

TECHNICAL MANUAL

**AVIATION UNIT AND AVIATION
INTERMEDIATE MAINTENANCE MANUAL**

CH-47D HELICOPTER

This manual together with TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-6, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-9, TM 55-1520-240-23-10, TM 55-1520-240-23-11, supersedes TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-9, TM 55-1520-240-23-10, 10 May 1983, and TM 55-1520-240-23-6, 6 May 1983, including all changes.

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can 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) 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 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or the World Wide Web. Our fax number is: DSN 788-6546 or Commercial 256-842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028. For the World Wide Web use: <https://amcom2028.redstone.army.mil>.

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*This manual together with TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-6, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-10, TM 55-1520-240-23-11, supersedes TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-9, TM 55-1520-240-23-10, 10 May 1983, and TM 55-1520-240-23-6, 6 May 1983, including all changes.

CHAPTER 6

DRIVE SYSTEM

SECTION I

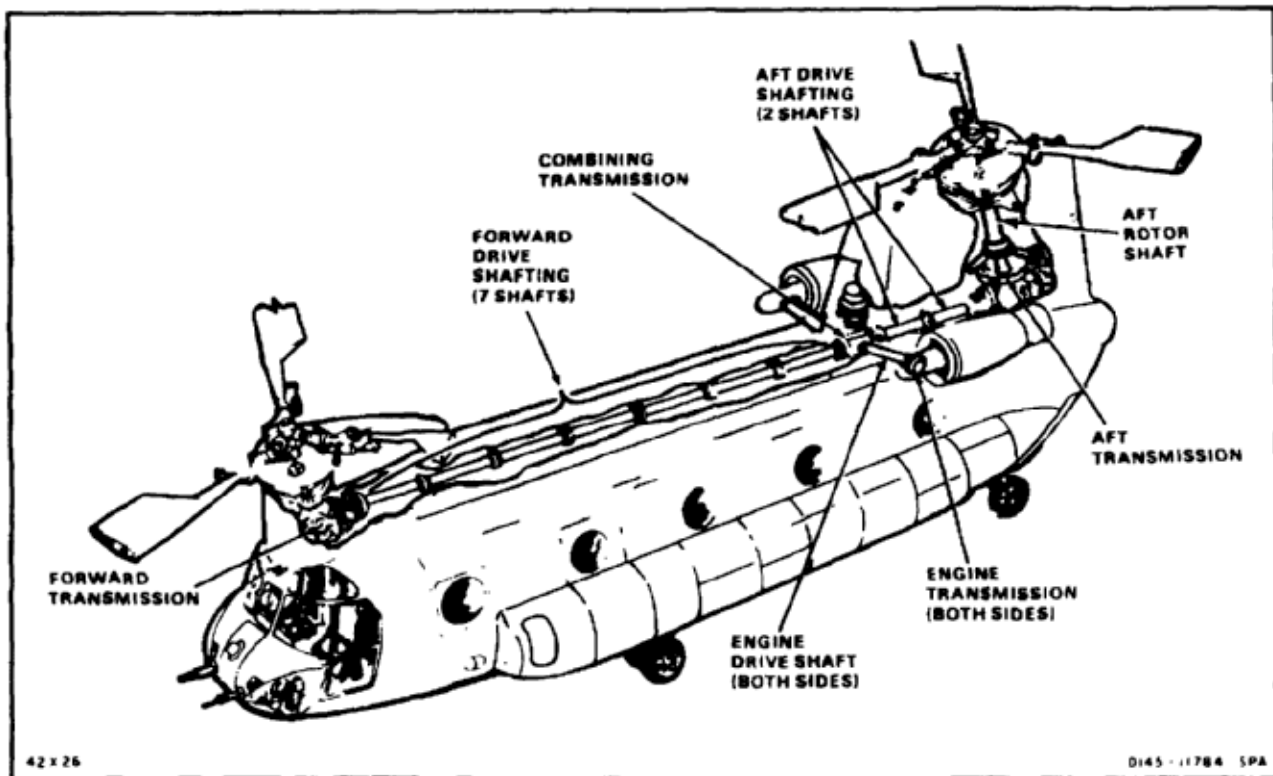
DRIVE SYSTEM DESCRIPTION AND OPERATION

6-1 DRIVE SYSTEM**6-1**

The drive system delivers torque from the engines to the rotary-wing heads and blades. It also drives the ac generators and pumps for the flight control and utility hydraulic systems.

