

**INCIDENT**

**Aircraft Type and Registration:** American Blimp Corporation A60 Plus Airship, N2017A

**No & Type of Engines:** 2 Limbach L2000 reciprocating engines

**Year of Manufacture:** 1991

**Date & Time (UTC):** 15 January 1995 at 1656 hrs

**Location:** The Wash, Holbeach Range, Lincolnshire

**Type of Flight:** Aerial Work

**Persons on Board:** Crew - 1                      Passengers - 3

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Moderate on landing, substantial during recovery

**Commander's Licence:** Commercial Pilot's Licence (FAA)

**Commander's Age:** 42 years

**Commander's Flying Experience:** 4,011 hours (of which 704 were on type)  
Last 90 days - 120 hours  
Last 28 days - 40 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot and  
AAIB telephone enquiries

The aircraft is a non-rigid helium airship with a conventionally shaped 69,000 cubic foot envelope with a cruciform tail. The pilot and passengers occupy an underslung five-place gondola on which are mounted two 80 hp piston engines each driving a pusher propeller. The main flight controls comprise a rudder/elevator surface on each of the four tail fins. The FAA certificated the A-60 airship in 1990 for day/night and VFR/IFR flight and the A-60 Plus in 1991. Application for CAA certification for the A-60 Plus has been made. N2017A was owned and operated in the UK by a USA company with USA licensed pilots under a UK Department of Transport permission to conduct Aerial Work. It was engaged chiefly in aerial advertising. Two of the type were operated in the UK; approximately 7 A-60 and A-60 Plus airships are currently in service worldwide.

N2017A took off from Bedford Cardington Airfield for a local flight. The forecast and actual weather for the area included a wind from 200°M at 15 kt, visibility of 7 km, ambient temperature of 5°C and broken cumulus at 3,000 feet agl. While flying overhead Bedford the rudder system sudden failed.

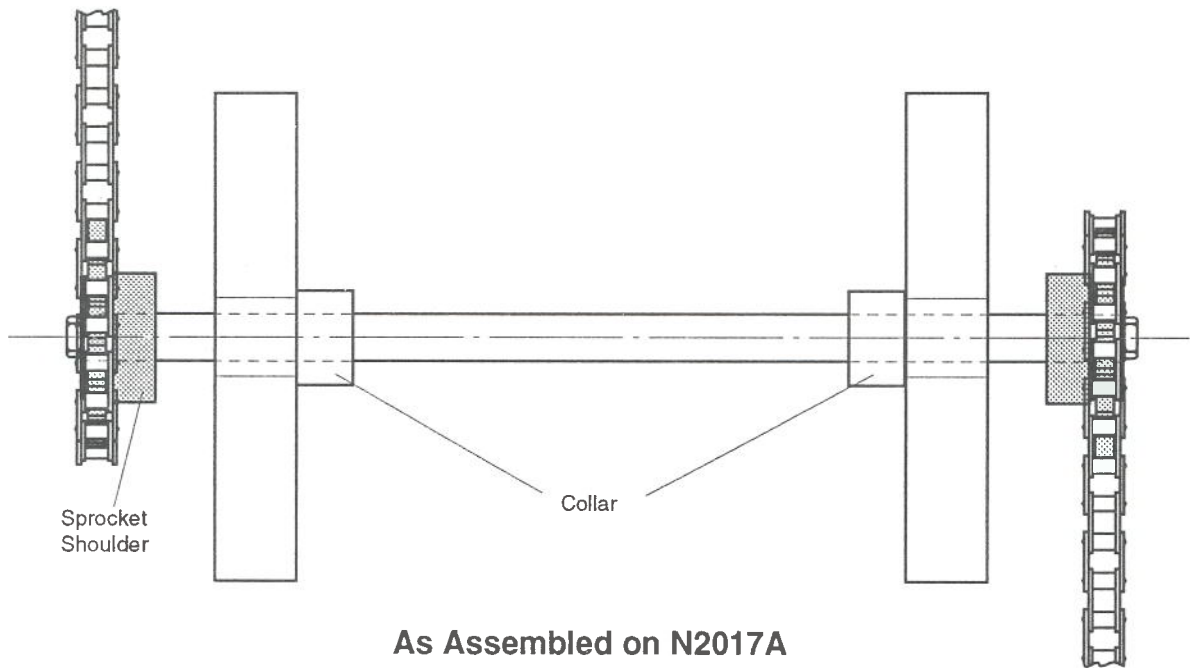
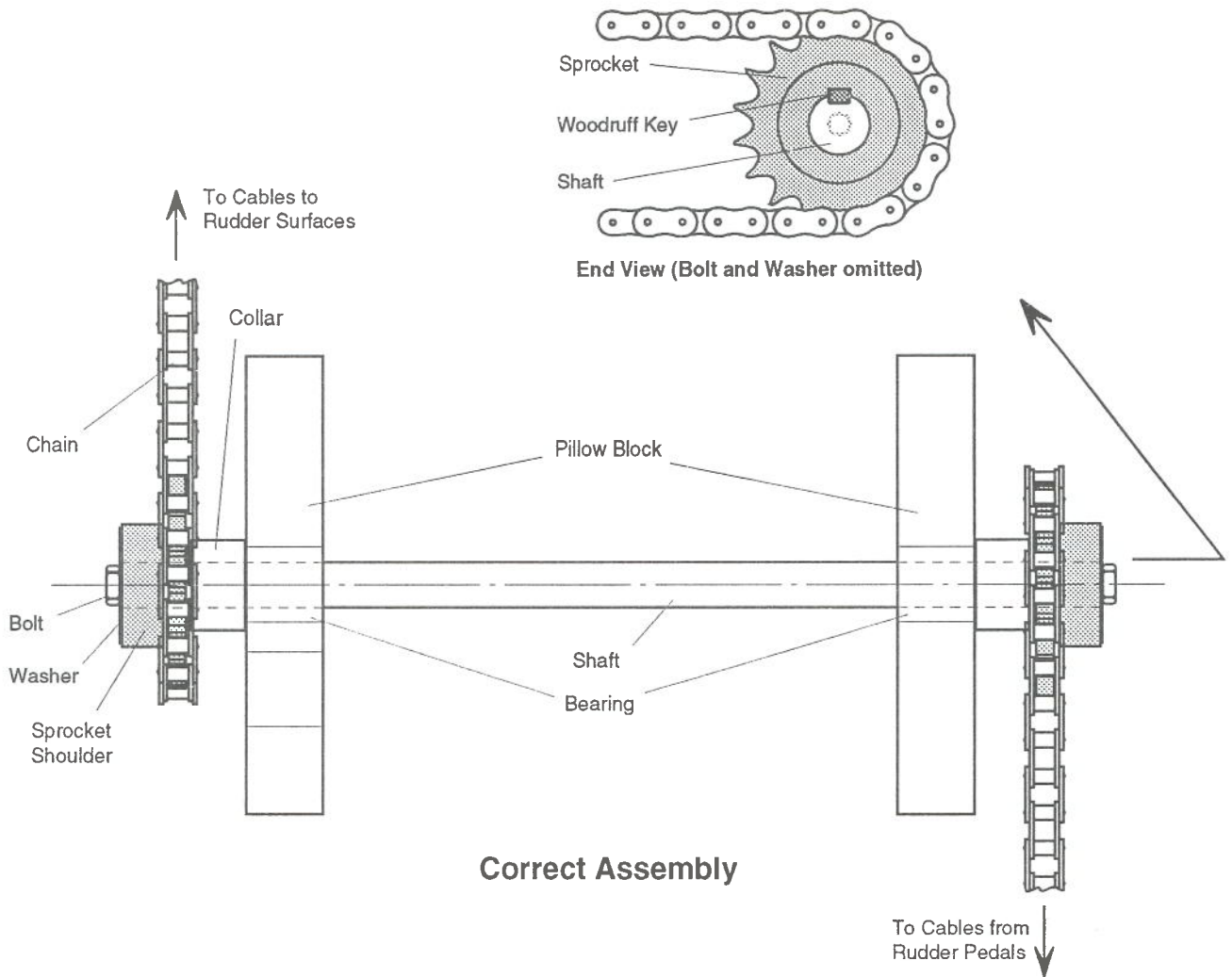
Adequate directional control for a return to Cardington using asymmetric thrust could not be achieved and the airship was blown to the northeast towards the Norfolk coast. The ground crew took to their vehicles in an attempt to rendezvous with the aircraft and land it at a suitable location. During a three hour flight following the failure the pilot attempted to land on several occasions but was prevented from doing so by the presence of power lines, trees and buildings, with the wind strength increasing as the flight progressed, to an estimated 25 to 30 kt, gusting to 35 kt, near the coast.

