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Airworthiness Directive: 127

Date: April 29, 2002

Subject: Trim Tab Flutter

Compliance: Mandatory

Models Effected: All S-7Models Manufactured Before 1999

- 2 owners of older model S-7 experienced low frequency elevator flutter.
  Both pilots were able to stop the elevator flutter through slowing down the AC and land safely.
  The flutter occurred in both cases at about 110 to 120mph indicated airspeed and could be found repeatedly at the same airspeed.
- Both aircraft had older style tails at least one had the old style trim actuation with a spring at the trim tab. One aircraft is a high time aircraft.
  It is known from older cases that the spring at the wrong tension could at least contribute to flutter.

  Both aircraft did not have mass balanced elevators.
- Flutter is a very complex matter and a lot of different factors could contribute to its occurrence. Such as: percentage of mass balancing around the hinge line, hinge play, control free play, stiffness for surface tab and control system, fuselage stiffness tail bracing, and aircraft loading.

  The complexity is multiplied through the fact that the S-7 is a kit aircraft and each aircraft is somehow different.
  The majority of S-7's never experienced flutter.
- The S-7 development program saw different fuselage, wing, control system, tail, trim tab and trim tab actuation styles. It also moved from 50 HP to 100 HP.
- To investigate for problems and to develop fixes for all the different older styles is not possible due to complexity and unavailability.

We would like you to contact us if you experienced something similar.

For above reasons:

We suggest limiting the VNE (Never exceed speed) to 100 mph until the following is completed on your aircraft.

Inspect your elevator control and elevator trim system thoroughly. This includes elevator and trim tab hinges, elevator and trim tab horns, push pull tubes and joints, elevator torque tube and attach, torque tube glides, control stick attach, link tubes and attach. This also includes all elements of the trim system.
Disconnect all connections and check all elements for wear, elongation, excessive play and general condition. Replace worn parts.
Lubricate all joints.

Change trim tab actuation on airplanes equipped with a spring on the trim tab to an actuation without spring. Preferably to the servo- trim system.

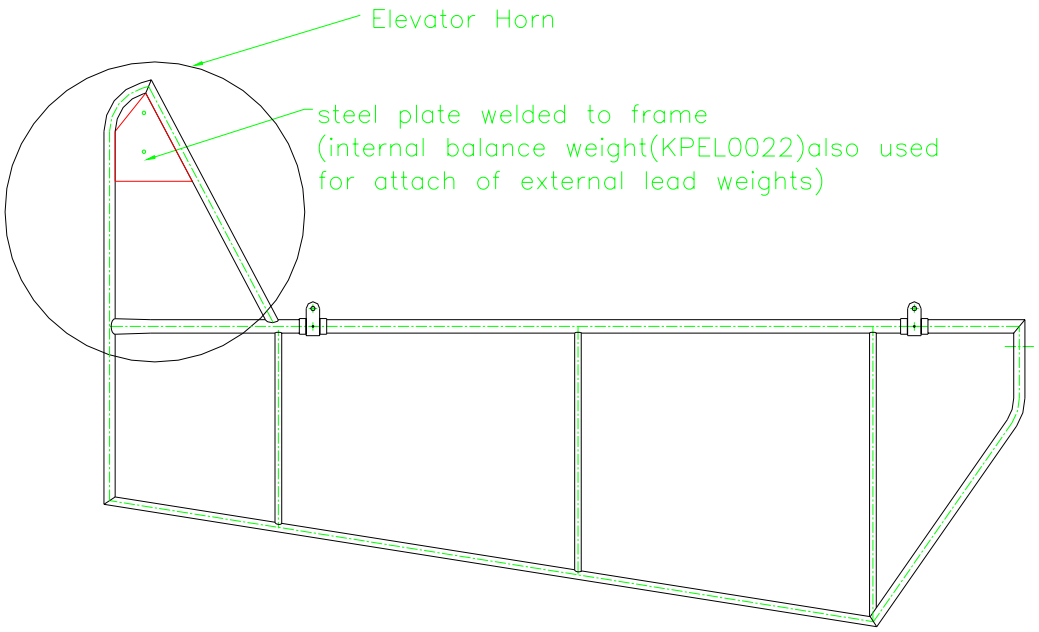
Mass balance both elevator 100% to the hinge line. You will have to remove both elevators to do this to remove hinge friction. The following provides some ideas how to do this for some of the more recent models. Reference also enclosed instructions for balancing which are taken out of a newer S-7 construction manual

For:

1. **Newer style S-7 with trim tab actuation through stiff Teleflex cable or electrical servo elevator mounted and with horn style elevators.**

We can conclude with reasonable safety, that the newer styles S-7 with trim tab actuation through electrical servo or stiff Teleflex cable are free from flutter throughout the operating range of the AC, if both elevators are 100 % static mass balanced around the hinge line and the airplane is built to factory specs.
You can easy identify the Teleflex cable operated trim trough the trim lever location next to the throttle lever on both seats.

