TM 1-1520-238-T-5

TECHNICAL MANUAL

AVIATION UNIT AND INTERMEDIATE TROUBLESHOOTING MANUAL

FOR

ARMY MODEL AH-64A HELICOPTER (NSN 1520-01-106-9519) EIC: (RHA)

SUPERSEDURE NOTICE: **This manual supersedes TM 55-1520-238-T-1, dated 15 DECEMBER 1985, including all changes.**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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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 the procedures, please let us know. Mail your letter, 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, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898–5230. A reply will be furnished to you.

You may also send in your comments electronically to our e–mail address: 2028@redstone.army.mil or by fax 205–842–6546/DSN 788–6546. Instructions for sending an electronic 2028 may be found at the end of this manual immediately preceding the hard copy 2028.

OZONE DEPLETING CHEMICAL INFORMATION:
This document has been reviewed for the presence of Class I Ozone depleting chemicals. As of Change 6 dated 19 December 1997, all references to Class I Ozone depleting chemicals have been removed from this document by substitution with chemicals that do not cause atmospheric Ozone depletion.

TABLE OF CONTENTS

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HOW TO USE THIS VOLUME

OVERVIEW

If you can't find information, you can't do the job. Learn how to use the Integrated Troubleshooting Manual System and this volume. Refer to TM 1-1520-238-T-2 for instructions on how to use the troubleshooting manual system and TM 1-1520-238-T-4 for instructions on how to use this volume.

USING AH–64A HELICOPTER EFFECTIVITY CODES

Helicopter effectivity codes designate differences between helicopters by helicopter serial numbers. These codes consist of three letters representing various helicopter serial number blocks. They are used throughout this volume as necessary to aid the helicopter troubleshooting effort.

The codes are used to designate serial number block differences as follows:

- When used within narrative text and fault isolation procedures (FIPs), effectivity codes appear within parentheses.

  Example: Narrative text and FIPs (AAA)

- When used inside wiring interconnect diagrams, effectivity codes appear within triangular borders and are placed on the line which represents that particular helicopter's configuration.

  Example: Wiring interconnect diagrams 

This volume uses these effectivity codes and corresponding helicopter serial numbers for reference.

To use the helicopter effectivity codes, note the helicopter serial number on the left side of the fuselage directly below the CPG window. Use this serial number to determine which procedure or path in a wiring interconnect diagram or FIP to use.

The effectivity codes and helicopter serial number blocks applicable to this volume are as follows:

Effectivity Code	Helicopter Serial No.
AAA	82–23355 thru 82–23365
AAB	82–23355 thru 83–23798
AAC	82–23355 thru 83–23814
AAD	85–25424 and subsequent
AAE	82–23355 thru 84–24231
AAF	84–24216 and subsequent
AAG	82–23355 thru 84–24289
AAH	82–23355 thru 85–25398
AAJ	85–25351 and subsequent
AAK	82–23355 thru 85–25488
AAL	88–0215 and subsequent
AAM	85–25465 and subsequent
AAN	83–23787 thru 85–25415

Effectivity Code	Helicopter Serial No.
AAP	82–23355 thru 88–0214
AAQ	82–23355 thru 84–24311
AAR	82–23355 thru 84–24239
AAS	84–24240 and subsequent
AAT	82–23355 thru 83–23804
AAU	83–23787 and subsequent
AAV	83–23805 and subsequent
AAW	83–23799 and subsequent
AAX	83–23799 thru 84–24245
AAY	83–23799 thru 85–25470 (Before MWO 1–1520–238–50–37)
AAZ	83–23815 and subsequent
ABA	84–24200 and subsequent
ABB	84–24246 and subsequent
ABC	84–24290 and subsequent
ABD	82–23355 thru 85–25415
ABE	82–23355 thru 84–24295
ABF	84–24296 and subsequent
ABG	85–25399 and subsequent
ABH	82–23355 thru 84–24245
ABJ	85–25447 and subsequent
ABK	82–23355 thru 85–24446
ABL	82–23355 thru 89–0215
ABM	84–24290 thru 88–0199
ABN	89–0192 and subsequent
ABP	85–25471 and subsequent
ABQ	86–8940 and subsequent
ABR	82–23355 thru 84–24232
ABS	84–24233 and subsequent
ABT	82–23355 thru 83–23816
ABU	83–23817 thru 85–25415
ABV	84–24246 thru 85–25398
ABW	82–23355 thru 83–23795
ABX	83–23796 and subsequent
ABY	With T700–GE 701 engines

