

Chapter 1

Battlefield Management of Downed Aircraft

The loss of an aircrew and/or airframe impacts the combat capability of aviation units. The psychological impact from the loss of an aircrew may be a severe detriment to unit morale. High loss rates can rapidly deplete available operational readiness float (ORF) assets. This chapter discusses the importance of including downed aircraft recovery missions into the battalion and brigade staff tactical decision making process. It also provides the relationship of combat search and rescue (CSAR) to downed aircraft recovery teams (DARTs), and battle damage assessment and repair (BDAR) personnel augmentation to DART missions. In addition, this chapter discusses the role of DART (BDAR) when planning for an aircraft recovery mission.

NOTE: This FM and FM 3-04.113(1-113), *Utility and Cargo Helicopter Operations*, are interrelated. CSAR information in chapter 1 of this FM is generalized from FM 3-04.113(1-113) to aid commanders in distinguishing between the roles of CSAR and DART when planning a downed aircraft recovery mission. Commanders should refer to FM 3-04.113(1-113) for specific doctrinal guidance on CSAR missions.

BATTLEFIELD MANAGEMENT

1-1. Historically, the effort at recovering aircrews or aircraft off the battlefield has been minimal and poorly coordinated at best. Today, CSAR and DART/BDAR provide the methods for retrieving aircrews and aircraft as well as regenerating those resources necessary to maintain momentum on the battlefield. FM 3-04.113(1-113), chapter 7, provides commanders guidance on CSAR missions. Army and Joint CSAR procedures can be found in Joint Publication (JP) 3-50.2, *Doctrine for Joint Combat Search and Rescue*, and in JP 3-50.21, *Joint Tactics, Techniques, and Procedures for Combat Search and Rescue*. Airspace control can be found in JP 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*.

EXTRACTION/RECOVERY PRIORITIES

1-2. According to FM 3-04.113(1-113), the CSAR task force (TF) commander executes the extraction of personnel followed by the recovery of equipment. This is true when both personnel and equipment are at the same location. Aircraft extracting personnel (for example, UH-60 Black Hawk) should be cleared into the extraction site immediately after the area has been secured. Equipment recovery operations may be conducted simultaneously with the personnel extraction operation or delayed until the personnel extraction has egressed the extraction site. In either case, any aircraft ingressing the extraction/recovery site will remain off-station until specifically cleared for the approach by the CSAR TF commander. Conversely, any aircraft egressing the extraction/recovery site will remain at the site until cleared for departure by the CSAR TF commander.

1-3. Simply stated, the extraction and recovery priorities are recovery of the aircrew and simultaneous evaluation of the aircraft. Determine if the aircraft is still an asset. If so, secure the aircraft or area, evacuate the aircraft, and repair the aircraft.

DEFINITIONS

1-4. Acronyms used in the battlefield management of downed aircraft are defined as follows:

- **Combat Search and Rescue (CSAR).** CSAR is the successful extraction of a downed aircrew and evacuation of the aircrew either to appropriate medical care or back to the unit. CSAR operations can be placed into separate categories—*immediate* and *delayed*. Commanders must recognize and prepare for both immediate and delayed types of CSAR operations.
- **Downed Aircraft Recovery Team (DART).** The DART team normally comprises selected command personnel. (These personnel include technical inspector, maintenance test pilot or pilot, maintenance personnel, radio operator and security force). The team successfully extracts an aircraft from a downed location to a safe location, using aerial recovery kits, trained recovery team, and recovery aircraft. Augmentation of the DART mission with BDAR trained repair personnel can recover downed aircraft using BDAR measures. These measures expedite the recovery and return of aircraft to the tactical assembly area (TAA). In addition, they prevent the aircraft from falling into enemy hands and retain control of the aircraft for future use as controlled exchange program for other aircraft and induction into a BDAR program for eventual reintegration into the battle.
- **Battle Damage Assessment and Repair (BDAR).** BDAR is the use of specialized aircraft damage assessment criteria, repair kits, and trained personnel to modify peacetime aircraft maintenance standards. The concept includes the safe return of damaged aircraft to a safe location and eventually to battle as soon as possible.
- **Rescue Coordination Center (RCC).** The Army component commander who plans, coordinates, and directs the execution of CSAR and DART operations establishes an RCC within the commander's area of operations (AO). The component commander may not directly establish an RCC. If an RCC is not established, the Army commander must designate an existing headquarters or staff section to perform the duties of the RCC. The RCC will—
 - Notify the Joint Search and Rescue Center (JSRC) as soon as possible when conducting CSAR and DART operations.
 - Extract information from the JSRC Evasion and Recovery (E&R) plan that is Army specific and disseminate that information to all Army units in theater.

- Request Joint Combat Search and Rescue (JCSAR) Support from the JSRC when Army assets cannot accomplish the CSAR
 - Forward pertinent data regarding isolated personnel to the JSRC.
 - Develop and plan mission packages in parallel with the tactical mission.
 - Manage the information flow to the two mission packages (CSAR/DART).
 - Manage the information flow of the DART mission with augmentation of BDAR personnel if require.
 - Integrate the enemy situation, from the TF tactical operations center (TOC), into the downed aircraft decision making process.
 - Execute mission packages.
- **Trigger.** According to FM 6-99.1(101-5-1), a trigger is an event or time-oriented criteria used to initiate planned actions directed toward achieving surprise and inflicting maximum destruction on the enemy. It is also a designated point or points (selected along identifiable terrain) in an engagement area (EA) used to mass fires at a predetermined range. A 'trigger,' as it applies to this manual, would be an event or time-oriented criteria used to initiate planned actions toward achieving successful extraction of downed aircrew and the recovery of downed aircraft.
 - **Assessor.** An assessor is one who can assess aircraft battle damage. One of the assessor's primary tasks is to determine the location of the damaged aircraft relative to the battlefield and the extent of the threat. Modern air defense threats may make aerial recovery in forward areas of the battlefield an impractical or unacceptably high risk. The ability to determine rapidly that a one-time evacuation mission is feasible or that a quick-fix repair is possible is important. It may prevent a situation in which the aircraft would otherwise be destroyed (in place) to prevent capture by, or compromise to, the enemy. Once the battle subsides, maintenance decisions are based on standard operational maintenance practices. An assessor can be one or a combination of the following: the aircrew of the downed aircraft; aircrew of another aircraft; the CSAR crew; the DART aircrew. The assessor's mission is to provide the commander with an initial assessment of the downed aircraft. Based on mission, enemy, terrain and weather, troops and support available – time available and civilian considerations (METT-TC), the assessor can, when appropriate, provide a more detailed assessment.

PLANNING PROCESS

INITIAL CONDITIONS/PRE-CONDITIONS

1-5. Aircraft recovery planning begins when the Army force deploys or immediately after it arrives in the area of responsibility (AOR). Commanders of aviation units emphasize both the CSAR and the aircraft recovery process

while ensuring that their units are prepared if an aircraft is lost during the fight.

1-6. Aircraft recovery operations are unique. Each operation is discrete and may involve the initiative and imagination of commanders and staff to synchronize the operation within a range of variables. Aircraft recovery on the battlefield is a recurring maintenance function. It is usually planned for, in advance, in conjunction with other maintenance support. Recovery operations are planned and coordinated in detail to minimize risk. METT-TC always influences the extent of detail and coordination. In addition, the following factors are considered:

- Commander's assessment of the threat.
- Tactical situation.
- Condition and location of disabled aircraft.
- Disabled aircraft accessibility.
- Airspace restrictions.
- Recovery assets.
- Air tasking order (ATO) missions.
 - Type of equipment required.
 - Location and availability of aircraft.
- Requirements for—
 - Fire support.
 - Air defense.
 - Engineer support.
 - Ground security.
 - Intelligence/aerial and ground surveillance.
 - Army Airspace Command and Control System (A²C²S).
 - Battlefield coordination through the S3/G3 to minimize possibility of fratricide.

