KC-135A Reconnaissance Platforms

At least three KC-135A tankers were converted into makeshift reconnaissance platforms with no change of Mission Design Series (MDS) designation. KC-135As 55-3121, 59-1465, and 59-1514 were modified beginning in 1961. That year the Soviet Union announced its intention to detonate a 100 megaton thermonuclear device on Novaya Zemlya, the so-called Tsar Bomba. One aircraft (probably either 55-3121 or 59-1465) was modified under the Big Safari program to the Speed Light configuration in order to obtain intelligence information on this test. The success of this mission prompted the conversion of two additional aircraft for intelligence gathering duties.

KC-135R Rivet Stand / Rivet Quick

Not to be confused with the much later CFM F108-powered KC-135R tanker, the KC-135R MDS was applied beginning in July 1967 to the three KC-135A reconnaissance aircraft under the Rivet Stand program name. The three aircraft were 55-3121, 59-1465, 59-1514, with KC-135A 58-0126 converted in 1969 to replace 59-1465 which had crashed at Offutt AFB, Nebraska in 1967. Externally the aircraft had varied configurations throughout their lives, but generally they were distinguished by five "towel rail" antennas along the spine of the upper fuselage and a radome below the forward fuselage. The first three aircraft retained the standard tanker nose radome, while 58-0126 was fitted with the 'hog nose' radome commonly associated with the RC-135. A trapeze-like structure in place of the refueling boom which was used to trail an aerodynamic shape housing a specialized receiver array (colloquially known as a "blivet") on a wire was installed. This was reported to be used for "Briar Patch" and "Combat Lion" missions. There were four small optically flat windows on each side of the forward fuselage. On some missions a small wing-like structure housing sensors was fitted to each side of the forward fuselage, with a diagonal brace below it. With the loss of 59-1465, KC-135A 58-0126 was modified to this standard under the Rivet Quick operational name. All four aircraft have now been lost or de-modified from the KC-135R configuration.

KC-135T Cobra Jaw

KC-135R 55-3121 Rivet Quick was modified in 1970 by Lockheed Air Services to the unique KC-135T configuration under the Cobra Jaw program name. Externally distinguished by the 'hog nose' radome, the aircraft also featured spinning "fangs" receiver antennas below the nose radome, a large blade antenna above the forward fuselage, a single 'towel rail' antenna on the spine, teardrop antennas forward of the horizontal stabilizers on each side, and the trapeze-like structure in place of the refueling boom. The aircraft briefly carried nose art consisting of the Ford Cobra Jet cartoon cobra. It was later modified into an RC-135T Rivet Dandy.

RC-135A

Four RC-135A (63-8058,63-8059, 63-8060, & 63-8061) were photo mapping platform utilized briefly by the Air Photographic & Charting Service, based at Turner AFB, Georgia and later at Forbes AFB, Kansas as part of the 1370th Photographic Mapping Wing . The mission was soon taken over by satellites, and the RC-135As were de-modified and used as staff transports, in the early 1980's they were converted to KC-135D's. Due to delays in fitting their original equipment, the RC-135As were the last of the entire C-135 series delivered to the USAF.

RC-135B

The as-delivered version of the RC-135. The RC-135B was never used operationally, as it had no mission equipment installed by Boeing. The entire RC-135B production run of ten aircraft was delivered directly to Martin Aircraft in Baltimore, Maryland for modification and installation of mission equipment under the Big Safari program. Upon completion, the RC-135Bs were re-designated RC-135C.

RC-135C Big Team

Modified and re-designated RC-135B aircraft used for strategic reconnaissance duties, equipped with the AN/ASD-1 electronic intelligence (ELINT) system. This system was characterized by the large 'cheek' pods on the forward fuselage containing the Automated ELINT Emitter Locating System (AEELS - not Side Looking Airborne Radar - SLAR, as often quoted), as well as numerous other antennae and a camera position in the refuelling pod area of the aft fuselage. The aircraft was crewed by two pilots, two navigators, a flight engineer, numerous intelligence gathering specialists, and airborne linguists. When the RC-135C was fully deployed, SAC was able to retire its fleet of RB-47H Stratojets from active reconnaissance duties. All ten continue in active service as either RC-135V Rivet Joint or RC-135U Combat Sent platforms.

RC-135D Office Boy / Rivet Brass

The RC-135Ds, originally designated KC-135A-II, were the first reconnaissance configured C-135's given the 'R' MDS designation, although they were not the first reconnaissance-tasked members of the C-135 family. They were delivered to Eielson Air Force Base, Alaska in 1962 as part of the Office Boy Project. Serial numbers were 60-356, 60-357, and 60-362. The aircraft began operational missions in 1963. These three aircraft were ordered as KC-135A tankers, but delivered without refueling booms, and known as "falsie C-135As" pending the delivery of the first actual C-135A cargo aircraft in 1961. The primary Rivet Brass mission flew along the northern border of the Soviet Union, often as a shuttle mission between Eielson and RAF Upper Heyford, Oxfordshire, and later RAF Mildenhall, Suffolk, UK. The RC-135D was also used in Southeast Asia during periods when the RC-135M (see below) was unavailable. In the late 1970s, with the expansion of the RC-135 fleet powered by TF33 turbofan engines, the RC-135Ds were converted into tankers, and are currently in the fleet as KC-135Rs.