The drive system consists of five transmissions, drive shafting to connect the transmissions, and an aft rotor shaft:

1. An engine transmission is mounted on the front of each of the two engines. Torque is transmitted from the engine to the transmission by a splined quill shaft.
2. Output torque from each engine transmission is delivered through an engine drive shaft to the combining transmission. The combining transmission combines the torque from both engines and transmits it to a forward transmission and an aft transmission through drive shafting.
3. The forward transmission is splined directly to the rotary-wing head to drive the forward rotor blades.
4. The aft transmission drives a separate vertical aft rotor shaft. This shaft is splined to the aft rotary-wing head to drive the aft rotor blades.
5. The forward drive shafting consists of seven aluminum tubes joined by flexible adapter assemblies. The tubes are referred to as No. 1 thru No. 7, beginning at the forward end of the shafting. The shafting is supported in a bearing at each adapter assembly by two rubber and metal mounts.
6. The aft drive shafting consists of two aluminum tubes joined by a flexible adapter assembly. The tubes are referred to as No. 8 (forward) and No. 9 (aft). The shafting is supported in a bearing at the adapter assembly by two rubber and metal mounts.



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FORWARD DRIVE SHAFTING

The forward drive shafting transmits torque from the combining transmission to the forward transmission. It consists of seven shafts coupled by six adapter assemblies.

The shafts are numbered 1 thru 7, beginning with the forward shaft.

Shafts 1 thru 6 consist of an aluminum tube with an adapter riveted to each end. The forward adapter is a three-cornered aluminum forging. The aft adapter is a steel forging with external splines and internal threads. Shafts No. 2 thru 6 are identical and interchangeable.

The adapter assemblies between shafts consist of a pack of flexible steel plates bolted to a three-fingered steel adapter. Each adapter is held in a bearing and support assembly. The assemblies are internally splined to mate with the external splines on the shaft aft adapters. Each adapter assembly is indexed to its mating shaft and balanced as a unit with the shaft.

Shaft No. 7 is an aluminum tube with a three-cornered aluminum adapter riveted to each end.

The shafting is carried on the helicopter structure on two elastomeric mounts at each of the six bearing and support assemblies.

Separate adapter assemblies couple the shafting to the forward and combining transmissions. Access to the shafting is through covers on the top of the fuselage.

AFT DRIVE SHAFTING

The aft drive shafting transmits torque from the combining transmission to the aft transmission. It consists of two individual shafts coupled by an adapter assembly.

The two shafts are numbered 8 (forward) and 9 (aft), to continue the numbering of the forward drive shafting.

Shaft No. 8 consists of an aluminum tube with an adapter riveted to each end. The forward adapter is a three-cornered aluminum forging. The aft adapter is a steel forging with external splines and internal threads.

The adapter assembly consists of a pack of flexible steel plates bolted to a three-fingered steel adapter. The assembly is held in a bearing and support assembly that is internally splined to mate with the external splines on the aft adapter of shaft No. 8. The adapter assembly is indexed to shaft No. 8 and balanced as a unit with the shaft.

Shaft No. 9 is an aluminum tube with a three-cornered aluminum adapter riveted to each end.

The shafting is carried on the helicopter structure on two elastomeric mounts at the bearing and support assembly.

