



By Sam McGowan

HERCULEAN ORDNANCE

Since its debut shortly after the Korean War, the C-130 has earned a well-deserved reputation for versatility. Developed as a tactical transport, the Hercules has been adapted to other roles ranging from intelligence gathering to weather reconnaissance to gunship.

One of the lesser-known roles it has played is as a bomber, dropping the heaviest munitions used since World War II.

the bombs were dropped by unmodified transports.

Project Commando Vault was the Air Force's answer to US Army requirements for a means of clearing patches of triple-canopy Vietnamese jungle to allow helicopters to land. Attempts to use air strikes to clear jungle began in 1966, but proved ineffective, so an effort was begun to develop a specialized answer to the requirement. In November 1967, the

in diameter and destroyed booby traps that had been set at intervals out to 150 feet from the bomb.

Impressed by the test results, MACV directed 7th Air Force to develop a method of delivering specialized ordnance designed to clear jungle. Tests of various explosives were conducted at the Armament Development and Test Center at Eglin AFB, Fla. Simultaneously, the Army began static tests at Fort Benning, Ga., of the 10,000-pound M121 bomb, a weapon originally developed for the B-36 bomber, then being stored in New Mexico. Further M121 testing was conducted in the western US using a CH-54 Skycrane helicopter and a C-130.

According to the flight engineer, TSgt. Charles Anderson, ideas were kicked around on a routine C-130 flight in Vietnam. Two colonels onboard, one Army and one Air Force, revealed they were with Air Force Systems Command and had come to Vietnam to evaluate the use of bombs to clear helicopter landing zones. While the plan was to use CH-54s, they

Massive "Daisy Cutter" bombs dropped from C-130s were highly effective at clearing landing zones in Vietnam.

The use of the C-130 as a bomber in the Vietnam War wasn't the first time transports were used in that role, but it was the most successful. And while some may think of the application as an ad hoc development, the C-130 turned out to be an excellent and accurate bombing platform. What is remarkable is that

scientific advisor to Military Assistance Command, Vietnam, came up with an idea to use a 3,000-pound M118 bomb to create clearings. One was flown to Dak To, where it was lifted into the jungle by a CH-47 helicopter and detonated by an explosives ordnance disposal team. The resulting blast cleared an area 150 feet



An MC-130E drops a 15,000-pound bomb at the Utah Test and Training Range. BLU-182 bombs were used to create instant landing zones for helicopters in Vietnam.

USAF photo by Capt. Patrick Nichols

thought C-130s might be more efficient. The pilot, Maj. Robert Archer, offered his opinions and was recruited on the spot as a project officer. The mission was assigned to Archer's 463rd Tactical Airlift Wing.

Archer went to Kirtland AFB, N.M., to observe tests and returned to Clark Air Base in the Philippines, where the 463rd was based. He took his 29th Tactical Airlift Squadron crew to Vietnam in October 1968 to make a series of test drops using guidance provided by MSQ-77 ground radar. Originally developed to score Strategic Air Command bomber crews on practice missions, the MSQ-77 radar had been adapted to control Skyspot "blind bombing" by fighters as well as B-52s. Marine pilots used a similar system called the TPQ-10. Ten bombs were dropped in December 1967 in another series of tests using the TPQ-10.

The test drops, which were conducted to evaluate the bombs' effectiveness and train additional crews, were code named Combat Trap, but the operational mission was dubbed Project Commando Vault.

Due to logistical issues, it wasn't until the spring of 1969 that operational drops commenced.

The 463rd was one of the C-130 wings providing airplanes and crews for airlift duty with 834th Air Division, a 7th Air Force component in South Vietnam. The division scheduled bombing missions for the 463rd. The wing's C-130Bs had been operating out of Tan Son Nhut since 1966 but when the 463rd assumed the new mission, its operating location changed to Cam Ranh, where Det. 2, 834th Air Division, provided operational control of the temporary duty C-130 crews and supervision of their maintenance personnel.

QUALIFYING CREWS

The bombs were shipped to Cam Ranh and missions originated from there to reduce flying time. The 463rd operated the C-130B, which was mechanically compatible with C-130Es from the 314th TAW that also operated from the seacoast base. The C-130As of

the 374th TAW and 815th TAS, which had different systems, were not parts-compatible. They replaced the 463rd B models at Tan Son Nhut.

Select crews in the wing's four squadrons were qualified to drop the huge bombs. Only the aircraft commander, navigator, and loadmaster needed to be qualified. Engineers and copilots required no special training and any loadmaster could serve as the second loadmaster. Loadmasters assigned to 834th AD Det. 2 routinely flew as second loadmaster on bomb missions.

For pilots and navigators, the few unique aspects of the mission meant working with the radar controllers, providing wind drift information and flying precise headings. Loadmasters learned new procedures involving rigging and the actual drop method itself and became familiar with the controller's terminology. On cargo drops, the loadmaster's job was to monitor the drop, but the load was released by the copilot using a switch in the cockpit.

