

Bombs, Guns and Missiles (and CPP Investments)

All 115 of the weapons listed below are aboard the major delivery systems with components and/or services provided by Canadian companies that are highlighted on pages 11 to 30 of this issue of *Press for Conversion!* Not all of the prime contractors of these weapons could be determined. Nine were found to be produced directly by the U.S. government. Of the 73 weapons listed here – whose nongovernment, prime contractors could be determined, 59 were built by prime contractors in which the Canada Pension Plan has investments, i.e., 81%.

AGM = Air to Ground Missile
AIM = Air Intercept Missile
BGM = Ballistic Guided Missile
BLU = Bomb Live Unit
CBU = Cluster Bomb Unit
GBU = Guided Bomb Unit
GPS = Global Positioning System
MW = Multipurpose Weapon

Delivery Systems: B-1, B-2, B-52
Contractor: Boeing (formerly McDonnell Douglas)

AGM-88A "HARM" CPP Investment ✓

This high-speed antiradiation missile (HARM) is a more advanced version of the AGM-45 "Shrike." It finds and destroys enemy radar-equipped, air defense systems and uses a 143.5 lb

Direct Fragmentation warhead.

Delivery Systems: EA-6, F-14, F-15, F-16, F-117, Tornado
Contractor: Raytheon [Texas Instruments]

AGM-89 "SRAM" CPP Investment ✓

This 2240-lb. Short Range Attack Missile (SRAM) has a 170 kiloton W69 warhead and uses an inertial guidance system. Its maximum range is about 115 miles.

Delivery System: B-1

Contractor: Lockheed

AGM-114 "Hellfire" CPP Investment ✓

The "Hellfire" Missile System, with its 8 km range can provide "heavy anti-armor capability."

Delivery Systems: AH-64, OH-58, RQ-1, UH-60

Contractor: Rockwell International Corp.

AGM-122 "Sidarm" CPP Investment ✓

The "Sidarm" is a small Anti-Radiation Missile for self defense against anti aircraft gun and SAM radars.

Delivery System: AH-64

Contractor: Motorola

AGM-129 CPP Investment ✓ "Advanced Cruise Missile" (ACM)

The 2760-lb ACM has a maximum range of 1800 nautical miles and a dramatically reduced radar signature. It carries a 5 to 150 kiloton W80 nuclear warhead. (Prime Minister Trudeau allowed its testing in Canada, 1983-1994.)

Delivery Systems: B-1, B-2

Contractor: General Dynamics

AGM-131 "SRAM" CPP Investment ✓

This Short-Range Attack Missile (SRAM) carries a W-91 thermonuclear warhead (10 kiloton or 100 kiloton).

Delivery System: B-2

Contractor: Boeing

AGM-130 CPP Investment ✓

This air-to-ground, guided missile carrying a 2,000-lb general purpose warhead is a powered version of the GBU-15.

Delivery System: F-15

Contractor: Rockwell International Corp.

AGM-137 CPP Investment ✓ "Conventional Cruise Missile"

This long-range, self-guided, conventional cruise uses a GPS-aided, inertial navigation system. One version carries Combined Effects Bomblet submunitions (i.e., cluster bombs) to attack land targets.

AGM-45 "Shrike" CPP Investment ✓

The "Shrike" guided missile finds and destroys radar transmitters that are directing missiles at warplanes. It uses a 145-lb conventional high-explosive/fragmentation warhead.

Delivery System: F/A-18

Contractor: Texas Instruments and Sperry Rand/Univac

AGM-62 "Walleye"

The "Walleye" is an air-to-surface TV-guided glide bomb used against fuel tanks, tunnels, bridges, radar sites, port facilities and ammunition depots.

Delivery System: F/A-18

Contractor: Naval Weapons Center, China Lake (U.S. gov't)

AGM-65 "Maverick" CPP Investment ✓

The "Maverick" guided missile destroys armour, air defences, ships, transport equipment and fuel storage facilities. The AGM-65E version (F/A-18) is used against fortified ground installations, armoured vehicles and soldiers.

