The UH-60 Black Hawk is a four-bladed, twin-engine, medium lift utility helicopter manufactured by Sikorsky Aircraft Company. The Black Hawk’s mission is to provide air assault, general support, aeromedical evacuation, command and control and special operations support to combat, stability and support operations.

The Black Hawk is a utility tactical transport helicopter that replaces the UH-1 “Huey”. The versatile Black Hawk has enhanced the overall mobility of the Army, due to dramatic improvements in troop capacity and cargo lift capability, and will serve as the Army’s utility helicopter for years to come. An entire 11-person, combat-equipped infantry squad can be lifted in a single Black Hawk and transported faster than in predecessor systems, in most weather conditions. With a maximum allowable gross weight of 22,000 lbs (9,979 kg), the Black Hawk can reposition a 105 mm Howitzer, its crew of six, and lift up to 30 rounds of ammunition in a single lift. The aircraft’s critical components and systems are armored and/or redundant, and its airframe is designed to progressively crush on impact to protect the crew and passengers.

The long, low profile of the UH-60 was designed to meet the Army’s requirement for transporting aboard a C-130 Hercules. Equipped with advanced avionics and electronics for increased survivability and capability, the Black Hawk is a rugged and extremely durable helicopter that provides enhanced safety for military operations.

Eaton is a recognized leader in the aerospace industry and is a key supplier of hydraulic, fuel, motion control and engine solution products on the UH-60. With this cutting edge technology, Eaton provides a broad array of products. Eaton supplies a number of hydraulic products for the UH-60 that provide, store, and/or control the aircraft’s hydraulic power. These products include the auxiliary power unit (APU) start valve, the brake transfer valve, the brake master cylinder, the pitch lock shutoff valve, a hydraulic manifold assembly, the APU starter motor, and the standard winch motor. On the UH-60M “Fly-by-Wire” (FBW) configuration, Eaton also provides two hydraulic pump modules, each of which consists of a hydraulic pump and a reservoir; a gearbox driven hydraulic pump; a hydraulic heat exchanger, and a ground checkout motorpump.

Eaton manufactures a variety of engine solution components used throughout the UH-60, both on the airframe and on the engines. They include engine and transmission oil debris monitoring sensors (chip detectors), oil level sight gauges on the main transmission, intermediate gear box and tail rotor gear box; pressure indication and monitoring sensors; the tail wheel lock actuator; the tail rotor index actuator; and the pedal adjust actuator mechanism.

Eaton’s products on the UH-60 include Aeroquip® self-sealing quick disconnect couplings, frangible connectors and various hose assemblies per AS1339, MIL-DTL-25579 and AS620/AS1227 standards.

Other conveyance products on the helicopter are various seals used in the T700-GE-701 series engines, including the starter seal, fuel control seal, gear box mating-ring seal, and the fuel booster pump seals.

Eaton also manufactures and supplies fuel components for the UH-60. These products include a pilot valve and the defuel valve for the external fuel tanks.

In addition to systems and components for the UH-60 community, Eaton also provides customer service and support worldwide. Eaton is committed to servicing, supporting and enhancing the products supplied to customers and end users. Eaton’s U.S. Army contact in the Aerospace Group is:

Charlie King
Tel: 931-494 1083
CharlesFKing@Eaton.com
Sikorsky UH-60 Key System Components

- Zapper® Electric Chip Detector
- Tail Rotor Index Actuator
- Hydraulic Accumulator
- Fuel Vent Assembly
- Repair Hoist Control & Hydraulic Winch Motor
- Brakes Transfer Valve & Master Brake Cylinder
- Pedal Adjust Actuator
- Hydraulic Valve Assembly & Transfer Module
- Pressure Switches
- Hydraulic Manifold Assembly
- Hose Assemblies
- Sight Plugs & Gauges
- Pilot Valves
- Seals
- Self-Sealing Quick Disconnect Couplings
- Frangible Connectors
- Hose Assemblies
- Hydraulic APU Starter Motor & Start Valve
- Full Flow Debris Monitor
- Defuel Valve
- Hydraulic Heat Exchanger
- UH-60M Fly-by-Wire
  Gearbox Driven Hydraulic Pump
  Hydraulic Pump Modules
  Ground Checkout Motorpump
  Hydraulic Heat Exchanger
Sikorsky UH-60 Key System Components

**Zapper® Electric Chip Detectors (Transmissions)**

Eaton provides the Zapper® electric chip detectors that incorporate a capacitor circuit that discharges an energy pulse through conductive debris that bridges the chip detector gap, causing enough local heating to melt away small, normal wear debris or “fuzz” and open the gap, similar to the blowing of a fuse. If the discharge current reopens the circuit, the system returns to the monitoring mode. If the debris is too large to burn off, it is considered significant debris and a cockpit chip light will illuminate and remain illuminated until the debris is cleared manually. The latest versions of these chip detectors also incorporate a Built-In-Test (BIT) feature wherein the entire chip detector system is tested upon helicopter start-up.

