CHAPTER 10

SUSPENSION, ARMING, AND RELEASING EQUIPMENT

The Navy uses complex suspension, arming, and releasing devices in combat aircraft and weapons. The high speed and performance of potential targets and of our own aircraft require the electronic operation of suspension, arming, and releasing equipment.

The equipment covered in this chapter is part of the aircraft search or kill stores systems. Generally, these devices operate electrically and are controlled by aircraft electrical circuits. A circuit-closing device actuates them manually by a hand switch or automatically in the system.

LEARNING OBJECTIVES

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

1. Identify the purpose of bomb racks.
2. Recognize the bomb racks used for various configurations.
3. Identify the operation of bomb racks, to include electrical and manual release and arming.
4. Identify the purpose of bomb ejector racks.
5. Identify the principles of operations of bomb ejector racks.

BOMB RACKS

Aircraft bombs, torpedoes, mines, countermeasure devices, and other stores are suspended internally or externally from the aircraft. The suspension equipment can carry, arm, and release those weapons/stores. Suspension equipment includes AERO adapters, bomb release units (BRU), suspension under wing units (SUU), or Army Navy air-launched expendable (AN/ALE) countermeasure dispenser systems (CMDS).

Bomb racks are generally classified as ejection or freefall. A free-fall bomb rack allows the ordnance item to fall from the rack when all the requirements of the launch sequence have been satisfied, while release from an ejector-type bomb rack is accomplished by the firing of a cartridge-actuated device (CAD), which then ejects the item or items.

AERO 1A/1B Adapter Assembly

The BRU-14/A and BRU-15/A bomb racks use the AERO 1A (Forward)/1B (Aft) adapter assemblies (Figure 10-1) on the forward and aft end suspension hooks, which enables them to load and carry weapons/stores that have suspension lugs spaced 30 inches apart and weigh up to 2,000 pounds.

The AERO 1A/1B adapter linkage attaches to the bomb rack, and the movement of the AERO 1A/1B adapter suspension hooks corresponds to the movement of the bomb rack suspension hooks. Operation and Service Instructions, AERO-1 Bomb Rack Adapter Assemblies, Commander, Naval Air Systems Command (NAVAIR) 11-5E-17 contains more information about the AERO 1A/1B adapter assembly.
BRU-12/A, BRU-12A/A Bomb Rack

The BRU-12/A and BRU-12A/A bomb racks (Figure 10-2) are designed for fixed mounting in a bomb bay of the P-3 aircraft and can carry, arm, and release a weapon/store weighing up to 1,450 pounds. Each has two hooks, spaced 14 inches apart.

Figure 10-1 — AERO 1A/1B bomb rack adapter assembly.

Two solenoid actuated arming units at the bottom of the rack provide mechanical arming for the nose and tail of a weapon/store. These units are electrically actuated to arm a weapon/store as it is dropped. If the arming units are not electrically actuated, the weapon/store will drop unarmed. A linear electro-mechanical actuator (LEMA) provides electrical release of a weapon/store. No in-flight manual release mechanism is provided. A BRU-12/A bomb rack with improved positive arming latch installation creates a BRU-12A/A.

Figure 10-2 — BRU-12/A, BRU-12A/A aircraft bomb rack.
BRU-14/A Bomb Rack

The BRU-14/A bomb rack (Figure 10-3) provides suspension and release of conventional and special weapons/stores up to 2,200 pounds with 14-inch suspensions. At times, AERO 1A/1B adapter assemblies are used to increase the bomb rack to 30-inch suspension capacity. The BRU-14/A may be installed in the bomb bay of the patrol (P)-3C aircraft and in the weapon pylon of the rotary wing (H)-60 aircraft.

Sway braces are bolted to the rack frame. Installation of an in-flight operable bomb rack lock (IFOBRL) allows remote locking and unlocking of the rack by applying electrical power to the aircraft.

The BRU-14/A bomb rack has an auxiliary unlock assembly. It releases the IFOBRL if the IFOBRL fails to function in the normal release mode. The auxiliary unlock assembly is a CAD that provides a mounting point for the aft end of the IFOBRL. When actuated, the unlock assembly releases the IFOBRL and allows it to move forward, freeing the sear link from restraint, and permits the rack linkage to function normally.

The BRU-14A bomb rack has a secondary release assembly. It initiates hook release if the LEMA fails to function. The secondary release assembly is a CAD that consists of a housing, piston, and release slider assembly mounted on the top of the bomb rack frame. When actuated, the secondary release moves the sear link forward to release the bomb rack. The BRU-14/A doesn't have remote manual-release capabilities.

Operation and Service Instructions, Bomb Rack BRU-14/A and BRU-15/A, NAVAIR 11-5E-18 contains more information about the BRU-14/A bomb rack.

