Boeing F/A-18E/F Super Hornet & EA-18G Growler
The multi-mission F/A-18E/F “Super Hornet” is an evolutionary upgrade from the combat-proven night strike fighter F/A-18 C/D. It is nearly 25% larger than the C/D, yet more survivable with improvements like reduced radar and infrared cross sections made possible through design features and coatings, greater situational awareness, and an advanced countermeasure suite. Reduced vulnerability is achieved through an active dry-bay fire suppression system, self-sealing fuel tanks, explosion suppression foam in the wing fuel tanks, and hydraulic reservoir level sensing.

The aircraft was designed as a high performance multi-role fighter/attack aircraft with primary missions of fighter escort and interdiction; secondary missions of air defense, fighter escort, close air support, forward air control, and reconnaissance. Specifics may vary depending on mission scenario, but the F/A-18E/F range and endurance was increased significantly over that of the F/A-18 C/D across the warfare spectrum.

The aircraft is powered by two General Electric augmented turbofan engines rated at 22,000 lb of thrust. A mid-span leading-edge sawtooth helps maintain aileron effectiveness and provides a high degree of maneuverability for the dogfighting role. Maximum speed exceeds Mach 1.7. The F-18 was the first US fighter capable of supersonic speeds without the use of afterburners.

The F/A-18E/F aircraft design incorporates two independent Type II Hydraulic Systems rated for “dual-pressure” 3000 psi (20,600 kPa) and 5000 psi (34,500 kPa). Each system is pressurized by a single variable delivery pump driven by the engines through an aircraft mounted accessory drive (AMAD). These pumps normally provide 3000 psi pressure compensation to their hydraulic circuits.

Eaton’s Vickers brand pumps can be transitioned from 3000 psi to 5000 psi or from 5000 psi to 3000 psi via an electrical solenoid valve commanded by the flight control computer (FCC). This unique “dual-pressure” pump capability allows the flight control computer to match the pump horsepower to the aircraft’s control surface loading. The maximum flight control surface loads occur at high aircraft speeds.

Eaton also provides Tedeco brand debris monitoring chip detectors and Prismalite manual level gauges for the F414-GE-400 engine lube system.

An electro/optical sensor, Levelmaster is mounted in the fuel tank vent tube to detect the presence of fuel during in-air refueling operation.

Modern military fighters like the F/A-18E/F have sophisticated environmental control systems (ECS) which support cabin air quality and pilot survivability. Because such aircraft operate in severe physical environments that are not survivable by unprotected pilots under ordinary conditions, these complex aircraft contain highly reliable and complex ECS systems which utilize Eaton’s static seals, flanges and couplings at the joints of the ducting system. These components are designed to manage the conveyance of high pressure, high temperature air under the most challenging g forces.

Eaton also provides Centurion brand mechanical seals for the F414-GE-400 engine gearbox.
Fuel Presence Sensor
Canopy Drive
Forward Cockpit Louvers
Wing Fold Control System
Rudder Pedal Control
Ram Air Scoop Actuator
3900 Series Couplings

In-Flight Refuel Control Valve
Gun Drive System
Flow Regulator
Dual Brake Valve
Emergency Landing Gear Control
Emergency & Parking Brake Control
ECS Heat & Defrost Control
Control Stick Feel/Trim Actuator
Longitudinal Position Sensor Assembly
Lateral Position Sensor Assembly
Feel/Trim Sensor Assembly
Control Stick Ratio Actuator

Aft Cockpit Louvers
Ram Bleed Air Door Actuator
Rectangular V-Band Coupling
Chip Detectors
Landing Gear Swivel
Level Indicators
Float Switch
Bomb Rack Breech Kit
Switching Valve
Fuel Duct
Missile Ejector Lock Actuator

Time Delay Restictor Valve
Solenoid Operated Selector Valve
Manually Override Check Valve

ECS Couplings, Flanges & Static Seals
Centurion™ Engine Gearbox Carbon Seals
Engine Driven Pumps & Hose Assemblies
145/155 Series Couplings
Gun Drive System
Eaton's Vickers brand gun drive system simultaneously rotates the barrels for firing and feeds ammunition to the gun through a linkless feed system especially designed for cycling at the Vulcan's high firing rate. The gun drive motor package powers the gun at 3000 psi (20,600 kPa) externally, operating independently of gun chamber pressure to provide continuous, positive rotation that is uninterrupted by misfires.

