CDC 2W151B

Aircraft Armament Systems Journeyman

Change Supplement for Volume: 01, 02, and 03

IMPORTANT: Make the corrections shown in this supplement before beginning your study of the volume it affects. This supplement contains pen-and-ink changes and/or replacement pages.

Air Force Career Development Academy
The Air University
Air Education and Training Command

2W151B 00 S01 1909 EC 07
AFSC 2W151

CDC 2W151B-01-1704, Edit Code 07

Changes for the Text: Volume 1

Pen-and-Ink Changes:

Page	Subject	Line(s)	Correction
1-35	006	6 fr bot	Change: “aircrafts” to “aircraft”
2-10	011	12 fr bot	Change: “AFI 91–203, *Air Force Consolidated Occupational Safety Instruction*” to “AFMAN 91–203, *Air Force Occupational Safety, Fire, and Health Standards*”

CDC 2W151B-02-1706, Edit Code 07

Changes for the Text: Volume 2

Pen-and-Ink Changes:

Page	Subject	Line(s)	Correction
3-12	218	21 fr top	Change: “red” to “green”
3-12	218	22 fr top	Change: “green” to “red”

CDC 2W151B-03-1706, Edit Code 07

Changes for the Text: Volume 3

Pen-and-Ink Changes:

Page	Subject	Line(s)	Correction
1-8	403	10 fr top	Change: "AFI 91–203, *Air Force Consolidated Occupational Safety Instruction*" to "AFMAN 91-203, *Air Force Occupational Safety, Fire, and Health Standards*"
1-8	403	11 fr top	Change: "*Explosive*" to "*Explosives*"
4-1	436	18 fr bot	Change: "*Explosive*" to "*Explosives*"

CDC 2W151B-01-1704, Edit Code 07

Changes for the Text: Volume 3

Page Changes:

Remove:	Insert:
3-7 – 3-8	3-7 – 3-8
4-9 – 4-12	4-9 – 4-16
G-1 – G-4	G-1 – G-4

rounds through the gun and extract empty cases after round firing. A bearing roller on top of the bolt is used to keep it in the cam path of the gun housing during gun operation.

Safing sector

A safing sector is attached to the gun housing with two quick-release pins. It is a safing device for the gun. Its inner surface forms the dwell segment of the cam path. This segment brings the bolt assemblies into the firing position. When the safing sector is removed, the bolt assemblies cannot be cammed into the firing position by manual or mechanical rotation of the barrels, nor can the firing pins be cocked and released by the triggering cam on the rotor assembly.

Housing cover

The housing cover is secured to the safing sector and gun housing by two quick-release pins. It provides you with a point of access to the rotor and bolt assemblies for inspection and service. There is a guide bar held to the housing assembly by a permanently installed pin at the front and a screw at the rear. This guide bar directs cartridges from a feeder assembly into the extractors. It also cams spent cartridge cases out of the extractors into an ejection chute. The gun also has an aft gun support attached to the rear of the rotor assembly. The gun barrels (fig. 3–6) are supported by the front part of the rotor assembly. They have a barrel lock flange on the breech end of the barrel to lock them into place in the rotor. A barrel clamp assembly is inserted over the muzzle end of the barrels to keep them from spreading apart as the gun turns.