BRU-15/A Bomb Rack

The BRU-15/A bomb rack (Figure 10-4) is installed on the wing stations of the P-3 aircraft. It is used with the aircraft wing store launcher assembly, which is modified to launch a Harpoon missile. Attaching AERO 1A/1B adapter assemblies can increase the bomb rack to 30-inch suspension capacity.
The BRU-15/A bomb rack is a modification of the BRU-14/A bomb rack. The IFOBRL mechanism and associated auxiliary unlock device are not included.

A safety mechanism positively locks the release mechanism of the bomb rack when a safety pin is installed in the safety mechanism.

The cartridge-actuated secondary release mechanism is replaced by a cable-actuated manual release mechanism that operates the primary release linkage through an added manual release cable and lever.

**BOMB EJECTOR RACKS**

When in flight, today's high-speed fighter and attack aircraft create a vacuum under the fuselage and wings. If a weapon/store is released from the bomb rack, the vacuum can prevent the weapon/store from entering the airstream and falling to the target. If the weapon/store does not fall, it may physically contact the aircraft structure, causing serious damage to or loss of the aircraft.

Bomb ejector racks are different from bomb racks. Bomb ejector racks use electrically fired impulse cartridges to eject the weapon/store free of the bomb racks. Bomb ejector racks eject the weapon/store from the bomb rack with sufficient force to overcome vacuum buildup and ensure a safe weapon/store-launching environment.

**BRU-32(Series) Ejector Unit Rack Assembly**

The BRU-32(series) ejector unit rack assembly (*Figure 10-5*) is a non-jettisonable single carriage rack used for carrying weapons or other external stores on the fighter and attack (F/A)-18(variants) aircraft. The bomb rack is attached to the aircraft by four bolts and electrically connected to the aircraft weapons system.

The BRU-32A/A can carry weapons/stores of 10 to 28 inches in diameter weighing up to 2,600 pounds, while the BRU-32B/A can carry weapons/stores of the same diameter weighing up to 4,200 pounds. There are two pairs of suspension hooks, 14 and 30 inches apart on the longitudinal centerline of the ejector unit rack.
The BRU-32(series) ejector unit rack assemblies use a 14- to 30-inch suspension hook to suspend the following:

- Single stores
- BRU-33/A vertical ejector racks (VER)
- BRU-33A/A canted vertical ejector rack (CVER)
- BRU-41(series) multiple ejector rack (MER) and improved multiple ejector rack (IMER)
- BRU-42(series) triple ejector rack (TER) and improved triple ejector rack (ITER)
- BRU-55/A ejector rack
- LAU-115(series), LAU-117(series), and LAU-118(series) missile launchers

Figure 10-5 — BRU-32(series) bomb ejector rack.

The BRU-32(series) bomb ejector rack has a safety interlock and two sway brace assemblies with self-adjusting wedges. The safety interlock mechanically prevents the accidental opening of the suspension hooks. It is also used to lock and unlock the suspension hooks during loading operations. Control the automatic sway bracing by opening and closing the suspension hooks.

Sensing switches are incorporated within the rack to indicate to the aircraft weapon system that a store is loaded. The primary ejection uses two cartridges to generate the required gas pressure for rack operations. If the primary ejection fails, the auxiliary release unit provides emergency release.
The auxiliary release unit uses one cartridge that opens the hooks only. Nose and tail arming solenoids are used with mechanical fuzing. A receptacle is provided for connecting the electric fuze. The bomb rack is interchangeable with the centerline or the inboard and outboard pylons.

**BRU-33(Series) Vertical Ejector Rack Assembly**

The BRU-33/A VER assembly (*Figure 10-6*) and BRU-33A/A CVER (*Figure 10-7*) are suspended by the BRU-32(series) bomb ejector rack. The BRU-33(series) vertical ejector rack assemblies use 14-inch suspension hooks to carry two 10- to 16-inch diameter external stores weighing up to 1,000 pounds each. The VER/CVER feature a special safety interlock and self-adjusting wedges. The aircraft electrically controls the safety interlock, which mechanically prevents accidental opening of the suspension hooks.

**Figure 10-6 — BRU-33/A bomb ejector rack.**

**Figure 10-7 — BRU-33A/A bomb ejector rack.**
Sensing switches are incorporated to indicate to the store management system (SMS) that a store is loaded. The rack has provisions for mechanical and electric fuzing. The ejection unit uses two cartridges to generate the required gas pressure for rack operations.

**BRU-55(Series) Aircraft Bomb Ejector Rack**

The BRU-55(series) bomb ejector racks (*Figure 10-8*) allow for carriage of two smart weapons (up to 1,000-pound class) on a single aircraft station. Currently the BRU-55(series) ejector racks suspend the Joint Stand-off Weapon (JSOW), and 1,000-pound Joint Direct Attack Munition (JDAM).

