

Weapons Systems Introduced Since Desert Storm (1991) that are available now (2003)

War fighting has changed significantly since Desert Storm in terms of operational concepts, tactics, and technology. In 1991 joint service operations were limited by interoperability, connectivity, and doctrine. Precision-guided weapons, first introduced in Vietnam, were still a small part of the inventory and GPS guided weapons were still in development. Targeting and air tasking took hours to days. Force build-up in the Middle East took many months. In the intervening time months have been shortened to weeks, and days to hours and minutes. Precision weapons are now the rule rather than the exception.

As we again prepare to go to war in Iraq many new systems have been introduced that have impacted our rapid response time, our lethality, and our precision. What follows are several of the significant new weapons systems that have been deployed, including a description of their capabilities. The listing is illustrative rather than complete and, for the most part, does not include system upgrades and prototypes. The systems are listed under the categories of Air Defense, Strike, C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance), and Logistics and Mobility. In addition to the listing below, much has been done to enhance the performance and the safety of the soldiers, sailors and marines. Improvements include combat casualty care, armor, communications, “wearable” computers and language translators, small arms, Meals-Ready –to-Eat (MRE’s) and other quality of life improvements

Air Defense Weapons:

1. **PAC 3 Patriot Air Defense System.** The Patriot provides protection against enemy planes and tactical ballistic missiles. The system consists of the M901 launch station, a remotely operated four-canister unit mounted on an M860 semitrailer, with its own electronics pack, data link cable, and generator. The prime mover of the M901 is either the M818 tractor or the M983 HEMTT (heavy expanded mobility tactical truck). The Patriot usually is deployed in a battery of five to eight launchers, in conjunction with an electric power plant, an OE-349/MRC antenna mast group, an AN/MPQ-53 radar unit, and an AN/MSQ-116 engagement control center. In addition, each battery has other dedicated support vehicles, to include missile reload trailer transporters and maintenance trucks. The newest PAC-3 variant is a single-stage, short-range, low-to high-altitude missile. Powered by a solid propellant rocket motor and equipped with advanced in-flight maneuvering capabilities, the PAC-3 is guided by inertial and active systems with millimeter-wave radar and terminal homing for hit-to-kill capability. It reaches speeds of Mach 5 and altitudes of 15 kilometers. (Source: US Army Fact Sheet.)
2. **Standard Missile 2 Block 4 Extended Range.** Standard Missile 2 (SM-2) is the world's premier surface-to-air air defense weapon. As an integral part of the *Aegis* Weapon System (AWS) aboard *Ticonderoga*-class cruisers and *Arleigh Burke*-class destroyers, SM-2 can be launched from the MK 41 Vertical Launcher System (VLS) or MK 26 Guided Missile Launcher System. Its primary mission is fleet area air defense and ship self defense, but it also has demonstrated an extended area air defense projection capability and it has a secondary anti-surface ship mission. SM-2s use tail controls and a solid fuel rocket motor for propulsion and maneuverability, and, in addition, extended range missiles have a booster with thrust vector controls. All are guided by inertial

navigation and mid-course commands from AWS, and semi-active radar or an IR sensor for terminal homing. Both medium and extended range versions have been developed. SM-2 Blocks III, IIIA, IIIB, and IV are in service with the U.S. Navy; these and other variants of Standard Missile are also in service with thirteen allied navies. SM-2 has consistently demonstrated effective performance against targets from surface ships to helicopters, manned aircraft, and cruise missiles, from very low to very high altitudes and from stationary to supersonic speeds, under a variety of weather conditions, and across a spectrum of stressing electronic countermeasures environments (Source: US Navy Fact File.)