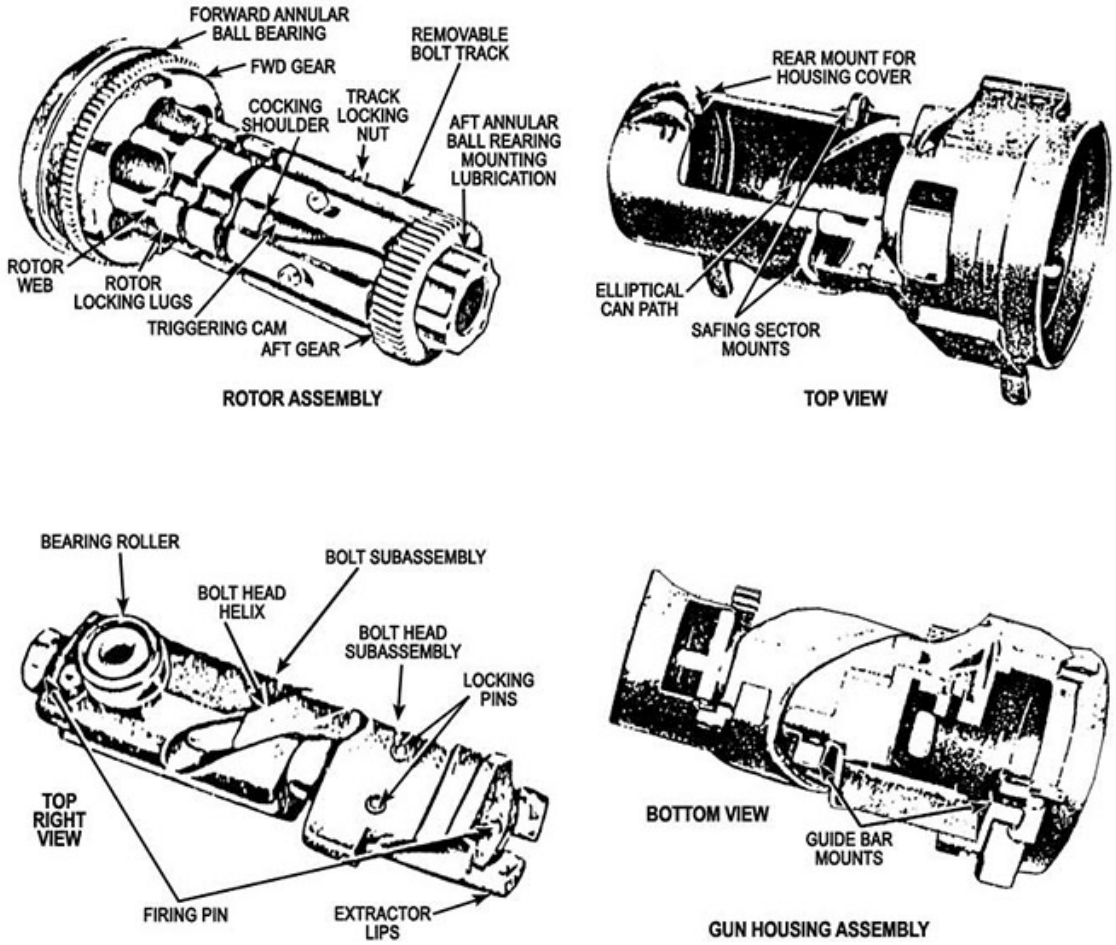

Figure 3–4. GAU–2 components.

