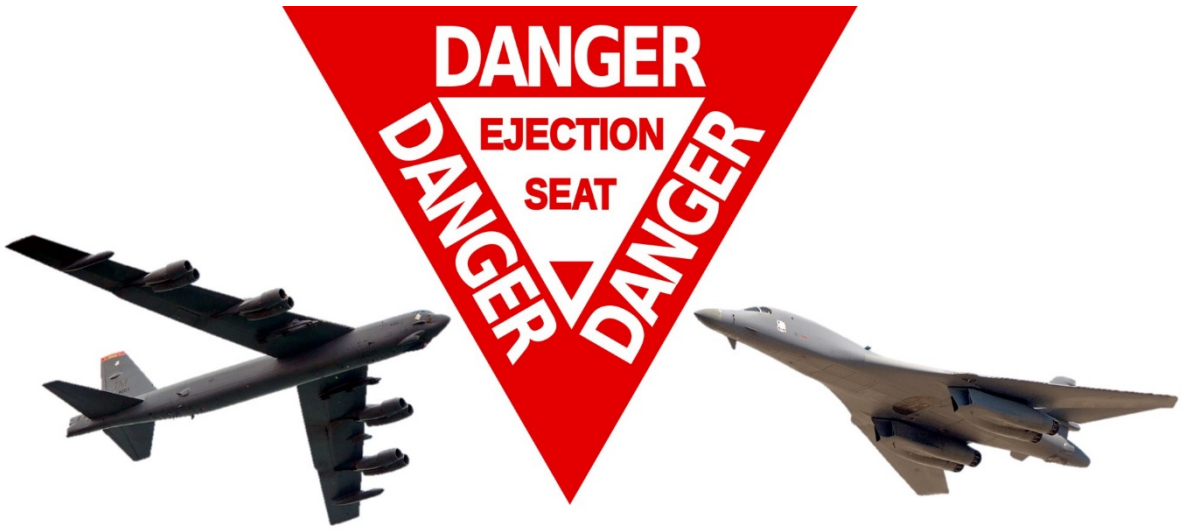
CDC 2A673

Aircrew Egress Systems Maintenance Craftsman

Volume 1. Maintenance Supply and Training and B-52/B-1 Aircraft Egress Systems



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Authors: MSgt Aaron Schmidt
TSgt Elijah Docker
361st Training Squadron
US Air Force Technical Training School
361 TRS/TRR
501 Missile Road
Sheppard Air Force Base, Texas, 76311–2264
DSN: 736-0463
E-mail address: 361TRSCDCWriters@us.af.mil

Instructional Systems Specialist: Dr. Kenith Isreal

Editor: Marie Lacayo

Air Force Career Development Academy (AFCDA)
Air University (AETC)
Maxwell AFB-Gunter Annex, Alabama

THIS career development course (CDC) serves to provide the basic maintenance management knowledge you need to upgrade to a craftsman (7-level) while in the Egress 2A673 career field. This is a two-volume, self-study course that the Air Force intends for you to complete during your off-duty time and when available, during idle duty hours. Satisfactory completion of this course is a prerequisite for upgrading to the 7-skill level.

You're required to know all the material contained within these two volumes even though you may not use all the information to perform your present job; you may find it useful at a future assignment.

This volume is broken into four units:

Unit 1 – Supply and Configuration Management.

Unit 2 – Maintenance Training and Personnel Resource Management.

Unit 3 – B-52 Egress System.

Unit 4 – B-1B Egress System.

A glossary is included for your use.

Code numbers on figures are for preparing agency identification only.

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For Guard and Reserve personnel, this volume is valued at 20 hours and 5 points.

NOTE:

In this volume, the subject matter is divided into self-contained units. A unit menu begins each unit, identifying the lesson headings and numbers. After reading the unit menu page and unit introduction, study the section, answer the self-test questions, and compare your answers with those given at the end of the unit. Then complete the unit review exercises.

Page

Please read the menu for Unit 1 and begin ➔

Unit 1. Supply and Configuration Management

1–1. Logistics Management and the Supply System

IN YOUR FIRST lesson we will discuss the fundamentals of the Air Force integrated life cycle management and then merge into the exciting Standard Base Supply System (SBSS), which is a supply interface system that you may already be familiar with –now referred to as Integrated Logistics System-Supply (ILS-S).

001. Logistics maintenance management

Logistics is defined as the procurement, supply and maintenance of equipment. So far, you may have only been exposed to the maintenance of the equipment, but to fully understand logistics maintenance management, we need to start at the beginning.

Integrated life cycle management

Air Force Policy Directive (AFPD) 63–1/20–1, *Integrated Life Cycle Management*, provides an Air Force acquisition and sustainment Integrated Life Cycle Management (ILCM) framework for Air Force systems, subsystems, end-items, services and activities. ILCM is the seamless governance, transparency, and integration of all aspects of infrastructure, resource management, and business systems necessary for successful development, acquisition, fielding, and sustainment of systems, subsystems, end-items, and services to satisfy validated warfighter capability needs. It applies to all Air Force military and civilian personnel, members of the Air Force Reserves, members of the Air National Guard and other individuals or organizations as required by binding agreement or obligation with the Department of the Air Force.

The ILCM approach must be applied to Air Force acquisition and sustainment activities, which shall provide for seamless governance and transparent processes to acquire and sustain programs to satisfy validated needs. ILCM recapitalizes Air Force capabilities through maximum acquisition cycle time efficiency and provides agile support that optimizes fielded capabilities and the supply chain, minimizes the logistics footprint, and reduces total ownership cost.

Acquisition

Acquisition is the conceptualization, initiation, design, development, test, contracting, production, deployment and disposal of a directed and funded effort that provides a new, improved or continued materiel, weapon, information system, logistics support or service capability in response to an approved need.

Sustainment

Sustainment is the continuing materiel support which consists of the planning, programming and execution of a logistics support strategy for a system, subsystem or major end-item to maintain operational capabilities from system fielding through disposal.

Air Force Materiel Command's role

Air Force Materiel Command (AFMC) is the major command (MAJCOM) responsible for delivering war-winning expeditionary capabilities to the warfighter through development and transition of technology, professional acquisition management, exacting test and evaluation and world-class sustainment of all Air Force weapon systems. From cradle-to-grave, AFMC provides the workforce and infrastructure necessary to ensure the United States remains the world's most respected air and space force.

The maintenance concept

Now that you understand the logistics side of maintenance management, we can talk about the maintenance concept. Maintenance is organized into two mutually supporting networks, Mission Generation Network (MGN) and Repair Network (RN). The MGN is optimized for mission generation at the wing level and contains the minimum capabilities required to launch, recover, configure, inspect and repair aircraft. The RN supports the MGN by providing serviceable components and equipment and conducting inspection, repair, and modification of aircraft and equipment. It is the responsibility of all maintenance personnel to comply with all written guidance to ensure required repairs, inspections and documentation are completed in a safe, timely and effective manner. Supervisors are responsible for enforcing and establishing a climate that promotes maintenance discipline. This includes the mandatory use of prescribed technical data and publications to maintain aircraft and equipment.

002. Maintenance-supply interface

The main objective of the Air Force supply system is to support all activities by providing all necessary supplies and equipment. A secondary objective is to conduct supply operations to conserve all items of materiel and ensure that the Air Force receives maximum possible benefits at the lowest cost. The supply system is the "lifeline" that allows us to function. Without it, our operations would eventually cease. Each shop must be capable of stocking and requisitioning the parts and supplies required to maintain its equipment and sustain the mission. The ILS-S, formally referred to as SBSS, is a system to meet this need.

Integrated Maintenance Data System (IMDS) interfacing with the ILS-S provides a way for the egress technician to manage nearly all of the shop's supply needs from a computer, without even leaving the work center. Begin with going to the ILS-S (supply) Utilities, screen 497 (fig. 1–1). From there you can navigate ILS-S with ease and efficiency. The two actions within the interface that we'll talk about in this lesson are performing inquiries and ordering parts.

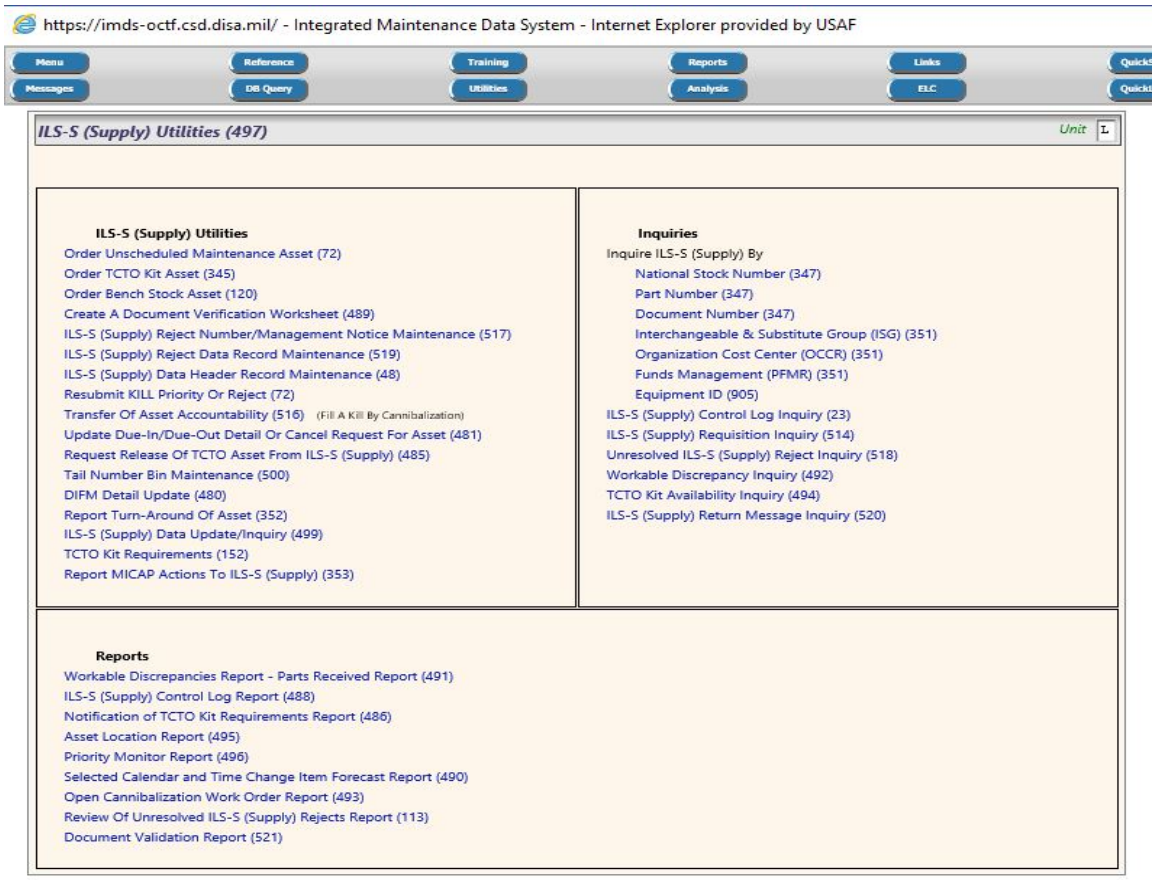


Figure 1–1. Integrated Logistics System-Supply (ILS-S) Utilities, screen 497.

Perform inquiries

As an egress technician, you may have to inquire into the availability of parts on base before you order them or find out the status of parts after ordering them.

Screen 497, ILS-S (supply) Utilities, is used as a central menu for the processing almost all your supply needs. The user can hyperlink to any screen from the menu; however, some options may require a document number to be entered.

The options on the menu located on screen 497 are presented in the following table:

Description
ILS-S Inquiry by Stock Number, Document Number, or Part Number. This screen provides the capability to inquire ILS-S by stock number, document number, or part number.
ILS-S Inquiry by OCCR, PFMR, MACR. This screen provides the capability to inquire ILS-S by Organization Cost Center Records (OCCR), Project Funds Management Records (PFMR), Materiel Acquisition Control Record (MACR) or Interchangeable and Substitution Group (ISG).
ILS-S Inquiry by Equipment-ID, Serial Number, or End Item Document Number. This screen provides the capability to inquire ILS-S by equipment-ID, serial number, or end item document number.
Workable Discrepancy Inquiry. This screen provides the capability to retrieve data necessary to generate an output containing data pertaining to open maintenance discrepancies as specified by the user.
Supply Control Log Inquiry. This screen provides the capability to retrieve data necessary to generate a Supply Control Report for a work center.
TCTO Kit Availability Inquiry. This screen provides the capability to retrieve data necessary to generate a time compliance technical order (TCTO) kit availability report.

Description
Review of Unresolved ILS-S Rejects. This screen provides the capability to retrieve data necessary to produce a listing of all ILS-S issued (ISU) request transactions rejected by ILS-S and not resolved by maintenance for an entire organization.
ILS-S (supply) Requisition Inquiry. This screen provides the capability to retrieve data from IMDS and display the outstanding supply requirements for a specific equipment-ID, work center, job control number, document number, part number, or equipment designator.

Order components

To minimize record discrepancies, all part ordering will be initiated from the logistics readiness squadron (LRS)/materiel management activity through the appropriate maintenance information system (MIS) when an interface with ILS-S exists. To navigate where you need to go to order parts in ILS-S, you would go through the ILS-S (supply) Utilities, screen 497. To order parts, choose “Order Unscheduled Maintenance Asset (72). Use this screen to order parts and other items needed for unscheduled maintenance and time change events at the job site from an IMDS remote terminal. With this screen, you can perform the following:

- Establish a request by using either a national stock number (NSN), a part number (PN), or a quick reference list (QRL) number.
- Request parts against the performing work center or the owning work center.

Take care to order parts against the proper work center so funding accounts can be properly managed. Usually fighter squadrons have bigger budgets so try to bill seat and aircraft components to them. The Integrated Maintenance Data System Central Database (IMDS-CDB) notifies supply in the form of an ISU transaction. The IMDS-CDB will create a supply data record ([SDR]–165) to maintain the status of each asset requirement forwarded to supply. Supply will, through ILS-S, accept the ISU transaction as “FILL” or “KILL”, and process it according to the urgency of need designator (UND) or urgency justification code (UJC) or the transaction exception (TEX) code in the input. UNDs are identified by the alphabetic letters A, B or C, with A being the highest. UJCs are two-digit codes that are too lengthy to explain here. For more information and a table matrix listing of UJCs, refer to Air Force Handbook (AFH) 23–123, Volume 2, Part 1, *ILS-S Materiel Management Oper*ati*ons,* Chapter 5.

An I004 management notice indicating the status of the request will be sent back to IMDS-CDB by the ILS-S after processing the ISU transaction. However, if the ISU transaction is rejected by ILS-S, the SDR–165 record will show “REJ” in the ILS-S -Act-Type field. Clear this document number by selecting “resubmit kill priority or reject” screen 497. If it is determined that the asset is not needed and a resubmission will not be done, then use “Data Update/Inquiry (499)” on screen 497 where you input a “D” in the option field to delete the document number. On the other hand, if the ISU transaction is rejected by the interactive communications interface (ICI), then the SDR–165 record will be automatically deleted from the IMDS-CDB database and a new ISU transaction will have to be accomplished at a time when ICI comes back up. You can also go directly through supply if ILS-S is down or if you are unfamiliar with this type of supply action.

It is absolutely necessary for the event (or job control number [JCN]) and work center event (WCE) to be loaded to IMDS-CDB prior to ordering parts from an IMDS-CDB terminal with the exception of shop stock and bench stock. During the Post-Post or contingency operations, parts will be ordered through the supply terminal or over the telephone. In this case, supply will load a “J” activity code 8000 series document number, which when passed to IM DS-CDB through the interface will build an SDR–165. If the event and work center event identification (WCE-ID) are already loaded in IMDS-CDB, then the document number will be hooked to it. If the event and WCE-ID are not yet loaded to IMDS-CDB but the equipment-ID is, then the document number record will be hooked to the equipment record. If there is no event and WCE-ID and there is no equipment-ID loaded to the IMDS-CDB system when Post-Post is ordered, the document number record will be built and hooked to the equipment-ID called “STRAY.”

If for some reason a document number is not hooked to a correct event, WCE, or equipment-ID, maintenance personnel will make the changes in IMDS-CDB. Use screen 516, Transfer of Asset Accountability, to transfer the document number to the proper event, WCE, and equipment-ID, then process a data integrity team (DIT) transaction to eliminate mismatches between IMDS-CDB and ILS-S on the document number. You can check to see what is hooked to STRAY by processing screen 514 with equipment-ID STRAY and placing a "Y" in the Post-Post field. You can also see if a change to the Document Number Record is required by processing screen 514, Supply Requisition Inquiry, entering the actual equipment-ID and a "Y" in the Post-Post field, or by doing an inquiry on screen 499. When an inquiry is made on screen 499 and it shows "PPS" in the ILS-S Act Type field, a change to the document number record is required.

If it shows a KILL action, then the amount killed, if still required, will have to be back ordered. To back order the killed amount on a partial issue, there must be a "P/I" in the ILS-S Act Type field of the supply record loaded in IMDS-CDB. This should happen automatically when supply processes the issue request. This field can be checked using screen 499. To process the back order request, use screen 497, option 4. Input the document number of the original partial issue request and transmit. This will pass off to a prefilled screen 072. Input the proper TEX code for back ordering. If back ordering mission impaired capability awaiting parts (MICAP), change the UJC to a MICAP UJC and input an "N" in the MICAP flag field. When transmitted, the amount killed will be back ordered under a new document number. The original document number will be changed to show quantity (Qty) Ordered field and Qty Issued field to be equal, Qty Killed field will be blank, and the ILS-S Act Type field will be changed from "P/I" to "ISU."

If supply does not have the requested asset in an issuable status and the request has a UJC of "AR" or "AO", a UND of "B" (except UJC code "BQ") or "C" (except numeric parts preference code (NPPC) "2" or "5" (Interactive Disposal Items)), then the ILS-S will automatically back order the requested asset and will send IMDS-CDB an I004 management notice indicating that the requested asset is being back ordered. The IMDS-CDB will use the I004 management notice to update the status fields in the SDR and then display the management notice on the IMDS-CDB terminal that originally input the request.

If supply does not have the requested asset in an issuable status and the request has a UJC of "BQ", the ILS-S will issue a KILL action notice to IMDS-CDB in the form of an I004 management notice indicating that the requested asset is not available in supply. The IMDS-CDB will use the I004 management notice to update the status fields in the supply data record and then display the management notice on the IMDS-CDB terminal that originally input the request. The management notice will also be displayed on a predesignated IMDS-CDB terminal for research and verification. All requests with a UJC of "BQ" must be verified by authorized maintenance personnel prior to being resubmitted and back ordered by supply. If the request is valid and is verified as a "BQ", maintenance will submit the ISU transaction with an "M" in the TEX code field. The ILS-S will create a firm due-out, requisition the asset, and send IMDS-CDB an I004 management notice indicating that the requested asset is being back ordered. The IMDS-CDB will use the I004 management notice received from ILS-S to update the status fields in the SDR and then display the management notice on the IMDS-CDB terminal that originally input the request.

If supply does not have the asset in an issuable status and the request has a UND code of "A" (except UJCs "AR" and "AO"), the ILS-S will issue a KILL action notice to IMDS-CDB in the form of an I004 management notice indicating that the requested asset is not available in supply. Supply will also issue IMDS-CDB an I023 (other assets) management notice to let maintenance know if there are any other assets available that may be used. The IMDS-CDB will send the I004 management notice back to the IMDS-CDB terminal that input the request. The IMDS-CDB will display a Verification Worksheet with all associated ILS-S management notices to the originating terminal for information and to a predesignated IMDS-CDB terminal for research and verification if the AF Form 2414, Verification Worksheet, print indicator is set to "Y" in the supply data record header ([SDRH]–129).

All requests with a UND of “A” (except UJCs “AR” and “AO”) must be verified by authorized maintenance personnel prior to being resubmitted back to supply. Prior to going MICAP, MAJCOMs have the option for maintenance to notify the MICAP section of possible MICAP requirements prior to maintenance making their checks. If the MICAP section is notified of any possible valid MICAP requirements, maintenance will pass all required information to the MICAP section so that they can perform their required MICAP checks. Close coordination will be maintained between the MICAP section and maintenance. Maintenance will research the areas listed on the I023 management notice received from the ILS-S and any other areas available to them to satisfy the MICAP requirement.

If a serviceable repairable asset is found to be available in maintenance, maintenance will reenter the document number assigned to the original request and a “G” in the TEX Code field. The IMDS-CDB will update the SDR–165 and retransmit the modified ISU transactions to the ILS-S for processing. The ILS-S will create a memo due-out and will send IMDS-CDB an I004 management notice to notify maintenance that the request for an asset has been processed. The IMDS-CDB will use the I004 management notice to update the SDR and then display the I004 management notice at the input terminal. Maintenance will take a copy of the I004 management notice and copy three of the original ISU, mission support issue (MSI), or due-out release (DOR) documents on the item being turned in to the repair cycle support section (RCSS). The RCSS will process a serviceable turn-in (TIN), TEX code 2 to force DOR of the asset being requested in the document number listed on the I004 management notice. The ILS-S will create a DOR document for maintenance to sign and will also send a due-out status notification to IMDS-CDB to notify maintenance that the requested asset was issued. The IMDS-CDB will use the 1SH transaction to update the status fields in the SDR and then display a management notice at the IMDS-CDB terminal that originally entered the request. Maintenance will sign for the asset when it is delivered.

If supply does not have the asset in an issuable status and no other assets are available at base level, it may be necessary to go MICAP to obtain the asset. Once a decision is made to back order MICAP, the issue transaction must be resubmitted with either a TEX code 7 or M. The MAJCOMs may decide which TEX code will be used to back order MICAP assets. If a TEX code 7 is used, the asset will be back ordered and a memo due-out created. No requisition to the depot will be made. If a TEX code M is used, the asset will be back ordered and a request for fill will be made to the depot.

Self-Test Questions

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

001. Logistics maintenance management

1. What Air Force publication provides an Air Force acquisition and sustainment ILCM framework for Air Force systems, subsystems, end-items, services and activities?

2. To whom does ILCM apply?

3. What MAJCOM is responsible for delivering war-winning expeditionary capabilities to the warfighter through development and transition of technology, professional acquisition management, exacting test and evaluation and world-class sustainment of all Air Force weapon systems?

4. What network supports the MGN by providing serviceable components and equipment and conducting inspection, repair and modification of aircraft and equipment?

5. Who is responsible for complying with all written guidance to ensure required repairs, inspections and documentation are completed in a safe, timely and effective manner?

002. Maintenance-supply interface

1. What screen within IMDS allows you to navigate the ILS-S with ease and efficiency?

2. What option provides the capability to retrieve data necessary to generate an output containing data pertaining to open maintenance discrepancies as specified by the user?

3. Within IMDS, how do you see what is hooked to STRAY?

4. Within IMDS, if you order an item but it is killed, how will you order the item MICAP?

5. Within IMDS, who verifies supply requests with an urgency justification code of “BQ” prior to being resubmitted?

6. Within IMDS, if you order a part with an urgency need designator code of “A” (except urgency justification codes “AR” and “AO”), how are you notified if the requested asset is not available in supply?

7. If a serviceable repairable asset is found to be available in maintenance and you request that asset, how does ILS-S notify you that the asset was issued?

8. Within IMDS, if your organization decides to order a part MICAP, you must resubmit the issue transaction using what TEX code?

1–2. Priority System

When you are dealing with maintenance and repair, priorities must be set to ensure the most important and urgent jobs are done first. If an aircraft is on the schedule to fly soon, it's more important to get that one ready to fly than it is to repair an aircraft that is undergoing a major inspection or is in cannibalization (CANN) status. The Air Force (AF) has established a priority system to identify the priority of parts ordered in support of maintenance tasks.

003. Uniform Materiel Movement and Issue Priority System

The Uniform Materiel Movement and Issue Priority System (UMMIPS) was established for use by the military services, Defense Logistics Agency (DLA) centers, and others authorized to requisition materiel in support of the national defense effort. The purpose of UMMIPS is to provide a standard method of ranking competing needs according to their importance and to ensure the most effective management of resources in reacting to each need. UMMIPS provides a method for identifying the importance of requisitions by using a combination of force activity designator (FAD) and UND. The FAD and UND together determine the priority placed on the requisition.

Responsibilities

Commanding officers and the heads of requisitioning activities are responsible for assigning priority designators consistent with assigned FADs and the existing urgency of need. The following guidelines are provided to assist in meeting this requirement:

- Ensure each individual responsible for assigning UNDs or priorities is properly trained in UMMIPS procedures.
- Ensure individuals are aware of and comply with the accurate assignment and use of priority designators consistent with the FADs assigned by higher authority and with the existing urgency of need.
- Review all UND requirements before sending a requisition to the source of supply.
- Ensure supply discipline in priority requisitioning to include the use of disciplinary action in cases involving deliberate abuses.

Force activity designators

The FAD (assigned by the Secretary of Defense or the Joint Chiefs of Staff [JCS]) is the code that identifies the unit, organization, or installation performing a function or mission. It may also identify a body of troops, ships, aerospace vehicles, or a combination thereof. FADs are identified by the Roman numerals I, II, III, IV and V.

FAD I

FAD I assignments are reserved for those units, projects, or forces which are most important militarily in the opinion of the JCS and as approved by the Secretary of Defense. FAD I will be assigned to the following:

- Programs which have been approved for top national priority by the president. (The automatic FAD ranking will continue after a given program enters operational use until it drops from the category that required the priority.)
- Units, projects, or forces, including foreign country forces, which have been specifically designated by the Secretary of Defense on the recommendation of the JCS.
- Others identified in AFH 23–123, Volume 2, Part 1, Chapter 2.

FAD II

FAD II is for the following:

- US combat, combat-ready, and direct combat support forces deployed outside the continental United States (OCONUS) in specific theaters or areas designated by the Secretary of Defense on the recommendation of the JCS.

- Those continental United States (CONUS) forces being maintained in a state of combat readiness for immediate (within 24-hours) employment or deployment.
- Military service programs and projects vital to defense or national objectives.
- Others identified in AFH 23–123, Volume 2, Part 1, Chapter 2.

FAD III

FAD III covers the following:

- All other US combat-ready and direct combat support forces OCONUS not included under FAD II.
- Those CONUS forces being maintained in a state of combat readiness for deployment to combat prior to D plus (+) 30 (as defined in Joint Publication (JP) 1–02, *Department of Defense Dictionary of Military and Associated Terms*.
- Others identified in AFH 23–123, Volume 2, Part 1, Chapter 2.

Force activity designators IV

Reserved for the following:

- US forces being maintained in a state of combat readiness for deployment to combat during the period D+30 to D+90 (as defined in JP 1–02).
- Military service programs and projects for planned improvement of defense or national objectives of comparable importance with elements specified in AFH 23–123, Volume 2, Part 1, Chapter 5.
- Others identified in AFH 23–123, Volume 2, Part 1, Chapter 2.

Force activity designators V

Assigned to the following:

- All other US forces or activities including administrative staff and base/post-type units.
- Others identified in AFH 23–123, Volume 2, Part 1, Chapter 2.

To facilitate optimum materiel readiness, the authorized higher FAD may be assumed by a force or activity at a maximum of 90 days prior to its scheduled deployment OCONUS or its authorized elevation from a lower to higher FAD.

Urgency of need designator

UNDs identify how seriously mission capability is hindered when required materiel is unavailable. Requisitioning programs also use this code to determine priority. Commanders or Department of Defense (DOD) leaders must review or delegate, in writing, the authority to certify that all requirements with priority designator A or B are appropriate and justified. At some point in your career, you will be responsible for determining UNDs, so it is important to learn them now.

High priority issue requests inflate the overall costs of assets by increasing their transporting and handling costs. To minimize these costs, make sure the UJC assigned is relative to the actual need. You, as the customer, and your commander have the ultimate responsibility for properly assigning and validating priority designators according to Air Force Instruction (AFI) 23–111, *Management of Government Property in Possession of the Air Force.*

Urgency of need designator A

Use UND A only for materiel when lack of the item would interfere with the assigned mission.

Urgency of need designator B

Use UND B only for materiel when the lack of the requested item impairs your ability to perform the assigned mission. Perform the management review of UND B requirements after the submission to base supply and requisitioning action from the source of supply.

Urgency of need designator C

Use UND C for requisitioning materiel for all other requirements. In other words, when a lack of an item would neither interfere with the assigned mission, nor when the lack of the requested item impairs your ability to perform the assigned mission.

Priority designator utilization

While retaining the responsibility for reviewing UND A and B requests, commanding officers may designate individuals to accomplish the actual review. It's important that these appointed individuals be in management-level positions, are capable of determining the mission impact, be fully knowledgeable of UMMIPS policy, and able to provide confirmation to base supply of the urgency of the request. You may have to justify to these individuals why your shop chose the UND for a particular part. Make sure that you can back up your decisions with research.

To maintain the integrity of the UMMIPS, the quantity of materiel included on priority designator 01 through 08 requisitions must be restricted to that amount necessary to satisfy the immediate requirement. Additional quantities necessary to replenish stock must be under a UND C routine priority.

Surveillance and review

If any system is to be effective, it must incorporate some form of checks and balances. To ensure UMMIPS remains effective and reliable, it uses surveillance and reviews to detect abuse, misuse and negative trends. Laws that prevent misuse and waste are also enacted to ensure optimum operation of the system.

Before-the-fact review

The importance of a before-the-fact review of the priority assigned to supply requests cannot be overemphasized. Abuse and misuse of UMMIPS have far-reaching and negative results on the logistics system, in supply, contracting, and transportation. As the proportion of priority requests increase compared to total requests, the relative importance of the priority decreases (doesn't have a negative impact).

After-the-fact review

The using organization commander or designated representative performs after-the-fact reviews. Periodically, base management and systems flight personnel review high-priority requirements during their internal supply surveillance, and when they see adverse trends, notify the organization commander.

Suspected abuses

If the chief of supply identifies suspected abuses, he or she notifies the organization commander of the requesting activity. The commander determines if a problem exists and takes corrective action, as required. A continuous, aggressive program to control and manage UMMIPS results in optimum supply support of valid high-priority requirements. Misuse and abuse of the system is a serious violation of public law, wastes scarce resources, and seriously degrades the ability to provide combat logistics support for combat operations.

004. Priority system elements

The AF uses a number of different elements to support the priority system. You must be familiar with some of these elements, as it is everyone's responsibility to make the system work. This lesson will familiarize you with elements that make up the priority system. We will discuss MICAP, Mission Impaired Capability Awaiting Parts Asset Sourcing System (MASS), delivery dates, modification of requisitions, priority system performance, and communication methods. Let's start with MICAP procedures.

Mission impaired capability awaiting parts

MICAP procedures are used to secure materiel needed to repair mission essential equipment of the highest priority. The MICAP System provides a method of obtaining the kinds of items required by AF organizations to maintain mission capability. For this reason, all personnel involved in the MICAP System should be familiar with MICAP procedures.

Procedures

Use MICAP only after all efforts are made to resolve materiel shortage problems through other local resources. You must check all base level resources before MICAP requisitions are initiated. Once a MICAP requisition is initiated, managers at all levels are required to intensively manage the MICAP requisition and reporting system. The AF Supply System is designed to help ensure that necessary supplies are available to maintain a high level of mission capability.

Base search

There will be times when a base will understandably fall short of supplies. Before a MICAP requisition is submitted, supply and maintenance personnel must ensure that all possible base-level resources are exhausted. They should determine whether a substitute item can be used; search for items issued for time change and TCTO kits; check bench stocks; check war reserve materiel (WRM), special-purpose recoverables authorized maintenance (SPRAM) or supply point details; consider cannibalization or items due-in from maintenance (DIFM) not awaiting parts; assess the possibility of priority repair; determine if a next higher assembly is available or cannibalization is feasible. A MICAP condition will be confirmed at base level only after maintenance verifies that the end item is not mission capable and both supply and maintenance personnel verify that the requirement cannot be satisfied using base-level resources.

Mission Impaired Capability Awaiting Parts Asset Sourcing System

MASS is a user-friendly, menu-driven personal computer (PC) application, used to improve MICAP processing. MASS also maintains historical data so that in-depth, accurate data analyses can be performed to identify potential problem areas in the overall supply support system. MASS was designed to improve the efficiency of MICAP processing and the management of MICAP requirements.

Features

MASS eliminates the need to maintain external MICAP boards. With MASS, you can request the display of a MICAP status board at any time. MASS also retains all textual comments regardless of their size or quantity for the life of a MICAP event. Additionally, MASS processes and records all MICAP upgrades, downgrades, and CANN actions. It provides faster and better methods for locating lateral assets needed to satisfy MICAP requirements. Lastly, MASS provides quick access for processing and printing MICAP queries using the “hot key” combinations within the MASS PC program. Locally required management products are easily obtained when developing and processing query language processor (QLP) retrievals against the MASS database.

Use

You can use MASS any time regardless of the availability of ILS-S. For example, if ILS-S is up, MASS uses normal procedures to process input transactions. If ILS-S is down, input transactions are stored in the MASS database and are processed when ILS-S becomes operational. Output responses are then written to the MASS database and can be reviewed at a later time. You can also use MASS for local configuration options such as determining whether to attempt initial sourcing from the prime depot or laterally.

Standard delivery date

The standard delivery date (SDD) is the maximum standard terminal date for order and shipping time normally required for the logistics system to effect delivery of requisitioned materiel to a consignee. Order and shipping time standards prescribed for priority designators/groups are included in

AFH 23–123, *Materiel Management Handbook*. Unless otherwise indicated by the requester, these standards are the basis for determining the requester's SDD. When requisitions received by AF materiel managers contain no entry in the required delivery date (RDD) field (columns 62–64) SDDs/RDDs will not be entered in the resulting passing actions and/or release/receipt documentation (Department of Defense [DD] Form 1348–1A, Issue Release/Receipt Document, or DD Form 1348–2, Issue Release/Receipt Document with Address Label). This means no priority will be assigned to your request and you won't receive it when it's needed.

Required delivery date

The RDD is the day (calendar date) of materiel delivery to a consignee that must be accomplished in order to satisfy a specific mission requirement. The criteria for determining the RDD are also prescribed by AFH 23–123, Volume 2, Part 1, Chapter 5. As a processing activity, you may not change the RDD entry in a requisition. When an RDD, shorter than the established standard, is included on a requisition, AF materiel managers will make the necessary adjustments in internal processing to ensure the most expeditious handling. This includes use of high-speed transportation, if necessary. Every effort will be made by materiel managers to meet RDDs.

Modification of requisitions

Documents to modify a requisition may be initiated as prescribed in AFH 23–123, Volume 2, Part 1, Chapter 5. AF materiel managers will ensure that requisition modifier documentation is processed along with the UMMIPS time standards for the revised priority designator and/or the SDD/RDD.

Self-Test Questions

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

003. Uniform Materiel Movement and Issue Priority System

1. What two codes together determine the priority placed on UMMIPS requisitions?

2. What guidelines must commanding officers and heads of requisitioning activities follow in order to responsibly assign priority designators consistent with assigned FADs and the existing urgency of need?

3. Match the FAD listed in column A with the activities or units that would fall under that FAD in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once.

Column A	*Column B*
____ (1) FAD I.	a. Administrative staff.
____ (2) FAD II.	b. Programs which have been approved for top national priority by the President.
____ (3) FAD III.	c. Direct combat support forces deployed outside the continental United States in theaters designated by the Secretary of Defense.
____ (4) FAD IV.	d. Continental United States forces being maintained in a state of combat readiness prior to D+ 30.
____ (5) FAD V.	e. Continental United States forces being maintained in a state of combat readiness from D+30 to D+90.

4. Who has ultimate responsibility for properly assigning and validating priority designators?

5. What UND code would you use when a lack of an item would interfere with the assigned mission?

6. What UND code would you use when a lack of an item would neither interfere with the assigned mission, nor when the lack of the requested item impairs your ability to perform the assigned mission?

7. How is the quantity of materiel included on priority designator 01 through 08 requisitions controlled to maintain the integrity of UMMIPS?

8. What type of UMMIPS review ensures the proportion of supply priority requests doesn't negatively impact the relative importance of priority requests?

004. Priority system elements

1. When would you initiate MICAP procedures?

2. What are some options to consider before using MICAP?

3. What is the user-friendly, menu-driven PC application, used to improve MICAP processing?

4. What happens if you fail to enter an RDD when requesting supply items?

5. What happens when an RDD is shorter than the established standard?

1–3. Repair Cycle Assets

The repair cycle support system establishes firm control over repair cycle assets and obtains the greatest benefits from the base maintenance shops. In this lesson, you'll study the repair cycle asset system concept, its function, procedures for issue, turn-in, DIFM reconciliation, and time change requirements.

005. Repair cycle support system

The repair cycle support system establishes control of all unserviceable repair cycle assets from the time they are generated until returned to base supply as serviceable or unserviceable. The RCSS is the base supply function that is responsible for managing the repair cycle support system.

Repair cycle assets

Repair cycle assets are also known as DIFM items. DIFM items are those for which the decision to repair or condemn is made at the field or depot level, not at the base level. In other words, item managers have decided that they want a person with more expertise and knowledge to decide if it would be economical to repair the item, or if it would cost less to trash it and buy a new one.

The objective of the repair cycle system concept is to obtain the greatest benefits from the base maintenance shops. The repair cycle time of an item starts when your shop removes the unserviceable item from the aircraft or piece of equipment, and a demand is made on supply for a replacement. It stops when your shop sends the item, either serviceable or unserviceable, back to base supply. It is important to know that base supply will not order a replacement item until it is determined that the unserviceable item is not repairable at your base. So, you must process unserviceable repair cycle items through the repair shops as quickly as possible. This means that you or your shift supervisor should routinely follow-up on the repair of these parts. Once repair shop personnel determine that the part is not repairable with the personnel, tools, and facilities available at the base, supply can then place a demand on the system to replace it.

The system establishes firm control over repair cycle assets to make sure they are repaired at base-level or sent to a repair facility as fast as possible. Status of repair cycle items must be continually maintained and updated according to Air Force Manual (AFMAN) 23–122, *Materiel Management Procedures*. The more time a part spends on a shelf and not in use or in the repair shop, the more money the AF is spending on parts that aren't being used.

Multiple due-in from maintenance indicator

Usually, DIFM issues are for a quantity of one each; therefore, the computer system in base supply is programmed to reject a DIFM issue for more than "one-each" of an item. The major reason behind this is the possibility of having a different maintenance "action taken" code assigned to different parts with the same document number. Although, the norm is one-each per document number, there may be cases where this is not reasonable, like for engine turbine blades or tires. When this happens, call the RCSS of base supply. Explain your situation, request a multiple DIFM issue and, if approved, they will assign a multiple DIFM indicator to allow DIFM issue requests for multiple quantities. When using this procedure, there is only one document number. If 10 are issued, but five are returned with an action taken code 9, and the other five are returned with an action taken code B, it will be necessary to process separate turn-ins with the same document number.

Maintenance turnarounds

You may remove repair cycle items from the end item, repair and reinstall them without placing a demand on base supply, or after base supply confirms that the serviceable asset is not available from their stocks. The asset being repaired is not physically processed through base supply. However, the maintenance activity must give the RCSS the information needed to update supply records. The term frequently used to record this type transaction is maintenance turnarounds (TRN). It is very important that you document each repair made on repair cycle items. Inform the RCSS every time a repair action is taken and prepare the necessary documentation on the Air Force Technical Order (AFTO)

Form 350, Reparable Item Processing Tag. Send the bottom portion of the AFTO Form 350 to the RCSS after it is completely filled out, to include the maintenance action taken code. The maintenance action taken code entered on the AFTO Form 350 for TRNs must be A, F, G, K, L, or Z. Invalid AFTO Forms 350 will get returned to the appropriate maintenance activity for action. If you fail to inform base supply about TRNs, this reduces the number of serviceable items base supply can keep on hand. Base supply's objective is to have serviceable items on hand to replace an item that has failed. This allows the unserviceable item to be processed through the repair cycle process on a scheduled basis. We'll talk more about maintenance turnarounds in the next lesson objective.

Due-in from maintenance turn-in procedure

DIFM assets are returned to base supply through the RCSS. The RCSS processes and controls all DIFM assets. You must provide a completed AFTO Form 350, a condition status tag (DD Forms 1574, Serviceable Tag-Materiel, 1575, Suspended Tag-Materiel, or 1577–2, Unserviceable [Reparable] Tag-Materiel), and the number 3 copy of the original issue or due-out release document (DD Form 1348–1A, Issue Release/Receipt Document), when items are turned in to the RCSS.

Due-in from maintenance update

Anytime you turn an item in to supply, or send it to a repair facility, you must update the status of that item. Ensure both the status and physical locations of the item are in the system.

Item status/location change

To accurately control DIFM assets, you must know the status and location of the item. When items are received in a shop or when the status changes, the shop scheduler or workcenter supervisor must inform the RCSS. RCSS personnel update the location and status of the item in ILS-S records. An example of a status change would be when an item goes from awaiting parts (AWP) to awaiting maintenance (AWM) or from AWM to in-work (INW). A location change occurs when an item is moved from one shop to another. Maintenance personnel that are under the IMDS use it to update the ILS-S when the location and status of an item has changed.

Due-in from maintenance status codes

You must return DIFM items to supply as quickly as possible. The DIFM managers in supply and maintenance must make every effort to process repair cycle items as fast as possible. MAJCOMs may assign other status codes to cover special situations in their command. Some codes you will use most often are as follows:

- AWM.
- AWP.
- INW.
- Time change (TCG).
- TIN.
- TCTO required for end item (TOC).

NOTE: Refer to AFH 23–123, Volume 2, Part 1, Chapter 5 for additional DIFM status codes.

Each day base supply generates a Repair Cycle Asset Management List (D23 report). This listing is posted online as an aid in managing and controlling DIFM or repair cycle assets. When differences exist between the DIFM status, or location as shown on the DIFM list and the actual status or location, the RCSS must be informed to ensure updates are made. If you haven't turned in your DIFM items to supply on time, you can expect a call from your maintenance pro-super.

Due-in from maintenance reconciliation

There may be times when supply records and the maintenance unit records do not match. In such a case, you must reconcile them. DIFM reconciliation between base supply and the maintenance activities is conducted by use of the D23. Copies of the applicable sections of this report are furnished

to each maintenance activity to verify the location of the issued items. Repair cycle support personnel will update the DIFM details with the current item location and current DIFM status when maintenance provides the required changes.

Time change requirements

Forecasting requirements are limited to specific time change items in Technical Order (TO) 00–20–9, *Forecasting Replacement Requirements for Selected Calendar and Hourly Time Change Items*. As maintenance schedulers we strive to plan and forecast the timely completion of maintenance events. No matter how well we plan, there are circumstances when time change items have to be replaced earlier than the projected due date. The approval authority for out-of-cycle time change cartridge actuated devices/propellant actuated devices (CAD/PAD) items, also known as an "emergency" request, rests with the maintenance group commander (MXG/CC) or designate. Although replacing a time change item early may not seem fiscally sound, some circumstances, such as deployments, higher headquarters (HHQ) tasking's, human error (i.e., damaged threads), and effective time change item (TCI) bundling (i.e., during a 36m inspection or long phase inspection), will require us to do so.

In accordance with (IAW) AFI 21–101, *Aircraft and Equipment Maintenance Management*, and AFI 21–201, *Munitions Management*, the wing's plans, scheduling & documentation (PS&D) will meet quarterly with munitions operations personnel. The purpose of this meeting is to ensure the Integrated Maintenance Data System quarterly requirements are accurate and available for timely requisitioning. Additionally, this meeting is the opportune time to ensure double requisitioning will not occur. There are some circumstances that could lead to double requisitioning. For example TCIs that are changed out during depot maintenance.

006. Condition tags

In addition to the requirement for the use of AFTO Form 350 for maintenance processing of items that require off-equipment or shop action, DD forms are required to indicate the condition status of items that are processed to supply activities for return to serviceable stock, for forwarding to off-base repair activities, or for other disposition action. For all items returned to supply, the maintenance activity responsible for condition status determination will prepare the applicable DD forms that are used as tags and labels to identify item condition. Any item being returned to supply as a serviceable item will have the DD Form 1574 or DD Form 1574–1, Serviceable Label-Materiel, annotated in the remarks block to reflect any TCTO that was performed to make the item serviceable. This will be accomplished by both depot and field activities. The following table describes each condition tag:

Form	Color	Used for
DD Form 1574, Serviceable Tag-Materiel	YELLOW	Serviceable items.
DD Form 1575, Suspended Tag-Materiel	BROWN	Suspended items. Items being held as materiel deficiency exhibits.
DD Form 1577, Unserviceable (Condemned) Tag-Materiel	RED	Unserviceable condemned items
DD Form 1577–2, Unserviceable (Reparable) Tag-Materiel	GREEN	Unserviceable reparable items

The colored tags on containers received from supply or a depot are normally of interest to personnel in the maintenance complex. As an egress technician, you probably won't be filling out condition tags, because this task is usually relegated to 7-level egress craftsman on the special certification roster; however, you will need to know how to identify these tags so you know what to do with the parts they are attached to and when to ask your 7-levels to fill them out so you can properly tag parts. A simple way to learn condition tags is by knowing the color of each condition tag. If you learn the colors of the tags and what conditions they represent, then you'll know at a glance the status of the part to which it's attached.

DD Forms 1574 and 1574–1

The DD Form 1574 is colored yellow and is attached to an item that is serviceable and ready to use (fig. 1-2). All serviceable items you receive from supply should have a DD Form 1574 attached to the item. The DD Form 1574–1 *should* also be affixed to the outside of the container that holds the serviceable part.

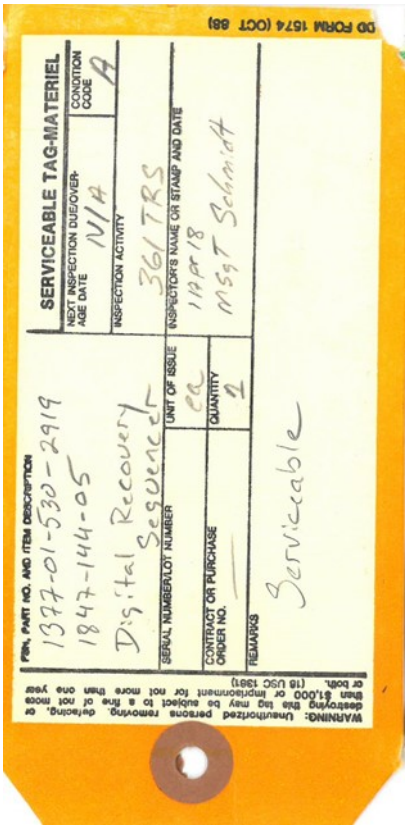


Figure 1–2. DD Form 1574.

DD Forms 1575 and 1575–1

The DD Form 1575 (fig. 1–3) (brown tag**)** is attached to a part when the part is AWM or AWP. This tag will also be attached to parts that are being held as materiel deficiency exhibits. The DD Form 1575–1, Suspended Label-Materiel, is also brown and is affixed to the outside of the container that holds the part.

Awaiting maintenance

Many times the installation of a part can be placed on hold because there are other jobs with higher priority that must be accomplished first. Some other reasons a part might be AWM include a lack of personnel to install the part or the equipment required to test the part is being repaired. Whatever the reason, attach a brown tag to a part so it can be identified as AWM.

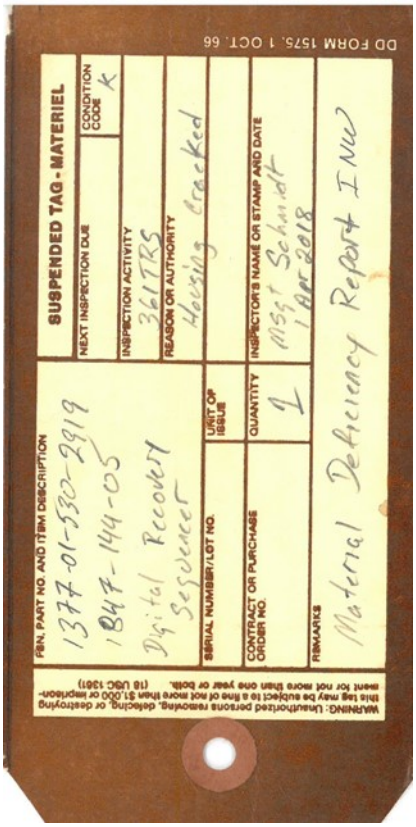


Figure 1–3. DD Form 1575.

Awaiting parts

Let's say a part has been bench checked and it is determined the part requires a new fitting. Place the required fitting on order and, between the time the fitting is ordered and the time it issues, maintenance cannot be completed on the bench-checked part. Attach a brown tag to the part identifying it as being in AWP status.

Materiel deficiency exhibits

Later in this unit, you'll learn all about filing product quality deficiency reports (PQDR). An important part of that process is tagging the deficient part so no one will erroneously install the part on any equipment. The brown tag will also need to be attached if the engineers investigating the PQDR need to look at the actual item. In this case, you'll send the deficient item off with the 350 tag, the brown tag and any other information they request.