Engine-Driven Hydraulic Pump
Hydraulic power for flight control and utility systems is provided by two 78.9 gpm (295 L/min.), 4480 rpm, variable displacement, pressure compensated inline pumps. Eaton’s Vickers brand hydraulic pump PV3-400-5B incorporates a solenoid actuated, dual pressure range compensator, allowing the flight control computer to select either 3000 psi (20,600 kPa) or 5000 psi (34,500 kPa) pressure operation based on flight surface loading.

Linear Actuator
Eaton’s model 6037 Missile Ejector Lock Actuator locks and unlocks the AIM-7F ejector launchers hook linkage mechanism on the aircraft.

Internal Limit Switches control the extend and retract limits. Signal Switches within the actuator provide lock and unlock indication. An observation window provides indication of “safe” and “armed” modes. A manual drive input allows the system to be cycled without electrical power.

Switching Valve
Eaton’s MC19710 Switching Valve provides autonomous switching of critical functions from one system to the other in the event of a failure in the primary hydraulic system. Eaton’s switching valve technology also provides pre-flight and continuous in-flight subsystem leak integrity testing. In-flight testing assures that a secondary hydraulic system is not switched into a leaking subsystem, preventing a second system failure. The switching valve is capable of operation at either 3000 psi (20,600 kPa) or 5000 psi (34,500 kPa) system pressure.

Flow Regulator
Eaton’s MC12656 Flow Regulator provides a solenoid selected dual speed control of the Gun Drive System and maintains a constant flow under varying hydraulic motor load conditions. The regulator operates at 3000 psi (20,600 kPa) system pressure. The two regulated flows provides two different fire rate of the gun and is pilot selected by energizing a 28 VDC solenoid.

Dual Brake Valves
Eaton’s MC12362-5 and MC12364-3 Dual Brake Valves provide independent and proportional brake control to the right and left main landing gear brakes under normal and emergency conditions. The Dual Brake Valves are a hydraulic servo design that provides a hydraulic pressure output proportional to the pilot’s mechanical input force. The brake valve provides normal brake pressure, emergency brake pressure and parking brake pressure using 3000 psi (20,600 kPa) system pressure.
Environmentally Sealed Three Phase 20 KVA Generator Contactor

Installed within the power distribution system of the F/A-18E/F, this 115/200 VAC, 400 Hz, 60 A, environmentally sealed continuous-duty, lightweight (0.60 lb), three-pole, single-throw, normally open (3PST N.O.) contactor, with coil suppression, performs a critical function during power transfer. The compact lightweight design employs an economizer coil assembly with 45 V coil suppression, 320 A overload and 400 A rupture capability. The device is also rated for 25 g shock, 10 g vibration, and is operable to 50,000 ft and qualified to MIL-PRF-6106 as M6106/10-005.

In-Flight Refuel Control Valve

Eaton’s MC14432-2 In-Flight Refuel Control Valve is a 3 position, 4 way design that is operated by a pair of 28 VDC solenoid valves. The solenoid valves shift the main spool and sleeve valve to either extend or retract the IFR Probe. The Probe position is dependent on which solenoid is energized. The manifold has a separate pilot operated emergency spool and sleeve valve that allows the probe to extend regardless of the position of the main spool and sleeve.

Time Delay Restrictor Valve

Eaton’s MC19098-1 and MC19099-1 Time Delay Valves are used in the landing gear. They provide a sequencing function between the doors and the gear. These valves provide a 0.1 second delay before switching from the restricted to free flow.

Manual Override Check Valve

Eaton’s manual override check valve is used in the hydraulic system. The valve can be manually opened using a 90° rotary input command.

High Power DC/AC Hermetically Sealed Relay

Installed in the power distribution system, this 28 VDC /115 VAC 400Hz 100 A, hermetically sealed, continuous duty single pole single throw normally open (SPST N.O.) relay performs power switching functions. The device is rated for 25 g shock, 8 g vibration, operable to 80,000 ft and is qualified to MIL-PRF-6106 as MS24182-D1.