Effectivity Code	Helicopter Serial No.
ABZ	With T700–GE 701C engines
ACA	82–23355 thru 88–0199
ACB	88–0200 and subsequent
ACC	82–23355 thru 83–23834
ACD	85–25416 and subsequent
ACE	82–23355 thru 86–9011
ACF	82–23355 thru 88–0284
ACG	89–0192 and subsequent
ACH	82–23355 thru 85–25423
ACJ	82–23355 thru 90–0290, 90–0292 thru 90–0301 (Before MWO 1–1520–238–50–07)
ACK	82–23355 thru 90–0290, 90–0292 thru 90–0301 (After MWO 1–1520–238–50–07) 90–0291, 90–0302 and subsequent
ACL	82–23355 thru 83–23814
ACM	83–23815 and subsequent
ACN	85–25471 thru 90–0448 (Before MWO 1–1520–238–50–37)
ACP	85–25471 thru 90–0448 (After MWO 1–1520–238–50–37) 90–0449 and subsequent
ACQ	82–23355 thru 90–0448 (Before MWO 1–1520–238–50–36)
ACR	82–23355 thru 90–0448 (After MWO 1–1520–238–50–36) 90–0449 and subsequent
ACS	82–23355 thru 90–0437
ACT	90–0438 and subsequent
ACU	82–23355 thru 90–0436
ACV	89–0192 thru 90–0434 with T700–GE–701C engines (Before MWO 1–1520–238–50–38)
ACW	89–0192 thru 90–0434 with T700–GE–701C engines (After MWO 1–1520–238–50–38) 90–0435 and subsequent with T700–GE–701C engines
ADF	Before MWO 1–1520–238–50–52
ADG	After MWO 1–1520–238–50–52

USING THE ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX

The ECLC index will help you find electrical components and their connectors on the helicopter during troubleshooting. The ECLC is located at the beginning of the troubleshooting procedures of each chapter (when applicable). This index is a list of connectors and applicable wiring harnesses which are illustrated by component location. Component locations are shown from the helicopter's forward sections to its aft sections by horizontal and vertical grid numbers. Connectors are listed numerically in the **FROM COLUMN Connector Ref Des** column of the index. Every connector is referenced to a grid area within the illustrations.

EXAMPLE OF ECLC INDEX

FROM COLUMN		TO COLUMN			
Connector Ref Des	**Component/ Harness**	**Connector Ref Des**	**Component/ Harness**	**Grid Area**	**Access**
P1	A76/W605	J1	A402	8B	PLT STATION
P402	W170	J402	W211	13E	R295 DOOR

Use the index to find connectors on the aircraft by first locating the connector reference designator number in the **FROM COLUMN Connector Ref Des** column of the index. Then, cross–reference the **FROM COLUMN Connector Ref Des** column with the following:

- **FROM COLUMN Component/Harness** column to locate the component or wire harness number.
- **TO COLUMN Connector Ref Des** column to locate the mating connector number.
- **TO COLUMN Component/Harness** column to locate the mating connector or wire harness number.
- **Grid Area** column to find the grid zone (within the illustration) depicting the location of the connector on the aircraft.
- **Access** column to find where access can be obtained (TM 1-1520-238-23).

For example, to locate connector P1 on the aircraft find connector P1 in the **FROM COLUMN Connector Ref Des** column, then refer to the **FROM COLUMN Component/Harness** column. This column shows that P1 is part of component/harness A76/W605. The **TO COLUMN Connector Ref Des** column shows that P1 connects to J1 on component A402 (**TO COLUMN Component/Harness** column). The **Grid Area** column indicates that P1 is depicted at illustration grid zone 8B, and that **Access** to the connector is obtained through the PLT STATION.

