>RW 1 &amp; 2</td>
<td>Insulate First Igniter Lead.</td>
</tr>
<tr>
<td>Item</td>
<td>Operation</td>
<td>Operative</td>
<td>Instructions</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>-----------</td>
<td>--------------</td>
</tr>
<tr>
<td>16</td>
<td>RW 1 &amp; 2</td>
<td>Cut Second Igniter Lead.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>RW 1 &amp; 2</td>
<td>Insulate Second Igniter Lead.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>RW 1 &amp; 2</td>
<td>Rotate Rocket 20° clockwise.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>RW 1 &amp; 2</td>
<td>Push Rocket forward in tube until Bore Riding Safety Pin clears tube.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>RW 1 &amp; 2</td>
<td>Re-engage Bore Riding Safety Pin Clip.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>RW 1 &amp; 2</td>
<td>Remove Rocket completely from Launcher Tube.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>RW 1 &amp; 2</td>
<td>Tape Bore Riding Safety Pin Clip in position.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>RW 1 &amp; 2</td>
<td>Remove Shortened Safety Pin.</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>LH</td>
<td>Inspect Rocket.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>RW 1 &amp; 2</td>
<td>Repackage Rockets and band to Pallet.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>RW 10</td>
<td>Move Pallet to Out Transit.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>RQS</td>
<td>Seal and Stencil.</td>
<td></td>
</tr>
</tbody>
</table>
TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 4 – Outline Process Chart

Launchers in Ammunition Container Assemblies (ACA) of all types

1  Launcher from A5 Storage held In Transit.
   1  External Inspection.
   1  Launcher in ACA moved to Process Site.

2  Unpackage Launcher.

3  Remove Nose Fairing.

4  Remove Tail Fairing.

5  Earth Launcher.

2  External Inspection.

6  Remove Retention Plate.

7  Remove Intervalometer Housing Cover.

Change to Intervalometer (if fitted)

8  Remove Intervalometer (if present).

9  Remove Puffer Unit from Intervalometer Pawl Unit (if present).

10 Repack Puffer Unit for disposal.

11 Seal and Stencil.

3  Inspect Intervalometers.

12 FFE Intervalometers, Intervalometer Housing Covers and Intervalometer Housing Cover Retention Screws.

Change to each Rocket Launcher Tube

13 Bend back Metal Fin Retaining End Caps.

14 Cut First Igniter Lead.

15 Insulate First Igniter Lead.

16 Cut Second Igniter Lead.

17 Insulate Second Igniter Lead.
18  Rotate Launcher 20° clockwise.
19  Push Rocket forward in tube until Bore Riding Safety Pin clears tube.
20  Re-engage Bore Riding Safety Pin Clip.
21  Remove Rocket completely from Launcher Tube.
22  Tape Bore Riding Safety Pin Clip in position.
23  Remove Shortened Safety Pin.
24  Insert New Transit Safety Pin.
25  Tape Transit Safety Pin in position.
26  Inspect Rocket.
27  Repackage rockets and band to Pallet.
28  Move pallet to Out Transit.

**Change to Launcher**

5  Inspect Launcher.
29  Remove Earthing.
30  Move empty Launcher to Out Transit.
6  Inspect Launcher.
31  Ensure Launcher is free from explosives (FFE).
32  Refit Nose Fairing.
33  Refit Tail Fairing.
34  Refit Retention Plate.
35  Remove Markings.
36  Seal and Stencil.
37  Repackage Launcher.
2  Held in Out Transit.
## TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

### Part 5 – Process Area Flow Diagram

<table>
<thead>
<tr>
<th>In Transit</th>
<th>Category 2 Area</th>
<th>Out Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQS</td>
<td>RW 10</td>
<td>RW 9</td>
</tr>
<tr>
<td>1, 1</td>
<td>1</td>
<td>RQS</td>
</tr>
<tr>
<td></td>
<td>1, 2, 3, 4, 5, 6</td>
<td>RW 9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7, 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9, 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1, 2, 13 – 25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1, 2, 26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1, 2, 29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11, 3, 12, 28, 6, 31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32, 33, 34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37, 2</td>
<td></td>
</tr>
</tbody>
</table>
### TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

**Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M**

**Part 6 – Operative Instructions**

<table>
<thead>
<tr>
<th>Grade:</th>
<th>Leading Hand (LH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task(s):</td>
<td>Inspection and Removal of Puffer Unit (if present)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
</table>
| 1 | 2 | Safety inspection of Launcher Centre Section to ensure the following:  
(1) All 19 Rockets 68mm HEAT are secure and present.  
(2) There is no evidence of motor ignition (e.g. blackening at rear of Launcher Tubes).  
(3) All 19 Rockets 68mm HEAT are correctly positioned in Launcher.  
(4) No Rocket 68mm HEAT Nose fuze has been crushed or distorted.  
(5) Confirm Launcher earthed.  
(NB. If the launcher fails the above safety inspection points 1a(1)-(4), the supervisor is to be informed and the Process Area evacuated. The Launcher will then be reassembled and removed for disposal, under instructions from TOIC).  
| 2 | 9 | Unscrew the Puffer Unit from the Pawl Unit by hand (see AP 110C-0505-125 FNQ). | |
| | 10 | Pack Puffer Units (50 per box) into Ammunition Boxes H83 using paper packing material. | |
| 3 | 4 | Hand Box containing Puffer Units to RQS. | |
| 4 | 6 | Inspect Rockets 68mm HEAT to ensure:  
(1) Bore Riding Safety Pin Clip is taped in safe position.  
(2) Transit Safety Pin securely taped in position (see AP 110C-0203-12 Ch 1, Paras 8&9 and Fig 1. | |
| | | Inspect Launcher to ensure:  
(1) All Rockets 68mm HEAT have been removed.  
(2) Intervalometers have been removed. | |
### Task(s):

- Unpackage Launcher.
- Remove Intervalometer (if fitted).
- Remove and repack Rockets 68mm HEAT.

<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Receive Launcher in ACA from In Transit.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Unpackage Launcher (see APA 110A-0401-1C Chap 10-1, 10-3 and 10-8).</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Remove Nose Fairing (see AP 110G-0505-125 FNQ). (NB Due to condition of Nose Fairing Securing Bolts, difficulty may be experienced in releasing the bolts. The supervisor may authorise use of hacksaw to remove bolts).</td>
<td>Pliers Closing Plain. Fospro Rust Remover.</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Earth Launcher and Fit Personal Earthing Equipment.</td>
<td>Earth Clip and Strap. Personal Grounding Wristband and Strap.</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Remove Retention Plate. (See AP 110G-0505-125 FNQ).</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Remove the Intervalometer Housing Cover (see AP 110G-0505 125 FNQ). Remove the Intervalometer (see AP 110G-0505 125 FNQ).</td>
<td>Screwdriver.</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Hand Intervalometer to LH.</td>
<td>Hand Intervalometer Housing Cover and Intervalometer Housing Cover Retention screws to RQS.</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>Bend back Metal Fin Retaining End Caps.</td>
<td>Pliers Closing Plain.</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
<td>Cut First Igniter Lead.</td>
<td>Nipper Diagonal Cutting 7&quot;.</td>
</tr>
<tr>
<td>11</td>
<td>15</td>
<td>Insulate First Igniter Lead.</td>
<td>Tape Adhesive Fabric Waterproof 1&quot;.</td>
</tr>
</tbody>
</table>