DD Forms 1577 and 1577–1

The DD Form 1577 is a red tag (fig. 1–4). It's used to identify an unserviceable, condemned item. Normally, you will not have to make the determination as to whether or not a component is worth repairing. In these cases, the part is usually cheaper to purchase than fix. Condemned items are not returned to depot for repair. They end up at Defense Property Disposal and are sold as unwanted Air Force equipment. The condition code on DD Forms 1577 is always condition code "H", and this is preprinted on the tag. The DD Form 1577–1, Unserviceable (Condemned) Label-Materiel, is also **red** and is affixed to the outside of the container that holds the part.

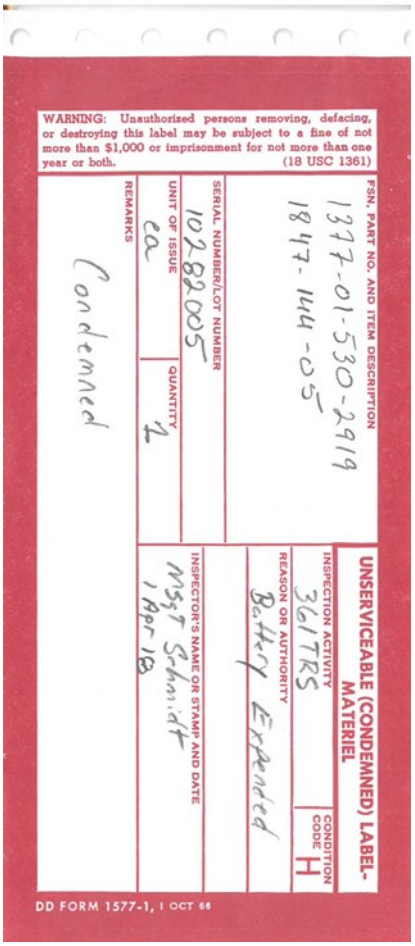


Figure 1–4. DD Form 1577-1.

DD Forms 1577–2 and 1577–3

DD Form 1577–2 is a green tag (fig. 1–5) and is used to identify defective items that can be repaired and made serviceable. This means they are worth the cost of repairing them. For example, if a seat height adjustment actuator is damaged, it will be tagged with a “green tag” to show that it’s broken, but that it would cost more to replace it than it would cost to fix it. The DD Form 1577–3, Unserviceable (Reparable) Label-Materiel, is also green and is affixed to the outside of the container that holds the part. The tag and label are used for components that cannot be repaired on the base and are sent to depot for repair.

If your shop receives a part with two different types of tags attached, such as a yellow and a green tag, take no chances—have the unit bench-checked before it is used. If you need to fill out a status tag, fill out two copies. Always attach one tag to the item; attach the other to the outside of the container to be used for shipping.

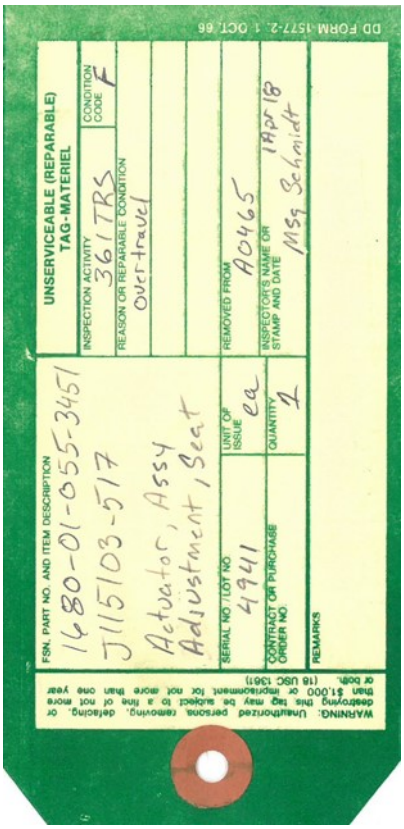


Figure 1–5. DD Form 1577–2.

007. Maintenance repair cycle transactions

To make efficient use of the funds and resources placed within your control, it's very important to understand the repair cycle and its role in fulfilling the mission of the AF. A major part of your role in the repair cycle is processing a maintenance turnaround.

Maintenance turnaround transactions

In the interest of time and resource conservation, it may be better to repair the broken part, assembly, or subassembly and return the AF asset to serviceable status. Maintenance TRNs are how the AF accomplishes this.

Processing

The basic maintenance concept and parts ordering policy for repair cycle assets is to remove and replace the defective component with a serviceable asset issued from supply. The unserviceable asset is then processed for bench check and repair. However, under certain conditions you may find it prudent to process a TRN.

Some reasons you'll process a TRN:

- The component may be married or integrated to another component where replacement would require the replacement of the other component.
- The defective component may require a minor repair, while a new issue may require elaborate bench checking. Time constraints may dictate the repair.
- It may be easier to repair the defect on the equipment, in which case a demand on supply would be impossible.

Repair and return processing procedures are the same as normal repairable processing except for annotating "TRN" on the AFTO Form 350 when you turn the part in to the repair activity. If repaired, forward Part II of the AFTO Form 350 to supply for processing of the TRN in IMDS. If repair cannot

be accomplished, place a demand on supply for the items. Process and control the removed items as a normal DIFM item.

Documenting

Processing a TRN produces the same demand data as the issue of a serviceable asset from supply and maintenance repair and turn-in of the broken assembly. Only action taken codes A, F, G, K, L, or Z may be used for TRN transactions. If you fail to process TRNs, you affect stock levels, which results in incomplete reports. AFMC bases its purchases, repairs, and distribution decisions on those reports.

Pickup and delivery of repairable items

The MXG/CC or chief of maintenance will establish pickup points for repair cycle assets and, in coordination with base supply, establish times to check the pickup points to ensure pickup of assets on a timely basis (usually weekly). Do not allow shop production and repairable turn-ins (completed work) to accumulate at these pickup points.

008. Prepare materiel deficiency reports

Materiel deficiency reporting (MDR) uses the PQDR system in order to identify, report and resolve deficiencies on military equipment or weapon systems (hardware, software, mission critical computer systems, vehicles, clothing, and textiles). TO 00–35D–54, *USAF Deficiency Reporting, Investigation, and Resolution,* is the source technical directive. The reporting system applies to all USAF agencies and organizations.

The MXG/CC assigns a product improvement manager (PIM) who is usually located in the quality assurance (QA) office. The PIM monitors the MDR process and ensures items are properly loaded in the maintenance information systems.

Product Quality Deficiency Report System

These are reports of deficiency (on hardware or software) resulting from an initial failure, defect, or nonconforming condition discovered on a new, newly repaired, revised, installed or overhauled product typically when that product is placed in service. For example: You are replacing the transparency on an F–16 or F–22. When you uncrate it, find that the transparency is cloudy or hazy and no pilot would ever be able to see through it. At this point you should do a PQDR on it.

A PQDR may be reported as either category (CAT) I or CAT II.

Category I

CAT I PQDRs are those deficiencies that, if uncorrected, would:

- Cause death, severe injury, occupational illness, or major loss or damage to equipment or a weapon system.
- Result in unacceptable delays in completing testing.
- Directly restrict combat or operational readiness.

You must submit a CAT I PQDR to the screening point within 24 hours after discovery of the deficiency, but you must report serious safety hazards immediately by phone or facsimile.

Category II

CAT II PQDRs include a report that does not meet the criteria of CAT I or:

- Attributable to errors in workmanship or nonconformance to specifications, drawing standards or other technical requirements.
- For tracking by agreement of the system manager (SM) and the using command deficiency report (DR) point of contact (POC).
- Identifies a potential improvement or enhancement noted during the acquisition and sustainment cycle.

CAT II PQDRs can be classified as enhancement, deficiency, or improvement reports. CAT II PQDRs must be submitted within three workdays after discovery of the deficiency.

Some conditions and equipment are not reported using the PQDR system. Other reporting systems already exist for reporting deficiencies related to items such as pricing errors, unsatisfactory conditions attributable to improper packaging or handling, technical order deficiencies, subsistence items, suggestions, medical supplies and equipment, and deficiencies in off-the-shelf, local purchase items. Table 1-3 of TO 00–35D–54 lists non-PQDR reportable equipment and conditions. This table also directs you to the applicable directive or form to resolve these deficiencies.

Joint Deficiency Reporting System database

The Joint Deficiency Reporting System (JDRS) database is centrally funded and available to all armed services. It provides a comprehensive and standardized software tool to create, process, and manage deficiency reports (DR). Users will access JDRS via a CAC enabled web-browser interface at http://www.jdrs.mil. Of course, if you haven't accessed JDRS before, you will have to request access which can easily be accomplished on the new user request page found on the home page of the site. Figures 1-6 thru 1-9 show an example of the registration pages. If you are unsure about which information to enter, contact your local maintenance group (MXG) PIM office, and they will walk you through the process.

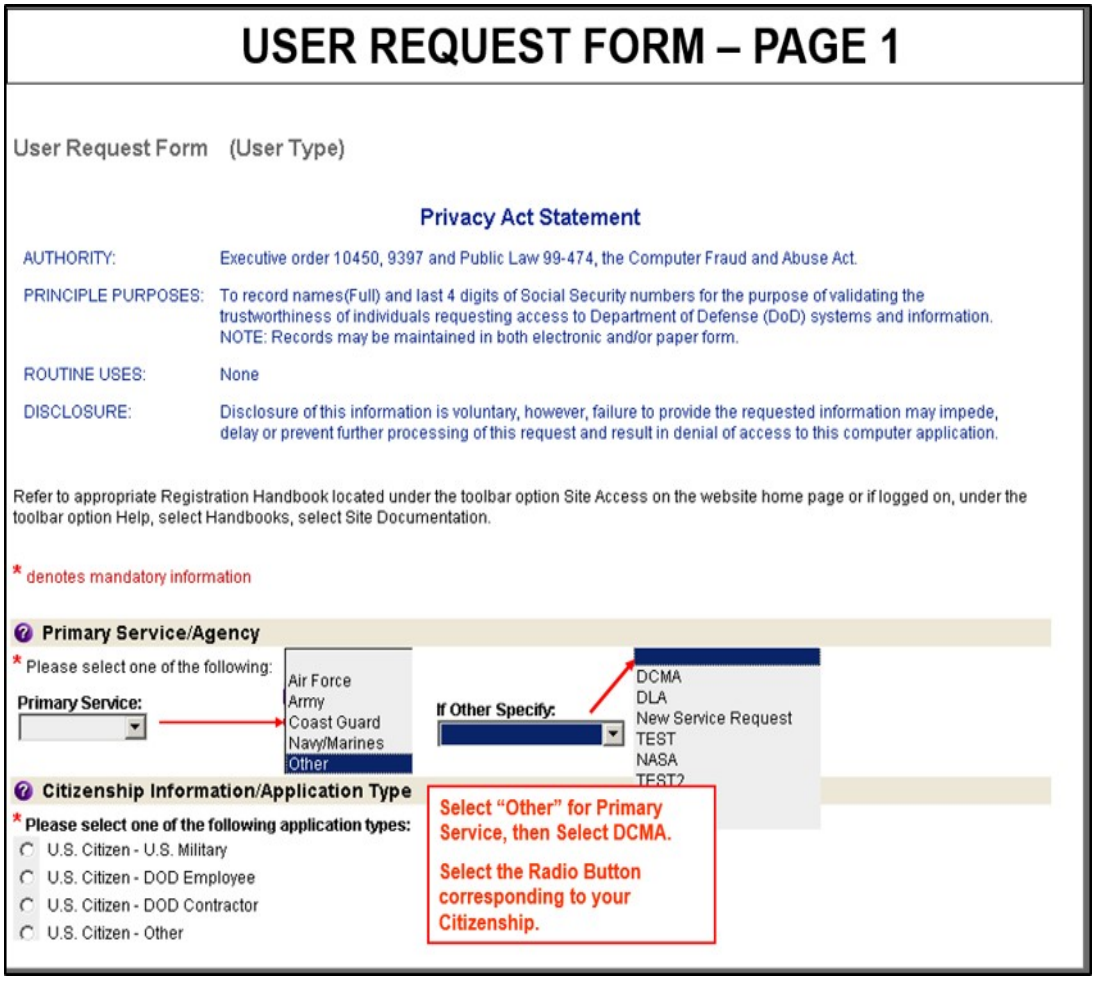


Figure 1–6. JDRS.mil user request page 1

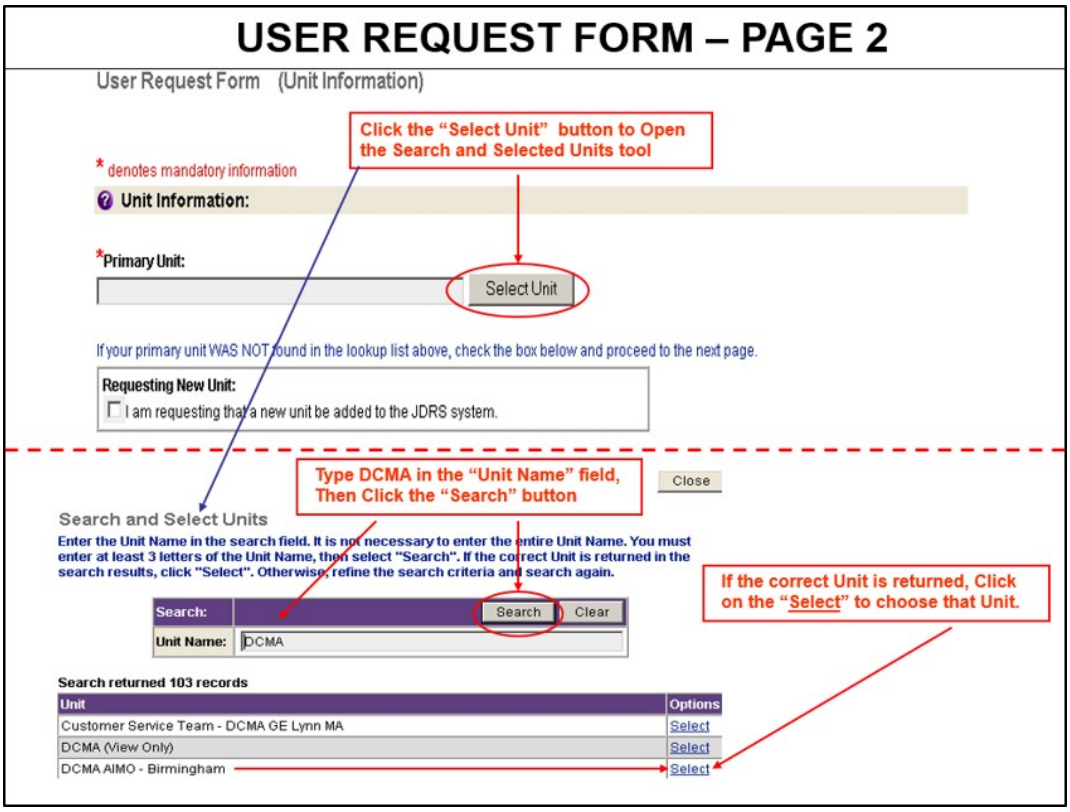


Figure 1–7. JDRS.mil user request page 2

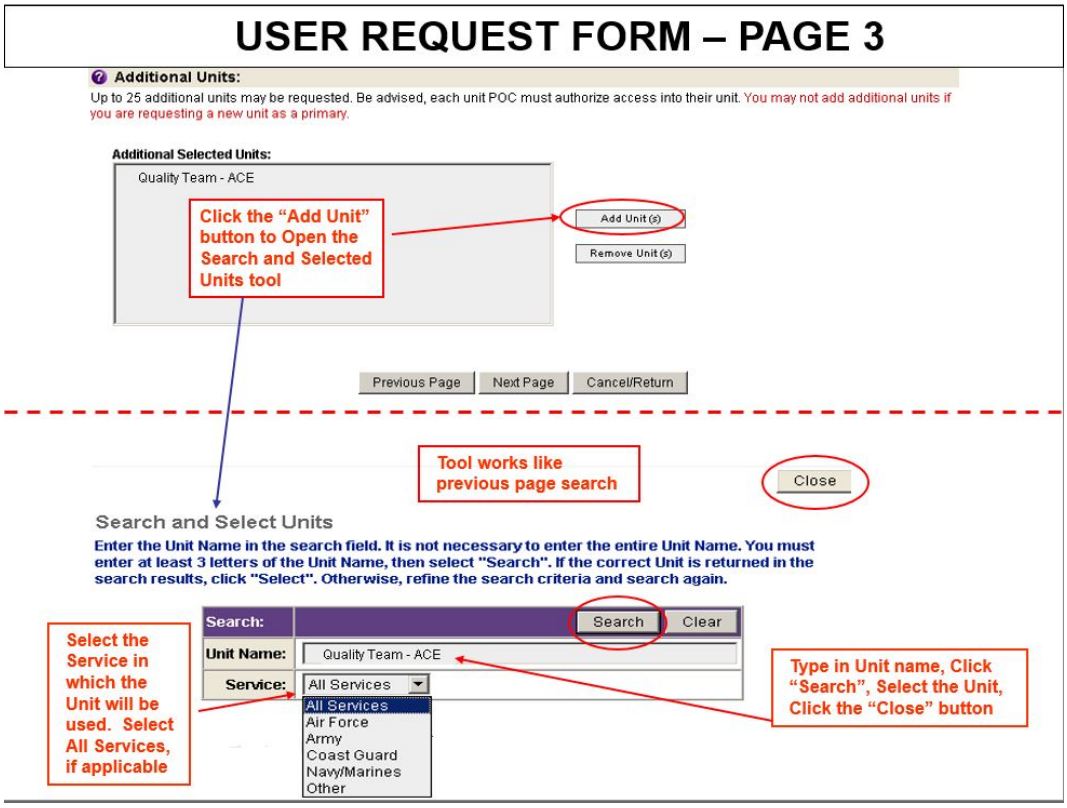


Figure 1–8. JDRS.mil user request page 3

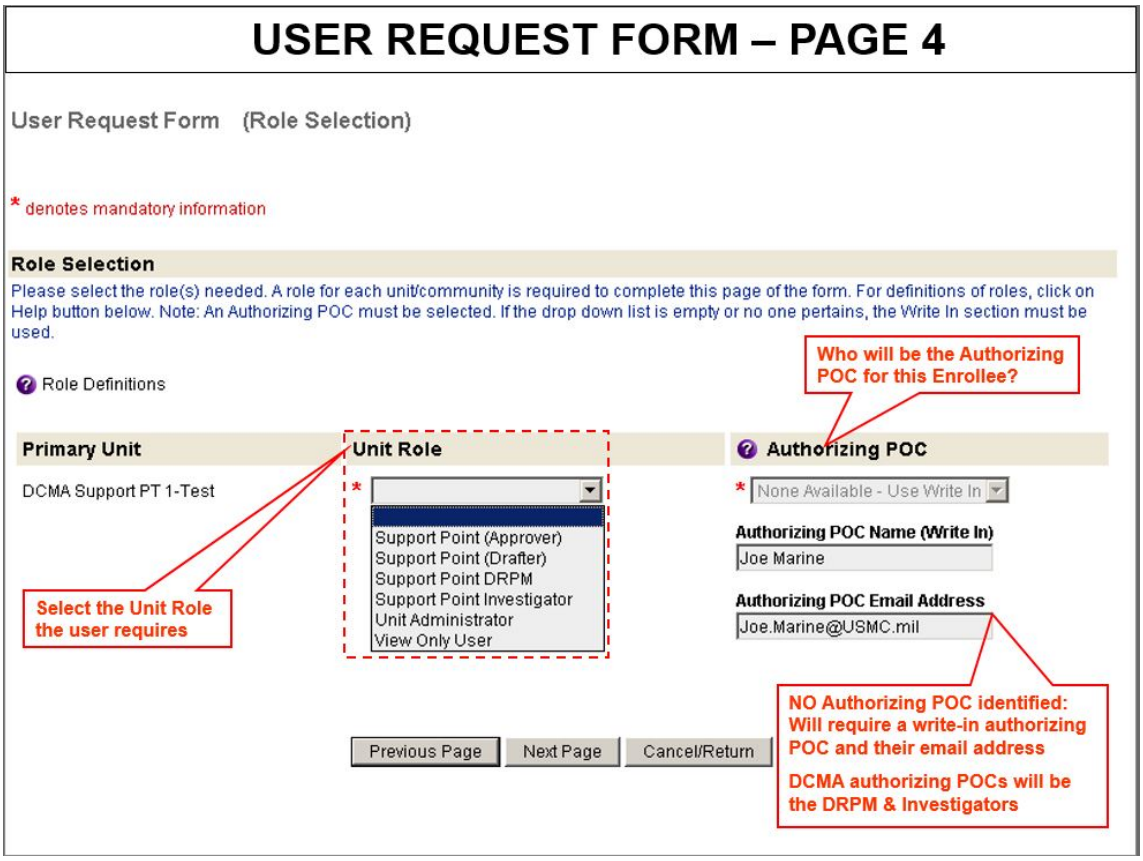


Figure 1–9. JDRS.mil user request page 4

After you register and gain access to the website, you are all set to start submitting DRs. To submit a DR, on the JDRS navigate to the Toolkit page and select Initiate DR from the menu options as seen in figure 1-10.

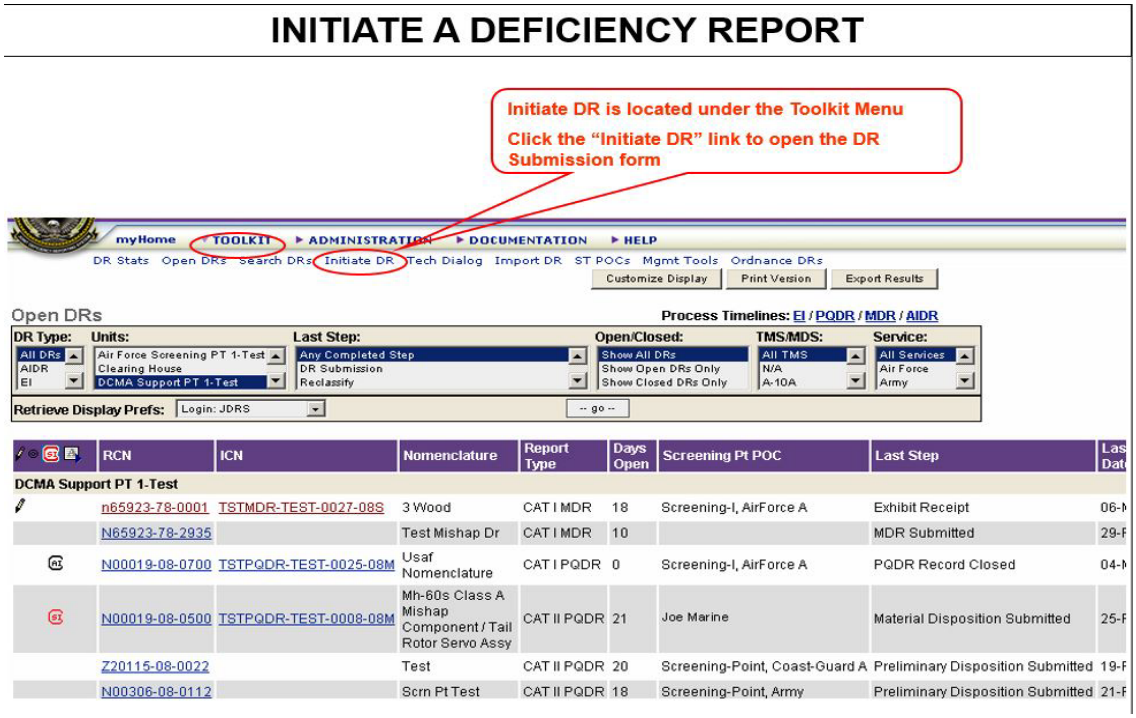


Figure 1–10. Initiate deficiency report.

After selecting the Initiate DR option, you will be prompted to select your branch of service as seen in figure 1-11. The next screen (fig 1-12) will prompt you to enter the information concerning the type and category information for the DR you are submitting. If you are unsure of the information you need, you can select the question mark next to each option and that will assist you in choosing the right options. If you are still in doubt, contact your local PIM and they should be able to help you select the correct information. If you find yourself doing DRs on the same items over and over, a local guide might be appropriate to help streamline the process for others in your section.

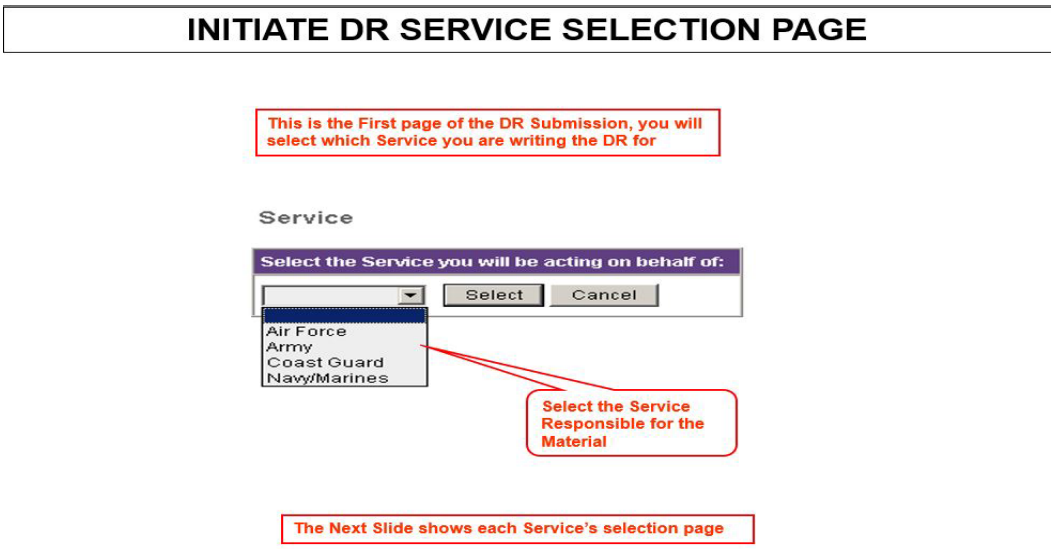


Figure 1–11. Deficiency report service selection page.

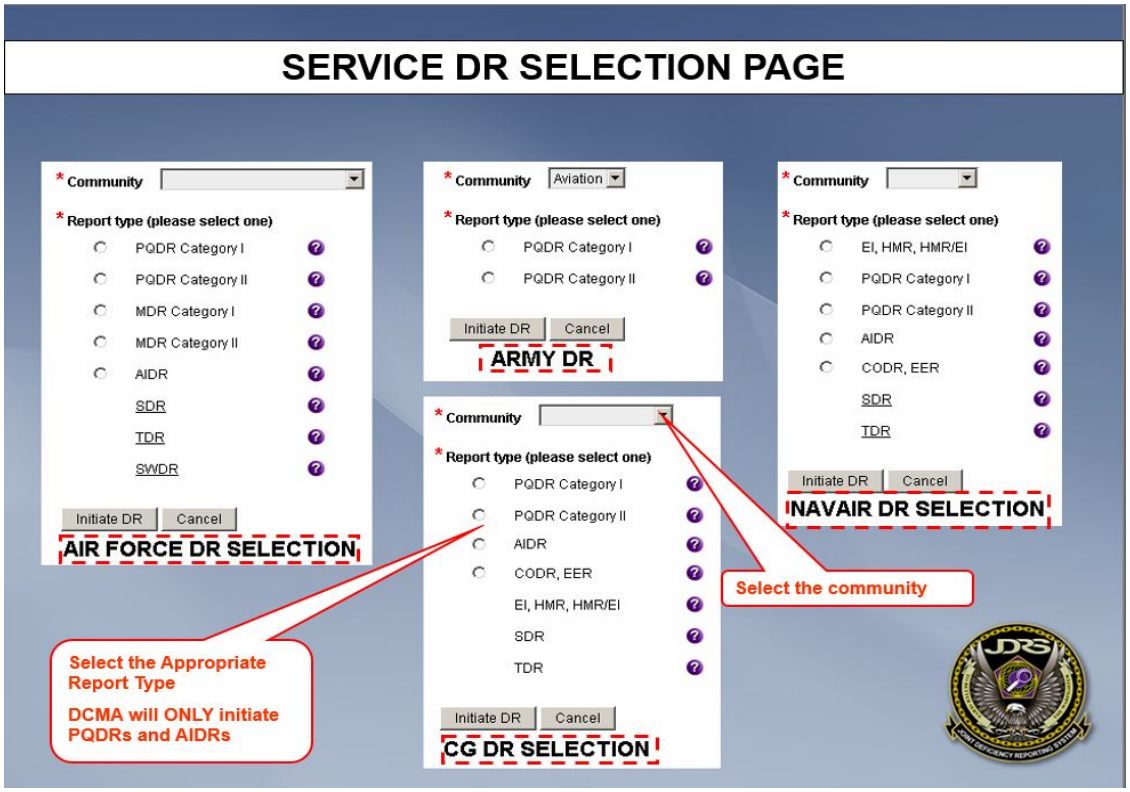


Figure 1–12. Deficiency report setup.

After the initial setup of the DR is complete the system will navigate to the next screen that will require information about the model or part (fig 1-13). You will be able to select the lookup buttons next to each field which will be the only way for you to enter information into those fields, which keeps the DR standardized across the services. When you select the ST Lookup button, it will open a window prompting you to enter the item part or model number for the item you are doing the deficiency report for. When you select the search button, a list will populate below and you can choose the matching part. It will automatically load the appropriate POC and other required information into the DR.

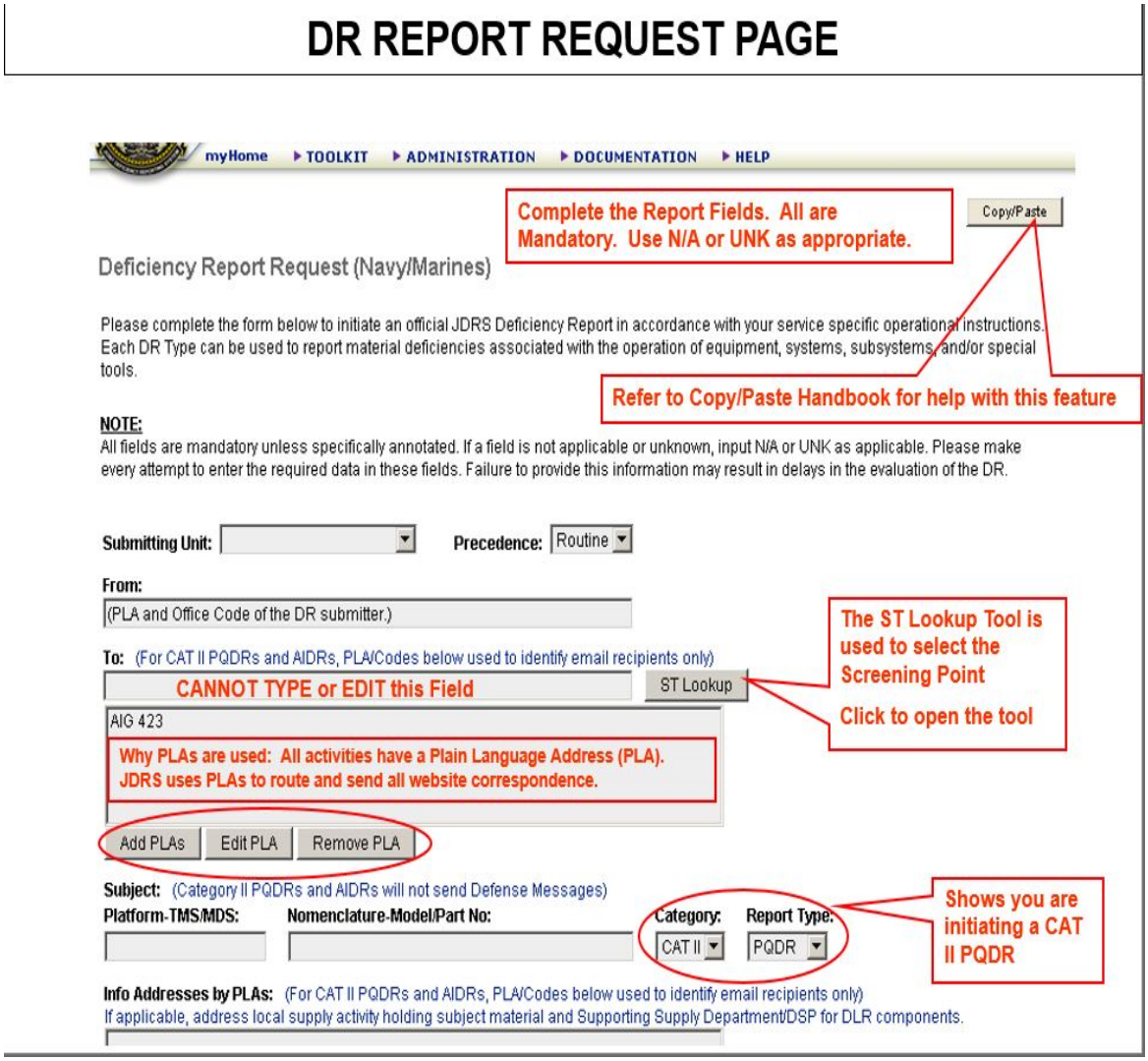


Figure 1–13. Deficiency report information entry.

The next screen you will be prompted to write recommendations and identify fleet representatives, if you are unsure of what goes into these fields your local PIM should be able to assist you. In egress, we will not use the engine type, model and series (TMS), so all of the entries in that field will be non-applicable (“NA”). Finally you will be able to save and validate the DR.

Self-Test Questions

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

005. Repair cycle support system

1. What system establishes control of all unserviceable repair cycle assets from the time they are generated until returned to base supply as serviceable or unserviceable?

2. What base supply function is responsible for managing the repair cycle support system?

3. What is the objective of the repair cycle system concept?

4. When does the repair cycle time of an item stop?

5. Why are DIFM issues normally for a quantity of “one-each”?

6. What must you do every time a repair action is taken on a repair cycle item?

7. What must you provide to the RCSS when repair cycle items are turned in?

8. How would you update the status and location of a repair cycle item with IMDS?

9. What base supply report is generated daily and posted online as an aid in managing and controlling DIFM assets?

006. Condition tags

1. Match the organization listed in column A with its responsibilities in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once, more than once or not at all.

Column A	Column B
____ (1) DD Form 1575.	a. Yellow
____ (2) DD Form 1574.	b. Green
____ (3) DD Form 1577.	c. Red
____ (4) DD Form 1577–2.	d. Brown

2. Why would a damaged component be tagged with a DD Form 1577?

3. Why would a damaged component be tagged with a DD Form 1577–2?

4. What should you do if your shop receives a part with two different types of condition tags attached?

007. Maintenance repair cycle transactions

1. How does the AF accomplish time and resource conservation through the repair of broken parts, assemblies and subassemblies?

2. What are some reasons you would process a maintenance turnaround transaction?

3. If a maintenance turnaround transaction item is repaired, what do you do with the AFTO Form 350?

4. What action taken codes can you use for maintenance turnaround transactions?

008. Prepare materiel deficiency reports

1. What system is used to identify, report, and resolve deficiencies on military equipment or weapon systems?

2. What category of PQDR would you use for deficiencies that can cause death, severe injury, occupational illness or major loss or damage to equipment or a weapons system if uncorrected?

3. What category of PQDR would you use for deficiencies that are attributable to errors in workmanship or nonconformance to specifications, drawing standards or other technical requirements?

4. After discovery of the deficiency, when must you submit a CAT II PQDR?

5. What database would you use to submit a PQDR?

6. When requesting access to the database, you should contact which agency to determine what information needs to be entered for your profile?

7. On the PQDR database website, where will you find the Initiate DR option?

8. Clicking on the ST Lookup button will prompt you to do what?

1–4. Configuration and Time Change Management

Configuration management provides unit managers the capability to determine the actual versus approved configuration of an aircraft or equipment. The intent of configuration management is to ensure selected serially-controlled and/or TCIs are properly loaded to the MIS database. This lesson will go into detail about time change management as it is a high visibility program within the maintenance complex and can determine the mission your unit is capable of performing. If you are in a position that works with PS&D, you may already be familiar with some of this materiel, and depending on the base you are currently stationed, you may or may not have access to all the IMDS screens discussed.

009. Integrated Maintenance Data System and Egress Configuration Management

The IMDS Equipment Configuration Management (ECM) Subsystem provides access to a database containing equipment and configuration records. The user can update the database as events occur which affect assigned equipment configuration records.

The inputs you make into this subsystem will be of two general types. The first type of transaction updates the database for maintenance events, and the second type requests information from the database. This process allows you to load equipment, work unit codes, and next-higher-assembly work unit code relationships. You can also load, track, and review F–16 canopy transparency coefficients. You can forecast time change requirements for egress equipment and establish and maintain job standards for inspection and time change items. If you input codes which fail to pass

input edits, a reject code with a narrative will be displayed on your IMDS screen. It is possible to input data incorrectly and thereby compromise the integrity of the database. The usefulness of the system is degraded when incorrect data is entered, and in egress, aircrew lives are in danger.

Reject messages

Each entry you make in IMDS is edited for validity, structure, and accuracy. A reject message is displayed if you enter incorrect or incomplete information. The cursor will blink (or the field will be highlighted), and an error number will be displayed at the bottom of the screen. You must correct any errors before you can continue.

Egress Configuration Menu

Screen 854, Egress Configuration Menu, allows you to enter egress configuration management data while documenting job data. Follow-on pages pre-fill subsequent screens which allows the system to reduce the number of entries you will have to make. Screen 854 will enable access to the following options:

- Individual equipment load.
- Work unit code (WUC)/logistics control number (LCN) table.
- Establish job standards.
- Individual equipment installation.
- Individual equipment removal.
- Inspection/time change.
- Automated history entry.
- TCTO.
- Canopy transparency coefficient.
- Job data documentation (JDD) menu.
- Egress inquiries/reports menu.

Job standards

IMDS allows PS&D and other authorized personnel the power to create job flow packages, called job standards (JST), which are customized to fit each of the tasks most common to an egress shop. For example, to remove the seat from an F–16C, the seat removal is only a small part of the job. The crew has to remove the canopy and seat, which requires that a canopy inflatable seal check be accomplished by electrical/environmental specialists, a built-in-test (BIT) on the seat’s flight data recorder, and an egress final inspection.

JSTs are convenient because they take you from screen to screen automatically, so the whole job can be documented without the burdensome returns to the main JDD menu to add a WCE for every discrepancy. JSTs are also composed for individual time change items.

Time change items

Management of time change items is critical to the egress system’s integrity. Earlier, we discussed shelf-life, service life, dates of manufacture and installation, and establishing due dates for time change items. Now we’ll discuss the IMDS functions that assist in managing the database.

When a time change item is replaced, the job is documented the same as any other job. There are just a few extra steps needed to create a serially controlled item in the database as discussed previously, and establish dates of manufacture and installation, and set the due date for when an item must be removed and replaced. Some of this can be done automatically by assigning the correct JST to the item. From JDD Utilities, the user would select the Documenting an Existing Event option. After entering the JCN and WCE and transmitting the screen, the user would fill in either On- or Off-

Equipment Maintenance (914 or 917) the same as usual. It's here that a time change differs from other removal/replacement actions.

The JST should forward you on to Part/Serial Number Record Update (42). Once that function is complete and the item is created in the database, and the JST is assigned via the Update Inspections/Time Changes (372) page, the rest of the job can be completed. Now, this is one way to work time changes, but we discussed a faster way in the last lesson. Many JSTs are built to include all the IMDS functions needed to complete documentation of a time change, but some do not. Either way, it is the egress technician's responsibility to ensure that it all gets done.

Once the job is documented and verified, you must delete the old part from the system. Having old, turned-in components in the database only encumbers the system, and is technically incorrect. Keep your database clean and correct by deleting old parts from the system. This can be done with the same function that is used to establish a part/serial number, screen 42, Individual Equipment Load. After the part has been deleted from the system, it will not show up when an inquiry is performed with the Serial Number Inquiry by Part Number (screen 412) function.

Egress Configuration List

You can find out what items are installed on an ejection seat, or what egress system items are installed on an aircraft by using the Egress Configuration List on screen 257. Entering the aircraft serial number and using the drop-down to select option A (B- and E-type egress items), the user can transmit and receive a list of all egress components installed on the aircraft (fig. 1–14). If you needed to know information on the parachute or survival kit (advanced concept ejection seat [ACES] II), you would select the option for all (B, C, and E).

```
INPUT ITEM: EQP-ID/PN: A0354          SN:          LN:                OPT:

     ** INPUT ITEM IS NOT INSTALLED ON ANY OTHER ITEM **

  ** INSTALLATION HIERARCHY **

 1:A0354

      64 ITEMS INSTALLED ON INPUT ITEM

PART            SERIAL                        MFG.  INSTL  DUE INT     FREQ     EGR
NUMBER          NUMBER      LOT NUMBER        DATE  DATE   DT/TM      DOM/DOI  IND

315E100-5       72121C0177                    83090 98327  NO TCH RECORD LOADED  E
JCN:NO EVT RC WUC/LCN:12CCA              NAR:ACTUATOR ASSEMBLY          JST:NO JST

2650100         0000019479 OAC97F001-015      97181 99110 11181 M  000168/       B
JCN:NO EVT RC WUC/LCN:97AN0              NAR:INIT MAN ACT DTA 2650100/6 JST:T80601

2650100         0000019511 OAC97F001-015      97181 99110 11181 M  000168/       B
JCN:NO EVT RC WUC/LCN:97AN0              NAR:INIT MAN ACT DTA 2650100/6 JST:T80601

2650100         0000019598 OAC97F001-015      97181 99110 11181 M  000168/       B
JCN:NO EVT RC WUC/LCN:97AN0              NAR:INIT MAN ACT DTA 2650100/6 JST:T80601

2651100         0000013183 OAC96E001-004      96152 99110 10151 M  000168/       B
JCN:NO EVT RC WUC/LCN:97AP0              NAR:INIT GAS ACT DTA 2651100   JST:T80603

2651100         0000013320 OAC96E001-004      96152 99110 10151 M  000168/       B
JCN:NO EVT RC WUC/LCN:97AP0              NAR:INIT GAS ACT DTA 2651100   JST:T80603

51281-725       0001201556 OAC95C001-005      95090 99116 14120 M       /000180 B
JCN:NO EVT RC WUC/LCN:97AB0              NAR:DET TRNS 16K0341-18/51282- JST:T80580

10520619        0000000259 IH-99L016-001      99334 00143 17151 M       /000204 B
JCN:NO EVT RC WUC/LCN:97AK0              NAR:INIT M53 10520619          JST:T80511
```

Figure 1–14. Integrated Maintenance Data System Egress Configuration List (screen 257).

If the seat isn't installed in the aircraft (and the removal is documented in IMDS), only the system components that are still installed will show up on the report generated from screen 257 (fig. 1–15). To verify components installed on the ejection seat in this case, the part and serial number of the ejection seat itself would be entered, instead of the aircraft number. The resulting report will include information such as part number, serial number, lot number (where applicable), WUC, date of

manufacture, date of installation, date due replacement, and more. All in all, this is a very valuable tool for managing the configuration of egress systems.

```
INPUT ITEM: EQP-ID/PN: J114936-539     SN: 000F6A1755 LN:                OPT:

  ** INSTALLATION HIERARCHY **

 1:A0354
 2:J114936-539     000F6A1755 12E00                          EJECT ST ACE II E

      26 ITEMS INSTALLED ON INPUT ITEM

PART              SERIAL                      MFG.  INSTL  DUE INT     FREQ     EGR
NUMBER            NUMBER      LOT NUMBER      DATE  DATE  DT/TM       DOM/DOI  IND

50436-11          0000004226 TAC96K001-020    96305 98293 08305 M  000144/       B
JCN:NO EVT RC WUC/LCN:97EAA             NAR:RKT MTR SEAT STABN          JST:T80697

CAP-12115C        0000003339 16               99243 00140 08335 M       /000102 E
JCN:NO EVT RC WUC/LCN:12EGH             NAR:EM PW SP,B/U PARA D         JST:T80530

1003-24           0000020697 UPC98H001-078    98243 01213 09240 M  000132/       B
JCN:NO EVT RC WUC/LCN:97EAG             NAR:CARTRIDGE DROGUE            JST:T80709

811-00112         0000011555 411-7380-4       02151 02274 11151 M  000108/       E
JCN:NO EVT RC WUC/LCN:12EHB             NAR:SENSOR ENVIRONMENTL         JST:T80400

9392046-2         0000016515 HST02G001-007    02212 04075 10212 M  000096/       B
JCN:NO EVT RC WUC/LCN:97EAC             NAR:CARTRDG HRNSS RLSE          JST:T80701

J114712-505       0000064930                  97365 04350 10365 M  000156/       E
JCN:NO EVT RC WUC/LCN:12EHA             NAR:PARACHUTE DROG SBSY         JST:T80504

J115140-505       000CCE3523 REFURB-SEP05     05273 05298 23273 M  000216/       E
JCN:NO EVT RC WUC/LCN:12EE0             NAR:CONTROL PITCH STAB          JST:T80529

6066100-02        0000018210 SCN04C002-047    04091 05298 11090 M  000084/       B
JCN:NO EVT RC WUC/LCN:97EAE             NAR:GAS GENERTOR STAPAC         JST:T80705
```

Figure 1–15. Integrated Maintenance Data System Egress Configuration Output (screen 257).

010. Technical order waivers

Although few and far between, there are some circumstances where it is appropriate to waive technical order guidance. An example of where you as an Egress maintainer might have to deal with a waiver would be if a CAD/PAD component was due time change but there is a zero balance in the Air Force supply. A waiver should be requested to keep the plane in service until parts are available. Over the years there have been waivers granted because of an Air Force shortage on rocket catapults and even environmental sensors, perhaps your section currently has a few waivers right now for items that are past their service life. Check with your sections time change monitor to look at one.

Emergency waivers

On-scene commanders have broad discretionary powers to waive compliance with technical order procedures in emergency situations. However, extreme caution is paramount because the safety of personnel and equipment could be jeopardized. If commanders choose to waive technical order guidance, then it must be properly documented and sent to Headquarters (HQ) United States Air Force (USAF) *after* the emergency is resolved. An example of where technical order guidance may be waived is when evacuation/rescue flights must be made during wartime or natural disaster situations. In this case, the responsible group commander or designated official can temporarily waive compliance with any type of technical order when the aircraft is the only vehicle to make a rescue in order to prevent loss of life or the capture of friendly forces.

Combat zone and emergency war order tasked systems and equipment

For forces engaged in actual combat operations or supporting emergency war order (EWO) alert taskings, and for systems or components engaged in contingency operations, the area of responsibility (AOR) commander may temporarily waive specific technical order compliance until operational capability permits or safety of personnel is assured.

Technical order updates issued to correct safety deficiencies (i.e., supplements and changes) are mandatory for compliance, but they may be accomplished on a phased basis to minimize the impact on EWO posture. Additionally, using commands may authorize waivers of “remove from service”

actions for weapon systems or equipment affected by TCTOs or master change logs that have been issued for immediate action when high priority, unscheduled special missions preclude accomplishment within the specified time limit.

In addition to the waiver situations covered here there are also many other scenarios that may call for temporarily waiving some technical order compliance. For detailed information about technical order waiver policy refer to AFI 21–101 and TO 00–25–107, *Maintenance Assistance*.

Technical order system policy and procedures waivers

AFMC is the executive agent for the Air Force Technical Order system. AFMC issues Air Force policy for managing the technical order system and provides the final authority for waivers to that policy, ensures compatibility between the Flight Manuals Program (FMP) and the technical order system, and approves all service tests and studies of new techniques for use in all facets of the technical order system. AFMC is also responsible for developing, coordinating and implementing AFMC technical order system policies. In addition, AFMC:

- Is the Air Force and AFMC technical order system point of contact for receipt, interpretation, and dissemination of AF policy, business practices, and procedures on the technical order system. Reviews and approves or disapproves requests for waivers to Air Force technical order policy, and assists users with problem resolution.
- Ensures AFMC organizations comply with Air Force Materiel Command Instruction (AFMCI) 21–301, *Air Force Materiel Command Technical Order System Implementing Policies*, for the acquisition and sustainment of joint service military systems and commodity technical manuals. Cooperates with other services to encourage cross-utilization of technical orders.
- Is the technical content manager (TCM) for 00–5-series technical orders and Air Force/AFMC 20-x series publications on the technical order system.
- Is the TCM for 00–20-series technical orders on maintenance data documentation.
- Manages and controls the Air Force Technical Manual Contract Requirements (TMCR), Technical Manual (TM)–86–01.
- Manages and controls the data item descriptions (DID) used with the Air Force technical order system.