*Figure 10-8 — BRU-55(series) aircraft bomb ejector rack.*

The BRU-55(series) uses the Department of Defense Interface Standard, (MIL-STD)-1760 interface. The BRU-55(series)—70 inches long, 29 inches wide, and weighing between 228 and 236 pounds—is currently used on the F/A-18(variants) aircraft. Its aircraft interface is 30-inch lugs and a single Department of Defense Interface Standard, MIL-STD-1760 umbilical, and its weapons interface is 14-inch lugs and one Department of Defense Interface Standard, MIL-STD-1760 umbilical each. It is also equipped with two weapon umbilical retaining brackets to prevent damage to the weapon umbilical upon release.

**BRU-75/A and BRU-76/A Bomb Rack Unit**

The BRU-75/A bomb rack (*Figure 10-9*) suspends weapons and stores using 14-inch suspension hooks and the BRU-76/A bomb rack (*Figure 10-10*) uses 14- and 30-inch suspension hooks. Each BRU has electrical and pneumatic connections, a pneumatic release assembly, safety interlock, and automatic sway bracing. They are electrically controlled by the SMS and pneumatically operated by compressed air.
**BRU-41/A Improved Multiple Ejector Rack and BRU-42/A Improved Triple Ejector Rack**

The BRU-41/A IMER (*Figure 10-11*) and the BRU-42/A ITER (*Figure 10-12*) function in basically the same manner. There are four major subassemblies—the structural adapter assembly, the electronic control unit, the cable assembly, and the ejector unit. The electronic control unit and the ejector unit are the same for both the BRU-41/A and the BRU-42/A.

**Adapter Assembly**

The adapter assembly is a hollow, hexagonal aluminum extrusion that forms the main support for the rack assembly hardware. Attaching points on the adapter assembly provide 14 or 30 inch spacing of the suspension lugs, which allows installation on the various types of aircraft.

The adapter assembly houses the electronic control unit and cable assembly and provides for attachment of three or six individual ejector units. A nose-cone assembly and a tail-cone assembly enclose the ends of the adapter assembly for aerodynamic purposes.
Electronic Control Unit
The electronic control unit is a disposable solid-state electronic control unit in a sealed container. It controls all the functions of the bomb rack and has the capability of releasing stores at 35 millisecond intervals. If it malfunctions, replace it with a new one.

Cable Assembly
The cable assemblies are modular wiring systems utilizing electromagnetic interface (EMI) resistant filter line wiring. The cable assemblies interface the aircraft with a quick-release connector and provide routing of electrical power to the ejector unit assemblies for store sensing, arming, and breech assembly firing. For rocket stores, the cable assemblies route electrical power to the rocket harness assemblies to provide firing impulses to the stores. Three rocket adapter harness assemblies electrically couple rocket stores to the BRU-41/A IMER or BRU-42/A ITER.

Ejector Unit Assembly
The ejector unit assemblies used on the BRU-41/A IMER and the BRU-42/A ITER are identical. The only difference between them is the internal configuration of the release linkage. The ejector units are configured for right-hand shoulder, left-hand shoulder, or centerline installation (Figure 10-13).
The shoulder stations are attached to the adapter assembly by ejector unit attach blocks. The centerline stations are attached by ejector unit attach hangars.

The BRU-41/A IMER and BRU-42/A ITER ejector units (Figure 10-14) consist of a housing assembly equipped with integral wiring, a breech and ejector mechanism, store suspension hooks, a store sensing switch, electro-mechanical arming units, adjustable sway braces, and mechanical linkage driven by the breech or manual release lever to open the suspension hooks.
The suspension hooks are spaced 14 inches apart and are independently self-latching. A manual release lever is used to open the hooks during ground operation. The safety stop lever safes the ejector unit mechanically. *Figure 10-15* shows the locked and unlocked positions of the ejector unit safety stop lever.

When the safety lever is in the LOCKED position, the hook release rod is physically blocked from rearward movement and prevents suspension hook release. If the hook release rod is not in the full forward position, the safety stop lever cannot be rotated to the LOCKED position. A store-sensing switch is located under the forward suspension hook, and is actuated by the opening and closing of the hook.

![Figure 10-15 — Ejector unit safety stop lever.](image)

**IMER/ITER Operational Description**

The functional description of the BRU-41/A IMER and BRU-42/A ITER ejector rack has two categories—ejector unit mechanical operation and electrical operation.

**Ejector Unit Mechanical Operation**

All ejector units on the BRU-41/A IMER and BRU-42/A ITER are operationally the same. An electrically initiated gas-generating cartridge actuates the ejection mechanism. *Figure 10-16* shows the mechanical operation of the ejector unit.

