

Appendix F

Recovery and Evacuation of Aircraft

The loss of an aircrew and/or airframe affects 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 ORF assets. This appendix provides the relationship of CSAR to DARTs, and BDAR personnel augmentation to DART missions. Refer to FMs 3-04.513 (1-513) and 3-04.113(1-113) for additional information on CSAR and DART/BDAR mission specifics.

BATTLEFIELD MANAGEMENT

F-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 JP 3-50.2 and in JP 3-50.21 Airspace control can be found in JP 3-52.

EXTRACTION/RECOVERY PRIORITIES

F-2. According to FM 3-04.113(1-113), the CSAR 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.

F-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

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

- **Combat Search and Rescue.** 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. Refer to FM 3-04.113(1-113).

- **Downed Aircraft Recovery Team.** 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 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. Refer to FM 3-04.513(1-513).
- **Battle Damage Assessment and Repair.** 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. Refer to FM 3-04.513(1-513).
- **Maintenance Evacuation.** Maintenance evacuation is the physical act of moving an aircraft from one maintenance location on the battlefield to another. Movement is either by fly-out or aerial/ground recovery means. Evacuation is to effect repair, cross-level maintenance workloads, or relieve units of disabled aircraft during tactical moves.
- **Rescue Coordination Center.** The Army component commander plans, coordinates, and directs the execution of CSAR and DART operations and establishes an RCC within the commander's 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.
- **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 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 METT-TC, the assessor can, when appropriate, provide a more detailed assessment.

AIRCRAFT RECOVERY

F-5. Equipment supporting combat operations is normally repaired forward as rapidly as possible; however, sometimes this is not possible. Commanders must plan for recovery operations in cases where aircraft are not repairable in the operations area. When damages exceed the immediate repair capabilities of maintenance units, including BDAR procedures, the aircraft must be recovered.

F-6. Aircraft recovery operations move inoperable aircraft from the battlefield to a MCP or maintenance unit location. Aircraft that cannot be repaired for self-powered recovery from the down site are moved directly to the first appropriate MCP or maintenance activity by another aircraft or surface vehicle. In contrast to aircraft recovery, aircraft evacuation is the movement of an inoperable aircraft between maintenance points to a higher echelon of maintenance. This normally occurs when, in consideration of METT-TC, necessary repairs to aircraft are beyond the capability of the lower echelon of maintenance.

PUBLICATIONS

F-7. FM 3-04.513(1-513) provides detailed procedures for preparing and performing aerial recovery operations for specific aircraft. FM 3-04.120(1-120) provides doctrinal guidance on the requirements, procedures, and C² tasks involved in planning, coordinating, and executing the airspace control function.

RESPONSIBILITY

F-8. Aircraft recovery is the responsibility of the operational aviation unit, using its AVUM element within the limits of its organic lift capability. Supporting AVIM units provide backup recovery support when recovery is beyond the AVUM team's capability. Successful recovery operations require a highly coordinated effort between the owning organization, its AVIM support, the ground element in whose area the recovery will take place, and any organization that may provide aircraft or vehicle assets to complete the recovery. Overall, control of the recovery rests with the TOC of the aviation brigade.

PLANNING

F-9. Recovery operations and, to a lesser degree, maintenance evacuations, are easily detected and subject to attack by enemy forces, regardless of combat intensity. Command, control, and coordination to support aircraft recovery operations are planned in advance within the context of the size of the force and the density of recovery assets at the disposal of commanders. Aircraft recovery procedures are included in unit SOPs, contingency plans, operation orders, and air mission briefings.

SPECIAL ENVIRONMENTS

F-10. Recovery operations in the NBC environment pose special risks to personnel, which can be minimized through the wearing of protective clothing by the recovering crew at the scene of the disabled aircraft. Also, the receiving crew at the maintenance site should wear protective clothing because of possible contamination of the disabled aircraft, the recovering aircraft, and rigging sets. Night recovery operations increase hazards and the

need for security. Increased risk must be weighed against the urgency considering time, weather, and the tactical situation.

AIRCRAFT COMMANDER AND AIRCREW

F-11. 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 allows. 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 the following information:

- The following critical information is required:
 - 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 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.
- The following information is the minimum required for in-flight emergencies:
 - Aircraft identification and type.
 - Nature of emergency.
 - Pilot's desires.
 - Aircraft position (grid or latitude and longitude coordinates).
- 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 IFR flight.
 - Time and place of last known position.
 - Heading since last known position.
 - Airspeed.
 - Navigation equipment capability.
 - NAVAID signals received.
 - Visible landmarks.
 - Aircraft color.

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

INITIAL INSPECTION

F-12. 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 MCP or maintenance area.

ASSESSOR

F-13. A trained assessor will 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 onetime flight is feasible or that a quick-fix repair is possible is important. It may prevent a situation where 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, where feasible, will provide the combat commander with increased availability for short periods only.

RECOVERY AND EVACUATION TEAM

F-14. Each AVUM organization will prepare for aircraft recovery contingencies by designating an aircraft recovery team. The DART is dispatched to downed aircraft sites as the situation requires and as the intensity of the conflict allows. Capabilities and decisions for recovery missions on the hostile side of the FLOT differ considerably from those on the friendly side.

