CHAPTER 9

AMMUNITION HANDLING EQUIPMENT

How aviation ammunition is handled depends on the time, place, and situation. The task of handling ammunition and explosives is hazardous. Equipment is designed so ammunition can be safely handled in any given situation. This equipment includes railroad, industrial, and automotive equipment used for transporting ammunition. It also includes equipment used to manually handle ammunition, such as skids, pallets, carriers, and aircraft loading equipment.

Often, the equipment used to handle ammunition afloat and ashore is the same. However, differences in stowage accommodations, fixed installations, working areas, and space limitations require the use of equipment and techniques especially designed for the job. Regardless of the situation, only the equipment designed for a particular task and approved by Commander, Naval Sea Systems Command (NAVSEA) or Commander, Naval Air Systems Command (NAVAIR) should be used.

The command that has control over a particular item of ammunition handling equipment is identified by the item designation. If Mark (Mk) and Modification (Mod) number designations identify the item, NAVSEA controls it. If the item is identified by designations, such as AERO, ADU, ADK, and HLK, NAVAIR controls it.

The number and availability of different ammunition handling equipment configurations are extremely large. The equipment that is routinely used by most of the operating units (ashore and afloat) is discussed in the following paragraphs. You can find a complete listing and description of approved handling equipment in Approved Handling Equipment for Weapons and Explosives, NAVSEA Ordnance Publication (OP) 2173, Volume 1 (NAVAIR 19-100-1.1), Volume 2 (NAVAIR 19-100-1.2), and Armament Weapons Support Equipment (AWSE) Configuration Manual, NAVAIR 11-140-25.

LEARNING OBJECTIVES

When you have completed this chapter, you will be able to do the following:

1. Identify the categories and subcategories of armament weapons support equipment (AWSE).
2. Identify the purpose of pallets, to include safe loads.
3. Identify weapons carriers.
4. Recognize the purpose of weapons carriers.
5. Recognize the purpose of stands, to include the A/F32K-1A bomb assembly stand.
6. Recognize the purpose of hoisting bars.
7. Recognize the purpose of beams.
8. Identify the loads that each beam can carry.
9. Recognize the purpose of ammunition handling slings.
10. Recognize the purpose of bomb hoists.
11. Identify the loads for each bomb hoist.
12. Identify the purpose of skids, weapons transporters, and associated adapters.
13. Recognize the safe loads for skids, weapons transporters, and associated adapters.
14. Identify the trucks used for ordnance handling, to include ammunition handling.
15. Recognize the safe loads for the trucks used for ordnance handling.
16. Identify trailers used for ordnance handling, to include the small munitions, rough terrain, and munitions trailers.
17. Identify the purpose of the weapons loader.
18. Recognize the safety precautions to follow while using ordnance handling equipment.

**ARMAMENT WEAPONS SUPPORT EQUIPMENT**

Armament weapons support equipment (AWSE) is support equipment required on the ground. The AWSE is classified as either common or peculiar and may be avionics or nonavionics. There are three subcategories (Figure 9-1)—armament support equipment (ASE), weapons support equipment (WSE), and logistics support equipment (LSE).

![Figure 9-1 — Armament weapons support equipment breakdown.](image)

**Armament Support Equipment**

The ASE includes all equipment whose primary function is to support the installed aircraft systems and is used primarily by an aircraft intermediate maintenance department or squadron.

Armament handling equipment includes special tools used to support the aircraft in providing handling, movement, installation, configuration, arming, loading, and downloading of air-launched weapons, airborne armament systems, or weapon-related components. Armament handling equipment includes bomb hoists, single hoist loading systems, weapon loaders, boresights, and special tools used to remove, replace, repair, test, assemble, or service aircraft bomb racks, missile launchers, installed machine guns, or gun pod units.
Weapons Support Equipment

The WSE includes all equipment whose primary function is to support explosive ordnance components or weapons. The WSE is divided into two categories, weapons handling equipment and weapons test equipment.

Weapons handling equipment includes both peculiar and common ordnance handling and transportation equipment, as well as tools used for canning and uncanning, magazine handling, and assembly of weapons or ordnance-related commodities. The WSE includes hoisting beams, weapons carriers, strongbacks, handlift trucks, weapon skids, trailers, bomb trucks (nonself-powered), and their associated weapons assembly tables, maintenance stands, and other weapon-related equipment. The WSE supports both air- and surface-launched weapons.

Logistics Support Equipment

The LSE consists of equipment used for packaging, bulk handling, storage or stowage, and transportation of weapons and weapon components within the weapon logistics cycle. LSE includes weapons packaging equipment, ship loading or underway replenishment equipment, installed shipboard or shore-based equipment, and industrial materials handling equipment.

Weapons packaging equipment consists of missile containers, pallets, boxes, and fleet-issue unit loads that contain ordnance and ancillary equipment.

Ship loading and underway replenishment equipment consists of connected replenishment slings, vertical replenishment pole pendants, spreader bars, beams, and missile transfer dollies.

Installed shipboard or shore-based equipment includes dunnaging, C-grabs, birail or monorail hoists, tie-downs, davits, bomb elevators, conveyors, and other fixed or moveable handling equipment.

Industrial material handling equipment includes forklifts, warehouse tractors, pallet trucks, and platform trucks.

ORDNANCE HANDLING EQUIPMENT

Ordnance handling equipment (OHE) includes specially designed mechanical equipment used for assembling, disassembling, handling, transporting, lifting, positioning, rotating, or containing conventional weapons, ammunition, explosives, and related components. While typically portable in nature and not self-propelled, OHE can serve as a link between permanently mounted and mobile lifting equipment (e.g., cranes, forklifts). OHE is used for dockside loading and offloading; intra-station handling in production, maintenance, and storage areas; shipboard handling; and transfer-at-sea operations. Examples include adapters, beams, carriers, dollies, hand trucks, restraint fixture slings, and stands.

PALLETS

A pallet is a wood or metal platform used to stack material for movement from one area to another. Pallets are used to store and handle bombs, cartridge tanks, projectiles, rocket containers, rocket heads, rocket motors, and unit loads. When live ammunition and explosives are involved, metal pallets must be used. Metal pallets are more durable than wood pallets, are not subject to warping, and do not present a fire hazard.

Standard Four-Way Wood Pallet

The standard four-way pallet (Figure 9-2) is a nine-post wood pallet that provides four-way entry for forklift and pallet trucks. The wings (overhangs) at each end allow sling installations. The slots in the
two top-deck members are used to install steel strapping, which provides load restraint. The pallet measures 48 inches in length and 40 inches in width. It has a safe working load (SWL) of 4,000 pounds. It is a general-purpose pallet primarily used for shipment of domestic unit loads of ordnance.

**Mk 3 Mod 0 Pallet**

The Mk 3 Mod 0 pallet (Figure 9-3) is a steel wire weldment. The deck is made of steel wire, formed into a grid pattern of 2-inch squares, and is welded to the deck supports. Nine steel deck supports are welded to the bearing plates and to the deck. The complete pallet is galvanized. The pallet measures 48 inches in length and 40 inches in width. It has an SWL of 4,000 pounds. The Mk 3 Mod 0 pallet is a general-purpose, four-way pallet used to handle unit loads aboard ship and at shore stations. A forklift or pallet truck is used to transport and stack loads. It is also used to hoist loads, by using pallet slings. The Mk 3 Mod 0 pallet is used for fleet issue and underway replenishment loads.

**Mk 12 Mod 1 Pallet**

The Mk 12 Mod 1 pallet (Figure 9-4) is a steel wire and formed sheet steel weldment. It consists of a deck, supports, and runners. The deck is made of steel wire bent and assembled into a grid pattern of 2-inch squares. The deck is welded to supports and runners. Steel edge strips protect the wire endings. The pallet measures 45.5 inches in length and 35 inches in width. It has an SWL of 4,000 pounds.

