HNA Technic

B-5538轮舱液压管漏油（B-nut渗漏）

海技北分区域波音技术组

2023.09.20

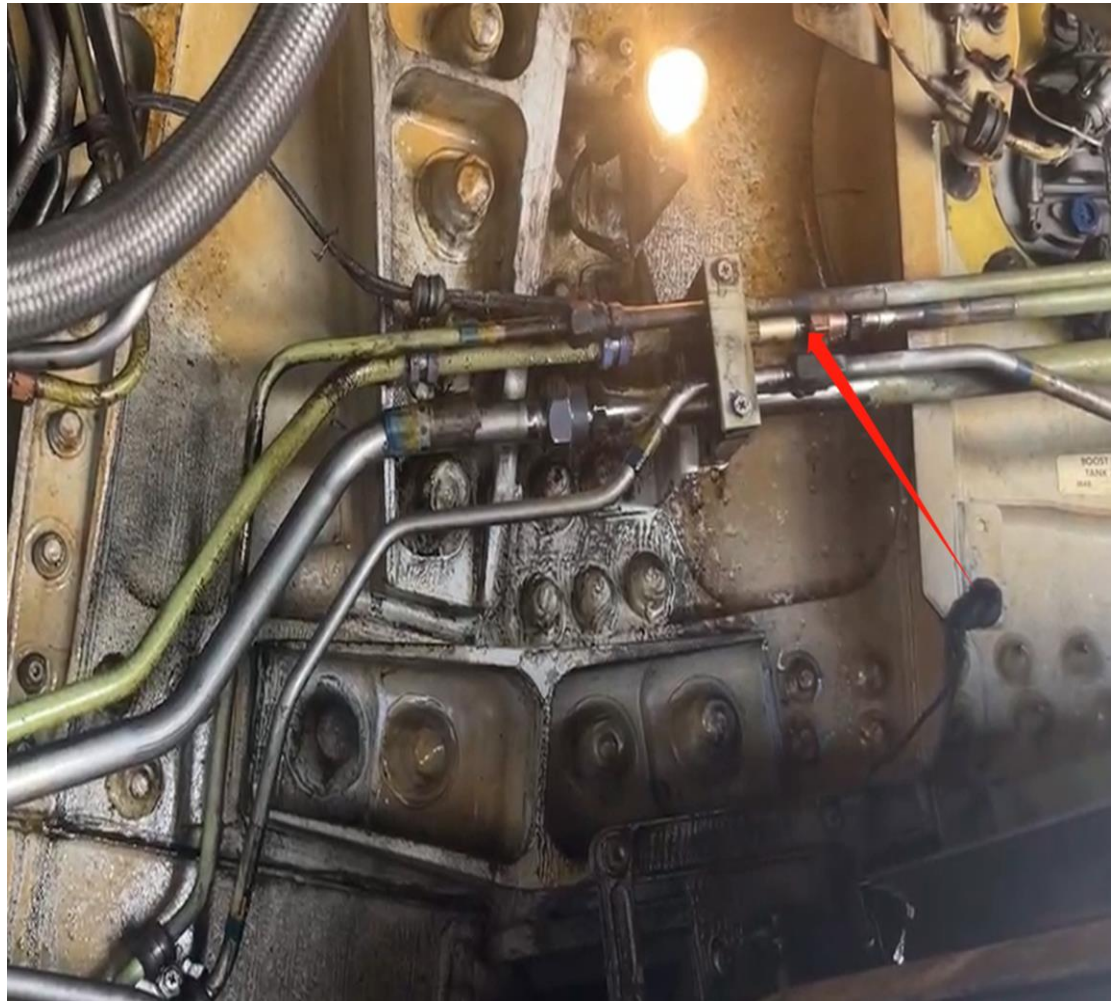
改版纪录

发布日期	版次	改版原因
20230920	R0	首次发布