**Hose Assemblies**

Eaton’s Aeroquip hose assemblies are utilized extensively throughout the UH-60 aircraft. The assemblies can be found in the hydraulic system, the fuel system and the lube oil system. Eaton provides 3,000 psi (20684 kPa) stainless steel braided Teflon® hose assemblies per AS1339, 1500 psig (10342 kPa) rated Teflon hose assemblies per MIL-DTL-25579, 601/AE701 fuel hose assemblies per MIL-DTL-83797 and the AE502 ballistic self-sealing hose assemblies. Eaton’s designation of product for the hydraulic system is the AE246 and 666 series hose assemblies. The suction side of the hydraulic system also uses AE641 convoluted Teflon hose per AS620/AS1227.

**Self-Sealing Quick Disconnect Couplings**

Four types of Eaton Aeroquip self-sealing quick disconnect couplings, all of which are rated at 3,000 psi (20684 kPa), are used on the UH-60. These couplings provide quick connection/disconnection and all have positive action locking valves that open simultaneously to prevent fluid loss during connection or disconnection. These valves have no cavities to trap air, dirt or moisture. The 145/155 series couplings are used when connecting the ground support equipment to the aircraft, and the 3200 series couplings are used for the brake and landing gear strut connections. Modular couplings certified to Sikorsky Standard SS65 are used in the flight control system for main servo and tail rotor servo connections, and modular couplings qualified to Sikorsky Source Control drawings for the tail fold connections.

**Frangible Connectors**

A number of Eaton Aeroquip frangible connectors are used throughout the UH-60’s fuel system. Frangible connectors are utilized on the aircraft to provide the best possible protection in times of critical need - in the event of a crash. They are specifically designed to break at controlled locations on impact in order to shut off fuel flow from fuel lines or tanks. As such, they greatly increase the probability of survivability of flight personnel and/or minimize the loss of assets by reducing the likelihood of post-crash fires.

**Pressure Switches**

Eaton supplies highly reliable and very robust pressure switches that are used on the T700 series engines and on the UH-60 landing struts (shock absorbers). These switches are used for pressure indication and/or monitoring.

**Seals**

Eaton is the source for a number of seals used on the T700-GE-701 engine, gearbox and fuel booster pump powering the UH-60. Among the seals Eaton provides are the starter seal, fuel control seals, ring mating gearbox seals, fuel booster pump seals, and the No. 1 and No. 5 main shaft bearing seals.

**Full Flow Debris Monitor**

Eaton’s Tedeco full flow debris monitor for the T700 engine contains a chip detector and integral screen assembly. When ferrous debris bridges the chip detector’s gap, a “chip light” is illuminated on the master caution panel. The screen assembly helps to capture and retain the metallic debris for use in particle analysis if needed to determine its source.

**Sight Plugs & Gauges**

Various types of sight gauges, both race track and plug styles, are used on the UH-60. “Race” gauges are used on both the intermediate and tail rotor gear boxes to enable the lubricating oil level to be determined. “Race track” style gauges are used on the main transmission and engine lube oil reservoirs.
Sikorsky UH-60 Key System Components

**Tail Wheel Lock Actuator**

Eaton's miniature DC linear actuators are small units designed for use on military helicopters such as the UH-60 to operate the tail wheel positioning mechanism. A wide range of speed and load variations are available for applications requiring lightweight, high reliability, and a small envelope. Features of these actuators include electromagnetic interference (EMI) filtering and switch transient attenuation; limit and indicator switches; and a high strength cover in order to minimize sand/rock damage during landing.

**Winch Drive Motor**

Eaton’s Vickers standard winch drive motor is a bent-axis hydraulic motor providing bi-directional mechanical shaft power to drive the rescue hoist reel.

**Ground Checkout Motorpump**

(UH-60M Fly-by-Wire)

The Eaton ground checkout motorpump for the UH-60M Fly-By-Wire Black Hawk variant operates under AC electrical power and serves as a hydraulic power source for the hydraulic system(s) while on ground without having to operate the T700 turbine engine. This AC motorpump is a derivative product with many years of reliable service.

**Hydraulic Heat Exchanger**

(UH-60M Fly-by-Wire)

Eaton’s heat exchanger is a vane motor design that makes the unit compact and reduces weight. It is designed to displace heat from the hydraulic fluid allowing for cooler operation and increased reliability.

**Hydraulic Auxilary Power Unit (APU) Starter Motor**

Using hydraulic pressure stored in the APU start accumulator, Eaton’s APU starter motor is used to start the APU.

**Hydraulic Pump Module**

(UH-60M Fly-by-Wire)

Eaton’s integrated design of pump and reservoir reduces the weight and space requirement. A variable displacement pump provides flow at wide variety of duty cycles.

**Gearbox Driven Hydraulic Pump**

(UH-60M Fly-by-Wire)

Eaton’s gearbox mounted hydraulic pump comes from the long line of highly reliable variable displacement pumps and provides hydraulic power to System 3 of the UH-60M Fly-By-Wire Black Hawk variant aircraft.

**Pilot Valve**

Eaton’s pilot valves have proven reliability through mature technology. It provides a pressure signal to the refuel/defuel valve to indicate a full tank condition.
## Sikorsky UH-60 Key System Components

### Refuel/Defuel Valve

The refuel/defuel valve when used in conjunction with a high level pilot valve provides refueling, defueling and high and low level shutoff control to the fuel tanks.

### Eaton Product Lines/Product Names

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<tr>
<th>Location</th>
<th>Product Description</th>
<th>Product Line/Product Name</th>
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