3. **Advanced Medium-Range Air-to-Air Missile (AMRAAM).** The AIM-120 Advanced Medium-Range, Air-to-Air missile is a new generation air-to-air missile, developed as the result of a joint agreement among the United States and its major allies. The AMRAAM has an all-weather, beyond-visual-range capability. It improves the aerial combat capabilities of U.S. and allied aircraft to meet the future threat of enemy air-to-air weapons. AMRAAM serves as a follow-on to the AIM-7 *Sparrow* missile series. The new missile is faster, smaller, and lighter, and has improved capabilities against low-altitude targets. It also incorporates an active radar in conjunction with an inertial reference unit and micro-computer system, which makes the missile less dependent upon the fire-control system of the aircraft. Once the missile closes in on the target, its active radar guides it to intercept. This enables the pilot to aim and fire several missiles simultaneously at multiple targets and perform evasive maneuvers while the missiles guide themselves to the targets. (Source: US Navy Fact File.)
4. **AIM-9X Sidewinder.** The *Sidewinder* has a high-explosive warhead and an infrared heat-seeking guidance system. Its main components are an infrared homing guidance section, an active optical target detector, a high-explosive warhead and a rocket motor. The guidance section enables the missile to home in on the engine exhaust of target aircraft. An infrared unit costs less than other types of guidance systems and can be used day or night in all weather conditions. The infrared seeker also permits the pilot to launch the missile then leave the area or take evasive action while the missile guides itself to the target. The AIM-9X is the most advanced variant, just now entering service. (Source: US Navy Fact File.)
5. **Rolling Airframe Missile (RAM).** The RIM-116A Rolling Airframe Missile (RAM) is a lightweight quick-reaction high-firepower anti-air weapon system jointly developed by the U.S. and German governments. Currently developed as a Block O-type RAM and Block 1-type RAM, the RAMs will be an added asset. The RIM-116A RAM is designed as an all-weather, high-firepower, low-cost, self-defense system against anti-ship missiles. It uses the infrared seeking of the *Stinger* missile and the warhead, rocket motor, and fuse from the *Sidewinder* missile. Due to its high-tech radio-to-infrared frequency guidance system, it requires no shipboard support after the missile is launched. It has been installed on various surface ships like the *USS Peleliu* (LHA-5) and *USS Gunston Hall* (LSD-44). The Navy expects to procure approximately 1,000 RAM Block 1 missiles. The RIM-116A RAM is a joint-venture between the U.S. and German governments. It is currently installed, or planned for installation, on 83 U.S. Navy and 28 German Navy ships. It entered US Navy service in 1993. (Source: US Navy Fact File.)

Strike Aircraft:

1. **B-2 Spirit.** The B-2 Spirit is a multi-role bomber capable of delivering both conventional and nuclear munitions. Along with the B-52 and B-1B, the B-2 provides the penetrating

flexibility and effectiveness inherent in manned bombers. Its low-observable, or "stealth," characteristics give it the unique ability to penetrate an enemy's most sophisticated defenses and threaten its most valued, and heavily defended, targets. Its capability to penetrate air defenses and threaten effective retaliation provide a strong, effective deterrent and combat force well into the 21st century. The revolutionary blending of low-observable technologies with high aerodynamic efficiency and large payload gives the B-2 important advantages over existing bombers. Its low-observability provides it greater freedom of action at high altitudes, thus increasing its range and a better field of view for the aircraft's sensors. Its unrefueled range is approximately 6,000 nautical miles (9,600 kilometers). The B-2's low observability is derived from a combination of reduced infrared, acoustic, electromagnetic, visual and radar signatures. These signatures make it difficult for the sophisticated defensive systems to detect, track and engage the B-2. The B-2 has a crew of two pilots, a pilot in the left seat and mission commander in the right, compared to the B-1B's crew of four and the B-52's crew of five. Whiteman AFB, Mo., is the B-2's only operational base. The first aircraft, Spirit of Missouri, was delivered Dec. 17, 1993..

2. **F/A-18E/F Super Hornet.** An all-weather fighter and attack aircraft, the Super Hornet entered fleet service in 2002. The F/A-18 *Hornet*, an all-weather aircraft, is used as an attack aircraft as well as a fighter. In its fighter mode, the F/A-18 is used primarily as a fighter escort and for fleet air defense; in its attack mode, it is used for force projection, interdiction and close and deep air support. The F/A-18 is a twin engine, mid-wing, multi-mission tactical aircraft. The newest models, the E and F were rolled out at McDonnell Douglas Sept. 17, 1995. The E is a single seat while the F is a two-seater. The first operational cruise of *Super Hornet* was with VFA-115 onboard the *USS Abraham Lincoln* (CVN 72) on July 24, 2002, and saw initial combat action on Nov. 6, 2002, when E models participated in a strike on hostile targets in the "no-fly" zone in Iraq. All F/A-18s can be configured quickly to perform either fighter or attack roles or both, through selected use of external equipment to accomplish specific missions. The fighter missions are primarily fighter escort and fleet air defense; while the attack missions are force projection, interdiction, and close and deep air support. The F/A-18C and D models are the result of a block upgrade in 1987 incorporating provisions for employing updated missiles and jamming devices against enemy ordnance. C and D models delivered since 1989 also include an improved night attack capability. The E and F models have enhanced range, load capability and advanced avionics (Source: US Navy Fact File.)