F-15. The DART usually consists of maintenance personnel, a maintenance test pilot, an aircraft assessor, and a TI. (The TI may also be the assessor.) All will be trained to prepare aircraft for recovery. The team chief ensures that appropriate rigging and recovery equipment is kept ready for quick-notice recovery missions. The team's size and composition depend on the type and size of disabled aircraft, type of recovery aircraft or vehicle, and length of time the recovery area will be accessible. At times dictated by local circumstances, one team may function as both the BDAR team and the recovery team, performing both functions.

TEAM COMPOSITION AND MATERIALS

F-16. Aircraft recovery operations are time sensitive. AVUM and AVIM units form DARTs from within their personnel assets.

F-17. 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).

F-18. 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.

F-19. 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 SOPs and 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.

F-20. Both delayed and immediate recovery missions normally are planned as a part of all flight operations, but are especially critical for cross-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.)

BATTLE DAMAGE ASSESSMENT AND REPAIR

F-21. 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. The concept uses 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. The following discussion defines BDAR requirements and procedures at the AVUM level. Similar actions apply to AVIM BDAR teams when used as backup support.

TEAM COMPOSITION AND MATERIELS

F-22. The BDAR 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 team given a specific BDAR mission depends on the type and extent of maintenance work anticipated.

F-23. The team will use BDAR 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 the following:

- 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 nonrecoverable aircraft.

F-24. The BDAR team will be provided with specially designed combat repair kits for repairing major aircraft systems. With the tools and materials in these kits, team members can make quick, temporary combat-damage repairs. Kits are man-portable (suitcase-sized).

SURFACE RECOVERY

F-25. Surface recovery and evacuation uses ground equipment and wheeled vehicles to move disabled aircraft to a MCP or maintenance facility. Planning a surface recovery follows these logical steps:

- Evaluate the downed aircraft.
- Determine the equipment and transportation needed to recover it.
- Perform a thorough reconnaissance and evaluate available ground routes to and from the recovery site.

Then expand these steps to include characteristics of the recovery site and special tactical considerations, for example:

- Likely enemy avenues of approach.
- Minefields and actions to minimize the danger of booby-traps in downed aircraft.
- Tactical cover.
- Need for troop or aerial escort to protect against ambush.

ADVANTAGES

F-26. Surface recovery restricts the enemy's ability to detect movement of recovery assets to an area relatively close to the movement routes. It can be used when weather conditions prohibit flight. In addition, the threat of total loss of the aircraft during transport because of recovery equipment malfunction is low.

DISADVANTAGES

F-27. Surface recovery may tie up route security assets badly needed elsewhere. The time needed for surface recovery is much greater than for aerial recovery. Recovery personnel and equipment assets are tied up for long periods. This relatively high exposure time on the battlefield with slow-moving equipment increases the threat. Also, a significant amount of aircraft disassembly or modification is often required to adapt the aircraft to surface travel; for example, the shortening of height dimensions to accommodate overhead road clearances or the fabricating of extensions for trailers because the aircraft wheelbase is too wide. Ground routes must be accessible, and meticulous reconnaissance of the route is required. Loading procedures and travel on rough terrain can cause further damage to the aircraft.

AERIAL RECOVERY

F-28. Aerial recovery involves attaching the aircraft to suitable airlift recovery equipment, connecting it to the lifting helicopter, and flying it to the MCP or maintenance area. All helicopters must be rigged according to applicable manuals (see FM 3-04.513[1-513]). Again, planning for this type of recovery entails thorough analysis of the recovery site and the threat associated with relatively slow air movement over a battlefield. Medium-lift helicopters will be required for heavier-type aircraft aerial recoveries.

ADVANTAGES

F-29. Aerial recovery reduces the time recovery assets are tied up and exposed to the battlefield. Route reconnaissance and security escort requirements are considered less, as is the need for aircraft disassembly. Recovery site accessibility requirements are not as rigid. The distance from which recovery assets may be obtained is much greater.

DISADVANTAGES

F-30. The possibility exists for complete loss of aircraft through failure of recovery equipment. Although exposure time is less, the distance from which recovery activities are detectable is much greater. Loss of recovery assets through enemy action will more severely degrade total force fighting capabilities. This is due to the multiuse value and relative low density of airlift helicopters, particularly medium-lift helicopters, compared to ground recovery vehicles.

OUTLINE OF AIRCRAFT RECOVERY AND EVACUATION STANDING OPERATING PROCEDURE

F-31. Figure F-1 is a sample format for an aircraft recovery and evacuation SOP. (Refer to FM 3-04.513[1-513] for detailed example of aircraft recovery and evacuation SOP.)

1. **NAME**

Head the SOP with the names of the organization and the station, the date, and the SOP number.

2. **PURPOSE.**

This SOP establishes policies and procedures for aircraft recovery (surface and aerial) and for the evacuation of aircraft from one maintenance facility to another.

3. **RESPONSIBILITIES**

The responsibilities for aircraft recovery are as follows:

- *Owning Unit.*
 - Commander
 - Maintenance officer
 - Recovery team
 - BDAR team

- *Supporting unit (AVIM)*

4. **TRAINING REQUIREMENTS**

5. **RECOVERY OPERATIONS**

6. **SAFETY CONSIDERATIONS**

Figure F-1. Sample Format for an Aircraft Recovery and Evacuation SOP