1-7. C² relationships, unit responsibilities, and coordination are planned for in advance to the extent possible and included in standing operating procedures (SOPs) and operations orders (OPORDs). When an aircraft becomes disabled on the battlefield, commanders and staffs supplement preplanning with a plan of execution. The operation is controlled at the appropriate level (normally the RCC).

1-8. Physical procedures for battlefield recovery of aircraft and maintenance evacuation are nearly identical. Both may require the rigging of the aircraft for lift by helicopter or lift by a crane device for placement on a ground transport vehicle.

1-9. Recovered aircraft normally are transported from the recovery point to a preselected maintenance site without intermediate stops. Air recovery (and evacuation) capitalize on back-haul from forward areas to the extent possible. This operation reduces separate demands on aircraft, especially CH-47

Chinook aircraft that may be heavily committed to re-supply and other transport missions.

RESPONSIBILITIES FOR RECOVERY OPERATIONS

AIR MISSION COMMANDER/AVIATION UNIT COMMANDER

1-10. The first line of responsibility for a recovery operation is the air mission commander/aviation unit commander. This commander may have at his disposal (from within the assets of the operation) on-call DART organizations and lift assets capable of recovering the disabled aircraft. In such cases, the commander employs those assets to assess and effect recovery within time and tactical situation constraints.

RESCUE COORDINATION CENTER

1-11. When beyond the capability of the air mission or unit commander, the responsibility to coordinate recovery defaults to the rescue coordination center (RCC). The RCC is a contingency organization in the aviation brigade TOC. Depending on the size of the force, the RCC also may be found in division and corps TOCs. In this case, RCC is primarily a communications node for staff elements to receive voice, manual, and automated messages; coordinate resources; coordinate battlefield functions of maneuver, fire support, air defense, intelligence, and combat service support within tactical priorities and the scheme of maneuver to support recovery operations. (See Fig. 1-1.) The principal in the RCC is the staff aviation maintenance officer.

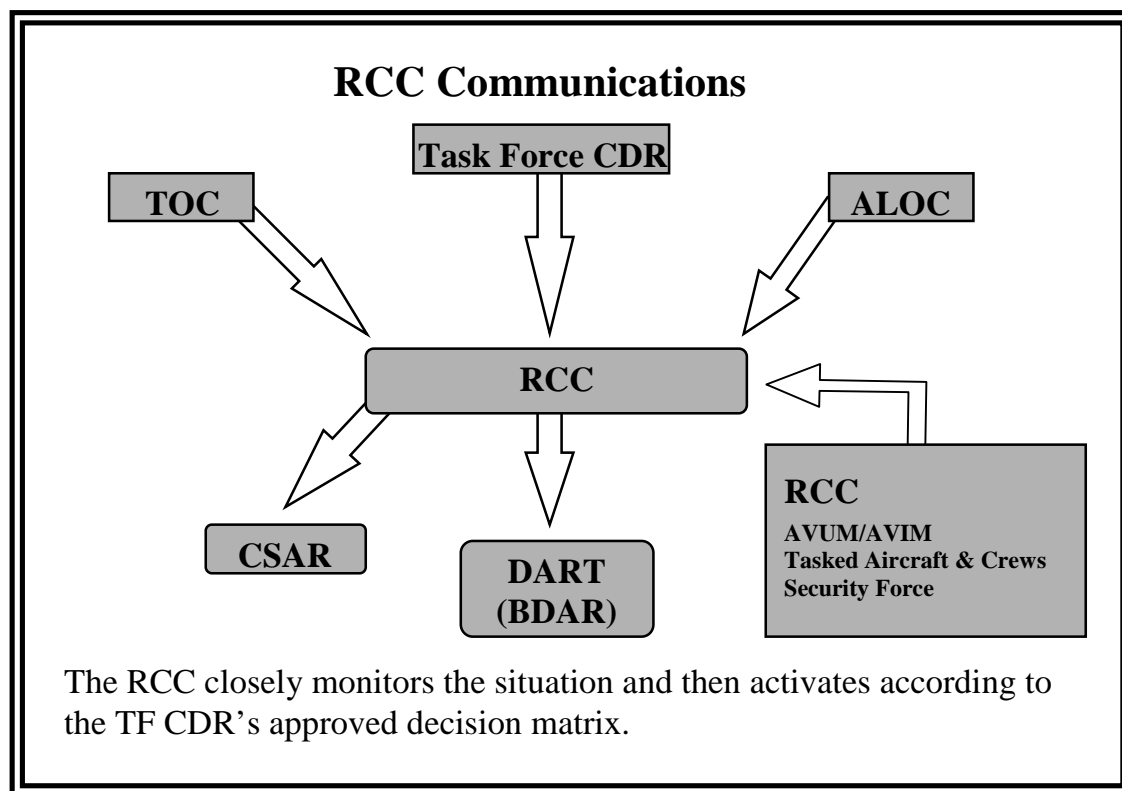


Figure 1-1. RCC Communications

AIRCRAFT COMMANDER AND AIRCREW

1-12. When an aircraft is forced down, the aircraft commander, or one of his crew, will use the aircraft radio (if operable and the tactical situation permits) to notify the parent AVUM commander of the problem and request DART assistance. This information may be relayed through other aircraft operating in the area as time and security allow. The crew takes the first step in the assessment process by providing the AVUM commander with key critical information on the problem. The information should include—

- **Critical Information:**
 - Location of aircraft.
 - Assessment of site security.
 - Adaptability of the site, including existing weather conditions, for the insertion of a DART team with the option of augmenting with BDAR personnel.
 - An evaluation of aircraft damage, to the extent possible, so that needed BDAR personnel, equipment, and parts requirements can be estimated.
 - Information on crew and passenger (s) condition to determine their capability to assist in repairing the damage. For example, the aircraft commander may be able to fly the aircraft out, eliminating the need for an aviator as part of BDAR.
 - Information provided by air traffic controllers.
- **Minimum Required Information for In-Flight Emergencies:**
 - Aircraft identification and type.
 - Nature of emergency.
 - Pilot's desires.
 - Aircraft position (grid or latitude and longitude coordinates).
- **Other Information.** Depending on the status of aircraft communications, the following items or any other pertinent information will be obtained from the pilot or aircraft operator:
 - Aircraft altitude.
 - Fuel remaining in time.
 - Pilot reported weather.
 - Pilot capability for instrument-flight requirements (IFR) flight.
 - Time and place of last known position.
 - Heading since last known position.
 - Airspeed.
 - Navigation equipment capability.
 - Navigational aid (NAVAID) signals received.
 - Visible landmarks.
 - Aircraft color.

- Number of people on board.
- Point of departure and destination.
- Emergency equipment on hand.
- Weapons available.

CONTINGENCY PLANNING FOR IMMEDIATE AND DELAYED AIRCRAFT RECOVERY OPERATIONS

GENERAL

1-13. Aircraft recovery operations can be placed into two separate categories: *Immediate* or *delayed*. Commanders must recognize and prepare for both types of recovery operations.

IMMEDIATE RECOVERY

1-14. Immediate recovery of the aircraft is possible when the aircraft at the scene of the forced landing can be assessed, fixed, and returned to service, or prepared for a one-time evacuation mission to a maintenance site in a minimal amount of time. The time required to repair the aircraft or rig it for recovery at the scene depends on the tactical situation and condition of aircraft, which may result in a delayed recovery operation.

(Example: During an air assault, an aircraft can be recovered immediately by having an aircraft in the flight follow a downed aircraft to rescue the flight crew and/or assess the aircraft damage or maintenance problem. If the problem can be fixed rapidly, the aircraft may be returned to service or prepared for a one-time evacuation mission to a maintenance site. Immediate recovery is the most effective method for recovering downed aircraft if the damage is not extensive.)