Commando Vault loadmasters released the powerful weapons themselves by pulling a handle that was intended for emergency release. The extraction parachute was deployed prior to the actual release. Because they sent the huge bombs on their way, loadmaster were sometimes referred to unofficially as bombardiers. Once they were qualified, bomb crews rotated to Cam Ranh as they had been doing. If bomb missions were scheduled, bomb crews were scheduled separately from the normal schedule. The 463rd kept at least two Commando Vault crews at Cam Ranh at all times.

Contrary to common belief that the bombs were “rolled out the back” of the C-130s, delivery was actually very precise. After they arrived at Cam Ranh Bay by ship, the bombs went to the 14th Aerial Port Squadron rigging section where they were placed on wooden cradles secured to modular air-drop pallets with cotton and nylon webbing. The bombs were secured to their cradles with the same materials. The webbing was rigged so it all came together at two points on top of the bomb with a harness over the nose. Each point was connected by straps with a metal “knife” rigged into the connection, and the knives were attached to static lines.

Normally, a 15,000-pound pallet required a larger parachute, but 15-foot extraction parachutes could be used because the extraction parachute was already deployed in the slipstream when the pallet was released. The bomb was held in the airplane by the right hand locks on the 463L cargo handling system, which had been set to provide maximum tension and prevent the pallet from moving when the parachute deployed. The loadmaster released the locks on a signal from the controller, who counted down to the drop from 10 to one, followed by, “Hack.”

HOW IT WORKED

When the loadmaster heard “hack,” he pulled the release handle and sent the bomb on its way. As the load left the ramp, the static lines pulled knives through the webbing and the bomb separated from the pallet. A triangular parachute, which deployed during the separation, stabilized the bomb as it fell. It took 26 seconds for the bomb to fall 6,000 feet. By the time it went off, the C-130 was some distance away; however, the shock wave caused a brief jolt.

Each bomb had two fuses: a conventional impact fuse at the front—armed by a propeller on a three-foot “tree penetrator” extension—and a fuse set off by a timer

at the rear. The timer activated when the triangular parachute deployed. Munitions personnel installed them before the platform went to the airplane.

The conventional fuse was the primary. If it worked properly, the bomb would detonate before it buried itself in the ground and not leave a crater. The timed fuse was a backup in case the primary failed. Occasionally, neither worked and the bomb was a dud. When this happened, an EOD team flew in by helicopter to detonate it to prevent the enemy from using the TNT.

Each mission carried two bombs, one for the primary target and one for a backup. Sometimes the second bomb was dropped adjacent to the clearing left by the first in order to enlarge it. If it wasn’t needed at the primary target, the second bomb was dropped on a secondary target.

Only minor modifications were required to turn the transports into bombers. The scanner’s intercom control boxes on all of the 463rd C-130s were rewired so the loadmaster could monitor the radios. Small antennas were installed on both sides of the fuselage. A technician taped a small battery-powered transponder to a seat rail on the side that would be facing the radar during the drop and hooked it

The last operational BLU-82 detonates at the test range in Utah. In addition to clearing landing zones, some of the bombs were used on tactical targets during the Vietnam War.



USAF photo by Capt. Patrick Nichols



Mothers of All Bombs

Although they have always attracted significant attention for their novelty and sheer destructive power, the Air Force's M121, BLU-82, or GBU-43B are not the largest aerial bombs ever developed. During World War II, the British Royal Air Force dropped 22,000-pound Grand Slam bombs from Avro Lancaster bombers. The M121 was developed from the 12,000-pound T10 bomb, the US version of the British Tallboy.

Though it was for a time, the GBU-43B is also no longer the most powerful non-nuclear weapon. In 2007, Russia announced it had developed and tested a weapon that, although smaller than the GBU-43B, has four times the destructive power.

And while not precisely acting as a bomber, a C-5A Galaxy released an 86,000-pound Minuteman missile from its cavernous cargo bay in a 1974 test. The missile was extracted with a parachute.

to the appropriate antenna with a coaxial cable.

Prior to the drop, the navigator provided wind information to the radar site. The controller vectored the pilot to put the airplane on a predetermined track to the target using a plot recorded by a stylus on paper. He provided precise heading information, sometimes only a degree at a time, to keep the C-130 on the proper track. Bombing accuracy was phenomenal, with an average circular error of 190 feet, although experienced crews were more precise. As crews gained experience, they became the most accurate of all crews controlled by Skyspot operators. Bombs were even dropped on top of ridges.

Although the Commando Vault mission was designed to create instant helicopter landing zones, some bombs were dropped on tactical targets. One crew was given a bomb damage assessment of over 100 enemy killed in action. The bombs were sometimes referred to as "daisy cutters" but this was a generic nickname given to a variety of big weapons used in Southeast Asia.

The process for requesting and scheduling a bomb mission was laborious. Field commanders made a request through channels and it was forwarded to 7th

Air Force and from there to 834th Air Division, which passed it on to Det. 2 at Cam Ranh Bay where one of the bomb-qualified crews was scheduled for the mission. An 834th officer flew with the forward air controller responsible for controlling the drop. Both the FAC and the 834th observer had authorization to abort the drop, as did the field commander. Aborts were rare, however.