AGM-65 Delivery Systems: A-10, F-14, F-15, F-16, F/A-18, Tornado

Contractor: Hughes Aircraft (now General Motors) and Raytheon Co.

AGM-69 "SRAM" CPP Investment ✓

This 14-foot, 2,230-lb., rocket-propelled Short Range Attack Missile (SRAM) carries a 170 kiloton W69 nuclear warhead and has a range of 20 to 50 nautical miles.

Delivery System: B-1, B-2

Contractor: Boeing

AGM-84 "SLAM" CPP Investment ✓

This Stand-Off Land Attack Missile (SLAM), nick-named "Harpoon" with a 150 mile range is used to attack ships and carries a 488-lb., high-explosive warhead.

Delivery Systems: B-52, F-14, F/A-18, P-3

Contractor: Boeing (formerly McDonnell Douglas)

AGM-86 CPP Investment ✓ "Air Launched Cruise Missile" (ALCM)

Two versions of the 20' 9" ALCM: (1) with a W80-1 nuclear warhead (200 kilotons), and (2) with a 3000-lb high explosive warhead. The maximum range is 1500 nautical miles. Most AGM-86s now have conventional warheads. (PM Trudeau allowed its testing in Canada, 1983-1994.)

Delivery System: B-2

Contractor: Northrop Grumman

AGM-142 "Have Nap" CPP Investment ✓

This 3000-lb missile, with a range of 50 nautical miles, is an Israeli-built "Popeye" missile acquired by the US.

Delivery System: B-52

Contractors: Lockheed Martin and Rafael

AGM-154 "JSOW" CPP Investment ✓

This GPS-guided "Joint Standoff Weapon" can glide 40 miles and carry: (a) a single warhead, (b) 145 BLU-97/B anti-armor cluster bomblets, a fragmenting case and zirconium for spreading fire, or (c) 6 BLU-108/B submunitions that each release 4 anti-armor projectiles.

Delivery Systems: B-1, B-2, B-52, F/A-18

Contractor: Raytheon Co.

AGM-158 "JASSM" CPP Investment ✓

The Joint Air to Surface Standoff Missile (JASSM) is a cruise missile that uses a GPS-aided, inertial navigation system to fly a low-altitude, circuitous route to its target.

Delivery Systems: B-1, B-2, B-52, F-15, F-16, FA-18, P-3, S-3

Contractor: Raytheon

AIM-7 "Sparrow" CPP Investment ✓

The "Sparrow" is a radar-guided, air-to-air missile with a high-explosive warhead.

Delivery Systems: F-14, F-15, F-16, F/A-18

Contractor: Raytheon

AIM-9 "Sidewinder" CPP Investments ✓

The "Sidewinder" is a high-explosive, supersonic, heat-seeking air-to-air missile with a 10 to 18 mile range.

Delivery Systems: A-10, AH-64, AV-8, F-14, F-15, F-16, F/A-18, F-117, OH-58, P-3, Tornado

Contractor: Lockheed Martin and Raytheon

AIM-54 "Phoenix" CPP Investments ✓

The "Phoenix" missile is a long-range, radar-guided missile used to kill multiple air targets with conventional warheads. Propulsion is provided by a solid propellant rocket motor, and lethality by a high explosive warhead.

Delivery System: F-14

Contractor: Hughes Aircraft (now General Motors) and Raytheon

AIM-92 "Stinger" CPP Investments ✓

Although the guided "Stinger" missile is often shouldered-fired to shoot down aircraft, it can also be launched from land vehicles and helicopters. It uses a "fire-and-forget" infrared guidance system and uses high explosive warheads.

Delivery Systems: AH-64, OH-58, UH-60

Contractors: Hughes Missile System, General Dynamics and Raytheon

AIM-120 "Slammer" CPP Investments ✓

This medium-range, guided, air-to-air missile, nick-named "Slammer," uses active radar target tracking, proportional navigation guidance and active Radio Frequency target detection. It employs inertial guidance navigational methods and attacks single or multiple targets.

