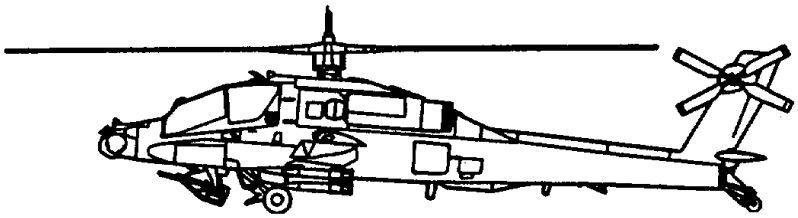

TECHNICAL MANUAL

BATTLEFIELD DAMAGE ASSESSMENT AND REPAIR

FOR
HELICOPTER, ATTACK,
AH-64A APACHE
(NSN 1520-01-106-9519)
(EIC: RHA)

HEADQUARTERS, DEPARTMENT OF THE ARMY

15 MARCH 1996

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WASHINGTON, D.C., 15 March 1996

NO. 1-1520-238-BD

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you.

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HOW TO USE THIS MANUAL

This manual has been developed to assist the soldier in a battlefield environment to make assessment and repair of battle damage on the Army AH-64A Apache attack helicopter which cannot, due to asset availability or environmental factors, be repaired in the normal prescribed manner.

Within this technical manual, the word shall is used to indicate a mandatory requirement. The word should is used to indicate a non-mandatory but preferred method of accomplishment. The word may is used to indicate an acceptable method of accomplishment. The word will is used for declaration of purpose.

Warnings, cautions, and notes are used to emphasize important and critical instructions and are used for the following conditions:

WARNING

An operating procedure or practice, which if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure or practice, which if not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure or condition, which is essential to highlight.

This manual contains a general information chapter (Chapter 1), eighteen specific repair chapters for each major functional group (Chapters 2 thru 19), six appendices, a glossary, and an index.

The major functional group chapters in this manual correspond with the functional groups of the TM 1-1520-238-23 series manuals that are employed in routine peacetime repairs to the AH-64A helicopter. Each functional group chapter is organized as follows:

a. Section I - Introduction.

(1) Scope. Purpose and application of the chapter.
(2) System Description and Location. Description of system and subsystem components and their location in the aircraft.
(3) Assessment Procedure. Assessment of damage to the system and determine if deferment, repair, or non-repair will be applied.
(4) Serviceability Criteria. General and specific serviceability criteria used in evaluation of system components.
(5) Cannibalization Criteria. List of critical components of the system that should be salvaged from crippled aircraft.
(6) Repair Procedure Index. List of all applicable repair tasks within the chapter.

b. Section II - Repair Item.

(1) General. Nature and cause of the damage and repair.
(2) Repair Item and Trouble.

(a) Limitations of repair.
(b) Personnel/time required for repair.
(c) Materials/tools required for repair.
(d) Procedural steps to perform repair.

(3) Options. If more than one method of repair can be utilized, the various options will be listed. The first option is the preferred repair method, the second option is the next preferred, etc. Selection of the option should be the most preferred method possible under the circumstances and with the materials and manpower available.

HOW TO USE THIS MANUAL - continued

c. Finding Repair Procedures in this Manual.

When the damage is obvious and known, find the functional group chapter of which the damaged item is a part. Turn to the repair procedure index and locate the item being repaired. Then turn to the appropriate repair section and review each option to ascertain the appropriate fix. Read the entire section for the option, then perform the repairs following the procedures given. If the chapter does not have a repair procedure for that specific system/component, refer to the manual(s) listed for repair of the system/component.

d. Preparation.

Each mechanic/technician shall read Chapter 1 and shall be familiar with the repairs and layout of the manual prior to attempting any BDR repairs. All warnings, cautions, and standard safety precautions shall be followed, inasmuch as possible, at all times during BDR procedures so as not to further damage or jeopardize either personnel or equipment during or subsequent to the BDR action. Ensure all documentation is completed as directed in this manual and by local command.

e. Expendable Supplies and Materials.

