



September 4, 2007

RE: FAA NPRM Docket No. FAA-2007-28434, Directorate Identifier 2007-CE-053-AD, Replacement of Circuit Breaker-Type Switches in certain Beechcraft piston airplanes.

Good day:

On behalf of over 10,400 members and aircraft owners, the American Bonanza Society (ABS) opposes the proposed Airworthiness Directive (AD) that is subject of a Notice of Proposed Rulemaking (NPRM) that calls for replacement of circuit breaker-style electrical switches in numerous Beech piston airplanes. ABS opposes this NPRM for the following reasons:

- 1) **There is no imminent threat to aircraft occupants or the public.** Of thousands of affected airplanes and over a hundred thousand individual circuit breaker-style switches in service, there have only been six (6) Service Difficulty Reports (SDRs) filed in the last five years that indicate an overheat of one of the affected switches. None of these incidents resulted in a reportable mishap and there are no NTSB reports of electrical fire or overheat linked to failure of these switches in affected airplanes in a search going back to January 1, 2000.
- 2) **Those very few reports affect only high electrical-load items, and only in Model 58 Barons.** There is nothing to indicate these isolated incidents affect all airplanes addressed in the NPRM, or all part number switches identified for proposed replacement.
- 3) **Testing by Raytheon Aircraft (now Hawker Beechcraft) and FAA does not indicate a wider threat of failure.** According to the FAA's October 1, 2004 Airworthiness Concern Sheet (ACS), the only switches that were tested were those that had previously been "squawked" as overheating in aircraft and safely removed under existing standards of maintenance. Hawker Beechcraft Technical Support says there are "no problems" with switches that had not previously indicated an overheat in service.
- 4) **High-utilization fleet service has shown there is no significant threat of switch overheat.** NPRM comments submitted by a training fleet operator flying A36 Bonanza and Baron 58 airplanes indicate switch failure is not a danger.
- 5) **An equivalent, even improved, level of safety would result from education in lieu of regulation.** Beech feels it is adequate to physically monitor switches in flight by feel for heat and looseness, and to replace (per Recommended Service Bulletin 24-3735 and 24-3807) only those switches. Further, the Pilot's Operating Handbooks (POHs) for many affected airplanes do not include an Electrical Fire or Overheat checklist. An educational effort to publicize Beech's guidance and a generic Electrical Fire or Overheat procedure for pilots of those POHs that do not contain such a checklist would provide pilots the information necessary to detect and respond in the rare event of a switch overheat condition.

ABS will commit to this educational effort and in fact has already published an article addressing this very point.

- 6) **There is a critical shortage of replacement switches.** A comparison of the number of affected airplanes on the FAA registry, the typical number of circuit breaker-type switches per each affected model of aircraft, and the manufacturer's parts availability shows a shortage of over 94,600 switches. Manufacturer stocking suggests that this shortage would not be made up in time to prevent a large number of affected aircraft from being grounded due to lack of replacement parts at the end of the proposed 12-month compliance period.
- 7) **Operational history of these switches does not warrant an \$18 million impact on airplane owners.** The extremely isolated reports of in-flight failure, and zero incidence of aircraft mishaps as a result, makes a sweeping and costly replacement of switches that are almost certainly *not* going to fail completely out of proportion to the low level of risk.
- 8) **ABS is concerned that the ACS process broke down in this NPRM, and our request for an extension to provide more detailed comments was not addressed.**

Amplification and data on comments

1) There is no imminent threat to aircraft occupants or the flying public.

There have only been six (6) SDRs filed against affected switches in the last five years. None has resulted in a reportable aircraft accident. There have been no injuries and no reported aircraft damage as a result except for a need to replace the switch itself (see Table 1).