When a store is loaded onto the ejector unit, the store suspension lugs force the suspension hooks to the closed position. The suspension hooks are locked in the closed position by the over center position of the hook toggle levers. The link stops, located over each of the hook toggle levers, prevent the suspension hooks from opening until the cartridge is fired or the manual release lever is pulled, even if the safety stop lever is in the unlocked position (*Figure 10-16*).

When the gas-generating cartridge is fired, the resulting gas pressure moves the breech aft. The aft movement of the breech also moves the hook release rod aft, lifting the toggle hook levers from the over center position, which forces the cranks are down and unlocks the suspension hooks (*Figure 10-16*).
Figure 10-16 — Ejector unit operation.
Gas pressure from the cartridge acting against the gun piston, plus the weight of the store, forces the unlocked suspension hooks to open, releasing the store. The hook toggle spring and helical spring hold the hooks in the open position. The gun piston continues to act against the store to provide positive separation from the ejector unit (Figure 10-16).

**BRU-41/A IMER and BRU-42/A ITER Electrical Operation**

Before discussing the electrical operation of the BRU-41/A IMER and BRU-42/A ITER, it is important to understand the function of several electrical components. The following paragraphs briefly discuss these components.

BRU-41/A IMER and BRU-42/A ITER ejector units are numbered according to their firing sequence (Figure 10-17). For the purpose of discussion, assume a BRU-41/A IMER has stores loaded on stations 1, 2, 4, and 6, and that the release mode selector is set for single release.

![Figure 10-17 — IMER/ITER firing sequence.](image)

When the pilot depresses the cockpit bomb button, a firing pulse is routed from the aircraft through the rack safety switch and the release mode selector switch to energize the necessary rack circuits. With a weapon loaded on station 1, the forward suspension hook is in the closed position, automatically closing the stores sensing switch. The firing voltage is then routed to the firing circuit, firing the cartridge and ejecting the weapon. Ejection of the stores from all remaining loaded stations will occur in sequence each time the pilot presses and releases the bomb button. In this particular load, stations 3 and 5 were not loaded; therefore, the forward hooks should be left open. If they are closed, the stores sensing switch signals the rack that a weapon is loaded on that station and will not automatically step to the next station.

**Hardware Adapter Kits**

Hardware adapter kits can adapt the BRU-41/A IMER and BRU-42/A ITER to various aircraft. The kits include electrical harness assemblies, suspension lugs, sway brace pads and extensions, and the attaching hardware required to configure the racks for a desired pylon station on a particular aircraft. Additionally, practice bomb adapters can adapt the BRU-41/A IMER and BRU-42/A ITER for the attachment of practice bombs or externally carried illumination unit (LUU)-2B/B aircraft parachute flares and Mk 58 marine location markers. The adapter (Figure 10-18) has two separate components—a bracket assembly, and a restrictor.

The hardware for practice bomb adapters is organizational-level equipment, to be maintained in the custody of the organizational unit.
Consult the Organizational, Intermediate, and Depot Level Maintenance Improve Multiple Ejector Rack (IMER) and Improved Triple Ejector Rack (ITER), NAVAIR 11-75A-603 for specific information concerning the IMER and ITER.

![Diagram of Practice bomb adapter kit](image)

**Figure 10-18 — Practice bomb adapter kit.**

**DISPENSERS AND EJECTORS**

Dispensers and ejectors provide additional offensive and defensive capabilities to the aircraft during tactical situations. These units are usually detachable. The dispenser or ejector is suspended from other installed suspension equipment or mounted directly to the aircraft. They suspend and release ordnance items, such as aircraft parachute flares and sonobuoys. The following section will cover basic characteristics of the dispensers and ejectors currently in use.

**SUU-25F/A Dispenser**

The SUU-25F/A dispenser (Figure 10-19) is an airborne, externally mounted, reusable four-tube, rearward ejecting-launching device. The dispenser may be loaded on any aircraft weapons station that has a 14-inch suspension and is authorized to carry the SUU-25F/A dispenser.

The SUU-25F/A has a cylindrical, all-metal body consisting of four aluminum tubes that can hold up to eight LUU-2B/B aircraft parachute flares. The tubes are 5 inches in diameter, clustered together inside an outer skin. There is an aluminum die-cast bulkhead at each end. When empty, the dispenser weighs 260 pounds. When fully loaded with eight LUU-2B/B flares and eight impulse cartridges, it weighs 490 pounds.
Figure 10-19 shows the shipping and flight configuration of the dispenser. The shipping configuration (Figure 10-19, view A) has shock pan assemblies at either end of the dispenser for easier handling during shipment and storage. A lock wire is attached to the two suspension lugs to prevent them from becoming lost during shipment or storage. Remove the lock wire and shock pan assemblies before using the dispenser. When the dispenser is configured for flight (Figure 10-19, view B), a phenolic or metal cover (nose cone) is mounted on the forward flange. Covers are not shipped with the dispenser; they are ordered as separate components.