1-15. Immediate recovery is desirable because friendly aircraft usually are in the area and enemy forces probably have not had the opportunity to react. The commander must consider certain factors when planning for immediate recovery such as—

- **Continuation of Mission.** Immediate recovery may take aircraft away from the primary mission. Commanders must consider the intent of the mission and decide if it is feasible to take an aircraft away from an ongoing mission to conduct immediate recovery mission. If the mission is an air assault, the aviation commander must consult with the air assault task force commander (AATFC) before executing immediate recovery. The aviation commander may designate an aircraft, piloted by maintenance officers, to conduct immediate recovery if required.
- **Pickup Aircraft.** Commander may designate specific aircraft, crewed by maintenance personnel, with the responsibility to conduct immediate recovery, or the responsibility may fall on the nearest aircraft in support of the downed aircraft. The commander must specify and select the aircraft to be used for immediate recovery during the planning process. The selected crew must receive specific, detailed instruction on the execution of an aircraft recovery.

- **Recovery Aircraft Location.** The aircraft designated for immediate recovery may be part of the mission and formation, or it may be an additional aircraft. The recovery aircraft should be positioned where it can best support the mission.
- **Army Airspace Command and Control.** Separate airspace control measures may be developed to allow DART aircraft to recover the aircraft without interfering with the ongoing mission. If the DART aircraft is designated as part of the mission fleet, effective C² must be established to de-conflict aircraft.

DELAYED RECOVERY

1-16. Delayed recovery is any recovery that cannot be conducted immediately by aircraft in the flight. Delayed recovery will be necessary when—

- Utility or cargo aircraft are not available in the flight.
- Enemy activity in the vicinity of the downed aircraft makes an immediate recovery too risky.
- Immediate recovery cannot be executed without adversely affecting the mission; for example, an air assault formation, loaded with ground troops, en route to the landing zone (LZ), with no dedicated maintenance aircraft.
- Location of the downed aircraft is not precisely known.
- JSRC directs the unit to conduct recovery of an aircraft from another unit, service, or coalition force.
- Damage to the aircraft is extensive, rendering it unable to fly.
- Location of the aircraft does not facilitate an aerial insertion/recovery.

1-17. A delayed recovery order also may be received from the JSRC to recover a downed aircraft from another unit, service, or coalition force. This operation would be planned as a completely separate operation and may involve using JSRC assets.

1-18. Whether planning a separate CSAR mission or planning an aircraft recovery mission, planning should include procedures for immediate and delayed CSAR/DART. (In other words, planning for a separate CSAR mission should include a contingency plan if an aircraft goes down while the CSAR mission is being conducted.) Aircraft designated as maintenance aircraft should be thoroughly integrated into all plans. Planning considerations for aircrews conducting a delayed recovery mission are as follows:

- **Downed Aircraft Recovery.** Availability of recovery aircraft and DART riggers to conduct downed aircraft recovery depends on the type of aircraft in the formation. All aircraft have external sling-load weight restrictions, which dictate the types of aircraft they can recover. A UH-60 Black Hawk can recover an OH-58 Kiowa, for instance, but can not recover another UH-60 or AH-64 Apache unless the recovered aircraft is stripped down to meet weight restrictions. The CH-47D Chinook is an exception, in that the CH-47D is capable of recovering any other Army rotary- and fixed-wing aircraft, to include another CH-47D. (See lift capability data in chap 2, paras 2-23 and 24.)

- **Standby Personnel and Equipment.** The aviation commander may depend on other units to have aircraft, DART riggers, and recovery equipment standing by for downed aircraft recovery. Equipment models will list external sling-load capabilities and weights for all aircraft. (See lift capability data in chap 2, paras 1-23 and 24.)

MAINTENANCE—DART TEAM

1-19. Aircraft recovery operations are time sensitive. Aviation unit maintenance (AVUM) and aviation intermediate maintenance (AVIM) units form DARTs from within their personnel assets. These teams should be skilled in BDAR and the use of rigging kits. The typical composition of a DART includes a maintenance officer/technician, technical inspector, repairer personnel, and vehicle operators.

1-20. A DART may perform any of the following actions:

- Assess repair requirements.
- Repair the aircraft or prepare it for a one-time evacuation mission.
- Recommend recovery by aerial or ground means.
- Rig the aircraft for recovery.
- Serve as the ground crew for helicopter lift.
- Serve as the crew to secure the load aboard a vehicle.
- If the aircraft is not repairable, determine which parts, subsystems, or components can be salvaged and remove them.
- Destroy, or take part in the destruction of, a disabled aircraft that is to be abandoned (according to TM 750-244-1-5, *Procedures for Destruction of Aircraft and Associated Equipment to Prevent Enemy Use*).

1-21. A DART may respond to the recovery of a downed aircraft from within the unit, a supported unit, an adjacent unit, or any aircraft that is disabled within a sector. Normally, the team is transported with their equipment by air to the scene of the disabled aircraft and extracted by air upon completion of the mission.

1-22. Aircraft that cannot be recovered and are in danger of enemy capture are destroyed according to TM 750-244-1-5. The authority for destruction will be included in standing operating procedures (SOPs) and operation orders (OPORDs). If possible, aircraft are cannibalized before destruction. The corps, on a mission basis, accomplishes recovery and evacuation of enemy, allied, and other US services aircraft using corps assets or by tasking division assets in sector.

1-23. Both delayed and immediate recovery missions normally are planned as a part of all flight operations, but are especially critical for cross-forward line of own troops (FLOT) operations. Commanders may be required to use internal assets to conduct a delayed aircraft recovery from their own unit, with or without additional detailed planning time. General procedures typically are covered in unit SOPs. (For example, the unit SOP may specify a radio frequency to be used, a color of light or smoke to be used for recognition,

and the last aircraft in the flight may be designated as the maintenance aircraft.)

1-24. Once the downed aircraft has been located and secured, the air mission commander will direct recovery aircraft to effect recovery. Ideally the downed aircrew will have—

- Dumped secure fills and data in all avionics and navigational equipment.
- Secured the sensitive items such as documents or equipment from the aircraft. (For example, these items may include radio frequencies, call signs, maps, graphic overlays, radio secure devices, or any classified material.)
- Prepared the aircraft for destruction if recovery will not be feasible.
- Avoided capture and reported enemy situation to friendly units.

1-25. Typically, the aircrew will be recovered either before or concurrently with recovery of the aircraft. When the aircraft recovery is attempted, according to the proper TM/FM, the sequence below typically occurs. This sequence may vary depending on the number of personnel on the ground, the size of the pickup zone (PZ), or other METT-TC factors.

- Security personnel will establish security around the downed aircraft.
- Person designated and trained to rig the aircraft will be inserted. The rigger(s) may be inserted using any one of several techniques. The rigger(s) may be landed in the PZ, rappel in on a rope lowered from the aircraft, use a “fast rope” lowered by the aircraft, lowered by forest penetrator, or climb down a rope ladder. The rigger(s) will have a sling set appropriate for the aircraft to be recovered.
- The rigger(s) will prepare the aircraft for recovery (i.e., tie down rotor blades, attach slings, and attach a stabilizing drogue chute).
- A rigging team member will signal the recovery aircraft that he is prepared to attach the slings, and attach a stabilizing drogue chute.
- A rigging team member will signal the recovery aircraft that he is prepared to attach the sling set to the recovery aircraft.
- A rigging team member will attach the sling to the recovery aircraft and then move away from the downed aircraft.
- A rigging team member will signal to the pilot that the load is attached and ready to be lifted.
- The pickup aircraft will lift the downed aircraft, and depart the PZ, en route to a designated drop off point, normally the unit’s maintenance facility.
- The rigger(s), and any other ground security and support personnel, will be recovered and all aircraft will depart the area to return to base.

1-26. Air mission commanders (AMCs) are required to submit a situation report when the recovery is completed and the aircrew and/or aircraft are departing the PZ and en route to the drop off point. The report will include

the status of aircrew members and downed aircraft if aircraft recovery is being attempted.