If you have the new horn style elevators and the new trim actuation (Teleflex or servo) all you need to do, is to mass balance the elevators around the hinge line.
This will be easy on all elevators built after 97. These elevators have already a heavy steel plate welded in the tip of the horn to achieve some degree of balance and to attach the external lead weights.
The drawing below shows an elevator with horn and internal weight installed.



If your elevators have these plates installed (feel through the fabric) you can simply follow the enclosed instructions for mass balancing.

If your elevator does not have the internal steel plates (Manufactured in 97 and before), we suggest installing them (Spot weld in 5 places). The plates will be available through the factory (Order: Mass balance KPEL0022). You will need two.

The plates have to be flush with the lower surface of the elevators.

This would involve some recovering and painting of at least the horn area.
After that, balance your elevator (before mounting) around the hinge line following our enclosed instructions.

2. S-7 with horn style elevator and trim tab actuation through spring and cable (some models build in 96 and 97).

These models have the horn style elevator but without the internal plates in the horns. The trim tab is actuated through cable and spring. The spring is located on the top of the elevator.
The following is suggested:

Substitute both elevators with new style parts. The new parts have internal plates and the right elevator comes with mount for the trim servo.
Or:
Substitute the right elevator for a new one and weld plate (Mass balance KPEL0022) in left elevator as under 1.
In any case:

Substitute the trim system (spring and cable) with the new servo trim system. You will have to run a wire through the fuselage to the control stick. After covering and painting balance both elevators according to instructions enclosed.

For ordering of parts refer to the following list:

#	**Description**	**Part Number**	**Qty.**
1	Elevator LH	KAEL0010	1
2	Elevator RH	KAEL0021	1
3	Trim servo kit	KSTR0001	1
4	Control stick grip	KSCS0016	1
5	Trim exit cover	KPCV0026	1
6	Trim exit ring	KPCV0027	1
7	1/8 Aluminum pop rivet Cherry Q	AAPQ-41	39
8	1/8 Aluminum pop rivet Cherry Q	AAPQ-42	4
9	3/32 Aluminum pop rivet	40APR1/8	20
10	1/8 Stainless steel pop rivet – Cherry Q	CCPQ-42	8
11	3/16 Bolt	AN3-5A	2
	3/16 Bolt	AN3-11A	4
12	3/16 Thin washer	AN960-10 L	2
13	3/16 Thick washer	AN960-10	2
14	3/16 Single ear nut plate	MS21051-L3	4
15	3/16 Nut plate	K-1000 -3	2
16	Nut	MS21083N04	3
17	¼ Bolt	AN4-14A	4
18	¼ Thin washer	AN960-416L	20
19	¼ Shear Nut	AN364-428 A	4
20	Machine screw	MS35206-218	3
21	1/8 small brass washer	AN960- B4	5
22	Hinge lock	KPTR0018	1
23	Trim tab center rib	KPTR0011	1
24	Trim tab horn left hand	KPTR0024-L	1
25	Trim tab horn right hand	KPTR0024-R	1
26	Trim tab end rib	KPTR0012	1
27	Trim tab inboard	KPTR0013	1
28	Trim tab outboard	KPTR0014	1
29	Trim tab center rib doubler	KPTR0015	1
30	Aircraft Fabric	CV-S7	12 ft
31	2” Surface Tape	2 Tape	50 ft
32	U-500 Urethane Adhesive	KSCV0001	1qt
33	Rib lacing	Rib Lacing	4 ft
34	Rib tape	Rib Tape	2 ft
35	#4 small pan head screw	4x1/4 PHS	14
		TOTAL COST	**$560.00**

3. S-7 without horn style elevator (straight) and trim actuation through spring and cable and serial numbers after 0594132 (build after 05. 94).

We suggest substituting the horizontal stabilizer and elevator completely through new style parts. Included would be the change over to the electrical servo trim system and a 100 % static mass balance of both elevators.
We will possibly need a couple simple measurements on an individual basis.
You will need all the parts listed:

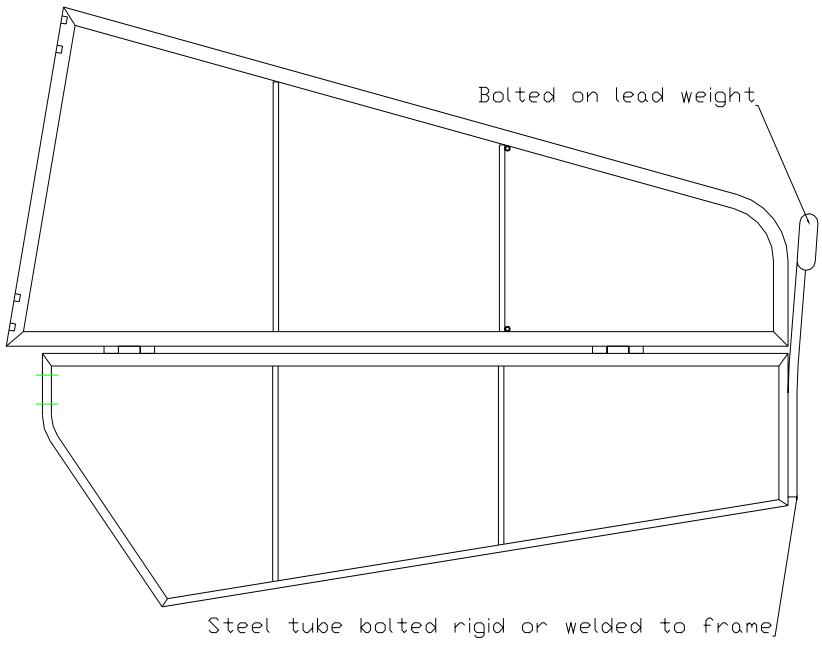
#	**Description**	**Part Number**	**Qty.**
1	Elevator LH	KAEL0010	1
2	Elevator RH	KAEL0021	1
3	Trim servo kit	KSTR0001	1
4	Control stick grip	KSCS0016	1
5	Horizontal stabilizer assembly, LH	KAHS0020-LH	1
6	Horizontal stabilizer assembly, RH	KAHS0020-RH	1
7	Wood lattice ribs	Lattice	10 ft
8	5 min Epoxy	Epoxy	1
9	Trim exit cover	KPCV0026	1
10	Trim exit ring	KPCV0027	1
11	1/8 Aluminum pop rivet Cherry Q	AAPQ-41	39
12	1/8 Aluminum pop rivet Cherry Q	AAPQ-42	4
13	3/32 Aluminum pop rivet	40APR1/8	20
14	1/8 Stainless steel pop rivet –Cherry Q	CCPQ-42	8
15	3/16 Bolt	AN3-4A	2
16	3/16 Bolt	AN3-5A	4
17	3/16 Bolt	AN3-11A	4
18	3/16 Bolt	AN3-14A	2
19	3/16 Bolt	AN3-15A	4
20	3/16 Bolt	AN3-33	4
21	3/16 Thin washer	AN960-10 L	40
22	3/16 Thick washer	AN960-10	6
23	3/16 Single ear nut plate	MS21051-L3	4
24	3/16 Nut plate	K-1000 -3	2
25	Nut	MS21083N04	3
26	3/16 Castle nut	AN310-3	4
27	Small cotter pin	MS24665-134	6
28	3/16 Tensile Nut	AN365-1032A	10
29	¼ Bolt	AN4-14A	4
30	¼ Thin washer	AN960-416L	20
31	¼ Shear Nut	AN364-428 A	4
32	Machine screw	MS35206-218	3
33	1/8 small brass washer	AN960- B4	5
34	Hinge lock	KPTR0018	1
35	Trim tab center rib	KPTR0011	1
36	Trim tab horn left hand	KPTR0024-L	1

37	Trim tab horn right hand	KPTR0024-R	1
38	Trim tab end rib	KPTR0012	1
39	Trim tab inboard	KPTR0013	1
40	Trim tab outboard	KPTR0014	1
41	Trim tab center rib doubler	KPTR0015	1
42	Aircraft Fabric	CV-S7	20 ft
43	2” Surface Tape	2 Tape	100 ft
44	U-500 Urethane Adhesive	KSCV0001	1qt
45	Rib lacing	Rib Lacing	4 ft
46	Rib tape	Rib Tape	2 ft
47	#4 small pan head screw	4x1/4 PHS	14
48	Aluminum Bushing 3/8x .090	KPAC0060	4
49	Tail brace cable (made to required length)		8
		TOTAL COST	**$725.00**

4. S-7 before serial number 0594132 (build before 05.94).

The new tail does not fit these older airplanes.
The following is suggested:

Mass balance both elevators to the hinge line. The elevators have no horn to attach a weight. We suggest attaching a forward facing tube to the outside of the elevator for the weight attach. The tube needs to be rigid enough to support the weight and must be bent outward to clear the horizontal stab during elevator movement. Bolt or weld on tube to elevator frame. Refer to picture below for the general lay out.
Also change the trim system to eliminate the spring or fix trim tab rigid in position.



If you need any help contact the factory.
We will provide available parts at a very attractive price and provide all the help possible.

Thank you for your attention to this matter.