CHAPTER 7
HYDRAULIC AND PNEUMATIC SYSTEMS

CHAPTER INDEX

SECTION I. EQUIPMENT DESCRIPTION AND DATA

7–1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES 7–1

a. **Characteristics**.

(1) The primary hydraulic system provides hydraulic power for the operation of the main rotor and tail rotor servocylinders.

(2) The utility hydraulic system provides hydraulic power for the operation of the main rotor and tail rotor servocylinders, auxiliary power unit (APU) start motor, rotor brake, hydraulically operated weapon system components and provides a source of stored high pressure fluid for emergency operation of the flight control servocylinders.

(3) The pressurized air system (PAS) cleans, pressurizes, regulates and distributes air to pneumatically operated systems and components.

b. **Capabilities and Features**.

(1) The primary hydraulic system provides 3000 psi hydraulic fluid pressure to hydraulically operated components. Flow rate is 6.0 gallons per minute (gpm) and capacity is three quarts of MIL–H–83282 or MIL–H–5606. The primary hydraulic system is serviced and bled using ground service equipment (GSE) through the GSE panel. External primary pressure is supplied, through the GSE panel, to provide ground hydraulic power operation for flight controls.

(2) The utility hydraulic system provides 3000 psi hydraulic fluid pressure to hydraulically operated components. Flow rate is 6.0 gpm and capacity is 2.6 gallons of MIL–H–83282 or MIL–H–5606. The system is serviced and bled using GSE through a **UTILITY** GSE panel. External primary pressure is supplied, through the GSE panel, to provide ground hydraulic power operation for the utility system.

(3) The PAS system provides 35 psi heated air to pneumatically operated components and has three modes of operation: primary, secondary and external. Engines 1 and 2, or the APU provides primary operation to drive the shaft driven compressor (SDC), secondary operation uses bleed air from engine 1, and external operation uses external air from the aviation ground power unit (AGPU).

7–2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS 7–2

a. **Primary Hydraulic System.** The primary hydraulic system (fig. 7–1) consists of the primary hydraulic pump, primary hydraulic manifold, primary GSE panel, longitudinal servocylinder, lateral servocylinder, collective servocylinder, and the directional servocylinder.

(1) **Primary Hydraulic Pump.** The primary hydraulic pump, located on the left forward drive pad of the main transmission accessory geartrain housing, pressurizes and transfers fluid for system operation. The primary hydraulic pump is a constant pressure, variable delivery, piston–type pump driven by the main transmission accessory geartrain. The external drive shaft mates with the main transmission accessory geartrain and is designed to shear under excessive loads.

(2) **Primary Hydraulic Manifold.** The primary hydraulic manifold, located on the main transmission deck forward and left of the main transmission, stores, filters and routes hydraulic fluid for system operation.

(3) Deleted.

(4) **Primary GSE Panel**. The primary GSE panel, located on the aft equipment bay deck outboard of the utility manifold, provides connections for external hydraulic application and for servicing the primary and utility reservoirs with fluid. The fluid is filtered by a 45 micron screen filter (ADF) or a 5 micron cartridge filter element (ADG).

(5) **Longitudinal Servocylinder**. The longitudinal servocylinder, located on the left transmission deck in front and to the right of the main transmission, converts mechanical inputs during normal operation, or electrical inputs during digital automatic stabilization equipment backup control system (DASE BUCS) operation, into hydraulic pressure outputs which are sent to the main rotor swashplate.

(6) **Lateral Servocylinder**. The lateral servocylinder, located on the transmission deck in front and to the left of the main transmission, converts mechanical inputs during normal operation, or electrical inputs during DASE BUCS operation, into hydraulic pressure outputs which are sent to the main rotor swashplate.

(7) **Collective Servocylinder**. The collective servocylinder, located on the transmission deck in front of the main transmission, converts mechanical inputs during normal operation, or electrical inputs during DASE BUCS operation, into hydraulic pressure outputs which are sent to the main rotor swashplate.

(8) **Directional Servocylinder**. The directional servocylinder, located on the top of the tail rotor gearbox, converts mechanical inputs during normal operation, or electrical inputs during DASE BUCS operation, into hydraulic pressure outputs which are sent to the tail rotor swashplate.