RC-135E Lisa Ann / Rivet Amber

Originally designated C-135B-II, project name Lisa Ann, the RC-135E Rivet Amber was a one-of-a-kind aircraft equipped with a large Hughes Aircraft phased-array radar system. Originally delivered as a C-135B, 62-4137

operated from Shemya Air Force Station, Alaska. Its operations were performed in concert with the RC-135S Rivet Ball aircraft (see below). The radar system alone weighed over 35,000 pounds and cost over USD$35 million (1960 dollars), making Rivet Amber both the heaviest C-135-derivative aircraft flying and the most expensive Air Force aircraft for its time. The radiation generated by the radar was sufficient to be a health hazard to the crew, and both ends of the radar compartment were shielded by thick lead bulkheads. This prevented the forward and aft crew areas from having direct contact after boarding the aircraft. The system could track an object the size of a soccer ball from a distance of 300 miles (480 km), and its mission was to monitor Soviet ballistic missile testing in the reentry phase. The power requirement for the phased array radar was enormous, necessitating an additional power supply. This took the form of a podded General Electric J-85 turbojet engine in a pod under the left inboard wing section, driving a generator dedicated to mission equipment. On the opposite wing in the same location was a podded heat exchanger to permit cooling of the massive electronic components onboard the aircraft. This configuration has led to the mistaken impression that the aircraft had six engines. On June 5, 1969, Rivet Amber was lost on a ferry flight from Shemya to Eielson, and no trace of the aircraft or its crew was ever found.

RC-135M Rivet Card

The RC-135M was an interim type with more limited ELINT capability than the RC-135C but with extensive additional COMINT capability. They were operated by the 82d Reconnaissance Squadron during the Vietnam War from Kadena AB, gathering signals intelligence over the Gulf of Tonkin and Laos with the program name Combat Apple (originally Burning Candy).[8] There were six RC-135M aircraft, 62-4131, 62-4132, 62-4134, 62-4135, 62-4138 and 62-4139, all of which were later modified to and continue in active service as RC-135W Rivet Joints by the early 1980s.

RC-135S Nancy Rae / Wanda Belle / Rivet Ball

Rivet Ball was the predecessor program to Cobra Ball and was initiated with a single RC-135S (serial 59-1491, formerly a JKC-135A) on December 31, 1961. The aircraft first operated under the Nancy Rae project name as an asset of Air Force Systems Command and later as an RC-135S reconnaissance platform with Strategic Air Command under the project name Wanda Belle. The name Rivet Ball was assigned in January 1967. The aircraft operated from Shemya AFB, Alaska. Along with most other RC-135 variants, the RC-135S had an elongated nose radome housing an S band receiving antenna. The aircraft was characterized by ten large optically flat quartz windows on the right side of the fuselage used for tracking cameras. Unlike any other RC-135S, Rivet Ball also had a pleixiglass dome mounted top center on its fuselage for the Manual Tracker position. Rivet Ball holds the distinction of being "the very first KC-135 of any variant to perform a reconnaissance mission." It also holds the distinction of obtaining the very first photographic documentation of Soviet Multiple Reentry vehicle (MRV) testing on October 4, 1968. On January 13, 1969 Rivet Ball was destroyed in a landing accident at Shemya when it hydroplaned off the end of runway 28 with no fatalities.

RC-135S Cobra Ball

The RC-135S Cobra Ball is a measurement and signal intelligence MASINT collector equipped with special electro-optical instruments designed to observe ballistic missile flights at long range. The Cobra Ball monitors missile-associated signals and tracks missiles during boost and re-entry phases to provide reconnaissance for treaty verification and theater ballistic missile proliferation. The aircraft are extensively modified C-135Bs. There are three aircraft in service and they are part of the 55th Wing, 45th Reconnaissance Squadron based at Offutt Air Force Base, Nebraska. Cobra Ball aircraft were originally assigned to Shemya and used to observe ballistic missile tests on the Kamchatka peninsula in conjunction with Cobra Dane and Cobra Judy. Two aircraft were converted for Cobra Ball in 1969 and following the loss of an aircraft in 1981 another aircraft was converted in 1983. The sole RC-135X was also converted into an RC-135S in the late 1990s to supplement the other aircraft. Following the loss of one RC-135T aircraft, an EC-135B was modified in 1985 as a TC-135S for use as a training aircraft for the RC-135S crews to enable them to train with the different aerodynamic effects from standard aircraft. It did not carry any mission equipment.