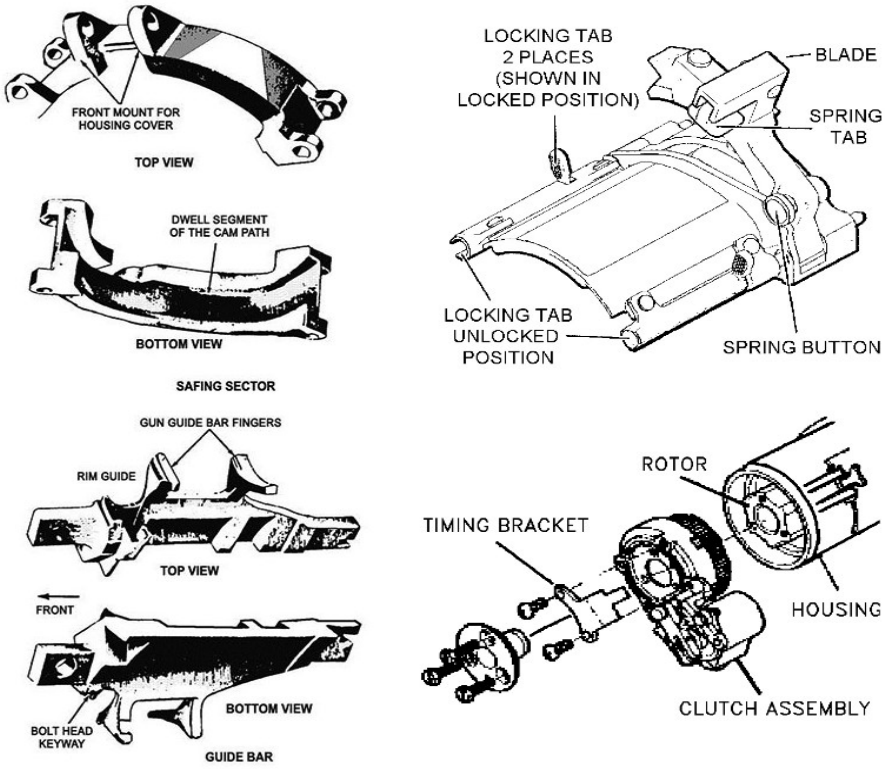

Figure 3–5. GAU–2 components (cont'd).

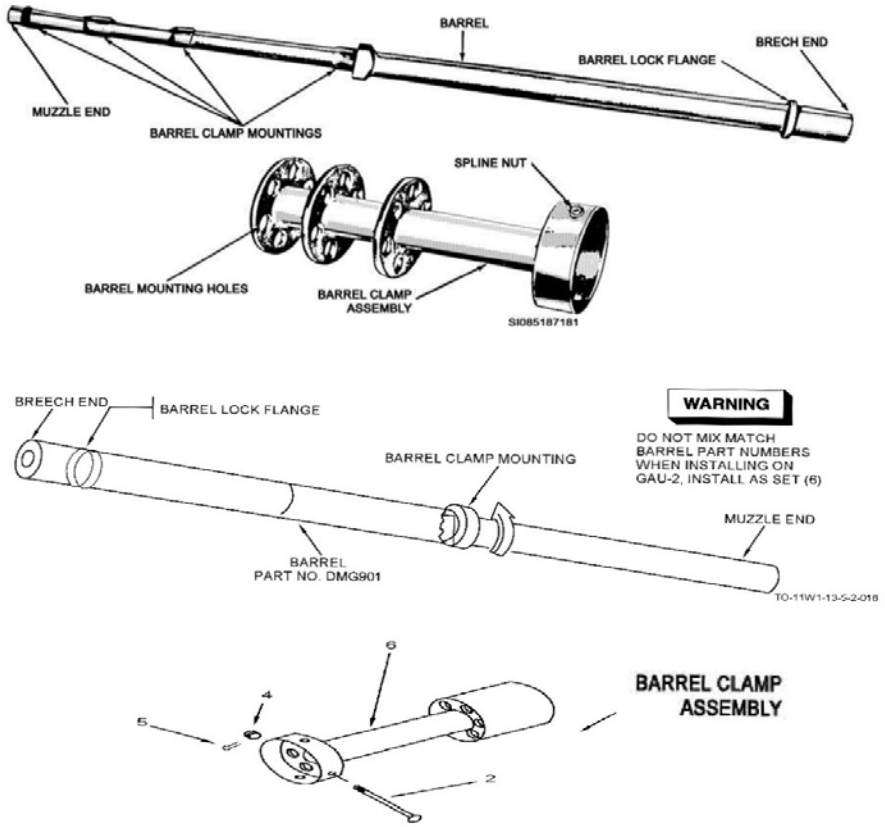

Figure 3–6. GAU–2 components (cont'd).

Concurrent servicing operations

Normally, when an aircraft returns from a mission, the various flightline expeditors will coordinate through the production superintendent a deconflicted servicing schedule where different shops will be able to work on aircraft, in turn, to prepare them for their next flight. Sometimes, it is necessary to "turn" aircraft as quickly as possible to complete the mission. To do this, the Air Force produced a series of procedures and guidance called the CSO. A CSO is defined as the simultaneous loading/unloading of munitions, fueling, aircraft reconfiguration, and may include aircraft –6 inspections, and other aircraft servicing. Other servicing may include oil, nitrogen, and hydraulic fluid. Oxygen servicing is *never* done during fuel servicing. CSO provides units operational flexibility in managing resources and a rapid means of generating mission-ready aircraft. A DLO will not be conducted during CSO. Any time fueling is being done during a CSO, a concurrent servicing supervisor (CSS) is required to be present.