Delivery Systems: F-14, F-15, F-16, F/A-18

Contractor: Hughes Aircraft (now GM) and Raytheon

AIM-132

CPP Investments ✓

This advanced, short-range air-to-air missile carries a 10-kg. blast/fragmentation warhead and is most effective against targets within a 5 to 50 kilometre range.

Delivery System: Tornado

Contractor: Matra British Aerospace, Raytheon-Hughes

"ALARM"

CPP Investments ✓

The Air-Launched Anti-Radar Missile (ALARM) protects bombers and attack warplanes by destroying ground-based air defence radars and surface-to-air missile radars.

Delivery System: Tornado

Contractors: British Aerospace (BAe) and Marconi

"Apache"

CPP Investments ✓

This 1,230-kg stealth missile is similar to the AGM-86 Tomahawk cruise missile.

Delivery System: Tornado

Contractors: Matra BAe Dynamics, a subsidiary of the Lagardère (France) and British Aerospace (BAe) (UK)

AS-30L

This 520-kg laser-guided, high-explosive, semi-armor piercing missile carries a 240-kg warhead up to 10 km.

Delivery System: Tornado

Contractor: Aerospatiale

AS-34 "Kormoran"

The "Kormoran" guided missile has a 23-mile range and carries a 352-lb. warhead that can penetrate up to 90mm of steel plate before detonating.

Delivery System: Tornado

Contractor: Messerschmitt-Bölkow-Blohm

B53

This gravity bomb is oldest nuclear warhead in the US arsenal and, according to the U.S. Department of Defense, "does not meet modern safety design criteria."

Delivery System: B-52

B57

This nuclear bomb was used for antisubmarine warfare and land warfare until its retirement in 1993.

Delivery System: P-3

B61

CPP Investments ✓

This strategic and tactical thermonuclear bomb is a two-stage radiation implosion weapon with variable yield options, or "dial-a-yield" (DAY).

Delivery Systems: B-1, B-2, B-52, Tornado

Contractor: General Electric (neutron generators)

B83

This free-fall, earth-penetrating nuclear bomb is for use against deeply-buried, hardened targets like bunkers.

Delivery Systems: B-1, B-2, B-52

"Beluga"

This weapon scatters cluster bomb units (CBUs).

Delivery System: Tornado

BGM-109

CPP Investments ✓

"Tomahawk Cruise Missile"

The "Tomahawk" is a sea-launched, land-attack cruise missile. It has inertial and terrain contour matching radar guid-

ance systems that determine the missile's position by comparing stored map references with the actual terrain.

Delivery System: DDG-51

Contractor: Hughes Missile Systems (now General Motors)

BL-755

This 600-lb cluster bomb releases 147 bomblets which each disintegrate to disperse 2000 fragments of shrapnel over a wide area, with resultant damage to personnel and soft-skinned vehicles.

Delivery System: Tornado

Contractor: Hunting Engineering (now Insys)

BLU-1B

This 750-lb incendiary bomb uses napalm, a highly flammable mixture of benzene, gasoline and polystyrene.

Delivery System: Tornado

BLU-82 "Commando Vault"

This 15,000-lb. bomb, the largest conventional weapon in existence, is too heavy for "delivery" by any bomber aircraft and so is dropped out the cargo door of modified C-130s. It contains 12,600 pounds of low-cost ammonium nitrate, aluminum powder and polystyrene. This slurry mixture fills the air and is ignited just above the ground to optimize destruction without digging a crater. Nicknamed "Commando Vault" in Vietnam, it created instant jungle clearings. Used in Afghanistan as an anti-personnel weapon and to intimidate the enemy, its "psychological" effect is caused by a very large, lethal radius (300-900 feet), overpressure of 1000 lbs per square inch near ground zero and the "shock and awe" of an explosion that can be seen for many miles. U.S. Joint Chiefs of Staff vice-chair Peter Pace told a press conference: "As you would expect, they make a heck of a bang when they go off. The intent is to kill people."

