August 17, 1995

To: Jill Ferranti

From: Debbie Bisch

Copies to: Mary Hodder, Janet Jedlicka, Erin Moore, Aleita Wilson, Tom Townsend

Subject: ARP1084

Please stamp the subject document "Inactive for New Design August 1995".

Please return this memo to Aleita as confirmation of this request.

Thanks!

8/19/95

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AEROSPACE RECOMMENDED PRACTICE

ARP 1084

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Revised

HYDRAULIC EXTERNAL LEAKAGE FOR IN-SERVICE COMPONENTS

1. PURPOSE

The purpose of this document is to provide guide lines for allowable leakage for in-service aircraft hydraulic components at a nominal 100 F temperature and to outline the procedure for measuring such leakage. The limits to be applied to any specific aircraft should be adjusted before inclusion in a maintenance manual. Leakage as hereafter referred to in this document shall mean external leakage.

2. SCOPE

The allowable leakage for hydraulic components has been documented in various military specifications concerning components. The leakage requirements given in the military specifications are intended in part to control the quality, assembly and proper functioning of the components. However, components that are in service sometimes develop leakage rates in excess of the specified amount. This does not necessarily imply that the components have degraded to a degree that they no longer provide reliable operation or that they would be detrimental to the system. The intent of this ARP is to establish a level of allowable leakage that will be applicable only to in-service hydraulic components. It is hoped that this will result in minimizing what is often the unnecessary removal of hydraulic components from an aircraft.

3. APPLICATION

This Aerospace Recommended Practice is applicable to all model aircraft and to all in-service aircraft hydraulic system components. This Aerospace Recommended Practice shall not be used as a basis for acceptance or rejection of components on any bench functional test or systems on new aircraft. This Aerospace Recommended Practice is not applicable to self-contained closed-compartment hydraulic units such as landing gear oleo struts, liquid springs, and self contained viscous dampers.

4. LEAKAGE - GENERAL

4.1 Causes of Leakage: Leakage of hydraulic components is difficult to describe in a quantitative manner such that it is obvious whether a component is acceptable or unacceptable. Since static or dynamic seals are not functionally perfect, some seepage is normally present. Following are some causes for seepage.

(a) A film of hydraulic fluid being retained by the finish of metal surfaces, such as piston rods, and being carried past the seal. However, this film is necessary for the lubrication of the seal.

(b) Pressure and temperature variations affecting seals.

(c) Seals tending to take a permanent set after a period of time.

(d) Detail parts such as felt rings, leather rings, and cavities retaining fluid.

4.2 Classification of Leakages: Leakages can be broadly classified as allowable or excessive.

(a) When the fluid escaping is of an insignificant quantity and will have no detrimental effect on aircraft operation, and when correction of this slight leakage does not warrant the maintenance time involved, the leakage is then termed "allowable."

(b) If the fluid leakage is such that the hydraulic reservoir level may be depleted or dangerously lowered during normal operation, a fire hazard created, or the air worthiness of the aircraft otherwise compromised, the leakage is termed "excessive." Allowable leakage, which can exist on even new or overhauled units, will usually show as a seepage, stain or wet area. However, it is possible for seepage or an allowable leakage to collect in a cavity of a unit or depression in an adjacent structure over a period of time and falsely indicate excessive leakage. This same leakage when allowed to accumulate on a flat area or a white painted surface often has the appearance of being excessive. Although the intent of this ARP is to liberalize the allowable leakage for in-service components, some judgement will have to be exercised when this criteria is applied to individual aircrafts. It should be apparent that under certain circumstances it may be possible to have enough components with allowable leakages such that their combined leakage will come under the classification of "excessive."

4.3 Measurement of Leakage:

(a) Leakage checks should not be immediately performed on aircraft hydraulic systems and components that have remained in a static unpressurized condition for an appreciable period of time. The systems should be activated first and the components operated a number of times after which any hydraulic fluid should be wiped off before making leakage checks.

(b) In some cases, leakage measurement becomes a problem because the location of the component in the aircraft does not permit direct observation. If there is a flat surface below the component then leakage may be measured by the following method. First wipe the surface clean and place a drop of hydraulic fluid on the area. When this drop stabilizes, note size of area by outlining with a soft lead pencil and wipe clean of hydraulic fluid. Pressurize and cycle the suspected component, correlating the area of the wetted surface with the area previously occupied by one drop. In the event that there is no flat surface below the component, then a pre-marked panel may be temporarily positioned underneath the component for leakage measurement.

(c) Where fluid dropping from a component may be directly observed, do not wipe surfaces but pressurize and cycle the component until a drop falls free. Continue operating the component until another drop falls and compare results with leakage criteria shown in Table I.

(d) For tests requiring long periods of time, and where fluid can drop, wipe the surface clean and dry but do not use a solvent. Secure or place a clean blotter or white cloth immediately below the suspected leak. Examine the blotter or cloth after the system has operated or has been idle the required period of time.

4.4 Leakage Rates: The allowable leakages for static and dynamic seals for various hydraulic components are listed in Table I.

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