SHUTTLING

Typically, a mission took about four hours of the crew's duty day. Once the Commando Vault portion was complete, the 834th command post assigned the crew to cargo missions for the remainder of their duty day. Since the crew wasn't assigned to a scheduled airlift mission, they filled requests that had come in during the day, missions often designated as "combat essential" or "combat emergency."

In 1969-70, this usually meant shuttling ammunition or fuel out of Bien Hoa to forward airfields along the Cambodian border. On days when no bomb missions were scheduled, bomb crews flew airlift missions.

Even before operational M121 drops began, the Air Force was working on a replacement for the aging weapons. The supply of M121s was limited but instead

Albert Weimorts (l), creator of the MOAB (GBU-43B), and Joseph Fellenz (r), lead model maker, look over the bomb prototype before it was tested. MOAB, the replacement for BLU-82, is satellite guided.

of manufacturing new ones, the Air Force Weapons Laboratory recommended other options using explosives other than TNT. The final result was eventually designated as the BLU-82B. Some 225 of these were ordered.

The new bombs looked like a propane tank with a cone on the front, which gave rise to a rumor that the explosive contained propane. It didn't. The bomb was filled with a gelled slurry explosive (GSX) made primarily of ammonium nitrate and powdered aluminum. It had been developed in the 1950s for commercial use.

Seventh Air Force saw a safety advantage with the GSX because the components weren't explosive until mixed and they could be shipped separately. Each BLU-82 weighed 15,000 pounds, of which 12,600 pounds was explosive. The rigged weight of the two types, including the cradle and webbing, was 15,000 and 20,000 pounds, respectively.

The average BLU-82 clearing was 1.5 times the size of that created by an M121. MACV wanted to be able to fly five heli-



The author, then-SSgt. Sam McGowan, leans on an M121 bomb before a mission from Cam Ranh Bay, South Vietnam, in 1969. A C-130 is in the background.

Photo courtesy of Sam McGowan

copters into the instant LZ simultaneously but neither bomb had that much explosive power. Nevertheless, the soldiers and marines jumping into the new LZs found a clearing that would have taken days to complete using conventional engineering methods, and they were nearly always secure. Any enemy in the vicinity who wasn't killed outright by the blast was physically stunned for up to 18 hours. After the assault force secured the LZ, engineers flew in with chain saws to expand it. Sometimes the clearing was enlarged enough to accommodate artillery and was turned into a firebase.

USAF records show that as of Oct. 1, 1970, some 324 bombs—217 M121s and 107 BLU-82s—had been dropped. Commando Vault missions continued into 1972, but with less frequency due to fewer combat operations. Both the Cambodia incursion in May 1970 and the Lam Son 719 operation in Laos in early 1971 began with the detonation of BLU-82s.

Commando Vault commenced a few months before President Richard Nixon directed MACV to reduce American casualties. The US ground combat role began decreasing as troops were withdrawn, and the Air Force began inactivating or reassigning its units in the Pacific. USAF plans called for the reduction of the Pacific Air Forces C-130 fleet from 12 squadrons to four.

The 463rd lost its first squadron in the fall of 1970 and the wing inactivated on Dec. 31, 1971. When the 463rd ceased in-country operations, Commando Vault operations were taken over by the wing at Ching Chuan Kang AB, Taiwan.

In the spring of 1975, as communist troops overran the country, the US supplied South Vietnam's air force with rigged BLU-82s to drop from C-130As the US had handed over two years before. USAF C-130s flew the bombs into Tan Son Nhut, where they were transferred to VNAF airplanes. The last USAF C-130 lost in Vietnam had just brought in a BLU-82 when it was destroyed by artillery.

MOTHER OF ALL BOMBS

Vietnamese air force crews achieved considerable success dropping the bombs on the advancing North Vietnamese. One bomb dropped near Xuan Loc reportedly killed more than 250 enemy troops. Unfortunately, the use of the bombs came too late to halt the communist advance.

A few weeks after Saigon fell, a USAF C-130 dropped a BLU-82 on Koh Tang during the Mayaguez Incident.

A few BLU-82s remained after the war. They were placed in storage until 1991, when they were resurrected—initially to clear mines in Kuwait and then to demoralize the Iraqi forces. Eleven BLU-

82s were dropped on Kuwait, mostly for psychological purposes.

The bombs dropped in Southeast Asia were dropped by tactical airlift crews; those used in Kuwait were dropped from highly modified MC-130Es by special operations crews. Later still, a few BLU-82s were dropped in Afghanistan in an attempt to destroy underground command posts and caves that were being used as sanctuaries by enemy fighters. The last BLU-82 was detonated in Utah in 2008.

As the supply of BLU-82s was exhausted, the Air Force sought a replacement using Global Positioning System guidance. The 21,600-pound GBU-43B Massive Ordnance Air Blast bomb (or MOAB, also jokingly referred to as the "mother of all bombs") is much longer than the BLU-82B but smaller in circumference. The MOAB features fins that deploy when the bomb separates from the air-drop platform, thus eliminating the need for a stabilization parachute. GPS guidance manipulates the fins to keep the bomb on the desired path. ★

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