

# Career Field History

by Michael H. Maggelet

On September 18, 1947 the U.S. Air Force came into existence. Nuclear weapons such as the Model 1561 Fat Man bomb and its successor (the Mark 3) and nuclear components were technically under the control of the Atomic Energy Commission. After World War II, the 509th Bomb Wing flying the B-29 Superfortress at Roswell AAF was the only unit capable of delivering nuclear weapons.

By the time the USSR detonated a nuclear device on August 29, 1949, the U.S. stockpile was steadily increasing. The military services were acquiring a variety of weapons, necessitating skilled technicians as maintainers instead of the weapons laboratories. An early Separation Qualification Record for Jack H. Rose, Tech 4, U.S. Army, who assembled the first atomic bombs, shows his background as an Aircraft Armorer (MOS 911) and Machinist (MOS 114).

According to the declassified document "The History and Custody of Nuclear Weapons", the services started maintaining weapons in 1950 under the direction of the Armed Forces Special Weapons Project under AEC supervision. It states "An example of military participation in custodial operations with the Atomic Energy Commission was at Site BAKER, a permanent storage site for stockpiled weapons. There were eleven AEC personnel and approximately 500 military. The military personnel consisted of two assembly teams of 77 technically qualified men each, 140 to 150 additional technical and administrative personnel and approximately 200 security personnel. In addition to training activities and supporting military maneuvers involving atomic weapons, the AFSWP personnel performed surveillance, inspection, maintenance, and conversion." (History, 13).

Components in early weapons required frequent testing, since the circuitry for fire sets, radars, and fusing components were based on vacuum tube technology. A major safety feature of early U.S. nuclear weapons required that nuclear components (capsule) not be fully installed inside the HE sphere during routine operations. The following paragraph on the Mark 3 bomb in Chuck Hansen's book "U.S. Nuclear Weapons, The Secret History" is informative-

*"The Mark III could be in combat ready status for just a short time. The life span of its lead acid batteries, once charged and installed was only nine days, during which time they had to be recharged twice (the batteries retained their charge for three days at a time). After nine days, the entire bomb had to be disassembled to remove the chemical batteries, lest they begin to corrode. Another problem was core heating: the large amount of plutonium in the weapon radiated so much energy (from alpha decay) that the pit had to be removed after ten days or its thermal effects would damage the high explosive charges and detonators. Like battery change, pit replacement also required complete disassembly and reassembly of the bomb, a procedure that took forty to fifty men between 56 and 76 hours to complete." (Hansen, 124).*

Subsequent weapons such as the Mark 4, 5, 6, 7, 12, 14, 15, 17, etc. were armed by a process known as in-flight insertion (IFI), where the inner and outer layers of HE were accessible through a trap door or field break and the nuclear components installed by electro-mechanical methods. The DOE film series "Basic Atomic Weapons" describes early weapons as such-

*"The Mark 3, more familiarly known as the Fat Man, was our first implosion type atomic weapon. Its prototype was first tested at Alamogordo, New Mexico in 1945, and later a Mk 3 was used operationally against the Japanese city of Nagasaki.*

*An improvement of the Mk 3, the Mk 4, developed after WWII, was our first atomic weapon to be produced on an assembly line basis and to be stockpiled in large numbers. To give better ballistic accuracy, the shape of the case was changed. Provisions were also made so that the nuclear core of*

*active material could be inserted without complete disassembly of the weapon, by the use of a special detachable device. This gave us the capability of in-flight insertion of the active material. The firing system, commonly referred to as the x-unit, and the fuzing system were also improved and mounted on a cartridge to facilitate checking and testing.*

*The Mk 6 looks almost identical to the Mk 4, from which it was developed; but inside the 61"x128" aluminum case, many changes have been made. Below the safing plugs, an easy to remove nose plate permits access to the horn type radar antenna, and allows for simpler and quicker inflight insertion. Redesign of the entrance to the pit, addition of a detonator holding trap door, and coring of the high explosives, makes it possible to slide the outer and inner cores of HE into a rotatable holder, and permits manual IFI to be accomplished in a minimum of time. A single lug at the top of the ballistic case is used to suspend this 8500 lb weapon from the bomb bay of the delivery aircraft, and extending through the skin are the arming wires that operate the pullout switches upon release.*