Table 1: Beech Aircraft SDRs for the last five years (8/21/2002 – 8/30/2007) concerning circuit breaker-type switch overheats

SDR Date	Model	Switch	SDR URL
8/27/2002	58P TJ-317	Panel lights	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=2002FA0001059
12/25/2002	58 TH-444	Prop heat	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=BSY2003F00006
3/19/2003	58 TH-333	Landing light	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=BSY2004F00001
5/6/2003	58 TH-600	Landing light	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=BSY2003F00012
1/8/2005	58 TH-1767	Landing light	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=2005FA0000762
2/24/2007	58 TH-1155	Landing light	http://av-info.faa.gov/isdr/LongFormView.asp?vB=IE&ocn=BSYA200700006

When searching under "Electrical Fire", "Overheat" or "Smoke" there are no NTSB reports for affected aircraft due to failure of cockpit switches, 1/1/2000 – 8/30/2007.

According to FAA registry data and additional information from the NPRM there are 9144 aircraft affected by this proposed AD (note: the NPRM cites a higher figure, 10,821). See Table 2. Using the *lower* estimate of 9144 aircraft, at the rate of less than one SDR per year this results in a 0.01% chance of failure in any one aircraft per year.

With factory-standard equipment there are or have been an estimated 96,296 affected switches in fleet service. With six SDRs in five years this equates to a 0.006% chance of any one switch failing in five years' time, or only 0.001% chance of switch failure in any one year.

Table 2: Total Aircraft and Estimated Number of Switches Affected by this NPRM

Beechcraft Fleet Affected by the Switch-Type Circuit Breaker NPRM

Data from FAA Registry 10/31/2005 + G58/Be77 data from NPRM

Model	33	35	36	55	56	58	77	Switches/ Aircraft*	Total Switches
F33	17							7	119
F33A	1094							7	7658
F33C	20							7	140
G33	46							7	322
V35B		1037						7	7259
A36			2754					7	19278
A36TC			216					7	1512
B36TC			355					7	2485
B55				1153				10	11530
D55				178				10	1780
E55				294				14	4116
A56TC					7			10	70
58						1151		24	27624
G58						15		25	375
58P						385		22	8470
58TC						110		21	2310
77							312	4	1248
Total	1177	1037	3325	1625	7	1661	312	n/a	96296
Model	33	35	36	55	56	58	77	n/a	n/a

Total A/C	9144
Switches*	96296

*standard equipment per POH

Using aircraft use estimates from the *Aircraft Bluebook Digest*, the affected fleet averages 1.4 million flying hours per year (see Table 3). At six SDRs in five years, this means there appears there is only a chance of roughly **one in 1.4 million flying hours** that a switch overheat will occur.

Table 3: Estimated Annual Fleet Hours, Affected Aircraft

Beechcraft Fleet Affected by the Switch-Type Circuit Breaker NPRM

Data from FAA Registry 10/31/2005 + G58/Be77 data from NPRM

Model	33	35	36	55	56	58	77	Est. Annual Hrs/A/C***	Est. total Hrs/Yr
F33	17							128	2176
F33A	1094							136	148784
F33C	20							128	2560
G33	46							128	5888
V35B		1037						120	124440
A36			2754					170	468180
A36TC			216					145	31320
B36TC			355					145	51475
B55				1153				129	148737
D55				178				145	25810
E55				294				145	42630
A56TC					7			145	1015
58						1151		175	201425
G58						15		175	2625
58P						385		150	57750
58TC						110		168	18480
77							312	178	55536
Total	1177	1037	3325	1625	7	1661	312	n/a	1388831
Model	33	35	36	55	56	58	77	n/a	n/a

Total Hrs	1388831
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***Figures from Aircraft Bluebook Digest, Fall 2007

With an average of 13 switches per affected aircraft and 150 hours per year operation, this suggests for any one airplane the risk of switch failure is one in 121,000 calendar years.

When reviewing all these estimates remember that there has not been a single report of an aircraft mishap resulting from switch overheating in a Beech piston airplane in at least the last seven years. There is no imminent threat from these switches.

2) Those very few reports affect only high electrical-load items, and only in Model 58 Barons.

Every SDR affects Model 58 Barons, five for Baron 58s and one for a 58P (See Table 1). Those switches that failed apply to high electrical draw lighting and deicing functions. There is nothing to indicate potential failures of switches in other models of Beechcraft or switches controlling power to other equipment. The Airworthiness Concern sheet (ACS)

on this issue, dated October 1, 2004, addressed only the Model 58 Baron and switches for high-draw electrical equipment.