The Mk 12 Mod 1 pallet is a four-way pallet used to palletize weapon components and containers for storage, handling, and shipping. The pallet is used to transport and stack loads by using a forklift or pallet truck and to hoist loads by using pallet slings. The Mk 12 Mod 1 pallet is used for fleet issue unit loads.
Ammunition Pallet Crate

The ammunition pallet crate (Figure 9-5) comes in three sizes with a capacity of 4,000 pounds each. It consists of a steel four-way pallet on which steel wire sides and ends are attached to form an open-top container. One end of the pallet crate is removable and has a hinge located in the center so the top half folds down over the lower half for loading and unloading operations. Twelve locks secure the sides and ends, and four lifting eyes allow it to be used with hooks on appropriate slings. The deck supports are designed for stacking.

The ammunition pallet crate is used at naval shore activities to handle loose ammunition and inert items during on-station handling and transportation. The pallet crate is particularly useful in combatant ship loadouts or offloads at dockside or anchorage where palletization is either impractical or inefficient. Projectiles, cartridges, and powder tanks up to 6 inches in diameter, boxed ammunition, and various inert loads are typical items handled with a pallet crate.

CARRIERS

Carriers are a quick and safe means of attaching a crane cable or other hoisting device to ammunition for movement from one area to another. Some carriers are designed for horizontal lifting and some for vertical lifting. Others are used for both horizontal and vertical lifting. Vertical carriers are used for surface-employed ammunition; therefore, only horizontal carriers are discussed in the following paragraphs.

Mk 43 Mod 1 Weapons Carrier

The Mk 43 Mod 1 weapons carrier (Figure 9-6) is made of a 5/8-inch steel plate with two safety hooks attached by shackles. The carrier has two sets of holes for attaching the safety hooks—one set spaced at 16 7/8 inches and the other at 14 inches. It is used in conjunction with two Mk 49 Mod 1 weapon carriers to lift Mk 82/bomb live unit (BLU) 111 bombs (500 pounds) in tandem off different skids and trailers. The Mk 43 Mod 1 weapons carrier has an SWL of 2,000 pounds.
Mk 49 Mod 1 Weapons Carrier

The Mk 49 Mod 1 weapons carrier (Figure 9-7) is constructed of two steel plates welded together. It has four hoisting points and two attaching studs. A fixed stud at one end of the strongback is engaged in one of the weapon suspension lugs. Then, the pivoting stud at the opposite end is engaged in the remaining lug and locked in place with a quick-release pin. The Mk 49 Mod 1 weapons carrier is used for horizontal lifting of weapons with 14-inch suspension lugs, and it has an SWL of 2,500 pounds.

Mk 51 Mod 1 Weapons Carrier

The Mk 51 Mod 1 weapons carrier (Figure 9-8) is an aluminum channel that is plate fitted with two steel hooks. A fixed position hook with a spring-loaded pinned latch is located at the aft end of the carrier. The forward hook is adjustable to allow attachment of the carrier to weapons or stores with 14- or 30-inch suspension lugs. The forward hook is held in place by a quick-release pin. Eight lifting eyes allow the ability to handle weapons with different centers of gravity.

Before attaching the carrier to the load, the adjustable hook should be put in the appropriate suspension placement hole, which is held in place by a quick-release pin. With the spring-loaded latch unpinned and depressed, the carrier hooks are engaged with the weapon lugs. The spring-loaded latch should be released and the latch pinned in place with a quick-release pin to secure the load. An instruction plate, mounted on the carrier, makes it easier to match the correct lifting eye to the load. The Mk 51 Mod 1 weapons carrier is used for horizontal lifting. It has an SWL of 4,000 pounds.

STANDS

Stands are metal frameworks used to support a weapon that is being assembled or maintained. Stands may be immobile or equipped with pivoting casters. The stands discussed in the following paragraphs are of the immobile type.
A/F32K-1A Bomb Assembly Stand

The A/F32K-1A bomb assembly stand (Figure 9-9) consists of three interchangeable and interlocking 49-inch sections. The stand must be secured to the deck. It has four trays that are placed on top of conveyor rollers to permit a 360-degree rotation of the weapon. Stops are located at each end to prevent the trays from moving beyond the end of the conveyor. Each section is collapsible for stowage purposes.

The top-mounted rollers on the tray assembly actually contact the skin of the weapon and support its weight. The stand is designed to support Mk 80/BLU 100(series) general-purpose bombs during the assembly process. However, the stand may be used to support various other weapons during the assembly process. The SWL of each tray is 2,000 pounds.

HOISTING BARS

Hoisting bars are used for carrying, lifting, and handling weapons. They are normally used during weapons handling and loading evolutions.

HLU-256/E Manual Hoisting Bar

The HLU-256/E manual hoisting bar (Figure 9-10) consists of a round steel bar with a removable bomb nose plug connector and tail stop plates on one end. A quick-release pin secures the nose plug connector to the bar. When a tee configuration is desired, the nose plug connector can be relocated to a position at the bar's midpoint.

The opposite end of the bar can be used as a lift point in the bomb's tail end. A tail stop is situated 18 inches from the end of the bar.
The HLU-256/E manual hoisting bar is used to manually lift Mk 80/BLU 100(series) general-purpose bombs that weigh up to 1,000 pounds during aircraft loading/unloading operations. It is also used for weapons assembly purposes.

BEAMS

A beam is a rigid metal item that has an I, H, T, or circular cross section. The rigid portion is fitted with a lifting eye, a sling or sling attaching points, and devices for attaching a load.

Mk 18 Mod 1 Handling Beam

The Mk 18 Mod 1 handling beam (Figure 9-11) is a structural steel weldment that consists of a cylindrical beam with a lifting eye at its center of gravity and hook-extender assemblies with safety hooks at each end. The Mk 18 Mod 1 is used during connected underway replenishment operations for transferring palletized unit loads. The beam is designed for coupling with cargo hoisting assembly Mk 20 Mod 0, and normally it is used with adjustable pallet slings for making the transfer. The Mk 18 Mod 1 handling beam has an SWL of 4,000 pounds.

Figure 9-10 — HLU-256/E manual hoisting bar.

Figure 9-11 — Mk 18 Mod 1 handling beam.
Mk 18 Mod 2 Handling Beam

The Mk 18 Mod 2 is identical to the Mk 18 MOD 1 with one exception: the Mk 18 Mod 2 contains larger safety hooks to accommodate an SWL of 4,500 pounds.

Mk 37 Mod 1 Lift Beam

The Mk 37 Mod 1 lift beam (Figure 9-12) is an aluminum beam with an adjustable lifting eye secured to it by two quick-release pins. The suspension lug adapters at each end of the lift beam are used to engage the forward and aft suspension lugs on the Harpoon air-launched missile. A quick-release pin in the aft suspension lug adapter is used for securing the beam to the missile.

The Mk 37 Mod 1 lift beam is used with an overhead crane or hoist to lift the Standoff Land Attack Missile (SLAM) and the Harpoon air-launched missile. The Mk 37 Mod 1 lift beam has an SWL of 1,450 pounds.

SLINGS

Slings are lifting devices used to handle weapons. They are made up of various materials, reinforced nylon, heavy cotton mesh, steel cables, welded rings, and safety devices.

Slings are made in two basic configurations: (1) a flexible section, or sections, which may be connected to a lifting link, and (2) a beam with a flexible section, or sections, attached.