DART – SPECIFIC PLANNING CONSIDERATIONS

DART RESPONSIBILITIES

1-27. During combat operations, situations arise making the use of DART necessary. In such cases, the unit commander will authorize the use of DART plans and procedures. DART is an AVUM-level responsibility, with backup from supporting AVIM units. The concept uses specialized assessment criteria: repair kits, recovery kits, and trained personnel. The DART team provides the means and manpower to safely return damaged aircraft to the TAA as soon as possible. The DART mission is designed to multiply force capability in a combat environment by augmenting the existing peacetime maintenance system.

REQUIREMENTS AND PROCEDURES

1-28. The discussion below defines DART requirements and procedures at the AVUM level. Similar actions apply to AVIM DART teams when used as backup support.

- **Team Composition and Materials.** The DART team is formed from AVUM platoon assets. A typical team includes a trained inspector for damage assessment, two or three repairers (MOS 67/68), and a maintenance test pilot. The actual composition of a DART team, if it is an aerial recovery or BDAR mission, depends on the type and extent of maintenance work anticipated of that airframe.
- **Revised Aircraft Recovery Criteria and Procedures.** The team uses recovery kit, airframe shipping, and BDAR manuals; and this manual, which contains revised aircraft recovery criteria and specific procedures. These manuals are formally processed and validated publications for use in combat and noncombat environments, as authorized by the unit commander. (See the bibliography for applicable manuals.) The manuals provide this information:
 - Combat damage inspection and assessment techniques.
 - Combat area maintenance serviceability and deferability criteria.
- **Recovery Kits.** The DART team should have the specially designed recovery kits for aerial and ground aircraft recoveries. With the tools and materials in these kits, team members can make quick combat extractions of downed aircraft. Recovery kits are aerial transported internally or externally (sling load) and man-portable.
- **Prepermission Drills.** Prepermission drills should be conducted for the following tasks/teams:
 - Security team.
 - Aircraft loading/unloading on vehicle.
 - Repair team (BDAR).
 - Aircraft assessment.

INITIAL INSPECTION

1-29. The AVUM unit commander authorizes dispatch (normally airlift) of a DART team with manuals, recovery kit, BDAR kits, materials, and parts, as mission necessitates, to the site. The team's initial on-site inspection determines the actual extent of damage. It also provides information needed to determine which of the following alternatives apply:

- Augmentation of the DART with BDAR personnel and equipment.
- Rig aircraft for aerial or surface recovery and make necessary recovery arrangements (repair not feasible at repair site).
- Cannibalize critical components and abandon (recover at later time) or destroy aircraft (repair or recovery not feasible). The decision to destroy an aircraft will be based on the possibility of an abandoned aircraft falling into enemy hands (according to TM 750-244-1-5).
- Clear the aircraft for immediate return to battle, deferring minor damage repairs to a later time.
- Make permanent repairs, returning the aircraft to a completely serviceable condition.
- Make temporary repairs that will allow safe return of the aircraft to meet immediate battle needs, deferring higher standard permanent repairs to a later time.
- Repair the aircraft to allow a one-time evacuation mission back to a more secure and better resourced maintenance control point (MCP) or maintenance area.

AIRCRAFT BATTLE DAMAGE ASSESSMENT

1-30. A trained assessor will assess aircraft battle damage. One of the assessor's primary tasks will determine the location of the damaged aircraft relative to the battlefield and any immediate threat. Modern air defense threats may make aerial recovery in forward areas of the battlefield an impractical or unacceptably high risk. The ability to determine rapidly that a one-time evacuation mission is feasible or that a quick-fix repair is possible is important. It may prevent a situation in which the aircraft would otherwise be destroyed (in place) to prevent capture by, or compromise to, the enemy. Once the battle subsides, maintenance decisions are based on standard operational maintenance practices. It must be emphasized that deferment of maintenance tasks is a "fly now, pay later" concept. Postponing maintenance, when feasible, will provide the combat commander with increased availability for short periods only.

DART – CRITICAL PLANNING CONSIDERATIONS

1-31. The DART must consider the following items and plan for them carefully. It must be able to exit the battle area. Once the load is secured to the transporting aircraft, the risk to the aircraft recovery team must be minimized by expediting its egress.

1-32. The DART requires an armed escort, and proper coordination from the theater RCC must be established. The DART must—

- Have coordination for passage points if cross-FLOT.
- Know the location of Level II care and communication, and be familiar with the landing site at Level II care.
- Know all airspace available and have the ability to coordinate passage through adjacent airspace. To do this, the DART must know the—
 - Enemy situation.
 - Friendly situation.
 - Air routes.
- Be able to react timely because, if the DART mission is—
 - Conducted too long in time, the enemy has the potential of using the downed aircraft as bait.
 - Conducted too soon in time, the enemy system that downed the target aircraft will not be suppressed.
- Coordinate with any or all available assets to assess and mitigate enemy systems with the use of the following operations:
 - Suppression of enemy air defense (SEAD).
 - Close air support (CAS).
 - Escort with attack helicopter aircraft.
- Predetermine an evacuation site for the aircraft. The DART must place the aircraft at a location where they can work on the aircraft. The actual site does not need to be within the perimeter of the recovering unit. It can be a pre-selected site that allows access by ground vehicle, and is securable for the anticipated amount of time to repair or cannibalize the aircraft.
- Determine the answer to these questions:
 - Has the recovered aircraft or recovering aircraft been subjected to NBC contamination?
 - Has the recovered aircraft or recovering aircraft been subject to NBC contamination?
 - Is the aircraft still armed and have measures been taken to de-arm and/or safe the aircraft?
 - Is there fuel onboard and is the aircraft leaking fuel, oils, etc?

DART - EQUIPMENT AND MANNING CONSIDERATIONS

1-33. The aircraft will be transported either by—

- Ground: Crane, lowboy trailer with tractor, personnel transport vehicles, and recovery equipment, or
- Air: UMARK, I-UMARK, HERK, or ARK system kits with recovery aircraft.

1-34. The rigging team should be composed of a five-man team and be trained in all supported aircraft. The team will—

- Be equipped to perform attachment to recovery aircraft.
- Have personal protective equipment inspected, serviceable, and carried with each member.
- Have a static discharge wand inspected, serviceable, and carried with the team.
- Be trained with a recovery aircraft crew.
- Have one of the team members combat-lifesaver qualified.
- Under all missions, have C² established at the RCC.

RCC – SPECIFIC PLANNING CONSIDERATIONS

1-35. The decision to launch DART missions into potential hostile areas when aircraft are forced down is a critical one for the commander. This decision must be made rapidly, but with caution. Commanders must not risk losing more aircraft and crewmembers by committing assets into a high threat area. A commander must consider the factors of METT-TC when he plans, coordinates, and executes an immediate recovery, delayed recovery with his own assets, or delayed recovery using joint CSAR and DART assets.

1-36. The mission dictates the size and composition of the RCC staff. The RCC staff perform the following actions when they develop, coordinate, and execute rescue plans. They—

- Ensure that mission packages are developed and planned in parallel with the tactical mission.
- Manage the information flow to the mission packages: CSAR/DART or separate CSAR and DART package(s).
- Manage the information flow of the DART mission with augmentation of BDAR personnel if required.
- Integrate the enemy situation from the TF TOC into the downed aircraft decision making process.
- Receive resources from the task force; for example—
 - Aircraft and/or crews by tasking.
 - Security teams by tasking.
 - Vehicles by tasking (if required).
 - Communications (radios, frequencies, and call signs).
- Manage the execution of CSAR/DART mission or separate CSAR and DART mission packages. (See Fig. 1-2.)
 - Determine coverage areas from the combat service support graphics.
 - Determine the location on the battlefield for the AO. The following areas need to be planned and posted on maps: CSAR - entire battlefield; DART - from the FLOT, with the possibility of extending beyond to the TAA. Augmentation of DART with BDAR personnel usually is performed in secure or securable areas.