*This easy to remove cartridge is the electrical and electronic heart of the weapon, readily accessible are the batteries, the radars, and barometric switches of the fusing system. The gap tubes, and detonator contacts of the x-unit are on the face of the cartridge, and inside the weapon is the detonator distribution system, with its loading coils to equalize the electrical paths to the detonators. When the cartridge is inserted into the weapon, pressure contact provides the connection between firing system and the terminals of the detonation system.*

*In contrast with the Mk 6, which requires manual insertion of the nuclear material, the Mk 5 has a built in mechanism to perform the insertion of the capsule and the cored high explosives. Thus, by a switch on his inflight control box, the bomb commander of the delivery aircraft can automatically perform a nuclear insertion or extraction at any time. After the cartridge has been checked and installed, the tail section is attached, completing the assembly of this internally carried weapon."*

The first sealed pit, "wooden bomb" warhead was the W-25 for the AIR-2A Genie, fielded in 1957. According to Chuck Hansen, the last open pit weapon fielded by the USAF was the Mk 6 mod 6, retired in 1962. The career field in actuality consisted of three AFSC's, one electrical, one mechanical, and one nuclear.

The early AFSC was 461X0 (Nuclear Weapons Technician, Mechanical), trained at Lowry and then at Sandia. AFSC 331X0 nuclear weapons technicians (Electrical) were trained at Keesler AFB, Mississippi, for about 40 weeks of electronics school, and later attended the specialty school at Sandia Base. The courses were the ABM-56 Assembly Course and the ARM-30 Assembly Course. AFSC 332X0 personnel, of which there were only about a hundred, controlled the nuclear capsules at locations with an AEC rep (the birdcages were stored in a separately controlled AEC igloo). The 332 was responsible for inspecting and cleaning the capsule and birdcage, and performing IFI. Much later, the 332 was combined with the 331/463 career field.

An early course outline for 331's (Electronic) is presented as follows-

- Non Academic Training- 30 hrs
- Fundamentals- 54 hrs
- Principles of DC- 60 hrs
- Principles of AC- 60 hrs
- Vacuum Tubes and Amplification- 60 hrs
- Radar and Servo Systems- 60 hrs
- Math & Sinusoidal Waves- 54 hrs
- Advanced AC Principles- 54 hrs
- Oscillator Principles & Transistors- 54 hrs
- Modulation and RF Transmission- 48 hrs

Servo and Computer Circuitry- 24 hrs  
Leave- 60 hrs

The 331X0 mechanical side attended the following course-

Introduction to Nuclear Weapons- 48 hrs  
Electronic Device "A" (MC-1A Radar)- 120 hrs  
T-7 Test Set- 114 hrs  
MC-3 Radar System- 72 hrs  
Nuclear Physics- 42 hrs  
Nuclear Components (11-0-DE)- 42 hrs  
Mk 7 bomb- 66 hrs  
Mk 15/39/28 bombs- 60 hrs  
Warheads (W5 etc)- 42 hrs  
Operational Techniques- 18 hrs  
ECC- 6 hrs

*(special thanks to Dave Nutile for 331X0 course info)*

Course Duration- 1248 hrs, the course length was subsequently shortened to half with the introduction of the "black box" (major components) and new systems such as the AIR-2A Genie, Clip-In's, Mk43 etc, becoming the basis for the later 463X0 course.

In 1956 the AFSC for the 461 special weapons troops became 463X0 (mechanical). The 331's still performed electrical testing of radar and fusing and firing components. By 1958 the Missile Badge had been approved for those who worked directly on missiles such as the Matador, Mace, Atlas, Titan, and so on.

In 1959 a suffix was added to the 463X0 AFSC, "A" for tactical weapons and "B" for strategic weapons. 331's also had shredouts for certain bombs or missiles. In 1960, the entire career field became known as 331X0. In 1962 the AFSC changed back to 463X0. Technology was improving to the point that extensive testing of electrical components was no longer required.