Air Force personnel should first refer TO system policy and procedure questions to their command technical order distribution office (TODO) and then the focal point identified in their MAJCOM supplement to TO 00–5–1, *AF Technical Order System*. Otherwise, refer technical order policy and procedure questions to the AF TO Policy and Procedures (AF TOPP) team, HQ AFMC/A4FI, 4375 Chidlaw Rd, Ste 6, WPAFB OH 45433–5006, e-mail: afmc.a4.af.topp@us.af.mil. Refer questions on specific technical order system tools to the office of primary responsibility (OPR) listed in Chapter 4 of TO 00–5–1. Request waivers to technical order system policy and procedures using the format and procedures on the Policy Integrated Air Force Network (AFNET), accessible via the AF portal. In other words, notification *cannot* be done using personal e-mail or telephone. Additionally, all authorized technical data variances must be kept with the affected aircraft/equipment historical records until they are no longer applicable.

Requesting a Waiver

When complying with a HHQ publication adversely affects your mission due to a unique situation, you may request a waiver from the OPR. Send the request via e-mail or memorandum and explain the need for the waiver. If the OPR deems it necessary, the waiver request may be elevated within the organization for review and approval. If the waiver is granted, the OPR of the publication must file it with the record set and provide a copy of the waiver to the publications/forms manager (Air Force Departmental Publishing Office [AFDPO] is the manager for HAF OPRs) when submitting the draft for publication. Field publications/forms managers must include a copy of each related waiver when submitting products to AFDPO. A waiver remains in effect until the OPR cancels it in writing, the publication is completely rewritten, or the waiver expires (the expiration date must be specified in the

documentation granting the waiver). Include a statement in the opening paragraph if no waivers are authorized for that particular publication or if no waivers are authorized for certain portions of the publication.

In some cases, the waiver may last the life of the basic publication. If so, the organization requesting a waiver may need to create a supplement to implement the waiver. The OPR of the basic publication will work with the organization requesting a waiver to design appropriate guidance if a supplement is necessary. In the opening paragraph state if the supplement has been created to implement a waiver. For additional information see AFI 33–360, *Publication and Forms Management.*

Egress time change item waivers

Specific waivers for TCI extension requests should be sent to the Air Force sustainment center-item manager (AFSC-IM) and an info copy to munitions operations. Usually PS&D will handle all this for you. Your part is to maintain a copy of approved waivers in the affected aircraft jacket file maintained in the shop and the aircraft forms folder. Only remove these items when they are no longer valid (i.e., after the item has been remove and replaced or if a published change in the appropriate 11p series technical order changes the due date). Check with your local supplement to AFI 21–101 and current local policies concerning technical order waivers for TCIs. TOs 00–20–1, *Web Access-Aerospace Equipment Maintenance Inspection, Documentation, Policy and Procedures,* and 00–20–9 contain additional guidance on TCI extensions that should be followed.

Self-Test Questions

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

009. Integrated Maintenance Data System and Egress Configuration Management

1. What subsystem within the IMDS provides access to a database containing equipment and configuration records?

2. What airframe’s canopy transparency coefficients are tracked within the IMDS ECM subsystem?

3. What happens in IMDS if you enter incorrect or incomplete information?

4. What options are available within IMDS using screen 854?

5. Within IMDS, why are job standards convenient?

6. Within IMDS, how can you automatically establish dates of manufacture and installation and due dates for time control items?

7. Once a time change job is coded complete in IMDS, what must you do with the old part?

8. What screen is used to delete old parts from IMDS?

9. What IMDS screen would you use to find out what egress items are installed on an aircraft?

10. If items are removed from the aircraft and documented correctly in the IMDS, what items will show up on the Egress Configuration List (screen 257)?

010. Technical order waivers

1. Why should on-scene commanders use extreme caution when waiving compliance with technical order guidance during an emergency situation?

2. Who may temporarily waive specific technical order compliance until operational capability permits or safety of personnel is assured for forces engaged in actual combat operations, supporting EWO alert taskings, and for systems or components engaged in contingency operations?

3. How long does a technical order waiver remain in effect?

Answers to Self-Test Questions

001

1. AFPD 63–1/20–1.
2. All Air Force military and civilian personnel, members of the Air Force Reserves, members of the Air National Guard and other individuals or organizations as required by binding agreement or obligation with the Department of the Air Force.
3. AFMC.
4. The RN.
5. All maintenance personnel.

002

1. Screen 497.
2. Workable Discrepancy Inquiry.
3. By processing screen 514 with equipment-ID STRAY and placing a “Y” in the Post-Post field.
4. On screen 072 input the proper TEX code for back ordering, change the UJC to a MICAP UJC and input an “N” in the MICAP flag field.
5. Authorized maintenance personnel.
6. The ILS-S will issue a KILL action notice to IMDS in the form of an I004 management notice.
7. The ILS-S will create a due-out release and send out a due-out Status Notification to IMDS-CDB to notify you that the requested asset was issued.
8. TEX code 7 or M.

003

1. FAD and UND.
2. Ensure each individual responsible for assigning UND requirements or priorities is properly trained in UMMIPS procedures; ensure individuals are aware of and comply with the accurate assignment and use of priority designators consistent with the FADs assigned by higher authority and with the existing urgency of need; review all UND requirements before sending a requisition to the source of supply; ensure supply discipline in priority requisitioning to include the use of disciplinary action in cases involving deliberate abuses.
3. (1) b.
   (2) c.
   (3) d.
   (4) e.
   (5) a.
4. You and your commander.
5. UND A.
6. UND C.
7. The quantities must be restricted to that amount necessary to satisfy the immediate requirement.
8. Before-the-fact review.

004

1. Only after all efforts are made to resolve materiel shortage problems through other local resources and you must check all base-level resources before MICAP requisitions are initiated.
2. Determine whether a substitute item can be used; search for items issued for time change and TCTO kits; check bench stocks; check WRM, SPRAM or supply point details; consider CANN or items due-in from maintenance not awaiting parts; assess the possibility of priority repair; determine if a next higher assembly is available or CANN is feasible.
3. MASS.
4. When requisitions received by AF materiel managers contain no entry in the RDD field, SDDs and RDDs will not be entered in the resulting passing actions and/or release/receipt documentation. No priority will be assigned to your request and you won't receive the part by the time it's needed.
5. AF materiel managers will make the necessary adjustments in internal processing to ensure the most expeditious handling.

005

1. The repair cycle support system.
2. RCSS.
3. To obtain the greatest benefits from the base maintenance shops.
4. When your shop sends the item, either serviceable or unserviceable, back to base supply.
5. The possibility of having different maintenance "action taken" codes assigned to different parts with the same document number.
6. Inform the RCSS and prepare the necessary documentation on the AFTO Form 350.
7. A completed AFTO Form 350, a condition status tag (DD Forms 1574, 1575 or 1577–2), and the number 3 copy of the original issue or due-out release document (DD Form 1348–1A).
8. Update ILS-S with IMDS.
9. D23-Repair Cycle Asset Management List.

006

1. (1) d.
   (2) a.
   (3) c.
   (4) b.
2. It would cost more to repair the component than to purchase another.
3. The item is worth the cost of repairing, or that it would cost more to replace than the cost to fix.
4. Have the unit bench-checked before it is used.

007

1. Maintenance turnaround transactions.
2. The component may be married or integrated to another component where replacement would require the replacement of the other component; the defective component may require a minor repair, while a new issue may require elaborate bench checking (time constraints may dictate the repair); it may be easier to repair the defect on the equipment, in which case a demand on supply would be impossible.
3. Forward part II to supply for processing of the maintenance turnaround transaction in IMDS.
4. A, F, G, K, L or Z.

008

1. The PQDR system.
2. Category I.
3. Category II.
4. Three workdays.
5. The JDRS.
6. Your local PIM office
7. Toolkit page
8. Enter the item part or model number for the item you are doing the report for.

009

1. The IMDS ECM subsystem.
2. F–16.
3. The cursor will blink (or the field will be highlighted), and an error number will be displayed at the bottom of the screen.
4. Individual equipment load; work unit code/logistics control number table; establish job standards; individual equipment installation; individual equipment removal; inspection/time change; automated history entry; time compliance technical order; canopy transparency coefficient; JDD menu; egress inquiries/reports menu.
5. They are built to take you from screen to screen automatically, so the whole job can be documented without the burdensome returns to the main JDD menu to add a work center event for every discrepancy.
6. By assigning the correct job standard to the item.
7. Delete it from the system.
8. Screen 42.
9. Screen 257.
10. Only the installed items.

010

1. They could be jeopardizing the safety of personnel and equipment.
2. AOR commanders.
3. Until the OPR cancels it in writing, the publication is completely rewritten, or the waiver expires (the expiration date must be specified in the documentation granting the waiver).

Complete the unit review exercises before going to the next unit.

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).

1. (001) What term describes the seamless governance, transparency and integration of all aspects of infrastructure, resource management and business systems necessary for successful development, acquisition, fielding and sustainment of systems, subsystems, end-items, and services to satisfy validated warfighter capability needs?
   a. Quality Assurance.
   b. Mission Generation Network.
   c. Integrated Life Cycle Management.
   d. Logistics Compliance Assessment Program.

2. (001) What term describes the conceptualization, initiation, design, development, test, contracting, production, deployment and disposal of a directed and funded effort that provides a new, improved or continued materiel, weapon, information system, logistics support, or service capability in response to an approved need?
   a. Logistics.
   b. Acquisition.
   c. Compliance.
   d. Sustainment.

3. (001) What term describes the continuing materiel support which consists of the planning, programming, and execution of a logistics support strategy for a system, subsystem, or major end-item to maintain operational capabilities from system fielding through disposal?
   a. Logistics.
   b. Acquisition.
   c. Compliance.
   d. Sustainment.

4. (002) You would start on which Integrated Maintenance Data System (IMDS) screen to generate a time compliance technical order (TCTO) kit availability report?
   a. 258.
   b. 380.
   c. 469.
   d. 497.

5. (002) Which Integrated Logistics System-Supply (ILS-S) Utilities screen option is used to order parts?
   a. Order Asset (722).
   b. Order On/Off equipment components (42).
   c. Order Unscheduled Maintenance Asset (72).
   d. Request Maintenance/Non-Maintenance Assets (497).

6. (002) What must exist before a part can be ordered from Integrated Logistics System-Supply (ILS-S)?
   a. Authorization control number.
   b. Supply document control number.
   c. Production supply control number.
   d. Job control number (JCN) and work center event (WCE).

7. (002) What Integrated Logistics System-Supply (ILS-S) screen is used to transfer a supply document number to the correct work center event?
   a. 516, Transfer of Asset Accountability.
   b. 352, SBSS Parts Turn-around Transaction.
   c. 42, Part/Serial Number Load/Change/Inquiry/Delete.
   d. 347, SBSS Inquiry by Stock Number, Document Number or Part Number.

8. (002) What is your next step if you order a part but your Integrated Maintenance Data System (IMDS) inquiry shows a KILL action?
   a. Backorder the parts in the amount required.
   b. Wait for the parts to come in as they are on their way.
   c. The parts have already been delivered to your shop so go find them.
   d. You do *not* have to do anything; the parts will automatically be backordered.

9. (003) What system provides a standard method of ranking competing needs according to their importance and to ensure the most effective management of resources in reacting to each need?
   a. Force Activator Designator System.
   b. Urgency of Need Designator System.
   c. Mission Capable Asset Sourcing System.
   d. Uniform Materiel Movement and Issue Priority System.

10. (003) What force activity designator (FAD) is assigned to continental United States (CONUS) forces being maintained in a state of combat readiness for immediate (within 24 hours) deployment?
   a. FAD I.
   b. FAD II.
   c. FAD IV.
   d. FAD V.

11. (003) What urgency of need designator (UND) is used only for materiel when the lack of the requested item impairs your ability to perform the assigned mission?
   a. UND A.
   b. UND B.
   c. UND C.
   d. UND D.

12. (003) Who will base management and systems flight personnel notify if they see adverse trends concerning the use of the Uniform Materiel Movement and Issue Priority System (UMMIPS)?
   a. Inspector General.
   b. Judge Advocate General.
   c. Organization commander.
   d. Office of Special Investigations.

13. (004) What priority supply system is used to secure materiel needed to repair mission essential equipment of the highest priority needed to maintain mission capability?
   a. Mission Impaired Capability Awaiting Parts (MICAP) System.
   b. Standard Delivery Date (SDD) System.
   c. Repair Cycle Support System (RCSS).
   d. Standard Base Supply System (SBSS).

14. (004) How are Mission Impaired Capability Awaiting Parts Asset Sourcing System (MASS) input transactions processed when the Integrated Logistics System-Supply (ILS-S)is down?
    a. You will have to fill out a paper AFTO Form 2005, Issue/Turn-in Request, to process the transactions.
    b. They are stored in the MASS database and are processed when ILS-S becomes available.
    c. Input transactions are lost, so do *not* input transactions into MASS when ILS-S is down.
    d. MASS uses normal procedures to process input transactions.

15. (004) What is the maximum standard terminal date for ordering and shipping normally required for the logistics system to effetely deliver requisitioned materiel to a consignee?
    a. Earliest delivery date.
    b. Contract delivery date.
    c. Required delivery date.
    d. Standard delivery date.

16. (004) What is the calendar date of materiel delivery to a consignee that must be accomplished in order to satisfy a specific mission requirement?
    a. Earliest delivery date.
    b. Contract delivery date.
    c. Standard delivery date.
    d. Required delivery date.

17. (005) After it is completely filled out, where is the bottom portion of the AFTO Form 350, Reparable Item Processing Tag sent?
    a. Repair cycle support section.
    b. Mission capable assets section.
    c. Equipment management element.
    d. Squadron maintenance operations.

18. (005) What due-in from maintenance (DIFM) status code would you use to code a part as “in work”?
    a. Awaiting part (AWP).
    b. In-work (INW).
    c. Time change (TCG).
    d. Turn-in (TIN).

19. (005) What supply report is posted online to aid in managing and controlling repair cycle assets?
    a. D04, Daily Document Register.
    b. D06, Daily Transaction Register.
    c. D23, Repair Cycle Asset Management List.
    d. D14, Daily Base Supply Management Report.

20. (005) How often does plans, scheduling & documentation meet with munitions operations personnel to ensure time change items (TCI) are accurate in the Integrated Maintenance Data System (IMDS) and available for requisition?
    a. Weekly.
    b. Monthly.
    c. Quarterly.
    d. The first workday of the month.

21. (006) What color is a DD Form 1574, Serviceable Tag-Materiel, attached to serviceable items?
    a. Red.
    b. Brown.
    c. Green.
    d. Yellow.

22. (006) What color is a DD Form 1575, Suspended Tag-Materiel, attached to suspended items?
    a. Red.
    b. Brown.
    c. Green.
    d. Yellow.

23. (006) What condition code is always preprinted on the DD Form 1577, Unserviceable (Condemned) Tag-Materiel?
    a. A.
    b. F.
    c. H.
    d. K.

24. (007) Which reason would require you to process a maintenance turnaround (TRN) transaction?
    a. The component is unable to be repaired, in which case you should place a demand on supply.
    b. The defective component may require a major repair which requires elaborate bench checking.
    c. It may be more difficult to repair the defect on the equipment, in which case you should place a demand on supply.
    d. The component may be integrated with another component where replacement would require replacement of the other component.

25. (007) When filling out an AFTO Form 350, Reparable Item Processing Tag, for a maintenance turnaround (TRN) transaction, what do you annotate on the AFTO Form 350 when you turn the part in to the repair activity?
    a. “TRN”.
    b. “TIN”.
    c. “ISU”.
    d. “T/I”.

26. (007) What happens when your shop fails to process maintenance turnaround (TRN) transactions?
    a. Supply orders the part.
    b. The part is impounded.
    c. Stock levels are affected.
    d. Pickup points accumulate.

27. (008) What product quality deficiency report category includes deficiencies which if not corrected, would directly restrict combat or operational readiness?
    a. Category I.
    b. Category II.
    c. Category III.
    d. Category IV.

28. (008) Within how many workdays do you have to submit a Category II Production Quality Deficiency Report after discovery of the deficiency?
    a. 1.
    b. 3.
    c. 5.
    d. 14.

29. (008) Once you gain access to the Joint Deficiency Reporting System database, where will you find the option to initiate a new deficiency report (DR)?
    a. Toolkit page.
    b. Home screen.
    c. New DR screen.
    d. Services screen.

30. (009) Within the Integrated Maintenance Data System (IMDS), to enter egress configuration data while you are documenting job data, you would use screen
    a. 907, Job Data Documentation Menu.
    b. 225, Egress Inquiries/Reports Menu.
    c. 854, Egress Configuration Menu.
    d. 693, Inspections/Time Changes.

31. (009) Within the Integrated Maintenance Data System (IMDS), what job flow package is customized to fit each of the tasks most common to an egress shop?
    a. Job standard (JST).
    b. Time change item (TCI).
    c. Job data documentation (JDD).
    d. Plans, scheduling and documentation (PS&D).

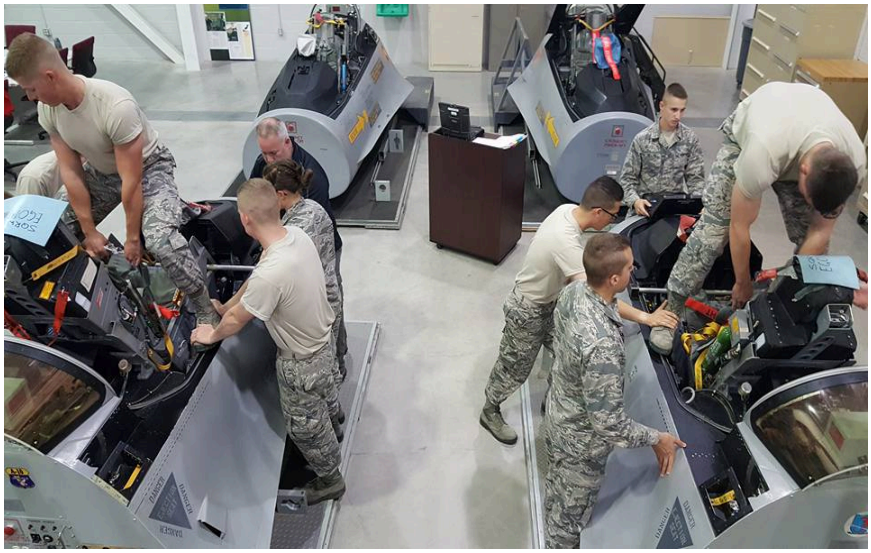
32. (009) After you have completed a time change within the Integrated Maintenance Data System (IMDS), what transaction should you perform on the old part?
    a. Load the part.
    b. Query the part.
    c. Reject the part.
    d. Delete the part.

33. (009) What Integrated Maintenance Data System (IMDS) screen is used to find out what egress system items are installed on a canopy?
    a. 257, Egress Configuration List.
    b. 225, Egress Inquiry/Reports Menu.
    c. 259, Canopy Transparency Coefficient List.
    d. 842, Egress Time Change Forecast Inquiry.

Please read the unit menu for unit 2 and continue ➔

Unit 2. Maintenance Training and Personnel Resource Management

This unit, and the rest of this volume, builds on the organizational structure and responsibilities covered in volume one. As you go through these lessons you'll draw on the knowledge about philosophy, structure, and responsibilities that you learned about in volume one. This will help you put each topic into perspective and allow you to build on your knowledge. For these topics you bear most of the day-to-day responsibility in managing your people—but you are not alone. For every one of these areas there is an organization in the MXG or within the wing to help you when you need guidance.



2-1. Maintenance training and supervising

One of your biggest training challenges is staying on top of it. Maintaining a fully trained work force is a continuous process—you can't just fix it and forget it! If you put it on the backburner, even for a month or two, you will quickly fall behind.

This lesson will cover some of the training resources you have at your disposal. Knowing the types of training available allows you to make more effective use of those resources. This not only means that your people will be better trained, but it also means that you have to spend less time worrying about it. In addition to the types of training available, we will also cover training documentation. After all, it doesn't do you much good to provide training if you don't document it properly.

011. Types of training

As a maintenance manager one of your primary duties is to ensure that your personnel are properly trained to do their jobs. While much of this training is conducted in the form of on-the-job training (OJT), there are several other options available to help you maintain a trained work force. Collectively, all types of maintenance training work together to provide a complete life-cycle: initial, upgrade, proficiency, qualification, recurring, and certification training.

Training detachment

Though training detachments (TD) are administratively assigned to the Air Education and Training Command (AETC), they teach classes at selected bases throughout the Air Force. They provide on-site training that would otherwise be locally developed at many bases or would require large numbers of temporary duty (TDY) assignments to provide the training at a central location. AETC strives to cut the cost of development and administration by developing the courses and then teaches them using permanently assigned instructors at TDs or instructors temporarily assigned to a mobile training team (MTT). TDs provide hands-on maintenance training on aerospace ground equipment (AGE), communications-electronics (C-E) equipment, and certification training (i.e., engine run, as well as other training on various aircraft and engine systems). An example of a TD class is the follow-on training 3-level technicians receive following technical school. An example of an MTT class is weight and balance (W&B) training.

TDs conduct field training for aircraft weapon systems assigned to the base on which they are located. TDs use base supplied facilities such as the flight line, maintenance shops, hangars, and classrooms for conducting their classes. As stated earlier, if a TD is assigned it is the primary aircraft maintenance training agency on base. There is a major exception—TDs normally *do not* conduct ancillary training. The TDs operate under a support agreement with the host wing. The host-tenant support agreement addresses issues such as facility use, funding, administrative support, vehicle support, aircraft support, and maintenance support beyond the TD's capability.

Formal training

Formal training is defined as any training conducted by HQ AETC, Air Combat Command (ACC) Logistics Readiness Training Center, or through the maintenance qualification training (MQT) program. A list of AF-wide courses available for a specific maintenance career field is included in Part 2 of the AF specialty code (AFSC) specific career field education and training plan (CFETP). Information about a specific course and instructions on how to enroll is provided on the Air Force's education and training course announcements (ETCA) website at https://health.mil/Training-Center/Education-and-Training-Course-Announcements. The ETCA site is a great source of information on formal training that includes courses conducted or administered by the AF and reserve forces. However, ETCA *does not* provide information on courses that are unique to a few organizations and it *does not* list short term (one-time) training.

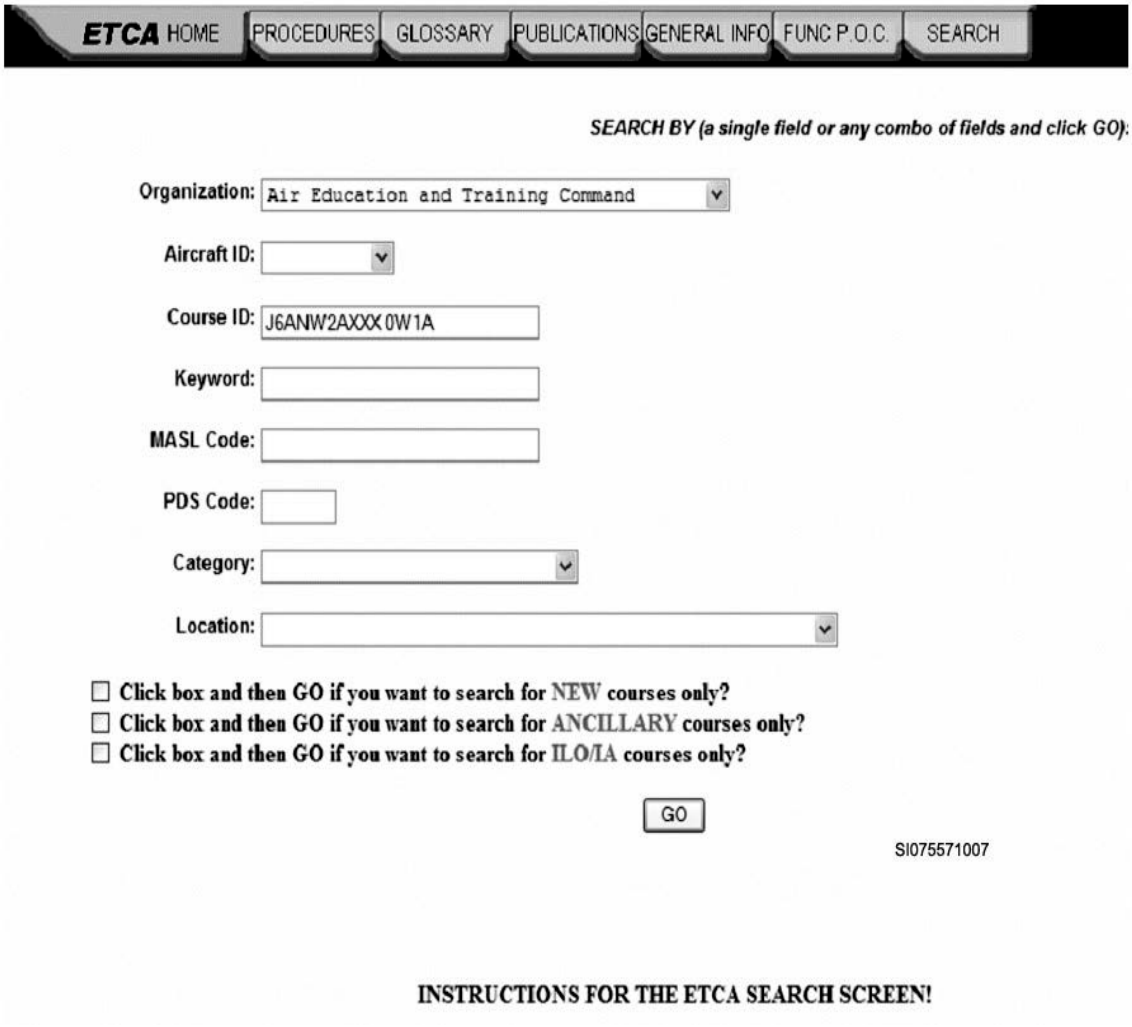
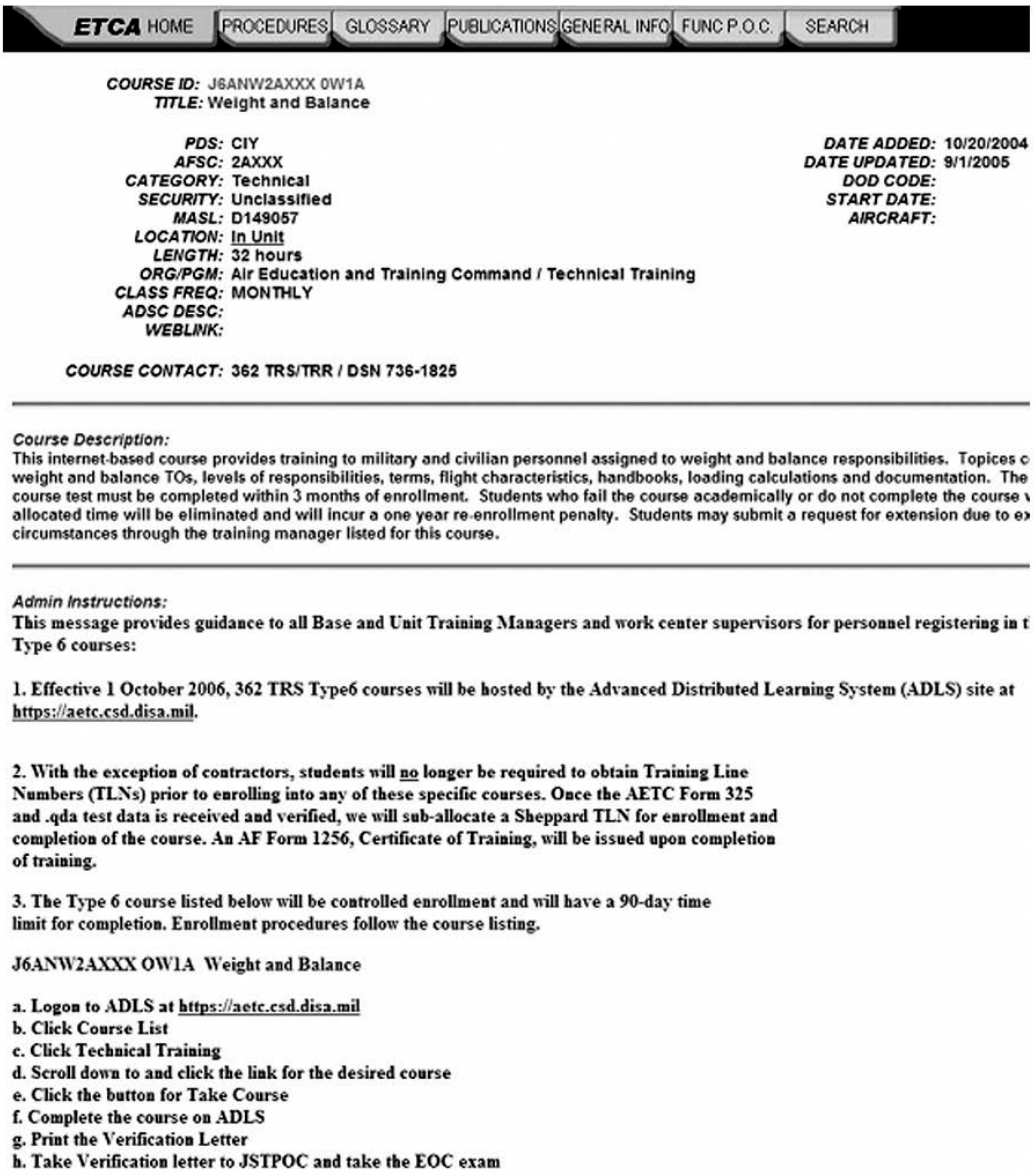


Figure 2-1. ETCA Search Page.

To find a specific course navigate to the ETCA website. Once you get there, click on the parent organization that teaches the course and then enter the course code as listed in Part 2 of your CFETP (fig. 2-1). Figure 2-2 is an example of a course description as listed on ETCA. You can also search for classes by aircraft type as well as other criteria. For instance, you can get all available courses taught by a MAJCOM or other major organization. To do this, just leave all search criteria blank except for the MAJCOM or agency.



ETCA HOME | PROCEDURES | GLOSSARY | PUBLICATIONS | GENERAL INFO | FUNC P.O.C. | SEARCH

COURSE ID: J6ANW2AXXX 0W1A
TITLE: Weight and Balance

PDS: CIY
AFSC: 2AXXX
CATEGORY: Technical
SECURITY: Unclassified
MASL: D149057
LOCATION: In Unit
LENGTH: 32 hours
ORG/PGM: Air Education and Training Command / Technical Training
CLASS FREQ: MONTHLY
ADSC DESC:
WEBLINK:

DATE ADDED: 10/20/2004
DATE UPDATED: 9/1/2005
DOD CODE:
START DATE:
AIRCRAFT:

COURSE CONTACT: 362 TRS/TRR / DSN 736-1825

Course Description:
This internet-based course provides training to military and civilian personnel assigned to weight and balance responsibilities. Topices c weight and balance TOs, levels of responsibilities, terms, flight characteristics, handbooks, loading calculations and documentation. The course test must be completed within 3 months of enrollment. Students who fail the course academically or do not complete the course v allocated time will be eliminated and will incur a one year re-enrollment penalty. Students may submit a request for extension due to ex circumstances through the training manager listed for this course.

Admin Instructions:
This message provides guidance to all Base and Unit Training Managers and work center supervisors for personnel registering in t Type 6 courses:

1. Effective 1 October 2006, 362 TRS Type6 courses will be hosted by the Advanced Distributed Learning System (ADLS) site at https://aetc.csd.disa.mil.

2. With the exception of contractors, students will no longer be required to obtain Training Line Numbers (TLNs) prior to enrolling into any of these specific courses. Once the AETC Form 325 and .qda test data is received and verified, we will sub-allocate a Sheppard TLN for enrollment and completion of the course. An AF Form 1256, Certificate of Training, will be issued upon completion of training.

3. The Type 6 course listed below will be controlled enrollment and will have a 90-day time limit for completion. Enrollment procedures follow the course listing.

J6ANW2AXXX OW1A Weight and Balance

a. Logon to ADLS at https://aetc.csd.disa.mil
b. Click Course List
c. Click Technical Training
d. Scroll down to and click the link for the desired course
e. Click the button for Take Course
f. Complete the course on ADLS
g. Print the Verification Letter
h. Take Verification letter to JSTPOC and take the EOC exam

Figure 2-2. Weight and Balance Course Description.

Formal training courses can range from in-resident training at AETC bases to computer-based training (CBT) given through distance learning. Formal training falls into two broad categories that differ significantly in funding, management, and relationship to overall AF requirements.

- *Category 1* courses have general application throughout the AF and are primarily taught and administered by those with the primary mission of training and education such as those taught by AETC organizations. This type of training includes a career field's official 7-level class if one is available.
- *Category 2* training is conducted by the various MAJCOMs and their operational units. This type of training is designed to support a specific MAJCOM's unique combat or combat support training needs.

For much more information on formal training refer to the Procedures tab of the ETCA website.

Distance learning

Distance learning (DL) is exportable training that is centrally produced and delivered to students to be accomplished at their convenience. It includes paper, computer based, interactive, and satellite-delivered training, and so forth. The aircraft maintenance DL program provides instruction using CBTs, interactive courseware (ICW), video teletraining (VTT), videodisk, and other distance learning media. The courseware is specifically tailored and has varied course content. DL programs are normally developed by AETC. Information about many of the distance learning classes can be found at the ETCA site mentioned above. Some of the distance learning courses your personnel will take include the Technical Order Account Custodian, W&B, and several IMDS courses.

Block training

Block training is a term that describes several different training modules that are taught together. The purpose of block training is to group as many training requirements as possible into a single training session. Initially, the training session should provide information that everyone requires and then taper to a point where only certain categories of personnel remain. Courses taught in the block training format include fire extinguisher, forms documentation, hazard communication (HAZCOM), corrosion control, foreign object damage (FOD), security awareness, egress, resource protection, and so forth. Many of these courses are conducted by the maintenance training flight (MTF). The MTF uses the block training method to teach initial/refresher maintenance orientation training. You undoubtedly remember your time at Sheppard, moving up in blocks getting closer to graduation with each one.

Continuation training

Continuation training includes advanced and qualification training that develops in-depth expertise within a specialty, broadens knowledge of new specialties, introduces new technologies and systems, develops analytical skills, or increases understanding of the relationship between maintenance specialties. This training uses various methods and includes such courses as dedicated crew chief (DCC) and AGE operator training.

Ancillary training

Ancillary training contributes to mission accomplishment, but is separate from an individual's primary AF specialty or occupational series requirements. Ancillary training is required and taught according to specific program governing directives. It is usually presented in block training format to reduce the impact on mission accomplishment. Ancillary training is used to address numerous training requirements (i.e., M-16 weapons training and chemical warfare defense training).

Cross utilization training

Cross utilization training (CUT) is used to provide units a certain degree of flexibility by training individuals to perform tasks not normally performed in their primary Air Force specialty. This training is used to offset periods of low level manning and to enhance combat capability by developing a pool of qualified personnel to draw upon during surges. Using CUT personnel comes with a caveat: try not to reach the point where you rely on them as a long-term solution. They should simply be used as a short-term fix until a more permanent solution can be found. Also, ensure your personnel's training records are properly documented to reflect training received and qualifications/certifications obtained. CUT can be accomplished through OJT or formal training courses.

A good example of CUT would be if the Egress shop has manning issues, the QA section will CUT a crew chief or weapons inspector so they may perform Egress maintenance inspections. We will discuss QA inspections later in the next lesson.

Specialized courses

Specialized courses (SC) are designed to meet a unique training need. In maintenance, they allow maintenance technicians to achieve a level of competency beyond their fellow maintainers that is not

available through normal upgrade training. Specialized courses are normally taught in a career development course (CDC) type format such as the Aircraft Communication/Navigation Systems course. They may also be offered in electronic format.

Three of the most widely available maintenance specific specialized courses are the Airframe and Powerplant (A&P) courses. AETC developed these to help AF maintainers acquire the necessary expertise to attain a Federal Aviation Administration (FAA) issued A&P license. This program includes three courses: General, Airframe, and Powerplant. All are titled Airframe and Powerplant Mechanic along with the specific course designators:

- The General course is 02AF1.
- The Airframe course is 02AF2.
- The Powerplant course is 02AF3.

Even if you have no aspirations to work on aircraft when you get out of the AF, the A&P certification awards you 30 semester hours of college credit at some schools—that's 10 classes! All of these credits can be applied towards resident or distance learning degrees offered by many universities. Don't forget all the credit hours that you earn when you attend Airman Leadership School and the Noncommissioned Officer (NCO) Academy, those credits give you a boost in a management type degree plan.

Technicians enroll in the AF A&P certification program through the Community College of the Air Force (CCAF) website located at https://ccaf.maxwell.af.mil/faa/index.asp. For specific information about the A&P certification process as well as other licensure and certification programs refer to https://augateway.maxwell.af.mil/ccaf/certifications/index.asp.

012. Explosives Safety Training Program

Aside from all the other training we just covered, the most important training you will receive for our career field is explosives safety. Most mishaps result from a chain of events that usually includes one or more unsafe acts or conditions. In theory, mishaps can be prevented by eliminating just one unsafe act which, in turn, prevents the chain of events. In practice, this isn't realistic because the result of a series of events isn't always predictable. The only sure way to prevent mishaps is to eliminate all unsafe acts and conditions. The key to preventing mishaps is to identify and then eliminate or control hazards or deficiencies before they cause injury or damage. In this lesson, we'll cover three major areas applicable to explosives safety:

1. Explosives and weapons safety training programs.
2. Safety standards.
3. Responsibilities.

Explosives and weapons safety training programs

The objective of the explosives safety program is to reduce the number of accidents and to minimize the results (injury, loss of life, and destruction of property) of the mishaps that do occur. A successful safety program includes proper safety instruction, adequate training, and careful supervision of personnel.

Weapons safety training is required for everyone who is involved with the handling, transportation, maintenance, loading, or disposal of explosives. The training is conducted by the base or unit weapons safety officer or NCO. The initial training is done before personnel perform explosives-related maintenance and followed by annual recurring training thereafter. The training must be tailored to the specific duties and weapons systems involved. If there are no MAJCOM lesson plans available, you (or your section) will need to develop a local lesson plan. If you do, your lesson plan should include (as a minimum) these six subjects:

1. The individual's role and specific responsibilities in the unit weapons safety program.
2. Explosive and hazardous aspects of the specific weapons systems.

3. Safety equipment provided.
4. Unique handling and transportation problem areas.
5. Lessons learned from past local and like-unit experiences involving mishaps, hazard reports, deficiency reports, inspection reports, and related events.
6. Requirements of TO 11A–1–33, *Handling and Maintenance of Explosive Loaded Aircraft*, for all personnel involved in explosives-loaded aircraft operations.

Safety standards

Written standards must be developed and used for each explosives operation. Local written safety standards (operating instructions [OI], squadron regulations, etc.) are required when explosives operations are not covered in sufficient detail by other standard publications such as technical orders. These written procedures will be coordinated with all applicable personnel such as your base's safety office. When local written procedures are required, along with any specific MAJCOM requirements, they must contain (as a minimum) the following information:

1. Explosive and personnel limits.
2. Operating locations.
3. Safety requirements.
4. Actions to be taken during emergencies.
5. Step-by-step procedures for doing the task.

Locally written instructions

Locally written instructions may take the form of crew briefings, safety briefings, local operating instructions, and so forth. Your squadron commander needs to approve your section's locally written instruction. It must be available at the work site, which means a copy of it should even be brought out to the flight line when you are performing explosive maintenance outside of your work center. It should be written in an easy to understand language and leave no room for confusion. Do not just copy/paste some warnings out of technical data; instead summarize it in plain English.

You will have to brief it prior to starting any explosive maintenance. As the supervisor, if you are giving the briefing, you need to ensure all personnel involved in the task fully understand the instruction and what actions to take during an incident prior to starting the job. Keep in mind, people get bored with repetitive tasks and accidents can happen to anyone, anytime – *complacency kills*. Giving the briefing should reinforce the hazards and hopefully avert a potential mishap.

Responsibilities

People who work with explosives have responsibilities to both themselves and their fellow workers. These responsibilities will vary according to the individual's assigned duties in these areas:

- Explosives safety NCO.
- Supervisors.
- Operating personnel.

Let's look at these in more depth.

Explosives safety Noncommissioned Officer

At some point in your career, you may fill the position of the unit explosives safety NCO. In this position, you'll represent and work directly for the commander. As the commander's representative, you must accomplish these tasks:

1. Keep the commander informed of the status of the explosives safety program.
2. Make sure safety standards applicable to your area of responsibility are current, available, and implemented.
3. Make sure personnel receive applicable explosives safety training.

4. Make sure facilities, equipment, work areas, and work processes comply with established standards.
5. Advise the commander of any explosives operations that would have a significant negative impact on mission capabilities.

Supervisors

Supervisors are the key to the entire explosives safety program because they're in a position to observe unsafe acts and conditions. As such, they must act promptly to eliminate any potential hazards. To ensure safety, supervisors must instruct their workers on the safety standards for the operations they'll be performing. To stay informed of any problem areas, you must also perform periodic inspections. Don't limit your inspection to one area, such as the explosives storage area; instead, a proper inspection should include the whole egress shop operation. To make sure your inspections are thorough, you should have an explosives safety checklist that's comprehensive and includes all aspects of maintenance and explosives operations. You should use this checklist regularly and correct any defects as soon as they're noted. You should then report these defects to the section chief so he or she may investigate the cause and take measures to prevent recurrence.

Operating personnel

Operating personnel are responsible for understanding and strictly observing all safety standards applicable to their duty. They shouldn't start any work or task involving explosives if they don't fully understand the hazards involved. They must report to their supervisor any condition or material that's found unsafe and warn others of the hazard. They must also be prepared to exercise appropriate caution in the event of a hazardous occurrence.

013. Training documentation

This lesson is not intended to teach you how to document training, there are other courses for that. Instead it covers some areas that will help you manage training for maintenance personnel. It will also clarify a few areas that you may not be sure about.

Training records

The MIS Training Business Area (TBA) is used to maintain individual training records. Training records must be maintained on all TSgts and below as well as any other personnel in upgrade training or retraining. For maintenance personnel, you must maintain documentation for all MSgts and above that perform maintenance on aircraft, missiles, or associated equipment. Consideration must be made for tasks that could be performed while deployed. For these individuals you only document "hands-on" tasks that they are expected to perform. This does not have to include career field core tasks or local upgrade requirements unless they may perform the task.

If used in place of electronic records, a hard copy Air Force Information Management Tool (AF IMT) 623, Individual Training Record Folder; AF IMT 623A, On-the-Job Training Record, Continuation Sheet; and the CFETP may be used to record training. However, they are only used when the maintenance information system TBA is down for two or more days and then records must be transcribed to TBA within 15 days once the system is available.

Special certification roster

The special certification roster (SCR) is a concise listing of assigned personnel authorized to perform maintenance tasks or work that is considered to be of a critical nature. It is used to ensure that only properly qualified and authorized personnel are performing these jobs. Normally, only maintenance tasks that have a high potential for personnel injury or damage to equipment are included on the SCR.

The SCR must be reviewed and signed semi-annually by the maintenance operations officer (MOO)/maintenance superintendent (MX SUPT)—wing weapons manager (WWM) will review and sign weapons standardization (WS) SCRs. MXG will review and sign SCR actions for those individuals administratively assigned to the military occupational specialty (MOS) and field training detachment (FTD) personnel. The purpose of reviewing the SCR is to verify all entries for currency

and accuracy. When someone is added to the SCR, a thorough review is conducted to ensure that the individual is properly certified on the particular task for which he or she is being added. Except for properly CUT trained individuals, personnel are normally put on the SCR only to perform critical tasks within their primary AFSC. Also, if someone is being added for a task normally performed by a higher skill level technician, the MXG/CC must approve a waiver to authorize them to be added for this task. For example, if your shop has a shortage of 7-level inspectors, a highly qualified SrA may be eligible to be waived in order to sign off Red X's for tasks like egress finals or seat installs. *Waivers should be kept to the minimum level necessary to accomplish the maintenance mission.*

Special certification roster documentation

There are very specific procedures you must follow to submit someone for addition to the SCR. Refer to AFI 21-101 to ensure that you are following current guidance. Some of the main items you need to be concerned with include:

- Reviewing the individual's qualifications before recommending approval.
- Generating an AF IMT 2426, Training Request and Completion, or other approved form.
- Making a copy for your records until the individual is officially approved or denied.
- Submitting the nomination through proper channels.
- Coordinating with the unit training manager (UTM) to ensure that the individual is updated in the applicable MIS.
- Keeping a current copy of the combined SCR for all section personnel.

It is important to note that your duties do not stop once you have someone added to the SCR. You must regularly monitor their proficiency and ensure that they are qualified to remain on the SCR for that task or duty. If you determine someone is no longer qualified, as the workcenter supervisor you should decertify the individual and have him or her removed from the SCR for that task. It is also very important to take a current copy of the SCR on all deployments.

There are quite a few duties that may be tracked on the SCR. The table below lists a few of the mandatory items. Please note that this is an abbreviated list; *for a complete list* refer to AFI 21-101.

Mandatory Special Certification Roster and Prerequisites		
Item	Mandatory SCR Item Titles	Prerequisites
1	All Systems "Red-X" (not egress, welding, munitions, fuel cell (in-tank work))	Master Sergeant (MSgt) or higher (or civilian equivalent) (See Note 1)
2	Exceptional Release (ER)	
3	"Red-X" Downgrade	
4	All systems in-process inspection (IPI) (no egress, welding, munitions, fuel cell (in tank work))	
5	"Red-X" by primary AFSC and mission design series (MDS) (For multiple MDSs, list separately)	Staff Sergeant (SSgt) or higher, minimum 7-skill level (or civilian equivalent); If used for egress personnel, additional requirements must be satisfied.
6	IPI by primary AFSC and MDS (For multiple MDSs, list separately)	
7	"Red-X" and/or IPI – limited (For multiple MDSs, list separately), for tasks outside primary AFSC through cross-utilization training or limited tasks within the primary AFSC.	SSgt or higher, minimum 7-level (or civilian equivalent). Use for personnel certified on tasks in other AFSCs through CUT training or personnel certified on limited tasks within their AFSC as determined by the unit (See Note 2).
Mandatory Special Certification Roster and Prerequisites		

8	Not reparable this station (NRTS) and serviceability Tag	SSgt or higher, minimum 7-level (or civilian equivalent) (See Notes 2 and 3).
9	Clear Red-X when a lost tool/item cannot be located	MOO/MX SUPT or above
Notes: 1. Approved by MXG/CC 2. Approved by Maintenance Operations Officer/MX SUPT 3. Maintenance Operations Officer/MX SUPT may delegate approval authority to the Aircraft Maintenance Unit (AMU) Officer In Charge (OIC)/SUPT or Flight Commander/Chief		

014. Training Business Area

TBA is an AF Portal, web-based application providing Air Force personnel with global, real-time visibility of technical qualifications, certifications and training status of weapons systems and support professionals Air Force-wide. TBA supports base, wing, and workcenter level training management activities by automating training management business process previously performed using paper records and legacy systems providing more accessibility to trainers, supervisors, and higher levels of management. This system allows all officers, enlisted and civilian personnel to access their training records and the training records of personnel they supervise anywhere that has network access. Supervisors can get real time access to revised career field education and training plans from their career field managers. The TBA system is exclusively *paperless*; there are no provisions for creating, accessing, or maintaining paper copies of records (other than covered above in the previous lesson). Additional information can be found in AFI 36-2650, *Maintenance Training,* and TBA can be found at https://www.my.af.mil/imdsltpa-tba/IMDSTWeb/servlet/roleSelection. TBA is developed and maintained by the 754th Electronic Systems Group, Installation and Logistics, Maintenance Flight (754 ELSG/ILM) at Maxwell-Gunter AFB.

After selecting the TBA application on the AF Portal, the first screen you will view is the “System Messages” board and DOD warning (see fig. 2-3). The “System Messages” board provides notifications of application problems, software releases (problem corrections) projected downtimes and training update information**.** *It is very important that you review the messages before proceeding.*

Training Business Area user roles

TBA utilizes organizational roles such as trainee, trainer, certifier, supervisor, and training manager. The actions TBA allows you to perform are based on the role, or roles, you have been assigned by a role manager. Some roles have more capabilities than others. For example, an individual assigned to a supervisor role is able to perform more functions than someone assigned to a trainee role. Some roles allow individuals to sign off the completion of a task. Others allow the individual to add or remove tasks in an individual training plan (ITP). Figure 2-4 contains a list of all the TBA user roles and figure 2-5 is the TBA Opening Menu Screen. Most users will have more than one role and the roles assigned will depend on the training management functions the user needs. Remember, TBA only allows the user access to the roles that have been previously assigned by a role manager.