- Determine coverage schedules.
- Determine resource requirements.
- Can be the launch authority if so delegated.
- Determine recovery sites for evacuated aircraft.
- Determine disposition of downed aircraft based on METT-TC.
- Advise the TF commander if destruction criteria for aircraft have been reached. Pass information to the TF staff for destruction missions possibly from CAS or artillery support. Confirm that destruction missions are accomplished.
- Plan equipment for only that mission, which avoids multiple mission situations. As decisions become more complex, requirements cannot be met for combination missions. Plan for possible multiple mission situations.
- Plan for security: each mission has elements of security. Protect your force.
- Ensure that each package has defined triggers.
- Integrate missions so triggers are in place and launch decisions are made in a timely and accurate manner. Set the conditions for success.
- Ensure proper A²C² coordination. May request a no-fire area over that site to protect the assets that are there. May request the air corridors forward of the FLOT to avoid already flown routes.

BDAR – SPECIFIC PLANNING CONSIDERATIONS

1-37. During combat operations, situations arise that make expediting normal maintenance procedures imperative. In such cases, the unit commander will authorize the use of BDAR procedures. BDAR is an AVUM-level responsibility, with backup from supporting AVIM units. These concepts use specialized assessment criteria, repair kits, and trained personnel. It modifies peacetime aircraft maintenance standards to safely return damaged aircraft to battle as soon as possible. Often, such return-to-battle repairs will be temporary, necessitating future permanent follow-up actions when the tactical situation permits. The BDAR system is designed to multiply force capability in a combat environment by augmenting the existing peacetime maintenance system.

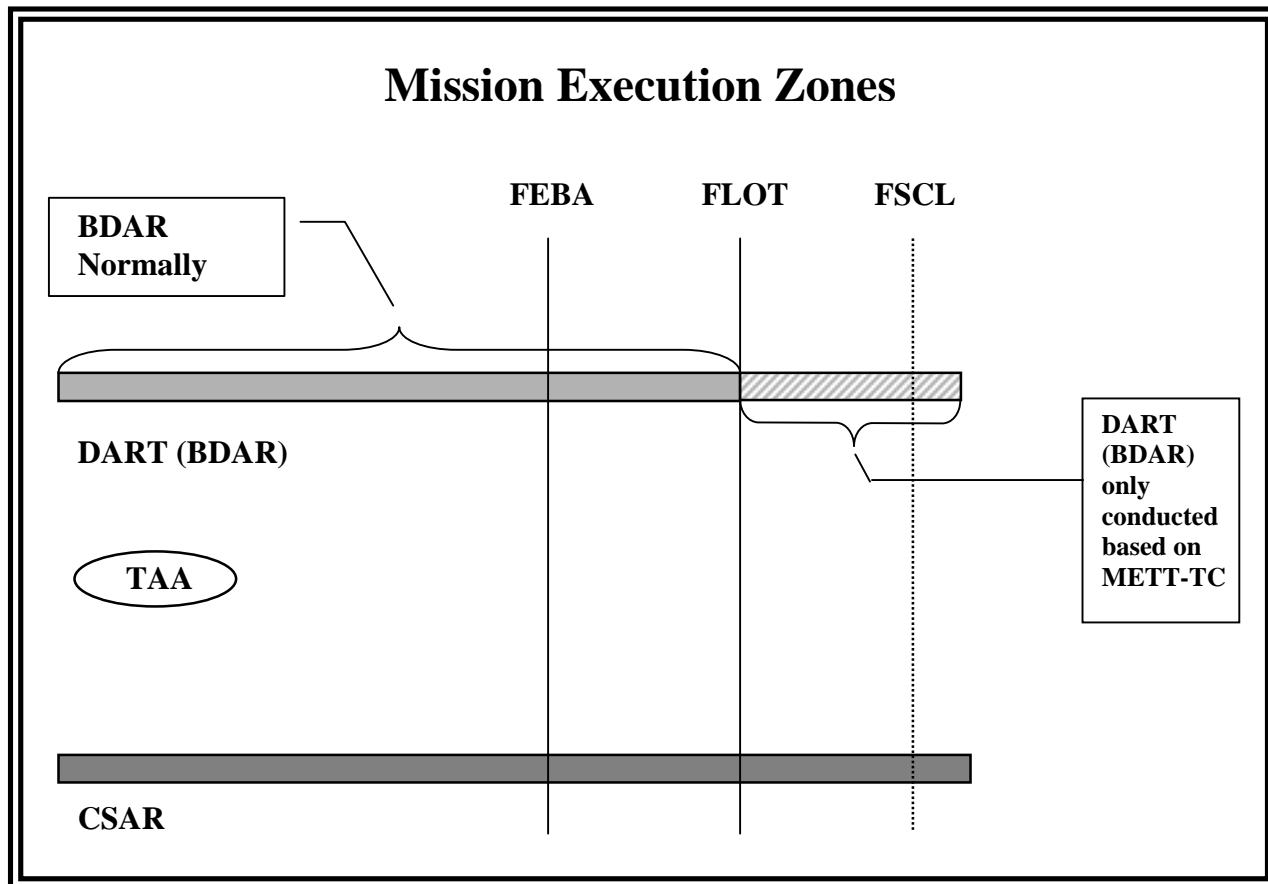


Figure 1-2. Mission Execution Zones

1-38. The following discussion defines BDAR requirements and procedures at the AVUM level. Similar actions apply to AVIM BDAR when used as backup support.

- **Composition and Materials.** BDAR personnel are formed from AVUM platoon assets, which augment the DART, dependent on mission type. Typically, the BDAR personnel are from the 68/35 MOS. The actual composition of BDAR personnel and equipment depends on the type and extent of maintenance work anticipated of that airframe.
- **BDAR Manuals.** BDAR will use manuals containing revised aircraft damage assessment criteria and repair procedures. These manuals are formally processed and validated publications for use in combat environments only, as authorized by the unit commander. Each type of aircraft has its own BDAR manuals that provide—
 - Combat damage inspection and assessment techniques.
 - Combat area maintenance serviceability and deferability criteria.
 - Cannibalization techniques that permit quick, efficient removal of critical components and structures from unrepairable and non-recoverable aircraft.

- **Combat Repair Kits.** BDAR personnel will use specially designed combat repair kits for repairing major aircraft systems. With the tools and materials in these kits, personnel can make quick, temporary combat-damage repairs. Kits are man-portable (suitcase-sized).

BDAR – EQUIPMENT AND MANNING CONSIDERATIONS

1-39. The items to be considered for BDAR equipment and manning are as follows:

- BDAR kits.
- BD manuals.
- AVUM and AVIM allied shop support.
- Aircraft assessment according to resources available.
- Minimum repairs necessary performed according to BD manuals.

PREPARATION PHASE

1-40. Preparation is divided into two phases: Pre-deployment preparation and Pre-combat checks/Pre-combat inspections (PCCs/PCIs) as follows:

- Pre-deployment preparation phase, which should be integrated into the units' pre-accident plan, includes addressing all of the items mentioned below.
- Preparation for each individual mission phase, which should include PCCs/PCIs covering the same points as the pre-deployment preparation phase, with the addition of mission-specific variables.

DART PREPARATION

1-41. The DART is prepared as indicated below. Successful DART missions require team rehearsals to iron out last-minute details and any unforeseen necessary adjustments. The DART must determine that—

- The aircraft assigned is available and suitable for the mission; for example:
 - The hours that the aircraft is available are known.
 - The possible flight hours that could be consumed that day are known. (No scheduled services should come due during that time.)
 - The performance capabilities should already be figured for that mission day; for example, the aircraft can lift the proposed loads.
 - A cargo hook is available.
 - The internal configuration is known.
 - The crew seats for the aircraft recovery crew are available.
 - The space for the selected type recovery kit is available.
 - The crew seats for security team are available.

- The communication plan has been made. (See Fig.1-3.)
- The external load configurations (sling load) are known.