Delivery System: C-130

BLU-95E "Fuel-Air Explosive II"

This 500-lb bomb uses a Fuel-Air Explosive (FAE) to disperse an aerosol cloud of fuel which is then ignited by a detonator. The vapour cloud explosion is considered useful against soft targets. The main destructive force of FAE is the high overpressure that flattens all objects near the epicentre and causes debilitating damage well beyond.

Delivery System: F/A-18

Contractor: Naval Weapons Center, China Lake (U.S. gov't)

BLU-109 **CPP Investment** ✓ **"Thermobaric bomb"**

This 2,000-lb. penetrator, blast/fragmentation, free-fall bomb has a 1-inch thick, steel alloy casing and carries a 550-lb., high-explosive blast warhead for used against hardened targets, like caves and bunkers. The explosive is dispersed before detonation to create an extended blast area with high temperatures, pressures and oxygen depletion.

Delivery System: F-117

Contractor: Lockheed Missiles & Space (division of Lockheed Martin)

"Brimstone"

This radar-seeking missile carrying a high-lethality warhead for destroying Main Battle Tanks, is derived from the US Army "Hellfire" AGM-114F.

Delivery System: Tornado

Contractor: Alenia Marconi Systems

CBU-52

Each of these 785-lb. antimaterial/antipersonnel cluster bombs contains 220 3.5-inch spherical bomblets weighing 2.7 lbs. with a 0.65-lb. high-explosive warhead.

Delivery Systems: A-10, B-52, F-14, F-15, F-16

CBU-58

This 800-lb. anti-personnel, anti-materiel, incendiary cluster bomb has 650 BLU-63/B bomblets with 5-gram titanium pellets that are "useful against flammable targets."

Delivery Systems: A-10, B-52, F-16

CBU-59 "Rockeye II"

Each 750-lb. Rockeye II bomb has 717 BLU-77 bomblets with armor-piercing effects, antipersonnel fragmentation and incendiary features.

Delivery Systems: F-14, F-15, F/A-18

CBU-71

This cluster bomb, much like the CBU-58, contains 650 titanium submunitions. It is said to have "two separate kill mechanisms, one fragmentation, the other incendiary."

Delivery Systems: A-10, B-52, F-15, F-16

CBU-72 "FAE"

This 550-lb. Fuel/Air Explosive (FAE) cluster bomb carries three 75-lb. ethylene oxide bomblets create 60x8 foot aerosol clouds that when ignited 30 feet above the ground produce fiery explosions. In 1991, at least 254 CBU-72s were used against mine fields and to ignite Iraqi troops hiding in trenches. Considered a "psychological weapon," CBU-72s were developed from Vietnam-era FAEs.

Delivery System: F/A-18

CBU-78 "Gator"

The bomblets in this 500-lb. cluster bomb each scatter 45 anti-vehicle and 15 antipersonnel landmines.

Delivery System: F-16

Contractor: Aerojet General

CBU-87 "CEM" **CPP Investment** ✓

This 1,000-lb. Combined Effects Munition (CEM) is used, in part, to attack "soft targets" (i.e. people). It uses detonating cluster bomblets for "anti-armor, fragmentation and incendiary capability." Each of the 202 bomblets contains "300 preformed ingrain fragments for defeating light armor and personnel." About 5% of its bomblets do not explode right away and thus act like anti-personnel landmines.

Delivery Systems: A-10, B-1, B-2, B-52, F-14, F-15, F-16, F/A-18, M-270

Contractor: Aerojet General and Honeywell

CBU-89 "Gator" **CPP Investment** ✓

This 1,000-lb. "Gator" mine is a cluster bomb containing 72 antitank and 22 antipersonnel landmines with a "fragmenting case warhead triggered by trip wires." The average size of the quickly-emplaced minefield is 200 x 650 meters. It is highly regarded for its "low-cost production."