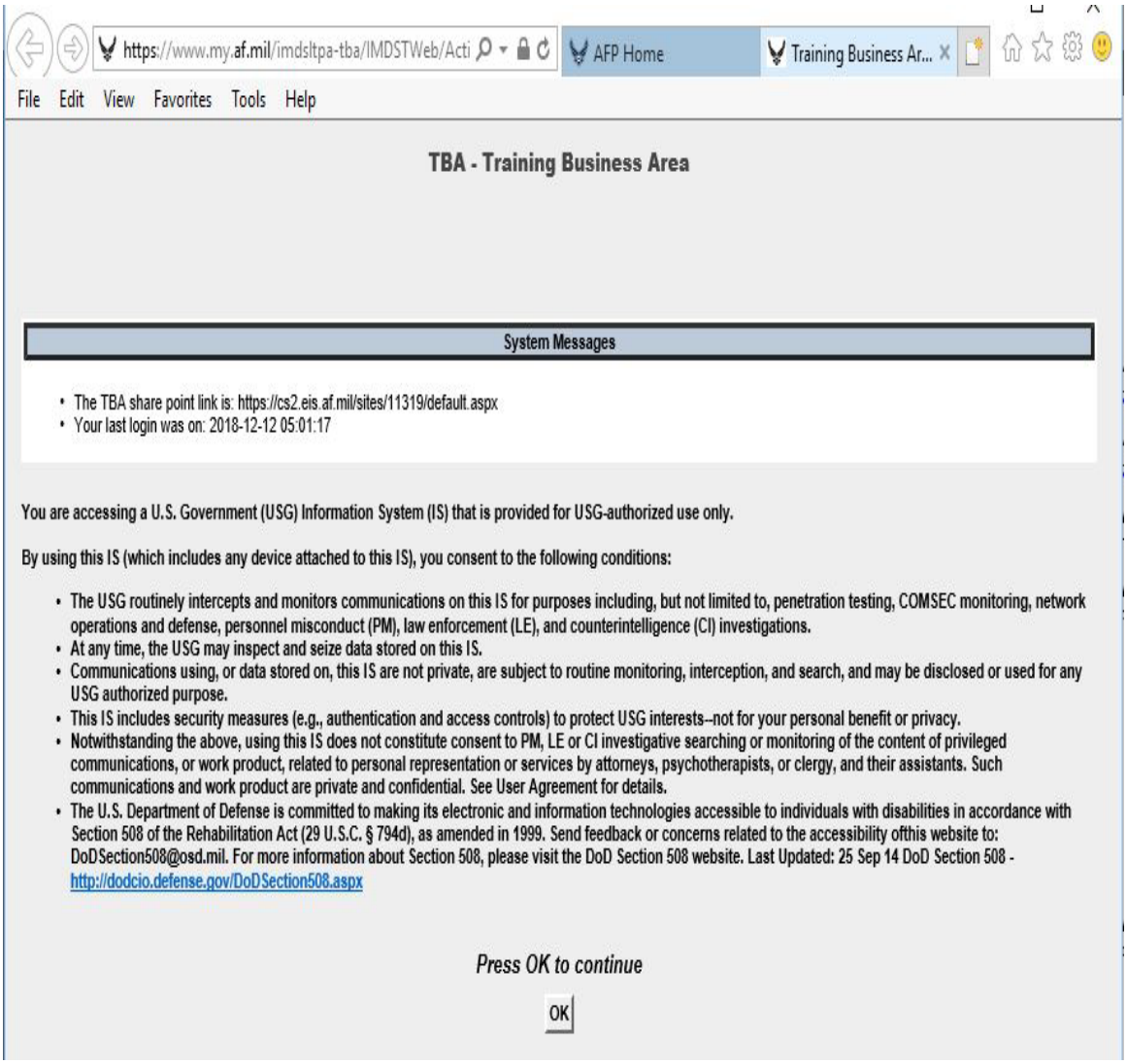


Figure 2-3. TBA System Messages and DOD Warning Screen.

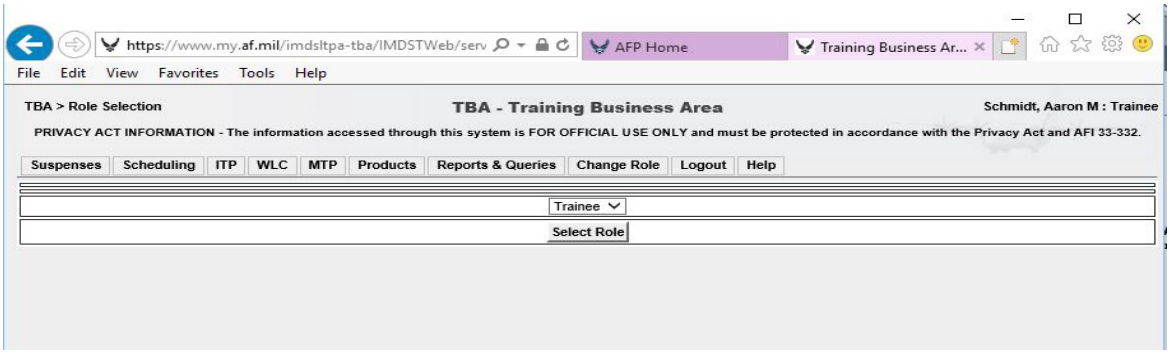


Figure 2-4. TBA Change Role Screen.

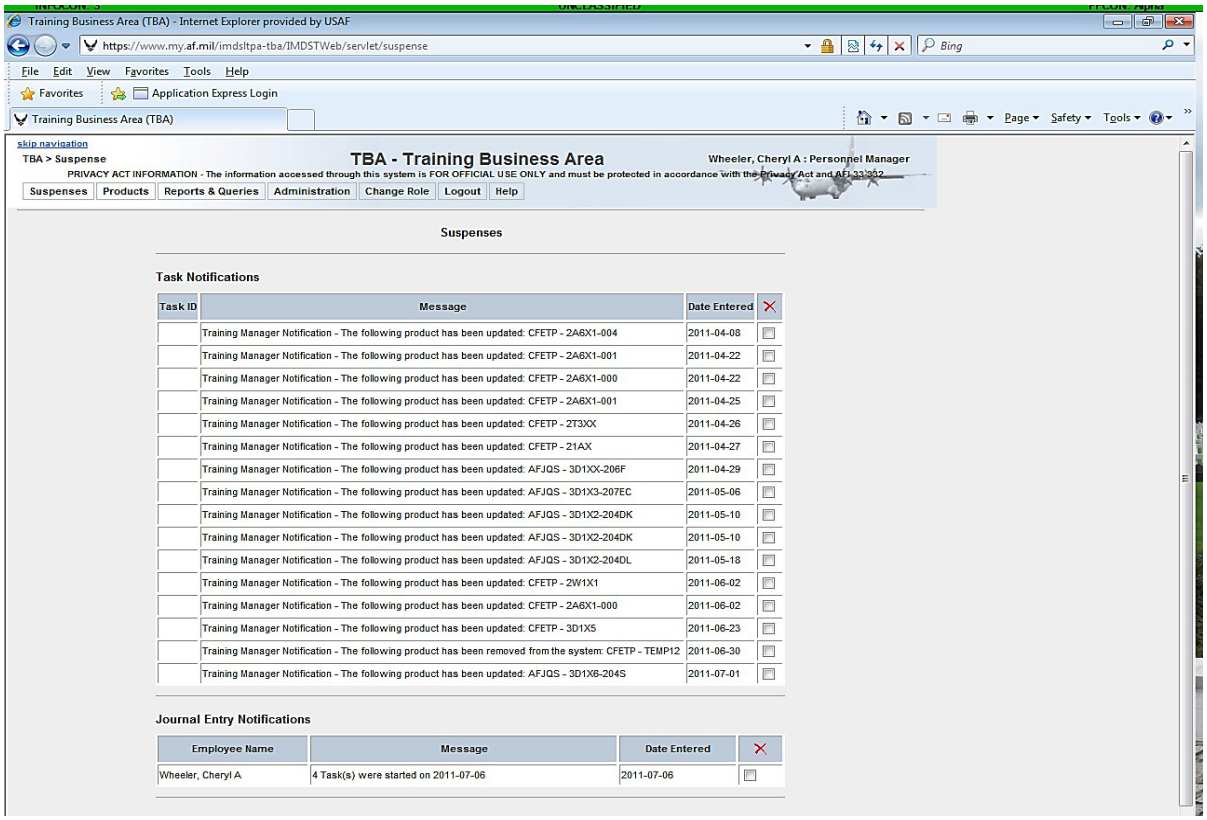


Figure 2-5. TBA Opening Menu Screen.

Sign individual training plan Task (trainee and certifier)

This function provides the capability for the trainee and certifier to select tasks to sign (initial) as completed within an assigned trainee's ITP.

NOTE: The trainer's initials are entered when they Enter ITP Task Completed Date function is executed.

Step	User Action	Results
1	a. Select "ITP" b. Select "Open ITP for which I'm a Certifier" or "Open My ITP" for the Trainee.	Application displays the employee or employees for which the user is the Certifier on the "Select Employee" screen. **NOTE 1**: Trainee has access to their ITP only, skip to step 3.
2	a. Select the radio button next to the employee whose ITP task is to be completed. b. Select "Get ITP"	Application display the "Sub Menu:" drop-down list box on the "ITP" screen.
3	a. Select "Tasks" from "Sub Menu:" drop-down list box. b. Select "Active Entries" from the drop-down list box. c. Select "Sign Trainee" or "Sign Certifier" from "Action" drop-down list box. d. Select "Go."	Application displays tasks for the selected employee, "Sign Trainee" or "Sign Certifier" and "Task journal Entry" buttons (grayed-out) on the "List ITP Tasks" screen.
4	Select the check box next to the task you want to complete (multiple task selection is allowed).	Application enables the "Sign Trainee" or "Sign Certifier" and "Task journal Entry" (not grayed out) buttons. NOTE: For single task sign off, select the RED

		background “Trainee” or “Certifier” box and the Electronic Signature pop-up window will be displayed
5	Select “Sign Trainee” or “Sign Certifier”	Application displays the Electronic Signature pop-up window on the “List ITP Tasks” screen. NOTE 1: To view tasks just completed select “Show Only Completed Tasks” or “Show All Tasks” from the “Action:” drop-down list box and select “GO.” NOTE 2: If not signed, the application will create a suspense for the applicable users that can be accessed, viewed and signed on the “Suspense” screen. Reference “Manage suspenses and Notifications.”

Add Training Journal Entry

Step	User Action	Results
1	a. Select “ITP” b. Select “Open ITP for which I’m a Certifier / Supervisor / Trainer / Workcenter Supervisor”	Application displays the employee or employees for which the user is the Certifier, Supervisor, Trainer, or Workcenter Supervisor on the “Select Employee” screen.
2	a. Select the radio button next to the employee whose ITP task is to be completed. b. Select “Get ITP”	Application display the “Sub Menu:” drop-down list box on the “ITP” screen.
Steps 3-6 are executed to enter task related Journal Entries.		
3	a. Select “Tasks” from the “Sub Menu:” drop-down list box. b. Select “Active Entries” from the “Status:” drop-down list box. c. Select “Show All Tasks” from the “Action:” drop-down list box. d. Select “Go	Application displays ITP tasks for the selected employee and options to “Task Journal Entry” (grayed-out) “Add/Remove Tasks” and “Add Task Groups” on the “List ITP Tasks” screen.
4	Select the check box of the task necessitating a Journal Entry.	Application activates the “Task Journal Entry” button (not grayed-out) on the “List ITP Tasks” screen.
5	Select “Task Journal Entry”	Application displays “Task Journal Entry” information on the “Add Training Journal” screen.
6	a. Enter “Subject:” and “Remarks:” in the text boxes. b. Select “Save”	Application displays the signature options below the updated “Task Journal Entry” on the “Add Training Journal” screen.

This function provides the capability to add a journal entry to the employee’s ITP.

Steps 7-9 are executed to enter non-task related General Journal Entries		
7	Enter non-task related Journal entries. a. Select “Journal Entries” from the “Sub Menu:” drop-down list box. b. Select “Active Entries” from the “Status:” drop-down list box. c. Select “Go”	Application displays an additional drop-down list box with options to “Query”, “Add”, and “Archive” and a “GO” button on the “Journal Entries” screen.
8	a. Select “Add” from the drop-down list box. b. Select “Go”	Application displays the “General Journal Entry” information on the “Journal Entries” screen.
9	a. Enter “Subject:” and “Remarks:” in the text boxes. b. Select “Save”	Application displays the signature options below the updated “General Journal Entry” on the “Journal Entries” screen. NOTE 1: Certifier / Supervisor / Trainer / Workcenter Supervisor and the Trainee will have to sign off entry

NOTE: A supervisor must be loaded before a trainee can add a manual journal entry.

Training Business Area user practice environment

TBA user practice environment (UPE) is a copy of the TBA production application intended for user practice and orientation on the TBA application. It is *not* for operational unit training management activities. TBA-UPE is also accessed through the AF Portal. Each screen in TBA-UPE has a different background color, USER PRACTICE ENVIRONMENT in red bold lettering and a watermark labeled “Practice Use Only” running down the right side.

Self-Test Questions

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

011. Types of training

1. Where is a list of formal AF-wide training courses for a specific career field normally found?

2. What type of aircraft maintenance training is centrally produced but delivered to students to be accomplished at their convenience?

3. What type of training includes advanced and qualification training that develops in-depth expertise within a specialty, broadens knowledge of new specialties, introduces new technologies and systems, develops analytical skills, or increases understanding of the relationship between maintenance specialties?

4. Other than three Airframe and Powerplant courses, what is an example of an aircraft maintenance-related specialized course?

012. Explosives Safety Training Program

1. As a minimum, what six subjects should your shop’s explosives safety lesson plan cover if no MAJCOM lesson plan is available?

2. As a minimum, what five areas should your shop's local written safety standards cover if no technical order for an explosive operation is available?

3. Who is tasked with keeping the commander informed of the status of the explosives safety program?

013. Training documentation

1. When must maintenance training documentation be maintained for MSgts and above?

2. What type of maintenance tasks are normally included on the special certification roster?

3. What form is normally used to add someone to the special certification roster?

4. What should supervisors do when they determine that a person is no longer qualified to perform a task he or she was added to the special certification roster to perform?

014. Training Business Area

1. TBA provides Air Force personnel with global, real-time visibility of what?

2. TBA allows all officers, enlisted and civilian personnel to access their training records and the records of personnel they supervise anywhere that has what?

3. What provides notifications on TBA application problems, software release (problem corrections) projected downtimes and training update information**?**

4. What determines the actions TBA allows you to perform?

5. What is a copy of the TBA production application intended for user practice and orientation on the TBA application and not for operational unit training management activities?

2-2. Training management, forecasting and Maintenance Standardization and Evaluation Program

In this section, we provide you with some valuable tips on requesting and tracking training and then discuss the Maintenance Standardization and Evaluation Program commonly known as MSEP. After all, without an effective MSEP what use would all the above mentioned training be if there was no evaluation of it outside of a classroom environment? First we go through the different phases of maintenance training that work together to ensure maintainers get the training they need. Then, we provide some valuable tips to help you fulfill your training related supervisory duties. Lastly, we cover the very important but often misunderstood topic of building a master training plan. If you master and use the information in these lessons, you will have a much better handle on building a quality training program.

015. Training management

As a supervisor, you will quickly learn that training management is a large part of your job. The reason for this is because the overall capability of a unit depends on the state of training for maintenance personnel. Training is essential to improving and sustaining unit capability and it is one of the most important responsibilities of commanders and supervisors. When you are balancing requirements and resources, maintenance training should carry as high a priority as the operational mission.

Workcenter supervisor duties

As a supervisor, you have many training specific duties. One of these is to identify all TD and MTF courses required for duty position qualification. You must also keep close tabs on training scheduling. This includes ensuring the needed classes are loaded in the appropriate MIS against your work center. When someone is loaded in IMDS against a certain work center, the training loaded as mandatory for personnel in that work center immediately shows as awaiting action (AWACT) without a due date. AWACT without a due date means that the initial training has not been performed or loaded for the individual in question. AWACT will continue to show until an initial training completion date or a scheduled date is loaded in IMDS. The course codes that are loaded against the work center should include all classes/training required by personnel in that work center. Once you have a good list of courses required for those in your work center, you must reverify the list every 6 months.

Training forecast

To properly coordinate training, you must work closely with your UTM to identify and schedule needed training. Utilization of training classes is a high visibility topic within the maintenance group and is, therefore, very important to commanders. Unused allocations of training classes are reported at a monthly status of training (SOT) briefing given by the MTF. This briefing is given to the MXG/CC on a monthly basis and to the wing commander on a quarterly basis. If your section gets into a bind due to training, it is going to be hard to explain it away if the training classes your personnel need have been consistently under-utilized.

Tracking training

As a supervisor, you should know the health of your training program. In other words, you should always know the number of people fully trained and, more importantly, the number of people who *need* training. As you track the training, you should formulate a plan for scheduling the required training. After personnel are scheduled, you need to closely monitor your MIS to track the training to completion. This includes ensuring that scheduled training is indeed showing as being scheduled and completed training is showing as completed. It is imperative that the training is promptly updated. Even though a class is complete, if it is still showing as due or overdue at the time of the monthly SOT briefing, then your training requirement is reported as *not accomplished*. And while we are on the topic of overdue training, an individual qualification becomes officially overdue on the last day of the month in which recertification is due. According to AFI 36-2650, an individual in TDY, leave, or incapacitated status need not be decertified provided the required training/evaluations are completed

within 30 days of the member's return to duty—not to exceed 2 calendar months from the original due date—unless specified by another authoritative reference.

Training request

To the greatest extent possible, training should be planned in an orderly fashion to minimize impact on the mission. If possible you should request training for your personnel using an AF IMT 2426, Training Request and Completion (fig. 2-6), or on a locally approved equivalent. The form will provide written proof of training request/completion and will also provide a written history of concurrence.

TRAINING REQUEST AND COMPLETION

REQUESTER	ORGAN/OFF SYM	PHONE	DATE
MSgt Lewing	8 MOS/MXOP	782-3898	20070710

COORDINATION ROUTING

TO	DATE	INITIAL	TO	DATE	INITIAL
			MXOO	20070710	JTP
			MXOT	20070711	BLH
			MXOP	20070712	JDL

NAME/RANK	EMPLOYEE NUMBER	COURSE CODE/SCORE	REQUESTED DATE	SCHEDULED DATE
SrA John E. Doe	00083	000060	20070718	20070718

REMARKS *(Continue on Reverse)*
Class completed as scheduled.

INSTRUCTOR'S/EVALUATOR'S NAME AND SIGNATURE, AS APPLICABLE *(Type or Print)*
TSgt John J. Farkel

AF IMT 2426, 19960801, V2 PREVIOUS EDITIONS WILL BE USED
SI075571009

Figure 2-6. Training Request and Completion

Career development course administration

As you probably already know, you have many responsibilities when it comes to monitoring CDC progression for your subordinates. If there is one thing that can cast you and your subordinates in a

negative light, it is haphazard control of CDC completion. Aside from the fact that CDCs are mandatory, they can be a career ender for a misguided but solidly performing subordinate. Some of your CDC responsibilities for your subordinates are:

- Coordinate with the UTM when subordinates are currently enrolled in CDCs but will be leaving the unit or have just arrived to the unit. There are specific items to be addressed.
- Attend an interview with trainee conducted by the UTM before trainee begins a CDC.
- Inventory CDC material and ensure any applicable pen-and-ink changes are made.
- Determine a course completion plan and tracking system to ensure timely completion.
- Make appropriate entries in the trainee's TBA or, if TBA is not used or available, on the AF IMT 623A, to show milestones such as date volume issued, completed, any delays, reviews of training progress, course exam ordered/passed or fail, and any other significant CDC training issues.

Other important training responsibilities

Another important aspect of your training responsibilities includes reviewing and responding to all AETC/TD/MTF Graduate Assessment Survey (GAS) or Field Evaluation Questionnaires that you receive. These questionnaires serve a vital purpose in improving the quality of not only 3-level technical school graduates but also other training. In addition to the issues talked about in this lesson, there are numerous other training responsibilities. Refer to AFI 36-2650 and AFI 36-2651, *Air Force Training Program*, on a regular basis to ensure that you are current and aware of any significant changes.

Master training plan

In a workcenter environment the training development process encompasses many different issues. One of these is how you plan to meet OJT requirements *not being met* by other training means. As a supervisor, you have an integral role in the training development process for your work center. If you are tasked with developing training from the ground up, then make sure you follow the principles of instructional systems development (ISD). The five basic steps are:

1. Develop a master task list (MTL).
2. Determine training needs.
3. Determine training capability.
4. Select training strategies.
5. Schedule training.

If you require more information on the ISD process refer to AFH 36-2235, *Information for Designers of Instructional Systems*, Volumes 1-12. In the following discussion we provide some pointers on how to develop your master training plan (MTP) using the ISD process.

As you develop your MTP you need to make several important decisions. First, you need to develop a MTL. Based on the MTL you can then determine what, how, where, and when training will be conducted based on the established training requirements. The MTL is an integral part of your training plan. It is mainly built using the CFETP and is a list of all required tasks in a work center and is a source from which you select tasks requiring training. On the MTL you must identify all requirements within your duty section or work center to ensure 100 percent task coverage. This means identifying all tasks including contingency/wartime tasks, additional duties identified by the supervisor as a certifiable task, and any mandatory core tasks required by the AF career field manager (AFCFM). Documents used to develop the MTL include, but are not limited to, the CFETP for all AFSCs within the work center; AF IMT 797, Job Qualification Standard Continuation/Command JQS; AF IMT 1098, Special Task Certification and Recurring Training (if applicable); automated forms; and/or forms required/approved by your MAJCOM.

Master Training Plan Development	
Elements	***Description***
Develop the Master Task List	In building your MTL, identify all normal day-to-day mission requirements. These tasks are used to form a list of workcenter requirements. A workcenter requirement is training that is required for 51 percent or more of personnel assigned to a work center. In addition to local workcenter requirements, you must also include core tasks as defined by the AFCFM if the training can be done locally to certify individuals on them. You should also identify any special work requirements not necessarily performed on a regular basis but still required for the duty position. Then determine mandatory qualifications as listed in the CFETP and other applicable guidance. Finally, determine recurring training requirements including tasks requiring regular certification/recertification. Once you have all the requirements to build the MTL, you just have to put it all together in an easy to refer to listing. On the MTL you may use color-coding, symbols, or other means to identify individual duty position requirements, core tasks, qualification tasks, additional duties, and etc. It is also very helpful to develop a legend to aid understanding when outside agencies, newly assigned personnel, or other supervisors in the work center are using or are initially exposed to the MTL. Unless otherwise directed by the AFCFM, any number of computer programs (i.e., word processing, spreadsheet, etc.) may be used to develop your MTL. However, the CFETP must be used as the core document; other forms used to expand or list tasks not found in the CFETP are considered supplemental.
Determine training needs	Once the MTL has been finished, your next step is to determine the training needs for your work center. To do this you must determine training objectives by circling the sub paragraph in the CFETP or other training documents for each skill level in the work center. Then you must establish timeframes to show when requirements should be completed (e.g. 12-18 months). Based on an interview with the trainee and a comparison of the training records with the MTL, you will be able to determine a list of training requirements from which you will set training priorities to get them fully qualified.
Determine training capabilities and resources	If there are personnel in the work center that can train the task, are certified in the applicable CFETP, and have attended the AF Training Course, you can most certainly utilize that capability. However, if there is no immediate training capability, then you will need to find out what outside resources are available to provide the training. Contact your UTM for assistance in determining this.
Select training strategies	The next step in the process is to decide how and where to provide the training. What is the training objective? What is the best method for providing the training? Is there a distance learning tool that can better meet the training need? Some other questions you should consider are: • Does your CDC meet the training requirements? • Can the training be accomplished through distance learning or web-based training? • Can the training be conducted as OJT? • Can the training be conducted in a one-time training session? • Can training be conducted without equipment downtime? • Can regularly schedule work be conducted at the same time as the training? • Can the trainer train more than one trainee at a time? • Will classroom time be needed? • Is there a local class to satisfy the requirement? If OJT is going to be used, develop a standard lesson guide to make it easier to provide training on a particular task in the future. To do this you must define the objective and develop a task breakdown. It may seem like a lot of work, but basically all you are doing is writing down a clear statement of what you want the trainee to know or to be able to do as a result of the training. You will then break the task down into logical parts to make it easier to train.
Schedule training	As stated before, training should be a top priority. If your people aren't trained to do their jobs then the mission will not get done very efficiently—if at all. It is basically an investment. You sacrifice a little today for a larger payoff tomorrow. That payoff will be a well-trained worker who performs more efficiently without sacrificing safety. Once the decision has been made that training is needed, develop a plan to schedule that training.

Master Training Plan Development	
Elements	***Description***
Evaluate training	If training has been accomplished through OJT, the trainee should be given time to practice what has been learned. The trainer will determine when the trainee is ready to be certified on the task. If no third party certification is required, training is certified complete by the trainer. If the task requires third party certification, the training is certified complete after the task certifier conducts the task evaluation.

Core tasks

When you are building your MTP for a particular duty position, you must consider core tasks. Core tasks are identified in the specialty training standard (STS) portion of the CFETP. With some exceptions, core tasks identify the *minimum* task certification that must be achieved by a technician to be upgraded to either 5- or 7-level. An exception to this is that core tasks *not applicable* to base assigned aircraft, missiles, or equipment are *not required* for upgrade. In other words, units are *not* required to send personnel TDY for core task training for those *items that are not locally applicable*. Additionally, some core task items are specifically not required for Air National Guard (ANG)/Air Force Reserve (AFR) technicians. Refer to your CFETP for further guidance or consult your UTM. You can also find specific guidance in AFI 36-2650.

According to current guidance, third-party certification of CFETP core tasks is *not required* unless they are designated critical tasks by MAJCOMS, commanders, or workcenter supervisors. The AFCFM can also designate tasks that require third-party certification. It is important to note that *critical tasks*—both core and non-core—still require third-party certification. However, documentation guidance changes over time so it is very important that you consult the references stated above on a regular basis. While we're on the topic of references, make sure you check regularly for updated CFETPs and any applicable change supplements.

016. Maintenance Standardization and Evaluation Program

The MSEP program is designed to provide units with a method of evaluating technical compliance and measure how well each unit within the maintenance group complies with established standards. The MSEP is developed in conjunction with inputs from the assigned squadron operations officers/superintendents and group leadership and is executed by the QA section. Units develop a MSEP and conduct local inspections and evaluations to ensure their programs, processes, maintenance technician proficiency, equipment condition and other focus areas are in compliance with AF, MAJCOM and local directives. Areas that show negative trends let supervisors know which areas need more training or tweaking in their management/leadership styles in order to keep our maintenance practices as safe and as effective as possible.

Purpose of the Maintenance Standardization and Evaluation Program

As you already know, the QA office routinely performs inspections and evaluations on your work center and personnel. The MXG/CC ensures the requirements directed by AFI 21-101 are implemented and the QA office is the commander's tool that implements and administers the program. This is why you keep hearing the phrase "QA is the eyes and ears for the group commander".

Inspections and evaluations are directed by the MSEP and carried out by the QA office. These inspections and over-the-shoulder evaluations help QA to accomplish their mission. The data collected from inspections serves as key information to help commanders identify negative trends that need correction.

Quality assurance role in the Maintenance Standardization and Evaluation Program

QA staff evaluates the quality of maintenance and performs necessary functions to effectively manage the MSEP. Aircraft and equipment condition as well as personnel proficiency are validated through the MSEP and recorded using a MAJCOM-approved QA database. The QA chief inspector initiates

actions when additional attention may be required to resolve adverse maintenance trends or training problems. These actions include preparing cross-tell information bulletins and messages for the MXG/CC to release to other similarly-equipped units and HHQ. It is QA's role to assess how units are meeting compliance goals and to identify areas of opportunity for improvement.

At least every quarter, there is an MSEP meeting where data from the last three months is reviewed by the MXG/CC and the inspected organizations (squadron/flight leadership) to identify possible deficiencies found from failed personnel evaluations (PE), quality verification inspections (QVI) special inspections (SI), detected safety violations (DSV), technical data violations (TDV), and unsatisfactory condition reports (UCR). Most commanders opt to have the MSEP meeting on a monthly basis. Data is summarized into graphs, narratives, and other types of visual information and discussed during the review. Units receive a monthly grade based on their MSEP inspections and evaluations; the grade is broken down into a five tier system:

- Outstanding: 95-100%
- Excellent: 90-94.99%
- Satisfactory: 80-89.99%
- Marginal: 70-79.99%
- Unsatisfactory: 0-69.99%

Ratings are calculated by dividing the total number of inspections passed by total completed. For example, QA inspects 10 tool kits with the following results: 9 "passes" and 1 "failure". Divide the total number of "passes" by the total number of inspections (9/10=0.90) which equals an "Excellent" rating. TDVs, DSVs, and UCRs cost 0.5 percentage points from the overall grade, having the biggest impact on the overall grade for the squadron and the group.

This is why when your work center receives a fail from an inspection, you may be requested to either attend the MSEP meeting or provide a written explanation on the results of the inspection. When you are tasked to provide an explanation for a failed inspection or evaluation, it is best to be as informative as possible as this will help your leadership isolate the root cause and make the necessary corrections. Try not to pass blame on to the QA inspector as most leadership looks down on this practice. If it is indeed a case of an overly critical inspector, plead your case to your supervisor and let them have that battle. Don't have an argument with the inspector, especially in front of subordinates. Maintain your professionalism.

Unit Maintenance Standardization and Evaluation Program evaluation and inspection plan

QA develops an evaluation and inspection (E&I) plan showing areas, types, and a number of inspections and evaluations that need to be completed each month by the QA section. This is where the MSEP briefing gets all its data from.

The E&I plan is custom tailored for each squadron, flight and section. The E&I plan is coordinated through each squadron operations officer and maintenance superintendent, then approved by the MXG/CC. The E&I plan is reviewed and updated monthly, highlighting trends in the maintenance group and adjusted accordingly. The E&I plan is a combination of the key task listing (KTL) and the routine inspection list (RIL).

Key Task Listing

The KTL is a list of required inspections developed by the Air Force, MAJCOM, and your local MXG. It covers inspections involving tasks that are complex and affect safety of flight or operation of a critical system. For example most egress sections have a KTL requirement for a QA inspector to inspect the ACES II seat after a 36 month inspection has been performed. It is mandatory to notify QA every time a maintenance action listed on the KTL is performed, so they can perform their required inspection. Try to give QA as much notice as possible so they can minimize delays on the maintenance schedule.

Routine Inspection List

The RIL is a list of routine inspections developed by the Air Force, MAJCOM, and your local MXG. Routine inspections are the inspections QA *routinely* performs on your composite tool kits (CTK) vehicles, aircraft forms documentation, housekeeping, and even the time change program. The frequency of these inspections is determined by the MXG based on inputs from your unit supervision.

Evaluation criteria

While QA is inspecting your section you should know the acceptable quality levels (AQL) according the applicable technical order(s). AQL denotes the maximum allowable number of *minor* findings that may be discovered before the inspection becomes a *fail*. The MAJCOM may standardize the AQL for some weapon systems, if it is not standardized by the MAJCOM it is up to the group commander to establish an appropriate AQL listing. If your section has a CTK that contains over a hundred tools, and you have an AQL of one and the QA inspector finds a minor discrepancy on two of the tools, the entire inspection will result in a fail. You can voice your concern to your supervision and see if your leadership can influence the MXG/CC to make a change to the AQL for your CTK inspections. If your case is valid then the MXG/CC may have the flexibility to make the change, giving your CTK a greater chance for a pass. *It never hurts to ask.*

Discrepancy categories

There are two categories for each discrepancy that a QA inspector might find, Category I and Category II.

Category I (CAT I): A required inspection/technical order/AFI procedural item missed or improperly completed. This category is a specific AFI requirement, work card item or technical order step, note, caution or warning for a specific condition or action. Use sub-classifications of major or minor to indicate the discrepancy's relative severity.

Category II (CAT II): An obvious defect, which could have been readily detected by a technician or supervisor, but is *not* a specific AFI requirement, work card item or technical order step, note, caution or warning for that specific evaluated task. Use sub-classification of major or minor to indicate the discrepancy's relative severity.

Findings

There are two types of findings, major and minor.

Major: A major finding is defined as a condition that would endanger personnel, jeopardize equipment or system reliability, impact safety of flight or warrant discontinuing the process or equipment operation. Any major discrepancy will result in an automatic inspection failure.

Minor: A minor finding is defined as an unsatisfactory condition that requires repair or correction, but does not endanger personnel, impact safety of flight, jeopardize equipment reliability or warrant discontinuing a process or equipment operation. Depending on your AQL, having minor discrepancies could still be a pass.

An example of a minor finding would be foreign objects (FO) contained in a tool kit or found in the cargo area of an aircraft which poses no FOD threat. It would be a minor finding since it would require more than one additional action to meet the definition of a major finding

> **NOTE:** In accordance with AFI 21-101, CAT II minors shall be documented for trends, but *must not* be counted against the AQL.

As you take this next step in your career ladder by becoming an Egress Craftsman you may one day take the opportunity to become a quality assurance inspector. Before then, to get a bigger picture of how MSEP works in the group, ask your leadership if you can attend the monthly MSEP meeting. Be a fly on the wall and you can see how QA findings are handled by your leadership and viewed by the MXG/CC. Also, seeing what other sections are being written up for, and their trends could give you an idea of what to look out for in your own section.

Self-Test Questions

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

015. Training management

1. What does it mean when someone is showing in IMDS as AWACT without a due date for a particular training requirement?

2. When an inventory of course materials is accomplished, what should also be completed in the CDC volumes before a trainee is allowed to begin work on the CDC course?

3. If TBA is not used or available, which AF IMT should be used to show milestones such as date volume issued, completed, any delays, reviews of training progress, course exam ordered/passed or fail, and any other significant CDC training issues?

4. When you are building a MTP for your flight/section, what should you do first?

5. What cutoff should be used to determine if a task should be a workcenter requirement?

6. With some exceptions, what do core tasks identify?

7. What type of training tasks—both core and non-core—require third-party certification?

016. Maintenance Standardization and Evaluation Program

1. What does the MSEP provide?

2. What is directed by the MSEP and carried out by quality assurance (QA)?

3. What is validated by the MSEP?

4. How is MSEP data summarized?

5. How is the monthly grade from MSEP inspections broken down?

6. The E&I plan is a combination of:

7. Who determines the frequency of routine inspection performed in your section?

8. What does the acceptable quality levels (AQL) denote?

9. A Category I minor discrepancy found during an inspection could still result in a pass, depending on what?

Answers to Self-Test Questions

011

1. In part 2 of the career field's CFETP.
2. Distance learning.
3. Continuation training.
4. Aircraft Communication/Navigation Systems career development course (CDC).

012

1. The individual's role and specific responsibilities in the unit weapons safety program. Explosive and hazardous aspects of the specific weapons systems. Safety equipment provided. Unique handling and transportation problem areas. Lessons learned from past local and like-unit experiences involving mishaps, hazard reports, deficiency reports, inspection reports, and so forth. Requirements of TO 11A–1–33 for all personnel involved in explosives-loaded aircraft operations.
2. Explosive and personnel limits. Operating locations. Safety requirements. Actions to be taken during emergencies. Step-by-step task procedures.
3. Explosives safety NCO.

013

1. When they perform maintenance on aircraft, missiles or associated equipment.
2. Those that have a high potential for personnel injury or damage to equipment.
3. AF IMT 2426, Training Request and Completion.
4. Decertify them and have them removed from the SCR for that task.

014

1. The technical qualifications, certifications and training status of weapons systems and support professionals Air Force wide.
2. Network access.
3. The "System Messages" board.
4. The role, or roles, you have been assigned by a role manager.

5. TBA user practice environment (UPE).

015

1. That the initial training has not been performed or loaded.
2. Any applicable pen-and-ink changes.
3. AF IMT 623A, On-the-Job Training Record Continuation Sheet**.**
4. Develop a master task list.
5. If it is performed by 51 percent of more of personnel in the work center.
6. The minimum task certification that must be achieved by a technician to be upgraded to either 5- or 7-level.
7. Critical tasks.

016

1. Provides unit's with a method of evaluating technical compliance and measure how well each unit within the maintenance group complies with established standards
2. Inspections and evaluations
3. Aircraft and equipment condition and personnel proficiency
4. Into graphs, narratives, and other types of visual information and discussed during a review
5. A 5 tier system: outstanding, excellent, satisfactory, marginal, unsatisfactory.
6. KTL and RIL
7. MXG
8. The maximum allowable number of minor findings that may be discovered before the inspection becomes a fail.
9. The AQL

Complete the unit review exercises before going to the next unit.

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 AFCDA.

34. (010) In an emergency situation who is given broad discretionary powers to waive compliance with technical order (TO) procedures?
    a. AF Safety Center Commander.
    b. Quality assurance chief.
    c. MAJCOM Commander.
    d. On-scene commander.

35. (010) Which of the following is *not* an approved communication method for issuing changes to technical orders (TO)?
    a. Telephone.
    b. Signed letter.
    c. Organizational e-mail.
    d. Command TO distribution office

36. (010) Where must a copy of an approved Time Change Item (TCI) wavier be kept until no longer valid?
    a. In the Egress section time change management folder.
    b. At wing, plans and scheduling (PS&D), in a share drive or SharePoint site.
    c. With the Munitions Operations section.
    d. In the aircraft forms folder.

37. (011) Training detachments (TD) are administratively assigned to which MAJCOM?
    a. Air Combat Command (ACC).
    b. Air Training Command (ATC).
    c. Air Force Reserve Command (AFRC).
    d. Air Education and Training Command (AETC).

38. (011) Air Education and Training Command (AETC) training detachments (TD) normally *do not* provide
    a. cross utilization training.
    b. continuation training.
    c. ancillary training.
    d. formal training.

39. (011) The block training method is normally used to teach which maintenance training flight (MTF) course?
    a. General Technical Order System
    b. Maintenance Orientation.
    c. Weight and Balance.
    d. Any 7-level course.

40. (011) How may cross utilization training (CUT) be accomplished?
    a. A formal training course only.
    b. On-the-job training (OJT) only.
    c. Either OJT or a formal training course.
    d. Only a computer based training program is required.

41. (012) Who conducts weapons safety training?
    a. The base or unit training office.
    b. The major command safety officer or NCO.
    c. The base or unit weapons safety officer or NCO.
    d. The munitions accountable systems Officer (MASO).

42. (012) Local written explosive operation safety standards must contain explosive and personnel limits,
    a. operating locations, technical orders, safety requirements, and step-by-step procedures.
    b. operating locations, safety requirements, actions to be taken during emergencies, and storage requirements.
    c. operating locations, safety requirements, actions to be taken during emergencies, and step-by-step procedures.
    d. safety requirements, actions to be taken during emergencies, step-by-step procedures, and number of assigned personnel.

43. (012) Who is responsible for ensuring that explosives safety training is provided to personnel?
    a. Flight chief.
    b. Training NCO.
    c. Operating personnel.
    d. Explosives safety NCO.

44. (012) Who is responsible for instructing workers on safety standards for the explosive operations they will be performing?
    a. Supervisor.
    b. Flight chief.
    c. Explosives safety NCO.
    d. Munitions accountable systems officer (MASO).

45. (013) Training records must be maintained for all personnel except
    a. SrA.
    b. SSgt.
    c. TSgt.
    d. MSgt.

46. (013) If paper training records are used because Training Business Area (TBA) is down or unavailable, when should the records be transcribed once TBA becomes available?
    a. 3 days.
    b. 7 days.
    c. 15 days.
    d. 30 days.

47. (013) How often must the maintenance operations officer/maintenance superintendent review and sign the special certification roster (SCR)?
    a. Annually.
    b. Semi-annually.
    c. Quarterly.
    d. Monthly.

48. (013) Who must approve a waiver before an individual can be added to the special certification roster (SCR) for a task normally performed by a person of a higher grade?
    a. Squadron operations officer.
    b. MAJCOM functional manager.
    c. Squadron commander (SQ/CC).
    d. Maintenance group commander (MXG/CC).

49. (013) An individual must be approved by the maintenance group commander (MGX/CC) and hold the minimum of what grade to downgrade a “Red-X?
    a. TSgt.
    b. MSgt.
    c. SMSgt.
    d. CMSgt.

50. (014) Training Business Area (TBA) provides Air Force personnel with global, real-time
    a. access to distance learning courseware.
    b. access to special certification roster criteria listings.
    c. visibility of available formal training courses Air Force-wide.
    d. visibility of technical qualifications, certifications, and training statuses of personnel.

51. (014) In addition to software releases, projected downtimes, and training update information, the Training Business Area (TBA) System Messages notification board provides
    a. open suspenses.
    b. system upgrades.
    c. application problems.
    d. changes to your user roles.

52. (014) The actions Training Business Area (TBA) allows you to perform are based on
    a. whether or not you have attended the Air Force Trainer Course.
    b. roles you have been assigned.
    c. network capabilities.
    d. your rank.

53. (015) How often does the maintenance training flight (MTF) provide a status of training (SOT) briefing to the maintenance group commander (MXG/CC)?
    a. Monthly.
    b. Quarterly.
    c. Semiannually.
    d. Annually.

54. (015) An individual comes due for a training recertification while TDY, on leave, or incapacitated. Provided it has not been more than 2 calendar months since the original due date, how many days are allowed after returning to duty before decertification occurs?
    a. 15.
    b. 30.
    c. 45.
    d. 60.

55. (015) Who is responsible for conducting an interview with both the trainee and his/her supervisor before a trainee starts a career development course (CDC)?
    a. Operations officer.
    b. Group commander.
    c. Unit training manager.
    d. Maintenance training flight commander (MTF/CC) or chief.

56. (015) When building a master task list, which of the following should serve as the core document?
    a. AF IMT 797, Job Qualification Standard Continuation/Command .
    b. AF IMT 1098, Special Task Certification and Recurring Training.
    c. MAJCOM specific job qualification standard.
    d. Career Field Education and Training Plan.

57. (015) Once you have completed the master task list for your master training plan, your next step is to
    a. evaluate training.
    b. select training strategies.
    c. determine training needs.
    d. determine training capabilities.

58. (015) When building a master training plan, core tasks that are *not* required for certification in order for the member to be upgraded to a 5 or 7-level are tasks that
    a. very rarely occur.
    b. are too tedious to properly evaluate.
    c. would cause unnecessary delays to the flying schedule.
    d. are not applicable to the equipment assigned to the base.

59. (015) What kinds of tasks require third-party certification?
    a. Core tasks.
    b. Critical tasks.
    c. Non-core tasks.
    d. Workcenter tasks.

60. (016) The Maintenance Standardization and Evaluation Program is designed to provide units with a method of evaluating technical compliance and measure how well each unit within the maintenance group
    a. produces training/combat sorties.
    b. complies with established standards.
    c. complies with the maintenance schedule.
    d. executes maintenance actions in a timely manner.

61. (016) When additional attention may be required to resolve adverse maintenance trends or training problems discovered in the Maintenance Standardization and Evaluation Program (MSEP), who has the responsibility to initiate actions?
    a. The QA chief.
    b. The MXG/CC.
    c. The QA chief inspector.
    d. The squadron supervision.

62. (016) If a unit received an 85 on their monthly Maintenance Standardization and Evaluation Program (MSEP) score, that would be considered
    a. Excellent.
    b. Satisfactory.
    c. Marginal.
    d. Unsatisfactory.

63. (016) What type of grade is given to units based on their monthly Maintenance Standardization and Evaluation Program score from inspections and evaluations?
    a. Five tier system.
    b. Either pass or fail.
    c. Either satisfactory or unsatisfactory.
    d. Numbering system between 0 and 100.

Please read the unit menu for unit 3 and continue ➔

Unit 3. B-52 Egress System

FOR ALMOST 70 years, B-52 Stratofortresses have been the backbone of the human piloted strategic bomber force for the United States. The B-52 is a long-range, heavy bomber that can perform a variety of missions. The bomber is capable of flying at high subsonic speeds at altitudes up to 50,000 feet. It can carry nuclear or precision-guided conventional ordnance with worldwide precision navigation capability. In fact, it can drop or launch the widest array of weapons in the US inventory. This includes gravity bombs, cluster bombs, precision-guided missiles, and joint direct attack munitions (JDAM). Updated with modern technology, the B-52 is capable of delivering the full complement of joint developed weapons and will continue into the 21st century as an important element of our nation's defenses.

In a conventional conflict, the B-52 can perform strategic attack, close-air support, air interdiction, offensive counter-air, and maritime operations. During Desert Storm, B-52s delivered 40 percent of all the weapons dropped by coalition forces. It is highly effective when used for ocean surveillance, and can assist the US Navy in anti-ship and mine-laying operations. In two hours, two B-52s can monitor 140,000 square miles of ocean surface.

On-going modifications, initiated in 1989, are upgrading B-52 capabilities by installing global positioning system components, heavy stores adapter beams for carrying 2,000 pound munitions, as well as a full array of advance weapons currently under development. Current engineering analyses show the B-52's life span to extend beyond the year 2040.

3–1. Escape System

The lessons in this section discuss the B-52 egress systems' components and the theories of operation for those systems. The B-52 escape systems are split into three categories:

- Upward ejection system.
- Downward ejection system.
- Escape hatches.

We'll discuss escape hatches separately in section 3–2.

017. Major components

The B-52 escape system consists of two ejection systems: the upward ejection system and the downward ejection system. There is no connection between the ejection systems of the seats. The layout of the B-52 cockpit is shown in figure 3-1. This lesson covers the major components of both the upward and downward ejection systems.

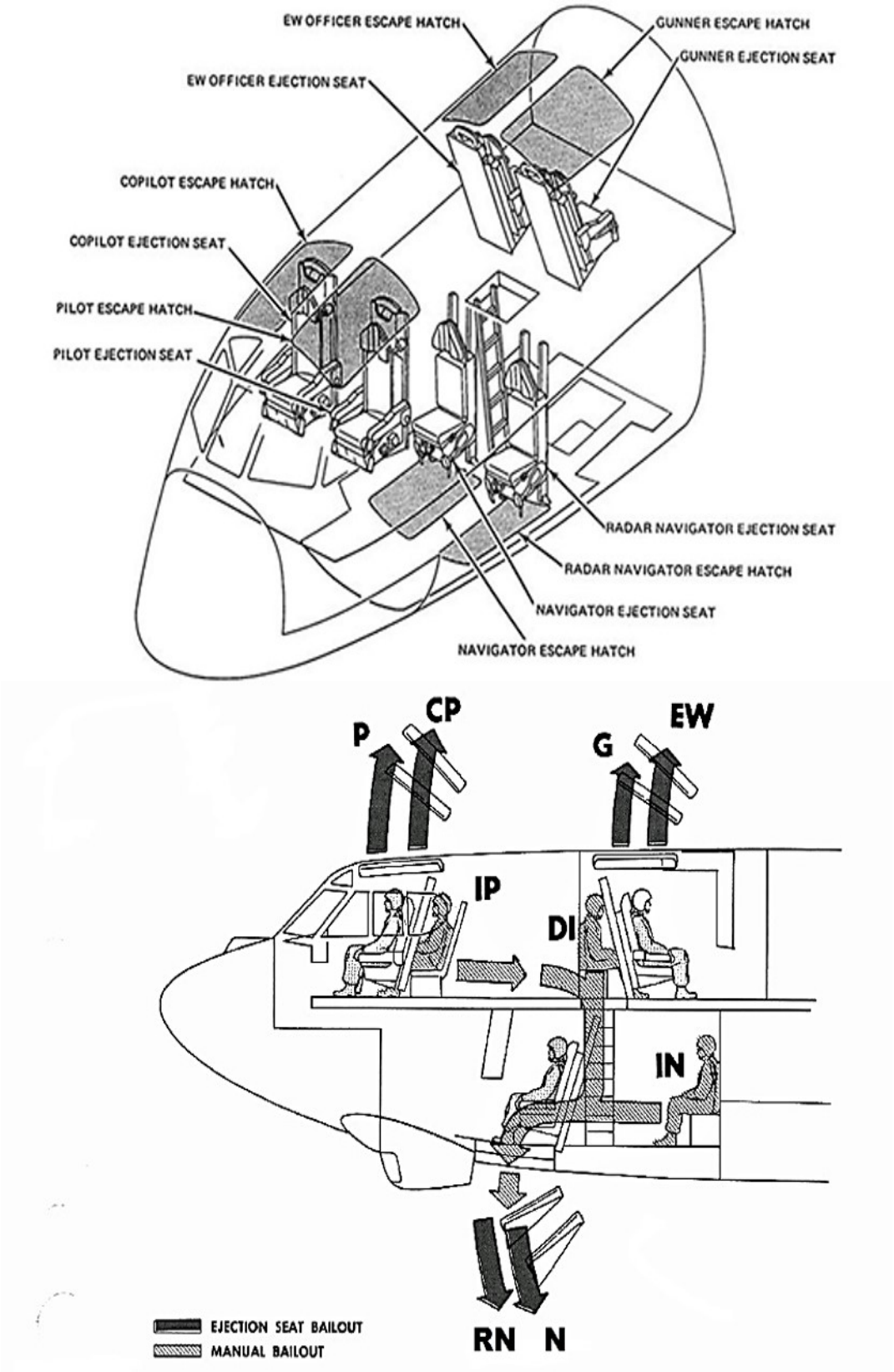


Figure 3-1. B-52 cockpit layout.