After several years, the proposed munition's badge was redesigned into the Aircraft/Munitions Maintenance Badge, approved for wear in 1986. By 1992, the AFSC had changed to 2W2X0. Today, the USAF nuclear weapons career field has about 890 technicians and supervisors. After fifty-five years, USAF weapons technicians have maintained over 35 warheads and performed tens of thousands of LLC exchanges and retrofits, following in the footsteps of his or her predecessors by providing safe and reliable nuclear weapons.

*Thanks to Glenn Wines for providing information on early AFSC's and courses, and Jim Oskins for info on AFSC 332X0.*

## Course Outline

### G3ABR46330 Nuclear Weapons Specialist

714 hours

Block 1- Nuclear theory, technical orders, regulations, publications, safety, security, electronics, etc.

Block 2- General Procedures (TP-35-51), PAL, T&H gear.

Block 3- W25/AIR-2A Genie

Block 4- B57 GM , PC, and LLC

Block 5- B43 GM and PC

Block 6- B43 LLC

Block 7- B28FI GM and PC

Block 8- W28 LLC

Block 9- B61 GM and PC

Block 10- B61 LLC

Block 11- W69/AGM-69A SRAM

Block 12- Clip In's (MHU-29A/C, MHU-20A/C, PWU-6), Bomb Racks, MJ-1 Jammer, etc. (SAC Hanger)

Block 13- B53 GM, PC, and LLC (High Bay)

Block 13- Reentry Vehicles (High Bay)

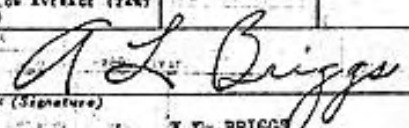
Block 14- Course Review, Final Exam, Graduation, and PCS.

Note- this outline is from memory, if you know the exact course of instruction or have examples of earlier ones, let me know!

Last Change- 17 Apr 2002

33130 CLASS SCHEDULE - LOWRY AFB - 1956

Total of 486 hours of instruction - 81 class days  
or approximately 16 weeks

LAST NAME - FIRST - MIDDLE INITIAL				GRADE <b>A/30</b>		COURSE <b>Weapons Firing System Specialist (Electrical)</b> AB13130-1													
36. ACTION							REASON												
ASSIGNED TO		CLASS NO	SHIFT	PAR	SO	DATE													
3d 15th Stolon		23056		30	97	21 May 56													
Grad off 25 Sep 56		23056		56	118	12 Sep 56													
37. PHASE TITLE							38. HOURS	39. PERFORM TEST SCORE	40. WRITTEN TEST SCORE	41. PHASE AVERAGE SCORE	37. PHASE TITLE	38. HOURS	39. PERFORM TEST SCORE	40. WRITTEN TEST SCORE	41. PHASE AVERAGE SCORE				
Electricity and Magnetism							84				Air Force Personnel Center 970 Page Blvd. St. Louis, Mo								
Alternating Current							78												
Introduction to Nuclear Weapons							24												
Large Diameter Weapons							90												
Small Diameter Weapons							90												
Warheads							60												
Operating Techniques							12												
42. REPEAT CASES				42A. NO OF PH RPT				42B. CRSE AVG BASED ON ORIG PH SCORES				43. TOTAL HOURS				44. FINAL GRADE			
												486							
43. REMARKS																			
																			
45A. TRANSFERRED TO				PAR	SO	DATE	45. CERTIFICATION (Signature)												
3d 15th Stolon (Perm Party)							T. D. BRIGGS MAJOR, USAF												

NOV 5 1956

Courtesy of Charles Moore

AIRMAN AIR FORCE SPECIALTY  
WEAPONS FUSING SYSTEM SPECIALIST

1. SPECIALTY SUMMARY

Inspects, assembles, tests, maintains, and repairs atomic weapons fusing systems components and related test equipment.