Delivery Systems: A-10, B-1, B-2, B-52, F-14, F-15, F-16, F/A-18

Contractor: Aerojet Ordnance and Honeywell

CBU-97 "SFW" CPP Investment ✓

This 1,000-lb. Sensor-Fuzed Weapon (SFW) is a cluster bomb used for attacking armoured targets, like tanks.

Delivery Systems: A-10, B-1, B-2, B-52, F-15

Contractor: Textron Defense Systems

CBU-99

This CBU carries 247 MK118 submunitions (bomblets).

Delivery System: AV-8

CBU-100

This is the same as the CBU-99, except that it uses a slightly different fuze and bomb dispenser.

Delivery System: AV-8

CBU-103, -104, -105

"WCMD" CPP Investment ✓

The Wind-Corrected Munitions Dispenser (WCMD) turns "dumb" bombs (like CBU-87, -89, -97) into these "smart" bombs (CBU-103, -104, -105). Modest corrections in the direction of the bomb's fall are achieved using small fins.

Delivery Systems: B-1, B-52, F-117

Contractor: Lockheed Martin

GAU-8 "Avenger" CPP Investment ✓

GAU-8 "Avenger" 30mm. cannon that fires up to 4,200 rounds of Depleted Uranium (DU) munitions per minute.

Delivery System: A-10

Contractor: General Electric

GAU-16

This 50-calibre machine gun fires 750 rounds per minute.

Delivery System: UH-1

GAU-17

This 6-barrelled, electrically-driven "minigun" is a simplified M61 Vulcan with a capacity for 4000 rounds of linked 7.62mm percussion-primed ammunition.

Delivery Systems: UH-1, UH-60

GBU-10, -12, -16 CPP Investment ✓

"Paveway II"

The 2000-lb. GBU-10 "Paveway II" uses a general purpose or penetrating warhead. It is an MK-84 "Blast/Fragmentation" bomb with an added laser guidance package.

The GBU-12 is a 500 lb. version of the GBU-10, while the GBU-16 is a 1000 lb version.

GBU-10 Delivery Systems: A-10, F-14, F-15, F-117, Tornado

GBU-12 Delivery Systems: A-10, AV-8, F-14, F-15, F/A-18, F-117

GBU-16 Delivery Systems: AV-8, F-14, F-15

Contractor: Texas Instruments

GBU-15 CPP Investment ✓

This unpowered, glide bomb carries either an MK-84 general purpose warhead or a BLU-109 penetrating bomb. The weapon systems operator locates the target by observing a video transmitted from the weapon.

Delivery Systems: F-15, Tornado

Contractor: Rockwell International Corp.

GBU-24 "Paveway III" CPP Investment ✓

The "Paveway III" is used against fixed soft or fixed hard targets. It uses either a 2,000-lb. MK-84 general purpose

bomb or BLU-109 penetrator bomb.

Delivery Systems: F-14, F/A-18, Tornado

Contractor: Texas Instruments

GBU-27 "Have Void" CPP Investment ✓

Developed in 1985 under the project name "Have Void," this bomb uses 550 lbs of high explosives to penetrate more than six feet of reinforced concrete.

Delivery Systems: B-1, B-2, F-117

Contractor: Texas Instruments

GBU-28 "Bunker Buster" CPP Investment ✓

This 5,000-lb. laser-guided conventional "Bunker Buster" munition using a 4,400-lb. penetrating warhead was developed in 1991 to destroy underground Iraqi command centres.

Delivery System: F-15

Contractor: Lockheed and National Forge

GBU-36 -37 "GAM" CPP Investment ✓

This GPS-aided munition (GAM) is a tail kit targeting system that attaches to a 2,000-lb. MK-84 general purpose bomb to more accurately guide it to its target. The GBU-37 is like the GBU-36 except that it attaches to 4,500 lb BLU-113 penetrator bomb.