Strike Weapons:

1. **Joint Direct Attack Munition (JDAM).** JDAM is a guided air-to-surface weapon using either the 2,000-pound MK 84 or the 1,000-pound MK 83 warheads as the payload. JDAM allows fighters and bombers to deploy weapons accurately against targets on the ground. The JDAM uses a tail control system and a Global Positioning System (GPS)-aided Inertial Navigation System (INS) for guidance. Targeting information from the aircraft is transmitted electronically to the weapon. Once released from the aircraft, the JDAM navigates to the target. Target coordinates can be loaded into the aircraft before takeoff, manually before weapon release, and automatically entered through target designation with onboard aircraft sensors. In its most accurate mode, when GPS data is available, the JDAM system will have an error of less than 13 meters. JDAM enables multiple weapons to be directed against single or multiple targets on a single pass. *Operation Desert Storm* revealed some shortcomings in air-to-surface weapon capability.

Adverse weather conditions limited employment of precision guided munitions. Unguided weapon accuracy was also poor when the weapons were delivered from medium and high altitudes. Research and development of an "adverse weather precision guided munition" began in 1992. The first JDAMs were delivered in 1997 with operational testing conducted in 1998 and 1999. The more than 450 JDAMs dropped during testing had 95 percent system reliability and were accurate to within 9 meters. JDAM also performed well in adverse weather testing, including clouds, rain and snow. (Source: US Navy Fact File.)

2. **Joint Standoff Weapon (JSOW).** The *Joint Standoff Weapon (JSOW)* is a key program that will replace five types of the older air-to-ground weapons currently in the naval inventory. It is a joint Navy-Air Force weapon development program. It will provide a family of precision-guided weapons that will allow aircraft to attack targets at increased stand-off distances, greatly increasing aircraft survivability. JSOW will be usable in adverse weather conditions and will give aircrews the ability to attack multiple targets in a single sortie. The JSOW family uses a common weapon body for all variants. The AGM-154A variant carries BLU-97 combined-effect bomblets for use against area targets. To provide anti-armor capability, a follow-on version will carry a BLU-108 sub-munitions payload derived from the *Sensor Fused Weapon (SFW)*. A third variant is being developed for a unitary warhead to provide blast-fragmentation capability. The AGM-154A and AGM-154B have completed Engineering and Manufacturing development and are in production. The demonstrated ability to launch from high or low altitudes and accurately navigate to the target area via selected waypoints is designed to further enhance weapon and aircrew survivability. JSOW is currently flying on the F/A-18 and F-16 aircraft and will soon be flying on the Air Force's B-52 and B-2. (Source: US Navy Fact File.)
3. **M109A6 Paladin 155mm Self-Propelled Howitzer.** The M109A6 Paladin is the latest advancement in 155mm self-propelled artillery. The system enhances previous versions of the M109 by implementing onboard navigational and automatic fire control systems. Paladin has both a Kevlar-lined chassis and a pressurized crew compartment to guard against ballistic, nuclear, biological, and chemical threats. The M109A6 is the most technologically advanced cannon in the Army inventory. This weapon has a 4 man crew, and weight approximately 62,000 lbs/32 tons, and has a cruising range of 186 miles, Max speed is 35 MPH, It has a fuel capacity of 133 gals. The Paladin can operate independently without external technical assistance. It can receive a fire mission while on the move, compute firing data, select and take up its firing position, automatically unlock and point its cannon, fire and then move out. Firing the first round from the move in less than 60 seconds, a "shoot and scoot" capability protects the crew from counter-battery fire. The M109A6 Paladin is capable of firing up to four rounds per minute to ranges of 30 kilometers. The Paladin features increased survivability characteristics such as day/night operability, NBC protection with climate control and secure voice and digital communications. The crew remains in the vehicle throughout the mission. (Sources: US Army TM 9-2350-314-10, FM 6-70)
4. **BLU-109 Thermobaric Bomb.** Free-fall bombs with PBXIH-135 thermobaric fill were first used in March 2002 against Al Qaeda targets in Gardez, Afghanistan. The Thermobaric weapon is particularly effective in enclosed spaces such as caves or bunkers. The explosive is dispersed prior to detonation and creates an extended blast area with high temperatures, pressures, and oxygen depletion. (Source: Office of Naval Research.)