Figure 10-19 — SUU-25F/A dispenser.

In the following section on the SUU-25F/A dispenser, Figure 10-20 contains information regarding the location and identification of the components.

The breech, breech cap, breech lead, downloading breech, downloading breech cap, manifold, and the stepper switch are located on the forward bulkhead.
Manifold
The manifold has eight manifold breech lead receptacles for connection of the breech leads and two test socket assemblies that are used during dispenser electrical test procedures.

Breech, Breech Cap, and Breech Lead
The dispenser has two breeches, two breech caps, and two breech leads for each tube. The breech is screwed into the bulkhead so an impulse cartridge can be installed. The breech cap, containing the firing pin, screws onto the breech. The breech lead connects to the breech cap and provides a path for the 28 volt direct current (dc) required to fire the impulse cartridge.

Downloading Breech and Downloading Breech Cap
The dispenser has one downloading breech and one downloading breech cap for each tube. The downloading breech mounts to the bulkhead. The downloading breech cap screws onto the downloading breech. With the cap removed, the downloading breech allows insertion of the loading, unloading, and cleaning push rod tool for easy store removal during downloading procedures. The downloading breech also prevents air pressure buildup in the tubes when loading stores. Reinstall the downloading breech caps after completing the loading or unloading procedures.

Stepper Switch
The stepper switch provides sequential firing of the impulse cartridges. The switch has ten functional settings—one safe setting, one arm setting, and eight firing steps. Always place the stepper switch in
the SAFE position during dispenser loading and unloading. Move the switch to the ARM position during aircraft arming procedures just before flight.

**Forward and Aft Retaining Lock**

Each of the four dispenser tubes contains a forward retaining lock, an aft retaining lock, and an arming mechanism.

The forward and aft retaining locks, when in the locked position, protrude into the dispenser tube. The retaining locks prevent loaded stores from being inadvertently ejected by the forces during aircraft catapult launches.

The forward retaining lock is located near the midpoint of the dispenser, between the dispenser outer skin and the tube. The retainer lock can be moved from either the locked or unlocked position through an access door located on either side of the dispenser. Rotate the retaining lock to the unlocked position before loading a store. The unlocked position pivots the retainer lock out of the tube. After loading the store, rotate the retaining lock to the locked position, and secure it by installing a shear pin. The forward retaining lock retains the forward-loaded store only.

The aft retaining lock is attached to the aft bulkhead and retains the aft loaded store. Secure the aft retaining lock in the locked position by installing a shear pin.

**Arming Mechanism**

The arming mechanism is located in the aft end of the dispenser tube (*Figure 10-21*). The arming mechanism initiates the arming sequence of a store as it is ejected from the tube.

The dispenser is suspended by two screw-type lugs spaced 14 inches apart. The area around the suspension lugs has a hardback reinforcement to permit sway bracing and forced ejection of the dispenser. Two electrical receptacles, J1 and J2, are located forward and aft of the suspension lugs, respectively. Both receptacles provide a way to electrically connect the dispenser to the aircraft weapons control system. Only one receptacle is used at a time. The electrical configuration of the rack determines which receptacle to use.

An electrical wiring harness is routed internally from electrical connectors J1 and J2 to the stepper switch. A safety switch that is normally in the closed position interrupts the wiring harness. When the safety pin and flag assembly are inserted, they hold the safety switch in the open position and ground the electrical circuits, making the dispenser electrically safe.

**Functional Description**

When a dispenser tube is loaded with munitions, each pair of flares is configured with an ADU-381/A flare adapter kit.

Press a yellow-colored sealing ring on each end of the munition as a seal between the munitions and the tube body to prevent the gas pressure from escaping during ejection. Install a green-colored arming cap on the timer end of a flare or on the rotochute end of a sonobuoy; connect the green arming cap lanyard to the timer knob of the flare, and then press it on over the flange of the sealing ring. Mount a white cross-shaped plastic spacer on the aft sealing ring of the forward munitions. The spacer provides enough space between the forward and aft munitions to provide an expansion chamber for ejecting the aft munitions. After installing the adapter, install the munitions in the dispenser tube.
When a SUU-25F/A dispenser is fully loaded and uploaded on the aircraft, the pilot may eject flares. The pilot must first select the weapons control system and then trigger the dispensing switch. A 28-volt dc electrical signal passes through an electrical cable from the aircraft to either receptacle J1 or J2 of the dispenser. The signal is routed from the dispenser receptacle to the stepper switch, causing the stepper switch to step from the preset ARM position to the number 1 position, firing the number 1 impulse cartridge. The gas pressure generated by the fired cartridge is ported through a gas tube, internally along the side of the dispenser, into the aft expansion chamber ahead of the aft flare.