2. DUTIES AND RESPONSIBILITIES

\*a. Inspects, assembles, and tests fusing system components: Prepares test equipment and fusing system components for acceptance checks. Tests circuits, voltages, power outputs, tuning, calibration, gear trains, automatic switches, timing devices, and operation of tubes and relays, using analyzers, frequency meters, resonant cavities, vacuum tube voltmeters, altimeters, oscilloscopes, and specialized electrical and electronic measuring devices. Observes dial readings, computes data from instrument and chart readings, and records component defects on inspection forms. Connects and mounts electrical and electronic components, conducts standardized tests of installed equipment, and rejects substandard assemblies. Performs visual inspection of nuclear components.

\*b. Maintains and repairs electrical and electronic components: Performs preventive maintenance on fusing system components and associated test equipment. Isolates malfunctions such as faulty condensers,

poor connections, faulty tubes, and discolored or cracked resistors. Replaces, repairs, or adjusts components in accordance with applicable technical publications. Tunes, aligns, and calibrates repaired assemblies to insure optimum performance consistent with design characteristics. Maintains and repairs radiac equipment.

c. Salvages damaged fusing system components: Collects and identifies scattered electrical and electronic components of atomic weapons. Safeguards salvaged assemblies and observes all safety precautions.

d. Supervises weapons fusing system specialists: Assigns work and reviews completed repairs to insure compliance with local procedures and applicable technical publications. Instructs subordinates in techniques and procedures for inspection, assembly, and repair of electrical and electronic components.

3. SPECIALTY QUALIFICATIONS

a. Education:

(1) Knowledge of the principles of electricity and radar electronics; theory of electro-chemical reactions in battery power sources; and interpretation of technical publications, blueprints, and wiring diagrams is mandatory. Attaining a qualifying

score on the APT applicable to the specialty described herein satisfies ~~these~~ mandatory knowledge qualifications.

(2) High School courses in algebra, plane geometry, trigonometry, physics, and radio are desirable.

b. Experience. Experience in analyzing---

AFM 35-1F  
AFSC 33150  
Semiskilled AFSC 33130

12 Aug 57  
Effective 31 December 1957

electrical and electronic defects in weapons fusing systems, use and interpretation of test equipment and publications, and maintenance and repair of fusing system components is mandatory.

c. Training. Completion of a weapons fusing system course is desirable.

d. Other:

(1) Physical profile serial 2221 is desirable for field or base assignment.

(2) Normal color vision (17 plate AOC test) as defined in AFM 160-1 is mandatory.

#### 4. S P E C I A L I T Y D A T A

A. Grade Spread: Airman second class through staff sergeant.

B. Source Jobs (D.O.T.):  
Electrical Equipment Tester..4--99.916

Radio Repairman I.....5--83.411  
Radio Mechanic II.....5--83.447  
Electrical Instrument  
Repairman.....5--83.975

## AIRMAN AIR FORCE SPECIALTY

# NUCLEAR WEAPONS MECHANICAL TECHNICIAN

### 1. SPECIALTY SUMMARY

Inspects, disassembles, tests, modifies, assembles, salvages, and stores mechanical components of nuclear weapons and related test equipment; and supervises nuclear weapons mechanical activities.

### 2. DUTIES AND RESPONSIBILITIES

a. *Inspects, modifies, and assembles mechanical components of nuclear weapons:* Modifies bomb cases, fin assemblies, insertion mechanisms, and external warhead fixtures. Inspects detonator cables visually and for ohms resistance by use of special testing equipment. Inspects nuclear pit. Insures cables are attached to proper coils. Installs fuses in nuclear weapons and connects fuse cables, using special nonsparking handtools. Repairs bomb case locking mechanisms, fin assemblies, insertion mechanisms, and access covers. Modernizes nuclear weapons by following applicable technical orders and modernization orders. Removes, inspects for damage, and replaces high explosive charges. Salvages mechanical components of damaged nuclear weapons.

b. *Supervises nuclear weapons mechanical personnel:* Plans and schedules work assignments. Establishes work methods, production controls,

and performance standards. Insures availability of required test equipment, tools, and spare parts. Assigns work to subordinates, reviews completed repairs to insure compliance with technical directives, and evaluates qualifications of assigned nuclear weapons mechanical personnel. Participates as required in salvage operations. Conducts on-the-job training programs in inspection, modification, salvage, and assembly of mechanical components of nuclear weapons. Briefs personnel on importance of security measures and instructs subordinates in methods and procedures for safeguarding classified documents and equipment. Rotates assignment of mechanical assembly personnel on various components to insure opportunity for full qualification and to improve utility of assigned personnel. Periodically reviews training status to determine level of qualification achieved by individuals and units.

