AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9301		
Aircraft Registration	ZS-KCP	**Date of Accident**	18 March 2014		**Time of Accident**	1550Z	
Type of Aircraft	Beech Baron BE55 (Aeroplane)		**Type of Operation**	Private			
Pilot-in-command Licence Type	CPL		**Age**	23	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours	521.3			Hours on Type	211.6	
Last point of departure	Vryheid Aerodrome (FAVY):KwaZulu Natal						
Next point of intended landing	Vryheid Aerodrome (FAVY): KwaZulu Natal						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On the grass at right-hand side of Runway 11. GPS co-ordinates: S 27º47'13.71", E030º47'37.17"							
Meteorological Information	Wind direction: 320º; Wind speed: 9kts; Visibility: CAVOC; Air temp: 23ºC						
Number of people on board	1+4	**No. of people injured**	0	**No. of people killed**	0		

Synopsis

The pilot accompanied by four passengers took-off for a pleasure flight in the local airspace around Vryheid Aerodrome. On his return and during the approach for landing, the pilot completed the landing procedures. While extending the landing gears he noticed that there was a problem with the left main landing gear extension because there was no confirmation by the three green lights for “gear down and locked.” The extension failure of the left main landing gear was then confirmed to him by the other pilot who was watching the aircraft on its approach; that pilot was on the ground standing on the apron.

The pilot attempted to extend the landing gear manually but failed and then opted to complete a wheels-up landing. He first burnt off the remaining fuel before proceeding with the wheels-up landing on the grass on the side of Runway 11. During contact both propellers broke off. The pilot and four passengers were not injured during the accident sequence.

The post-accident investigation revealed that the main extension rod for the left landing gear had failed.

Probable Cause

Wheels-up landing following failure of the left landing gear to extend.

Contributory factors

1.Extension rod failure attributable to compression forces during extension.

2.Possible up-lock block release failure

The cause of the up-lock release failure could not be determined.

ASP Date	14 April 2015	Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner	**:** D. Munro
Name of Operator	**:** D. Munro
Manufacturer	**:** Beech Aircraft Corporation
Model	**:** 95-B55
Nationality	**:** South African
Registration Marks	**:** ZS-KCP
Place	**:** Vryheid Aerodrome: KwaZulu Natal
Date	**:** 18 March 2014
Time	**:** 1550Z

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to establish legal liability****.*

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 The pilot accompanied by four passengers took-off for a pleasure flight in the local airspace around Vryheid Aerodrome. On his return and during the approach for landing the pilot completed the landing procedures. Whilst extending the landing gears he noticed that there was a problem with the left main landing gear extension; this was apparent because of lack of the confirmation normally provided by the three green lights for “gear down and locked.” The extension failure of the left main landing gear was then confirmed to the pilot by the pilot on the ground, using a radio; that pilot was watching the aircraft on its approach while standing on the apron.

1.1.2 The pilot attempted to extend the landing gear manually but failed to do this and he opted first to burn off the remaining fuel and then complete a wheels-up landing. On touch down, both propellers broke off on impact. The pilot and four passengers sustained no injuries during the accident sequence.

1.1.3 The aircraft accident occurred in daylight conditions on an aerodrome with GPS readings of: S 27º47'13.71", E030º47'37.17" with field elevation of 3799ft.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	-	4	-

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage to propellers, engines and fuselage belly.

Figure 1: The aircraft as it came to rest

1.4 Other Damage

1.4.1 None

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	23
Licence Number	0272313149	Licence Type	Commercial		
Licence valid	Valid	Type Endorsed	Yes		
Ratings	Instrument, Instructor grade 3, Flight test, Night, Single engine piston, Multi engine piston,				
Medical Expiry Date	31 October 2014				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	521.3
Total Past 90 Days	28.4
Total on Type Past 90 Days	20.2
Total on Type	211.6

1.6 Aircraft Information

Airframe:

1.6.1 The early Beech Baron B55 was fitted with 260 HP (194 kW) Continental IO-470 engines and had a gross weight of 4880 to 5100 lb (2,200 to 2,300 kg). These airplanes have a typical cruise speed of 190 knots (350 km/h) at 7000 ft (2100 m), and were supplied either with 116 or 136 US gallon (440 or 515 L) fuel tanks. Model B55 Barons were introduced in 1964 and run through to 1982 with four to six seats and a new exterior scheme and interior design. This resulted in a 120 lb (54 kg) increase in gross weight from 4980 lb to 5,100 lb

1.6.2 The aircraft documentation such as maintenance records, certificates and service bulletin letters was studied and reviewed. The information that these documents provided gives a record of how the aircraft was equipped and indicates the maintenance procedures. All service bulletins published by the engine and aircraft manufacturer were adhered to by the AMO. A further study of the last mandatory periodic inspection was considered for maintenance analysis.

Type	Beech Baron 95-B55	
Serial Number	TC-2156	
Manufacturer	Beech Aircraft Corporation	
Date of Manufacture	1978	
Total Airframe Hours (At time of Accident)	3296.1	
Last MPI (Date & Hours)	2 October 2013	3268.4
Hours since Last MPI	27.7	
C of A (Issue Date)	16 October 2013	
C of A (Expiry Date)	17 October 2014	
C of R (Issue Date) (Present owner)	31 October 2012	
Operating Categories	Standard part 135	

Engine: 1

Type	Continental IO-470-L
Serial Number	CS91531-4L
Hours since New	792.1
Hours since Overhaul	TBO not yet reached

Propeller: 1

Type	Hartzell PHC-C3YF-2UF
Serial Number	EB955
Hours since New	439.5
Hours since Overhaul	TBO not yet reached

Engine: 2

Type	Continental IO-470-L
Serial Number	297894
Hours since New	718.4
Hours since Overhaul	TBO not yet reached

Propeller: 2

Type	Hartzell PHC-C3YF-2UF
Serial Number	EB954
Hours since New	435.5
Hours since Overhaul	TBO not yet reached