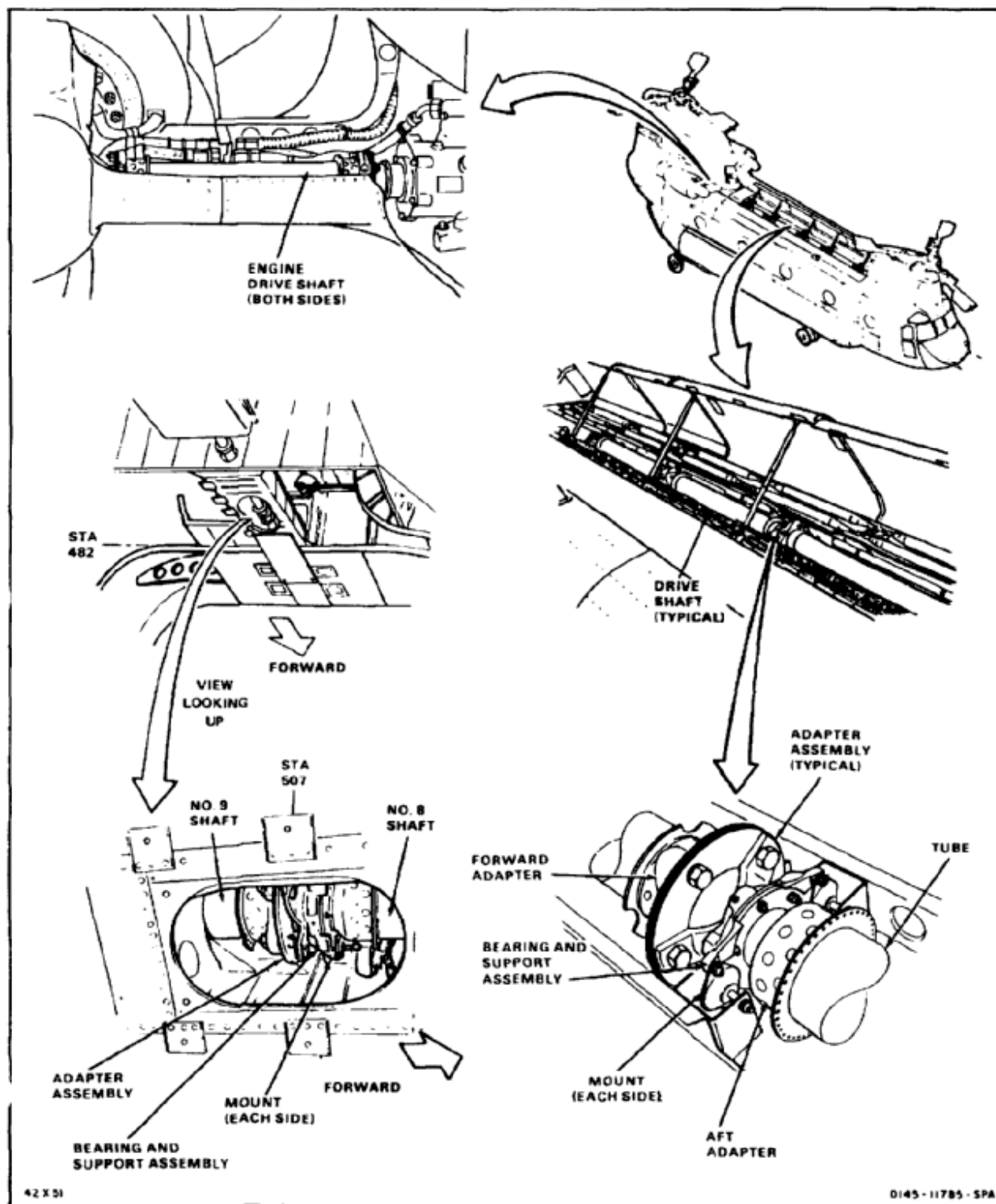
Separate adapter assemblies couple the shafting to the combining and aft transmissions. Access to the shafting is from inside the cabin.

ENGINE DRIVE SHAFTS

An engine drive shaft transmits torque from each engine transmission to the combining transmission. On helicopters without **51** the shaft consists of an aluminum tube with a three-cornered aluminum adapter riveted to each end. On helicopters with **51**, it is a one-piece aluminum shaft with flanged ends.

Each shaft is connected to the transmissions by an adapter assembly at each end. Each of the three-piece riveted shafts is serial numbered and dynamically balanced as a unit with the two adapter assemblies. One-piece shafts are balanced separately from their adapters and are separately replaceable.

Access to each shaft is through a fairing between the engine transmission and combining transmission.



FORWARD TRANSMISSION

The forward transmission receives input torque from the combining transmission through the forward drive shafting. It transmits it directly to the forward rotary-wing head and blades through an integral shaft.

A slider shaft is mounted around the integral shaft and bolted to the top of the transmission. It provides the bearing surface for swashplate motion.

An integral spur gear at the bottom of the transmission provides power to drive a pump for the flight control hydraulic system.

The transmission is bolted to structure directly above the cockpit. It is part of a package that can be removed and installed as an assembly. In addition to the transmission, the package includes the rotary-wing head and head controls, a weather-protective cover, and two flight control bellcranks. Access to the top of the transmission is through hinged work platforms at each side of the forward transmission fairing. Access to the bottom of the transmission is through a removable drip pan.

Lubrication System

The forward transmission is lubricated with oil from a sump at the bottom of the transmission. Oil is circulated by main and auxiliary pumps mounted on the bottom of the transmission. The main pump is externally mounted. The auxiliary pump is covered by the sump.

The lubrication system is monitored and protected by the following:

- A combined indicating screen and chip detector and temperature sensor on the sump.

- A pump inlet screen inside the sump.

- A main filter inside the main pump.

- Main and auxiliary pressure switches, an auxiliary filter, and an inlet screen on the left side of the transmission.

Hot oil from the transmission passes through a circular oil cooler mounted on the aft end of the transmission. The oil is cooled by air forced through the cooler by an impeller. The impeller fits within the cooler and is splined to the transmission input shaft.