Rynglok Tube Fittings

The primary tube fittings for the F/A-18E/F Strike Fighter are the 5000 psi (34,500 kPa) OEM-style, titanium Rynglok Tube fittings. On low pressure fluid delivery tubing, such as fuel and coolant lines, the Super Hornet also uses the light weight, aluminum version Rynglok fittings. These axial swage fittings provide a permanent, reliable link to join fluid delivery tubing while minimizing system weight. Fittings include permanent and ArcSeal® separable connections in straight, elbow, and tee configurations.

Hydraulic System Swivels

The F/A-18E/F incorporates six different dual passage swivels in the main landing gear system and wing fold system. The swivels are used to provide rotational flexibility during extension and retraction of the gears and folding of the wings for aircraft stowage on board aircraft carriers. The complex swivels are made to withstand the demanding corrosive environment found on sea-based applications, of which two are qualified for 5,000 psig (34,500 kPa).
145/155 Series Ground Service Quick Disconnect Couplings
Eaton’s Aeroquip brand 145/155 series couplings have been the industry standard for hydraulic ground service applications for over 50 years. The F/A-18E/F utilizes the most current design improvements, which include soft seal for leak free connection as well as disconnection and blunt start threads to prevent cross threading during connection.

3900 Series Couplings
The F/A-18E/F radar cooling system incorporates Eaton’s 3900 Series Coupling, which is a one-hand operation self-sealing quick-disconnect coupling used extensively where low pressure drops are required. The 3900 Series Coupling eliminates spillage, leakage, or spraying during connection by employing a unique mechanical pull-home valving that makes it one, if not the best, coupling on the market.

Flexible Fuel Duct
The F/A-18E/F fuel inlet duct is a 2 in diameter aluminum tube assembly that allows for three degrees of movement. It employs a pressure balance slip tube to prevent end loads due to fluid system pressure. This movement allows for engine removal, thermal growth, in-flight flexure, installation tolerances, and engine displacement should an engine mount fail. The duct is rated for all fuel system pressures and temperature ranges of -65°F to 265°F. It connects to the mating airframe flapper value connector.

Rectangular V-Band Coupling
Eaton’s sheet metal V-band couplings and flanges connect and seal all types of tubing, piping, ducts and containers. They meet functional requirements with optimized weight designs. The sheet metal V-band supplied on the F/A-18E/F, shown as the rectangular clamp, demonstrates the design flexibility of this product while meeting stringent performance requirements for the application.

Chip Detector
Eaton’s Tedeco brand chip detector is a sensor that detects ferrous wear particles in the F/A-18 engine lube oil system.

Sight Gauge
Eaton’s sight gauge provides a visual indication of oil level in the F/A-18’s APU.

Full-Flow Screen Housing
Eaton’s Tedeco brand full-flow screen housing is a self-closing valve and screen that allows the chip detector to monitor the complete oil flow.
Float Switch
Eaton’s Tedeco brand float switch is a remote indicator of oil level in the AMAD.

Electro/Optical Level Sensor
Eaton’s Tedeco brand electro/optical level sensor detects the presence of fuel in the aircraft’s tank vent tube to avoid overfill.

Prismalite Sight Gauge
Eaton’s Prismalite Sight Gauge provides visual indication of fluid level in the F/A-18 engine lube tank.

Sampling Valve
Eaton’s sampling valve facilitates the remote leak-free extracting of oil samples for off-site analysis.

Chip Detectors With Self-Closing Valves
Eaton’s chip detectors for the F/A-18 are continuity-type detectors that monitor the aircraft’s scavenging pumps for wear particles.

Prismalite Sight Gauge
Eaton’s Prismalite sight gauge provides visual indication of oil level in the Airframe Mounted Accessory Drive (AMAD) gearbox.

Float Switch
Eaton’s Tedeco brand float switch provides remote indication of low oil levels in the F/A-18’s Auxiliary Power Unit (APU).

Louvers
Eaton manufactures more than a dozen different louver assemblies for the F/A-18 E/F aircraft. They are arranged in all possible vacant cavities of the cockpit to provide heat and air conditioning to the front and back seat.
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