As the gas pressure increases, it cuts the aft retaining lock shear pin, allowing the aft flare to eject. As the timer end of the flare approaches the rear of the tube, the arming finger of the arming mechanism engages the yellow sealing ring. The sealing ring cams the arming finger down, which, in turn, cams the arming hook up to engage the green arming cap, permitting the flare to extend the lanyard. The lanyard extracts the timer knob and arms or starts the flare functioning sequence.

When the pilot triggers the system again, the stepper switch steps to the number 2 position and fires the number 2 impulse cartridge. The gas pressure is directed into the forward expansion chamber. As the gas pressure increases, it cuts the forward retaining lock shear pin, permitting the forward flare to be dispensed in the same manner as the aft flare. If the aft flare failed to eject, the gas pressure generated for ejecting the forward flare produces sufficient gas pressure to purge both flares out of the tube.

The procedure for the remaining three tubes is the same. The firing sequence of the breeches is stamped into the metal of the breech caps as shown in Figure 10-22.
Maintenance Requirements

Organizational-level maintenance is limited to a visual inspection of the dispenser. Examine the dispenser for damage, such as cracks or breaks in the aft retaining locks or suspension lugs, unburned pellets or obstructers in the breech sleeve, and frayed or broken breech leads.

For further information concerning the SUU-25F/A dispenser, see Maintenance Instructions with Illustrated Parts Breakdown Organizational and Intermediate Level Dispenser SUU-25F/A, NAVAIR 11-75AA-48.

AN/ALE-39 Countermeasures Dispensing System

The AN/ALE-39 CMDS dispenses decoys to confuse and jam enemy electronic tracking, missile guidance, and homing systems. The system ejects expendable payloads consisting of chaff, flares, or radiofrequency (RF) jammers singly or in groups from two 30-round dispenser magazines.

Decoy flares are used during evasive maneuvers against heat-seeking missiles. Chaff rounds consist of fine-shredded metal strips contained in a cylindrical metal container. When ejected from the chaff dispenser, the metal strips are forced from the cylindrical container and dispersed into the atmosphere. The chaff in the atmosphere jams ground controlled radar installations or radar-controlled missiles.

The countermeasure dispensing system includes two dispenser assemblies, each of which consists of a dispenser system block and printed wiring board (PWB), two dispenser housings, an electronic countermeasure (ECM) control panel, an AN/ALE-39 programmer, and chaff/flare ECM dispense switches.

Magazine Block and Printed Wiring Board

The dispensing system block and a PWB (Figure 10-23), has 30 holes for loading payload units.

**NOTE**

Installation of the impulse cartridges must be accomplished in a designated RF-free area.

The PWB contains the circuitry and socket holes for installing 30 electrically-initiated impulse cartridges.
Load the dispenser by putting the 30 payload units into the block (Figure 10-24).
Install an impulse cartridge in each of the 30 socket holes on the PWB (Figure 10-25). Then, attach the board to the block by two captive screws.

Finally, install the loaded dispenser magazine assembly in the dispenser housing (Figure 10-26), securing it with the four positive-lock studs of the dispenser block.

The gas pressure generated when the impulse cartridges are fired forces the payload units from their plastic or aluminum sleeves. Use the chaff sleeve extractor (Figure 10-27) during dispenser download procedures.

**Dispenser Assembly**

Remove the dispenser assembly from the housing assembly by unlocking the four positive-lock studs. Move the dispenser assembly to a designated area and load it. Then, return it to the aircraft and reinstall it in the dispenser housing. Safety switches, installed in the aircraft near the dispenser housings, make the dispenser's assemblies electrically safe when the safety pin or flag assemblies are installed. When the dispensers are loaded, the safety pin or flag assemblies must remain installed until just before flight.

**WARNING**

Do not hammer or force a flare into or out of a flare dispenser tube. Hand pressure is adequate for seating or removing flares.

Figure 10-25 — Impulse cartridge installation.

Figure 10-26 — Dispenser magazine loading.
The rear of the housing assembly has a dispenser interconnect that electrically connects the dispenser assembly to the system. When installing the dispenser assembly into the housing assembly, use a guide pin to ensure proper alignment of the electrical connectors.

**AN/ALE-47 Countermeasures Dispenser System**

The AN/ALE-47 CMDS provides an integrated, reprogrammable, computer-controlled system for dispensing expendables/decoys such as chaff, flares, RF expendables, and others. The system enhances aircraft survivability in sophisticated threat environments and is designed to employ electronic and infrared countermeasures according to a program the aircrew develops and implements.

The AN/ALE-47 CMDS provides the aircrew with a smart CMDS, allowing the aircrew to optimize the countermeasures employed against anti-aircraft threats.

The AN/ALE-47 contains an MX-12023/ALE-47(V) block (*Figure 10-28*) and a breechplate (*Figure 10-29*).