Mk 85 Mod 1, Mk 86 Mod 1, Mk 87 Mod 1, and Mk 100 Mod 2 Pallet Slings

The Mk 85, Mk 86, Mk 87, and Mk 100 pallet slings (Figure 9-13) are wire rope basket slings that are adjustable for load height. These slings accommodate a full range of load heights (16 to 70 inches) on 40- by 48-inch pallets. A section of colored tubing on the cross bridle indicates the sling type. Table 9-1 lists physical data for the separate types of slings.
Figure 9-13 — Mk 85, Mk 86, Mk 87, and Mk 100 pallet slings.

Table 9-1 — Physical Data for Pallet Slings

<table>
<thead>
<tr>
<th>Mk/Mod</th>
<th>Color of Coded Tubing</th>
<th>Load Height (inches)</th>
<th>Capacity (pounds)</th>
<th>Weight (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85/1</td>
<td>Red</td>
<td>16</td>
<td>2,800</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>3,350</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>4,050</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 to 31</td>
<td>4,500</td>
<td>13</td>
</tr>
<tr>
<td>86/1</td>
<td>Black</td>
<td>29 to 40</td>
<td>4,500</td>
<td>13</td>
</tr>
<tr>
<td>87/1</td>
<td>Green</td>
<td>36 to 50</td>
<td>4,500</td>
<td>14</td>
</tr>
<tr>
<td>100/2</td>
<td>Yellow</td>
<td>48 to 70</td>
<td>4,500</td>
<td>15</td>
</tr>
</tbody>
</table>
Mk 105 Mod 0 Hoisting Sling
The Mk 105 Mod 0 hoisting sling (Figure 9-14) is a braided nylon rope that consists of a pendant and a leg assembly. Each end of the pendant has a spliced eye, one for the helicopter hook and one for the legs. Legs are rated at 4,000 pounds; with two or more legs, the assembly is rated at 6,000-pound capacity. The shorter legs (91 inches) are orange in color and are used for all pallet loads. The longer legs (122 inches) are also available for long or stacked containers and are green in color.

Mk 109 Mod 1 Container Lifting Sling
The Mk 109 Mod 1 container lifting sling (Figure 9-15) consists of an adjustable wire rope and chain assembly fitted with a lifting eye and spreader bars. The spreader bars are modified turnbuckles that permit adjustment of sling-leg width within the range of 26 to 42 inches. Height adjustment of the bars is provided by the swage stops. The Mk 109 Mod 1 container lifting sling is designed to fit most of the containers and cradles currently in the military system. The Mk 109 Mod 1 container lifting sling has an SWL of 5,000 pounds.

Figure 9-14 — Mk 105 Mod 0 hoisting sling.

Figure 9-15 — Mk 109 Mod 1 container lifting sling.
BOMB HOISTS

A hoist is a mechanism that provides a mechanical advantage when raising or lowering heavy loads, such as bombs, mines, and torpedoes.

HLU-196D/E Bomb Hoisting Unit

The HLU-196D/E bomb hoisting unit (Figure 9-16) is a lightweight, portable unit designed to load various weapons/stores on naval aircraft. The bomb hoisting unit consists of a gear-driven mechanism, battery-operated motor, cable drum assembly, load brake assembly, battery pack, electronic controller, battery charger, aircraft adapter, removable boom assembly, and 19-foot cable assembly.

The entire unit weighs 123 pounds. It has a direct, single-point lift capacity of 1,500 pounds. A double-point lift capacity of 3,000 pounds is obtainable by using various trolleys and rack adapters that are available.

HLU-288/E Bomb Hoist

The HLU-288/E bomb hoist (Figure 9-17) consists of a gear train, drum and cable, brake mechanism, extension tube, and brake crank. The cable drum rotates in the direction opposite to that of the cranks. The brake crank is used to hoist and lower the load. After a load is lifted, a clutch-type brake locks the gear train.

The HLU-288/E bomb hoist is used with Single Hoist Ordnance Loading System (SHOLS) adapters to load various weapons onto a variety of aircraft. The HLU-
288/E bomb hoist has a single lift capacity of 2,240 pounds and a double lift capacity of 4,480 pounds.

**SKIDS, WEAPONS TRANSPORTERS, AND ASSOCIATED ADAPTERS**

A skid or weapon transporter is a mobile piece of equipment with a welded frame-type construction mounted on two or four rubber-tired wheels. It is used with various adapters to support a load for movement from one area to another.

Wheeled skids or weapons transporters are generally equipped with a brake mechanism so the skid will not move when unattended. Handles are attached to all mobile skids and weapons transporters to provide a means of moving and controlling the units. The units are not self-propelled and require either manpower or power equipment to move them. They are used for handling various weapons and miscellaneous ammunition items during the aircraft rearming process aboard aircraft carriers and at shore stations.

Skids and weapons transporters cannot be used without adapters. Adapters are an interface between the skid or weapon transporter and the weapon or store to be supported. The adapters provide a support surface and a means of securing the weapon or store to the skid or transporter, preventing any inadvertent movement. Many different types of adapters are available for any one particular skid or weapon transporter, or an adapter may be compatible with several different skids or weapons transporters. Adapters are attached to the skids or weapons transporters by quick-release pins or other types of quick-change devices.

**AERO 12C Bomb Skid**

The AERO 12C bomb skid (*Figure 9-18*) is a wheelbarrow-type skid. It consists of a cradle frame mounted on two rubber-tired wheels and equipped with two supporting legs. The skid has two tubular steel handles that can be quickly latched or unlatched. The handles can be repositioned or removed by using the handle release on the aft end of each handle.

Braking is accomplished by means of two brake shoes, which are applied to the wheels by the support legs. The brakes are applied by lowering the skid so the supporting legs come in contact with the deck. The brakes are released when the skid is raised high enough for the supporting legs to clear the deck.

The skid is equipped with adjustable chocks on the bed of the frame. These chocks let the operator properly position the load on the skid. Each side of the skid is equipped with two hold-down brackets. One set of brackets accommodates the long or short handles. The other set of brackets is used for attaching tie-down straps.
The skid is used to transport weapons and (when used with different adapters) to transport miscellaneous items (e.g., wings, fins, nitrogen bottles) from the bomb assembly ordnance staging area to the flight deck aboard ship. The bomb skid is utilized on the flight deck to transport ordnance items in support of flight deck operations (e.g., cartridges, arming wire). The skid has an SWL of 1,250 pounds.

AERO 9C Bomb Skid Adapter

The AERO 9C bomb skid adapter (Figure 9-19) consists of an aluminum box-like frame with collapsible walls. It is constructed with stiffeners at the sides and bottom. The adapter is secured to the skid by two spring-loaded latches. Hand holes are provided in the sides of the adapter for manual handling.

The AERO 9C bomb skid adapter is used with the AERO 12C bomb skid to handle and transport miscellaneous ammunition items. The adapter has an SWL of 1,000 pounds.

AERO 39C Bomb Skid Adapter

The AERO 39C bomb skid adapter (Figure 9-20) consists of seven hexagonal aluminum tubes welded together. It is flat on one side and contoured around the hexagonal tubes on the other three sides. The assembly has three handles mounted on it for lifting and a hinged door at one end for loading.

The AERO 39C bomb skid adapter is used with the AERO 12C bomb skid to transport and store nitrogen-filled bottles used as a coolant on the LAU-7A guided missile launcher. The adapter has an SWL of seven nitrogen bottles.
AERO 64B Soft-Belt Adapter

The AERO 64B soft-belt adapter (Figure 9-21) consists of a flexible, neoprene-covered, woven-wire sling. The adapter has slots at the ends for attaching tie-down straps. The adapter is also equipped with brackets for attaching it to the skid.