On approaching the coast the pilot was able to evacuate the three passengers in a field but reportedly was forced to then power out of the area due to the location of a large building. Shortly afterwards, with darkness approaching, he made a controlled landing in sea marshes on the Holbeach Military Range (currently inactive) near the mouth of the Wash. This is believed to have resulted in minor damage to the landing gear and to the gondola. The pilot evacuated the cabin and lodged himself on the outside of the gondola to await the rescue services with the airship afloat in a 6 ft swell partially rolled onto its side. An SAR helicopter arrived on the scene after a period and stood-by until the Skegness Lifeboat and a Great Yarmouth Pilot Boat arrived and the pilot was rescued. The rescue services reportedly considered the airship to be a potential hazard to shipping and towed it 12 nm to Skegness. The airship reportedly sustained major damage during the recovery.

The rudder system is manually operated by a cable/pulley system. This incorporates a chain/sprocket link below the floor in the rear part of the gondola to transfer the drive from the rudder pedal mechanism laterally across to close to the aircraft's centre line (Fig 1). A rotatable shaft located in two pillow block mounted bearings carries a shouldered sprocket on each end, locked to the shaft rotationally by a Woodruff key. Axial movement of the Woodruff key is prevented by a washer on the outboard side and by a collar on the inner side and the assembly is held together by a bolt screwed into the shaft at either end. The design requires the collar to be installed between the sprocket and the bearing and the sprockets to be installed with the shoulder outwards. However, investigation found that the rudder system on N2017A had been assembled with both collars inside the bearings and both sprockets reversed, with the shoulders inwards, and this had allowed the Woodruff key of the outboard sprocket to migrate axially and disconnect the drive from the sprocket to the shaft. The assembly had been stripped and reassembled a few flying hours before the incident during maintenance. It was noted that the sprocket orientation found, with shoulders inwards, corresponded to that for an almost identical linkage in the elevator system but for both elevator and rudder systems the collars were required to be fitted outside of the bearings.

Following the incident, the airship manufacturer issued three Memoranda requiring an inspection of the flight control system, with particular attention to the orientation of the rudder and elevator sprockets, requesting a report on the installation found and including drawings of the rudder and elevator linkages for inclusion in the Maintenance Manual.

**RUDDER SYSTEM CHAIN/SPROCKET LINK SCHEMATIC**



**Fig 1**