The CSS is the person responsible for onsite supervision of all aspects of fuel servicing, munitions loading/unloading, and aircraft reconfiguration while being performed concurrently. The key function requiring the CSS is fueling. When no fueling is taking place, a CSS is not required. The CSS must be at least a 7-level with a maintenance (2AXXX or 2WXXX) Air Force specialty code (AFSC). The CSS must have at least one year of experience on the airframe. Also, the CSS must be a safety supervisor who will supervise only one CSO at a time and will perform no other functions.

Integrated combat turn around concept

One of the best methods we use to prepare for contingency operations of quick turning combat aircraft is the integrated combat turn (ICT) around concept. An ICT operation is a method of recovering, re-servicing, reloading, rearming, and relaunching mission-capable aircraft as quickly as possible. This concept allows different personnel in different Air Force specialties to perform their specialized aircraft maintenance tasks simultaneously so an aircraft may be returned to combat in a minimum amount of time. This is a very fast-paced operation, which without thorough initial planning can result in an extremely hazardous working environment.

Classes

ICTs are divided into two classes—hot and cold. Hot ICTs are performed with aircraft engines running; engines are shut down during cold ICTs. Hot ICTs are normally performed during combat operations but may be performed for combat training exercise and evaluations when authorized by MAJCOMs.

Combat turnaround area

Hot ICTs are performed in combat turnaround areas (CTA). CTAs may be a hardened aircraft shelter (HAS), flow-through revetments, an open ramp, or a hot refueling pit.

Configurations

ICTs are performed within the CTA in three different configurations, depending on the aircraft and major command authorization. These configurations are nose-in, nose-out, and double-stuffing.

Nose-in

The nose-in configuration allows an aircraft to taxi or be towed into a shelter nose first and then undergo ICT procedures.

Nose-out

In the nose-out ICT, an aircraft is positioned with the nose toward the shelter doors for ICT.

Double-stuffing

Double-stuffing uses the concept of two aircraft being towed or taxied into the same shelter. One of the aircrafts may undergo ICT procedures while the other is just parked in the shelter for survivability purposes, or they both may undergo ICT procedures sequentially. Parking the aircraft in the shelter includes parking schemes such as both aircraft nose-in, both nose-out, and nose-to-nose parking.

Personnel

There are a number of people involved in ICT operations.

Sortie production

Sortie production (SP) has overall responsibility for all maintenance personnel and resources dedicated to a CTA. SP have complete authority to establish priorities and expanded resources to ensure maximum SP and request assistance in resolving problems beyond the capable of meeting mission requirements and weigh all decisions against the priority of the mission(s) being generated (for example, whether to continue or terminate operations in the face of hazards/safety risks).

Aircraft turnaround supervisor

An aircraft turnaround supervisor (ATS) is normally required for an individual aircraft involved in an ICT operation but may be responsible for more than one aircraft at a time depending on base requirements. The ATS is a 7-level maintenance technician who is responsible for coordinating all activities for the aircraft. The ATS additional responsibilities include:

1. Briefing the turnaround crew on actions to be taken in the event of an accident.
2. Ensuring tech data, local operating instructions (OI), and established safety procedures are followed.
3. Stopping the turnaround operation if an unsafe condition is observed.
4. Ensuring equipment and munitions are prepositioned and inspected for serviceability.
5. Ensuring security requirements are maintained during the operation.

Fuels personnel

Fuels specialists or petroleum, oils, and lubricants (POL) personnel are present for the refueling of each aircraft.

Fire department

Because ICTs present a higher degree of risks and increased potential of fire hazards, fire department personnel are also on hand.

Weapons load crew

A weapons load crew proficient in loading the required munitions and have received additional training pertaining to ICT procedures must be present to perform weapons functions.

Crew chiefs

Airframe Powerplant General (APG) or aircraft crew chiefs are responsible for recovering, re-servicing, and relaunching the aircraft during ICTs. Two crew chiefs are normally involved. One hooks up the ground interphone sets and communicates directly with the pilot, and the other re-services the aircraft.