Two AERO 64B soft-belt adapters support or store a soft-skin weapon up to 20 inches in diameter on the AERO 12C bomb skid, which has an SWL not to exceed 1,250 pounds. Each AERO 64B adapter has an SWL of 2,500 pounds.

ADU-488/E Wing, Fin, and Fuze Adapter

The ADU-488/E wing, fin, and fuze adapter (Figure 9-22) is an aluminum container that contains different features to transport a variety of ordnance components. Preformed urethane channels that provide protection for wings and fins are installed in the base. Above the base are two hinged plates, which are lowered onto the wings and fins to hold them in place. There are two cushioned plates that are lowered from their stowed position and provide holes for fuzes.

The ADU-488/E wing, fin, and fuze adapter is used by ordnance personnel to transfer different ordnance and ordnance components from weapons breakout areas to the flight deck/flight line.
ADU-729/E Nitrogen Receiver Adapter

The ADU-729/E nitrogen receiver adapter (Figure 9-23) is an aluminum container with seven hexagonal tubes. A welded plate is fitted with contoured urethane pads to fit the nitrogen bottles of the LAU-127 launcher. The hinged plate is spring-loaded and dual-clasped for security. Two handles located on the side aid in lifting and carrying. The ADU-729/E nitrogen receiver adapter is used with the AERO 12C bomb skid.

MHU-191A/M Munitions Transporter

The MHU-191A/M munitions transporter (Figure 9-24) is a welded tubular frame equipped with a box section of drilled steel bars, which provide the mounting holes for attaching various adapters. It has two axles and four rubber wheels. The two front wheels are equipped with drum brakes.

The brake lever located on the draw bar actuates the brakes. The brakes are applied automatically when the spring-loaded brake lever is in the down position. To release the brakes, pull the brake lever upward toward the T on the draw bar. The brake shoes are actuated through the mechanical linkage located inside the draw bar. The brake lever is continually held in the upward position so the skid can move. Care must be taken when the brake lever is released; it is spring-loaded and can cause the lever to snap downward, causing damage to the mechanical linkage system. The draw bar is attached to the skid by a quick-release pin. The pin also connects the brake linkage between the skid and the brake lever on the draw bar.

Two draw bars are available for use with the MHU-191A/M munitions transporter. The short draw bar should be used to transport short weapons or when working in an area where the long draw bar handle cannot be used. The long draw bar should be used to transport long weapons, such as missiles, flare dispensers, or rocket launchers. The MHU-191A/M munitions transporter has an SWL of 5,000 pounds. It is used with various adapters to transport or load weapons, stores, and equipment.

AERO 58A Skid Adapter

The AERO 58A skid adapter (Figure 9-25) has a front and rear section. These sections are similar in design. The primary difference is the base—the front section has a 10-inch base and the rear section has a 15-inch base. These front and rear sections fit on the rails of the MHU-191A/M munitions transporter.

Each adapter section has two removable rubber rollers supporting the weapon. These rollers are adjustable from one to six positions to accommodate weapons of different diameters. Nylon straps hold the weapon in place.
One set of AERO 58A skid adapters has an SWL of 5,000 pounds. It holds a single weapon from 8 to 30.5 inches in diameter. The AERO 58A adapter can also be used with the MHU-126A/M munitions trailer and the MHU-202/M small munitions trailer.

**Figure 9-25 — AERO 58A skid adapter mounted on an MHU-191A/M munitions transporter.**

**AERO 64A Soft-Belt Adapter**

The AERO 64A soft-belt adapter (*Figure 9-26*) consists of a flexible neoprene-covered, woven-wire sling. The adapter has slots at the ends for attaching tie-down straps. The adapter is also equipped with brackets for attaching it to the skid.

**Figure 9-26 — AERO 64A soft-belt adapter mounted to AERO 58A skid adapters and MHU-191A/M munitions transporter.**
Two AERO 64A soft-belt adapters support a soft-skin store up to 30 inches in diameter. Each adapter has an SWL of 2,500 pounds. The AERO 64A is designed for use with AERO 58A skid adapters, and is used with various skids, transporters, and trailers.

**AERO 71A Skid Flatbed Adapter**

The AERO 71A skid flatbed adapter *(Figure 9-27)* consists of a welded aluminum angle frame and sheet aluminum deck. The adapter is secured to a weapon skid by quick-release pins.

When the AERO 71A is used, two AERO 58A skid adapters must be used in order to form a flatbed conveyance for transportation of the weapon components, containers, and a variety of other materials. The AERO 71A can be used with various skids, transporters, and trailers. The adapter has an SWL of 4,000 pounds.

**AERO 83A Transport Adapter**

The AERO 83A transport adapter *(Figure 9-28)* consists of a tubular aluminum frame with a system of movable suspension assemblies. The adapter is equipped with four rack-attachment hooks adjusted to accept 14- or 30-inch suspension lugs. The adapter is equipped with two tie-down straps to secure the load against the rubber bumpers.
The AERO 83A transport adapter is used with the AERO 58A skid adapter on the MHU-191A/M munitions transporter for transporting empty improved multiple ejector racks (IMERs), vertical ejector racks (VERs), improved triple ejector racks (ITERs), and missile launchers LAU-115/117/118. One adapter can handle two IMERs, two ITERs, or two launchers. The adapters can be stacked two high so four racks/launchers can be transported. The adapters are stacked by inserting the support pins of the upper adapter into the stacking sockets of the lower adapter. Then the adapter is mounted on the skid by inserting the AERO 83A transport adapter support pins into the front and rear sockets of the AERO 58A. The AERO 83A has an SWL of 5,000 pounds.

**ADU-405/E Roller Height Adapter**

The ADU-405/E roller height adapter (*Figure 9-29*) consists of a rubber roller fitted between cast aluminum housing. The opposite end of the housing contains a spring and pin, which lock it onto other adapters. The ADU-405/E roller height adapter has an SWL of 2,500 pounds when used in sets of four on the AERO 58A skid adapters for handling Harpoon missiles and guided bomb units (GBU)-24 Paveway III weapons with the MHU-191A/M munitions transporter.

**ADU-433A/E Aft Height Adapter and ADU-434A/E Forward Height Adapter**

The ADU-433A/E aft height adapter and ADU-434A/E forward height adapter (*Figure 9-30*) consist of machined steel end supports connected by hollow steel tubes. The upper edges of the end support a duplicate portion of the rail assembly of the associated skid, transporter, or trailer, and provide for the attachment of various adapters using quick-release pins.
The ADU-433A/E aft height adapter is used with the ADU-434A/E forward height adapter to alleviate clearance problems with the wheels of trailers and the wings and fins of the weapons they transport. The ADU-433A/E is used with 15-inch rails and the ADU-434A/E is used with 10-inch rails on associated skids, transporters (including the MHU-191A/M munitions transporter), or trailers. The ADU-433A/E and ADU-434A/E height adapters have an SWL of 1,800 pounds.

**ADU-483/E Skid Adapter Assembly**

The ADU-483/E skid adapter assembly (Figure 9-31) consists of one steel upper-frame section with two removable rubber rollers and a nylon tie-down strap with a buckle. A quick-release pin is used to attach and secure the two adapter assemblies together at the top, forming a complete load-bearing assembly that supports two cylindrical weapons side by side. The position of the outboard roller is fixed. The inboard roller can be positioned in either of two positions to hold weapons of different diameters.

The ADU-483/E skid adapter assembly is used in pairs with the AERO 58A skid adapters. When mounted on the top of two AERO 58A skid adapters (front and rear) and secured with quick-release pins, the ADU-483/E skid adapter assembly supports two weapons from 9 to 16 inches in diameter. Two pairs (total of four) of the ADU-483/E skid adapters have an SWL of 4,000 pounds. When the skid adapter assemblies are installed, the AERO 58A skid adapter is limited to weapons with a maximum diameter of 16 inches.