3) Testing by Raytheon Aircraft (now Hawker Beechcraft) does not indicate a wider threat of failure.

The October 2004 ACS states:

Eight [previously] failed switches were removed from various model aircraft above [Baron 58, 58A, 58P, 58PA, 58TC, 58TCA] and evaluated by Raytheon along with the FAA and three of these switches were observed to get very hot to the touch and one eventually produced smoke, and could not be selected off.

According to the FAA's own Airworthiness Concern Sheet ([www.aopa.org/gta/ad/documents/2004/Raytheon\(Beech\)-Baron-switchstylecircuitbreakers-ACS.pdf](http://www.aopa.org/gta/ad/documents/2004/Raytheon(Beech)-Baron-switchstylecircuitbreakers-ACS.pdf)), the only switches tested were those that had previously overheated in aircraft. Only one of those known-failure switches reached a point in testing that it presented a potential safety-of-flight issue, and then only after being permitted to run some time after getting "very hot to the touch." This is only one switch out of a population of well over 96,000 originally installed in affected airplanes, and the switch only "smoked" when subjected to prolonged testing after having been identified as defective and safely removed in the field under existing standards of maintenance.

4) High-utilization fleet service has shown there is no significant threat of switch overheat.

A comment to this NPRM filed by the maintenance manager of Mesa Airlines Pilot Development (http://dmses.dot.gov/docimages/pdf102/485307_web.pdf) indicates no history of hazardous situations concerning the switches, and that Mesa's very high utilization of subject airplanes proves any that do become defective in service can safely be detected and replaced using standard maintenance practices.

5) An equivalent, even improved, level of safety would result from education in lieu of regulation.

Service history shows that existing pilot and mechanic techniques are adequate to detect and replace failed switches before they become a safety-of-flight issue. Beech technical support tells ABS it feels it is adequate to physically monitor switches in operation by feel for looseness and heat, and to replace (per Recommended Service Bulletin 24-3735 and 24-3807) any switch that is loose or feels hot to the touch. Further, the Pilot's Operating Handbooks (POHs) for many affected airplanes do not include an Electrical Fire or Overheat checklist. An educational effort to publicize Beech's guidance and a generic Electrical Fire or Overheat procedure for pilots of those POHs that do not contain such a checklist would provide pilots the information necessary to detect and respond in the rare event of a switch overheat condition. ABS, in fact, ran an article in *ABS Magazine* in the March 2002 issue giving guidance on electrical fire and overheat procedures for pilots of those airplanes without manufacturer guidance. ABS will commit to an educational effort highlighting operational checks of the subject switches and

recommendations for pilots of airplanes that do not have an Electrical Fire or Overheat checklist in the Pilots Operating Handbook.

6) There is a critical shortage of replacement switches.

A comparison of the number of affected airplanes on the FAA registry, the typical number of circuit breaker-type switches per each affected model of aircraft, and the manufacturer's parts availability shows a shortage of over 94,000 switches (see Tables 2 and 4). The actual shortage is even greater since part numbers are not interchangeable and many airplanes have more switches controlling optional equipment.

Manufacturer stocking suggests that this shortage would not be made up in time to prevent a large number of affected aircraft from being grounded due to lack of replacement parts at the end of the proposed 12-month compliance period.

Although identical parts might be available through other sources, the aircraft approval basis requires specific Beech parts numbers that are applied by the factory. There is no assurance that the manufacturer is able or willing to produce enough parts to meet the need if wholesale parts replacement becomes mandatory over a short period of time.

All indications are that a large number of affected airplanes would be grounded for an indefinite period if this NPRM is adopted as an AD.

Table 4: Replacement Switches in RAPID Stock

Replacement circuit breakers in RAPID stock, 8/21/2007

Part number	In stock		
35-380132-61	82		
35-380132-62	13		
35-380132-63	98		
35-380132-64	29	Total in stock (all part numbers)	1673
35-380132-65	96	Estimated number of breakers needing replacement (from Affected Fleet spreadsheet)	96296
35-380132-66	92	Shortfall	-94623
35-380132-67	12		
35-380132-68	100		
35-380132-69	100		
35-380132-70	100		
35-380132-71	96		
35-380132-72	96		
35-380132-73	100		
35-380132-74	100		
35-380132-75	100		
35-380132-76	99		
35-380132-77	72		
35-380132-78	100		
35-380132-79	100		
35-380132-80	88		

From online RAPID query. Price per breaker \$105

7) Operational history of these switches does not warrant an \$18 million impact on airplane owners.