During magazine assembly, remove the breechplate from the block by loosening the four captive screws (*Figure 10-29*) that secure the breechplate to the block. Place the block on its side in preparation to receive expendables. After verifying inspection of the expendables, insert them into the block from the breechplate side in accordance with (IAW) the applicable ALE-47 (V) mission data file (MDF) magazine identification (ID) loadout configuration. Consult the appropriate technical manual for loadout configuration data.

Prior to using the breechplate, inspect it for cleanliness or fired impulse cartridge residue—particularly around impulse cartridge contacts. Before installing the impulse cartridge, clean all surfaces of the breechplates. If needed, clean the breechplate surface IAW procedures outlined in Organizational and Intermediate Maintenance Instructions with Illustrated Parts Breakdown Countermeasures Dispensing Set AN/ALE-47(V), NAVAIR 16-30ALE-47-1.

It is important to verify that breechplate magazine ID switch settings of S1 and S2 are correctly set for the selected MDF loadout configuration (*Figure 10-30*).

Next, install impulse cartridges onto the breechplate. Use appropriate assembly manuals for dispenser/component compatibility and to identify which impulse cartridge types to use with loaded expendables.
Figure 10-28 — ALE-47 block.

Figure 10-29 — ALE-47 dispenser block assembly.
Use the following procedures to install the impulse cartridges:

1. Insert the impulse cartridge into the impulse cartridge alignment tool located on the breechplate (Figure 10-30). Reject the impulse cartridge if the base does not seat firmly on the breechplate.

2. Remove the impulse cartridge from the impulse cartridge alignment tool.

3. Insert the impulse cartridge into the appropriate breechplate firing location, remembering that the corresponding positions between magazine dispenser block and impulse cartridge side of breechplate are reversed (mirror image).

4. Repeat these steps until the breechplate is completely loaded.

Then install the breechplate on the dispenser block. With the loaded block on its side, bring the breechplate with impulse cartridges installed up to mate with the block and then secure the breechplate to the block using the four captive screws. The breechplate rotation method has the advantage of not losing the impulse cartridge from the breechplate and also directs the expendable away from the technician where an inadvertent ignition will produce a less hazardous situation.

The screws securing the breechplate to the block do not ensure a gas tight seal between the block, expendable, and the breechplate. These screws simply secure the breechplate to the block until the magazine is loaded into the dispenser. Tighten the four screws securing the breechplate to the block using a torque wrench IAW applicable weapons assembly manual without overtightening. These screws are for alignment of the breechplate to the block only and are not designed as structural attachments. Finally, load the AN/ALE-47 magazine into the dispenser. Consult platform-specific loading manuals for loading instructions.

SAFETY PRECAUTIONS

For an aviation ordnanceman (AO), safety is very important when working with suspension, arming, and releasing systems. It is doubtful there is a second class petty officer in the Navy who has not witnessed a minor mishap with suspension, arming, and releasing equipment. Accidents can be prevented if personnel are trained, educated to work on the equipment, and follow the safety precautions and maintenance instructions. As an AO, you must follow safety precautions and
maintenance instructions and train new personnel. A few safety precautions that technicians and subordinates need to follow are listed below:

- Keep all components of all systems clean, well adjusted, and lubricated as prescribed
- Perform operational checks or periodic inspections of the system under the direct supervision of fully qualified personnel
- Never insert your fingers or tools into a rack when the rack is cocked
- Check wiring and electrical fittings regularly; replace frayed or broken wiring; check plugs for condition and proper installation
- Never bypass safety circuits or devices or make them inoperative; do not use any safety pin other than the one prescribed
- When stores are loaded, install safety pins or other safety devices as prescribed while the aircraft is on the ground
- Never install or arm an ejector rack unless the safety pin(s) and flag(s) are in place
- Do not perform resistance checks of an electrically-primed cartridge
- Remove or electrically disconnect all cartridges from the rack firing circuits before removing any component
- Install only the prescribed cartridges in ejector devices
- Inspect all ordnance handling equipment prior to, during, and after use
- Do not use excessive force when seating or latching the weapon’s lugs in the suspension hooks
- When loading stores, make sure that the store is in position and the rack is securely locked before removing hoists
- Do not place any part of your body under stores being loaded or unloaded if it is possible to accomplish the job without doing so
- When installing suspension equipment, torque all installation bolts or screws to the prescribed torque value
- Make sure quality assurance personnel are familiar with the system; inspect all final work performed on the armament system; ensure operational tests are made on repaired systems where necessary
- Because empty expendable countermeasure dispenser blocks are subject to cracking when dropped on corners, avoid rough handling, and under no circumstances hammer or force a payload into the block
- Handle impulse cartridges according to the Electromagnetic Radiation Hazards (Hazards to Ordnance), Commander, Naval Sea Systems Command (NAVSEA) Ordnance Publication (OP) 3565/NAVAIR 16-1-529 manual
- Carefully examine expendables, impulse cartridges, and retainers for possible damage before installation, and discard wet or cracked expendables, or expendables with damaged sleeves; discard impulse cartridges with bent, deformed, or out-of-tolerance pins per applicable airborne weapon assembly manual
- In the event that a decoy flare has visible damage or the device’s pyrotechnic load is visible, segregate the flares from other decoy devices and notify explosive ordnance disposal (EOD)
for proper disposition; ensure decoy devices that have been dropped or roughly handled are disposed of by EOD personnel.