### 3. SPECIALTY QUALIFICATIONS

a. *Education:*

(1) Knowledge of mechanical assembly and disassembly procedures, safety precautions for handling high explosives, use of test equipment, and interpretation of schematic diagrams and blueprints, is *mandatory*. Attaining a qualifying score on the APT applicable to the specialty described herein satisfies these mandatory knowledge qualifications.

(2) Knowledge of fusing system functions is desirable.

b. *Experience.* Qualification as Nuclear Weapons Mechanical Specialist is *mandatory*.

In addition, experience in performing or supervising functions such as receiving, storing, performing storage inspections, modernizing, and preparing mechanical components of nuclear weapons for operational use, is *mandatory*.

c. *Training.* Completion of a primary management course is desirable.

d. *Other:*

(1) Physical profile serial 222221 is desirable for field or base assignment.

(2) Normal color vision as determined by the 17-plate AOC test is *mandatory*.

## The 332X0 Career Field (Oskins)

The 332X0 training was conducted at Lowry AFB in Denver, and consisted of about 4 months of basic electricity and electronics theory, and 2 months of "SET" school. The 332X0 technical training contained information on nuclear theory and the inspection, maintenance, disassembly, and assembly of the initiator and nuclear capsule.

All the units that we later worked on, the MK6, MK15, MK17, MK21 and MK36 required a capsule. We had three size capsules, depending on the weapon and the yield desired. They were referred to by number - 110, 150, or 210 which was the largest. By 1956, it was no longer necessary to inspect or change the initiator, so we did not have to disassemble a capsule. However, we still had to inspect them and clean them periodically. There were three 332s assigned to each SAC base. The nuclear capsule work did not keep us busy, so we filled in with the 331s.

At Manzano Base and Lake Mead Base (Nellis AFB), the nuclear capsules were stored in a separate part of the Plants. When the Air Force and the Atomic Energy Commission went to the "bombs on base" concept, a vault in a standard igloo was used. In some cases, these igloos were shorter than the regular storage igloos.

## Re(1): 332X0 CAREER FIELD

Posted on December 30, 2002 at 10:20:30 PM by [George Alvord](#)

Jim,

You probably aren't going to find someone who has a 332X0 job description. At the time the 332X0 career field existed the job descriptions of both the 331 and 332 were classified. At the time, the AFM with the job descriptions of all the AFSCs had a short statement that the duties were classified for both these fields. Eventually the 331X0 job description was declassified, but the 332X0 no longer existed by that time.

I started in the 331X0 field in 1954 and had friends who were 332's. I'll pass on some info from memory.

At the time, training for entry to the 331X0 field started with a electronic fundamentals course through the Q13 bombing radar at Keesler AFB, MS. It was followed by the ABE course taught by AFSWP at Sandia Base NM. Upon graduation we were awarded AFSC 33130 At every other graduating ABE class they picked some of the top of the class for the 332X0 course which if I remember was 6 weeks long. (All courses taught there were intense.) The course included nuclear physics and nucleonics.

Task of the 332X0 was to maintain the capsules, which like all components of the weapons of that generation required periodic disassembly, testing, inspection, cleaning, reassembly and repackaging.

About 1955 improvements in the capsule design and replacement with the new versions eliminated the testing and made their maintenance much easier. The 332X0s were merged into the 331X0 field. Capsule maintenance was passed on to the 331X0s in addition to their other duties. A few years later changes in weapon design sent the old design weapons and their capsules into retirement and history.

Hope this helps a bit.