Concept of operation

Each MAJCOM has its own expectations of how their ICTs should progress under given circumstances. But, in general, ICTs are very similar, regardless of the command or the aircraft being turned.

Basic assumption

Each ICT starts with the assumption that an aircraft is returning from a combat sortie.

Inspection

Upon landing, the aircraft taxis to a cursory inspection area and is checked for status, leaks, and battle damage. The outcome of this inspection determines whether the aircraft is routed to an aircraft fix area or to the CTA.

In the CTA

Once the aircraft is in the CTA, it is prepared for servicing, which includes safing, debriefing, and removing devices.

Safing

After safing the aircraft, munitions unloading/loading is done.

Debriefing

If the aircrew requires a debriefing, the debriefing is normally done through the use of the ground interphone sets.

Remove devices

Next, all equipment, munitions safety devices, and aircraft ground safety devices are removed so that the aircraft can taxi.

Out of the CTA

The aircraft will taxi out of the CTA for immediate launch or return to a shelter for a later scheduled launch. During hot ICTs, HAS doors will remain open and onsite fire protection normally will be available.

Attack

If an airfield attack occurs, the aircraft engines are shut down and the HAS doors are closed. Cold ICT procedures will then be used to complete the ICT. During an attack, onsite fire protection normally will not be available because these vehicles themselves are withdrawn to an empty HAS for protection. At this point, fire protection vehicles will only respond when directed to do so by the command post.

Safety

The major hazard found in any ICT operation is an abundance of ignition sources—all present at the same time and in the same place. These sources include operating support equipment and uncontrolled static discharge from personnel and equipment.

Hazards

ICTs, hot or cold, possess these hazards. During hot ICTs, the additional hazard of running aircraft engines is always present.

Static

The chance of a static discharge taking place during an ICT is higher because of the high stress environment that is imposed on the personnel involved.

Grounding

Personnel could forget to ground themselves and accidentally set off an explosion from a spark of static electricity.

Number of personnel

The probability of mishaps occurring increases as the number of people in the operation increases and the stress level rises. For these reasons, personnel in these operations must be kept to a minimum.

Fuel spills

Fuel spills or leaks added to an ignition source create another possibility for an explosion or fire to take place.

Damage

During hot ICTs, the possibility of an aircraft engine sustaining damage because of foreign objects is greater than normal since there will be substantially more people working under and around the aircraft while its engines are running. Everyone must exercise extreme care when working around the aircraft’s engine intake areas.

Settle and pinch

During aircraft loading, the load crew must be aware that the aircraft may abruptly settle, creating pinch points between the equipment and the aircraft. Make sure you or any part of your body is not in one of these areas.

Noise

Noise from working in an enclosed area is an ever-present hazard. Always wear ear protection.

Emissions

Any emissions from operating engines (aircraft and support equipment) may cause eye irritation. Loading safety requirements used during ICTs include all the items we covered in the section on aircraft loading safety requirements plus any authorizations/restrictions that apply to a particular aircraft. You must consult the individual aircraft's TOs for these requirements.

Towing and winching

There are a few general requirements that apply across various aircraft that you should be aware of. Any aircraft that requires towing/winching into a CTA must have its landing gear down-locks (if applicable) installed. The only time this is not required is if the aircraft is a hot ICT. You should also be aware that unexpended munitions normally need not be downloaded to accomplish ICT procedures, but they must have all applicable safety pins and devices installed.

Support equipment

During refueling operations, the use of support equipment must be kept to a minimum and operators must keep their equipment clear of all fuel vents, masts, or ports to the greatest extent possible. Never stop a piece of support equipment where the unit's engine is in line with these fuel vents. Normally, live impulse cartridges do not need to be removed from stations that are being reloaded (reconfigured with a different munition). If a fuel spill occurs, all operations must be suspended and corrective action taken before proceeding further with the operation. During refueling or reloading, aircraft maintenance should be limited to operations that (1) can be done during the combat turnaround; (2) does not interfere with other operations; (3) does not require power to be applied to additional aircraft circuits; and (4) does not require access to the cockpit (except as specifically authorized by tech data).