Upward ejection system

The upward ejection system provides automatic emergency ejection for the pilot, copilot, electronic warfare officer (EWO), and gunner. The pilot and copilot seats are forward facing and the EWO and gunner seats are aft facing. Ejection of the seats and escape hatches is initiated by a series of ballistic devices and linkages incorporated into the seat. Each seat includes a catapult and is equipped with arming levers and triggers. The major components of the upward ejection system include:

- Control column stowage thruster.
- Upward ejection seats.

The components for the pilot/copilot seats are shown in figure 3-2 and the components for the EWO/gunner are shown in figure 3-3.

Control column stowage thruster

The control column stowage thruster is a CAD used to release the stowage spring. Releasing the stowage spring allows the control column to move forward so that it will not interfere with the seat ejection. Two of these thrusters are used in the aircraft—one for the pilot ejection system and one for the copilot system. The pilot's control column stowage thruster is located in the control column disconnect mechanism below the pilot's side panel. The copilot's control column stowage thruster is located under the copilot's side panel.

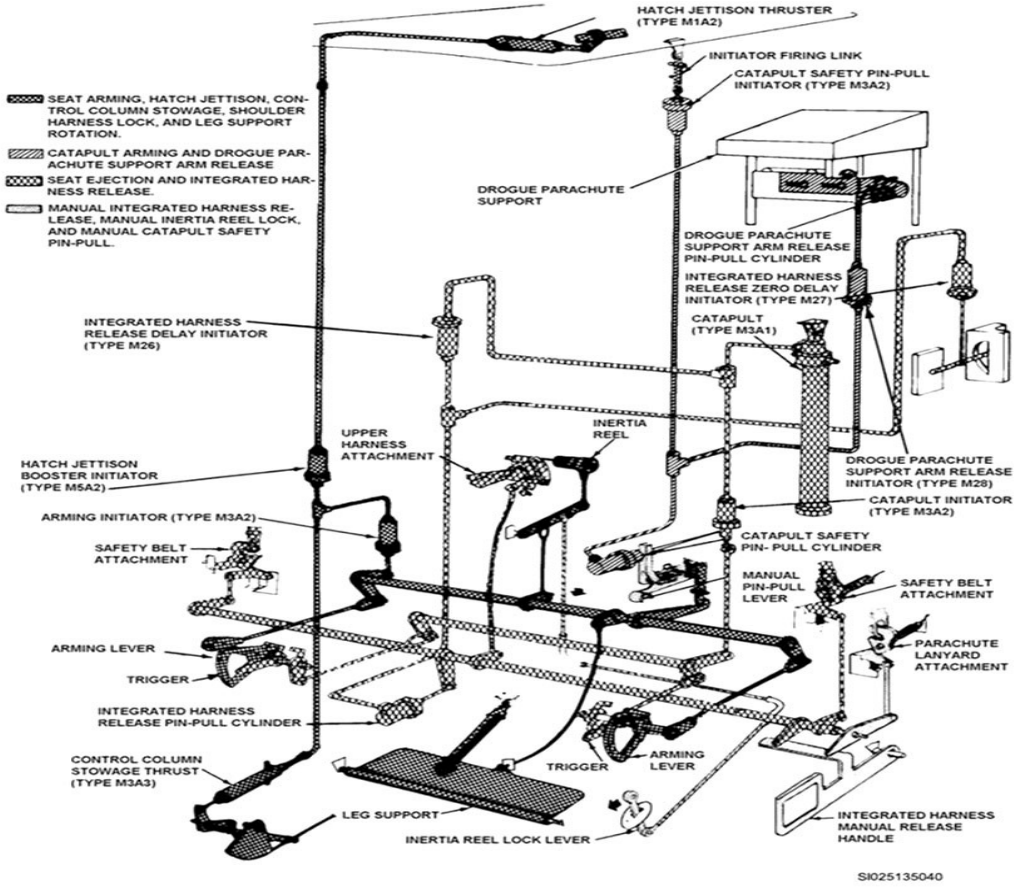


Figure 3-2. Pilot/copilot components.

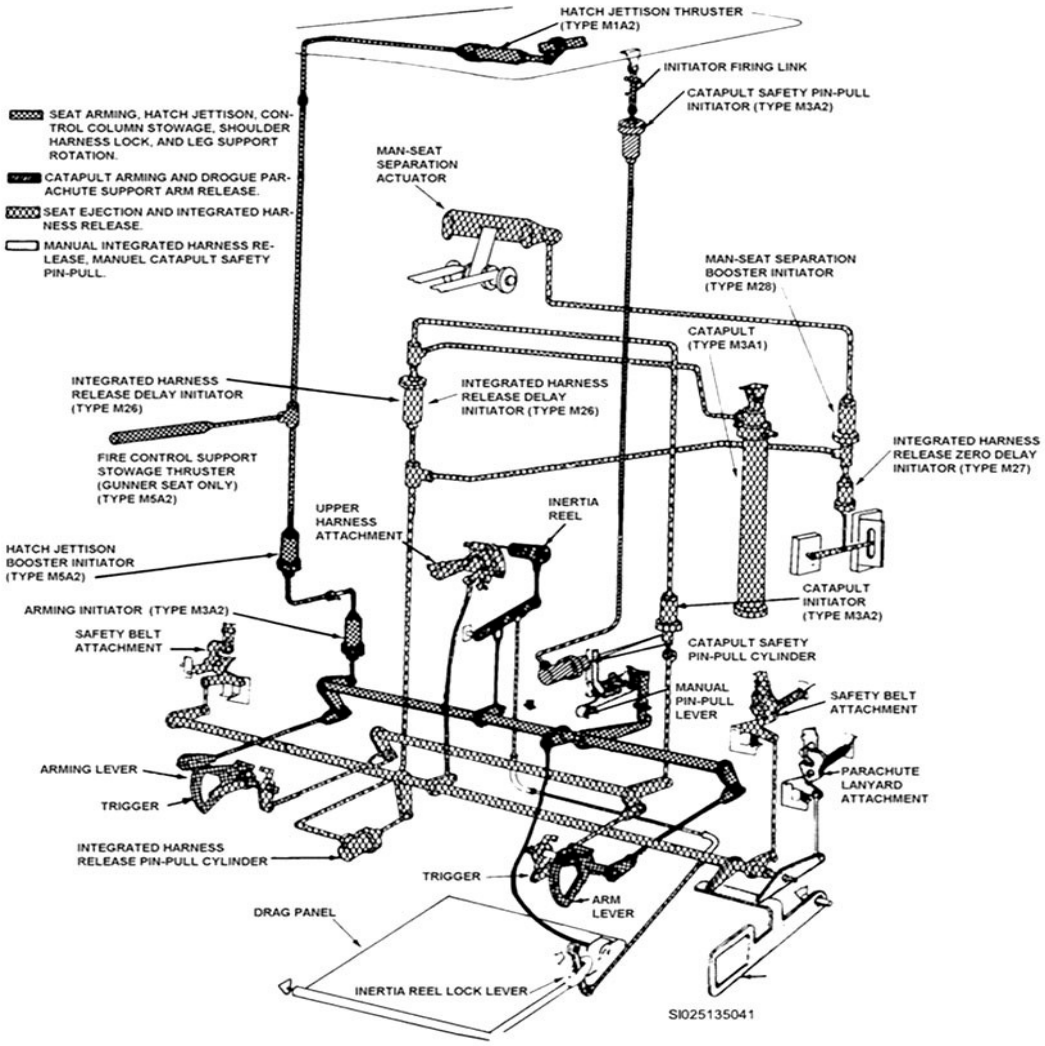


Figure 3-3. EWO/gunner components.

Upward ejection seats

The upward ejection bucket-type seats are located under the upward ejection escape hatches. Each upward ejection seat's components include the following:

- Seat bucket.
- Three seat positioning actuators.
- Ejectable rails.
- Fixed rails.
- Telescoping intermediate rails.
- Catapult.
- Initiators.
- Man-seat separation system.
- Drogue parachute.

Both pilot and copilot seats also incorporate a drogue parachute support which aids in deploying the parachute. The seat is provided with a personnel parachute and a manual opening safety belt.

Seat bucket

The seat bucket is equipped with components discussed in the following table.

Seat Bucket Components	
Component	**Description**
Inertia reel	The inertia reel is located just below the headrest on the back of the seat. The reel is connected directly to the upper harness release fitting by a web belt that is wound into the reel by a return spring. The reel is controlled by a single control lever and cable located on the left side of the seat. The reel is equipped with an integral centrifugal-type brake which serves as a lock for any sudden force. The reel is automatically locked when either arming lever is rotated to the up position.
Survival kit	The survival kit is a reinforced fiberglass container shaped to fit the bottom of the seat bucket and contains an inflatable life raft and other survival items. The kit consists of the following: • Main compartment. • Seat cushion. • Parachute spacer. • Release mechanism. • Nylon drop lanyard.
Adjustable armrests	The armrests on each side of the seat are adjustable up and down to allow the occupant freedom of movement and easy access to the seat.
Ejection controls	The ejection controls are located on the forward end of the armrests. They consist of an unlocking lever, a loop-type arming lever, and catapult firing trigger. The controls have a dual capability; that is, either right or left hand controls will arm the seat and fire the catapult.
Leg support (pilot/copilot) or drag panel (EWO/gunner)	The leg support (for the pilot and copilot) or drag panel (for the EWO/gunner) is hinged on the lower forward edge of the seat bucket so that it can be folded back when not in use and is automatically extended when the seat is armed.
Integrated harness attaching fittings	Three attaching fittings are provided for the integrated harness: one located on each side of the seat bucket and one just below the headrest. The fittings are provided to accommodate use of the integrated harness and a separable back parachute.
Drogue parachute (EWO/gunner)	The drogue parachute deploys immediately after the seat departs the aircraft. The deployed parachute stabilizes and decelerates the ejection seat to assist in the positive separation of the seat occupant.

Seat positioning actuators

Three seat positioning actuators like the one below in figure 3-4 are provided for each upward crew station ejection seat. The actuators are similar in design and function and allow the seat bucket to be adjusted up and down, fore and aft, and tilted. The specific adjustment provided for the seat depends on its location on the seat. Mounted on the ejectable rail, the seat positioning actuators support the seat bucket.

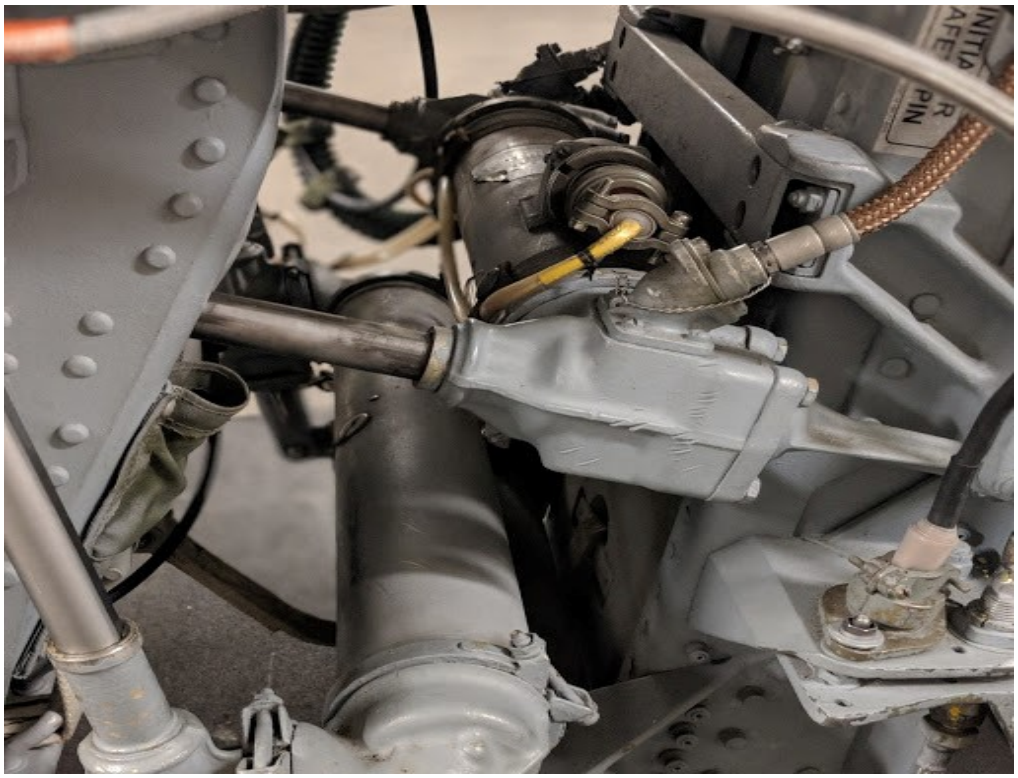


Figure 3-4. Seat actuator.

Rails

The telescoping intermediate rails and the fixed rails guide the ejectable rails and seat upward when ejected from the aircraft.

Catapult

The upward ejection seat catapults are three-tube telescoping ejection mechanisms powered by an explosive charge. The upper end of the inner tube has a trunnion which attaches to the yoke at the top of the ejectable rails. The upper end of the outer tube has a trunnion which attaches to the fixed rails. The catapult is fired by an initiator in the ejection system after the proper sequence has taken place.

Initiators

All of the B-52 initiators are the instantaneous type except for the integrated harness release initiators which are delay initiators on upward systems. These initiators delay firing to provide sequencing of the systems.

Man-seat separation system

The EWO and gunner ejection seats are provided with a man-seat separation system for positive separation of crew members after ejection from the aircraft. The system consists of a reel-type ballistic actuator, jackshaft, and a harness made of two nylon straps (fig 3-5). The harness is installed in the seat under the global survival kit and parachute. The lower end of the harness is attached to the forward side of the seat bucket and the upper end is attached to the jackshaft on the back side of the seat. The jackshaft is driven by the ballistic actuator which is connected by ballistic tubing to the man-seat separation booster initiator. The booster initiator is connected to both integrated harness release initiators. When either integrated harness release initiator is fired releasing the integrated harness, gas pressure from the initiator also fires the man-seat separation booster initiator which, in turn, fires the cartridge in the actuator. After the integrated harness is released, the actuator rotates the

jackshaft, pulling the harness tight. This action forms a triangle with the seat bottom and seat back. As the man-seat separation harness is pulled tight, it throws the occupant clear of the seat.

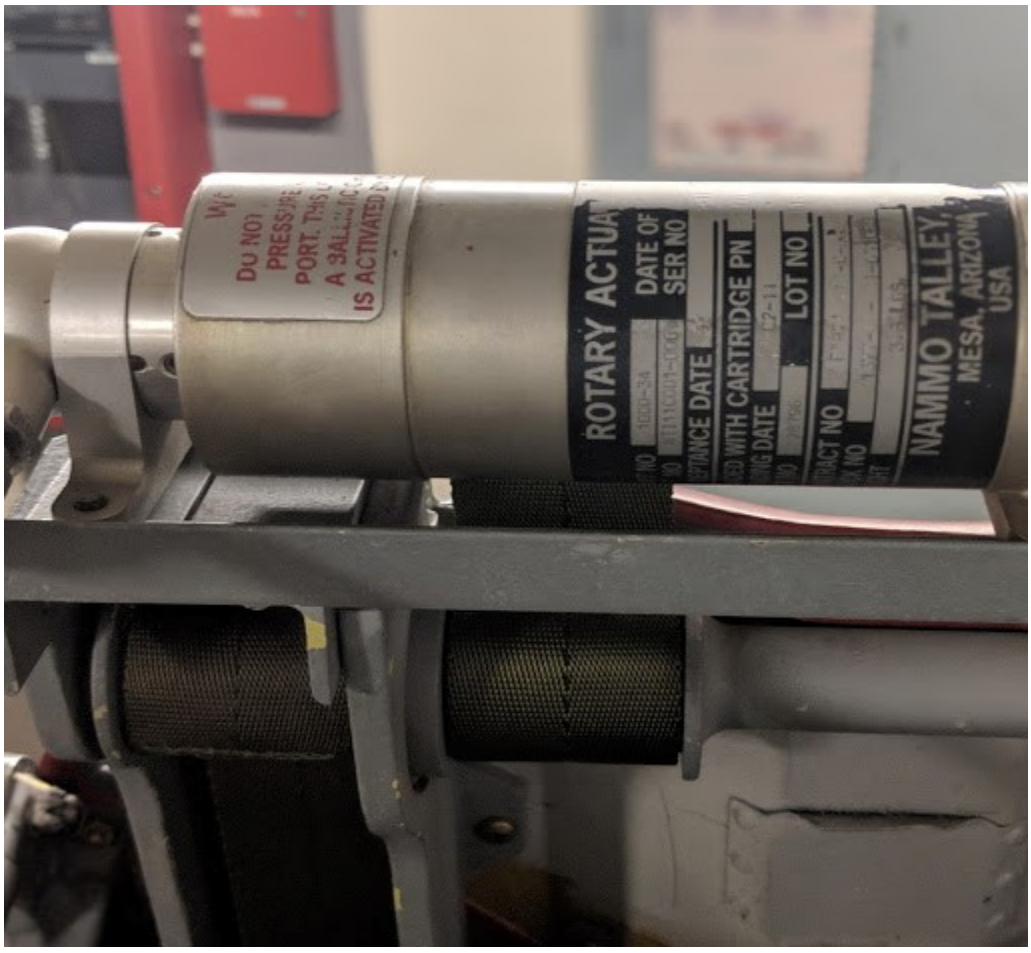


Figure 3-5. Man-seat separation system.

Drogue parachute

We already talked briefly about the drogue parachute for the EWO and gunner seats, but there are drogue parachutes on all four upward ejection seats.

On the pilot and copilot seats, the drogue parachute pack is supported above the headrest by tubular arms attached to the ejectable rails. The parachute support is held in position by a latch assembly which is actuated by a pin-pull cylinder. During the seat ejection sequence, the ballistically actuated pin-pull cylinder releases the spring-loaded parachute support which extends and rotates away from the seat as the seat moves up the rails and departs the aircraft. The parachute support arms rotate aft and lock in trail position at the limit of the restraining straps. The drogue parachute ripcord is pulled deploying the parachute as the support rotates to the trail position.

On EWO and gunner seats, the drogue parachute pack is stowed between the drag panel and the underside of the seat bucket. The pack is attached to the seat bucket by a latch mechanism. As the arming levers are rotated up, the drag panel is released and allowed to drop down. During initial ejection from the aircraft, gravity and catapult induced acceleration initiate deployment, causing the drag panel to rotate downward to the limit of the restraint cables. The sliding plate extends from the drag panel and pulls the parachute bridle lines from their stowage pouches. As the seat and ejectable rails are unlatched from the intermediate rails and continue their upward travel, the static line, which is attached to the intermediate rails, releases the latch securing the drogue parachute to the bottom of

the seat bucket. The drogue parachute is pulled away from the seat by the static line until the bridle lines become taut. At this point, the static line pulls the parachute pack away from the parachute causing the parachute to deploy.

Downward ejection system

The downward ejection system provides automatic emergency ejection for the radar navigator and navigator. The system is composed of forward facing, downward ejection seats and their respective escape hatches. Each seat is provided with its own ejection system consisting principally of the seat and the hatch immediately underneath. The downward ejection seat components are shown in figure 3-6.

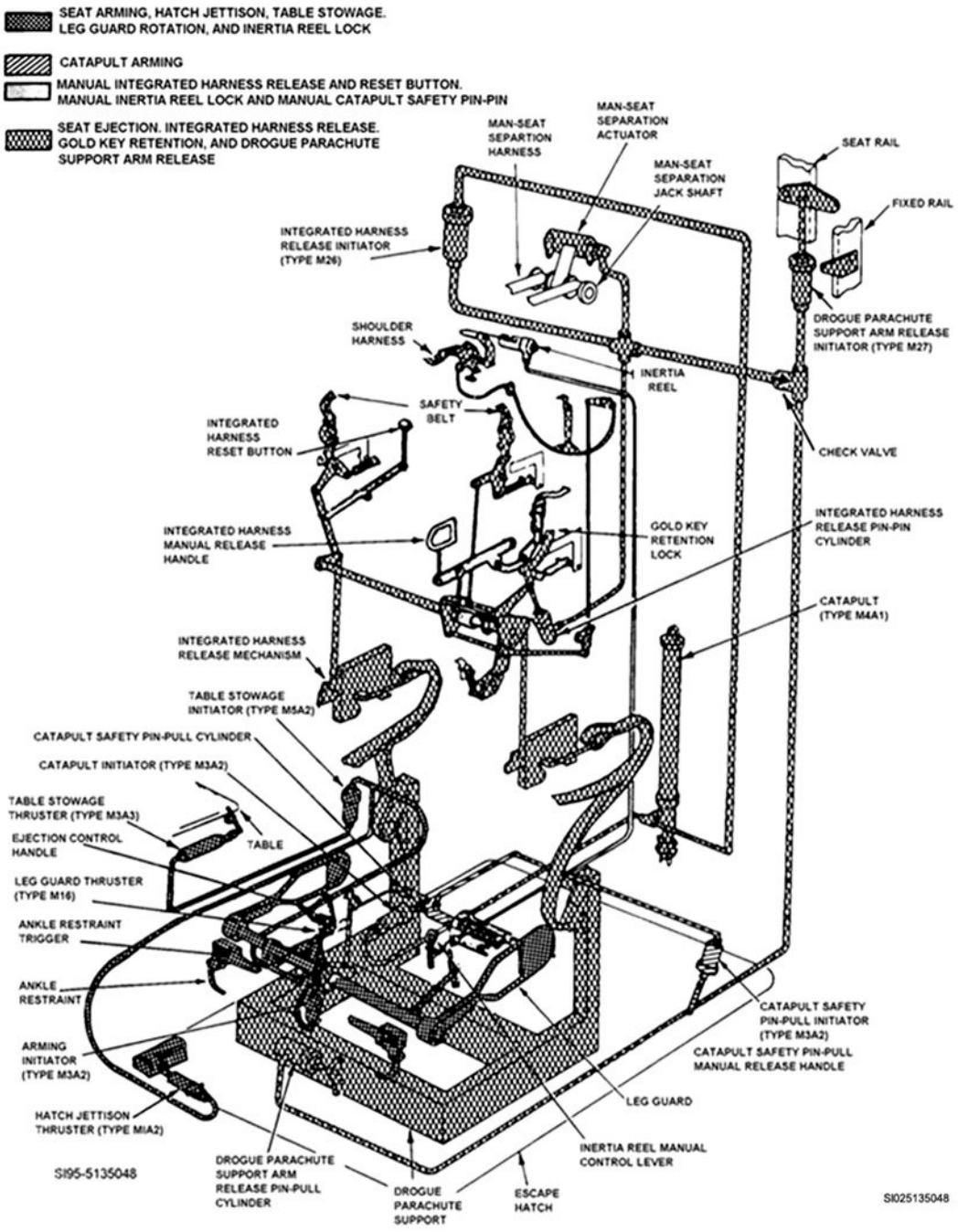


Figure 3-6. Navigator/radar navigator components.

Downward ejection seats

From the standpoint of operation, both seats are identical. The seats are bucket type and roller mounted on fixed ejection rails which allow downward ejection of the seat and occupant. Each seat is equipped with the following components.

Downward Ejection Seat Equipment	
Equipment	**Description**
Ankle restraints	The downward ejection seats are equipped with ankle restraints which hold the occupant ankles in place during the ejection sequence. The restraints are located on the lower forward part of the seat so that the ankle restraint triggers behind each ankle cause the restraints to rotate around the ankles when touched by the legs. This action must be accomplished prior to pulling the ejection control handle. In their final deployed position, the restraints can rotate out but not upward. If, for any reason, it is decided not to complete the ejection sequence, the ankle restraints may be restored to full stowed position by rotating the ankle restraints out and down from the seat. The ankle restraints will rotate to their deployed position any time the ankle restraint triggers are depressed.
Leg guards	The leg guards are located on both sides of the seat. During ejection, the leg guards rotate to protect the crew member's legs from flailing and becoming injured.
Leg guard thruster	Leg guards are rotated by a thruster attached to the bottom of the seat bucket and to a linkage attached to the leg guard torque tube. The thruster is fired by gas expansion from the arming initiator. The force from the thruster acts on the leg guard torque tube, rotating the leg guards to the ejection position.
Integrated harness attachment fittings	The downward ejection seats are provided with three integrated harness attachment fittings for the integrated harness and a separable back parachute. One fitting is located on each side of the seat bucket and is used to attach the safety belt to the seat. The left fitting is also used to attach the parachute lanyard to the seat. The third fitting is located just below the headrest and is used to attach the shoulder harness to the inertia reel. A manual release handle, located on the left side of the seat, is connected by linkage to the attachment fittings. Pulling up on this handle will unlock the attachment fittings, allowing the safety belt and shoulder harness to pull free and eject the parachute lanyard. The drogue parachute support restraining straps are also tied into the integrated harness release mechanism so that tension on either restraining strap will open the integrated harness attachment fittings. This ensures that the occupant is released from the seat at the time the drogue parachute is deployed.
Pin-pull cylinder	The integrated harness attachment fittings are unlocked automatically by a pin-pull cylinder located on the seat back. This cylinder is operated by gas pressure from the integrated harness release initiator which is fired when the seat is ejected.
Integrated harness release initiator	The integrated harness release initiator is ballistically fired by the catapult initiator and has a 0.30-second delay.
Survival kit	The survival kits used in the downward ejection seats are identical to the kits used in the upward ejection seats.
Seat positioning actuators	Each downward ejection seat is equipped with three 118-volt alternating current (AC) motor-driven seat positioning actuators operated by three seat positioning switches located on the lower right side of the seat. Movement of the horizontal positioning switch causes the seat positioning actuator to position the seat fore or aft. Movement of the back tilt positioning switch causes the seat positioning actuator to tilt

Downward Ejection Seat Equipment	
Equipment	**Description**
	the seat forward or aft. Movement of the vertical positioning switch causes the seat positioning actuator to move the seat up or down.
Ejection controls	The downward ejection system is provided with single motion ejection seats which require the crew members to perform only one operation to complete the ejection sequence. The ejection control handle, located between the occupant's legs, initiates a series of ballistic devices and mechanical linkages incorporated in the seat. Initial travel of the ejection control handle fires the arming initiator which rotates the leg guards, stows the worktable, locks the shoulder harness and jettisons the hatch. Further travel of the ejection control handle fires the catapult initiator which fires the catapult to eject the seat.
Safety pin-pull handle	The safety pin-pull handle enables the occupant to manually arm the catapult initiator in case the catapult safety pin-pull cylinder does not operate during normal ejection procedure.
Initiators	Both mechanically fired and gas fired initiators are used in the downward ejection seats.
Drogue parachute	The seats are equipped with a drogue parachute which deploys immediately after the seat departs the aircraft. The deployed parachute stabilizes and decelerates the ejection seat to assist in the positive separation of the seat occupant. The drogue parachute pack is supported below the seat by tubular arms which are attached to the seat back. The parachute support is held in position by a pin-pull cylinder. During the seat ejection sequence, the ballistically actuated pin-pull releases the spring-loaded parachute support and, as the seat moves down the rails and departs the aircraft, the parachute support arms rotate aft and lock in trail position at the limit of the restraining straps. The drogue parachute ripcord is pulled to deploy the parachute as the support rotates to the trail position. Backup operation of the drogue parachute support release pin-pull cylinder is provided by the integrated harness release 0.3-second delay initiator.
Man-seat separation system	The downward seats are provided with a man-seat separation system which provides positive separation for crew members occupying the downward ejection seats after ejection from the aircraft. The system consists of a reel-type ballistic actuator, jackshaft, and a harness made of two nylon straps. The downward seat man-seat separation system operates exactly like the upward man-seat separation system.

Catapult

The downward ejection seat catapult is a telescoping tube which contains an explosive charge. The lower end of the inner tube contains a female trunnion that attaches to the ejectable rails. The upper end of the outer tube contains a trunnion that attaches to the vertical positioning actuator which is attached to the fixed rails. The catapult is fired by a gas initiator in the ejection system after the proper sequence of events has taken place.

Table stowage thrusters

The radar navigator and navigator table stowage thrusters are used to stow the tables automatically during the seat ejection sequence. The thrusters are located below the instrument panel and between the two tables. Each thruster is gas-fired by a table stowage thruster initiator which is fired by gas

expansion from the arming initiator. Slip joints on the aft end of the thrusters allow the tables to be stowed manually by pushing them forward.

018. Theory of operation

In this lesson, we'll discuss the theories of operation for the upward seats and the downward seats.

Upward ejection system

Our discussion of the operational theory of upward ejection is divided into two categories: the pilot/copilot seats and the EWO/gunner seats like the one seen in figure 3-7.

Figure 3-7. Copilot seat.

Pilot and copilot seats

To eject, the crew member lifts both armrests to the up position and rotates either or both arming levers. The arming levers are interconnected and rotation of either right or left arming lever fires the arming initiator, locks the shoulder harness inertia reel, releases the leg support, and exposes the right or left trigger (fig. 3-8).

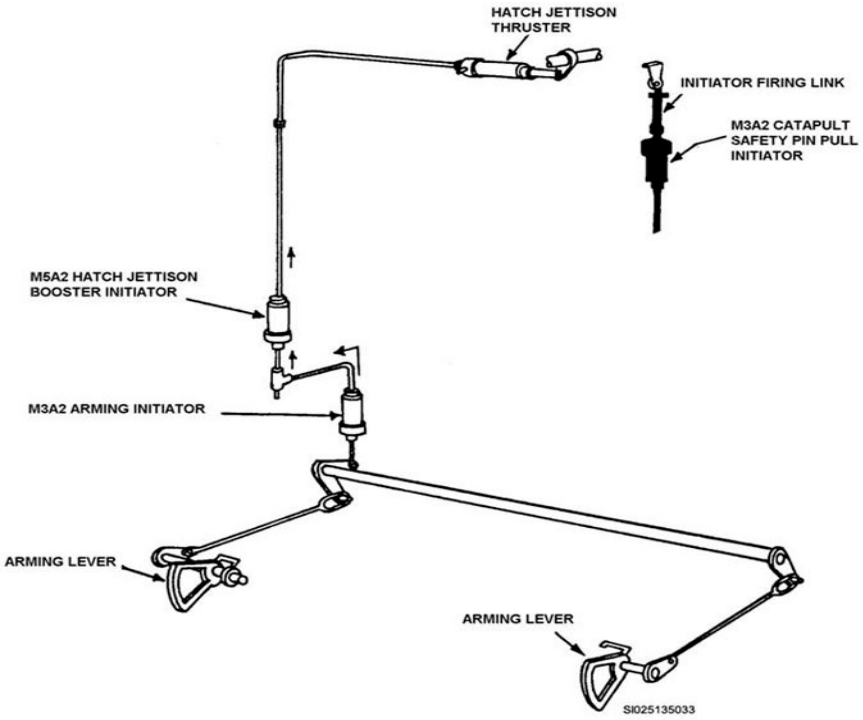


Figure 3-8. Upward escape system firing mechanism.

Gas expansion from the arming initiator fires the hatch jettison booster initiator and the control column stowage thruster, thus stowing the control column.

Gas expansion from the hatch jettison booster initiator fires the hatch jettison thruster, thus jettisoning the hatch. As the hatch is jettisoned, the catapult safety pin-pull initiator is fired by means of a telescoping linkage.

Gas expansion from the catapult safety pin-pull initiator operates the catapult safety pin-pull cylinder and fires the drogue parachute support arm release initiator.

When the catapult safety pin-pull cylinder operates, it retracts the safety pin from the catapult initiator, which arms the seat. If the catapult safety pin-pull initiator fails to fire when the hatch is jettisoned, pulling the manual safety pin-pull lever allows manual operation of the safety pin-pull cylinder.

Gas expansion from the drogue parachute support arm release initiator operates the drogue parachute support arm release pin-pull cylinder retracting latch mechanism. This allows the support arms to extend and rotate away from the seat. Note: The parachute support will not rotate away from the seat until the seat is ejected.

To continue the sequence, the crew member will squeeze the right or left trigger. Motion of the trigger linkage fires the catapult initiator.

Gas expansion from the catapult initiator fires the catapult and integrated harness release delay initiator after a 0.30-second delay.

The catapult fires, causing the seat, ejectable rails, and intermediate rails to move up the fixed rails. The drogue parachute support moves away from the seat as the seat moves upward through the hatch opening. As the parachute support moves away from the seat, the drogue parachute lanyard is pulled from the drogue parachute pack. This causes the pack to be turned inside out by spring force and results in parachute deployment. As the latch mechanisms in the ejectable rails move past the top of the fixed rails, the latches are tripped, thus allowing the pack to be turned inside out by spring force

which results in parachute deployment. The drogue parachute support rotates away from the seat until the restraint straps become taut.

As the latch mechanisms in the ejectable rails move past the top of the fixed rails, the latches are tripped, disengaging the ejectable rails from the intermediate rails. The intermediate rails connect the snubbers mounted on the fixed rails, preventing the intermediate rails from moving upward with the seat and ejectable rails.

As the seat and ejectable rails continue to move upward on the intermediate rails, the integrated harness release zero delay initiator is fired by a trip attached to the intermediate rails.

Gas expansion from the integrated harness release delay and zero delay initiators cause the integrated harness release pin-pull cylinder to operate, allowing the occupant to leave the seat. If the integrated harness release mechanism fails to release, an integrated harness release handle, shown in figure 3-9, will release the crew member from the ejection seat.

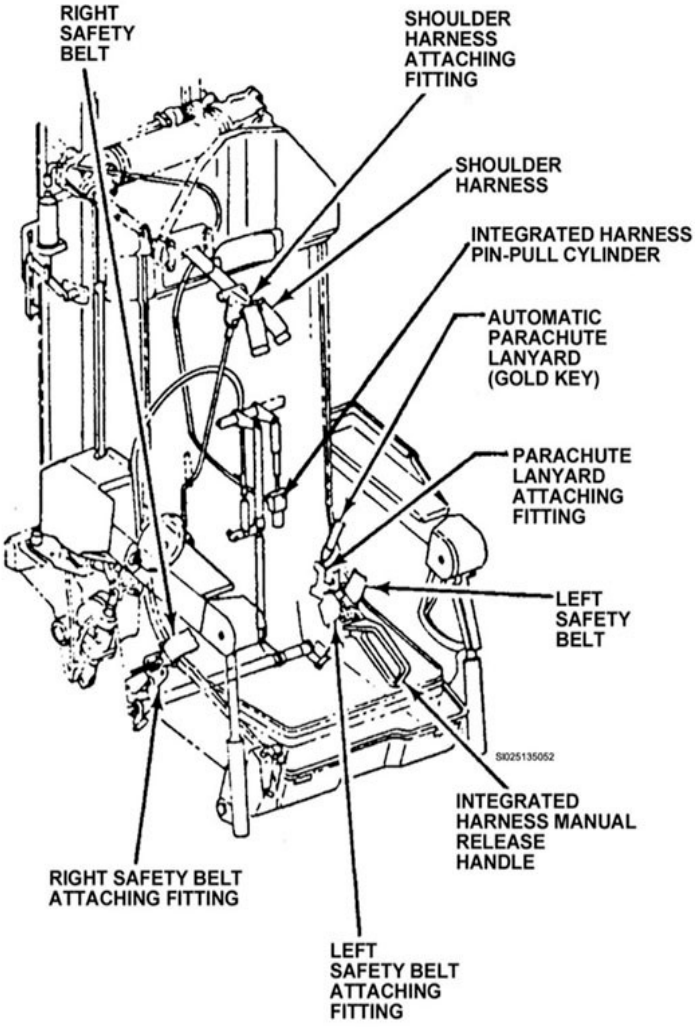


Figure 3-9. Integrated harness release mechanism.

Electronic warfare officer and gunner seats

To eject, the crew member lifts both armrests to the up position and rotates either or both arming levers. The arming levers are interconnected and rotation of either right or left arming lever fires the arming initiator (fig. 3-8), locks the shoulder harness inertia reel, releases the drag panel and exposes the right or left trigger.

Gas expansion from the arming initiator fires the hatch jettison booster initiator.

Gas expansion from the hatch jettison booster initiator fires the hatch jettison thruster which jettisons the hatch.

As the hatch is jettisoned, the catapult safety pin-pull initiator is fired by a telescoping linkage.

Gas expansion from the catapult safety pin-pull initiator operates the catapult safety pin-pull cylinder retracting safety pin from the catapult initiator and arming the seat. If the catapult safety pin-pull initiator fails to fire when the hatch is jettisoned, pulling the manual safety pin-pull lever operates the safety pin-pull cylinder manually.

To continue the sequence, the crew member squeezes the right or left trigger. Moving the trigger linkage fires the catapult initiator.

Gas expansion from the catapult initiator fires the catapult and integrated harness release delay initiator after a 0.30-second delay.

The catapult fires causing the seat, ejectable rails, and intermediate rails to move up the fixed rails. As the seat moves upward, the hinged drag panel rotates downward, the sliding panel extends from the drag panel, and the drogue parachute bridle lines are pulled from their stowage containers. The drag panel and sliding panel rotate downward until the restraint cables become taut.

As the latch mechanisms in the ejectable rails move past the top of the fixed rails, the latches are tripped, disengaging the ejectable rails from the intermediate rails. The intermediate rails contact the snubbers mounted on the fixed rails which prevent the intermediate rails from moving upward with the seat and ejectable rails.

As the seat and the ejectable rails continue to move upward on the intermediate rails, the drogue parachute lanyard attached to the intermediate rails becomes taut. The lanyard then releases a latch which attaches the drogue parachute pack to the bottom of the seat. When the bridle lines become taut, the parachute lanyard pulls the parachute pack away from the drogue parachute causing the parachute to deploy.

As the seat and ejectable rails continue to move upward on the intermediate rails, the integrated harness release zero delay initiator is fired by a trip attached to the intermediate rails.

Gas expansion from the integrated harness release delay and zero delay initiators fires the man-seat separation booster initiator and operates the integrated harness release pin-pull cylinder.

When the integrated harness release pin-pull cylinder operates, it releases the integrated harness, allowing the occupant to leave the seat. If the integrated harness release mechanism fails to release, an integrated harness release handle (fig. 3-9) will release the crew member from the ejection seat.

Gas expansion from the man-seat separation booster initiator fires the cartridge in the man-seat separation actuator, tightening the separation harness and throwing the occupant from the seat.

Downward ejection system

When the navigator or radar navigator pulls the ejection control handle (D-ring), the first part of the control handle travel fires the arming initiator (fig. 3-10).

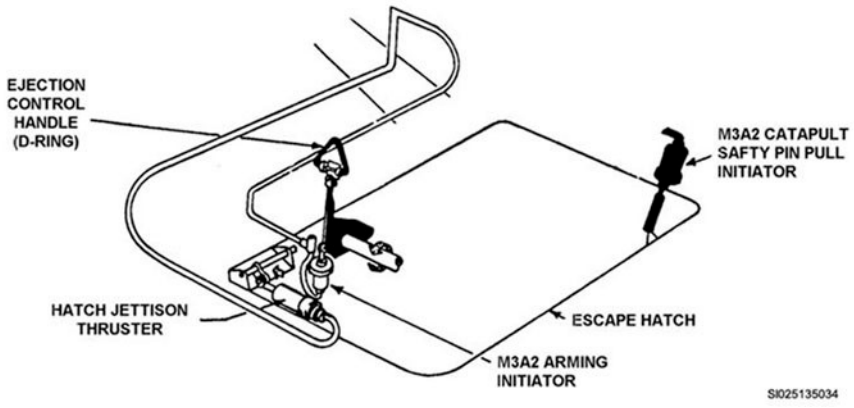


Figure 3-10. Downward escape system firing mechanism.

Gas expansion from the arming initiator fires the leg guard thruster, hatch jettison thruster, and table stowage initiator. Gas expansion from the table stowage initiator fires the table stowage thruster, which moves the table to the stowed position. Rotation of the leg guard locks the shoulder harness inertia reel.

As the escape hatch is jettisoned, the catapult safety pin-pull initiator is fired by a link attached to the escape hatch.

Gas expansion from the catapult safety pin-pull cylinder causes it to retract the pin which acts as a safety on the catapult initiator. If the catapult safety pin-pull initiator fails to fire when the hatch is jettisoned, pulling the safety pin-pull manual handle operates the safety pin-pull cylinder manually.

The last part of the ejection control handle pull fires the catapult initiator. Gas expansion from the catapult initiator fires the catapult and integrated harness release initiator after a 0.30-second delay.

The catapult fires causing the seat and ejectable rails to move downward on the fixed rails.

As the seat ejects, the drogue parachute support arm release initiator is fired by an initiator trip mounted on the fixed rails.

Gas expansion from the drogue parachute support arm release initiator causes the drogue parachute support arm pin-pull cylinder to operate, which rotates the drogue parachute support away from the seat. As the parachute support moves away from the seat, the drogue parachute lanyard is pulled from the drogue parachute pack, causing the pack to be turned inside out by spring force, deploying the parachute. The drogue parachute support rotates away from the seat until the restraint straps become taut.

After a 0.30-second delay, gas expansion from the integrated harness release initiator actuates the integrated harness release pin-pull cylinder and fires the man-seat separation actuator. Gas expansion from the integrated harness release initiator also acts as a backup in case the drogue parachute support arm release initiator fails to fire and release the drogue parachute support.

Actuation of the integrated harness release pin-pull cylinder releases the integrated harness. This allows the occupant to leave the seat when the man-seat actuator fires. It also actuates the gold key retention lock which positively retains the gold key in the latched position. In case the integrated harness release pin-pull cylinder fails to actuate, there is a mechanical backup. As the drogue parachute support rotates away from the seat, the actuating rings attached to the boom restraint straps are pulled from their mechanisms, mechanically releasing the integrated harness.

Firing of the man-seat separation actuator tightens the separation harness and throws the occupant from the seat.

Self-Test Questions

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

017. Major components

1. Match the B-52 upward ejection system component listed in column A with its description in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once.

Column A

___(1) Control column stowage thruster.
___(2) Inertia reel.
___(3) Survival kit.
___(4) Ejection controls.
___(5) Leg support.
___(6) Drag panel.
___(7) Seat positioning actuators.
___(8) Catapult.
___(9) Integrated harness release initiators.
___(10) Man-seat separation system.
___(11) Pilot/copilot drogue parachute.
___(12) EWO/gunner drogue parachute.

Column B

a. Dual capability so that either right or left hand controls will arm the seat and fire the catapult.
b. Pin-pull cylinder fires to initiate deployment.
c. Located under forward edge of EWO/gunner seats.
d. Only delay-type initiator on upward systems.
e. Includes integral centrifugal-type brake.
f. Releases a stowage spring.
g. Gravity and acceleration initiate deployment.
h. Located under forward edge of pilot/copilot seats.
i. Throws occupant from seat.
j. Three provided for each upward crew station.
k. Attached to ejectable and fixed rails by trunnions.
l. Reinforced fiberglass container.

2. Match the B-52 downward ejection system component listed in column A with its description in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once.

Column A

___(1) Ankle restraints.
___(2) Leg guards.
___(3) Leg guard thruster.
___(4) Pin-pull cylinder.
___(5) Integrated harness release initiator.
___(6) Seat positioning actuators.
___(7) Ejection controls.
___(8) Safety pin-pull handle.
___(9) Drogue parachute.
___(10) Table stowage thrusters.

Column B

a. 0.30-second delay.
b. Slip joints on aft end allow manual movement.
c. Can be stowed by rotating out and down.
d. Single motion.
e. Fired by gas expansion from the arming initiator.
f. Its support is held in place by pin-pull cylinder.
g. Enables manual catapult initiator arming.
h. Each equipped with three 118-volt AC motor-driven actuators.
i. Automatically unlocks integrated harness attachment fittings.
j. Protect against flail injuries.

018. Theory of operation

1. How do pilot and copilot crew members initiate ejection?

2. How does the pilot/copilot drogue parachute deploy?

3. How is the pilot/copilot catapult initiator fired?

4. How is the EWO/gunner seat catapult armed if the catapult safety pin-pull initiator fails to fire when the hatch is jettisoned?

5. How does the EWO/gunner drogue parachute deploy?

6. What three components are fired by the arming initiator?

7. How does the navigator/radar navigator drogue parachute deploy?

3–2. Hatch Jettison System

The ejection systems include an escape hatch for each ejection seat. The hatch is jettisoned during the seat ejection sequence. We'll first discuss the major components and then cover the theories of operations for the hatches.

019. Major components

Before you can understand how the overall hatch system operates, you need to understand how each component operates individually. In this lesson, we'll begin by taking a look at the hatch system and then move on to cover the individual components.

The hatches for all of the crew stations share most of their components, although there are a few differences.

Description

The B-52 egress system consists of six escape hatches, one for each ejection seat. The primary purpose of these hatches is to provide an opening for the ejection seats in case of an emergency. Four of the hatches—the pilot's, copilot's, EWO's, and gunner's—are on top of the aircraft fuselage and jettison upward. The remaining two hatches—the navigator's and the radar navigator's—are in the bottom of the fuselage and have a downward jettison path. There are no connections between the jettison systems for each of the six escape hatches. Each jettison system operates independently with its own ejection seat. A pilot vocal command system is used to sequence ejection events and prevent crew members from colliding during the escape sequence. This means the pilot must tell each crew member when to eject.

The upward hatches serve a dual purpose in that they provide an opening for seat ejection as well as a means of ground entry or exit to or from the forward crew compartment after ditching or crash landing. Except for the fact that the EWO and gunner escape hatches have lifter mechanisms, the four

upward escape hatches are similar in design and operation. The upward hatch components are shown in figure 3-11.

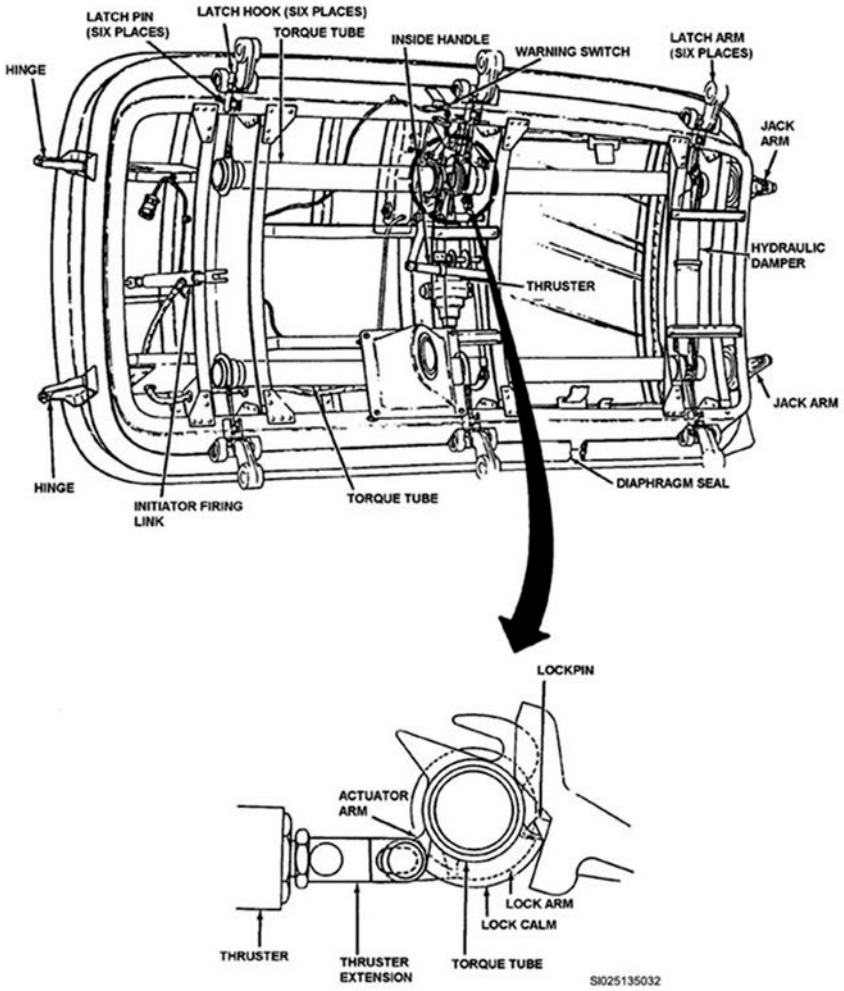


Figure 3-11. Upward hatch components.

The two downward hatches (navigator and radar navigator) are similar to the upward hatches. Although the components are located differently, they have the same functions. These hatches also have lifter mechanisms installed. The navigator and radar navigator hatch components are shown in figure 3-12.

Manual handle

The upper hatches have both inside and outside manual handles, while the downward hatches have only inside handles. The handles unlock, open, and close the hatch. Hatches cannot be unlocked by one handle and locked by the other; if a hatch is opened using one handle, it must be closed and locked using the same handle. This is because the handles completely disengage from the torque tubes as the hatches move to the fully closed and locked position.