Communication	Medium
Assessor to RCC	FM/UHF/VHF/HF. FM is probably primary unless RCC is equipped with UHF/VHF radios.
RCC to DART (BDAR)	REDCON – Landline or radio (A&L) En route - AMC command frequency

Figure 1-3. Communication Plan

- The team members—
 - Are composed correctly. The DART will outline specific tasks for each individual with cross-checks to minimize time on the ground.
 - Are trained. The DART will rehearse entering and exiting the aircraft and using night vision devices (NVDs).
 - Can expand and collapse a security perimeter. The DART (DBAR) will practice using covering fire.
- The after action review (ARR) has been prepared. The DART (BDAR) will determine whether the DART (DBAR) functioned as intended or if they could improve.
- The mission plan has been refined and adjusted to achieve goals.
- Handling the additional workload generated by hostile fire has been practiced.
- The unit’s ability to identify, evaluate, and categorize battle damage has been redefined.
- Load plans for additional expendable supplies required for repairing aircraft have been refined.
- The assessors are familiar with the proper BD manuals.
- Last repairs have been looked at. Determine if there is a need to re-look at how the repairs were completed. Were they timely, appropriate, and within the team’s capabilities? Look at people, parts, and tools; then refine, innovate, and anticipate changes.

PRE-COMBAT CHECKS/PRE-COMBAT INSPECTIONS

DART

- 1-42. DART PPCs/PCIs include, but are not limited, to—
- Recovery kits (UMARK, I-UMARK, HERK, or ARK) inventoried/inspected.
 - Personnel qualified/trained/rehearsed.
 - Weapons.
 - Aircraft weight estimates for downed aircraft.

- Battle graphics on maps.
- Safety procedures for armed downed aircraft.
- Drop off areas for recovered aircraft identified.

BDAR

1-43. BDAR PPCs/PCIs include but are not limited to—

- Expendable supplies. Allied shops have proper expendable supplies (rivets, sheet metal stock, hydraulic lines, swedge kit, K-747 blade repair kit, hysol products, paint , etc.).
- Personnel management. These questions pertain to BDAR personnel:
 - How many sheet metal personnel do I have?
 - How many pneudraulics personnel do I have?
 - Am I identifying the critically short MOSs and managing their time for maximum effect on my fleet. Is my only engine man assigned as a driver?
 - Do I have appropriate logistics assistant representatives (LARs) support for the hard decisions and for letters of exception (if required)?

SANITIZATION OF AIRCRAFT

1-44. Sanitization of aircraft is the process of taking the necessary measures to ensure the area around the downed aircraft is secured and remains secure. Air or ground assets, or a combination of both, are used.

- Maintenance personnel must ensure communication equipment, maps, navigation aids, critical mission equipment are secured, zeroized, or destroyed to prevent enemy compromise.
- Medical personnel will evacuate and treat casualties. The guards and gunners must understand the setup of their defensive perimeter. Sanitization of the aircraft is critical in performing recovery missions; therefore, the area around the aircraft must be secured and necessary actions performed as outlined below:
 - Organize and coordinate for armed escort aircraft.
 - Provide a ground security team, path finders, and local unit personnel.
 - If the aircraft is armed, make sure nothing is in front of the aircraft and safe weapon systems.

1-45. This paragraph outlines the assessor actions on arrival at the downed aircraft site. (The technical inspector (TI)/maintenance test pilot (MTP)/subject matter expert (SME)) upon arrival at downed aircraft site—

- Identify immediate dangers (fire, armament, fuel leakage, and electrical sparks).

- Approach from either wing position, outside of surface danger areas, according to the applicable aircraft Aircraft Operator's Manual (Technical Manual (TM) –10).
 - Safe weapons and external stores (if applicable).
 - HMMS Launcher Safe/Arm to Safe (missile locking lever release).
 - Ground M-261 rocket pods; remove possibility of firing voltage by disconnecting electrical cannon plug on rocket pod.
 - Insert wing stores ground safety pins.
 - On area weapon system, disconnect electrical cannon plug on 30mm/50 cal. machinegun.
 - Turn master arm switch in pilot station to OFF position.
 - Disconnect aircraft battery.
 - Remove KY-75 and KY-100.
 - Remove Kit-1C, KY-58 from avionics bay(s).
 - Randomize or remove M-130 control module settings.
 - Turn pilots' power levers, thrust levers, or collective throttle to the "Off" position.
 - Zero data, keys, and frequency fills for all radios.
 - Remove or zero the APX-100 transponder settings.
 - Remove or zero data, keys, and waypoint settings from the doppler, global positioning system (GPS), and data transfer cartridge.
 - Remove all maps, kneeboards, strip maps, signal operation instructions (SOIs) from cockpit.
 - Remove AN/ALQ-156 and AN/ALQ-162.
 - Remove AN-ALQ-136 from aircraft.
 - Remove or destroy AN-ALQ-144 from aircraft.
 - Remove AN/APR-39 and AN/AVR-2 threat signature card from AN/APR-39 and AN/VDR-2 digital processor or comparator.
 - Remove the data transfer cartridge from the data transfer unit.
 - Continue assessment of aircraft.
- 1-46. Guards/Gunners (PCCs/PCIs) will ensure—
- PCC/PCI weapons loads are appropriate.
 - PCC/PCI weapons are serviceable and test fired.
 - Fields of fire are interlocked.
 - Fields of fire are integrated with the aircraft mounted weapons (if applicable).
 - Fields of fire are oriented on the most likely avenue of approach.
 - The security team members have rehearsed exiting the aircraft, setting up a perimeter, and collapsing the perimeter and entering the aircraft.

- The security team has established C² signals, audible or visual, for use at the downed aircraft site for communication between the team members, and aircrew of the recovery aircraft.

MISSION EXECUTION TRIGGERS

TRIGGERING CONDITIONS

1-47. Triggering conditions for an immediate recovery operation are a visual sighting of an aircraft going down or a radio report of an aircraft within the flight going down. Immediate recovery can occur only if the friendly aviation unit has utility or cargo aircraft and or maintenance personnel within the flight designated or dedicated as maintenance aircraft. (See Fig. 1-4.)