RC-135T Rivet Dandy

KC-135T 55-3121 was modified to RC-135T Rivet Dandy configuration in 1971. It was used to supplement the RC-135C/D/M fleet, then in short supply due to ongoing upgrades requiring airframes to be out of service. It operated under the Burning Candy operational order. In 1973 the aircraft's SIGINT gear was removed and transferred to KC-135R 58-0126, resulting in 55-3121 assuming the role of trainer, a role which it fulfilled for the remainder of its life.

RC-135T trainer configuration

The sole Rivet Dandy RC-135T, 55-3121 had its reconnaissance gear removed in 1973, and it assumed the role of aircrew proficiency trainer. Externally it retained the 'hog nose' radome and some other external modifications, but the trapeze below the tail was removed, and no refueling boom was fitted and the aircraft had no operational reconnaissance role. In this configuration it operated variously with the 376th Strategic Wing at Kadena AB, Okinawa, the 305th AREFW at Grissom AFB, Indiana, and the 6th Strategic Wing at Eielson AFB, Alaska. In 1982 the aircraft was modified with Pratt & Whitney TF33-PW102 engines and other modifications common to the KC-135E tanker program, and returned to Eielson AFB. It crashed while on approach to Valdez, Alaska on 25 February 1985 with the loss of three crew members, thus ending the career of arguably the most historically

significant member of the C-135 family.

RC-135U Combat Sent

The RC-135U Combat Sent is designed to collect technical intelligence on adversary radar emitter systems. Combat Sent data is collected to develop new or upgraded radar warning receivers, jammers, decoys, anti-radiation missiles, and training simulators.

Distinctly identified by the antennae arrays on the nose, tail, and wing tips, three RC-135C aircraft were converted to RC-135U (63-9792, 64-14847, & 64-14849) in the early 1970's and 63-9792 was converted to Rivet Joint, late 1978, and all aircraft are based at based at Offutt AFB, Nebraska. Minimum crew requirements are 2 pilots, 2 navigators, 3 systems engineers, 10 electronic warfare officers, and 6 area specialists.

RC-135 Rivet Joint

The RC-135V/W is the USAF's standard airborne SIGINT platform. Its sensor suite allows the mission crew to detect, identify and geolocate signals throughout the electromagnetic spectrum. The mission crew can then forward gathered information in a variety of formats to a wide range of consumers via Rivet Joint's extensive communications suite. The crew consists of the cockpit crew, electronic warfare officers, intelligence operators, and airborne systems maintenance personnel. All Rivet Joint airframe and mission systems modifications are performed by L-3 Communications in Greenville, Texas, under the oversight of the Air Force Materiel Command. All RC-135s are assigned to Air Combat Command. The RC-135 is permanently based at Offutt Air Force Base, Nebraska., and operated by the 55th Wing, using various forward deployment locations worldwide. Under the "BIG SAFARI" program name, RC-135Vs were upgraded from the RC-135C "Big Team" configuration, itself a mission modified RC-135B (the first version delivered). RC-135Ws were originally delivered as C-135B transports, and all were modified from RC-135Ms.

RC-135X Cobra Eye

The sole RC-135X Cobra Eye was converted during the mid to late-1980s from a C-135B Telemetry/Range Instrumented Aircraft, serial number 62-4128, with the mission of tracking ICBM reentry vehicles. In 1993, it was converted into an additional RC-135S Cobra Ball.

RC-135W Air Seeker

The Air Seeker is a SIGINT aircraft for the Royal Air Force based on the Boeing RC-135 Rivet Joint aircraft. Three KC-135R aircraft are to be purchased and converted to RC-135W Rivet Joint standard. The cost per airframe is believed to be $330 million.

The Air Seeker is to replace the Nimrod R1 in the signal intelligence role. The Nimrod R1 is scheduled to be retired in March 2011 due to the cost of airframe maintenance and the cancellation of the Project Helix upgrade programme due to escalating costs. With the early retirement of the Nimrod R1 in 2011 and the delivery of the first Air Seeker to the Royal Air Force not until 2014, the gap in operational capability will be filled by joint operations between the RAF and USAF's 343d Reconnaissance Squadron.

In January 2011 personnel from No. 51 Squadron RAF began training at Offutt for conversion to the RC-135. The conversion of three KC-135R airframes to RC-135W standard is to be undertaken by L3 Communications, who will also provide ongoing maintenance and upgrades under a long-term agreement.

The three airframes are former United States Air Force KC-135Rs, all of which first flew in 1964 but will be modified to the latest RC-135W standard before delivery. The three airframes on offer to the UK are the youngest KC-135s in the USAF fleet. The aircraft have approximately 23,200; 22,200 hours; and 23,200 flying hours respectively, as of September 2010, and are expected to remain in service until 2045.