Torque tubes

Each hatch has two torque tubes that run the entire length of the hatch. The torque tubes, which are operated by a handle or thruster, are interconnected by a push-pull rod and rotate in opposite directions to lock and unlock the hatch. Attached to the torque tubes are the jack arms, located on the forward end of the hatch, and six latch pins (three on each side of the hatch). When the torque tubes are rotated to the fully locked position, a lock pin engages a lock arm on the torque tube to prevent the torque tubes from rotating to an unlocked position. During unlocking, a lock cam, which is rotated by

either the manual handles (when the hatch is opened manually) or thruster (when the hatch is jettisoned), depresses the lock pin and unlocks the torque tubes.

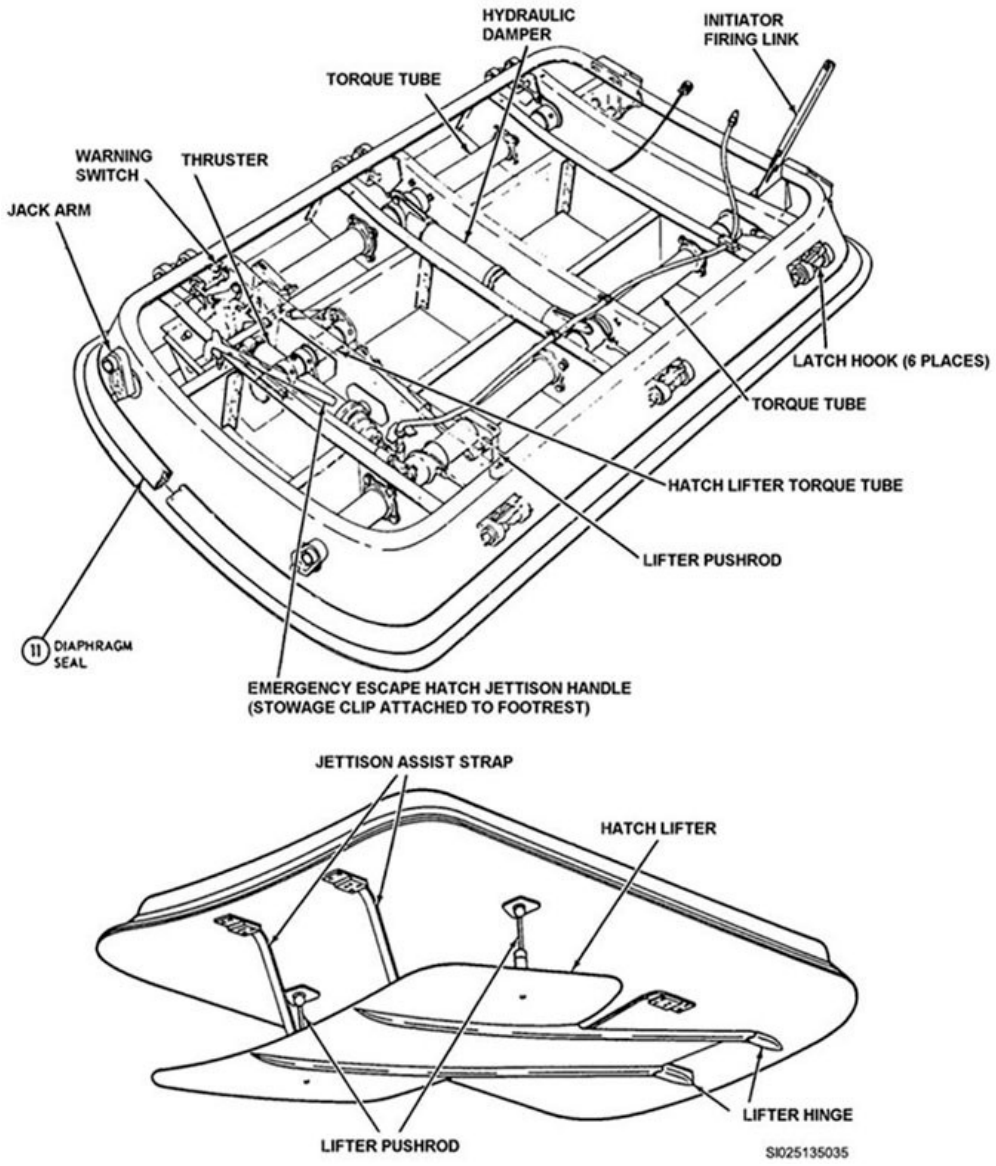


Figure 3-12. Downward hatch components.

Jack arms

The jack arms (fig 3-13) engage tracks mounted in the hatch wells as the hatch is closed and pull the forward end of the hatch to the aircraft. The jack arms are designed to force the forward end of the hatch away from the aircraft to ensure positive hatch jettison on the pilot and copilot hatches.

Figure 3-13. Jack arm.

Latching mechanism

The hatch latching mechanism consists of latch arms that are structurally attached to the hatch wells, six latch hooks, and six latch pins. These components all work together to secure the hatch to the aircraft. As the hatch is closed, the latch hooks contact and rotate around the latch arms. The latch pins, which are extended by the torque tubes, engage and overlap the throat of the latch hooks. The latch pin engagement prevents the latch hooks from rotating and releasing from the latch arms. The hatch is considered secured to the aircraft when the latch pins extend $^{1}/_{8}$ of an inch into the throats of the latch hooks.

Hydraulic damper

The hydraulic damper (fig. 3-14) is primarily designed to absorb the opening shock caused by the thruster extension during hatch jettison.

Figure 3-14. Hydraulic damper.

Hinge arms

The hinge arms are located at the aft end of the hatch. When engaged into the hinge sockets, located in the hatch well, they provide the pivot point for the hatch.

Hatch pressure seal

This diaphragm-type seal (fig. 3-15) is a noninflatable seal that seals the hatch to the aircraft. As cabin pressure builds within the aircraft, the seal is forced against the hatch well to prevent loss of cabin pressure at high altitudes.

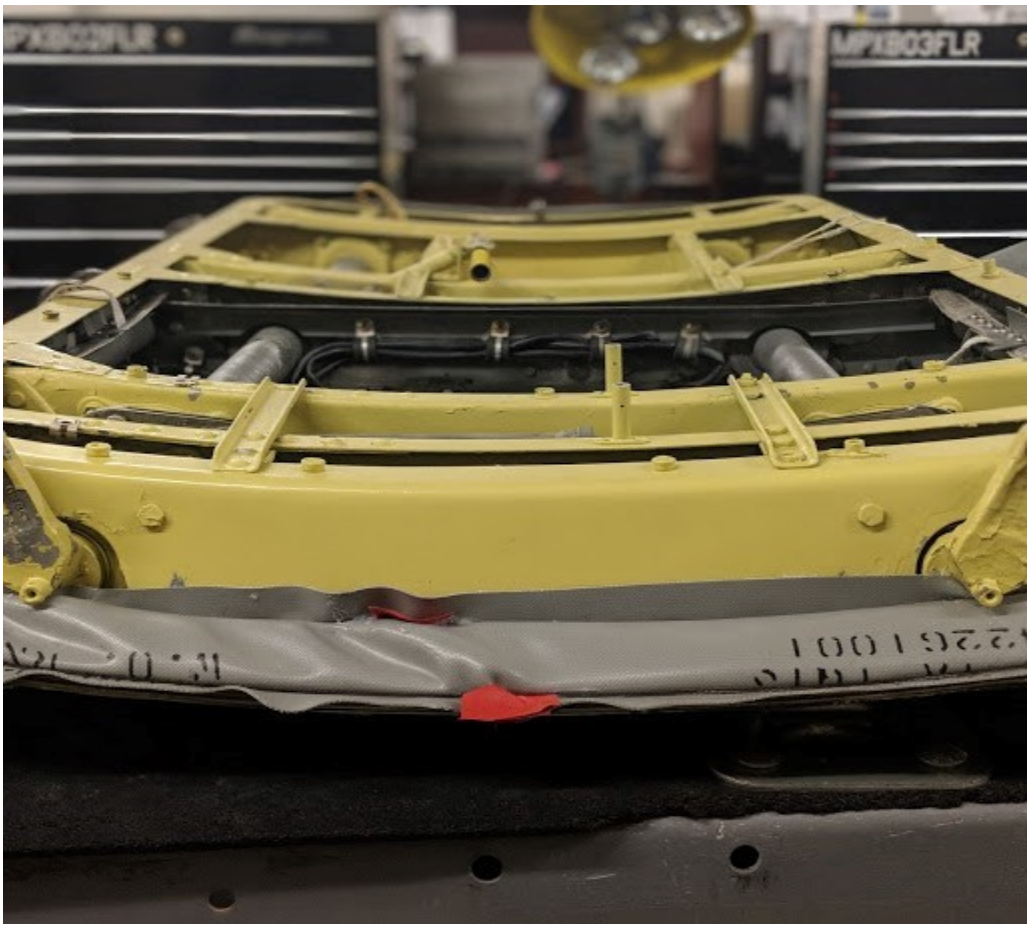


Figure 3-15. Diaphragm-type seal.

Warning light system

A warning switch on each hatch causes an amber warning light on the pilot's instrument panel to illuminate when any hatch is not properly closed and locked. If the warning light illuminates, all hatches must be checked to determine which hatch is not properly locked. Disconnecting each hatch warning light connector plug will remove that hatch from the circuit. When the light extinguishes you have isolated the malfunctioning hatch and can start your troubleshooting.

Thruster

The thruster, which is attached to the torque tubes by a thruster extension and an actuator arm, unlocks the hatch during emergency escape sequences. It is designed so the thruster extension contacts a lug on the lock cam during the initial thruster movement. This causes the lock pin to reposition and unlock the torque tubes. With the torque tubes free to rotate, the actuator arm, which is attached to the thruster extension, rotates during further movement of the thruster. The actuator arm then contacts the lock arm to rotate the torque tubes. The oblong slot on the thruster shaft allows sequencing to take place.

Initiator firing link

The initiator firing link fires the safety pin pull initiator in the ejection system. This arms the seat catapult initiator so that the seat ejection sequence can be completed.

Lifter mechanism

The lifter mechanism is only found on the EWO, gunner, navigator, and radar navigator escape hatches. This mechanism assists in jettisoning the hatch when the hatch jettison thruster is fired. The lifter mechanism consists of the following items which are described in the table.

- Lifter.
- Push-off mechanism.
- Jettison assist straps.

Lifter Mechanism Components	
Component	**Description**
Lifter	The lifter is a door that rests on the outside of the hatch and is hinged at the aft end. The lifter is held against the hatch by pushrods on the forward end.
Push-off mechanism	When the hatch jettison mechanism is in the normal position, the pushrod arms engage a ball on the ends of the pushrods. The lifter mechanism is held in the normal or retracted position by the hatch jettison thruster. When the thruster is fired, the lifter torque shaft rotates, causing the pushrod arms to rotate, pushing the pushrods outboard. At the fully rotated position, the pushrods disengage from the pushrod arms, allowing the lifter to swing free in the airstream.
Jettison assist straps	Jettison assist straps attach to the hatch and to the lifter. They are designed to stop the lifter after it has swung away from the hatch 30 degrees. These straps absorb the shock of extending the lifter and transfer the air load from the lifter to the hatch to assist in jettisoning the hatch.

020. Theory of operation

Now that you have learned the components of the escape hatch system, let's see how they work together during operation. In the first part of this lesson we cover normal operation and then move on to the emergency operation.

Normal operation

The escape hatches are situated directly above the upward ejection seats and directly below the downward seats. The normal operation of each hatch is identical. The upward escape hatches may be opened by the following three methods:

- An outside handle for outside entry or hatch maintenance.
- An inside handle for opening manually from the inside (this handle also may be used for hatch jettison during manual bailouts in the event the egress system becomes inoperable).
- A thruster mechanism that jettisons the hatch during ejections. Remember, the downward hatches do not have outside handles; therefore, they may only be opened manually using the inside handle or the thruster mechanism.

Open cycle

To manually open an upward hatch from its closed and locked position you must first release the inside or outside handle. When either hatch handle is pulled, it contacts and engages the lock cam, causing the cam to rotate. As the lock cam rotates, the lock pin is depressed and the torque tubes are free to rotate. The torque tubes retract the six pairs of latch pins, unlocking the latch hooks. The latch hooks are now free to rotate. At the same time, jack arms connected to the torque tube ends rotate and force the forward end of the hatch open. While the hatch is opening, the latch hooks release from the latch arms. The escape hatch can then be swung open until the hinge arms separate from the hinge sockets. The hatch is now free from the aircraft.

Close cycle

To close and lock the escape hatch, you must first insert the hinge arms into the hinge sockets and then close the hatch. The jack arms, guided by tracks on the forward end of each hatch well, draw the hatch closed. As the escape hatch is closed, the latch hooks rotate around the latch arms. Final rotation of the torque tubes extends the six pairs of latch pins. The latch pins engage the latch hooks and the lock pin engages the lock arm to lock the torque tubes in place. At this point the handle pulls free from the lock cam. If the hatch is locked properly, the warning switch is de-energized, causing the amber light on the pilot's instrument panel to extinguish. The diaphragm seal around the hatch seals against the hatch well when the cabin is pressurized to prevent loss of pressurization.

Emergency operation

The upward and downward jettison systems are basically the same. The hatches jettison during their respective ejection seat sequence. An ejection control handle initiates them.

Upward escape hatch sequence

Refer back to figure 3-11 as you read about the upward escape hatch sequence. An arming lever located on either side of the seat must be raised to initiate the hatch and seat sequence from any of the four upward positions such as the pilot, copilot, EWO, or gunner. Raising the arming lever on either side of the seat mechanically fires the M3A2 arming initiator. The arming initiator sends ballistic gas pressure to fire the M5A2 hatch jettison booster initiator. The hatch jettison booster initiator's gas pressure is sent to fire the hatch jettison thruster. As stated earlier, the thruster extends and rotates the torque tubes. The rotation of the torque tubes unlocks the hatch, extends the lifter mechanism on the EWO and gunner hatches, and jettisons the hatch. As the upward hatch leaves the aircraft, the initiator firing link fires the M3A2 catapult safety pin-pull initiator (CSPPI) which retracts the catapult safety pin-pull cylinder, arming the seat so that it can be ejected. The CSPPI serves as the sequencing initiator for the hatch and seat systems.

Downward escape hatch sequence

To initiate the hatch and seat sequence from either the navigator or radar navigator position, an ejection control handle (D-ring), located on the front of the ejection seat, must be pulled (refer back to fig. 3-12). Pulling the D-ring mechanically fires the M3A2 arming initiator. Gas-pressure from the arming initiator fires the hatch jettison thruster that extends to rotate the lifter torque tube. The thruster extension also rotates the torque tubes that rotate the jack arms. As the torque tubes rotate, the hatch is unlocked, the lifter is extended, and the hatch is pulled away from the aircraft. As the hatch leaves the aircraft, the initiator firing link fires the M3A2 CSPPI. The CSPPI arms the ejection seat in the same manner as the upward hatch jettison system so that it may eject. This initiator also serves as the sequencing initiator for the hatch and seat in the downward systems.

Hatch thruster operation (without lifters)

As you remember by referring back to figure 3-11, the thruster is attached to the torque tubes by a thruster extension and actuator arm. When jettisoning takes place, gas pressure from an initiator fires the hatch jettison thruster. Gas pressure in the thruster causes it to extend. The initial movement of the thruster extension causes the lock cam to rotate and unlock the torque tubes. As the thruster continues to extend, the actuator arm rotates, contacting the lock arm and the torque tubes, and unlocks the hatch. The thruster extension is slotted to sequence the unlocking and rotation of the torque tubes. The jack arms then force the forward end of the hatch into the airstream and the hatch is carried free of the aircraft. The hydraulic damper is incorporated in the mechanism to reduce the unlocking and opening shock produced by the thruster. As the hatch is jettisoned, a telescoping link fires the safety pin-pull initiator in the ejection system. This causes the catapult safety pin-pull cylinder safety device to retract from the catapult initiator, thus arming the initiator so the seat can be ejected.

Hatch thruster operation (with lifters)

The EWO, gunner, navigator, and radar navigator escape hatches operate similar to the pilot and copilot hatches except a lifter mechanism has been incorporated in the jettison mechanism. Refer back to figure 3-8 which shows component location on the downward hatches. On these systems, the lifter torque tube is attached directly to the thruster extension. When the hatch jettison mechanism is in the normal or retracted position, the thruster holds the lifter to the hatch through mechanical linkage. When the thruster is fired, the same events occur as described for hatches without lifters. In addition, the thruster extension rotates the lifter torque tube. The lifter torque tube, through push-pull rods, forces the pushrod arms to rotate downward causing the pushrods to extend the lifter. Once fully extended, the pushrods disengage from the pushrod arms allowing the lifter to swing free in the airstream. The hatch jettison assist straps, attached to the hatch and lifter, prevent the lifter from over-extending and transfer the air load from the lifter to the hatch. In this way, the lifter ensures positive jettisoning of these hatch systems.

Self-Test Questions

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

019. Major components

1. What is the primary purpose of the B-52 escape hatches?

2. Match the B-52 hatch jettison system component listed in column A with its description in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once.

Column A	*Column B*
___(1) EWO hatch.	a. Prevent latch hooks from rotating.
___(2) Radar navigator hatch.	b. Engages a lock arm on the torque tube to prevent rotation.
___(3) Manual handle.	c. Transfer air load from the lifter to the hatch.
___(4) Torque tubes.	d. Illuminates light on pilot’s instrument panel.
___(5) Lock pin.	e. Jettisons downward.
___(6) Jack arms.	f. Structurally attached to the hatch wells.
___(7) Latching mechanism.	g. Disengages pushrods from pushrod arms.
___(8) Latch hooks.	h. Rotate in opposite directions to lock and unlock the hatch.
___(9) Latch pins.	i. Only found on the EWO, gunner, navigator, and radar navigator escape hatches.
___(10) Hydraulic damper.	j. Contact and rotate around latch arms.
___(11) Hinge arms.	k. A door that rests on the outside of the hatch.
___(12) Hatch pressure seal.	l. Arms the seat catapult initiator.
___(13) Warning light system.	m. Absorbs opening shock caused by thruster extension.
___(14) Thruster.	n. Provide pivot point for the hatch.
___(15) Initiator firing link.	o. Jettisons upward.
___(16) Lifter mechanism.	p. The same one must be used to open and close the hatch.
___(17) Lifter.	q. Designed to force forward end of hatch away from aircraft.
___(18) Push-off mechanism.	r. Prevents loss of cabin pressure at high altitudes.
___(19) Jettison assist straps.	s. Oblong slot on shaft allows sequencing.

020. Theory of operation

1. Which hatches can only be opened manually by using the inside handle?

2. What indicates that all hatches are locked properly?

3. What upward escape hatch component receives ballistic gas pressure from the seat's arming initiator?

4. What component is fired as an upward escape hatch leaves the aircraft?

5. How is the downward escape hatch jettison sequence initiated?

6. What initiator serves as the sequencing initiator for the downward hatch and seat?

7. Explain the sequence of events for lifter operation during hatch jettison.

Answers to Self-Test Questions

017

1. (1) f.
   (2) e.
   (3) l.
   (4) a.
   (5) h.
   (6) c.
   (7) j.
   (8) k.
   (9) d.
   (10) i.
   (11) b.
   (12) g.
2. (1) c.
   (2) j.
   (3) e.
   (4) i.
   (5) a.

(6) h.
(7) d.
(8) g.
(9) f.
(10) b.

018

1. By lifting both armrests to the up position and rotating either or both arming levers.
2. Gas expansion from the drogue parachute support arm release initiator operates the drogue parachute support arm release pin-pull cylinder retracting latch mechanism, allowing the support arms to extend and rotate away from the seat. The parachute support will not rotate away from the seat until the seat is ejected. Firing of the catapult causes the seat, ejectable rails, and intermediate rails to move up the fixed rails. The drogue parachute support moves away from the seat as the seat moves upward through the hatch opening. As the parachute support moves away from the seat, the drogue parachute lanyard is pulled from the drogue parachute pack causing the pack to be turned inside out by spring force causing the parachute to deploy. As the latch mechanisms in the ejectable rails move past the top of the fixed rails, the latches are tripped, allowing the pack to be turned inside out by spring force resulting in parachute deployment. The drogue parachute support rotates away from the seat until the restraint straps become taut.
3. By squeezing the right or left trigger.
4. The crew member pulls the manual safety pin-pull lever in order to operate the safety pin-pull cylinder manually.
5. Firing of the catapult causes the seat, ejectable rails, and intermediate rails to move up the fixed rails. As the seat moves upward, the hinged drag panel rotates downward, the sliding panel extends from the drag panel, and the drogue parachute bridle lines are pulled from their stowage containers. The drag panel and sliding panel rotate downward until the restraint cables become taut. As the seat and the ejectable rails continue to move upward on the intermediate rails, the drogue parachute lanyard attached to the intermediate rails becomes taut. The lanyard then releases a latch which attaches the drogue parachute pack to the bottom of the seat. When the bridle lines become taut, the parachute lanyard pulls the parachute pack away from the drogue parachute, deploying the parachute.
6. The leg guard thruster, hatch jettison thruster, and table stowage initiator.
7. As the seat ejects, the drogue parachute support arm release initiator is fired by means of an initiator trip mounted on the fixed rails. Gas expansion from the drogue parachute support arm release initiator causes the drogue parachute support arm pin-pull cylinder to operate, allowing the drogue parachute support to rotate away from the seat. As the parachute support moves away from the seat, the drogue parachute lanyard is pulled from the drogue parachute pack allowing the pack to be turned inside out by spring force, resulting in parachute deployment. The drogue parachute support rotates away from the seat until the restraint straps become taut. Gas expansion from the integrated harness release initiator also acts as a backup in case the drogue parachute support arm release initiator fails to fire and release the drogue parachute support.

019

1. To provide an opening for the ejection seats in case of an emergency.
2. (1) o.
(2) e.
(3) p.
(4) h.
(5) b.
(6) q.
(7) f.
(8) j.
(9) a.
(10) m.

(11) n.
(12) r.
(13) d.
(14) s.
(15) l.
(16) i.
(17) k.
(18) g.
(19) c.

020

1. Downward hatches.
2. The warning switch is de-energized, causing the amber light on the pilot's instrument light to extinguish.
3. The M5A2 hatch jettison booster initiator.
4. The M3A2 CSPPI.
5. Pulling of the ejection control handle D-ring.
6. The M3A2 CSPPI.
7. When the thruster is fired, the thruster extension rotates the lifter torque tube. The lifter torque tube, through push-pull rods, forces the pushrod arms to rotate downward causing the pushrods to extend the lifter. Once fully extended, the pushrods disengage from the pushrod arms allowing the lifter to swing free in the airstream. The jettison assist straps, attached to the hatch and lifter, prevent the lifter from over-extending and transfer the air load from the lifter to the hatch.

Complete the unit review exercises before going to the next unit.

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 AFCDA.

64. (017) Drag panels are found at what B–52 crew member positions?
    a. Pilot and copilot.
    b. Navigator and radar navigator.
    c. Electronic warfare officer and gunner.
    d. Offensive system operator and defensive system operator.

65. (017) The ankle restraints actuate during a B–52 downward ejection when the
    a. seat leaves the intermediate rails and a mechanical linkage rotates the ankle restraints.
    b. leg guard thruster fires and the leg guards will rotate and trip the ankle restraint triggers.
    c. crew member's legs touch the ankle restraint triggers prior to pulling the ejection control handle.
    d. crew member pulls the ejection control handle and the ankle restraint initiator fires and rotates the ankle restraints.

66. (017) What B–52 downward seat system consists of a reel-type ballistic actuator, jackshaft, and a nylon strap harness?
    a. Integrated harness release system.
    b. Man-seat separation system.
    c. Drogue parachute system.
    d. Rotary actuator system.

67. (018) During a B–52 pilot seat ejection, the drogue parachute pack is turned inside out by
    a. gravity.
    b. the catapult.
    c. spring force.
    d. a drogue gun.

68. (018) The B–52 navigator arms the seat for ejection by
    a. squeezing the right or left ejection control trigger.
    b. pulling the internal hatch jettison initiator handle.
    c. lifting both armrests to the up position and rotating either or both arming levers.
    d. pulling the ejection control handle so the first part of travel fires the arming initiator.

69. (018) How does a B–52 navigator separate from the seat during a downward ejection?
    a. Gas expansion from the man-seat separation booster initiator fires, throwing the navigator from the seat.
    b. Firing of the man-seat separation actuator tightens the separation harness, throwing the navigator from the seat.
    c. The personnel parachute is mechanically launched from the seat so that when it opens fully, the navigator is pulled from the seat.
    d. The personnel parachute is ballistically launched from the seat so that when it opens fully, the navigator is pulled from the seat.

70. (019) What B–52 hatch components are interconnected by a push-pull rod and rotate in opposite directions to lock and unlock the hatches?
    a. Jack arms.
    b. Hinge arms.
    c. Torque tubes.
    d. Manual handles.

71. (019) What unlocks the B–52 torque tubes during the hatch jettison sequence?
    a. A lock cam is rotated by the manual handles, depressing the lock pin and unlocking the torque tubes.
    b. Thruster extension contacts a lug on the lock cam during initial thruster movement causing a lock pin to reposition.
    c. The thruster is fired, rotating the lifter torque shaft and causing the pushrod arms to rotate, pushing the pushrods outboard.
    d. Thruster extension contacts the hinge arms to rotate out of the hinge sockets, providing a pivot point to unlock the torque tubes.

72. (019) The B–52 hatch lifter mechanism consists of a lifter, a push-off mechanism and
    a. a warning light system.
    b. the hatch pressure seal.
    c. a hydraulic damper.
    d. jettison assist straps.

73. (020) To close and lock a B–52 escape hatch, you must first insert the hinge arms into the hinge sockets and then
    a. close the hatch.
    b. rotate the latch arms.
    c. energize the warning switch.
    d. pressurize the diaphragm seal.

74. (020) What action fires the M3A2 arming initiator during the B–52 upward escape hatch sequence?
    a. Pulling the internal hatch jettison handle.
    b. Firing the M3A2 catapult safety pin pull initiator.
    c. Raising the arming lever on either side of the seat.
    d. Pulling the ejection control handle on the front of the seat.

75. (020) What B–52 hatch component reduces the unlocking and opening shock produced by the thruster?
    a. Load arrestor.
    b. Lifter mechanism.
    c. Hydraulic damper.
    d. Hatch pressure seal.

76. (020) The B–52 radar navigator hatch jettison assist straps
    a. rotate the lifter torque tube.
    b. prevent the lifter from over-extending.
    c. allow the lifter to swing free in the airstream.
    d. transfer the air load from the hatch to the lifter.

Please read the unit menu for unit 4 and continue ➔

Unit 4. B-1B Egress System

CARRYING THE LARGEST payload of both guided and unguided weapons in the Air Force inventory, the multi-mission B-1B Lancer is the backbone of America's long-range bomber force. Hence its nick name "The Bone" It can rapidly deliver massive quantities of precision and non-precision weapons against any adversary, anywhere in the world, at any time. When put into service back in 1985, it was originally designed for nuclear capabilities but, switch to an exclusively conventional combat role in the mid-1990s. In 1999, during Operation Allied Force, six B-1s flew 2 percent of the strike missions, yet dropped 20 percent of the ordnance, and during Operation Enduring Freedom the B-1 flew on 2 percent of the sorties while dropping over 40 percent of the precision weapons. The B-1 has been nearly continuously deployed in combat operations over Afghanistan and Iraq since 2001. With current mission demands, it is on course to serving the Air Force to the year 2040 and beyond.

The B-1B's blended wing/body configuration, variable-geometry wings, and turbofan afterburning engines combine to provide long-range, maneuverability, and high speed while enhancing survivability. Forward wing settings are used for takeoff, landings, air refueling, and in some high-altitude weapons employment scenarios. Aft wing sweep settings—the main combat configuration—are typically used during high subsonic and supersonic flight, enhancing the B-1B's maneuverability in the low- and high-altitude regimes. The B-1B's speed (900+ miles per hour [MPH], Mach 1.2) and superior handling characteristics allow it to seamlessly integrate in mixed force packages. These capabilities, when combined with its substantial payload, excellent radar targeting system, long loiter time, and survivability, make the B-1B a key element of any joint/composite strike force.

This unit covers the B-1B egress system. First, we'll look at the egress system as a whole, starting with the major components and the theory of operation. Next, we'll examine the B-1B hatch systems. We'll conclude the unit with a discussion of the cabin decompression and bottom bailout systems.

4–1. Escape System

In this section, we'll discuss the B1-B crew escape and safety system. Although it shares the ACES II with the aircraft we discussed in the preceding volume, there are some major and minor differences. First, we'll talk about the major components of the system, and then move on to the system's theory of operation.

021. Major components

The crew's escape and safety system consists of an escape hatch jettison, bottom bailout, and energy transfer (ET) components. The major components we'll discuss in this lesson are the following:

- ACES II.
- Rocket catapults.
- Ejection seat carriages.
- Carriage load arrestors.
- Seat carriage pin pullers.
- Carriage retraction thrusters.
- ET lines.
- Shielded mild detonating cord (SMDC)-gas initiators.
- Gas-SMDC initiators.
- Interrupters.
- One-way transfer initiators.
- Time delay initiators.
- AND gates.
- Worktable stowage thrusters.
- Eject mode selectors.

Advanced concept ejection seat II

The B1-B crew arrangement is shown in figure 4-1. The B-1B crew stations are pilot, copilot, offensive system operator (OSO) and defensive system operator (DSO). Each ejection seat (fig. 4-2) has two ejection control handles (on the sides), a safety lever, and is activated with mechanically and gas fired initiators. The seat has a gas-powered inertia reel, personal restraints, an emergency manual parachute deployment handle, a recovery sequencer, and an automatic restraint release mechanism. Also included are the pitch stabilization control assembly (STAPAC), trajectory divergence rocket (TDR), yaw divergence rocket, velocity sensor, environmental sensor, drogue and recovery parachutes, survival kit, and an emergency oxygen bottle. Since the velocity sensor, yaw divergence rocket, and restraint system are unique to the B-1B, let's cover them in more detail.

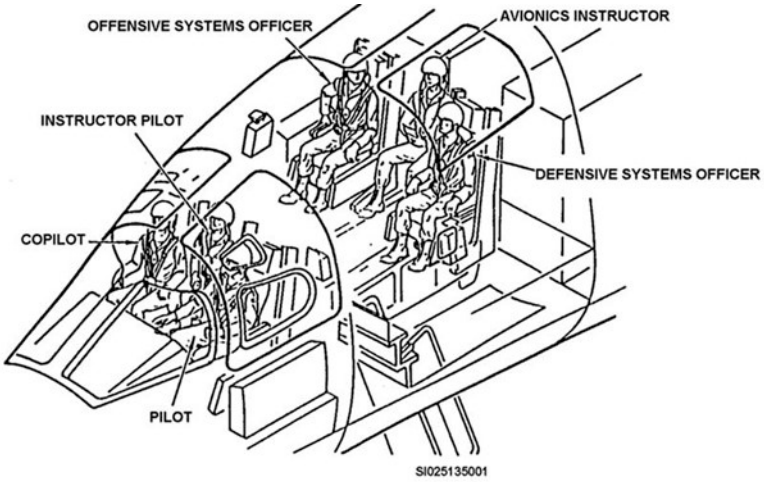


Figure 4-1. B-1B crew arrangement.

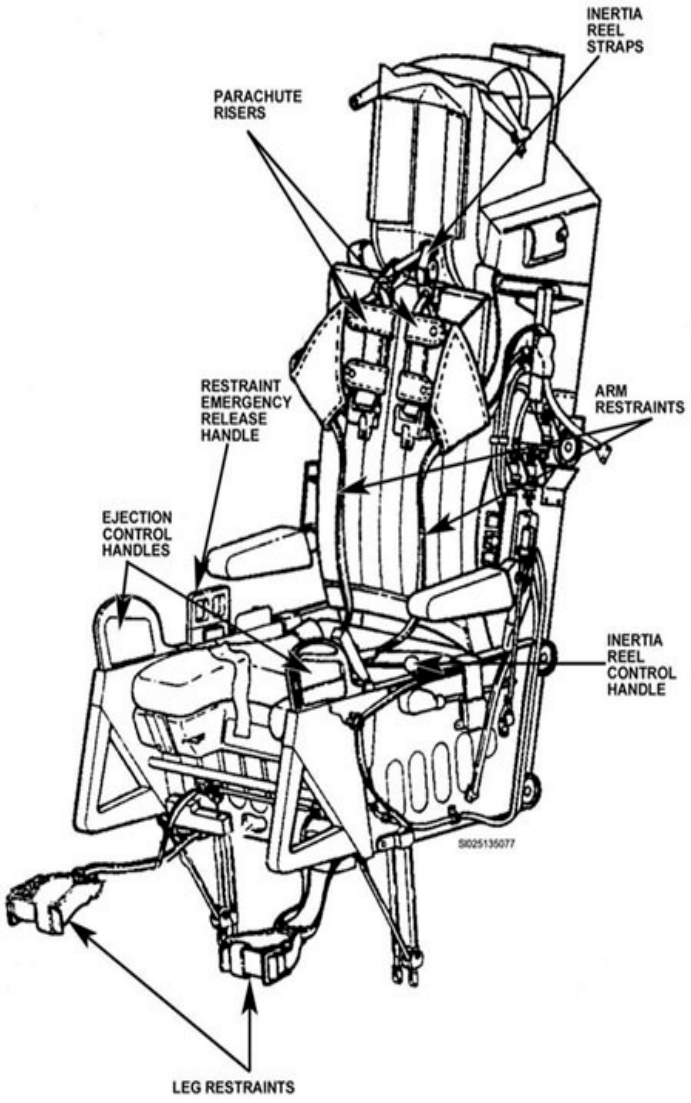


Figure 4-2. B-1B ACES II.

Velocity sensor

The velocity sensor is located near the environmental sensor and uses the same dynamic pressure inputs from the two common pitot's. Velocity sensor transducers measure air speed during seat ejection when the two pitot's are exposed to the external atmosphere. The velocity sensor inhibits operation of the yaw divergence rocket when monitored aircraft speed exceeds 360 to 380 knots at sea level (KEAS).

Yaw divergence rocket

The yaw divergence rocket consists of a dual bridgewire initiator and an internal squib. It's fired by a signal from the recovery sequencer. The yaw divergence rockets are only installed on the aft (OSO and DSO) seats (fig. 4-3). During ejection they provide yaw divergence that directs the seats to opposite sides of the ejection path in order to avoid possible in-flight collision.

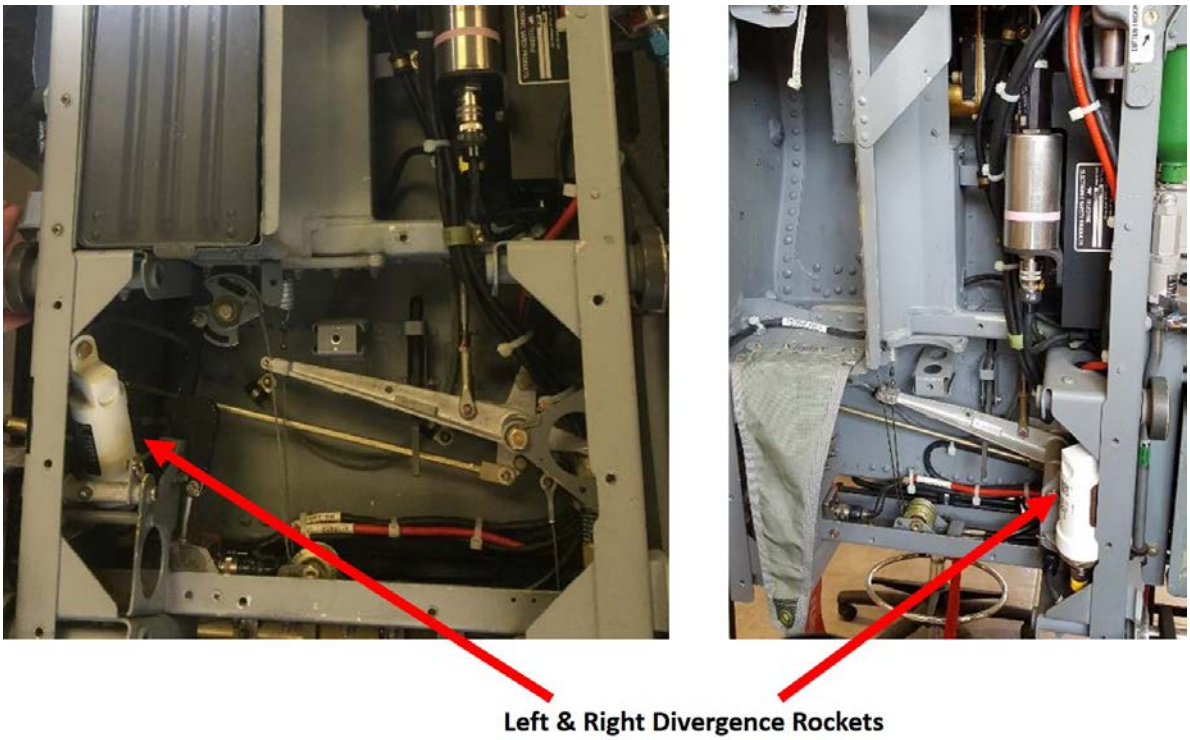


Figure 4-3. Yaw divergence rockets.

Restraint system

Refer once again to figure 4-2 as we discuss the restraint system. The B-1B bomber ejection seat restraint system consists of the lap belts, inertia reel straps, parachute risers, and limb restraints for both arms and legs. The lap belts and shoulder harness straps (not shown), along with the parachute risers, restrain the crew member at all times. Seat movement up the rails during ejection actuates the limb restraints.

Arm restraints

The arm restraints are net assemblies that are spring-loaded into position and tightened with restraint straps by the upward motion of the seat during ejection. A net assembly is stowed in a vertical channel on each side of the seat and is pinned in place against the force of a deployment spring. A restraint strap attached to the forward side of the bucket is routed through a carriage-mounted pulley, a seat-mounted snubber, and a seat-mounted “D” ring attached to the upper forward side of the seat. Then it is routed aft into the lower end of the net stowage channel. From here it goes up and out of the top of the channel, and down through a Teflon ring attached to the side of the seat by a bungee cord. From this ring it is routed back up to the top of the side channel through the net collector ring, and over to an epaulet keeper attached to the parachute riser. This keeper is held closed by hook and pile Velcro tape. The strap is then routed down through a ring on the lap belt at the buckle and back to the lap belt attach fitting. At this point, a lever restrains it as long as the fitting is pinned to the side of the bucket.

Leg restraints

The leg restraints consist of a garter assembly that the crew member buckles around the calves of each leg. Each garter has two rings that a leg restraint strap assembly is routed through. During normal seat operation, this strap assembly is slack and allows freedom of movement. During ejection, the upward movement of the seat tightens the straps. This pulls the lower legs down and aft against the forward face of the seat bucket. Each strap is attached to the carriage assembly by a shear link and is routed over the roller and through a snubber which is mounted on the lower part of the bucket. It is

then routed up and through the two rings of the garter and back into a housing on the upper forward face of the seat bucket. There it is locked in place by a spring-loaded torsion rod that lies along the forward face of the bucket. This rod goes through both lock housings and is spring-loaded in the locked position.

Rocket catapults

The rocket catapult (fig. 4-4) is mounted on the vertical seat positioning actuator (fig. 4-5) between the seat guide rails. The CKU–5 series rocket catapult is a two-stage device actuated by a propellant cartridge. The first stage (catapult phase) provides the initial clearance from the aircraft while the second stage (sustainer phase) propels the seat and occupant to a height suitable for safe recovery. Gas pressure from the catapult impulse cartridge activates the recovery sequencer thermal batteries and starts the seat moving up the guide rails. Approximately two inches from the end of the catapult stroke, the inner tube uncovers four small holes in the intermediate tube. This permits the hot gases to ignite the rocket motor igniter and fire the rocket motor propellant.

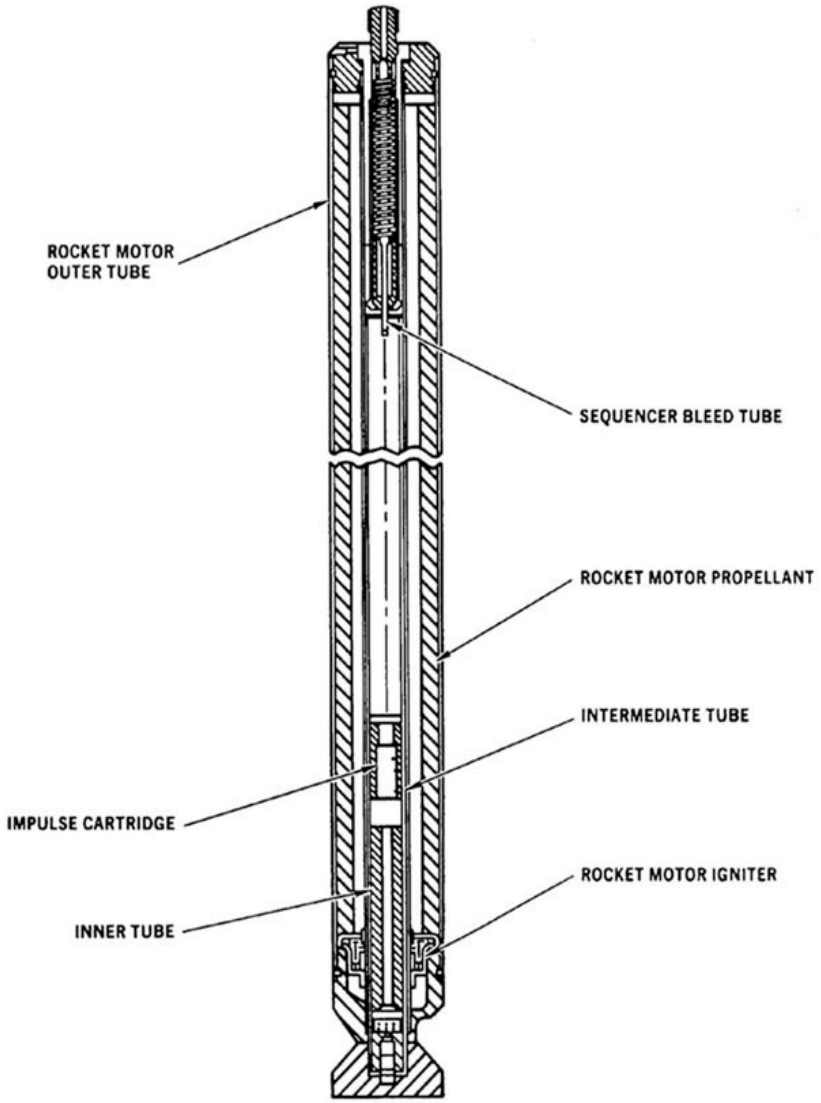


Figure 4-4. Ejection seat rocket catapult.

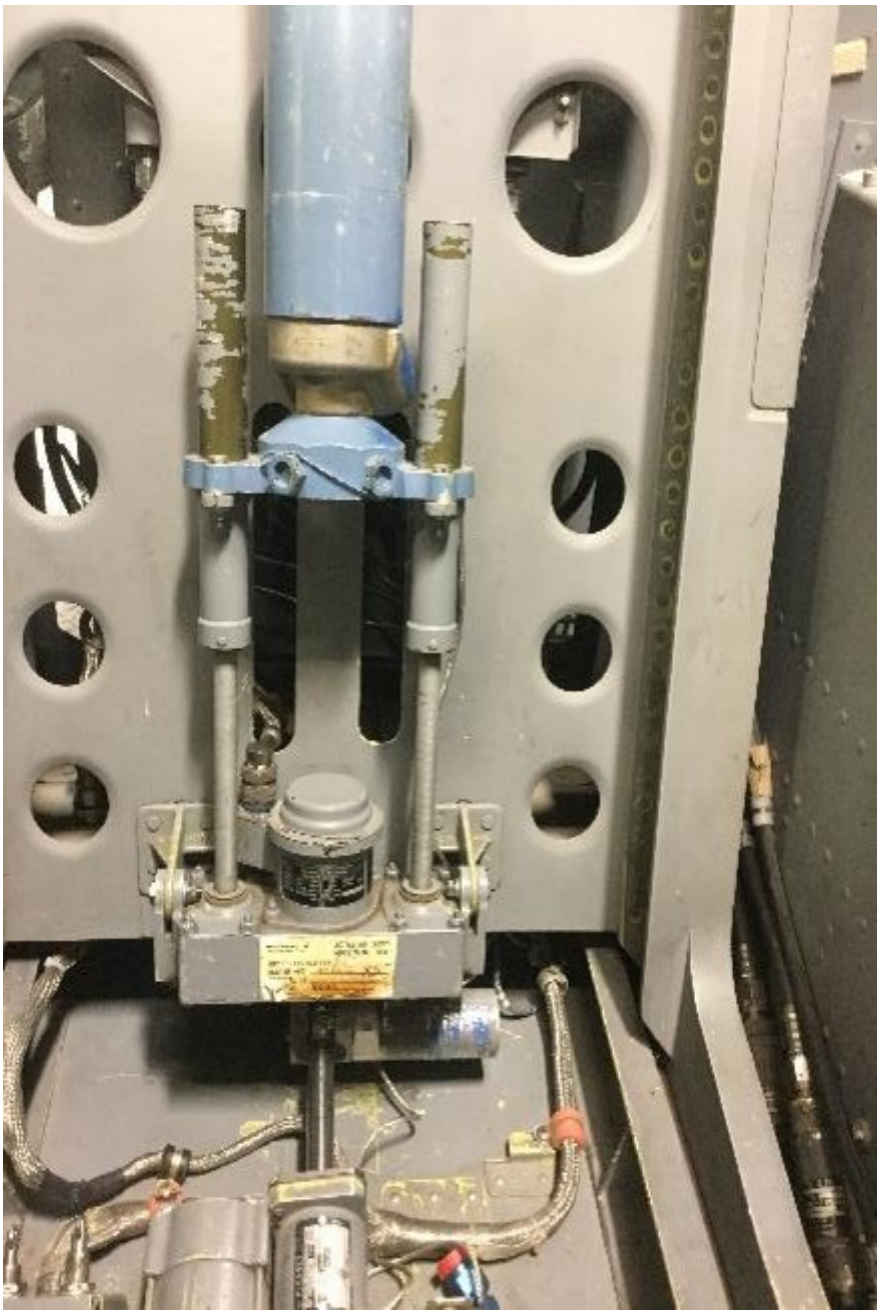
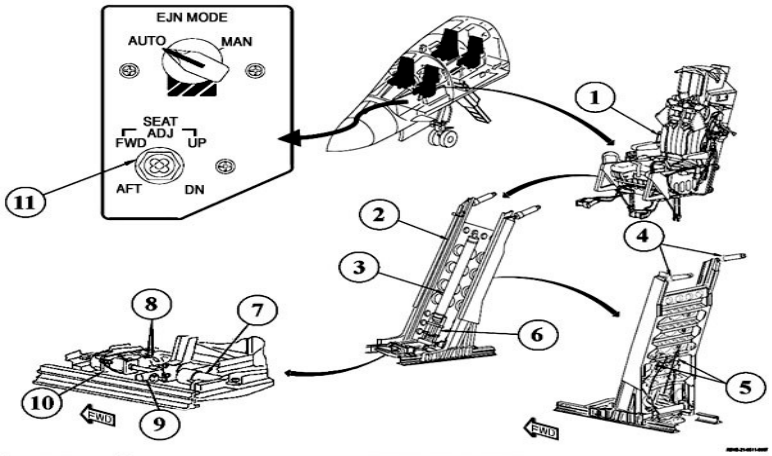


Figure 4-5. Vertical actuator.

Ejection seat carriage

An ejection seat carriage (fig. 4-6) is installed on horizontal tracks mounted to the crew compartment floor structure in each of the crew stations. The seat carriage side supports act as guide rails for the seats throughout the vertical (up and down) movement and during seat ejection. The horizontal seat positioning actuator provides forward and aft movement of the seat carriage.



INDEX	NOMENCLATURE
1	EJECTION SEAT
2	SEAT CARRIAGE
3	ROCKET CATAPULT
4	CARRIAGE LOAD ARRESTOR
5	ROCKET CATAPULT SMDC-GAS INITIATOR
6	VERTICAL SEAT POSTIONING ACTUATOR
7	CARRIAGE SEAT RETRACT THRUSTER
8	SEAT FORWARD/DOWN LIMIT SWITCHES
9	CARRIAGE PIN PULLER
10	HORIZONTAL SEAT POSITIONING ACTUATOR
11	SEAT ADJUST SWITCH

Figure 4-6. Ejection seat carriage/crew compartment components.