5. **MOAB Massive Ordnance Airburst Bomb.** The MOAB is a 21,500 pound GPS guided bomb delivered by an MC-130 cargo plane. The huge size of the MOAB will make it effective against hardened structures, caves and bunkers as well as troops over a large area while the guidance will limit damage to surrounding neighborhoods. The weapon is also anticipated to have a psychological impact. (Source: New York Times 11 March 2003)
6. **Standoff Land Attack Missile - Expanded Response (SLAM-ER).** An evolutionary upgrade to the combat-proven SLAM, SLAM-ER is a day/night, adverse weather over-the-horizon, precision-strike missile. SLAM-ER addresses the Navy's requirements of a precision-guided Standoff Outside of Area Defense weapons. SLAM-ER provides an effective, long range, precision strike option for both pre-planned and target of opportunity attack missions against land and ship targets. Most significant among these enhancements are: a highly accurate, GPS-aided guidance system; improved missile aerodynamic performance characteristics that allow both greater range and more effective terminal attack profiles; a redesigned ordnance section for increased penetrating power and lethality; and a more user-friendly interface for both Man-in-the-Loop control and mission planning. SLAM-ER will be the first weapon to feature Automatic Target Acquisition (ATA), a revolutionary technological breakthrough that will automate and improve target acquisition in cluttered scenes, and overcome most countermeasures and environmentally degraded conditions. Deployment began in 1999. (Source: US Navy Fact File.)
7. **E-Bomb.** The E-Bomb is a missile or drone whose warhead produces a high power radio frequency pulse that disrupts or damages electronic systems such as computers at short ranges. As reported in the press, a few of these prototype weapons may be deployed to Iraq to disrupt command centers without destroying buildings.
8. **Affordable Weapon.** Some 15 Affordable Weapons are being deployed to the CENTCOM AOR. Launched from its shipping container by a small rocket booster and powered in flight by a small turbojet engine, the Affordable Weapon is designed to carry a significant payload to a target several hundred miles away. Equipped with both line-of-sight and satellite data links, the Affordable Weapon can fly directly to its target guided by the Global Positioning System (GPS). Alternatively, it can fly to an area and loiter until a forward observer directs it to a target. It can also be retargeted in flight—an observer can direct it to switch to a target different from the one the weapon was originally sent to attack. (Source: Office of Naval Research.)

C4ISR systems:

1. **Link-16 tactical data link.** Link-16 is the current state-of-the-art Tactical Data Link for the Department of Defense. Link-16 does not significantly change the basic concepts of tactical data link information exchange supported for many years by Link-11 and Link-4A. Link-16 does provide technical and operational improvements to existing tactical data link capabilities. The Joint Tactical Information Distribution Systems (JTIDS) is a communications, navigation, and identification system intended to exchange surveillance and command and control (C2) information among various C2 platforms and weapons platforms to enhance varied missions of each of the Services. It provides multiple access, high capacity, jam-resistant, digital data, and secure voice Communication, Navigation, and Identification (CNI) information to a variety of platforms. There are three families of terminals that have been or are currently in development. The Class 1 terminal was

developed in the 1970s and is currently fielded on U.S. and NATO AWACS (E-3s) and sheltered ground-based C2 facilities. Smaller and higher capacity Class 2 and 2H terminals are now being deployed with select Air Force/Navy sea and air platforms. A smaller Class 2M version is being developed for the Army's air defense artillery mission and for the Ballistic Missile Defense Organization (BMDO) terminal missile defense mission. All terminals provide data communication in the LINK 16 data format which was designated on October 18, 1994, as the DoD primary data link for all Service and Defense Agency C3I and weapon system applications. The Link-16 terminal implements the Tactical Digital Information Link-J (TADIL-J) message standard. Its architecture provides a common communications net to a large community of airborne and surface elements within line-of-sight. By using one or more members of the net as relays, the net can be extended to platforms beyond line-of-sight. Any terminal can be employed as a relay. The system uses low duty cycle pulses, pseudo-randomly distributed in the frequency code domain. It operates on a slot-by-slot basis in both NORMAL (300 nautical miles) and EXTENDED (500 nautical miles) modes and is capable of transmitting and receiving information on multiple nets. (Source: US Navy Space and Naval Warfare System Command.)