Delivery System: B-2

Contractor: Northrop Grumman

"HOT" & "HOT-2" CPP Investment ✓

The HOT anti-tank missile uses a 3-kg. high-explosive warhead while the HOT 2 warhead weighs 4 kg.

Delivery System: UH-60

Contractors: Daimler-Benz Aerospace (now Daimler Chrysler) and Aerospatiale

"Hydra-70" CPP Investment ✓

This missile system is a 'family' of 2.75 inch (70 mm) unguided rockets with different warheads, including high-explosive submunitions, white phosphorous (incendiary), armor-piercing, blast-fragmentation, flechette (dart-shaped) anti-personnel, smoke or illumination munitions. These rockets can be fired "against enemy personnel, light armor vehicles and other soft-skinned targets."

Delivery Systems: AH-64, OH-58

Contractor: General Dynamics

"JDAM"

The Joint Direct Attack Munition is a set of guidance fins that are attached to the rear of existing bombs like the MK-83 (BLU-110), MK-84 (BLU-109). An inertial navigation system steers the bomb using a GPS receiver.

Delivery Systems: B-1, B-2, B-52, F-15, F/A-18

JP233

This 6.5 metre-long bomb carries two types of submunitions: one creates craters in runways, while the other scatters land mines to prevent people from doing repairs.

Delivery System: Tornado

Contractor: Hunting Engineering (now Insys)

L60

This cannon fires 40 mm rounds at up to 256 per minute.

Delivery System: AC-130

Contractor: Bofors

LAU-51A

This weapons system launches multiple 2.75 inch rockets.

Delivery System: Tornado

M26**CPP Investment✓**

This unguided, freeflight rocket has a range of 30 miles. Its warhead carries 644 submunitions that are scattered over the target area and then explode separately. When these M77 bomblets explode, their steel casings break apart into hundreds of fragments. As a result, everyone within a quarter of a square kilometre is killed. During the 1991 war, Iraqis appropriately described this weapon as "steel rain." Some 4 percent of the M77 bomblets do not explode on impact, thereby creating a landmine-like hazard.

Delivery Systems: F-14, M-270

Contractor: Lockheed Martin

M39**CPP Investment✓**

The M39 guided rocket has a range of 300 kilometres. Its warhead carries 950 M74 grenades and distributes them evenly over the target area. Upon impact, when these grenades detonate, they break up into a large number of high-velocity steel fragments. Each grenade also contains an incendiary, pyrophoric pellet to spread fires. This weapon is "used against personnel and soft targets."

Delivery System: M-270

Contractor: Lockheed Martin Vought Systems

M60

This cannon fires 7.62 mm rounds at about 500 per minute.

Delivery System: UH-60

M61 "Vulcan"**CPP Investments✓**

The "Vulcan" 6-barrel cannon, with up to 6,000 rounds of 20 mm ammunition, has a range of several kilometres.

Delivery Systems: AC-130, F-14, F/A-18

Contractor: General Electric and General Dynamics Armament Systems

M39A2

This is 20-mm cannon fires 280 rounds of ammunition.

Delivery System: F-14

Contractor: Colt-Browning

M230

This 30-mm automatic machine gun fires about 625 shots per minute.

Delivery System: AH-64

M110

This 105-mm howitzer fires up to 100 rounds per minute.

Delivery Systems: B-2, B-52

M-117

This free-fall, unguided, 750-lb general purpose bomb. Some M-117s function as landmines because they detonate when a person or vehicle triggers the fuze.

Delivery System: B-52

M-139 "Volcano Mine Dispenser"

The Volcano Mine Dispenser can fire 160 landmine canisters per sortie. Each canister carries 5 anti-tank and one anti-personnel landmine for a total of 960 landmines. It rapidly lays a 1,100 m. by 120 m. "Gator" minefield

Delivery System: UH-60

M-220 "TOW"**CPP Investment✓**

This Tube-launched, Optically tracked, Wire-guided (TOW) missile 4-kilometre range and uses a high-explosive warhead to destroy armour vehicles, primarily tanks.