Carriage load arrestor

In figure 4-6, item 4, you can see the carriage load arrestors (fig. 4-7) that are mounted between the top of the seat carriage and the upper fuselage structure. The arrestors permit normal seat adjustment and function as shock absorbers during rapid retraction of the seat carriage prior to seat ejection. Under high load conditions, the arrestors lock and become rigid, preventing forward or backward seat carriage tilt.

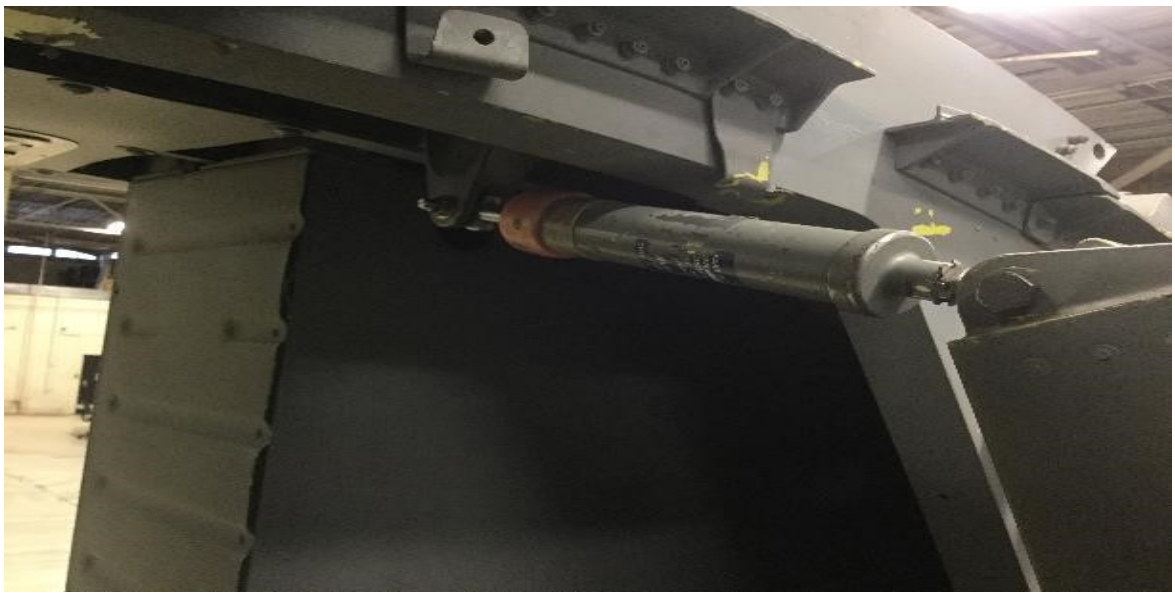


Figure 4-7. Carriage load arrestor.

Carriage pin puller

The cartridge-actuated carriage pin puller is installed on the lower seat carriage fitting and attaches the horizontal seat positioning actuator to the seat carriage. The pin cartridge produces the high pressure required to retract the retaining pin from the horizontal seat positioning actuator.

Carriage seat retract thruster

The seat retract thruster (fig. 4-8) is attached to the lower seat carriage fitting and aft seat track channels. The thruster input cartridge produces high-pressure gas that retracts the seat carriage to the full aft and locked position and fires the thruster output cartridge. The purpose of repositioning the seat with a thruster is to make sure that it is in the proper position to eject through the hatch opening once the hatch is jettisoned. After the seat is repositioned, the output cartridge continues the chain of events.

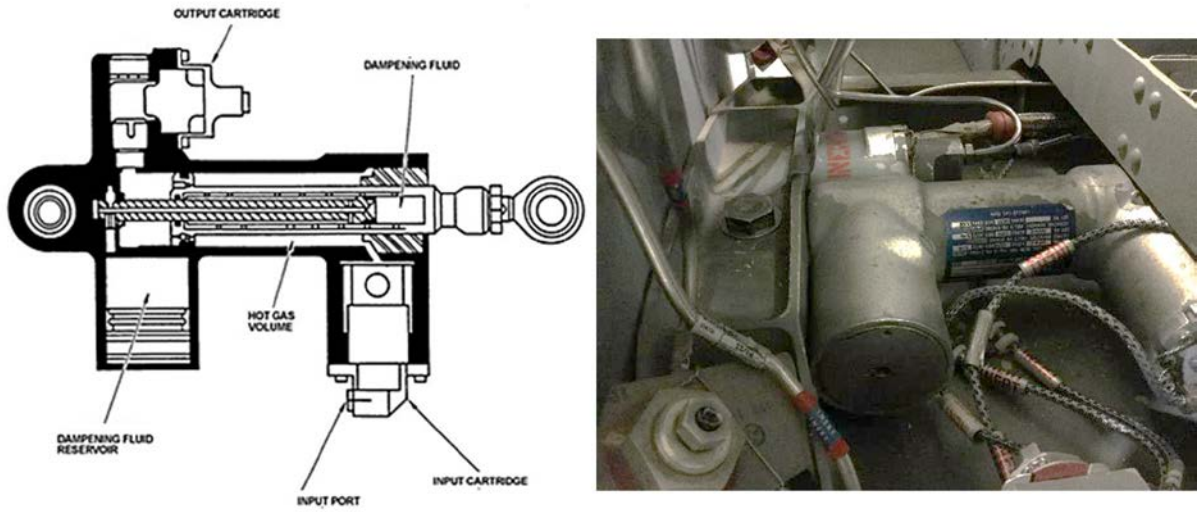


Figure 4-8. Carriage seat retract thruster.

Energy transfer lines

The B-1B escape system uses SMDCs and shock propagation cords (SPC) to route, transfer, or continue the high energy transfer system (ETS). The lines are ignited by booster tips.

Shielded mild detonating cord

An SMDC consists of a straight or preformed stainless steel tubing of varying lengths with an inner core. The inner core contains an explosive mix throughout its length. Each end of the SMDC has an externally threaded fitting (booster tip) for connecting to another component in the ETS. SMDC tubing has an aluminum foil identification plate bonded to a mobile sleeve around its external surface. Each end of the SMDC also has an aluminum foil end designation tag bonded to a mobile sleeve.

The SMDC is actuated by the detonating force of the ordnance device it is connected to. The blast destroys the booster tip, igniting the explosive mix contained in the booster tip. The burning explosive mix ignites the explosive mix contained in the core of the SMDC tubing. In turn, the burning explosive mix in the core of the SMDC tubing detonates the explosive mix contained in the output end of the SMDC. The blast destroys the output end booster tip, which detonates the ordnance device it is connected to. The detonation signal travels throughout the core of the SMDC at a rate of approximately 20,000 feet per second. The transfer line assembly remains intact during and after the operation.

Shock propagation cord

An SPC is similar to an SMDC except the outer covering is braided stainless steel and is installed for flexible ETS line applications. It also has a double-walled plastic core. The inner wall of the core is coated with a fine explosive mix. The functional operation of SPC is similar to SMDC except that the explosive mix clinging to the inner wall of the core causes a shock wave in the form of violent burning rather than a high explosive detonation. The shock front passes through the core of the SPC at a rate of approximately 5,000 feet per second.

SMDC-gas initiators

This system includes two SMDC-gas initiators per seat, the rocket catapult SMDC-gas initiator and the inertia reel SMDC-gas initiator. The rocket catapult SMDC-gas initiator (fig. 4-9) is located on the back of each seat carriage. It changes the SMDC detonation into high-pressure gas, which fires the rocket catapult. The inertia reel SMDC-gas initiators are mounted on the inboard side of each crew station side console and contain two input ports and a single output port. As the name suggests, they provide gas pressure to fire the inertia reel initiators.

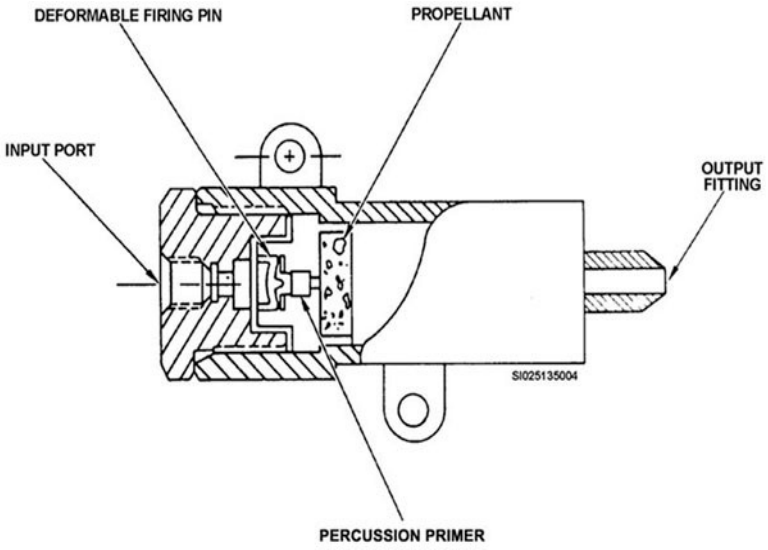


Figure 4-9. Rocket catapult SMDC-gas initiator.

Gas-SMDC initiators

The gas-SMDC initiators are mounted on the inboard side of each crew station side console. They are fired by high-pressure gas from the seat-mounted JAU–8/A25 initiators. This pressure shatters a shear pin holding a firing pin in place and then forces the firing pin against a percussion primer. This initiates an explosive charge that produces gas pressure that then initiates an SMDC booster tip.

Interrupters

The interrupters are located inside each crew station side console (fig. 4-10). The normally open interrupter is a device that mates with two in-line SMDC lines (ports 1 and 2), plus a third actuating line (port 3). Prior to actuation, the interrupter permits detonation signal transfer between the inline SMDC lines (ports 1 and 2). After actuation from the third SMDC line (port 3), the signal path between ports 1 and 2 is permanently blocked by a sliding interrupter element. The interrupter does not contain explosive materials, but operates from the output of the mating SMDC lines. Prior to initiation, a shear pin locks the slider in the open position, after initiation, the slider is positively locked in the closed position. The interrupters block SMDC detonation to the seat ejection components when the external hatch jettison initiators have been fired.

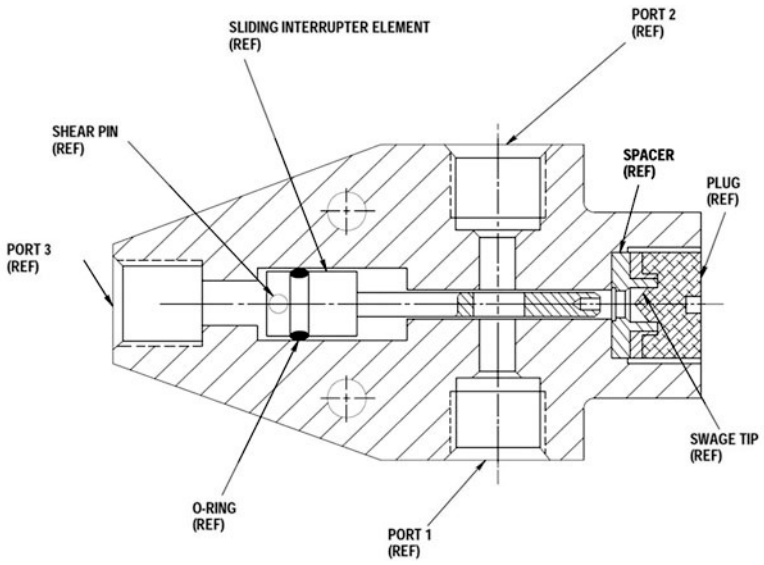


Figure 4-10. Interrupter.

One-way transfer initiators

The one-way transfer initiators, located throughout the ETS, are initiated by SMDC booster tips. The initiators permit SMDC line detonation in one direction only (similar to a check valve), and are used to stop or continue the ETS line detonation. The energy from the SMDC tip deforms a firing pin that fires a primer. The primer initiates the donor charge that triggers the receptor charge, which initiates the output SMDC transfer line tip. The pointed shape of the receptor charges prevents initiation at the output port from traveling in the reverse direction, which prevents the donor charge from initiating. The identification plate has an arrow to indicate the direction of the transfer.

Time delay initiators

The time delay initiators are mounted on ET panels near each ejection seat. An identification plate has an arrow that indicates the function direction of the device. The time delay assembly is actuated by a detonation within the input port. The force of the blast causes the integral bulkhead in the input port to deform, forcing a firing pin into a percussion primer. In turn, a small column of delay fuse is ignited and burns for a predetermined delay time (0.30, 0.50, 0.70, 1.00, 2.40, or 3.20 seconds). Immediately following the delay, the burning column of delay fuse ignites and detonates an explosive booster in the outlet port of the unit.

AND gates

The AND gates, mounted on panels near each ejection seat, are mechanical logic elements in the ETS (fig. 4-11). Each AND gate must receive two inputs before one output can take place. The two inputs do not have to be received in any specific order. The AND gate has two input ports and one output port. A shuttle assembly and a plunger assembly are contained within the aluminum housing. The shuttle assembly consists of two percussion primers, two firing pins, the output charge, and a keeper. The plunger is an interference fit in the holder. Three types of AND gates are used (Type I, II, and III), and they differ only in the port thread sizes.

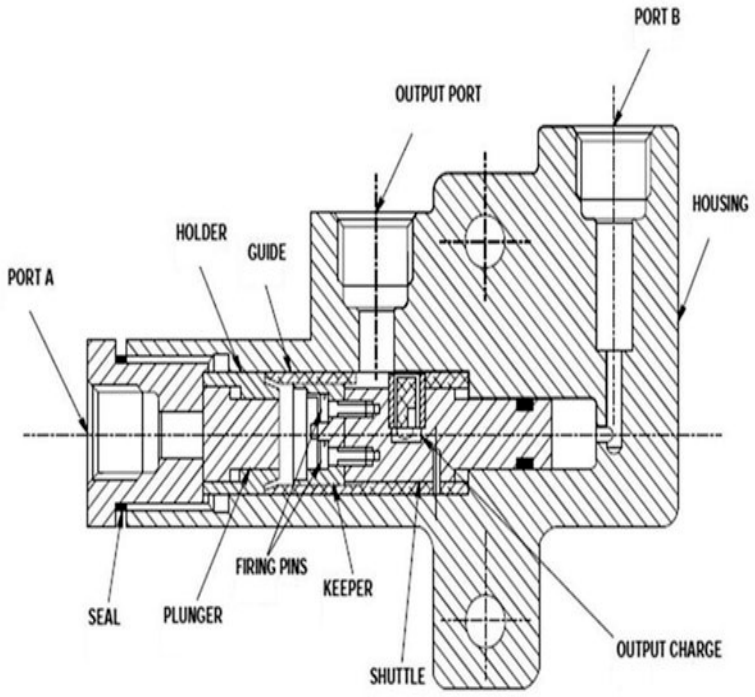


Figure 4-11. AND gate.

When port A receives an explosive input, the plunger is actuated toward port B within the holder and is retained in the actuated position. If port B subsequently receives an input signal, the shuttle rapidly actuates toward port A, aligning the output charge with the output port. Actuation of the shuttle causes the firing pins to impact the previously actuated plunger causing the percussion primer of the output charge to fire. If port B receives the first input signal, the shuttle actuates and aligns the output charge with the output port. The shuttle is locked in the actuated position by the action of the keeper (deformable) flaring into the space between the holder and guide. When port A subsequently receives an input signal, the plunger actuates to impact the firing pins, thus firing the percussion primer of the output charge. The AND gate will function normally if both input signals are received simultaneously.

Worktable stowage thrusters

The worktable stowage thrusters are located behind the DSO and OSO instrument panels, outboard of the worktables (fig. 4-12). The thrusters produce high-pressure gas that drives the work tables to the stowed position during seat ejection. Thruster operation begins with the detonation of either one or both of the dual initiation ports on the cartridge assembly. The shock provided by the ETS line creates gas within the cartridge. The gas pressurizes the oil between the gas piston and the oil piston and provides thrust through the piston to the worktable. As the pressure increases, the oil flows through an orifice and dampens the motion of the actuator. The thruster is designed to provide a dampened stroke of 1.94 inches.

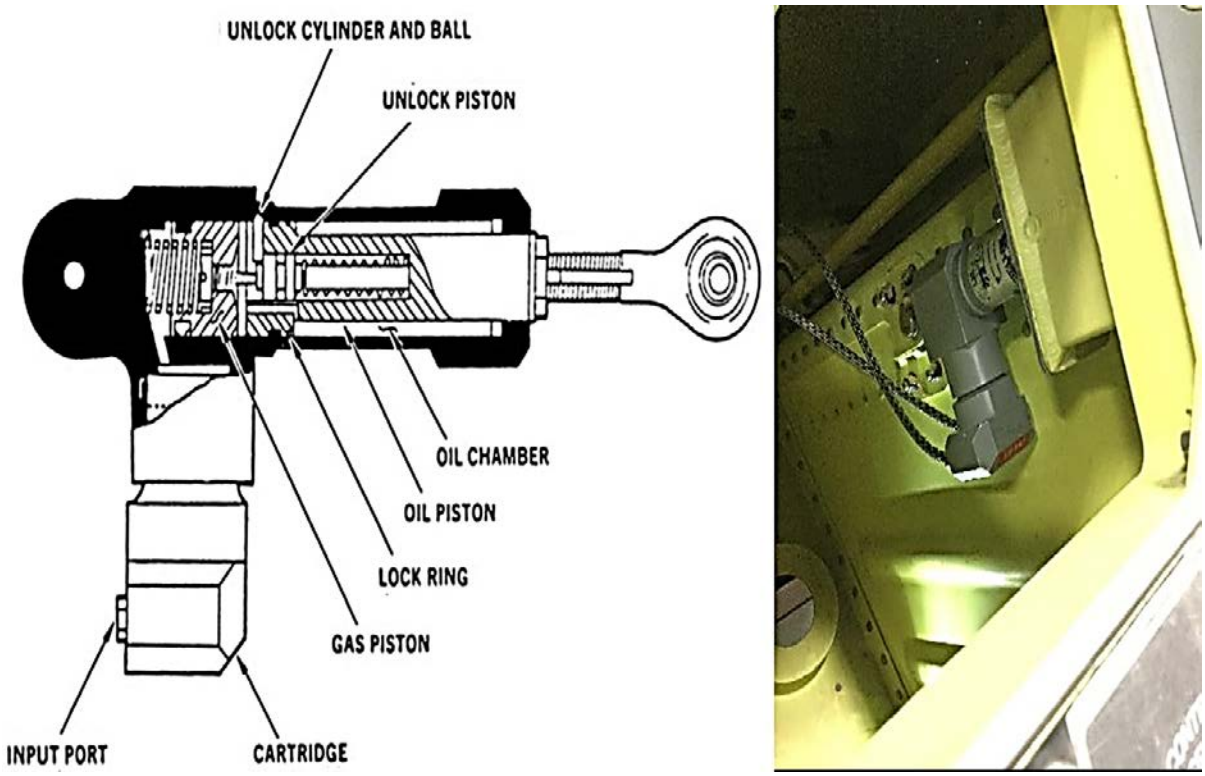


Figure 4-12. Worktable stowage thruster.

Eject mode selectors

The mode selector, mounted on each crew station side console, is a cylindrically shaped explosive detonation switching device that consists of an aluminum housing with internal components (fig. 4-13). The projecting bottom part of the housing confines a piston and a coil-type compression spring. The spring positions the device in the AUTO position in the event that it is inadvertently positioned between AUTO (automatic) and MAN (manual). Two guide shafts extend through the housing and are positioned in a machined part of the piston. A cam follower shaft extends through the upper end of the piston and both ends of the cam follower shaft fit into a roller. The large-diameter part of the camshaft contacts the cam follower rollers, and the smaller diameter part of the camshaft is contained in a thrust bearing. A support plate is positioned between the explosive transfer assembly and the housing to which it is secured. A stop pin extending from the bottom side of the support plate limits the rotation of the camshaft. The eccentric is offset from the camshaft and attached to it by a link. A closure cap is secured to the housing and closes out the assembly.

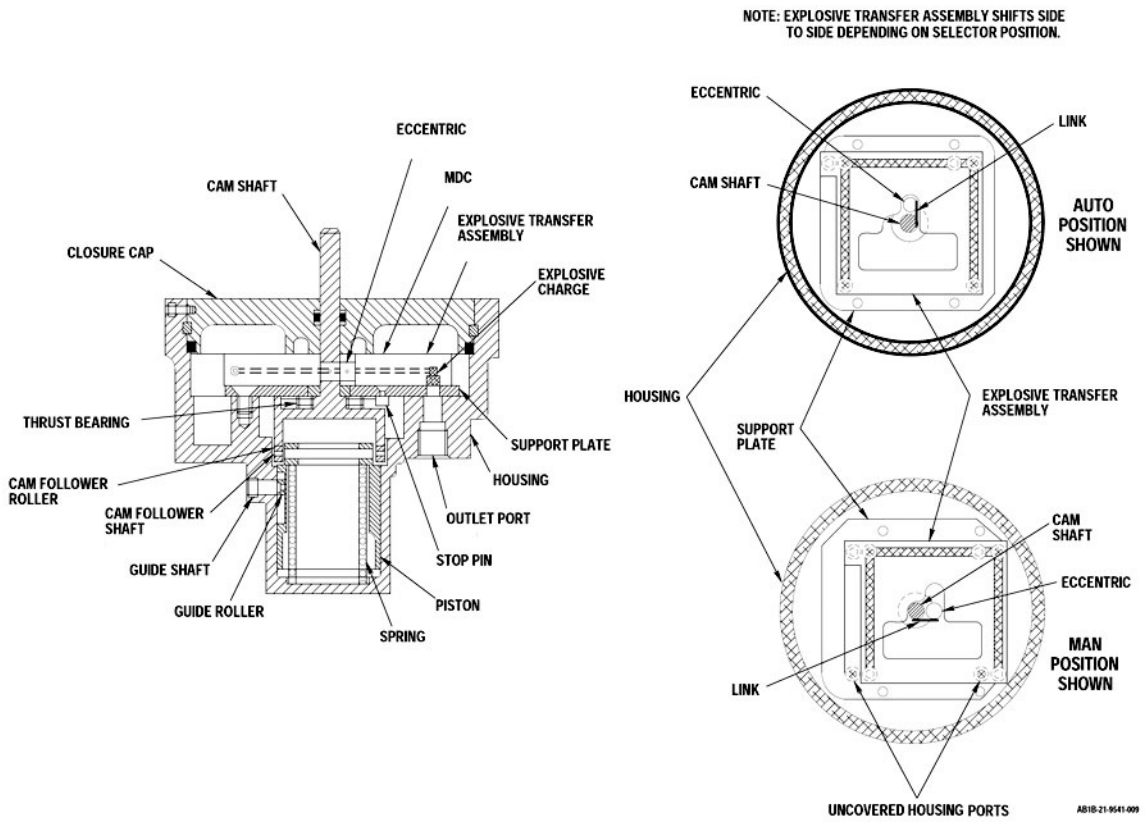


Figure 4-13. Eject mode selector.

The explosive transfer assembly is only allowed side-to-side movement. This movement allows the ET assembly ports to cover all four ports in the housing, or cover only two ports in the housing. When in MAN mode, only two housing ports are aligned with the ET assembly ports so that detonation at these ports does not propagate through to the other two housing ports, preventing an AUTO ejection. When the selector is positioned in the AUTO mode, the ET assembly is aligned with all four housing ports. Explosive inputs will then detonate the explosive material in the device and produce an output through the other ports.

022. Theory of operation

The crew escape system provides the capability for ejecting the crew members either sequentially (automatic) or individually (manual). The system incorporates four ACES II ejection seats for the pilot, copilot, OSO, and DSO.

The ejection seats are lightweight, upward ejecting, and rocket stabilized. Recovery sequencers provide the seats with three different recovery modes—each dependent on airspeed and altitude at the time of ejection. Each seat has a survival kit, a parachute, and an emergency oxygen bottle. Restraint harnesses are also provided to protect the crew members from injury when encountering in-flight turbulence, as well as during ejection and crash landing.

The egress system contains explosive components that can be fired either mechanically, by gas pressure, by SMDC, or by SPC. SMDC and SPC lines are the primary means by which a detonation signal is routed to individual system components. Detonation signals are also initiated by gas pressure from gas-generating devices, and by mechanical initiators that use a spring-loaded sear to strike an explosive primer.

Eject mode selectors at each crew station allow the individual crew members to select either MAN or AUTO mode of ejection. When all four eject mode selectors are in the AUTO mode, all seats are

automatically ejected when either forward crew member initiates the ejection sequence. If either of the two aft mode selectors is in the MAN position, that seat occupant must initiate an individual ejection. The OSO and DSO seat occupants cannot eject any other seat, regardless of the applicable mode selector's setting. The forward crew member seats will not initiate an automatic ejection unless the initiating position's mode selector is in AUTO.

Automatic ejection sequence

A complete automatic (i.e., all mode selectors are in AUTO) ejection sequence is started when either the pilot or copilot pulls the seat ejection control handles, which fires the seat-mounted JAU–8/A25 initiators. Gas pressure from the seat-mounted initiators is routed through ballistic hoses to fire the gas-SMDC initiators, which start the ETS SMDC detonation.

The interrupter blocks the SMDC detonation if the interrupter has been actuated via an SMDC input from an external hatch jettison initiator. If the interrupter has not been actuated, the SMDC detonation will pass through the interrupter where it routes to the opposite forward seat position and both aft seat positions. The seat sequencing (SS) AND gate will receive the first of two required inputs. The SMDC signals will fire the SMDC-gas initiators to provide gas pressure to the inertia reel initiators and provide the first of the two required energy transfer AND gate inputs. The signal will switch from SMDC lines to SPC lines in order to detonate the carriage pin pullers and seat retraction thrusters. *For the aft seats only*, the SPC lines fire the worktable stowage thrusters.

The signal from the interrupter also travels via SMDC lines to one-way transfer initiators and then to the central equipment bay (CEB) hatch pin puller (fig 4-14). The SMDC line also detonates the cabin decompression sensors and the 3.2-second time delay initiators. When the cabin decompression sensors or 3.2-second time delay initiators detonate the output SMDC lines, the ET AND gates receive the second input and immediately detonate the ET AND gate output SMDC lines. The output detonation signal is used to initiate the 0.7, 1.0, 1.6, and 2.4-second time delay initiators. That same ET AND gate output signal also changes from SMDC lines to SPC lines before detonating the forward hatch linear shaped charges and the forward and aft hatch removers. The forward and aft hatches are all jettisoned simultaneously. The cabin decompression sensor or 3.2-second time delay output SMDC signal also provides the second of two SS AND gate inputs. The SS AND gate then immediately outputs a signal via an SMDC line to initiate the 0.3-second time delay initiators.

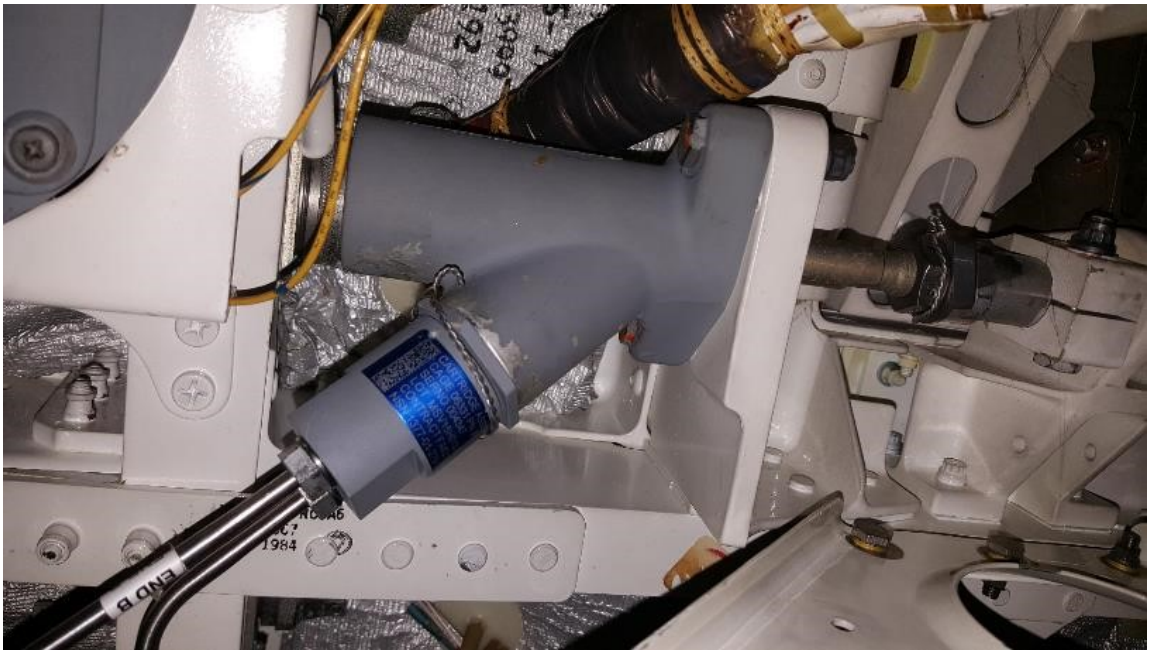


Figure 4-14. Central equipment bay (CEB) hatch pin puller.

The carriage retract thrusters pull the carriages to the full aft position, positioning the seats for ejection. The hatch removers jettison the hatches. The carriage retract thruster and hatch remover output cartridges detonate SMDC and/or SPC lines to provide both required inputs for each seat ejection sequencing (SES) AND gate. The SES AND gate outputs then provide the first of two inputs to the seat ejection (SE) AND gates. The SS AND gate output detonates an SMDC line to fire the 0.3-second time delay initiators that, in turn, detonate SMDC lines to fire the 0.5-second time delay initiator and a one-way transfer initiator. The one-way transfer initiator output then provides the second input to the OSO SE AND gates, which immediately output a signal via SPC and SMDC to the SMDC-gas initiator to fire the OSO rocket catapult.

The 0.5-second time delay initiators detonate SMDC lines to initiate the additional 0.5-second time delay initiators and also fires the one-way transfer initiators for the DSO seat. The output from the one-way transfer provides the second input to the DSO SE AND gates that will provide the output via SPC and SMDC to the SMDC-gas initiator to fire the DSO rocket catapult.

The 0.5-second time delay initiators detonate SMDC lines to fire the one-way transfer initiators leading to the copilot seat. The output from the one-way transfer provides the second input to the copilot SE AND gates that will provide the output via SPC and SMDC to the SMDC-gas initiator to fire the copilot's rocket catapult.

The 0.5-second time delay initiators detonate SMDC to initiate the pilot 0.7-second time delay initiators which provide SMDC line detonation for the second input to the pilot SE AND gates that will provide the output via SPC and SMDC to the SMDC-gas initiator to fire the pilot's rocket catapult.

The 1.6, 2.4, 1.0, and 0.7-second time delay initiators are used when the applicable mode selector is placed in the MAN mode of ejection. When a manual ejection is performed, these time delay initiators detonate SMDC to provide the second input to the seat SE AND gates. The SE AND gate output is via SPC and SMDC to the SMDC-gas initiator to fire the seat rocket catapult.

Seat sequence

We've discussed what's happening inside the cockpit, now let's look at the sequence of events for the seats.

Crew member actuation of the seat-mounted ejection control handles fires the seat-mounted JAU–8/A25 initiators. These initiators provide ballistic gas pressure to the gas-SMDC initiators that provide input to the ETS.

The ETS provides input to the ACES II using an SMDC-gas initiator. This initiator provides the gas pressure required to fire the inertia reel initiator. The inertia reel initiator provides gas pressure to activate the inertia reel. The activated inertia reel retracts the inertia reel straps and draws the crew member securely against the seat regardless of the inertia reel control handle position. The inertia reel control handle is set by the crew member and is used to lock the inertia reel to prevent the inertia reel straps from extending. The straps may still be retracted into the inertia reel.

As the rocket catapult pushes the seat up the seat carriage guide rails, the pitot tubes, located on each side of the seat headrest, are exposed to the air stream. These pitot tubes provide the dynamic pressure inputs to the environmental and velocity sensors (the velocity sensors are used on the aft seats only). The environmental sensors also contain a static pressure sensing port.

These sensors determine if the velocity and altitude thresholds used by the recovery sequencer have been met so that the recovery sequencer timing and logic circuits can determine which mode the ejection will be (mode 1, mode 2, or mode 3). The environmental sensors are connected to the recovery sequencer using cable P1, and the velocity sensors are connected to the recovery sequencer using cable P10. The aft recovery sequencers use the velocity sensor input to inhibit the yaw divergence rockets when air speed exceeds 370 plus or minus (±) 10 knots.

Each seat contains an emergency manual chute handle located on the right side. When the handle is pulled, the emergency power supply is actuated. This power supply provides the electrical power required to fire the secondary mortar cartridge and consequently launch the recovery parachute assembly away from the seat. The emergency manual chute handle is also connected to the restraint release bellcrank via a cable. When the emergency manual chute handle is pulled, the bellcrank rotates to withdraw locking pins from the mortar disconnect assembly and the restraints. The emergency power supply is connected to the secondary mortar cartridge using P11.

An emergency oxygen bottle is located on the inboard side of each seat. As the seat moves up the guide rails, the emergency oxygen system is automatically actuated by a lanyard that is anchored to the aircraft floor. The lanyard stretches taut until it separates the aircraft-half oxygen quick disconnect from the mating seat-half oxygen quick disconnect. When this occurs, the crew member receives oxygen from the seat-mounted bottle instead of the aircraft oxygen system. Pulling the seat-mounted emergency oxygen ring can also activate the emergency oxygen system.

The survival kit is located in the seat pan. A control lever, located on the front of the seat, is used to select either manual or automatic survival kit deployment. The survival kit contains a radio beacon that is set to manual or automatic depending on the switch position. The radio beacon switch is located on the front of the seat pan.

The crew member intercom is connected to the aircraft via an intercom quick disconnect located under the seat. This disconnect is separated on ejection by a lanyard attached to the airframe.

The ETS provides input to the rocket catapult SMDC-gas initiators located on the seat carriage. These initiators provide the gas pressure necessary to fire the rocket catapult. The rocket catapult upper end is connected to the ACES II seat and propels the seat up the seat carriage guide rails. High-pressure gas is ported from the catapult chamber to the recovery sequencer where it initiates the two recovery sequencer thermal batteries.

As the seat travels up the guide rails, the slack in the arm and leg restraints is pulled through the snubbers. Shear links secure the straps to the seat carriage. These restraints hold the crew member’s limbs against the seat and within the seat escape envelope. When the force on the shear links exceeds 800 pounds, the shear links break and allow the tethered straps to separate from the aircraft. Snubbers hold the restraints taut until seat-crew member separation occurs.

A lanyard is connected between the seat carriage and the arm restraint strap cutter. When the lanyard is pulled taut due to the seat moving up the rails, a firing pin strikes a two-second time delay initiator. At the end of the time delay, the right arm restraint strap is severed. This allows the crew member freedom to pull the emergency manual chute handle and/or manual emergency oxygen ring, if needed.

The rail-mounted sequence start striker actuates the seat-mounted sequence start switch when the seat reaches the top of the seat carriage rails. This causes the initiation of the recovery sequencer timing circuit. Removing the seat for maintenance will not start the timing sequence because there is no power provided to the switch from the recovery sequencer thermal batteries. The switch is connected to the recovery sequencer through an electrical receptacle and cable P8.

The recovery sequencer timing circuit provides electrical signals to fire the pitch stabilization control assembly (using cable P2) and the other seat devices. The timing of all the other devices is dependent on the ejection mode.

Depending on the determined ejection mode, the recovery sequencer will provide the electrical signal to fire the primary mortar cartridge (P4), the restraint release thruster (P7), the roll divergence rocket or yaw divergence rocket (P9), the drogue gun (P3), the left drogue chute severance cutter (P5), and the right drogue chute severance cutter (P6).

The primary mortar cartridge fires to provide ballistic pressure to launch the recovery parachute assembly away from the seat. A lanyard attached to the seat structure pulls a pin from the top of the parachute assembly to release the spring-loaded pilot chute.

The restraint release thruster is fired to rotate the restraint release bellcrank assembly. This bellcrank pulls the locking pins to release the inertia reel straps, lap belt and arm restraints, seat pan latch, and releases the leg restraints. The bellcrank pulls a pin to unlock the recovery parachute assembly from the recovery parachute deployment mortar.

In mode 2 and mode 3 operation, the drogue gun fires to deploy the drogue chute assembly. The drogue chute provides stabilization and deceleration under high-speed conditions and during descent from high altitudes. The recovery sequencer fires the left and right drogue chute severance cutters to release the drogue chute from the seat.

B1 operational differences

The B-1B modes of operation differ slightly from the other ACES II modes of operation, so we'll discuss them here.

Mode 1 operation

Mode 1 operation is selected for speeds from 0 KEAS to less than 250 KEAS, and up to 15,000 feet. The recovery parachute mortar is initiated 0.073 seconds after ignition of the rocket catapult. The mortar launches the parachute assembly away from the seat. The parachute assembly consists of the pilot chute and the attached recovery parachute canister containing the recovery parachute. After a 1.15-second delay, the reefing line cutters are activated and the recovery parachute is allowed to fully inflate. Even though the drogue chute is not deployed during mode 1 operation, the drogue severance cutters are sequenced to fire 0.15 seconds after the recovery parachute mortar is fired.

The harness release thruster is fired 0.25 seconds after recovery parachute mortar firing. When the harness release thruster is fired, it rotates a bellcrank assembly which pulls the locking pins to release the inertia reel straps, leg restraints, lap belt, and arm restraints (connected to the lap belt). The bellcrank also retracts the pilot chute cable to trigger a spring ejection of the pilot chute. At the same time, a cable attached to the bellcrank unlocks and frees the parachute inner mortar barrel tube from the housing in case of mortar cartridge malfunction.

The inflated pilot chute aids in separating the container assembly from the recovery parachute. As the recovery parachute inflates to a reefed configuration, the crew member and survival kit are separated from the seat. After a 1.15-second delay, the reefing line cutters are actuated to allow the recovery parachute to inflate fully.

If automatic survival kit deployment was preselected, the kit will open approximately four seconds after seat-crew member separation allowing the life raft, sleeping bag, and rucksack to be deployed.

Mode 2 operation

Mode 2 operation is selected for speeds from 250 to 640 KEAS at sea level and for altitudes up to 15,000 feet. During mode 2 operation, a signal from the recovery sequencer fires the drogue gun 0.023 seconds after rocket catapult ignition. The drogue gun fires a slug, which unlocks the drogue chute door and deploys the extraction chute. The extraction chute, in turn, deploys the drogue chute. The drogue chute provides stabilization and deceleration under high speed conditions and during descent from high altitudes.

Another signal from the recovery sequencer fires the recovery parachute mortar one second after drogue gun deployment of the drogue chute.

The drogue severance cutters are fired 0.15 second after the recovery parachute is deployed. The drogue chute bridles are severed by the cutters, releasing the drogue chute. Recovery parachute deployment and seat-crew member separation occur as described under mode 1 operation.

Mode 3 operation

Mode 3 operation is selected for speed and altitude exceeding the mode 1 and mode 2 operation envelopes. The sequence of events during mode 3 operation is the same as those during mode 2 operation, except that after the drogue chute is deployed, operation of the recovery sequencer is interrupted until the speed and altitude of the ejected seat is within the mode 2 envelope.

Se lf-Test Questions

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

021. Major components

1. Match the B-1B escape system component listed in column A with its description in column B by writing the correct letter in the blank space provided. Descriptions in column B may only be used once.

Column A

____ (1) Velocity sensor.
____ (2) Yaw divergence rocket.
____ (3) Restraint system.
____ (4) Arm restraints.
____ (5) Leg restraints.
____ (6) Rocket catapult.
____ (7) Ejection seat carriage.
____ (8) Horizontal seat positioning actuator.
____ (9) Carriage load arrestors.
____ (10) Carriage pin puller.
____ (11) Carriage seat retract thruster.
____ (12) SMDC.
____ (13) SPC.
____ (14) SMDC-gas initiators.
____ (15) Gas-SMDC initiators.
____ (16) Interrupter.
____ (17) One-way transfer initiators.
____ (18) Time delay initiators.
____ (19) AND gates.
____ (20) Worktable stowage thrusters.
____ (21) Eject mode selectors.

Column B

a. Installed for flexible ET applications.
b. Consists of garter assembly.
c. Ensures proper positioning of seat for ejection.
d. Provides forward and aft movement.
e. Cylindrically shaped explosive detonation switching device.
f. Contains a small column of delay fuse.
g. Includes lap belts and parachute risers.
h. Mounted on inboard side of each crew station console.
i. Inhibits yaw divergence rocket operation.
j. Lock and become rigid under high load conditions.
k. Operates from output of mating SMDC lines.
l. Acts as guide rails for seats during seat ejection.
m. Fires rocket catapults and inertia reel initiators.
n. Drive work tables to stowed positions during ejection.
o. Detonation signal travels through it at 20,000 feet per second.
p. Permit SMDC line detonation in one direction only.
q. Receive two inputs before one output can take place.
r. Attaches horizontal seat positioning actuator to seat carriage.
s. Consists of net assembly stowed in vertical channel.
t. Directs seats to opposite sides of ejection path.
u. Fires for catapult and sustainer phases.

2. What position does the eject mode selector spring to if it is inadvertently positioned between AUTO and MAN?

3. When the eject mode selector is set to MAN, how does the selector design ensure that detonation does not propagate through housing ports to initiate an AUTO ejection?

022. Theory of operation

1. What seat occupants cannot eject any other seat, regardless of the setting of the applicable mode selector?

2. How are the seats prevented from ejecting after external hatch jettison?

3. What provides the second of two SS AND gate inputs so that it can fire the 0.3-second time delay initiators?

4. How does the ETS provide input to the ACES II?

5. How do the leg and arm restraints separate from the aircraft during an ejection?

6. What P-lead fires the roll divergence rocket or yaw divergence rocket?

7. How are the leg restraints released from the seat during seat-crew member separation?

4–2. Hatch Jettison System

Now that we've learned the escape system, let's delve into the B-1B hatch system.

023. Major components

Before we discuss the crew ejection hatch system, let's go over some major components. The system is comprised of following:

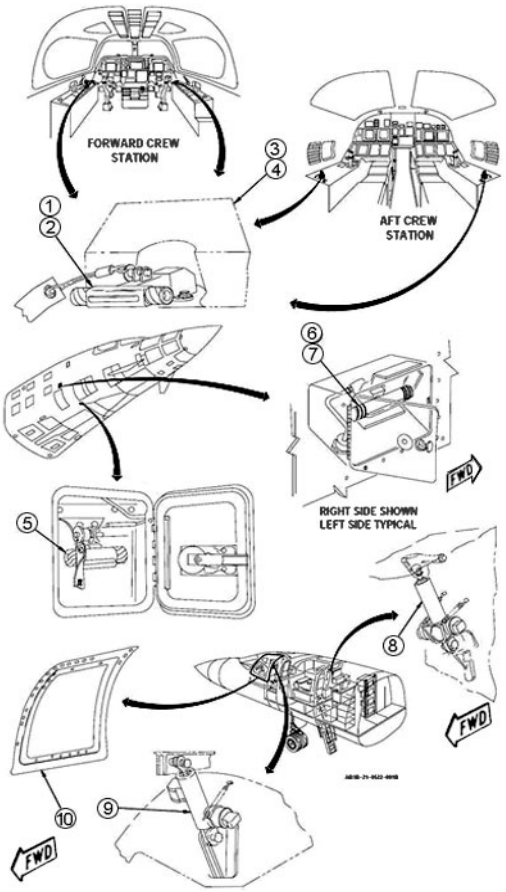
- Hatch jettison initiators.
- Forward and aft hatch removers.
- Forward hatch severance charges.
- Escape hatches.

Figure 4–15 shows the locations of hatch components.

Internal hatch jettison initiators

Internal hatch jettison initiators, mounted on the side consoles of each crew station, provide for individual hatch jettison without seat ejection. The hatch jettison initiator mechanically fires the internal percussion primer to detonate SMDC and SPC to the applicable hatch severance linear shaped charges (forward hatches only) and the forward and aft hatch remover input cartridges. Gas pressure from the forward and aft input cartridges unlatch (aft hatches only) and jettison the hatches

and fire the remover output cartridges. Firing a hatch jettison initiator will only jettison that specific hatch and will allow the applicable ejection seat to be ejected.



INDEX	NOMENCLATURE
①	EGRESS HATCH JETTISON INITIATOR
②	EGRESS HATCH JETTISON INITIATOR
③	EGRESS HATCH JETTISON INITIATOR
④	EGRESS HATCH JETTISON INITIATOR
⑤	MASTER EXTERNAL HATCH JETTISON (MASTER)
⑥	EXTERNAL HATCH JETTISON INITIATOR (LEFT)
⑦	EXTERNAL HATCH JETTISON INITIATOR (RIGHT)
⑧	AFT HATCH REMOVER
⑨	FORWARD HATCH REMOVER
⑩	FORWARD HATCH SEVERANCE LINEAR SHAPED CHARGE

Figure 4-15. B-1B hatch component locations.

There is a left external hatch jettison initiator, via ETS lines, that will jettison both the forward hatch and aft hatch on the left side of the aircraft. Likewise, the right external hatch jettison initiator will jettison the forward hatch and aft hatch on the right side of the aircraft. There is also a master external hatch jettison handle near the nose landing gear that will jettison all four hatches when it is pulled.

Forward and aft hatch removers

The forward hatch remover is a ballistically actuated remover that jettisons the forward hatch (fig. 4-16). The forward hatch removers are mounted through rod end fittings to a fitting on the hatch and a fitting on the aircraft structural frame. After severance of the forward hatch retainer plates by the linear charge assembly, the remover exerts a force on the hatch to enable jettison. The gas pressure internal to the device increases until there is enough force to shear the screw holding the inner thrust piston tube to the outer housing allowing the telescoping tubes of the remover to separate and the ballistic gases to vent. At mid-stroke, ballistic gases are ported internally to fire the explosive output initiator to signal the sequencing system that hatch jettison is occurring. After jettison, the inner thrust piston tube is connected to the jettisoned hatch, and the outer housing is connected to the aircraft structure.

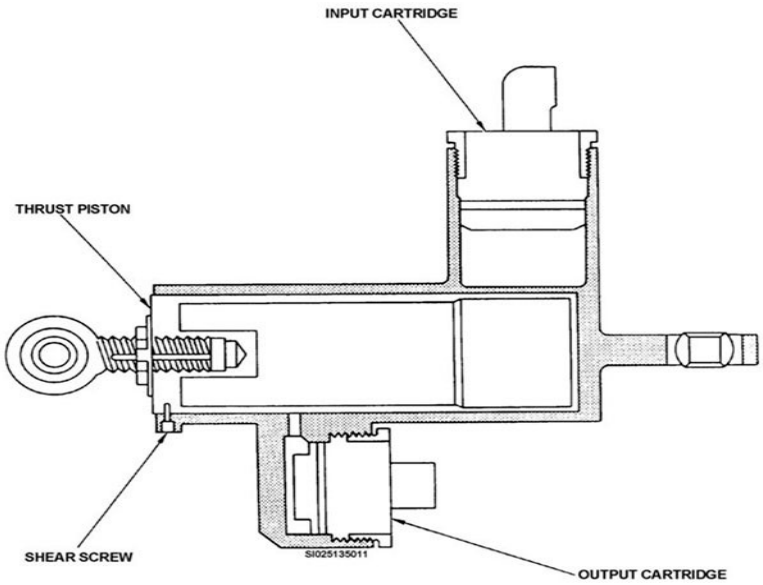


Figure 4-16. Forward hatch remover.

The aft hatch remover is a ballistically actuated remover that jettisons the aft hatch (fig. 4-17). It is mounted through rod end fittings to an idler link on the aft hatch and to a fitting on the aircraft structure. The remover contains an internal lock so that it can function as a strut to resist externally applied axial loads. The remover and idler link, acting as a linkage, permit the aft hatch to be unlatched and opened. During jettison, initial high-pressure gas from the ballistic cartridge unlocks the unit and causes the remover to stroke. The initial portion of the stroke produces a low-level thrust that is sufficient to operate the aft hatch latching mechanism. The remover then applies full thrust to the hatch to enable jettison. At mid-stroke, ballistic gases are ported internally to fire the explosive output initiator to signal the sequencing system that hatch jettisoning is occurring. At hatch release, the telescoping tubes of the stroking remover separate and the ballistic gases vent. After jettison, the outer tube remains attached to the hatch and the hatch idler arm while the inner tube and housing remain with the aircraft.