- 2. RQ-1 Predator.** The RQ-1 Predator is a medium-altitude, long-endurance unmanned aerial vehicle system. It is a Joint Forces Air Component Commander-owned theater asset for reconnaissance, surveillance and target acquisition in support of the Joint Force commander. A fully operational system consists of four aircraft (with sensors), a ground control station (GCS), a Predator Primary Satellite Link (PPSL), and 55 personnel for continuous 24 hour operations. The basic crew for the Predator is one pilot and two sensor operators. They fly the aircraft from inside the GCS via a C-Band line-of-sight data link or a Ku-Band satellite data link for beyond line-of-sight flight. The aircraft is equipped with a color nose camera (generally used by the aerial vehicle operator for flight control), a day variable aperture TV camera, a variable aperture infrared camera (for low light/night), and a synthetic aperture radar (SAR) for looking through smoke, clouds, or haze. The cameras produce full motion video and the SAR still frame radar images. The three sensors are carried on the same airframe but cannot be operated simultaneously. In the future, Predators will carry the Multispectral Targeting System (MTS) with inherent AGM-114 Hellfire missile targeting capability that integrates electro-optical, infrared, laser designator and laser illuminator into a single sensor package. These Predators cannot carry MTS and the SAR simultaneously. The aircraft will carry and employ two laser-guided Hellfire anti-tank missiles with MTS. Each Predator aircraft can be disassembled into six main components and loaded into a container nicknamed "the coffin." This enables all system components and support equipment to be rapidly deployed worldwide. The largest component is the GCS and it is designed to be rolled into a C-130. The air transportable PPSL consists of a 6.25 meter Ku-Band satellite system mounted on a trailer. It provides communications between the ground station and the aircraft when it is beyond line-of-sight and is a link into secondary intelligence dissemination networks. The RQ-1B system needs 5,000 feet by 125 feet (1,524 meters by 38 meters) of hard surface runway with clear line-of-sight to each end from the GCS to the air vehicles. The RQ-1B includes an ARC-210 radio, an APX-100 IFF/SIF with Mode 4, an upgraded turbo-charged engine and an ice mitigation system. In April 1996, the secretary of defense selected the U. S. Air Force as the operating service for the RQ-1A Predator system. Operating responsibility is at the 11th, 15th and 17th

Reconnaissance Squadrons, Indian Springs Air Force Auxiliary Field, Nev. (Source: US Air Force Fact Sheet)