**ADU-895/E Interface Adapter Assembly**

The ADU-895/E interface adapter assembly (Figure 9-32) consists of one steel upper-frame section with two removable rubber rollers and a nylon tie-down strap with a buckle. A quick-release pin is used to attach and secure the two adapter assemblies together at the top, forming a complete load-bearing assembly that supports two cylindrical weapons side by side. A second centerline configuration can support GBU-16 weapons. The position of the outboard roller is fixed. The inboard roller can be positioned in either of three positions to hold weapons of different diameters.
The ADU-895/E interface adapter assembly is used in pairs with the AERO 58A skid adapters. The adapter can support two weapons from 9 to 16 inches in diameter or a single GBU-16 weapon during transport on the MHU-191A/M. Two pairs (total of four) of the ADU-895/E interface adapter assemblies have an SWL of 4,000 pounds. The ADU-895/E is replacing the ADU-483/E skid adapter assembly.

**ADU-496A/E Single Store Adapter**

The ADU-496A/E (*Figure 9-33*) consists of a steel body and urethane pad bonded together to form a single unit.

The adapter is used in sets of four to support a single weapon, and 10-inch diameter and larger weapons/stores during handling and transport on the MHU-191A/M munitions transporter. The adapter attaches to the AERO-58A and ADU-483/E skid adapters.

The ADU-496A/E is used to support the AGM-88 High-speed Anti-Radiation Missile (HARM) missile and 10-inch diameter and larger stores. The ADU-496A/E has an SWL of 500 pounds and is used in sets of four to create an SWL of 2,000 pounds.

**ADU-511A/E Adjustable Weapons Adapter**

The ADU-511A/E adapter (*Figure 9-34*) consists of a steel support bar with adjustable chocks that can be configured for different diameter weapons by using designated hole positions. Designed to carry two stores side by side, the adapter may also be configured to carry single stores.

The ADU-511A/E adapter is used in support of the AIM-7, AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM), AGM-88, and AGM-65 missiles for transporting and loading operations. The ADU-511A/E attaches to the AERO-58A skid adapter on the MHU-191A/M munitions transporter. The ADU-511A/E has an SWL of 2,000 pounds each.
**ADU-514A/E Small Missile Adapter**

The ADU-514A/E small missile adapter *(Figure 9-35)* is an aluminum weldment that consists of upper and lower frames with support pads, two side blocks, buckle, and strap. The adapter is used in pairs and features a two-tier design. The missile support pads attached to the upper and lower frames are solid rubber to provide cradling of missiles and weapons.

The ADU-514A/E small missile adapter is used on a variety of weapon skids, transporters (including the MHU-191A/M munitions transporter), and trailers for transporting up to four each of the following missiles: AIM-7(series), AIM-9(series), AIM-120(series), and AGM-114(series). The ADU-514A/E small missile adapter has an SWL of 1,200 pounds.

**ADU-566/E Bracket Adapter**

The ADU-566/E bracket adapter *(Figure 9-36)* consists of a main beam with holes along each side and two sleeves, which slide over the main beam and have similarly spaced holes along each side.

The complete assembly is placed on an AERO 58A skid adapter with the holes aligned and quick-release pins inserted to secure the adapter. Strap tie-down points are provided at the end of each sleeve, and spindle/lock assemblies are furnished. The bracket is adjustable to accommodate load widths varying between 28 and 48 inches. The ADU-566/E bracket adapter has an SWL of 5,000 pounds when used in pairs.

The ADU-566/E bracket adapter attaches to the AERO 58A skid adapters on the MHU-191A/M munitions transporter when handling unit loads. The adapter converts the transporter into a flatbed
vehicle capable of handling ordnance pallets, cradles, and containers. Two bracket adapters are required for each transporter. The adapter is used during replenishment at sea operations for transporting containerized missiles, weapons, and weapons components from the flight deck and hangar deck to magazine spaces.

**ADU-567/E Wing/Fin Guard Adapter**

The ADU-567/E adapter (Figure 9-37) consists of a main tube weldment, tube extension, pivot tube, two guards, and retractable spring-locking plungers. The tube extension can be retracted and locked into the main tube weldment, and the two guards can be pivoted and locked in a flat position to create a compact shipping and stowage package.

![Figure 9-37 — ADU-567/E wing/fin guard adapter.](image)

The ADU-567/E adapter provides protection for the AIM-9(series) wings and fins when attached to the ADU-514A/E small missile adapter during transporting and handling on a MHU-191A/M munitions transporter.

**ADK-598 Transport Adapter**

The ADK-598 transport adapter (Figure 9-38) is shaped like a cradle and consists of sheet aluminum, two angles, two attaching blocks with quick-release pins, and two top belting strips.

The ADK-598 transport adapter mounts on AERO 58A skid adapters (front and rear) with rollers while on the MHU-191A/M munitions transporter for transport of one Tactical Air Launched Decoy (TALD) ADM-141. Three transport adapters can also be used to transport three TALDs by using the AERO 58A (front and

![Figure 9-38 — ADK-598 transport adapter.](image)
ADU-699A/E Sonobuoy Modular Carrier Unit Assembly Adapter and ADU-834/E Adapter

The ADU-699A/E sonobuoy modular carrier unit assembly adapter is the base frame assembly. The adapter is used in conjunction with the ADU-834/E to store and transport sonobuoys in launch containers (Figure 9-39). The ADU-699A/E can hold and transport 12 sonobuoys. The ADU-834/E can hold and transport 13 sonobuoys.

The ADU-699A/E with four ADU-834/E sonobuoy transport adapters can hold and/or transport up to 64 sonobuoys in launch containers. The ADU-699A/E is designed to adapt to the AERO 58A skid adapters, which allow interface with the MHU-191A/M.

ADU-775/E Transport Adapter Assembly

The ADU-775/E transport adapter assembly (Figure 9-40) consists of a molded polychloroprene (rubber) cradle and four spring-loaded attached pins. The 6-inch-wide rubber cradle conforms to the U-shape underside body structure of the Joint Standoff Weapon (JSOW) AGM-154(series).

The spring-loaded pins allow the ADU-775/E transport adapter assembly (used in pairs) to be attached/locked in place at holes number 5 of the AERO-58A front and rear adapters on the MHU-191A/M munitions transporter. The ADU-775/E on MHU-191A/M and AERO 58A front and rear adapters combination will allow handling and transporting of one JSOW AGM-154(series) baseline/variant missile shape (weapon nose toward
transporter draw bar on MHU-191A/M). The ADU-775/E was designed and developed to meet the JSOW AGM-154(series) missile transporter requirements. The ADU-775/E has an SWL of 1,500 pounds each.

**ADU-800/E Tactical Air-Launched Decoy Forward Transport Cradle Adapter**

The ADU-800/E TALD forward transport cradle adapter (*Figure 9-41*) consists of a square harness and a polyether urethane, casting resin plastic, all-black saddle base. The adapter also has a smooth, oil-resistant, neoprene rubber pad equipped with two lanyards containing quick-release pins terminating at each end.

The ADU-800/E TALD forward transport cradle adapter is designed to attach to the AERO 58A skid adapters, which interface with the MHU-191A/M munitions transporter. The adapter provides a square cradle surface conforming to the square fuselage shape of the TALD ADM-141. The TALD requires the use of two ADU-800/E adapters to support the forward and aft sections of the TALD. The ADU-800/E TALD forward transport cradle adapter has an SWL of 600 pounds each.