**WARNING:** THE LAUNCHER MUST NOW BE EARTHED

**WARNING:** BOTH IGNITER CABLES ARE NOT TO BE CUT SIMULTANEOUSLY

**WARNING:** THE OPERATIVES ARE TO BE EARTHED AT ALL TIMES DURING THIS TASK

**WARNING:** THE OPERATIVES ARE TO STAND TO ONE SIDE OFF THE LAUNCHER AND NOT FORWARD OR REARWARDS OF THE LAUNCHER TUBES DURING THIS TASK
<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>16</td>
<td>Cut Second Igniter Lead.</td>
<td>Nipper Diagonal Cutting 7&quot;.</td>
</tr>
<tr>
<td>13</td>
<td>17</td>
<td>Insulate Second Igniter Lead.</td>
<td>Tape Adhesive Fabric Waterproof 1&quot;.</td>
</tr>
<tr>
<td>14</td>
<td>18</td>
<td>Rotate Rocket 20° clockwise to disengage fins from Fin Retaining End Caps.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>19</td>
<td>Push Rocket forward in tube until Bore Riding Safety Pin clears tube.</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td>Re-engage Bore Riding Safety Pin Clip by sliding it towards the nose of the Rocket 68mm HEAT.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>21</td>
<td>Remove Rocket completely from Launcher Tube.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>22</td>
<td>Tape Bore Riding Safety Pin Clip in position.</td>
<td>Tape Adhesive Fabric Waterproof 1&quot;.</td>
</tr>
<tr>
<td>19</td>
<td>23</td>
<td>Remove Shortened Safety Pin and remove as scrap.</td>
<td>Pliers Narrow Nose.</td>
</tr>
<tr>
<td>21</td>
<td>25</td>
<td>Tape Transit Safety Pin in position.</td>
<td>Tape Adhesive Fabric Waterproof 1&quot;.</td>
</tr>
<tr>
<td>22</td>
<td>26</td>
<td>Repackage Rockets 68mm HEAT into pallets and band.</td>
<td>Crate, Special Purpose Banding Equipment.</td>
</tr>
<tr>
<td>23</td>
<td>29</td>
<td>Remove earthing from Launcher.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>Remove personal earthing equipment.</td>
<td></td>
</tr>
</tbody>
</table>
Grade: **Range Worker (MHE Operator) (RW 10)**

**Task(s):**

- a. Move full Launchers to process sites from In Transit.
- b. Move empty Launchers from process site to Out Transit.
- c. Move Pallets Special Purpose fitted with Rockets 68mm HEAT to Out Transit.

<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Move full Launchers to process sites (one per site).</td>
<td>MHE Cat C.</td>
</tr>
<tr>
<td>2</td>
<td>27</td>
<td>Move Pallets Special Purpose loaded with Rocket 68mm HEAT to Out Transit.</td>
<td>MHE Cat C.</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>Move empty Launchers to Out Transit.</td>
<td>MHE Cat C.</td>
</tr>
<tr>
<td>Grade:</td>
<td>Range Quality Staff (RQS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Task(s): | a. Inspection and Documentation of full Launchers.  
b. FFE, Remove markings from, Seal and Stencil, empty Launcher and Intervalometer.  
c. Seal and Stencil Puffer Unit packaging. |

<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>External inspection and documentation.</td>
<td></td>
</tr>
</tbody>
</table>
| 2 | 11 | Seal and Stencil box containing Puffer Units.  
The following information is to be stencilled on two sides of the box.  
*Puffer Units From Matra Launchers*.  
Quantity.  
HCC 1.4S  
*For Disposal*. | Indelible Black Felt Tip Pen.  
Stencilling Equipment.  
Sealing Equipment. |
| 3 | 3 | Inspect Intervalometers to ensure Puffer Units have been removed. |  |
| 4 | 12 | FFE Intervalometers, Intervalometer Housing Covers and Intervalometer Housing Cover Retention Screws and remove as scrap. |  |
| 5 | 28 | Seal and Stencil special purpose Pallets containing Rockets 68mm HEAT. Recoverable boards placed on two sides may be used stencilled with the following:  
*RKT 68mm HEAT*.  
Quantity.  
HCC 1.1F.  
*For Disposal*. | Indelible Black Felt Tip Pen.  
Stencilling Equipment.  
Sealing Equipment. |
| 6 | 6 | Inspect Launcher to ensure:  
a. Intervalometer has been removed.  
b. All Rockets 68mm HEAT have been removed. |  |
| 7 | 31 | FFE Launcher. |  |
| 8 | 35 | Remove markings. | Paint Spray Matt Black. |
| 9 | 36 | Seal and Stencil Launchers. | Sealing Equipment.  
Stencilling Equipment. |
<table>
<thead>
<tr>
<th>Operation #</th>
<th>Serial #</th>
<th>Instructions</th>
<th>Tools, Stores and Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29</td>
<td>Refit Nose Fairing using Nose Fairing Retention Bolts or Tape.</td>
<td>Tape Adhesive Fabric Waterproof 1”. Pliers Closing Plain.</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>Refit Tail Fairing using Tail Fairing Retention Bolts or Tape.</td>
<td>Tape Adhesive Fabric Waterproof 1”. Pliers Closing Plain.</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>Refit Retention Plate.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>37</td>
<td>Repackage Launchers.</td>
<td></td>
</tr>
</tbody>
</table>
Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 7 – Explosive Components