- Examine flares remaining in the magazine upon completion of a flight prior to downloading; if the pyrotechnic load is visible, inspect the magazine and make sure it is disassembled by EOD personnel.
Review Questions

10-1. Bomb racks are used for which of the following purposes?

A. To carry stores only
B. To release stores only
C. To arm stores only
D. To carry, release, and arm stores

10-2. What term defines the abbreviation LEMA?

A. Line Electronic-Magnetic Actors
B. Line Electronic-Magnetic Accelerator
C. Linear Electro-Mechanical Actuator
D. Linear Electro-Mechanical Ascending

10-3. What source provides the power required to operate the secondary release assembly of a bomb release unit (BRU)-14/A bomb rack?

A. Cartridge-actuated device
B. Direct current generator
C. Electromechanical device
D. Manual-release cable

10-4. Which of the following bomb racks are installed in the weapon pylon of the H-60 aircraft?

A. BRU-12/A
B. BRU-14/A
C. BRU-32A/A
D. BRU-55/A

10-5. Which of the following types of aircraft has a bomb release unit (BRU)-32A/A bomb ejector rack installed?

A. F-16
B. F/A-18
C. H-60
D. P-3

10-6. A bomb release unit (BRU)-33/A bomb ejector rack is used to carry two external stores each weighing up to what maximum weight, in pounds?

A. 1,000
B. 2,000
C. 3,000
D. 4,000
10-7. A bomb release unit (BRU)-33(series) bomb ejector rack requires what number of impulse cartridges to generate the required gas pressure for rack operations?

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

10-8. The bomb release unit (BRU)-55 bomb ejector rack provides the interface from the aircraft for carriage of which of the following weapons?

A. Two AIM-7 or two AIM-120  
B. Two Harpoon or two SLAM-ER  
C. Two JSOW or two 1,000 pound JDAM  
D. Two 2,000-pound class weapon

10-9. When the gas-generating cartridge is fired in an improved multiple ejector rack or improved triple ejector rack ejector unit assembly, which of the following movements is part of the unlocking process of the suspension hooks?

A. The aft movement of the breech  
B. The downward movement of the suspension hooks  
C. The forward movement of the hook release rod  
D. The upward movement of the cranks

10-10. Which set of components holds the suspension hooks of the improved multiple ejector rack or improved triple ejector rack in the open position?

A. The coil spring and helical spring  
B. The hook toggle lever and safety pin  
C. The hook toggle spring and safety pin  
D. The hook toggle spring and the helical spring

10-11. What maintenance level is responsible for maintaining both the hardware adapter kit and the practice bomb adapters used with an improved multiple ejector rack or improved triple ejector rack?

A. Organizational  
B. Intermediate  
C. Depot  
D. Overhaul

10-12. What maximum weight, in pounds, is the suspension under wing unit (SUU)-25F/A dispenser when it is loaded with eight aircraft parachute flares?

A. 260  
B. 435  
C. 490  
D. 572
10-13. What maximum number of impulse cartridges are installed in a fully loaded suspension under wing unit (SUU)-25F/A dispenser?

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

10-14. Which of the following load configurations are ejected from the Army/Navy air-launched expendable (AN/ALE)-39 dispensing system?

A. Chaff
B. Fire bombs
C. Radiofrequency enhancers
D. 1.25 inch rockets

10-15. The Army/Navy air-launched expendable (AN/ALE)-47 countermeasures dispenser system provides an integrated, reprogrammable, computer-controlled system for dispensing what items?

A. Bombs, fuzes, and bullets
B. Chaff, flares, and radiofrequency expendables
C. Flares, bullets, and rockets
D. Radiofrequency expendables, fuzes, and rockets

10-16. What manual should be referenced when handling impulse cartridges?

A. NAVAIR 11-140-25
B. NAVSEA OP 2173/NAVAIR 19-100-1
C. NAVSEA OP 3565/NAVAIR 16-1-529
D. SW030-AA-MMO-010

10-17. Which of the following personnel must be notified in the event a decoy flare has visible damage or the device’s pyrotechnic load is visible?

A. Chief of Naval Operations
B. Commander, Naval Air systems Command
C. Commander, Naval Sea Systems Command
D. Explosive Ordnance Disposal
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