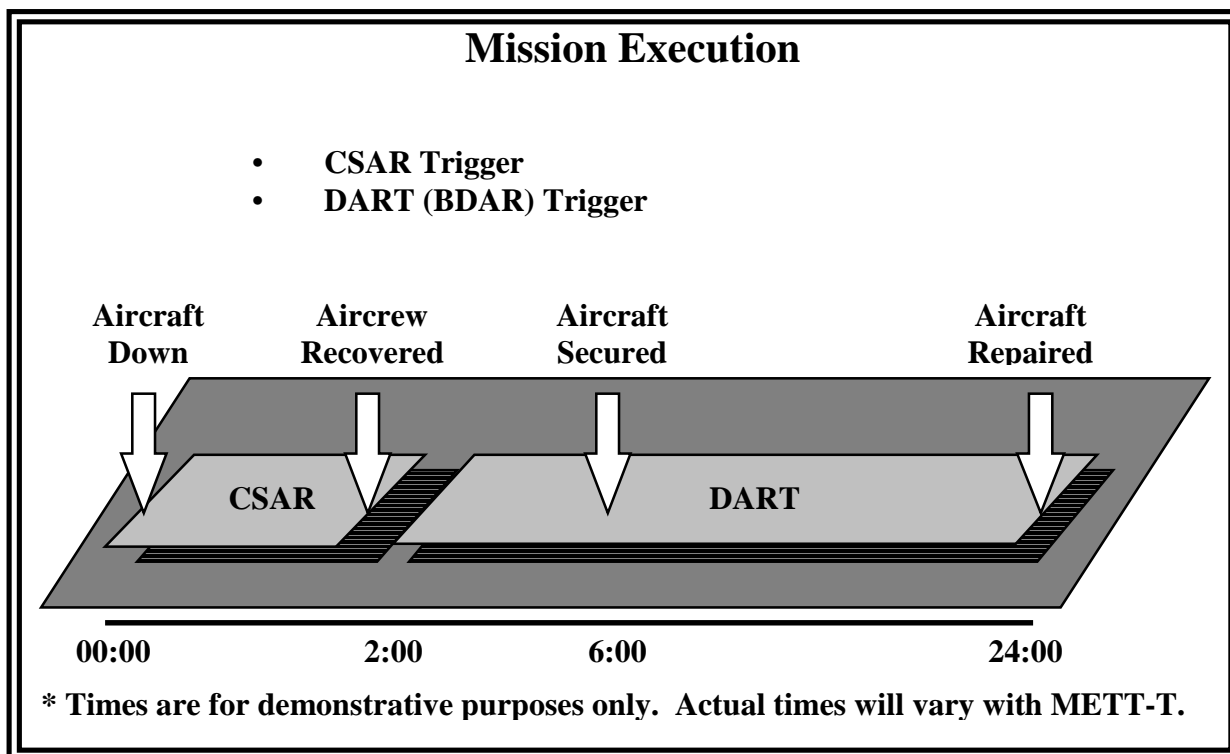


Figure 1-4. Execution of the CSAR/DART (BDAR) Mission

1-48. Either one or two different circumstances may trigger planning for downed aircraft recovery operations.

- Mission planning for any flight will trigger contingency planning for immediate and/or delayed downed aircraft recovery operations by the aviation unit. Planning will be implemented if one of the aircraft taking part in the operation goes down.
- The aviation unit may be directed by higher headquarters to conduct DART (BDAR) operations to recover aircraft belonging to some other unit, service, or coalition force. Planning for a DART (BDAR) operation also includes contingency planning for immediate or delayed recovery operation for the aircraft taking part in the DART (BDAR) operation.

CSAR TRIGGER

1-49. Triggered by aircraft being downed (See Fig. 1-5)—

- The RCC launches aircraft on command from TOC or flight operations.
- The Air Mission Commander (AMC) coordinates the use of CSAR aircraft during the mission. CSAR aircraft would be cross-FLOT and may or may not be with supported aircraft during the mission. It is feasible to place in a lager site if the tactical allows it.

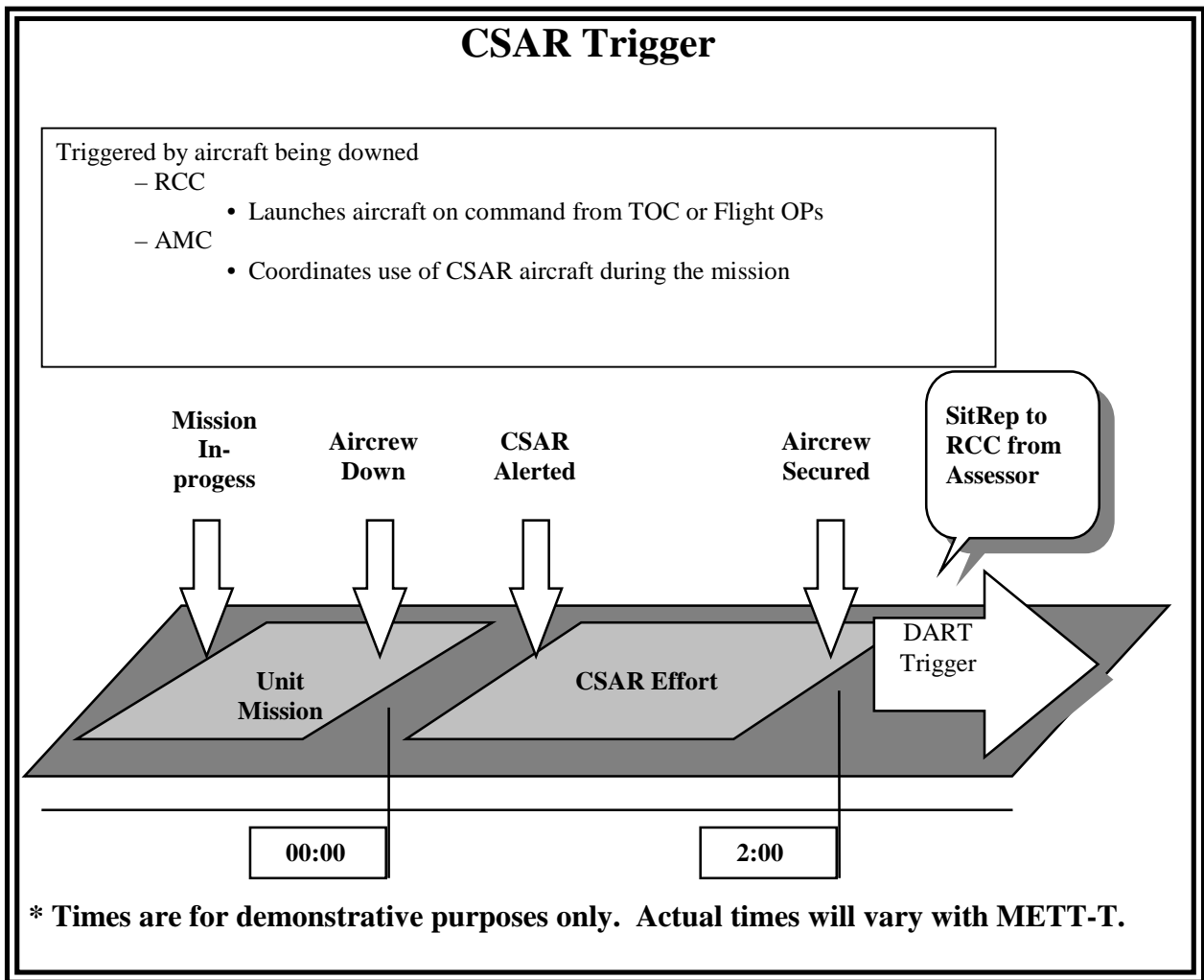


Figure 1-5. CSAR Trigger

DART/BDAR TRIGGER

1-50. Triggered by a CSAR assessor, a typical spot report is sent from assessor in the CSAR aircraft to the RCC. (See Fig 1-6.) The spot report covers the following:

- Aircraft Condition.