1. Intervalometer Puffer Unit. Launchers are usually delivered without the Intervalometer, (which contains the Puffer Unit) fitted. Launchers must be checked, however, to ensure Intervalometers are not present - if fitted, the Puffer Unit can be removed by unscrewing by hand as shown in AP 110G-0505-125 FNQ. For ACA No A484 Mk 1 packaging, a recess is provided for storage of the Puffer Unit; this recess is to be checked prior to FFE action.

2. Rocket 68mm HEAT. The Rocket 68mm HEAT consists of:

a) Head, HEAT, Type 23 (see AP 110C-0203-12 Chap 1); and

b) Motor, Rocket, Aircraft, 68mm, Type 253 (see AP 110C-0102-1).
Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 8 – Tools and Equipment

<table>
<thead>
<tr>
<th>Item</th>
<th>Catalogue Number (or NSN)</th>
<th>Designation</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MHE Cat C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5120-99-910-5531</td>
<td>Pliers Snipe Nose 4.5&quot;</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5110-99-910-5746</td>
<td>Frame Hacksaw 9-12&quot;</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Earth Clip</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Earthing Strap</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Personal Grounding Wrist Band</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Personal Grounding Strap</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5120-99-136-5597</td>
<td>Screwdriver Flat/pt 2.5&quot; x 0.125</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>5110-99-910-5295</td>
<td>Nipper Diagonal Cutting 5&quot;</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>5120-99-910-5522</td>
<td>Pliers S/C Sq Nose 6&quot;</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>15-5467</td>
<td>Heavy Duty Seal-less Combination Tool for 19mm Steel Strapping</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>5110-99-910-5930</td>
<td>Snips Tinman's Straight 8&quot;</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>15-5460</td>
<td>Mobile Dispenser for Oscillation Mill Wound Steel Strapping 19mm</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>7920-99-120-9945</td>
<td>Brush Wire Steel 2&quot;</td>
<td>1</td>
</tr>
</tbody>
</table>

NSN is the NATO Stock Number. This is included as many equipment manufacturers have adopted this system.
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Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 9 – Expendable Stores

<table>
<thead>
<tr>
<th>Item</th>
<th>Catalogue Number (or NSN)</th>
<th>Designation</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tape Lassovic</td>
<td></td>
<td>4 Rolls</td>
</tr>
<tr>
<td>2</td>
<td>8030-99-923-1633</td>
<td>Fospro Rust Remover</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>8135-99-220-1154</td>
<td>Tape Adhesive Fabric Waterproof 1&quot;</td>
<td>4 Rolls</td>
</tr>
<tr>
<td>4</td>
<td>27920-99-20-4368</td>
<td>Rags Cotton Clean White</td>
<td>As Req'd</td>
</tr>
<tr>
<td>5</td>
<td>BESAFE 34-590</td>
<td>Gloves PVC Disposable</td>
<td>As Req'd</td>
</tr>
<tr>
<td>6</td>
<td>BS 8800</td>
<td>Facemask 3m Dust &amp; Mist Disposable</td>
<td>Each</td>
</tr>
<tr>
<td>7</td>
<td>Paint Spray (Matt Black)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Marker Pen (Black)</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

26 NSN is the NATO Stock Number. This is included as many equipment manufacturers have adopted this system.
TOIC INSPECTION/REPAIR INSTRUCTION IATG 07.10/001