Procedures

ICT procedures are broken into two sections—prepositioning and servicing/loading.

Prepositioning

Prepositioning includes a prepositioning inspection and munitions preparation. During the prepositioning inspection, all support and firefighting equipment is positioned in the appropriate area in which it will be used. This is just more or less a preparation of the CTA than for the ICT. Munitions preparation is performed the same as those done under normal loading procedures.

Servicing/loading

Servicing/loading includes cursory inspection, aircraft preparation, munitions unloading and loading, final cockpit preparation, aircraft servicing, final aircraft preparation, and immediately prior to launch procedures.

Cursory inspection

The cursory inspection can be performed in conjunction with aircraft preparation and really equates to an end of runway (EOR) inspection. Here, we install safety pins or devices in all applicable stations and safe all returned munitions.

Aircraft preparation

Aircraft preparation basically stays the same for us and, of course, so does munitions loading and unloading.

Final preparation

During final aircraft preparation, we ensure that safety pins are installed in all loaded stations, impulse cartridges have been installed, fuze safety devices are removed, tool and equipment are cleared from the area, all access doors are closed and secured, and AFTO Form 781 entries are made.

Immediately prior to launch

Immediately prior to launch includes EOR arm procedures, removing munitions protective covers and safety pins and devices, and arming munitions for flight.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

438. Rapid aircraft "turning" methods

1. What is a DLO?

2. On what aircraft is the DLO accomplished?

3. What is a CSO?

4. What are the requirements to become a concurrent servicing supervisor?

5. Who constantly stays in contact with the aircraft pilot during an ICT?

6. How is a hot ICT completed if an airfield attack occurs?

7. What are the major ignition sources present during an ICT operation?

8. What two enclosed area hazards are particularly present during hot ICTs?

9. When is the only time landing gear down-locks (if applicable) are not required during ICT operations?

10. What do you do if a fuel spill occurs during ICT operations?

Answers to Self-Test Questions

436

1. AFMAN 91–201.
2. One 150-pound Halon 1211 extinguisher.
3. Ground yourself.
4. Submerge the munition in a container of water or smother it with sand, dirt, or foam.
5. A protective mask, butyl rubber gloves, and a 5-gallon container of clean water.
6. This certifies that impulse cartridges are not installed at a particular station.

437

1. Seven.
2. Aircraft preparation.
3. Safing the aircraft, installed accessory preparation, and functional or stray voltage tests.
4. Munitions preparation.
5. Alternately, from one wing to the other.
6. Never load the aft weapons bay before loading either the forward or intermediate weapons bay.
7. Before cartridge installation.
8. They must be torqued according to the applicable tech data.
9. Load crew chief.
10. Immediately before launch or EOR.
11. Safing, preunloading, unloading.

438

1. Two load crews working on the aircraft at the same time.
2. External and internal (B–52) or dual bay (B–1, B–2).
3. The simultaneous loading/unloading of munitions, fueling, aircraft reconfiguration, and may include aircraft –6 inspections, and other aircraft servicing.
4. The CSS must be at least a 7-level with a maintenance (2AXXX or 2WXXX) AFSC with at least one year of experience on the airframe.
5. Aircraft crew chief or APG specialist.
6. HAS doors are closed and cold procedures are used.
7. Operating aircraft engines, operating support equipment, and uncontrolled static discharges.
8. Noise and emissions from operating aircraft engines.
9. When the ICT is hot.
10. Suspend all operations and take corrective actions.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

94. (436) The use of ground interphones during aircraft functional checks is
    a. preferred.
    b. mandatory.
    c. suggested.
    d. optional.

95. (436) In addition to a 5-gallon container of clean water and butyl rubber gloves, what *must* be available at a loading site where practice bombs with CXU–1/B spotting charges are being loaded?
    a. A protective apron.
    b. A protective mask.
    c. Telephone.
    d. Radio.

96. (436) If you find breech cartridge retainers installed, safety wired, or sealed this certifies the
    a. station cannot be loaded.
    b. station is not nuclear capable.
    c. impulse cartridges are installed.
    d. impulse cartridges are not installed.