**ADU-801/E Transport Adapter**

The ADU-801/E transport adapter (*Figure 9-42*) is a machined aluminum adapter with a sliding rubber chock used to transport the AGM-84H/K Standoff Land Attack Missile-Expanded Response (SLAM-ER) missile. The adapter has provision to attach a tie-down strap and contains some acetal (Delrin®) covered surfaces, which prevent damage to the missile. The transport adapter is used for both shipboard and shore-based transport applications.

Four ADU-801/E transport adapters are required to transport one AGM-84H/K SLAM-ER missile. The adapter is designed to attach to the AERO 58A skid adapters, which interface with the MHU-191A/M munitions transporter. For shore-based operations, the ADU-801/E, used with the AERO 58A skid adapters, attaches to the MHU-126(series) or MHU-202/M trailers. The ADU-801/E has an SWL of 600 pounds each.
ADU-814/E Improved Tactical Air-Launched Decoy Aft Transport Cradle Adapter

The ADU-814/E ITALD aft transport cradle adapter (Figure 9-43) consists of a round aluminum alloy saddle base with a smooth black, oil resistant, neoprene rubber pad equipped with two quick release pins attached to the adapter via lanyards.

The ADU-814/E ITALD aft transport cradle adapter is designed to attach to the AERO 58A skid adapters, which interface with the MHU-191A/M munitions transporter. The adapter provides a rounded cradle surface conforming to the round fuselage shape of the ITALD. The ITALD requires the use of one ADU-800/E adapter to support the square forward section, and one ADU-814/E adapter for cradling the rounded aft section. The ADU-814/E ITALD aft transport cradle adapter has an SWL of 600 pounds each.

TRUCKS

The term truck applies to either a manually propelled or self-propelled vehicle. Gasoline engines, diesel engines, or electric motors power self-propelled trucks.

Gasoline- or diesel-powered trucks are equipped with exhaust system spark-arresting devices. These devices help ensure safe operation of the trucks in areas where there is danger of fire or explosion caused by sparks. These vehicles must meet rigid mechanical and safety inspections.

**NOTE**

Do not use vehicles that fail to meet the minimum established inspection and safety criteria in ordnance handling evolutions.

Forklift Trucks

The forklift truck is a mobile four-wheel or three-wheel unit that lets one person pick up, transport, and lift the load to different heights. The forklift truck is designed on the cantilever principle. The front wheels act as a fulcrum. The load is counterbalanced because the weight of the truck is directly behind the front wheels.

The forklift truck has two fork tines secured to the supporting frame. Both tines and the supporting frame are located in the front of the truck. The tines are moved vertically on the supporting frame by a hydraulic lift. The supporting frame may be either telescoping (to provide greater lift) or nontelescoping. The tines and supporting frame can be tilted forward from the vertical position to pick up the load. The frame can be tilted backward from a vertical position to help balance the load. The tines can also be fitted with an adapter hook, Mk 91 Mod 0 (Figure 9-44), which converts a forklift truck tine assembly into a fork/boom assembly, for lifting and transporting various loads.
The electric motor or diesel engine forklift trucks are normally used during ordnance evolutions. Forklift trucks are equipped with braking systems and with either automobile- or lever-type steering mechanisms. Forklift trucks have solid rubber tires for use over smooth and hard surfaces, such as paved roads, magazine and warehouse floors, and piers. Pneumatic tires are used for rough and uneven terrain, in mud, or over soft, sandy ground.

**Diesel Engine Forklift Trucks**

A wide variety of diesel engine forklift trucks are available for use throughout the Navy. They range from a 4,000-pound capacity to a 20,000-pound capacity (Figure 9-45).

*Figure 9-45 shows a typical 6,000-pound capacity forklift truck. The truck has a diesel engine and four pneumatic rubber tires. It is typical of the size and capacity ordnance personnel usually use. A number of different models of the forklift truck are used at naval activities. Every model has an adjustable two-tine fork. The tines are secured to a vertical supporting frame that can be telescoped and tilted. The lifting and tilting mechanisms are hydraulically operated. An overhead guard is also provided for the operator's safety. Forklift trucks have either dual or single front wheels, diesel engines, power-shifted transmissions, and either pneumatic or cushion tires. The main difference between the 4,000- and 6,000-pound trucks is in load-carrying capacity and in overall truck dimensions and weight. The exhaust systems of these trucks have spark-arresting devices that are used when handling ammunition—even in the open.*

**Electric Forklift Trucks**

Electric forklift trucks are frequently used by ordnance personnel. They are discussed in the following paragraphs.

**Electric Forklift Truck, 4,000-Pound Capacity**

A typical 4,000-pound capacity electric forklift truck is shown in *Figure 9-46*. Many different models are currently used at naval activities.
Every model has an adjustable two-tine fork secured to a vertical-supporting frame, which can be telescoped and tilted. An overhead guard may be provided for the operator’s safety.

A rechargeable battery provides power for the operation of the truck and its hydraulic lift and tilt mechanisms. The electric forklift truck can pick up, transport, and lift loads weighing up to 4,000 pounds. It can also handle boxes of ammunition and other hazardous materials that can be properly supported across the fork tines. When ammunition is handled, the truck is spark-enclosed or explosive proof.

**Electric Forklift Truck (Reaching and Tiering), 4,000-Pound Capacity**

A typical 4,000-pound electric (reaching and tiering) forklift truck is shown in Figure 9-47. Several different models of the electric forklift truck are in use at naval activities. Every model has an adjustable two-tine fork.

The tines are secured to a vertical-supporting frame that can be telescoped and tilted. The tines are elevated by a hydraulic-mechanical lift mechanism. An overhead guard is not normally provided on shipboard models for the operator’s safety. All models of the reaching and tiering type forklift truck have outriggers to provide a rigid structure. A rechargeable battery provides the power for the operation of the truck and its hydraulic lift and tilt mechanisms. The forklift truck has mechanical or hydraulic brakes that the operator applies by using a foot pedal.

The electric forklift truck is used to pick up, transport, stack, and unstack palletized unit loads weighing up to 4,000 pounds. It is intended for use in warehouses that have narrow aisles or low floor-load ratings and aboard aircraft carriers. When the truck is used to handle ammunition, it is spark-enclosed.
Pallet Trucks

The pallet trucks used most frequently by aviation ordnanceman are discussed in the following paragraphs.

Electric-Powered Walkie-Type Pallet Truck

A typical 6,000-pound capacity electric-powered walkie-type pallet truck is shown in Figure 9-48. Several different models of the pallet truck are used at naval activities. In order to use these pallet trucks, the operator must walk behind the truck while steering by hand.

Each model of the pallet truck has a two-tine fork that supports a palletized load. The tines are raised or lowered by a hydraulic lift mechanism. Depending upon the model, the lift mechanism is either electrically or manually operated. The power source for truck traction is a rechargeable battery. It is steered by using the steering handle, with a possible right-angle turn in either direction. The truck is equipped with mechanical brakes, which, when applied, automatically shut off the electrical power.

The pallet truck is used to pick up, transport, and deposit palletized loads that do not exceed 6,000 pounds. The pallet truck is used on hard and smooth surfaces, such as warehouse and magazine floors. The pallet truck is spark-enclosed when used to handle ammunition.

Manual Pallet Truck

A typical 4,000-pound capacity manual pallet truck is shown in Figure 9-49. Many different models of the manual pallet truck are used at naval activities. Since the trucks all operate in the same way, the following general description applies to all models.