背景

近期检查发现飞机轮舱一液压管接头处渗出液压油，重新完成力矩检查再次打压检查未见渗漏，航班正常保障。

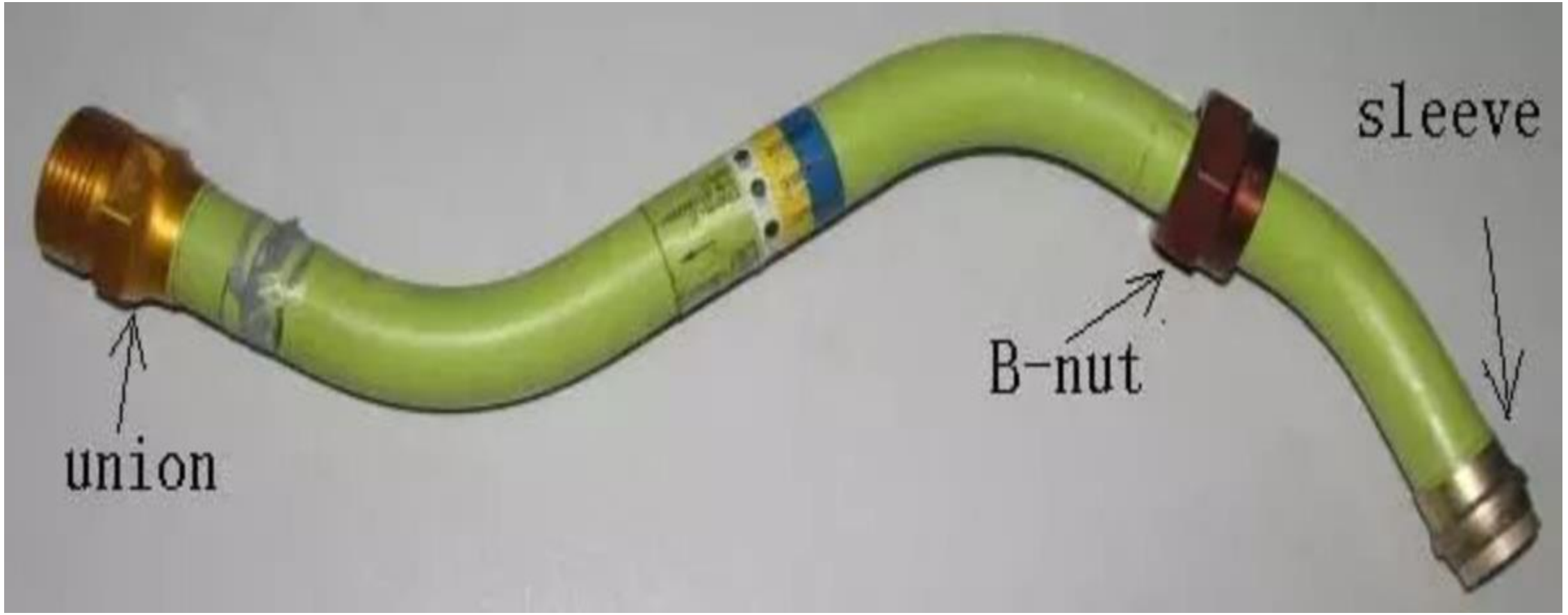
此类漏油比较常见，尤其是在冬季更为多发，因此将案例进行总结，积累处置经验，提高处置效率。