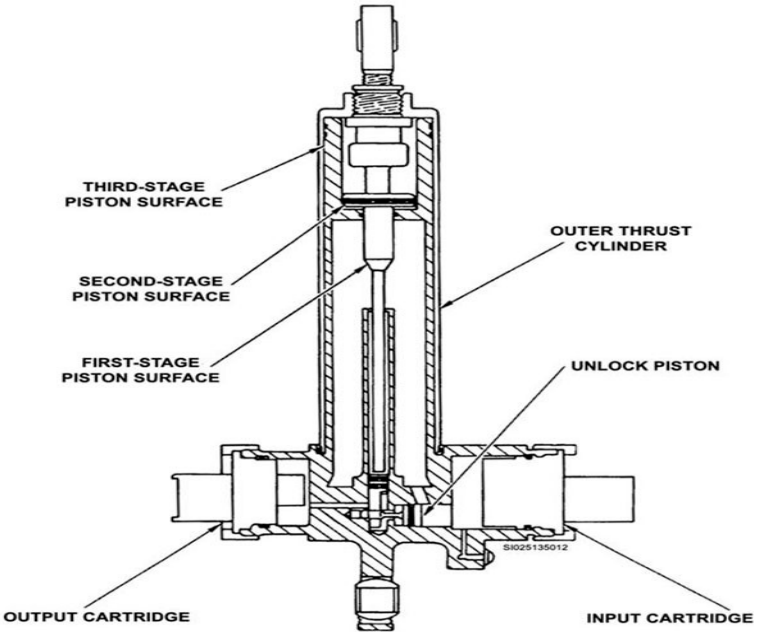


Figure 4-17. Aft hatch remover.

Forward hatch severance charges

The linear shaped charge (LSC) is installed between the forward escape hatches and the aircraft structure and retainer plates (fig. 4-18). The LSC consists of an explosive core contained in a V-shaped silver sheath and a fiberglass holder. When detonated by the SPC booster tips, the LSC "V" shape produces a shock wave that projects a portion of the silver sheath at hypersonic velocity against the retainer plates to sever the structural retainer plates and permit the hatches to be jettisoned.

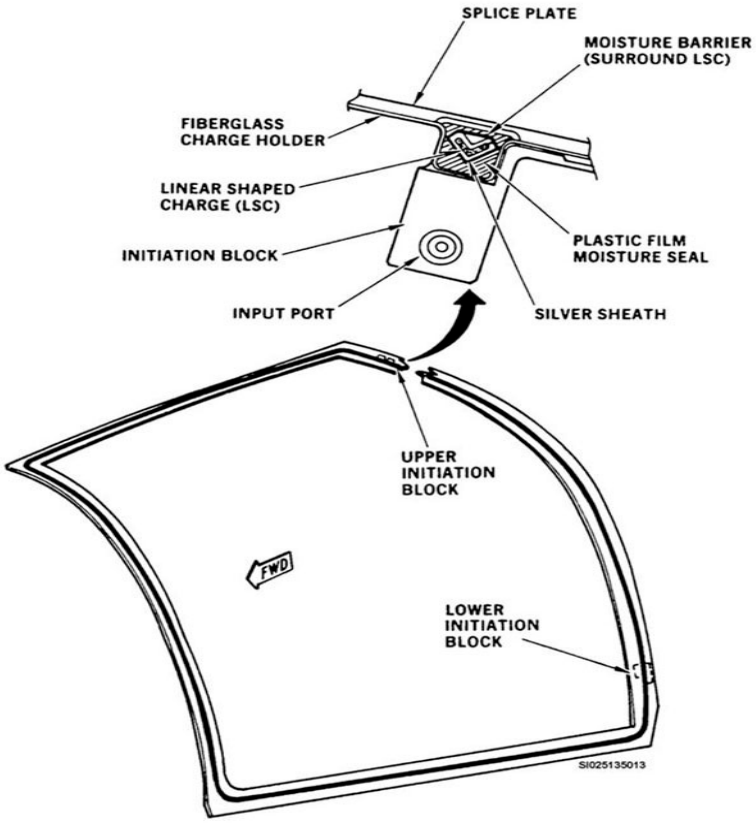


Figure 4-18. Linear shaped charge.

Escape hatches

The hatches themselves are jettisoned during the ejection sequence by the escape hatch jettison initiators, or they can be jettisoned on the ground by the external hatch jettison initiators. The hatches serve a dual purpose—they provide an opening for seat ejection as well as a means of entry or exit after ditching or crash landing. The forward escape hatches cannot be manually opened for ground operations. The DSO and OSO hatches (which are the aft hatches) can be manually opened for ground ventilation.

024. Theory of operation

The following are the three modes of operation for hatch jettison:

- Emergency ground entry.
- Individual hatch jettison.
- During ejection.

Emergency ground entry

Three external hatch jettison initiators mounted behind quick-opening access panels provide for emergency ground rescue entry. The master external hatch jettison initiator detonates SMDC to the one-way transfer initiators. Detonation of the one-way transfer initiators continues the SMDC

detonation to the interrupters, forward hatch severance LSC, and all four hatch remover input cartridges, jettisoning the hatches and firing the remover output cartridges. However, after a hatch jettisons, the interrupters render the seats safe, preventing them from ejecting due to initiation by the seat ejection control handles.

The left and right external hatch jettison initiators jettison the left side and right side hatches, respectively. SMDC from the hatch jettison initiators fire the interrupters to render the seats safe, preventing them from ejecting due to initiation by the seat ejection control handles. The respective hatch jettison initiator detonates SMDC to the one-way transfer initiators within the left or right hatch jettison system. The master hatch jettison one-way transfer initiators block SMDC detonation to the opposite side hatch jettison system (left or right). Detonation of the respective side one-way transfer initiators and SMDC and SPC detonate the forward hatch severance LSC and forward and aft hatch remover input cartridges. Detonation of the forward hatch LSC and hatch remover input cartridge severs the hatch/fuselage retainer plates, jettisons the hatch, and fires the remover output cartridge. Gas pressure from the aft hatch remover input cartridge unlatches and jettisons the hatch, and fires the hatch remover output cartridge.

Individual hatch jettison

Hatch jettison initiators mounted on the side consoles of each crew station provide for individual hatch jettison without seat ejection. The hatch jettison initiator mechanically fires the internal percussion primer to detonate SMDC and SPC to the applicable hatch severance LSC (forward hatches only) and the forward and aft hatch remover input cartridges. Gas pressure from the forward and aft input cartridges unlatch (aft hatches only) and jettison the hatches and fire the remover output cartridges. The ejection seats can still be ejected after using the side console mounted hatch jettison initiators to jettison the hatches.

During ejection

Escape hatch jettison during an ejection sequence is initiated by the ETS. Actuation of the seat ejection control handles fires the seat-mounted initiators causing ballistic gas pressure to fire the gas-SMDC initiator, detonating the SMDC to the one-way transfer initiators, and CEB hatch pin puller cartridge. SMDC detonation also arms the ET AND gates and cabin decompression sensors, and initiates the 3.2-second time delay initiators. SMDC detonation temporarily stops at the ET AND gates, cabin decompression sensors, and 3.2-second time delay initiators.

Detonation of the CEB hatch pin puller cartridge retracts the CEB hatch retaining pin, unlatching the hatch and removing cabin pressure. When the air pressure differential (0.8–1.2 pounds per square inch differential [psid]) is attained, the cabin decompression sensor output detonates the SMDC to the ET AND gates, completing the ET AND gate input requirements.

If the cabin decompression sensor pressure differential is not met, the 3.2-second time delay initiators detonate the SMDC to the ET AND gates, completing the ET AND gate input requirements.

The ET AND gates detonate the SMDC and SPC to the forward hatch severance system, the forward and aft hatch remover input cartridges, and SS time delay initiators. SPC detonation is used to fire the forward hatch severance system that uses LSC to cut the forward hatch retainers. SPC detonation also provides input to fire the forward hatch remover input cartridges that provide gas pressure to forcibly push the forward hatches away from the aircraft. Gas pressure from the aft hatch remover input cartridges provides the pressure to extend the aft hatch remover outer housing. This extension rotates internal mechanisms inside the aft hatch that unlatches the aft hatch forward hooks and side bayonets. The hatch remover output cartridges are fired, and SMDC detonates the SES AND gates. The aft hatch remover continues to extend outward and forcibly push the aft hatch away from the aircraft.

Self-Test Questions

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

023. Major components

1. Match the B-1B hatch jettison system component listed in column A with its description in column B by writing the correct letter in the blank space provided. Descriptions in column B may be used once.

Column A

___(1) Internal hatch jettison initiators.
___(2) Left external hatch jettison initiator.
___(3) Right external hatch jettison initiator.
___(4) Master external hatch jettison initiator.
___(5) Forward hatch remover.
___(6) Aft hatch remover.
___(7) LSC.
___(8) Forward hatches.
___(9) Aft hatches.

Column B

a. Jettisons both forward and aft hatches on the left side.
b. Mounted through rod end fittings to a fitting on the hatch.
c. Cannot be opened manually.
d. Mounted through rod end fittings to idler link on the hatch.
e. Mounted on side consoles of each crew station.
f. Jettisons all four hatches.
g. Severs structural retainer plates to jettison forward hatches.
h. May be opened manually.
i. Jettisons both forward and aft hatches on the right side.

2. During aft hatch jettison, how is the sequencing system signaled that hatch jettisoning is occurring?

024. Theory of operation

1. After the left or right hatch jettison initiator is pulled, what blocks SMDC detonation to the opposite side hatch jettison system?

2. What does gas pressure from the aft hatch remover input cartridge do?

3. When the hatches are jettisoned using the individual hatch jettison initiators, can the ejection seats still be ejected?

4. How is cabin pressure relieved during an ejection to enable hatch jettison?

5. How are the SMDC to the ET AND gates detonated if cabin decompression sensor differential is not met?

4–3. Associated Systems

Two systems integrated with the escape system are the cabin decompression system and the bottom bailout system.

025. Cabin decompression system theory of operation

The purpose of the cabin decompression system is to depressurize the crew compartment prior to ejection or bottom bailout. We'll first discuss the major components and then the theories of operation during those conditions.

Major components

Following are the major components of the cabin decompression system.

Cabin air dump initiator

The cabin air dump initiator is located on the aft end of the forward overhead panel (fig. 4-19). The initiator is actuated by pushing the PRESS TO RELEASE bar and pulling the handle downward. The initiator detonates SPC and SMDC to the CEB hatch pin puller cartridge and closes an internal switch that turns on eight floodlights. These include the forward and aft aisle floodlights, the left and right entryway floodlights, the left and right overhead floodlights, and the left and right bailout bar floodlights. The cabin air dump handle is identified as a Type I handle, and has two redundant SMDC connection ports as well as two internal redundant switches.

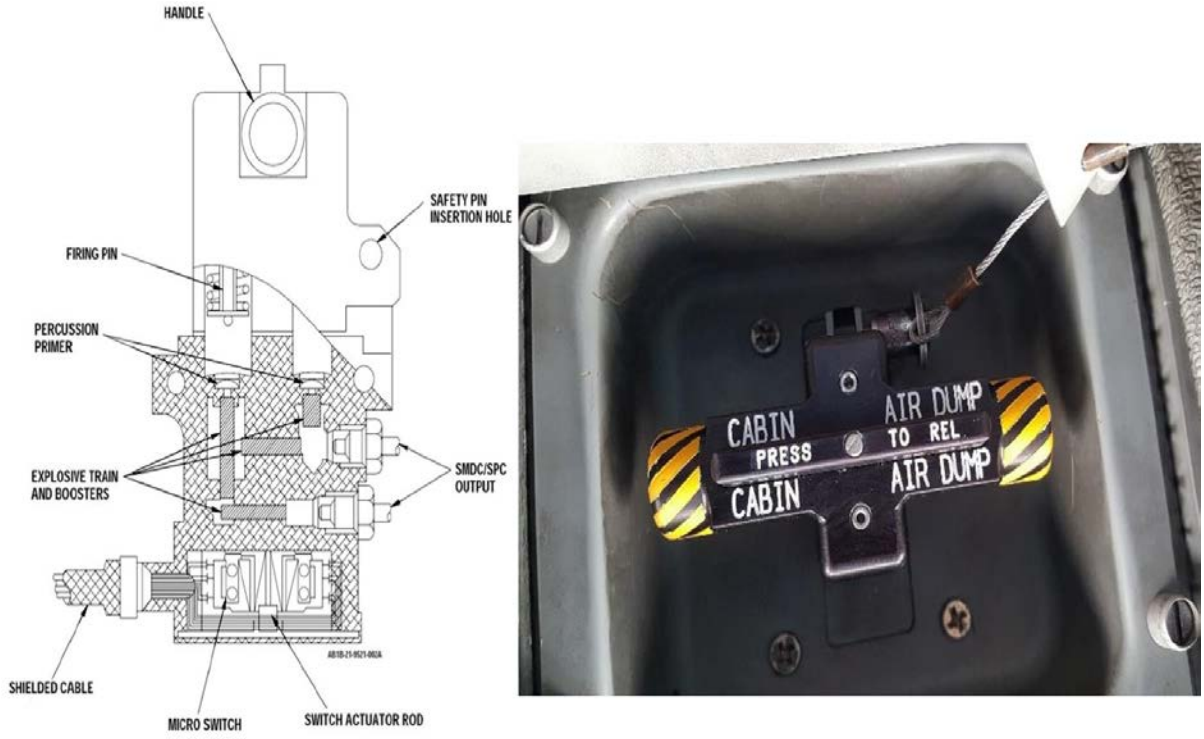


Figure 4-19. Bottom bailout/cabin air dump initiator.

Central equipment bay hatch pin puller

The CEB hatch pin puller is a Type II pin puller installed on the aircraft structure next to the CEB hatch (fig. 4-20). The pin puller cartridge produces gas pressure to retract the pin and sliding bar latch from the CEB hatch. This allows the hatch to open for cabin depressurization.

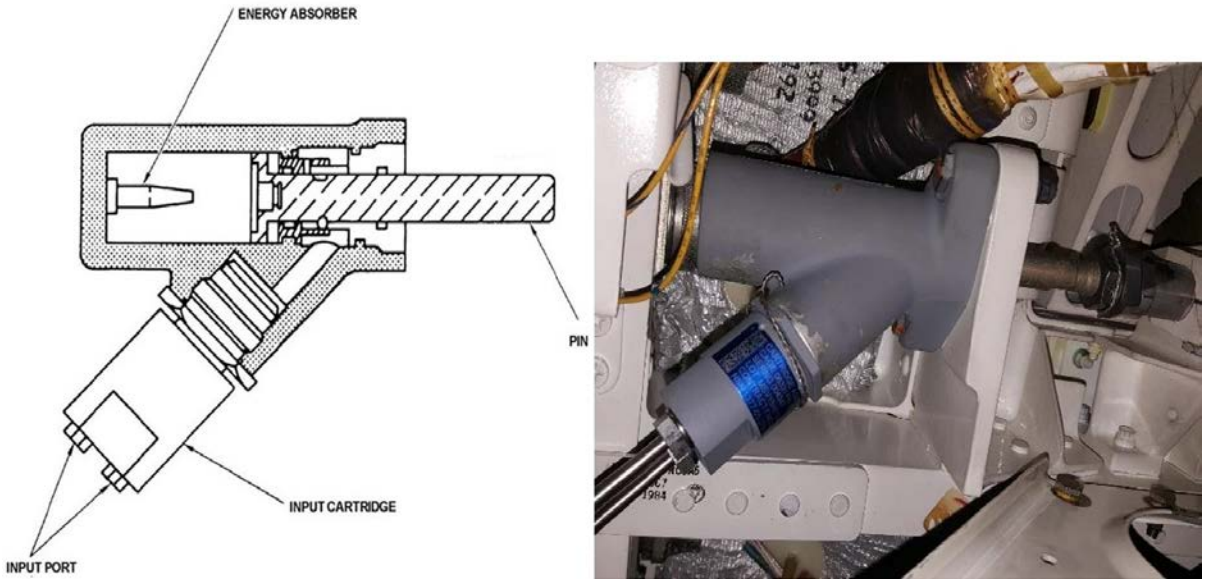


Figure 4-20. Central equipment bay hatch pin puller.

The Type II pin puller has a pin that is threaded on the end in order to attach to the sliding bar latch that retains the cabin decompression hatch. This pin carries no load until the pin puller is fired; then the pin retracts, pulling the sliding latch along a line that loads the pin axially. The principal parts of the pin puller include a housing machined from an aluminum forging, the pin, and a removable ballistic cartridge. The ballistic cartridge is initiated by SMDC/SPC lines in the energy transfer system. When one or both of the lines are fired, pressure and shock energy drive a firing pin into a percussion primer, which, in turn, ignites the main propellant charge. The burning propellant provides the high pressure that is ported to the high pressure side of the piston to drive the pin to the retracted position. Initial motion of the piston shears a small shear pin that locks the piston to the pin retainer and releases the six locking balls that lock the pin to the pin retainer. Snubbing of the pin is accomplished through a combination of compressing air trapped behind the piston and plastic deformation of a soft aluminum stake during the final portion of the pin stroke. The stake deforms into the head of the pin to lock it in fully retracted position.

Cabin decompression sensors

The cabin decompression sensors, located aft and outboard of the DSO and OSO ejection seats, assure that the escape sequence occurs subsequent to a safe cabin depressurization when the escape sequence is initiated above 8,000 feet (fig. 4-21). SMDC lines from the ET system activate the cabin decompression sensors during the ejection sequence. The cabin decompression sensors sense the pressure differential between cabin air and ambient (outside) air. If the pressure difference between cabin air and ambient air is less than the set-point (1.0 ±0.2 psid), the sensor SMDC output fires to transmit the escape signal with minimal delay. If the pressure is greater than the set point, the sensor output is delayed until cabin pressure vents down to a value within the set-point tolerance range.

The sensor has one SMDC input and one SMDC output. The sensor contains a spring-loaded ram that is held in a cocked position by a latch-lever mechanism. This latch-lever mechanism is held in position by an arming pin and by stop pins attached to two independent bellows assemblies. Two conditions must exist for the spring to release and fire the device. The arming pin must be retracted by gas pressure from the input SMDC tip, and both bellow pin stops must be retracted from the path of the release lever by a low-pressure difference in the bellows. When the spring is released, it propels a ram against a firing pin that strikes a percussion primer. The percussion primer is part of an explosive train designed to initiate an SMDC tip installed in the output SMDC port.

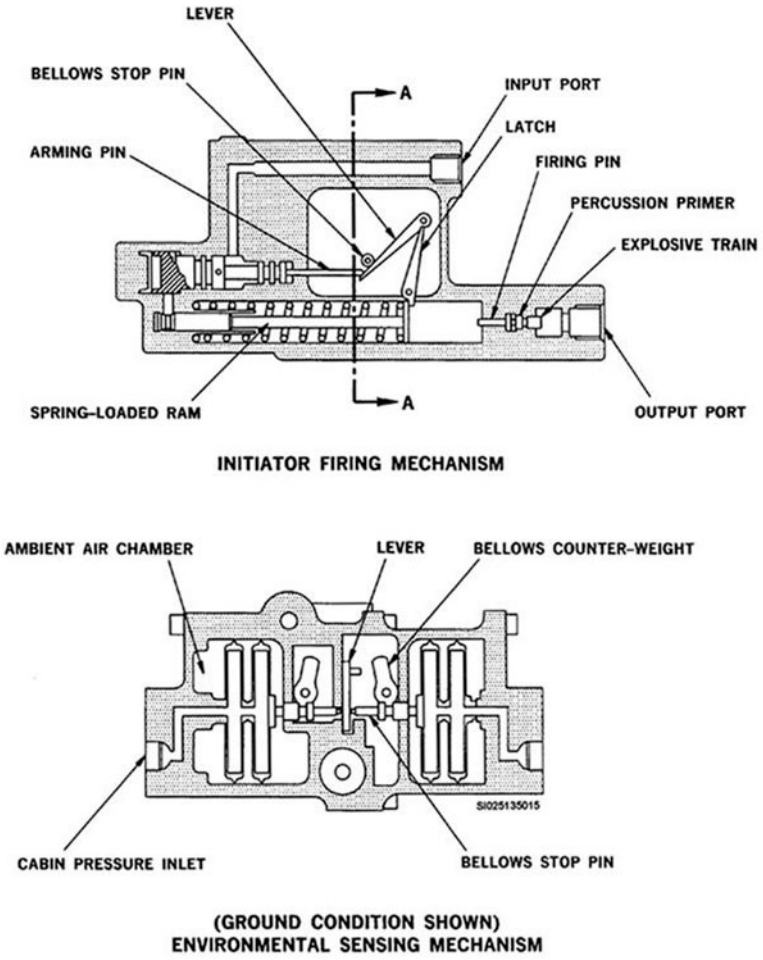


Figure 4-21. Cabin decompression sensor.

Theory of operation

Now we'll cover the two methods of operation for the cabin decompression system.

During ejection

The signal from the interrupter travels via SMDC lines to the CEB hatch pin puller. Initiation of the CEB hatch pin puller cartridge retracts the pin puller pin, allowing the spring-loaded CEB hatch to open, depressurizing the crew compartment. When the cabin decompression sensors or 3.2-second time delay initiators detonate the output SMDC lines, the ejection sequence will continue.

During bottom bailout

The cabin air dump initiator detonates SPC and SMDC to the CEB hatch pin puller cartridge. Initiation of the CEB hatch pin puller cartridge retracts the pin puller pin allowing the spring-loaded CEB hatch to open, depressurizing the crew compartment. 28 volts direct current (VDC) bus power is supplied to the cabin air dump initiator switch through the right essential circuit breaker panel. Two redundant switches connect the power to illuminate the forward and aft aisle floodlights, the left and right entryway floodlights, the left and right overhead floodlights, and the left and right bailout bar floodlights.

026. Bottom bailout system theory of operation

The bottom bailout system provides a means of escape through the crew entry stair ladder door opening. This escape would be used by an instructor pilot flying in a fold down seat located between

the pilot and copilot seats or between the OSO and DSO seats. However, those crew positions have been removed from most B-1Bs.

In this lesson, we'll cover the major components and theory of operation of the bottom bailout system.

Major components

The system consists of the following:

- Cabin air dump initiator.
- CEB hatch pin puller.
- Bottom bailout initiator.
- Entry stair ladder forward severance charge.
- Entry stair ladder aft severance charge.
- Bottom bailout rocket motor.
- Bottom bailout initiator interlock cable.

We've already discussed the cabin air dump initiator and the CEB hatch pin puller, so we'll start out with the bottom bailout initiator.

Bottom bailout initiator

Referring back to figure 4-19, the bottom bailout initiator is located between the forward and aft crew stations on the center aisle left wall. The initiator is mechanically interlocked with the crew entry hatch bi-folding door. The interlock cable prevents inadvertent bottom bailout handle actuation when the bi-folding door is not up and latched. Pushing the PRESS TO RELEASE bar and pulling the handle actuates the initiator. The initiator detonates SMDC and SPC lines to the stair ladder door severance charges and the bottom bailout rocket motor. An electrical switch inside the initiator provides an electrical signal to lower the nose landing gear. The nose gear is lowered to provide a windbreak to facilitate a bottom bailout. The bottom bailout handle is a Type IV handle that has two redundant SMDC connection ports, as well as two internal redundant switches. The internal operation of the initiator differs only in that there are two SMDC/SPC outputs and electrical switches.

Entry stair ladder forward severance charge

The entry stair ladder forward severance charges are circular linear charge assemblies (CLCA). Type I CLCAs are located in the forward portion of the crew entryway and are mounted to the aircraft structure encircling the entry door support arms (fig. 4-22). The severance charges consist of a length of linear shaped charge within fiberglass housings containing two SMDC/SPC input ports. The CLCA consists of an explosive material contained in a lead sheath and formed into a "V" shape. When the explosive detonates, the "V" shape produces a shock wave which projects a portion of the lead sheath at hypersonic velocity against the structure to be severed. The CLCAs are used to sever the two entry door support arms in conjunction with the detonation of the aft severance charges and bottom bailout rocket motor ignition.

Entry stair ladder aft severance charge

The entry stair ladder aft severance charges are also CLCAs. Type II CLCAs are installed on the stair ladder actuator shaft and mounted to the aircraft structure (fig. 4-22). The severance charges consist of two "V" shaped lengths of linear shaped charge (one behind the other) within fiberglass housings. When the explosive detonates, the "V" shape produces a shock wave which projects a portion of the lead sheath at hypersonic velocity against the structure to be severed. The CLCAs sever the stair ladder actuator shaft, in conjunction with the entry stair ladder forward severance charges and bottom bailout rocket motor ignition.

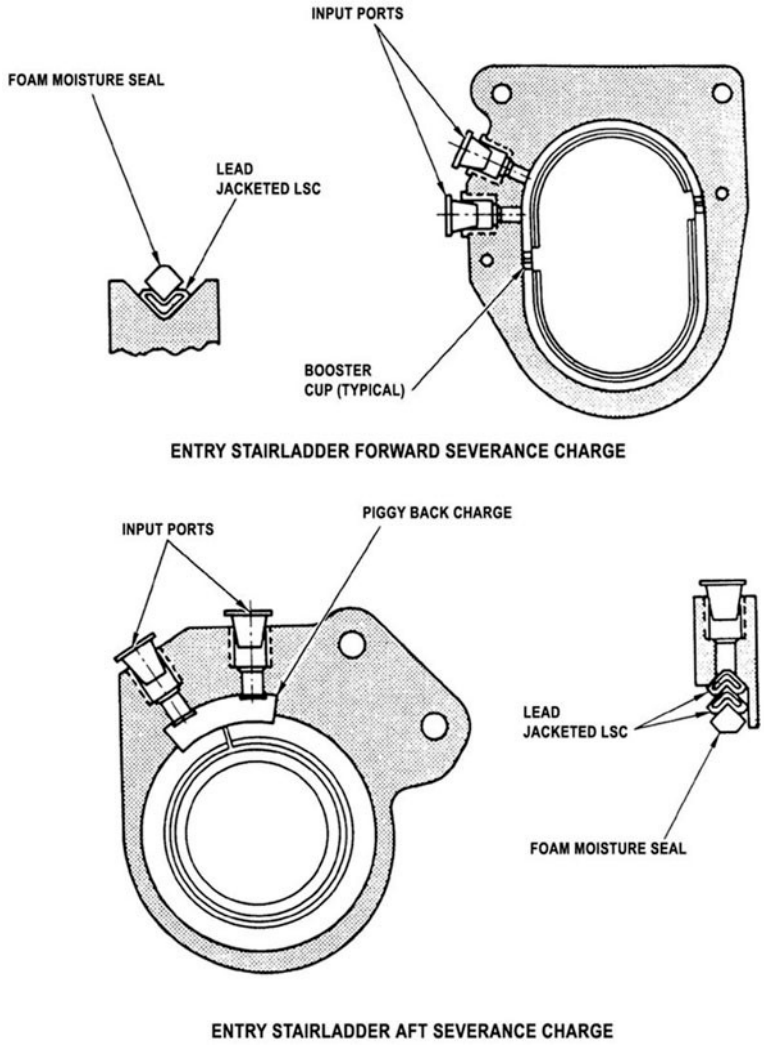


Figure 4-22. Stair ladder severance charges.

Bottom bailout rocket motor

The bottom bailout rocket motor is located just below the second step on the stair ladder (fig. 4-23). The rocket motor jettisons the crew entry door when initiated by SPC. The SPC initiation generates a shock wave allowing a firing pin to strike a primer. Hot gases from the primer are emitted through a flash hole to ignite the igniter mix. The hot gases from the igniter mix flow down the center of the rocket motor, igniting the propellant grain. Gas generated by the burning propellant exits through the throat of the nozzle, thereby producing thrust.

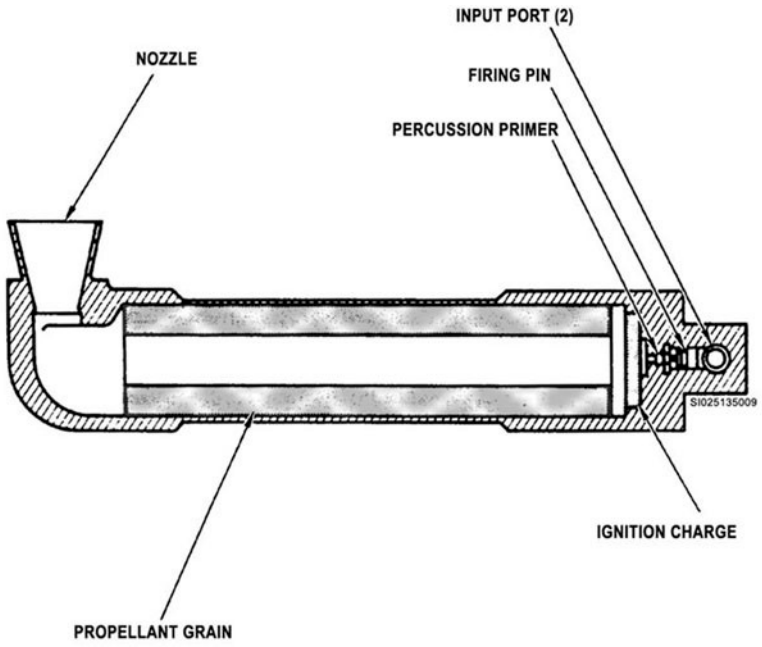


Figure 4-23. Bottom bailout rocket motor.

Bottom bailout initiator interlock cable

The bottom bailout initiator interlock cable is installed inboard of the DSO station on the center aisle left wall (fig. 4-24). The interlock cable prevents firing the bottom bailout initiator until the bi-folding hatch is latched in the open position.

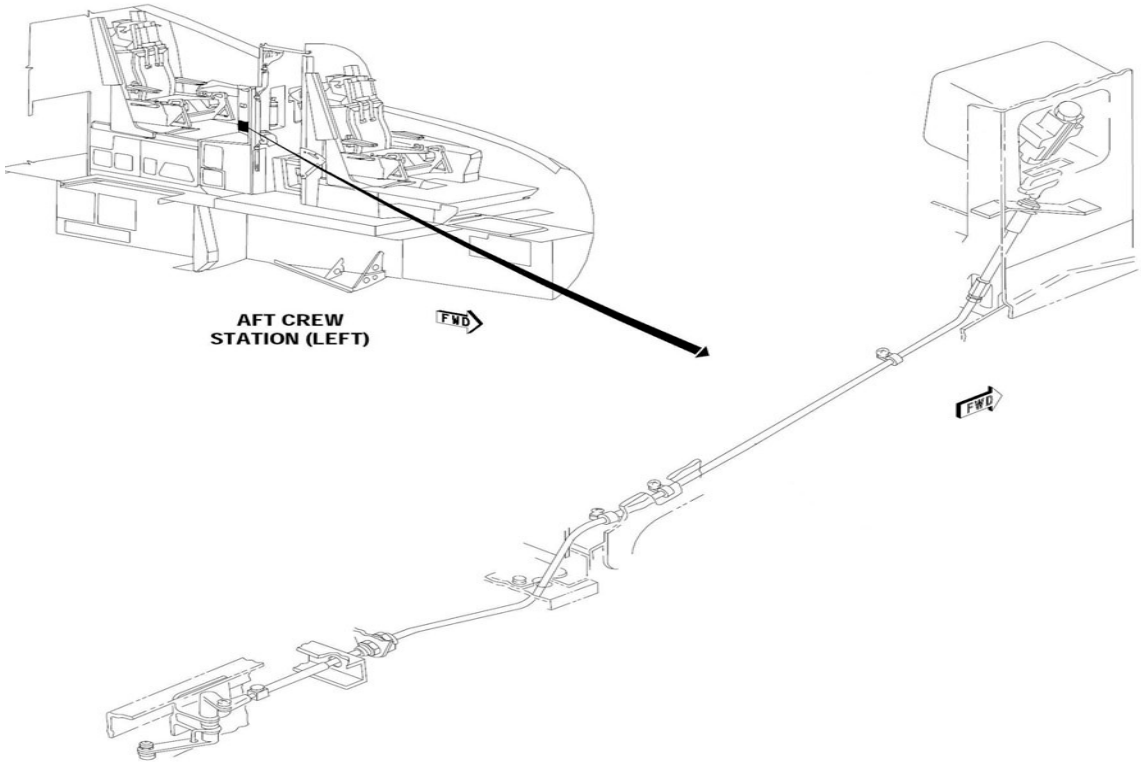


Figure 4-24. Bottom bailout initiator interlock cable.

Theory of operation

Before the bottom bailout initiator is actuated by the crew member, the crew member is trained to actuate the cabin air dump initiator to depressurize the cabin. If the cabin is not depressurized, the bottom bailout system will not work properly and the crew entry hatch will likely remain in place because of the suction, preventing crew member's escape. We discussed the cabin air dump theory of operation in the last lesson, so we won't repeat it here.

The bottom bailout initiator mechanical interlock is released when the bi-folding hatch is latched open. Pulling the bottom bailout handle detonates the SMDC/SPC to the entry stair ladder forward and aft severance charges, and bottom bailout rocket motor. Detonation of the severance charges severs the stair ladder connections. The rocket motor jettisons the stair ladder from the aircraft. 28 VDC bus power is supplied to the bottom bailout initiator switch from the left essential circuit breaker panel. Two redundant electrical switches inside the bottom bailout handle provide the electrical signal to the nose landing gear emergency pressure selector valve and landing gear control panel to lower the nose landing gear.

The reason the nose landing gear lowers is to provide a break in the airstream and slow the aircraft in order for the crew member to safely exit the bottom bailout using a parachute, without being severed by the airstream or pulled into the aircraft engines.

Self-Test Questions

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

025. Cabin decompression system theory of operation

1. How is the cabin air dump initiator actuated?

2. What is the purpose of the CEB hatch pin puller?

3. What is used to initiates the CEB hatch pin puller's ballistic cartridge?

4. What is the purpose of the decompression sensors?

5. During bottom bailout, what lights are illuminated through the cabin air dump initiator switch?

026. Bottom bailout system theory of operation

1. What component is mechanically interlocked with the crew entry hatch bi-folding door?

2. How does the bottom bailout system lower the nose landing gear?

3. How does CLCA operate?

4. What is the purpose of the Type II CLCAs installed on the stair ladder actuator shaft and mounted to the aircraft structure?

5. How does the bottom bailout rocket motor operate?

6. Excluding ET lines, in what order do the explosive components in the bottom bailout system operate during bottom bailout?

Answers to Self-Test Questions

021

1. (1) i.
   (2) t.
   (3) g.
   (4) s.
   (5) b.
   (6) u.
   (7) l.
   (8) d.
   (9) j.
   (10) r.
   (11) c.
   (12) o.
   (13) a.
   (14) m.
   (15) h.
   (16) k.
   (17) p.
   (18) f.
   (19) q.
   (20) n.
   (21) e.
2. Auto.
3. Only two housing ports are aligned with the ET assembly ports.

022

1. OSO and DSO.
2. The interrupter blocks the SMDC detonation.
3. The cabin decompression sensor or 3.2-second time delay output SMDC signal.
4. By using an SMDC-gas initiator.

5. When force on the shear links securing the straps to the seat carriage exceeds 800 pounds, the shear links break and allow the tethered straps to separate from the aircraft.
6. P9.
7. When the harness release thruster is fired, it rotates a bellcrank assembly, which pulls the locking pins to release the leg restraints.

023

1. (1) e.
   (2) a.
   (3) i.
   (4) f.
   (5) b.
   (6) d.
   (7) g.
   (8) c.
   (9) h.
2. Ballistic gasses from the aft hatch remover are ported internally at mid-stroke to fire the explosive output initiator, which sends a signal to the sequencing system.

024

1. The master hatch jettison one-way transfer initiators.
2. Unlatches and jettisons the hatch and fires the hatch remover output cartridge.
3. Yes.
4. The CEB hatch pin puller cartridge retracts the CEB hatch retaining pin, unlatching the CEB hatch.
5. By 3.2-second time delay initiators.

025

1. By pushing the PRESS TO RELEASE bar and pulling the handle downward.
2. Produce gas pressure to retract the pin and sliding bar latch from the central equipment bay hatch.
3. SMDC/SPC lines in the energy transfer system.
4. To assure that the escape sequence occurs subsequent to a safe cabin depressurization when the escape sequence is initiated above 8,000 feet.
5. The forward and aft aisle floodlights, the left and right entryway floodlights, the left and right overhead floodlights, and the left and right bailout bar floodlights.

026

1. The bottom bailout initiator.
2. An electrical switch inside the bottom bailout initiator provides an electrical signal to lower the nose landing gear.
3. When the explosive detonates, the “V” shape produces a shock wave which projects a portion of the lead sheath at hypersonic velocity against the structure to be severed.
4. To sever the stair ladder actuator shaft, in conjunction with the entry stair ladder forward severance charges and bottom bailout rocket motor ignition.
5. The rocket motor jettisons the crew entry door when initiated by SPC. The SPC initiation generates a shock wave allowing a firing pin to strike a primer. Hot gases from the primer are emitted through a flash hole to ignite the igniter mix. The hot gases from the igniter mix flow down the center of the rocket motor, igniting the propellant grain. Gas generated by the burning propellant exits through the throat of the nozzle, thereby producing thrust.
6. Cabin air dump initiator, bottom bailout initiator, entry stair ladder forward and aft severance charges, entry stair ladder forward and aft severance charges, bottom bailout rocket motor.

Complete the unit review exercises before going to the next unit.

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 AFCDA.

77. (021) What B–1B ejection system component inhibits operation of the yaw divergence rocket when monitored aircraft speed exceeds 360 to 380 knots at sea level (KEAS)?
    a. Velocity sensor.
    b. Divergence sensor.
    c. Recovery sequencer.
    d. Environmental sensor.

78. (021) The B–1B's advanced concept ejection seat (ACES) II leg restraint system consists of
    a. leg guards, which rotate to protect the crew member's legs from flailing and becoming injured.
    b. a passive restraint system that is routed around the leg channels and held in place with hook and pile.
    c. ankle restraints on the lower forward part of the seat which rotate around the ankles.
    d. a garter assembly for each leg that is buckled around the calves by the crew member.

79. (021) What two types of energy transfer cords does the B–1B escape system use?
    a. Shielded mild detonating and shock propagation.
    b. Detonation transfer assemblies and wire harnesses.
    c. Shock propagation and flexible linear shaped charges.
    d. Shielded mild detonating and detonation transfer assemblies.

80. (021) On the B–1B escape system, AND gates
    a. must receive two inputs before one output can take place.
    b. must receive one input before two outputs can take place.
    c. contain an arrow to indicate the device's function direction.
    d. block explosive transfer through a sliding interrupter element.

81. (022) When the pilot initiates a B–1B ejection, what occurs if the offensive system operator (OSO) eject mode selector is set to manual (MAN)?
    a. The seat occupant will not eject automatically and must initiate his or her own ejection.
    b. The eject mode selector is overridden by the pilot's decision and the seat occupant will eject.
    c. Neither aft seat will eject and the seat occupants will have to initiate the bottom bailout system.
    d. The seat occupant will not eject automatically and will have to initiate the bottom bailout system.

82. (022) What B–1B energy transfer lines fire the aft seats' worktable stowage thrusters?
    a. Detonation transfer assemblies.
    b. Shielded mild detonating cord.
    c. Flexible linear shaped charge.
    d. Shock propagation cord.

83. (022) The B–1B advanced concept ejection seat (ACES) II components used to position the seats for ejection are the carriage
    a. pin pullers.
    b. load arrestors.
    c. retract thrusters.
    d. stowage thrusters.

84. (022) The B–1B advanced concept ejection seat (ACES) II recovery sequencer selects Mode 2 operation if the environmental sensor detects
    a. 670 knots equivalent air speed (KEAS) at 15,649 feet.
    b. 360 KEAS at 13,469 feet.
    c. 249 KEAS at 15,649 feet.
    d. 249 KEAS at 13,469 feet.

85. (023) What B–1B hatch jettison initiator will jettison all four hatches when pulled?
    a. Pilot internal hatch jettison initiator.
    b. Left external hatch jettison initiator.
    c. Right external hatch jettison initiator.
    d. Master external hatch jettison initiator.

86. (023) What portion of the B–1B forward hatch remover is still attached to the aircraft structure after the hatch jettison?
    a. Idler link.
    b. Outer housing.
    c. Intermediate housing.
    d. Inner thrust piston tube.

87. (023) What B–1B aft hatch components permit the aft hatches to be unlatched and opened?
    a. Hatch retainer plates and strut.
    b. Aft hatch remover and idler link.
    c. Rod end fittings and shear screw.
    d. Hatch remover rocket and linkage.

88. (023) What component installed between the forward B–1B escape hatches and the aircraft structure and retainer plates produces a shock wave that severs the retainer plates to permit the hatches to be jettisoned?
    a. Separation assembly horseshoe.
    b. Separation assembly racetrack.
    c. Forward hatch remover.
    d. Linear shaped charge.

89. (024) What B–1B escape component renders the seats safe and prevents them from ejecting after a hatch jettison?
    a. Hatch pin puller.
    b. Input cartridges.
    c. Interrupters.
    d. AND gates.

90. (024) When the B–1B's left external hatch jettison initiator is pulled, the detonation energy first travels to
    a. all four forward and aft hatch remover input cartridges.
    b. the left forward and left aft hatch remover input cartridges.
    c. one-way transfer initiators within all four hatches' jettison systems.
    d. one-way transfer initiators within the left or right hatch jettison system.

91. (025) The B–1B's cabin air dump initiator detonates shock propagation and shielded mild detonating cord to the central equipment bay (CEB) hatch pin puller cartridge and
    a. assures the escape sequence occurs subsequent to safe cabin depressurization.
    b. provides an electrical signal to lower the nose landing gear.
    c. closes an internal switch that turns on eight floodlights.
    d. allows the hatch to open for cabin depressurization.

92. (025) The purpose of the B–1B's cabin decompression sensors is to delay shielded mild detonating cord (SMDC) output until the
    a. cabin pressure vents down to within 1.0 ±0.2 pounds per square inch differential.
    b. cabin pressure vents down to within 2.0 ±0.1 pounds per square inch differential.
    c. 1.0-second time delay initiators fire and continue the ejection sequence.
    d. 3.2-second time delay initiators fire and continue the ejection sequence.

93. (025) During B–1B ejection, what component sends signals to fire the central equipment bay hatch pin puller?
    a. An interrupter.
    b. The AND gate.
    c. An input cartridge.
    d. The cabin air dump initiator.

94. (025) When the B–1B's cabin air dump initiator is pulled, what lines transfer energy to the central equipment bay hatch pin puller?
    a. Detonation transfer assemblies (DTA) and wire harnesses.
    b. Shielded mild detonating cord (SMDC) and shock propagation cord (SPC).
    c. SPC and flexible linear shaped charges.
    d. SMDC and DTA.

95. (026) When the B–1B bottom bailout system aft severance charge detonates, the circular linear charge assemblies (CLCA) sever the
    a. two entry door support arms.
    b. stairladder actuator shaft.
    c. interlock cable.
    d. bifolding door.

96. (026) What B–1B component prevents inadvertent bottom bailout handle actuation when the bi-folding door is not latched in the open position?
    a. Interlock cable.
    b. Hatch pin puller.
    c. Severance charge.
    d. Bottom bailout initiator.

97. (026) During the B–1B bottom bailout system operation, two redundant electrical switches provide the electrical signal to
    a. activate eight floodlights.
    b. lower the nose landing gear.
    c. delay cabin pressure venting.
    d. activate cabin decompression sensors.

Glossary

Abbreviations and Acronyms

+	plus
±	plus or minus
A&P	Airframe and Powerplant
AC	alternating current
ACC	Air Combat Command
ACES	advanced concept ejection seat
AETC	Air Education and Training Command
AF	Air Force
AF IMT	Air Force Information Management Tool
AF TOPP	Air Force Technical Order Policy and Procedures
AFCFM	Air Force career field manager
AFDPO	Air Force Departmental Publishing Office
AFH	Air Force handbook
AFI	Air Force instruction
AFMAN	Air Force manual
AFMC	Air Force Materiel Command
AFMCI	Air Force Materiel Command Instruction
AFNET	Air Force Network
AFPD	Air Force policy directive
AFR	Air Force Reserve
AFSC	Air Force specialty code
AFSC-IM	Air Force sustainment center-item manager
AFTO	Air Force technical order
AGE	aerospace ground equipment
AMU	aircraft maintenance unit
ANG	Air National Guard
AOR	area of responsibility
AQL	acceptable quality level
AWACT	awaiting action

AWM	awaiting maintenance
AWP	awaiting parts
BIT	built-in-test
CAD/PAD	cartridge actuated device/propellant actuated device
CANN	cannibalization
CAT	category
CBT	computer-based training
CCAF	Community College of the Air Force
CDC	career development course
C-E	communications-electronics
CEB	central equipment bay
CFETP	career field education and training plan
CLCA	circular linear charge assembly
CONUS	continental United States
CSPPI	catapult safety pin-pull initiator
CTK	composite tool kit
CUT	cross utilization training
DCC	dedicated crew chief
DD	Department of Defense
DID	data item description
DIFM	due-in from maintenance
DIT	data integrity team
DL	distance learning
DLA	Defense Logistics Agency
DOD	Department of Defense
DOR	due-out release
DR	deficiency report
DSO	defensive system operator
DSV	detected safety violation
E&I	evaluation and inspection
ECM	equipment configuration management
ER	exceptional release

ET	energy transfer
ETCA	Education and Training Course Announcements
ETS	energy transfer system
EWO	electronic warfare officer; emergency war order
FAA	Federal Aviation Administration
FAD	force activity designator
FMP	Flight Manuals Program
FO	foreign object
FOD	foreign object damage
FTD	field training detachment
GAS	graduate assessment survey
HAZCOM	hazard communication
HHQ	higher headquarters
HQ	headquarters
IAW	in accordance with
ICI	interactive communitions interface
ICW	interactive courseware
ILCM	Integrated Life Cycle Management
ILS-S	Integrated Logistics System-Supply
IMDS	Integrated Maintenance Data System
IMDS-CDB	Integrated Maintenance Data System Central Database
INW	in-work
IPI	in-process inspection
ISD	instructional systems development
ISG	Interchangeable and Substitution Group
ISU	issue
ITP	individual training plan
JCN	job control number
JCS	Joint Chiefs of Staff
JDAM	joint direct attack munition
JDD	job data documentation
JDRS	Joint Deficiency Reporting System

JP	joint publication
JST	job standard
KEAS	knots at sea level
KTL	key task listing
LCN	logistics control number
LRS	logistics readiness squadron
LSC	linear shaped charge
MACR	Materiel Acquisition Control Record
MAJCOM	major command
MASS	Mission Impaired Capability Awaiting Parts Asset Sourcing System
MDR	materiel deficiency report
MDS	mission design series
MGN	Mission Generation Network
MICAP	mission impaired capability awaiting parts
MIS	maintenance information system
MOO	maintenance operations officer
MOS	military occupational specialty
MPH	miles per hour
MQT	maintenance qualification training
MSEP	Maintenance Standardization and Evaluation Program
MSgt	master sergeant
MSI	mission support issue
MTF	maintenance training flight
MTL	master task list
MTP	master training plan
MTT	mobile training team
MX SUPT	maintenance superintendent
MXG	maintenance group
MXG/CC	maintenance group commander
NA	non-applicable
NCO	noncommissioned officer
NPPC	numeric parts preference code

NRTS	not reparable this station
NSN	national stock number
OCCR	Organization Cost Center Record
OCONUS	outside the continental United States
OI	operating instruction
OIC	officer in charge
OJT	on-the-job training
OPR	office of primary responsibility
OSO	offensive system operator
PC	personal computer
PE	personnel evaluation
PFMR	Project Funds Management Record
PIM	product improvement manager
PN	part number
POC	point of contact
PQDR	product quality deficiency report
PS&D	plans, scheduling & documentation
psid	pounds per square inch differential
QA	quality assurance
QLP	query language processor
QRL	quick reference list
Qty	quantity
QVI	quality verification inspection
RCSS	repair cycle support section
RDD	required delivery date
RIL	routine inspection list
RN	Repair Network
SBSS	Standard Base Supply System
SC	specialized course
SCR	special certification roster
SDD	standard delivery date
SDR	supply data record

SDRH	supply data record header
SE	seat ejection
SES	seat ejection sequencing
SI	special inspection
SM	system manager
SMDC	shielded mild detonating cord
SOT	status of training
SPC	shock propagation cord
SPRAM	special-purpose recoverables authorized maintenance
SS	seat sequencing
SSgt	staff sergeant
STAPAC	pitch stabilization control assembly
STS	specialty training standard
TBA	Training Business Area
TCG	time change
TCI	time change item
TCM	technical content manager
TCTO	time compliance technical order
TD	training detachment
TDR	trajectory divergence rocket
TDV	technical data violation
TDY	temporary duty
TEX	transaction exception
TIN	turn-in
TM	technical manual
TMCR	Technical Manual Contract Requirements
TMS	type, model and series
TO	technical order
TOC	time compliance technical order required for end item
TODO	technical order distribution office
TRN	turnaround
UCR	unsatisfactory condition report

UJC	urgency justification code
UMMIPS	Uniform Materiel Movement and Issue Priority System
UND	urgency of need designator
UPE	user practice environment
USAF	United States Air Force
UTM	unit training manager
VDC	volts direct current
VTT	video teletraining
W&B	weight and balance
WCE	work center event
WCE-ID	work center event identification
WRM	war reserve materiel
WS	weapons standardization
WUC	work unit code
WWM	wing weapons manager

Student Notes

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