The 4,000-pound hand pallet truck has a two-tine fork that supports a palletized load. The tines are raised or lowered by a hydraulic or mechanical lift mechanism. The height of lift differs from model to model but is generally in the range of 2 to 4 inches. Depending upon the model, the lift mechanism is operated by the tow handle, a foot pedal, or a hand lever. The truck is not self-propelled and requires manpower for mobility. It is steered by the tow handle. A right-angle turn is possible in either direction without moving the truck. The drive wheel is located directly beneath the tow handle. It is usually one solid rubber tire. The load wheels, located approximately 6 inches from the ends of the fork tines, can be arranged in a single or double (tandem) fashion under each tine.
The hand truck is used to pick up, transport, and deposit palletized unit loads on single- or double-faced pallets that do not exceed 4,000 pounds in weight. The manual pallet truck is particularly useful and economical for moving loads a short distance. It must be used in areas that have hard and smooth surfaces.

**Mk 45 Mod 2 Handlift Truck**

The Mk 45 Mod 2 handlift truck (Figure 9-50) body is mounted on two wheels equipped with polyurethane tires. The lifting mechanism, which includes a lift arm and a mounting pin for engaging the load, is manually operated by using a reversible, ratchet-type, cranking lever to raise or lower the lift arm assembly. A handlebar is connected to the axle for steering the truck.

The Mk 45 Mod 2 is intended for use in lifting and maneuvering long, heavy containers and cradles within the weight capacity of two trucks (6,000 pounds). These trucks are used in pairs, with one truck positioned at each end of the container being handled.

**TRAILERS**

A trailer is a transport vehicle towed by another vehicle, such as a truck or tractor. All trailers are equipped with load-supporting bodies or frames and with wheels for mobility. Trailers may be divided into three categories—weapon trailers, weight handling trailers, and warehouse trailers. Only trailers
within the weapon trailer category are discussed in this training manual because they directly support aircraft weapon loading operations ashore.

A weapon trailer consists of a heavy channel or tubular frame mounted on two axles and wheels that are equipped with four pneumatic tires. The frame is supported by automotive leaf-type springs. The front axle is steerable and the rear axle is fixed. The trailer is equipped with a tow bar or tow handle that has a towing eye on its end. The towing eye should be used to couple the trailer to the towing vehicle. Some trailers have draw bars at the rear to couple the towing eye of another trailer.

A weapon trailer has cradles or brackets that fit the contours of the weapon being transported. The cradles or brackets on the trailer can be removed or adjusted for carrying loads of various sizes. Hold-down devices, such as chains or straps, secure the load during transport. Some weapon trailers have hydraulic systems to load weapons on aircraft, or for similar uses.

Weapon trailers are used to transport weapons, such as bombs, mines, missiles, and torpedoes of various sizes. In general, the trailers are capable of operating over moderately soft or moderately rough terrain. The short airfield tactical site (SATS) trailers operate over very rough terrain. Vehicles such as the cargo truck (pickup) tow these trailers.

**A/M32K-4A Rough Terrain Trailer**

The A/M32K-4A rough terrain trailer ([Figure 9-51](#)) is a transport vehicle that consists of a chassis and a lightweight, flatbed, aluminum body. The chassis has two axles and four single wheels that are equipped with pneumatic tires. A torque box provides strength and rigidity to the body.

Two sections of the nonskid flatbed can be removed to use a forklift truck to load and unload the trailer. The trailer is equipped with a tow bar, multiple leaf springs, service brakes, and parking brakes. The trailer has 12 cradle tie-down fittings to hold the weapon cradles securely on the bed.

![Figure 9-51 — A/M32K-4A rough terrain trailer.](image)

The A/M32K-4A rough terrain trailer is used to transport air-launched weapons from an ammunition dump to an airstrip. It can be operated over very rough terrain. The trailer holds weapons in cradles that are two tiers in height when equipped with increased load-density weapon cradles. The cradles are secured to the trailer bed by quick-release, positive-locking clips. The trailer can also be equipped...
with stake sides and used as a utility vehicle for transporting weapon components. The A/M32K-4A has an SWL of 8,000 pounds.

**AERO 51D Munitions Trailer**

The AERO 51D munitions trailer (*Figure 9-52*) is a transport vehicle that has an automotive chassis and a flat-deck body. The chassis has two axles and four single wheels equipped with pneumatic tires. The center section of the nonskid flat deck is hinged. It can be opened to provide a hatchway across the full width of the vehicle. It also has hinged deck panels that have double rails with holes at intervals to provide a mounting base for cradles and adapters.

The trailer has hydraulic surge brakes and mechanical parking brakes, a tow bar, and cable harness. The cable harness electrically connects the trailer to the towing vehicle for operation of the trailer lights. Accessory items (chocks, tie-down straps, interconnecting electrical harness, etc.) are stored in toolboxes mounted underneath the forward and aft decks.

The AERO 51D munitions trailer is used with a towing vehicle to transport and hold a variety of weapons in ready storage. Adapters or cradles support the weapons on the trailer. The AERO 51D munitions trailer is not used aboard ship. The AERO 51D has an SWL of 8,500 pounds.

**MHU-126A/M Munitions Trailer**

The MHU-126A/M munitions trailer (*Figure 9-53*) has a low slung, channel steel frame, which is mounted on four single wheels equipped with pneumatic rubber tires. Lengths of drilled steel bars welded to crossmembers of the frame provide mounting holes for the various adapters. The front axle is steerable and equipped with a draw bar that has a towing eye on its end to couple the trailer to a towing vehicle. A pintle hook on the rear of the
frame permits coupling with another trailer. The wheels are equipped with hydraulic service brakes. Mechanical parking brakes are provided on two of the four wheels.

When it is equipped with adapters, the MHU-126A/M munitions trailer can be used to transport and load various weapons, stores, and equipment. The recommended maximum towing speed is 5 miles per hour for single or multiple trailers being towed in a train. The MHU-126A/M has an SWL of 5,000 pounds.

**MHU-202/M Small Munitions Trailer**

The MHU-202/M small munitions trailer (Figure 9-54) is an upgraded version of the MHU-126A/E and MHU-171A/E. The trailer consists of a steel frame, tow bar, and electrical harness, which operates stop, running, and directional lights.

![Figure 9-54 — MHU-202/M small munitions trailer.](image)

The trailer features four single wheels equipped with pneumatic tires, hydraulic brakes on all four wheels, and mechanical parking brakes on the rear wheels. The rail configuration is the same as the MHU-191A/M munitions transporter. The trailer is equipped for towing in up to three trailers. When equipped with various adapters, the MHU-202/M small munitions trailer is used to transport weapons, weapon components, and stores. The MHU-202/M has an SWL of 5,000 pounds.

**LOADERS**

Loaders are generally used to handle a variety of loads, such as weapons, ammunition, jet-assisted take-off (JATO) bottles, rockets, pylons, or fuel tanks during naval aircraft loading operations. Some loaders are capable of operating over rough terrain while others are built for smooth surfaces. The types of loaders used to handle ammunition and explosives are equipped with flame- and spark-arresting mufflers.

**A/S32K-1E Weapon Loader**

The A/S32K-1E weapon loader (Figure 9-55) is a self-propelled vehicle with a low, heavy-duty frame supported by six small, high-capacity wheels. The vehicle has two main functional components—the lifting mechanism and the drive mechanism.
The lift boom is operated by a piston-type hydraulic cylinder mounted in the mid-section of the boom support. The manipulating head is located at the upper end of the lift boom and is capable of limited lateral and longitudinal motions as well as tilt and yaw control. The head is equipped with lifting forks, which are secured with quick-release pins and may be mounted in three positions: normal, inverted forward, and inverted rear. The drive mechanism includes a hydrostatic drive system (drive motor and directional valve), drive shaft with universal joints, limited-slip differential, axle/wheel disconnect hubs, and steerable rear drive wheels assisted by power steering. The power to operate the drive and lifting mechanisms is supplied by a diesel engine.