Each fix or repair option contains a list of materials and tools considered basic to the repair. It is important to note that the expendable materials listed usually cover a wide range for any one item. One of the key points concerning successful BDR repairs is flexibility. The users of this manual should strive to use the items on hand, provided a safe repair is made. The stringent requirements of peacetime maintenance are usually lifted in a combat environment.

SAFETY SUMMARY

This publication describes physical and chemical processes which may require the use of chemicals, solvents, paints, or other commercially available material. The user of this publication should obtain the material safety data sheets (Occupational Safety and Health Act (OSHA) Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. The user must become completely familiar with the manufacturer/supplier information and adhere to the procedures, recommendations, warnings, and cautions of the manufacturer/supplier for the safe use, handling, storage, and disposal of these materials. The following are general safety precautions and instructions that people must understand and apply during many phases of operation and maintenance to ensure personal safety and health and the protection of DOD property. Portions of this safety summary may be repeated elsewhere in this publication for emphasis.

WARNING AND CAUTION STATEMENTS

WARNING and CAUTION statements have been strategically placed throughout this text prior to operating or maintenance procedures, practices, or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION). A WARNING or CAUTION will apply each time the related step is repeated. Prior to starting any task, the WARNINGS or CAUTIONS included in the text for that task will be reviewed and understood. Refer to the materials list figure at the beginning of the appropriate manual section for material used during maintenance of this equipment. The detailed warnings for hazardous material only are listed separately in the safety summary as the "Hazardous Materials Warnings" section.

HAZARDOUS MATERIALS WARNINGS

Warnings for hazardous material in this manual are designed to warn personnel of hazards associated with such items when they come in contact with them during actual use. For each hazardous material used, a material safety data sheet (MSDS) is required to be provided and available for review by the users. Consult your local safety and health staff concerning any questions on hazardous chemicals, MSDSs, personal protective equipment requirements, and appropriate handling and emergency procedures. This Hazardous Materials Warnings section gives the complete warnings for hazardous material used in this manual. To help the user understand the potential hazards of these materials, a more detailed warning for these materials and an explanation of the hazard symbols follow.

EXPLANATION OF HAZARD SYMBOLS

The rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.

The symbol of a flame shows that a material can ignite and burn you.

The symbol of a human figure in a cloud shows that vapors of a material present a danger to your life or health.

The symbol of drops of a liquid onto a hand shows that the material will cause burns or irritation of human skin or tissue.

The symbol of a person wearing goggles shows that the material will injure your eyes.

CHAPTER 1
GENERAL INFORMATION

BDAR TM PROCEDURES. THE EXPEDIENT REPAIR PROCEDURES IN BDAR TM ARE FOR USE IN COMBAT ONLY. STANDARD MAINTENANCE/REPAIR PROCEDURES ARE TO BE USED AS SOON THEREAFTER AS POSSIBLE.

Section I. INTRODUCTION

1-1. PURPOSE.

This manual provides information and instructions for assessing and repairing battle damage to the Army AH-64A Apache Helicopter. The purpose of the manual is to assist the damage assessor in identifying and classifying aircraft battle damage, assessing the extent of the damage, and determining if repair can be made or deferred. Methods of expedient battle damage repair (BDR) are also presented.

1-2. SCOPE.

This manual is to be used by aviation unit maintenance (AVUM) and aviation intermediate maintenance (AVIM) personnel during combat operations and for training of personnel.

1-3. APPLICATION.

These procedures are to be used during combat operations only. The commander determines when normal maintenance procedures may be deferred. Repairs are made using interim techniques, off-the-shelf standard hardware (not necessarily aircraft related), and without concern for appearance. As new repair procedures, materials, tools, and equipment become available they will be introduced and incorporated into this manual.

1-4. TERMS AND DEFINITIONS.

There is a variety of special terms and definitions used with battle damage assessment and repair. The reader should familiarize himself with the terms in the glossary before continuing.

Section II. STANDARDS AND PRACTICES

1-5. BDR CHARACTERISTICS.