97. (437) In what loading step is the serviceability of the munition loading stations determined?
    a. Safing.
    b. Loading.
    c. Aircraft preparation.
    d. Munitions preparation.

98. (438) Which load crew performs aircraft safe for maintenance procedures during a dual loading operation (DLO)?
    a. Primary.
    b. Secondary.
    c. Both.
    d. Squadron lead crew.

99. (438) During a concurrent servicing operation, what servicing action *cannot* be performed while refueling?
    a. Oil.
    b. Oxygen.
    c. Loading.
    d. Nitrogen.

100. (438) During a concurrent servicing operation, a concurrent servicing supervisor (CSS) is *not* required when
    a. engines are not running.
    b. no loading is taking place.
    c. fueling is not being performed.
    d. no oxygen servicing is taking place.

Student Notes

Glossary Abbreviations and Acronyms

A/A	air-to-air
A/G	air-to-ground
ADU	adapter unit
AFI	Air Force instruction
AFMAN	Air Force manual
AFOSH	Air Force Occupational Safety and Health
AGM	air-to-ground missile
AIM	air intercept missile
ALCM	air-launched cruise missile
ALIS	Autonomic Logistics Information System
AMAC	aircraft armament and control
AMU	aircraft maintenance unit
APG	Airframe Powerplant General
ASHS	ammunition storage and handling system
ATS	aircraft turnaround supervisor
BDU	bomb dummy unit
BIT	built-in-test
BRA	bomb rack assembly
BRU	bomb rack unit
CAC	common access card
CAS	Combat Ammunition System
CBU	cluster bomb unit
CDC	career development course
CND	can not duplicate
CRC	complete round code
CSCE	carriage system control electronics
CSO	concurrent servicing operation
CSRL	common strategic rotary launcher
CSS	concurrent servicing supervisor
CTA	combat turnaround area
db	decibel
DC	direct current
DLO	dual loading operations

ECIU	enhanced central interface unit
ECS	environmental control system
ECU	electronic control unit
EMI	electromagnetic interference
EO	electro-optical
EOD	explosive ordinance disposal
EOR	end of runway
FI	fault isolation
FOD	foreign object damage
GAU	gun automatic unit
GBU	guided bomb unit
GPS	global positioning system
HAS	hardened aircraft shelter
HUD	heads up display
ICT	integrated combat turn
IFL	in-flight lock
IMIS	Integrated Maintenance Information System
IMDS	Integrated Maintenance Data System
IR	insulation resistance; infrared
JDAM	Joint Direct Attack Munitions
JG	job guide
JHMCS	joint helmet mounted cueing system
JMMI	joint miniature munition interface
LAU	launcher adapter unit
LEU	launcher electronic unit
LRU	line replaceable unit
MAJCOM	major command
MAU	munitions adapter unit
MFD	multifunctional display
MHU	munitions handling unit
MIL-STD	military standard
MIU	missile interface unit
mm	millimeter
MOI	maintenance operating instruction
MPCD	multipurpose color display

MSCI	missile status control indicator
MUX	multiplex
OAS	offensive avionics system
OI	operating instruction
PAL	permissive action link
PBAR	practice bomb adapter rack
PDU	power drive unit
POL	petroleum, oils, and lubricants
QA	quality assurance
RDY	ready
RF	radio frequency
RIU	remote interface unit
RLA	rotary launcher assembly
RPM	rounds per minute
SBRA	smart bomb rack assembly
SCU	station control unit
SECBM	standard enhanced conventional bomb module
SEL JETT	selective jettison
SLU	station logic unit
SMS	stores management system
SOP	standard operating procedures
SP	sortie production
spm	shots per minute
SPU	station program unit
SRU	shop replaceable unit
SUU	suspension utility unit
TCTO	time compliance technical order
TER	triple ejector rack
TICMS	Theater Integrated Combat Munitions System
TO	technical order
VAC	volts, alternating current
VDC	volts, direct current
WCMD	wind corrected munition dispensers
WP	white phosphorus
WPN REL	weapon release switch

WSN	weapon stock number
WW1	World War 1

Student Notes

AFSC 2W151
2W151B 00 S01 1909
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