7–2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont) 7–2

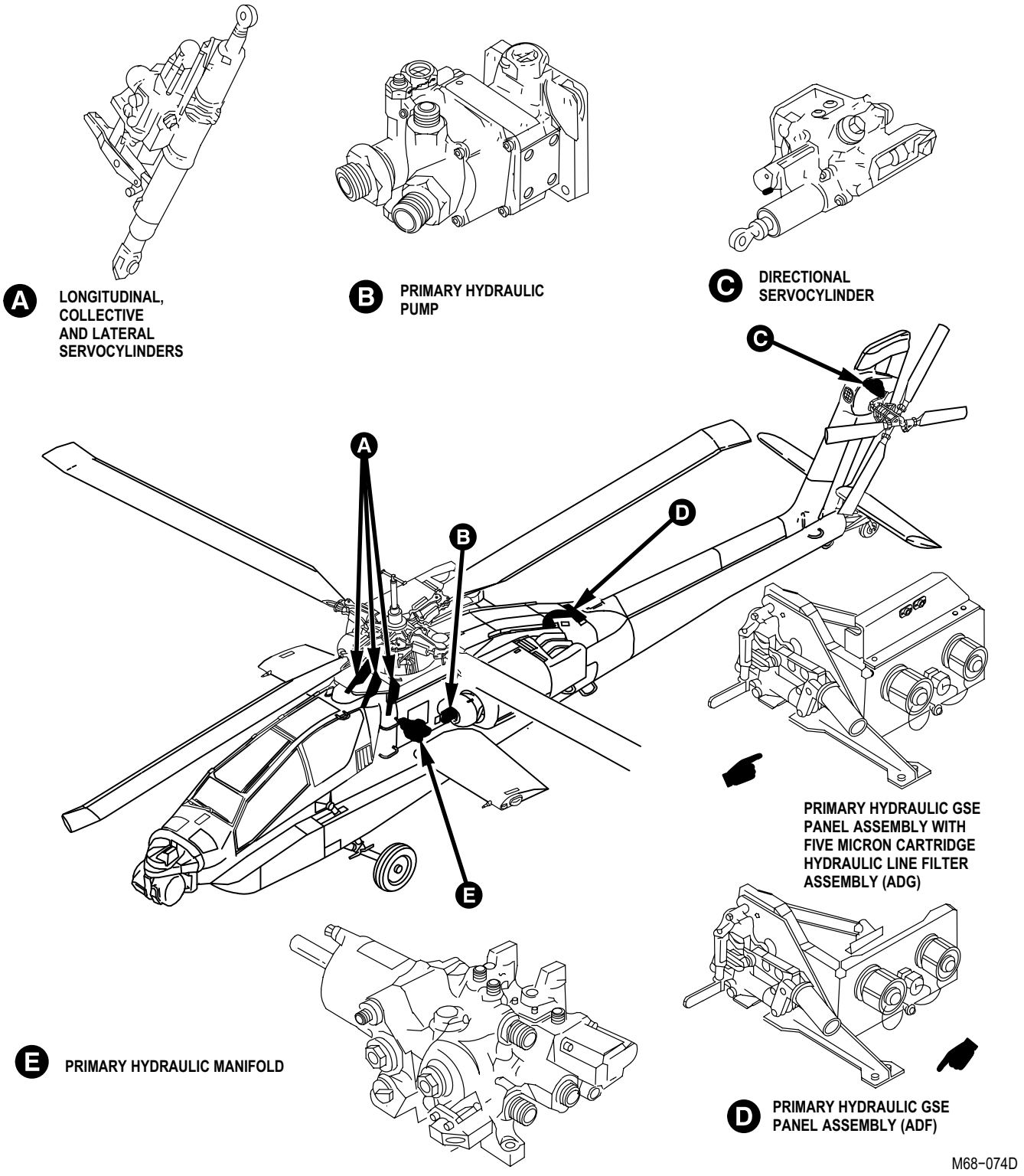

Figure 7–1. Primary Hydraulic System Major Component Location