液压管组成介绍

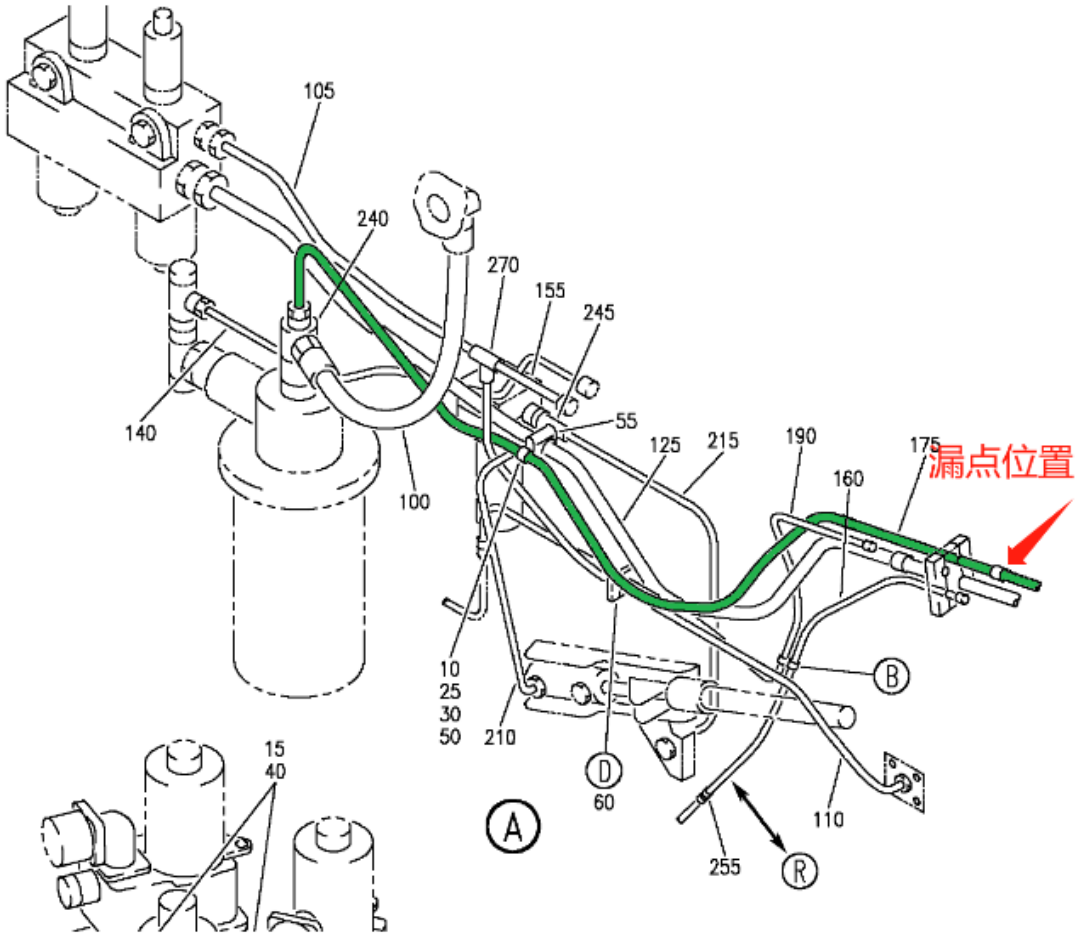
飞机上的液压管组件通常由管子、UNION、B-nut、sleeve组成，如下图所示。

有的管子没有UNION，两端都是B-nut（具体可以在IPC中进行判断，后面有介绍）



渗漏管路介绍

管路件号：272A4451-1080，是从B系统热交换器的回油路上过来的管路，漏点在管路B-nut连接处



渗漏管路介绍

本次涉及的液压管件号为 272A4451-1080，

从IPC可以确认管子有2个sleeve和2个B-nut，并能得到下述信息：

件号：272A4451-1080

材质：铝合金

外径：0.5inch

管壁厚度：0.035inch

长度：50inch

	175	272A4451-1080	•TUBE ASSY - FROM HEAT EXCHANGER TUBING MATERIAL: .5 IN. OD X .035 IN. WALL X 50 IN. LG ALUMINUM ALLOY AMS 4083 6061 T6 TUBING	040-047	1
	175	272A4451-1112	•TUBE ASSY - FROM HEAT EXCHANGER TUBING MATERIAL: .5 IN. OD X .035 IN. WALL X 51.7 IN. LG ALUMINUM ALLOY AMS 4083 6061 T6 TUBING	040-064, 194-195, 704-706, 841-843, 845-845	1
	-180	AP2097HP08	• • SLEEVE Supplier Code: V01673 SPECIFICATION NUMBER: BACS13BX08HP OPTIONAL PART: 2-02903-08HP, V11328 35235VN08, V08199 AFP175V08P, V30974 DB0S13BX08HP, V14798	040-064, 194-195, 704-706, 841-843, 845-845	2
	-185	BACN10YL08	• • NUT	040-064, 194-195, 704-706, 841-843, 845-845	2

漏油标准核实

漏油标准可以在AMM 29-00-00-790-801中找到，核实核实B-nut不允许有渗漏

Table 602. Hydraulic Fluid Leakage Limits

COMPONENTS	NORMAL OPERATION LIMITS *[1]	DISPATCH LIMITS TO AVOID DELAY *[1]
1. B-Nuts, Tubing and Hoses *[2]	No leakage *[3] *[4]	No leakage *[3] *[4]

Footnote Information:

*[3] Leakage is defined as the escape of fluid from any point of the fitting assembly including the fitting-tube junction, which returns within a time period after being cleaned up (see *[4]). This junction is defined to include one tube outside diameter in length beyond the fitting envelope. The fitting envelope is the area from free parent tube material to free parent tube material or boss.

