

GIV NOISE AND VIBRATION IN THE CABIN CHAFE INSPECTION

revised 6/9/97
by Al Lane

Not to be provided to operators. Inspection info is in AMM Chapter 54 (Pylon Inspection) and Chapter 71 (Powerplant Inspection). This is a quick reference for GAC personnel to locate repair info.

Noise and/or vibration in the cabin has been reported on several GIV aircraft. Several areas can provide paths for normal engine vibration/harmonics to bypass the engine isolators and go directly into the cabin. In the cabin, the vibration can be felt, or heard as "noise". In most cases, identifying and eliminating "noise paths" eliminates the annoying cabin noise. A thorough inspection and correction of "noise paths" will correct the majority of cabin noise problems.

The majority of the identified noise paths are associated with the engine mounting and fixed cowl. The GIV has a new mounting design that incorporates a fixed cowl which is fixed to the thrust reverser and nose cowl versus the engine crane beams. This design allows the "Floating" fixed cowl to move with the engine. Due to the new GIV engine mounting design, contact between the fixed cowl and the shear web/crane beams must be prevented.

The most common isolation factor used to determine if cabin noise is being generated by the engine or a foul between the engine and mounting is the EVM indication system. If EVM indication is present (above approximately 0.16 ips), then a fan balance would be the first item to be performed. If EVM indication is less than approximately 0.16 ips, then a chafe inspection would be the first item to be performed. In all cases, exact details on when and where the noise is occurring, engine parameters, engine EVM indications, flight profile and flight time, would supply the required information to start the resolution process.

The following information has been assembled to help maintenance personnel locate and eliminate the most common noise paths. Additional information regarding engine chafes and related Rolls-Royce modifications to the engine is provided in TAY Notice to Operators (NTO) No. 17.

If additional information or assistance is needed, please contact the area Gulfstream Field Service Representative or Gulfstream Technical Operations.

- A. Open upper and lower cowl doors on both nacelles. Check all hinge fittings on upper cowl and upper fixed cowl for evidence of contact with shear web/crane beam assembly. Look for chafe marks and damage on (or near) the fittings and fasteners on upper cowl and fixed cowl, then look for corresponding marks and damage on channels, Z-angles and fasteners on shear web and crane beams. Also check for clearance between metal seal on upper fixed cowl and both sides of the hooks, hinges and crane beams.
- B. Check pylon leading edge and pylon boards for contact with fixed cowl and fuselage. Check inside the pylon for contact between lines, components and brackets. Look for anything that may be contacting pylon boards, pylon support structure fixed cowl or fuselage. Check bearing in aft end of thrust strut for security.
- C. The following areas have been identified as noise paths into the cabin. Inspect these areas closely and unless otherwise specified, items apply to the left and right sides.
 1. Upper cowl: Look for contact between number two (2) upper cowl hook/fasteners and fixed cowl hook/rivets on shear web. Check for evidence of contact on both sides and outboard of fixed cowl hook. Repair per Grumman Service Bulletin 88-30.

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2. Upper cowl: Look for contact between the forward side of the aft hinge fitting area (pan radius) and the aft isolator on the aft crane beam. Repair per Grumman Service Bulletin 88-30.
3. Fixed Cowl: Look for contact between the number two (2) upper fixed cowl hook and/or fasteners/rivets, channels and Z-angles on shear web assembly. Repair per Grumman Service Bulletin 88-27, Gulfstream drawing SE45254902 (hook repair) and/or Gulfstream drawing SE45054901 (Z-angle repair).
4. Fixed Cowl: Look for contact between number three (3) upper fixed cowl hook and/or fasteners/rivets, channels and Z-angles on shear web assembly. Repair per Grumman Service Bulletin 88-30.
5. Fixed Cowl: Look for contact between the fixed cowl upper metal seal and the crane beams and the hinge fittings on the fixed cowl and upper cowl. Check both sides of the crane beams and fittings. Repair per Grumman Service Bulletin 87-27.
6. Aft Crane Beam: Look for contact between inner ring of isolator and isolator fitting on crane beam. Refer to GIV Maintenance Manual, Chapter 71-1-0, Engine Isolator - Inspection/Repair.
7. Pylon boards: Look for contact between ALL upper and lower boards (including pylon leading edge) and fixed cowl and fuselage. Clearance should be 0.040 to 0.125 inch. Trim and seal boards as necessary to provide clearance.
8. Pylon boards: Remove upper and lower pylon boards and look for contact between boards and brackets inside pylon. With pylons open, inspect pylon interior for lines chafing together and for anything chafing boards, pylon structure, fuselage or fixed cowl. Check thrust strut aft bearing for security. Check for chafing between seal retainer on number two (2) lower board and crane beam attachment fitting on fuselage.
9. Thrust reverser: Open thrust reverser doors and look for contact between lower door seal retainer and pylon structure. Trim seal retainer angle off as required to clear chafe and paint.
10. Thrust reverser: With thrust reverser doors open, look for contact between lower door (midway back) and pylon structure. Trim angle of pylon bracket off as required to clear chafe and paint.
11. Thrust reverser: With thrust reverser doors open, look for contact between vertical angle located near small flap seal and pylon structure. Trim angle as required to clear chafe and paint.
12. Engine: Open lower cowl door and look for contact between ignitor cables and 7th stage check valve, Refer to TAY Notice to Operators (NTO) No. 17. Reposition cables.
13. Engine: With lower cowl door open, look for contact between bypass duct mating flanges and 7th stage check valve clamp, Refer to TAY Notice to Operators (NTO) No. 17. Reposition check valve clamp.
14. Engine: **RIGHT HAND ONLY** - With lower cowl door open, look for contact between accessory raft on engine and trunnion mount on fixed cowl. Repair per Tay Service Bulletin 72-1144. Engine removal is required. It is recommended left engine accessory raft also be modified to prevent future chafing if engines are swapped for any reason.

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15. Thrust Strut: Check both ends of the thrust strut and ensure the bearing is centered in the lug of the strut. Notify Gulfstream if either bearing is displaced (not centered in the lug). Struts with displaced bearings should be removed and repaired as soon as practical. If the lug of the strut is contacting the attaching structure at either end, corrective action should be taken as soon as possible to prevent damage to the thrust strut and attach fittings.
 16. Check engine suspension link for contacting crane beam at outboard end fittings (where isolators are located).
- D. The following are other POSSIBLE sources of noise/vibration. (Note: The following areas are not usually involved with noise in cabin, and should be considered only after all other items have been checked and cleared.)
1. Low torque on trunnion canister outer ring nut or tie bolt.
 2. Fit of main landing gear doors.
 3. Contact between aft end of inboard mount bolt for trunnion housing and fixed cowl. Notify Gulfstream Technical Operations if there is evidence of contact. Repair requires removal of engine mounting / fixed cowl and relocating washers or installing improved hardware.
 4. Forward fixed cowl fire seal retainer contacting crane beam. See GIV Customer Bulletin No. 14.
 5. Thrust reverser feedback cable routing causing chafe condition. Reroute per Grumman Service Bulletin 88-02.
 6. Upper aft pylon board seal retainer contacting thrust reverser barrel rivets (button head). Repair per drawing SE 45054902 or ASC 276/drawing 1159SB41276.
 7. Engine "Controlex" cables contacting pylon components.