Delivery System: UH-60

Contractor: Hughes Aircraft (now General Motors)

M-240

This is a machine gun that fires 7.62 mm rounds.

Delivery System: UH-1

M-242 "Bushmaster" CPP Investment✓

The "Bushmaster" chain gun fires 200 rounds per minute of either armor-piercing or high-explosive 25 mm ammunition and has a range of 2 kilometres.

Delivery System: M2/M3

Contractor: Boeing (formerly McDonnell Douglas)

MK-20 "Rockeye II"

This free-fall, unguided "Rockeye II" cluster weapon with a high-explosive warhead is "most efficiently used against area targets requiring penetration to kill.... The Rockeye dispenser is also used in the Gator air-delivered mine system...against armor, artillery and antipersonnel targets."

Delivery Systems: B-52, F-14, F-16, F/A-18, Tornado

Contractor: U.S. Naval Weapons Center (U.S. gov't)

MK-25

This 2000-lb mine has an 1200-lb. explosive charge.

Delivery System: P-3

MK-36, -40, -41 "Destructor"

The 500-lb. MK-36 "Destructor" mine is a modified (converted) version of the MK-82. It is used either at sea, as a "bottom mine," or on land, as a land mine.

The MK-40 (1000-lb) and MK-41 (2,000-lb) versions bury themselves in the ground and are set off by vehicles or people. When dropped in water, they lie on the bottom ready to be actuated by warships, freighters or even small boats.

MK-36 Delivery Systems: B-1, B-2, B-52, P-3

MK-40 Delivery System: P-3

MK-41 Delivery Systems: B-52, DDG-51

Contractor: Naval Ordnance Test Station (U.S. gov't)

MK-45**CPP Investment✓**

The Navy's primary ship gun for hitting shore targets, fires 5 inch rounds and has a range of about 15 miles.

Delivery System: DDG-51

Contractor: Raytheon

MK-46, -50, -54 CPP Investments✓

The MK-46 self-propelled, guided torpedo operates underwater and detonates on contact with, or near, its target. It can be launched from submarines, surface ships or aircraft. The MK-50, with a 100-lb high explosive warhead, is a new and improved version of the MK-46. It can be launched from anti-submarine warfare aircraft and surface warships. The MK-54 is a less expensive version of the MK-50. It combines the MK-50s search and homing with the MK-46s propulsion system.

MK-46 Delivery System: P-3

MK-50 Delivery Systems: DDG-51, P-3

MK-54 Delivery System: P-3

Contractor: Alliant Techsystems, Northrop Grumman

[Westinghouse], Raytheon Electronic Systems)

MK-52 and -55

These aircraft-dropped, bottom mines destroy submarines and surface ships: MK-52 (1000 lb); MK-55 (2000 lb.)

MK-52 Delivery System: B-52

MK-55 Delivery Systems: B-52, P-3

MK-56

This 2000-lb aircraft-laid, moored mine containing an explosive charge of 360 lbs, is used against submarines.

Delivery Systems: B-2, F/A-18, P-3

MK-60 "Captor"

The Encapsulated Torpedo (CAPTOR) is a deepwater-moored torpedo launcher. It is a moored mine that detects submarines and then releases a modified MK-46 torpedo.

Delivery Systems: B-52, P-3

Contractor: Alliant Techsystems

MK-62, -63, -64, -65 "Quick Strike Mines"

These "Quick Strike Mines" are closely related to the "Destructor" family of mines and are used against submarines and surface targets. It is a "conversion" of the MK-82 General Purpose Bomb: MK-62 (500 lb); MK-63 (1000-lb); MK-64 (2,000 lb); MK-65 (improved, 2000-lb).