Footnote Information:

*[4] Evidence of fluid on a fitting joint does not always indicate a leakage condition. For example, a fitting joint may appear moist due to: (a) residual assembly lubricant (MCS352); (b) residual fluid from previous leakage that was corrected but not properly cleaned up or; (c) residual fluid from previous leakage that was corrected and properly cleaned up, but later drained from an inaccessible area (such as fluid from threads within a flareless joint which does not return when re-wiped).

漏油标准核实

依据上述标准，飞机无法放行，难道飞机因此AOG了吗？我们通篇阅读前述AMM AMM 29-00-00-790-801可以发现general部分有如下关键信息，从中我们可以知悉B-nut连接密封是通过金属件的贴合实现的，如果在正确力矩下渗流依旧，说明部件已经失去功能，需要立即更换。因此，只要对相关位置重新按正确力矩进行紧固，确认其不再渗漏，飞机就可以正常保障的。（注意：这里的前提是使用正确的力矩，而不是超力矩拧紧，否则会加速部件的失效）

(5) These conditions are important when you do a leakage check for the various components:

(a) The seal at the B-nut tube connections is made by metal-to-metal surfaces. If a leak will not stop when you tighten the B-nut to the correct torque, the joint is defective and must be repaired.

(b) Supply hydraulic pressure to the component while you measure the leakage.

(c) If it is possible, operate the actuators to see if the leakage changes during the travel.

(d) Make sure the leak is not a type which will increase to a much higher rate with time. Use the type of leak and the length of time the component is pressurized to make this decision.

(e) Make sure all the reservoirs are full before each flight.

(f) After each flight, do a check of the components which have a leak.

(g) If hydraulic fluid collects in the area of the leak, it must not cause damage to the airplane equipment.

力矩查询

管路的力矩需要在AMM 20-50-11-910-801标准力矩中查找，因此需要我们知道管子、接头、螺母等部件的材料，根据件号核实相关信息如下：

1、管子信息

件号： 272A4451-1080

材质： 铝合金

外径： 0.5inch

管壁厚度： 0.035inch

长度： 50inch

2、sleeve信息

Sleeve件号： BACS13BX08HP

材质： 镀铬不锈钢（查询标准BACS13BX核实）

3、nut信息

管路nut件号： BACN10YL08

材质： 铝合金（在标准BACN10YL可以查到）

力矩查询

因为上述部件均为铝合金（铝合金材质是最软的，因此不用再核实与其连接的另一路管路相关材质）

在AMM 20-50-11-910-801table219找到力矩为280in_lb。

注：若管子是钛合金的但是接头是铝合金的，因钛合金硬度大于铝合金，在核实力矩的时候需要按铝合金材质的标准力矩执行。

Table 219. Standard Torque Values for Low Pressure and Return Line Fittings

TUBE SIZE		FLARED AND FLARELESS COMPONENTS TORQUE	
		TUBE MATERIAL/END CONFIGURATION	
OUTER DIAMETER (INCHES)	SIZE	ALUMINUM FLARED TUBE ENDS ALUMINUM TUBE ENDS WITH BACS13BD AND BACS13BX SWAGED SLEEVES FLARELESS TYPE HOSE END FITTINGS WITH ALUMINUM INSERTS TORQUE	FLARED HOSE END FITTINGS WITH ALUMINUM INSERTS
3/16	03	80 in-lb (9 N·m)	35 in-lb (4 N·m)
1/4	04	110 in-lb (12 N·m)	65 in-lb (7 N·m)
5/16	05	140 in-lb (16 N·m)	90 in-lb (10 N·m)
3/8	06	170 in-lb (19 N·m)	130 in-lb (15 N·m)
1/2	08	280 in-lb (32 N·m)	260 in-lb (29 N·m)
5/8	10	360 in-lb (41 N·m)	360 in-lb (41 N·m)
3/4	12	450 in-lb (51 N·m)	500 in-lb (56 N·m)
7/8	14	--	--
1	16	750 in-lb (85 N·m)	700 in-lb (79 N·m)

总结

1、漏油处置

对于液压B-nut渗漏，依据手册核实力矩：

（1）若力矩正常且渗漏，飞机AOG.

（2）若管子力矩小于标准力矩，重新完成磅至正确力矩再次检查，若不再渗漏，正常保障，后续监控。若重新磅力矩依旧渗漏，飞机AOG。

2、力矩核实

实力矩时务必确认各个部件的材质，以最软材质的力矩为最终力矩。例如，管子是钛合金的，接头是铝合金的，此时就应该用接头的标准力矩。