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**Technical Bulletin**

**Engineering Test Results - Rebel Inboard Spring Gear Attach Bolt**

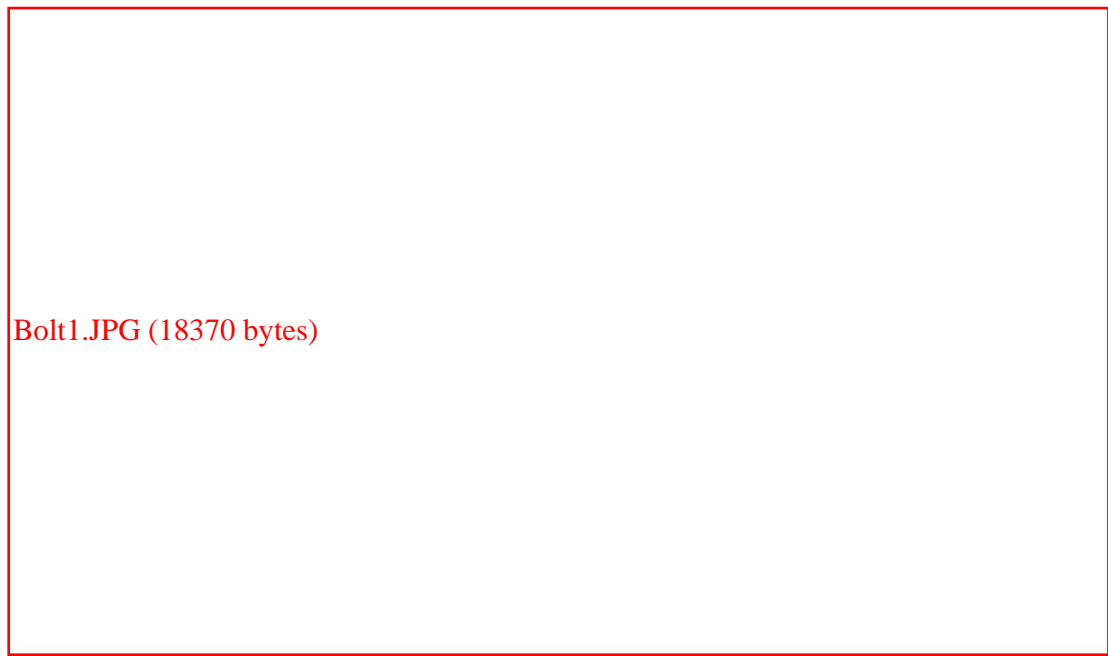
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**Attention:** Rebel Builders

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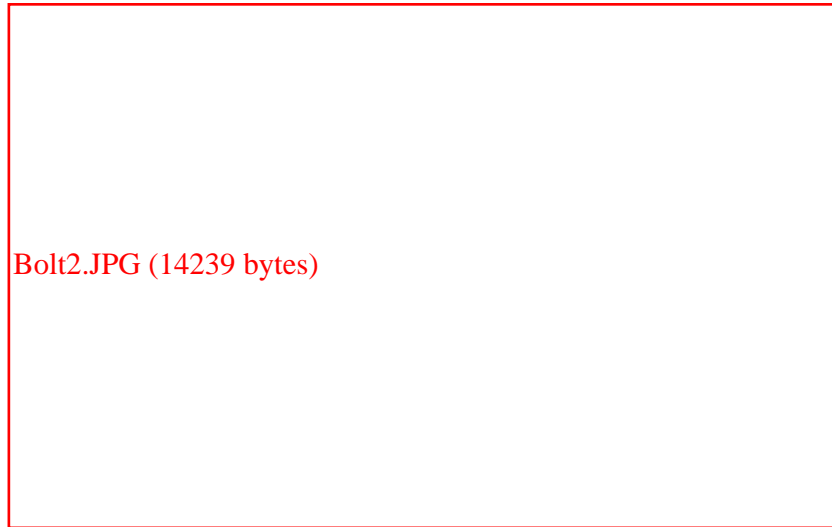
Recently, one of our Rebel customer's spring gear collapsed due to the failure of the inboard Spring Gear Attach Bolts. The landing gear was tested by following standard aircraft drop test procedures during the prototype stage of development. There was no sign of failure of the bolts. Our own Elite aircraft (heavier than the Rebel) has approximately 300 hours on it with no signs of failure of the inboard bolts. We also asked all flying Rebel and Elite customers to check their aircraft and no one reported any signs of possible bolt failure. We decided to send the failed bolt to an engineering company for analysis. Following are the conclusions reached in their final report to us:

"The evidence shows that the bolt failed in service due to a sustained overload condition....It is possible that the bolt failed as a result of several applications of heavy loads, however, no cracking took place. If several heavy loading events did take place, reduction in area by necking occurred during the early events, and final fracture occurred in a single final overload event". "It is possible that the fractured bolt became loose as a result of a prior event. No material faults were found with the failed bolt."



**Figure 1 Overall view of fractured bolt. Note deformation at arrow caused by bending**

Given the above conclusions it is apparent that the design of the gear and the bolts used to attach it to the fuselage are more than adequate.



**Figure 2 Magnified view of "cone" side of fracture**

The most important finding resulting from the engineering report is that the bolts are subject to deformation after a hard landing. It is therefore extremely important for the customer to check the condition of the spring gear attach bolts, especially the inboard bolt, after a hard landing for signs of failure. If a loose bolt is detected after a hard landing DO NOT retighten the bolt. The bolt has stretched and therefore has a reduced cross-sectional area. This means that the bolt will not take as much load before it stretches again. Loose bolts MUST be replaced and torqued to the proper value.

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