The weapon loader is equipped with four-wheel hydraulic brakes, mechanical hydraulic-operated parking brake, a spark- and flame-arresting muffler, nylon tie-down straps to hold the load securely during handling, and lights for night loading operation.

The weapon loader is used to load externally carried munitions, weapons, and stores onto aircraft. The loader is also capable of transporting a specific load over semi-improved terrain as well as hard, smooth surfaces.

The weapon loader has an SWL of 4,500 pounds and is used with a variety of adapters and cradles.

SAFETY PRECAUTIONS FOR HANDLING EQUIPMENT

The safety precautions and instructions that pertain to the safe operation and use of ammunition and explosives handling equipment must be observed, both afloat and ashore. The task of ammunition and explosives handling is hazardous. Accidents involving ammunition and explosives handling kill and injure personnel, destroy essential supplies, and damage valuable equipment and property. These accidents do not just happen. They are caused by carelessness or unfamiliarity with the use and limitations of handling equipment, as well as relaxation or failure to observe safety precautions, orders, and regulations pertaining to the handling and stowage of ammunition and explosives. Accidents caused by misuse of handling equipment can be prevented if the operator takes the time to understand the use and limitations of the handling equipment.

Many technical manuals and instructions contain information about safety, inspection, and tests for OHE. For general information, refer to the following publications:

- Approved Handling Equipment for Weapons and Explosives, NAVSEA OP 2173, Volume 1 (NAVAIR 19-100-1.1) and Volume 2 (NAVAIR 19-100-1.2)
- Ammunition and Explosives Safety Afloat, NAVSEA OP 4
- Ammunition and Explosives Safety Ashore, NAVSEA OP 5, Volume 1
Only approved handling equipment should be used to handle explosive ordnance. Approved handling equipment is described in NAVSEA OP 2173. Before anyone can be assigned to operate any explosive OHE, the operator must receive a thorough indoctrination in general safety precautions applicable to explosive ordnance. The operator must also be indoctrinated in the specific precautions applicable to the equipment he or she will be operating. Additionally, operators must be qualified and certified under OPNAVINST 8023.24(series) and other appropriate command directives.

To assure reliability, explosive handling equipment must be inspected and periodically tested. Equipment, such as slings, bands, beams, strongbacks, and spreader bars, is static tested at 200 percent to 215 percent of SWL. If the date and the results of the latest static test are not marked on the equipment or the test is out of date, the equipment should not be used.

Operators must possess a valid explosives driver's license before operating industrial material handling equipment, such as forklift trucks, pickup trucks, platform trucks, crane trucks, tractors, and trailers.

The SWL of the equipment being used should never be exceeded. If adapters are used, the lowest SWL of the equipment-adapter configuration cannot be exceeded. For example, if an AERO 12C bomb skid (SWL of 1,250 pounds) is used with an AERO 9C bomb skid adapter (SWL of 1,000 pounds), the maximum capacity of the skid-adapter configuration is limited to 1,000 pounds.
End of Chapter 9

Ammunition Handling Equipment

Review Questions

9-1. What command controls the ammunition handling equipment identified by mark and modification numbers?

A. COMNAVAIRLANT
B. COMNAVAIRPAC
C. NAVAIR
D. NAVSEA

9-2. What command controls the ammunition handling equipment identified by ADU, ADK, and HLK?

A. COMNAVAIRLANT
B. COMNAVAIRPAC
C. NAVAIR
D. NAVSEA

9-3. By what means can the command that has control over a particular piece of ammunition handling equipment be identified?

A. Item cost
B. Item designation
C. Item security classification
D. Item usage

9-4. A standard four-way wood pallet has what maximum safe working load, in pounds?

A. 1,000
B. 2,000
C. 3,000
D. 4,000

9-5. A Mark 3 Modification 0 pallet has what maximum safe working load, in pounds?

A. 1,000
B. 2,000
C. 3,000
D. 4,000

9-6. A Mark 12 Modification 1 pallet is what width, in inches?

A. 35
B. 38
C. 45
D. 48
9-7. A Mark 43 Modification 1 weapons carrier is combined with what weapons carrier to lift Mark 82/bomb live unit 111 bombs in tandem?

A. Mk 18 Mod 1  
B. Mk 49 Mod 1  
C. Mk 105 Mod 1  
D. Mk 109 Mod 0

9-8. The Mark 49 Modification 1 weapons carrier has what maximum safe working load, in pounds?

A. 2,500  
B. 3,500  
C. 4,000  
D. 4,500

9-9. A Mark 51 Modification 1 weapons carrier has what total number of lifting eyes?

A. Two  
B. Four  
C. Six  
D. Eight

9-10. What number of interchangeable and interlocking 49-inch sections make up the A/F32K-1A bomb assembly stand?

A. Two  
B. Three  
C. Four  
D. Five

9-11. What action is provided by the A/F32K-1A bomb assembly stand tray for the weapon during assembly/disassembly operations?

A. Provides a total weight printout of the weapons being assembled  
B. Permits a 360-degree rotation of the weapon  
C. Collapses for stowage purposes  
D. Provides tie-down locations during calm seas

9-12. What action should be performed to use an HLU-256/E manual hoisting bar in a tee configuration?

A. Remove the tail fuze plug  
B. Remove the tail stop  
C. Relocate the nose plug connector to a position at the bar's midpoint  
D. Relocate the tail stop to a position at the bar's midpoint
9-13. What beam is used to lift Harpoon missiles?

A. Mk 37 Mod 1  
B. Mk 18 Mod 1  
C. MHU-129/E  
D. ADU-399/E

9-14. The Mark 85, 86, 87 Modification 1 and Mark 100 Modification 2 pallet slings can handle what range of load heights, in inches?

A. 16 to 70  
B. 25 to 40  
C. 35 to 48  
D. 40 to 68

9-15. What total number of pounds is the rated capacity of a Mark 105 hoisting sling with two leg assemblies?

A. 1,500  
B. 2,000  
C. 3,000  
D. 6,000

9-16. The brake crank on an HLU-288/E bomb hoist is used for what purpose?

A. Help hoist a load  
B. Keep the cable firm in its groove  
C. Maintain tension on the brake clutch  
D. Swing the load

9-17. The HLU-196D/E has what double-point cable lift capacity, in pounds?

A. 1,500  
B. 3,000  
C. 4,000  
D. 6,000

9-18. The AERO 12C bomb skid has what maximum safe working load, in pounds?

A. 1,250  
B. 1,550  
C. 2,500  
D. 4,000
9-19. An AERO 12C bomb skid with an AERO 9C bomb skid adapter installed provides what maximum safe working load, in pounds?

A. 1,000  
B. 1,250  
C. 2,000  
D. 2,500

9-20. The AERO 64B soft-belt adapter provides what maximum safe working load, in pounds?

A. 1,000  
B. 2,000  
C. 2,500  
D. 4,000

9-21. The MHU-191A/M munitions transporter provides what maximum safe working load, in pounds?

A. 2,000  
B. 2,500  
C. 5,000  
D. 6,000

9-22. Two pairs of ADU-483/E adapters provide what maximum safe working load, in pounds?

A. 1,000  
B. 4,000  
C. 5,000  
D. 8,500

9-23. The AERO 71A skid flatbed adapter provides what maximum safe working load, in pounds?

A. 1,000  
B. 2,000  
C. 4,000  
D. 5,000

9-24. Forklift trucks are powered by gasoline engines, diesel engines, and what other source?

A. Emergency hoists  
B. Electric motors  
C. 24-volt generators  
D. Steam engines

9-25. An A/S32K-1E weapons loader provides what maximum safe working load, in pounds?

A. 2,500  
B. 4,500  
C. 6,500  
D. 8,000
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<th>Course Name</th>
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<tbody>
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<td>Chapter Number</td>
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