Removal of Rocket 68mm HEAT from Launcher, Rocket, Aircraft, Matra, Type 116M

Part 10 – Inert Components and Containers

<table>
<thead>
<tr>
<th>Item</th>
<th>Catalogue Number (or NSN)\textsuperscript{27}</th>
<th>Designation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Box Steel H83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Crate Special Purpose</td>
<td></td>
<td>One per 50 x Rocket 68mm HEAT.</td>
</tr>
<tr>
<td>3</td>
<td>Transit Safety Pins</td>
<td></td>
<td>One per Rocket 68mm HEAT.</td>
</tr>
</tbody>
</table>

\textsuperscript{27} NSN is the NATO Stock Number. This is included as many equipment manufacturers have adopted this system.
Annex E
(informative)

Guidance on processing tools and equipment (LEVEL 3)

E.1 All tools and equipment used for processing explosives and munitions should comply with the requirements of the relevant national technical authority. A formal system of approval should be operated which confirms that the tools and equipment are suitable for use in the relevant processing environment, comply with national legislation and, where appropriate, are acceptable to the national technical authority for the munition concerned.

E.2 All materials used in the construction of a machine, its tools and associated equipment that are likely to come into contact with explosives should be approved as compatible with the explosives concerned. Compatibility in this context means that the material shall not produce any chemical or physical interaction to cause the explosives to deteriorate and cause fire, explosion or render them unserviceable. Due regard must be given to the requirement that the material chosen must not be liable to produce sparks.

E.3 All equipment and machinery and their related components will be bonded together and earthed to prevent electrical discharges. See IATG 05.40:2015[E] Safety standards for electrical installations and IATG 05.50:2015[E] Vehicles and mechanical handling equipment in explosives facilities.

E.4 Hoppers etc. feeding explosives to machines should be sited and protected to minimise the transmission of fire and explosion and their effects on the operatives. The quantity of explosives shall be kept as low as possible bearing in mind the need for efficient operation. Particular care is required with small arms propellants as these may burn to detonation if the depth of bed is sufficient (see the Explosives Hazard Data Sheet for the particular propellant).

E.5 Machinery for use with explosives shall be designed to keep frictional effects of moving parts to a minimum. Consideration shall be given to the robustness of the machines and any possibility of distortion under load that could compromise the clearances between moving parts during operation.

E.6 Where there is a possibility that they could work loose and fall into mixing machinery, nuts should be secured in position by drilling through them and their bolts and securing them with twisted wire. Blind holes in a machine where explosives can accumulate, especially if threaded, should be avoided. Where such cavities are unavoidable they shall be closed off or filled.

E.7 When machines are designed or selected, due regard should be paid to their suitability for inspection, dismantling and cleaning. A suitable receptacle shall be provided where leakage or spillage of explosives or oil from a machine occurs. Receptacles should be readily removable so that they may be emptied frequently.

E.8 Electrical circuits should be designed to the requirements of IATG 05.40:2015[E] Safety standards for electrical installations.

E.9 All control gear should be designed to ‘fail’ to a known safe condition, (using ‘fail to safe’ principle).

E.10 A maintenance regime should be devised, in conjunction with the manufacturer of the equipment, for all machinery used for processing of explosives. This shall be recorded and held by the user of the machine. It should include the measurement of any critical clearances and the location of all lubrication points on a machine. Only lubricants compatible with the materials being processed should be used. Machinery should be designed to prevent the lubricant and explosives from contaminating each other. The maintenance regime should include a visual examination to
ensure that explosives dust does not accumulate. Details of the routine maintenance carried out, including lubrication, should be recorded in the maintenance logbook for each machine.
Amendment record

Management of IATG amendments

The IATG guidelines are subject to formal review on a five-yearly basis, however this does not preclude amendments being made within these five-year periods for reasons of operational safety and efficiency or for editorial purposes.

As amendments are made to this IATG they will be given a number, and the date and general details of the amendment shown in the table below. The amendment will also be shown on the cover page of the IATG by the inclusion under the edition date of the phrase ‘incorporating amendment number(s) 1 etc.’

As the formal reviews of each IATG are completed new editions may be issued. Amendments up to the date of the new edition will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended, and thus extant, IATG will be the versions that are posted on the UN SaferGuard IATG website at www.un.org/disarmament/un-saferguard/.

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<td>01 Feb 15</td>
<td>Release of Edition 2 of IATG.</td>
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