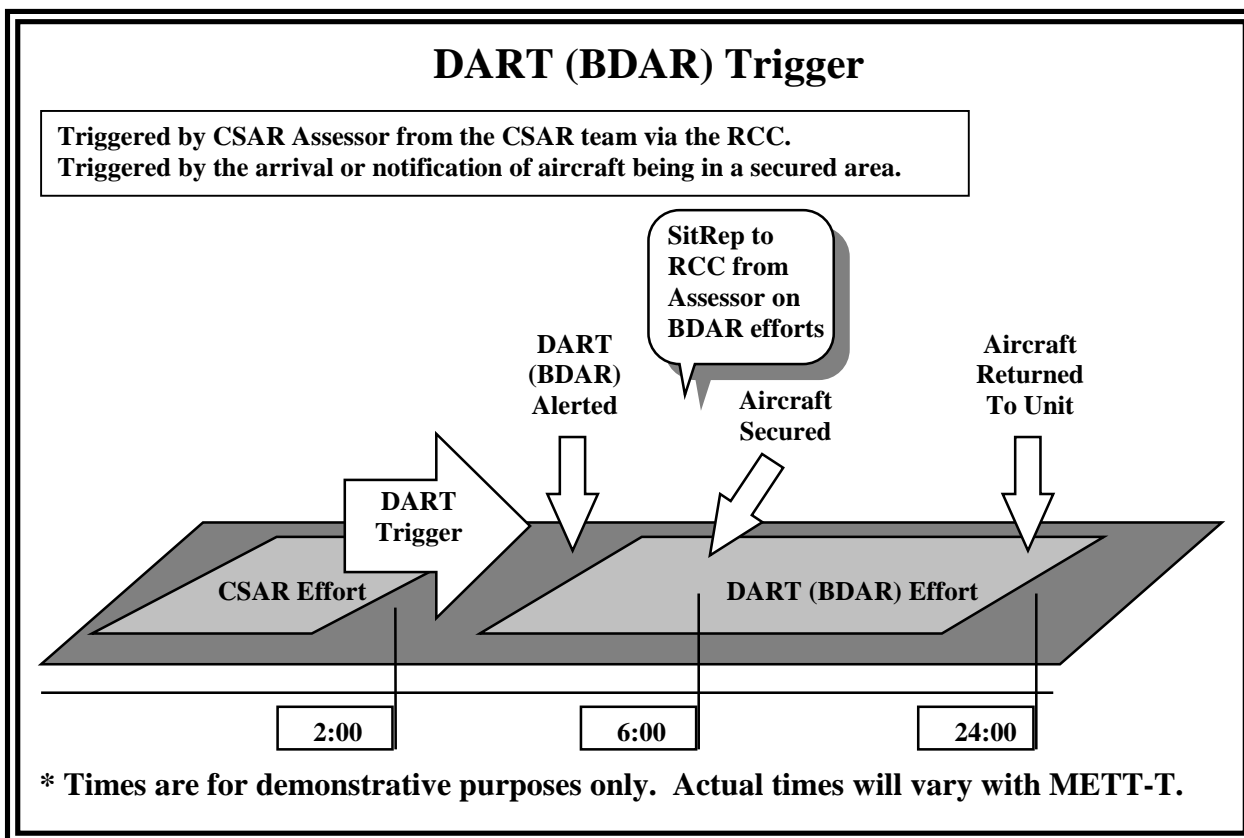


Figure 1-6. DART (BDAR)

- CAT I – Aircraft is repairable. It is possible to repair the aircraft on site by bringing resources to it. The only hindrance to this course of action may be the tactical situation on the battlefield. {In other words, there is not enough time to perform the repairs before the amount of support (tactical) exceeds what you have on hand. For instance, do not use an infantry battalion to help secure the area against the enemy who is threatening while someone changes the nose gearbox}.
- CAT II – The aircraft is recoverable. The aircraft still has intrinsic value; the engines are a good example. Assume that the aircraft lost all hydraulic fluid and managed to land after further flight was not possible. Assume that the crew managed to get the engines shut down, but the landing was a little hard; in other words, no sudden stoppages were involved. In this instance, the engines are both still good as is the possibility that the nose gear box, transmission, drive shafting, and all of the various weapon systems sub components are also. All of those items are recoverable. The fuselage was a little banged up on landing. As an aircraft, the entire airframe is an asset. Probably the most prudent decision would not be to “blow in place.” This aircraft would be a prime candidate for an aerial recovery.

- CAT III – The aircraft is destroyed. Why bother risking assets?
The aircraft is assessed as destroyed and the crews have been recovered.
- Aircraft location.
- 8 to10-digit grid.
- 10-digit grid for artillery destruction mission.
- Triggered by the arrival or notification of the aircraft being in a secured area.
- Brief elaboration of the remaining components that are worth being cannibalized.

CSAR/DART (BDAR) DECISION MATRIX

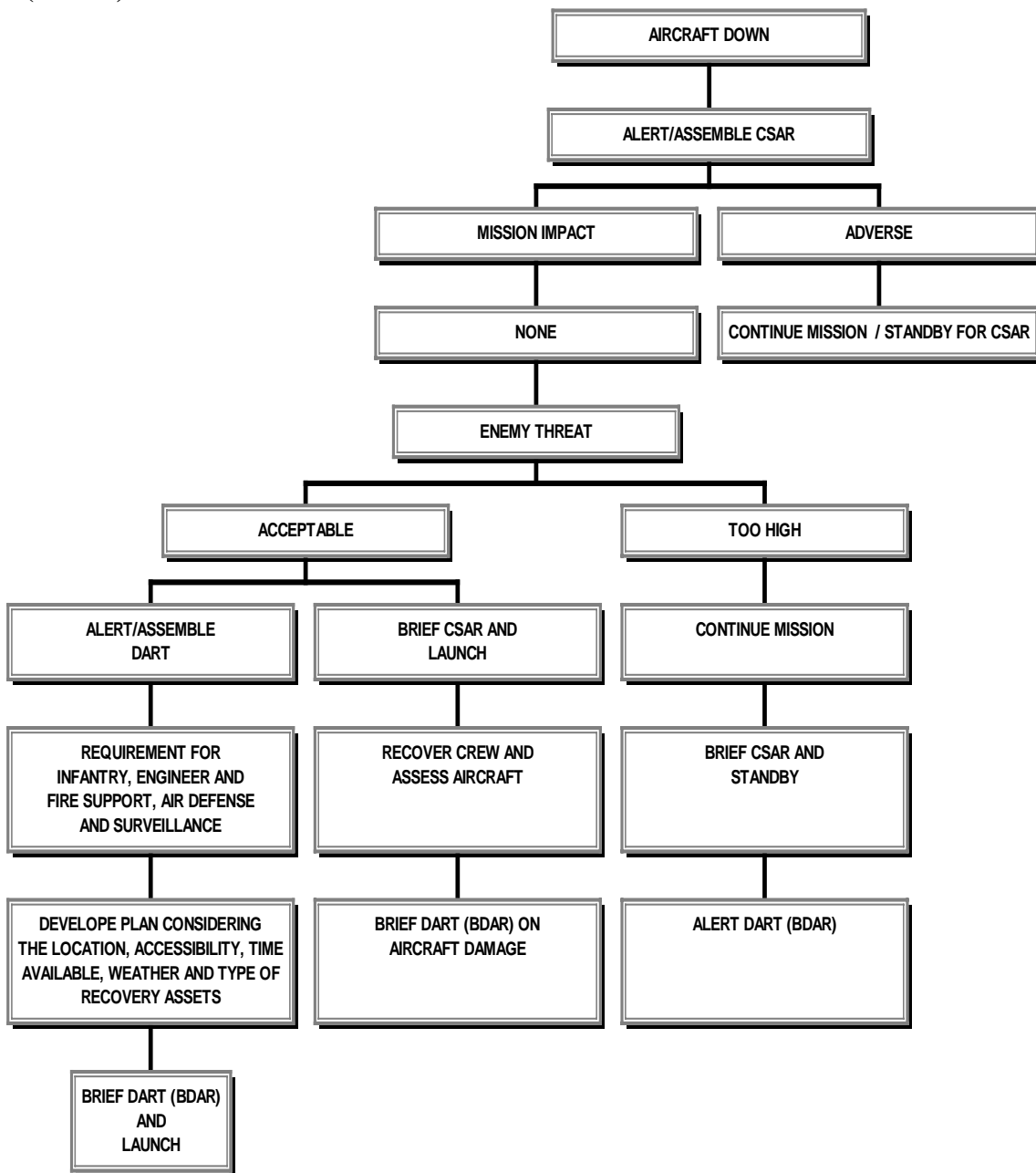


Figure 1-7. CSAR/DART (BDAR) Decision Matrix

MISSION END STATE

CSAR

1-52. Extraction of the crew is primary; aircraft assessment is secondary. The CSAR mission is designed to—

- Provide for the safe recovery of the downed aircrew.
- Return the aircrews to Level II medical care if appropriate.
- Re-integrate the aircrew into the unit.

DART

1-53. The DART is primarily for the extraction of aircraft, not for transport of repair teams. The DART mission may be augmented with BDAR personnel (dependent on METT-TC) for the sole purpose of BDAR procedures. Recover the airframe if—

- The aircraft is worth recovering.
- The tactical situation allows recovery.

BDAR

1-54. BDAR is not actually a mission. BDAR is a method of returning the aircraft to the commander as a resource. It —

- Is preferably performed in a secured area.
- Brings security to aircraft or bring aircraft to security.
- Is deferment.
- Is short term.
- Is long term.
- Is best performed where all the necessary tools and equipment are.
- Is setting the conditions for success.