Given the cost of compliance per switch identified in the NPRM, the estimated cost of compliance per aircraft ranges from \$740 (for a very few airplanes) through a more typical range of \$1295.00 through \$4625.00 (see Table 5). Total estimated economic impact to the affect fleet is approximately \$18 million. Note that ABS' technical experts feel these numbers are low because in their opinion the estimated time of one hour per switch for replacement is low by a factor of two to three. Actual cost of compliance to the affected fleet may be as high as \$54 million.

The extremely isolated reports of in-flight failure, and zero incidence of aircraft mishaps as a result, makes a sweeping and costly replacement of switches that are almost certainly *not* going to fail completely out of proportion to the low level of risk.

Table 5: Estimate Switch Replacement Cost

Switch Replacement Cost

Model	Switches/ Aircraft*	Total Switches	Cost per Aircraft **
F33	7	119	\$1,295.00
F33A	7	7658	\$1,295.00
F33C	7	140	\$1,295.00
G33	7	322	\$1,295.00
V35B	7	7259	\$1,295.00
A36	7	19278	\$1,295.00
A36TC	7	1512	\$1,295.00
B36TC	7	2485	\$1,295.00
B55	10	11530	\$1,850.00
D55	10	1780	\$1,850.00
E55	14	4116	\$2,590.00
A56TC	10	70	\$1,850.00
58	24	27624	\$4,440.00
G58	25	375	\$4,625.00
58P	22	8470	\$4,070.00
58TC	21	2310	\$3,885.00
77	4	1248	\$740.00
Total	n/a	96296	\$17,814,760.00

8) ABS is concerned that the ACS process broke down in this NPRM, and our request for an extension to provide more detailed comments was not addressed.

The October 2004 ACS addressed only Model 58 airplanes and a very limited number of tested switches. There was no regulatory action and no contact from FAA on this issue until the NPRM proposing a much more sweeping requirement was published in the Federal register in July 2007. Agreed-upon notification procedures developed by FAA,

AOPA and type clubs were not followed and ABS did not become aware of the NPRM until less than three weeks before the expiration of the comment period. At the suggestion of the Small Aircraft Directorate in Kansas City, ABS filed a request for an extension in the form of a comment to the NPRM and advised the Wichita ACO that the request was posted. ABS received no return contact and, when we called the ACO asking for an update, we discovered all parties with authority to grant an extension were unavailable until after the expiration of the comment period.

Summary

ABS therefore submits these comments in the hope they are sufficient to show:

- 1) There is no imminent hazard associated with the topic of this NPRM.
- 2) Existing procedures have proven adequate to detect and replace the few affected switches that have failed in service.
- 3) Manufacturer testing of the switches does not validate this proposed AD because testing involved only eight switches, all of which had already been identified as having failed in service (and were safety removed using routine procedures), and the single switch that “smoked” was one that was purposely left on for a prolonged period after developing a identifiable overheat condition.
- 4) Parts availability is vastly insufficient to meet the demands of this proposed AD.
- 5) An equivalent, if not even improved, level of safety would result from an educational effort in lieu of mandated replacement.
- 6) Data shows there is no justification for the \$18 million or greater impact this AD, if adopted, would have on aircraft owners.

This issue indeed does warrant an InFO (Information for Operators) letter or a Special Airworthiness Information Bulletin (SAIB) highlighting the need to monitor switches for looseness or overheat, and procedures to follow in those airplanes for which no manufacturer’s Electrical Fire or Overheat checklist exists. ABS will help FAA develop an InFO or SAIB if requested. Representing over 10,400 members who own and operate Beech piston airplanes, however, the American Bonanza Society strongly opposes an Airworthiness Directive requiring needless, costly and unsupported switch replacement.

Respectfully submitted

Thomas P. Turner
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