3. **RQ-4A Global Hawk.** The Global Hawk Unmanned Aerial Vehicle (UAV) provides Air Force and joint battlefield commanders near-real-time, high-resolution, intelligence, surveillance and reconnaissance imagery. In the last year, the Global Hawk provided Air Force and joint warfighting commanders more than 15,000 of these images to support Operation Enduring Freedom, flying more than 50 missions and 1,000 combat hours to date. Cruising at extremely high altitudes, Global Hawk can survey large geographic areas with pinpoint accuracy, to give military decision-makers the most current information about enemy location, resources and personnel. Once mission parameters are programmed into Global Hawk, the UAV can autonomously taxi, take off, fly, remain on station capturing imagery, return and land. Ground-based operators monitor UAV health and status, and can change navigation and sensor plans during flight as necessary. The Global Hawk Program, Reconnaissance Systems Program Office, Aeronautical Systems Center is located at Wright-Patterson AFB, Ohio, which assumed total program control on Oct. 1, 1998. Global Hawk, which has a wingspan of 116 feet (35.3 meters) and is 44 feet (13.4 meters) long, can range as far as 12,000 nautical miles, at altitudes up to 65,000 feet (19,812 meters), flying at speeds approaching 340 knots (about 400 mph) for as long as 35 hours. During a typical mission, the aircraft can fly 1,200 miles to an area of interest and remain on station for 24 hours. Its cloud penetrating, Synthetic Aperture Radar/Ground Moving Target Indicator, electro-optical and infrared sensors can image an area the size of Illinois (40,000 nautical square miles) in just 24 hours. Through satellite and ground systems, the imagery can be relayed in near real time to battlefield commanders. When fully fueled for flight, Global Hawk weighs approximately 25,600 pounds (11,612 kilograms). More than half the UAV's components are constructed of lightweight, high-strength composite materials, including its wings, wing fairings, empennage, engine cover, engine intake and three radomes. Its main fuselage is standard aluminum, semi-monocoque construction. (Source: US Air Force Fact Sheet)
4. **Tactically Adaptable Robots (Crawlers, "Lemmings").** Small robotic crawlers (28 x 24 x 11 inches, 90 lbs dry weight, speed 0-5 ft/s, maximum range 10 nm) with real-time uplink of target information via acoustic and RF modem. These robots are used by the Marines and special forces in fighting in urban areas and against enemies in caves or other cover. (Source: Office of Naval Research)
5. **Dragon Eye.** A UAV that can be carried, launched, operated, and recovered by a single Marine, the Dragon Eye deployed to the CENTCOM AOR in 2002. A tactical reconnaissance and surveillance platform, Dragon Eye can carry a variety of sensors. It weighs 4 pounds, fits in a backpack, has the radar signature of a bird, can be assembled and launched in less than 5 minutes, and comes with a portable control station with a dedicated communications link. (Source: Office of Naval Research)
6. **Specific Emitter Identification (AN/UYX-4).** A system capable of tracking the unique signature of a specific target, the AN/UYX-4 was fielded in the late 1990s. (Source: Office of Naval Research.)
7. **Collaborative Planning Tools.** Since Dessert Storm computer connectivity and networks have significantly accelerated battlefield collaborative planning between command elements. These tools include secure voice, data, and on-line "chat" capabilities that allow rapid, interactive decision making in real time.

Logistics and Mobility:

1. **C-17 Globemaster III.** The C-17 Globemaster III is the newest, most flexible cargo aircraft to enter the airlift force. The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases in the deployment area. The aircraft is also capable of performing tactical airlift and airdrop missions when required. Current operational requirements include an aircraft mission completion success probability rate of 92 percent, only 20 aircraft maintenance man-hours per flying hour, and full and partial mission availability rates of 74.7 and 82.5 percent, respectively. The C-17 measures 174 feet long (53 meters) with a wingspan of 169 feet, 10 inches (51.75 meters). The aircraft is powered by four, fully reversible, Federal Aviation Administration-certified F117-PW-100 engines (the military designation for the commercial Pratt & Whitney PW2040), currently used on the Boeing 757. Each engine is rated at 40,440 pounds of thrust. The thrust reversers direct the flow of air upward and forward to avoid ingestion of dust and debris. Maximum use has been made of off-the-shelf and commercial equipment, including Air Force-standardized avionics. The aircraft is operated by a crew of three (pilot, copilot and loadmaster), reducing manpower requirements, risk exposure and long-term operating costs. Cargo is loaded onto the C-17 through a large aft door that accommodates military vehicles and palletized cargo. The C-17 can carry virtually all of the Army's air-transportable equipment. Maximum payload capacity of the C-17 is 170,900 pounds (77,519 kilograms), and its maximum gross takeoff weight is 585,000 pounds (265,352 kilograms). With a payload of 160,000 pounds (72,575 kilograms) and an initial cruise altitude of 28,000 feet (8,534 meters), the C-17 has an unrefueled range of approximately 2,400 nautical miles. Its cruise speed is approximately 450 knots (.74 Mach). The C-17 is designed to airdrop 102 paratroopers and equipment. The design of the aircraft allows it to operate through small, austere airfields. The C-17 can take off and land on runways as short as 3,000 feet (914 meters) and only 90 feet wide (27.4 meters). Even on such narrow runways, the C-17 can turn around using a three-point star turn and its backing capability. (Source: US Air Force Fact Sheet.)
2. **JTAV Joint Total Asset Visibility.** The JTAV system, operational since 2000, marks items with codes, RF ID tags and GPS based-based systems that allow computers to keep track of material on a continuous basis and resupply automatically. (Source: Economist.com Military technology)