MK-62 Delivery Systems: B-1, B-2, B-52, F/A-18

MK-63 Delivery Systems: F/A-18, P-3

MK-64 Delivery System: B-52

MK-65 Delivery Systems: B-1, B-52, P-3

MK-77 "Napalm"

This modern version of Napalm (Naphthalene + Palmitate) uses benzene, gasoline and polystyrene instead. It is a 500-pound fire bomb with a "thin-skinned" container that easily ruptures on impact so that the burning contents spread far and wide. It adheres to objects, like troops, wooden structures and convoys. The MK-77 "family" of weapons evolved from M-47 and M-74 incendiary bombs, that were first used by the U.S. to firebomb many Korean cities but were made infamous during the Vietnam war.

Delivery Systems: A-10, AV-8, F/A-18

MK-82, -83, -84

The MK-82 is a 500-lb., free-fall, "general purpose, blast/fragmentation" bomb that is used when "maximum blast and explosive effects are desired." It is "designed for soft, fragment sensitive targets such as troops..." The MK-83 is a 1,000-lb. version; the MK-84 is a 2,000-lb. version.

Delivery Systems:

MK-82: A-10, AV-8, 1, B-52, F-14, F-16, F/A-18, P-3

MK-83: AV-8, F-14, F/A-18, Tornado

MK-84: A-10, B-2, B-52, F-14, F/A-18, F-117

Contractor: Naval Ammunition Depot (U.S. gov't)

MK-101

This is a nuclear depth bomb that uses a hydrostatic fuze to detect water pressure so it can be set to explode when reaching a certain depth.

Delivery System: P-3

MW-1

This multi-purpose weapons dispenser is designed to laterally disperse cluster munitions

Delivery System: Tornado

Contractor: Messerschmitt-Bölkow-Blohm

"Pave Spike"

This 420-lb. electro-optical designator pod directs laser-guided bombs to targets in daytime conditions.

Delivery System: Tornado

Contractor: Westinghouse

RIM-7M "Sea Sparrow" CPP Investments✓

The "Sea Sparrow" radar-guided missile uses a high-explosive, blast fragmentation warhead and moves at 2,660 mph to attack warplanes and missiles.

Delivery System: DDG-51, F-14, F-15, F-16, F/A-18

Contractors: Sperry, Raytheon and General Dynamics

RIM-66 CPP Investments✓

"Standard Missile"

The "Standard Missile" is the U.S. Navy's primary weapon against missiles, aircraft and ships.

Delivery System: DDG-51

Contractors: Hughes Missile Systems, Raytheon, Motorola, Morton-Thiokol and Aerojet General

"Sea Eagle" CPP Investment✓

This radar-guided, anti-ship missile with a jet engine, carries a 230-kg high-explosive warhead up to 110 km.

Delivery System: Tornado

Contractor: British Aerospace Systems (BAe Systems)

"Sea Skua"

This helicopter-launched, anti-ship torpedo uses radar to detect and then lock on to its target. The manufacturer says it uses a "high lethality, blast fragmentation warhead."

Delivery Systems: EH-101, Lynx

Contractor: Matra BAe Dynamics

"Sky Flash" CPP Investments✓

This medium-range radar-guided air-to-air missile developed from the AIM-7E2 "Sparrow" protects warplanes from attack by other warplanes.

Delivery System: Tornado

Contractors: British Aerospace (BAe), Boeing-Rocketdyne, Marconi

"Sting Ray"

This torpedo, fired from ships and aircraft, uses sonar and computer software to search for and destroy submarines.

Delivery System: Lynx

Contractor: Marconi Electronic Systems

WE177B

This is a British parachute-retarded, tactical nuclear weapon.

Delivery System: Tornado

"WCMD" (See CBU-103, CBU-104, CBU-105)

Sources: These descriptions are summarized from a wide variety of web sources. Especially useful were:

(1) Andreas Parsch's "Directory of U.S. Military Rockets and Missiles," www.designation-systems.net

(2) the "Smart Weapons" and "Dumb Bombs" databases originally compiled by John Pike that are available on the Federation of American Scientists' website:

www.fas.org/man/dod-101/sys