periodic aircraft rework, and maintenance performed as a result of actual or suspected malfunctions.

HYDRAULIC FLUIDS

Learning Objective: *Identify the types of hydraulic fluid used in naval aircraft and support equipment.*

Aircraft hydraulic systems are capable of reliable unattended operation for long periods of time, but some periodic service is generally required. Such service will either be fluid servicing or air bleeding. Hydraulic fluids MIL-H-5606, MIL-H-83282, and MIL-H-81019 are used in automatic pilots, shock absorbers, brakes, control mechanisms, servo control systems, and other hydraulic systems using seal materials compatible with petroleum-based fluids. The primary use for hydraulic fluid MIL-H-46170 is as a preservative fluid for hydraulic systems and components storage.

MIL-H-5606 was the principal hydraulic fluid used in naval aircraft before MIL-H-83282 was introduced. MIL-H-5606 consists of petroleum products with additive materials to improve viscosity (temperature characteristics), inhibit oxidation, and act as an antiwear agent. The oxidation inhibiter was included to reduce the amount of oxidation that occurs in petroleum-based fluids when they are subjected to high pressure and high temperature, and to minimize corrosion of metal parts due to oxidation and resulting acids. The temperature range of MIL-H-5606 is between –65°F to +275°F. It is dyed red so it can be distinguished from incompatible fluids. **Hydraulic fluid MIL-H-5606 is compatible with hydraulic fluid MIL-H-46170.**

MIL-H-83282 is the principal hydraulic fluid used in military aircraft. MIL-H-83282 replaces MIL-H-5606. It is dyed red so it can be distinguished from incompatible fluids. MIL-H-83282 has a synthetic hydrocarbon base and contains additives to provide the required viscosity and antiwear characteristics, which inhibit oxidation and corrosion. It is used in hydraulic systems having a temperature range of—40°F to +275°T. Flash point, fire point, and spontaneous ignition temperature of MIL-H-83282, which is fire resistant, exceeds that of MIL-H-5606 by more than 200°F. The fluid extinguishes itself when the external source of flame or heat is removed. Hydraulic fluid MIL-H-83282 is compatible with all materials used in systems presently using MIL-H-5606. It maybe combined with MIL-H-5606 with no adverse effect other than a reduction of its fire-resistant properties. MIL-H-83282 is now required in the main systems of all fleet aircraft previously using MIL-H-5606. MIL-H-83282 is not used in some viscous dampers due to its low-temperature characteristics.

MIL-H-81019 is an ultra-low temperature hydraulic fluid. It is used in aircraft when extremely low surrounding temperatures are expected. MIL-H-81019 consists of petroleum products with additive materials to improve its viscosity (temperature characteristics), increase its resistance to oxidation, inhibit corrosion, and act as an antiwear agent. It is dyed red so it can be distinguished from other incompatible hydraulic fluids. **In extreme emergencies, it is interchangeable with hydraulic fluid MIL - H - 5606 and MIL-H-83282.** MIL-H-81019 is designed to operate in hydraulic systems having a temperature range between –90°F to +120°F.

The primary use of MIL-H-46170 is as a preservative fluid for hydraulic systems and components storage. Components serviced with this preservation fluid should be drip drained and filled with MIL-H-83282 prior to being installed. This fluid should not be mixed under any other condition. It is also used as a testing medium in stationary test stands that have a temperature range between 40°F to +275°F. It is dyed red so it can be distinguished from incompatible fluids.

NOTE: When mixing or combining hydraulic fluids, the aircraft logbook or S/E logs and records need to be annotated when this is done.

FLUID SERVICING AND SUPPORT EQUIPMENT

Learning Objective: *Identify the support equipment used to service and test aircraft hydraulic systems and components.*

Fluid servicing consists of adding new filtered hydraulic fluid to a system, which replaces fluid lost through leakage, system maintenance, or malfunction. The type of support equipment varies, depending on the type of aircraft you're working on. As an AM, you must know this equipment and know how to