During the first few days of combat, maximum aircraft availability is essential. Aircraft will sustain varying degrees of damage during combat operations. The damage must be assessed and repaired as quickly as possible. Maximum availability must be maintained for further sorties. In addition to combat damage, aircraft will have higher component failure rates because of increased flying hours and higher stress levels. Aircraft combat maintenance/battle damage repair (ACM/BDR) is an operational concept for maintaining aircraft at a high level of readiness in combat. Peacetime maintenance procedures and methods must be modified to achieve this.

Aircraft which have battle damage will be inspected and classified by a damage assessor using a method similar to the medical concept of "triage" (deferment, repair, non-repair). Following assessment, some aircraft will be returned to service immediately through deferment. Other aircraft will be repaired using approved BDR techniques. Those aircraft requiring extensive repair (4 to 24 hours) will be set aside and repaired as manpower and parts become available. Aircraft that have sustained major battle damage so that BDR is not practical may be ground-recovered or evacuated to a facility with required repair sources, cannibalized for spare components, or destroyed in place to prevent enemy capture.

Scheduled maintenance and inspections will be completed in accordance with paragraph 1-6. Necessary lubrication, servicing, and operational checks (TM 1-1520-238-23) will not be deferred. When conditions permit, the "overflown" inspection will be completed. When expedient repairs are made on the aircraft or repair of damage is deferred, to ensure flight safety or mission accomplishment, it may be necessary to schedule inspections at subsequent flight hour intervals. Scheduled battle damage inspections of this type will not be deferred.

During periods of intense combat, aircraft will receive only that maintenance needed for the next scheduled mission. They will often be flown with nonessential components damaged, inoperative, or missing. Repair of systems and subsystems which are not critical to mission accomplishment, may be deferred unless they might cause further damage. Items may be deferred even if it places operational limitations on the aircraft, as long as the restricted aircraft can accomplish designated missions and can contribute to the battle. Deferment of repairs for a one-time flight to a higher maintenance level, or for self-recovery from a combat area, is highly desirable. This eliminates the need for another aircraft to accomplish the recovery, or the loss of the aircraft if recovery is not available. The maintenance officer or assessor will make the decision based on an analysis of the overall situation and air worthiness of the aircraft.

1-6. INSPECTIONS.

1-6.1. ACM/BDR Preflight and 10-Hour/14 Day Inspection. The ACM/BDR modified preflight (TM 1-1520-238-10) and 10-hour/14-day (TM 1-1520-238-PMS) inspections are the only preventive maintenance required. All phases can be deferred for the 100 flight hours or 30 days.

As stated in the AH-64A Operator's Manual (TM 1-1520-238-10), “The preflight inspection may be as comprehensive as conditions warrant, at the discretion of the pilot”. Considering that the aircraft has been engaged in combat operations and has been recently post-flighted and considered fit for continued operation, the preflight inspection is not intended to be a detailed mechanical inspection, but rather a quick look for obvious discrepancies. Ensure all major components (landing gear, wings, empennage, etc.) are intact and have no severe damage. Ensure that all tools, equipment, and potential FOD materials have been removed and all panels, doors, and fairings (if available) are secured in place. Check all accessible tubes, hoses, and fittings for excessive leakage.

The 10-hour/14-day inspection should be more detailed and will involve the removal of panels and doors to provide access to internal components. Check for excessive wear, damage, and loose or missing hardware and wiring. Ensure that all systems have been properly serviced and all tubing, hoses, and fittings are intact and free from excessive leakage. Refer to Figure 1-1.

Maintenance personnel should refer to Tables 1-1 and 1-2 which identify the recommended list of ACM/BDR inspections for both preflight and 10-hour/14-day requirements.

Table 1-1. AH-64A ACM/BDR - Preflight Inspection

Task Description
Gun Turret - Mounting, Feed Chute
Right Forward Avionics Bay
Right MLG and Wheel Assembly
Main Transmission
Right Engine Nose Gearbox
Right Engine Inlet
Upper Flight Control Components
Stationary Swashplate
Rotating Swashplate
Main Rotor Head/Blades/Strap Packs
Rotor Hub
Blade Spars, Root Finger Doublers, and Bushings
Right Wing Surfaces, Panels, and Lights
Pylons and Racks, Safety Pins, and Streamers
Pilot Tube
Ammunition Bay Door