The landing gears system

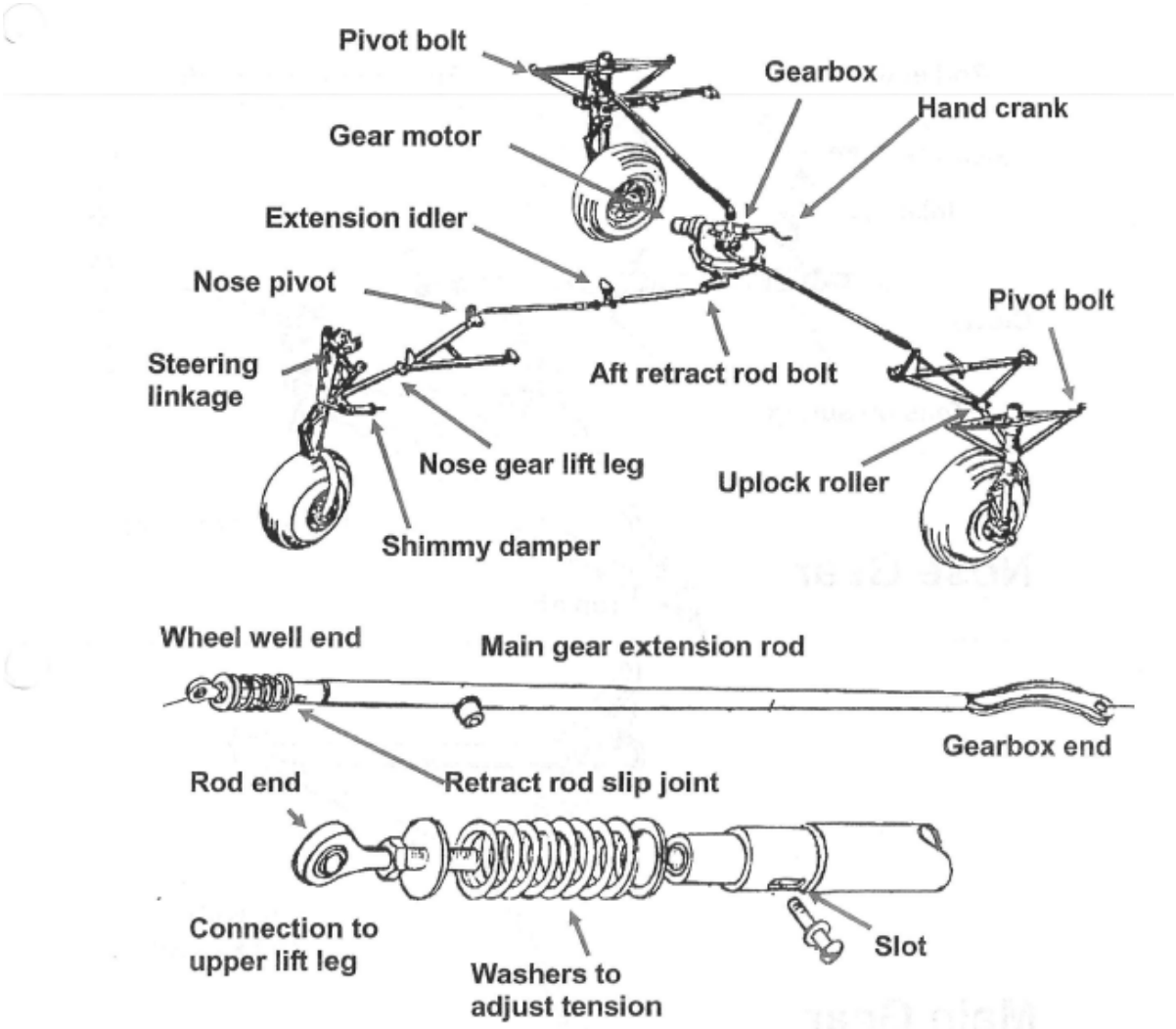

Figure 2: The parts of the landing gear system

1.6.3 Beechcraft designed a simple, strong and reliable electro-mechanical landing gear system. The landing gear is operated through an adjustable linkage connected to an actuator assembly mounted beneath the front seats. The actuator assembly is driven by an electrically retracted and extended, and may be extended manually. The landing gear is controlled by a two-position switch on the right side of the control console. The switch handle must be pulled out of the safety detent before it can be moved to the opposite position. One should never operate the landing gear electrically with the hand crank engaged.

1.6.4 The landing gear position indicators are located above the landing gear switch handle. Three green lights, one for each gear, are illuminated whenever the landing gear is down and locked. The red light illuminates whenever one or all the landing gears are in transit or in any intermediate position. All of the lights will be extinguished when the landing gear is up and locked. Pressing the warning light test button on the instrument panel will verify that the landing gear lamp bulbs are illuminating. The intensity of the light produced by lamps is automatically lowered for night flights when the navigation lights are turned on.

Important notes about landing gear inspection, adjustment and repair
(NOTE: The following information is supplied from the source: American Bonanza Society Air Safety Foundation: Landing Gear Repair Guide http://bonanza.org/documents/ABS%20Landing%20Gear%20Maintenance%20Guide.pdf)

Maintenance should begin with a complete inspection of the landing gear, listing all the discrepancies noted, assessing the condition, replacing worn parts, installing shims, and tightening / re-torqueing loose hardware **before** making any adjustments or repairs. It is vital that the entire landing gear inspection should be completed, with any discrepancies noted, before making *any* adjustments to the rig or tensions of the landing gear system. Adjusting or repairing an item before the initial inspection is complete may prevent discovery of subsequent landing gear issues.

It is the opinion of the American Bonanza Society (ABS) that all repairs and adjustments included in its Guide (*available at the Internet page cited above*) are minor alterations or repairs. Nevertheless, the final determination whether a specific

piece of work is a minor or major repair rests with the authorized person completing that work. Beechcraft landing gear-up tensions and clearances are a function of the length of the retract rod, and should be addressed first. Landing gear-down tension is a function of spring preload and should be addressed after the “gear-up” work is completed. This is followed by main and nose gear door adjustment. Often, worn bushings on the lift leg system can affect clearances and tensions.

1.7 Meteorological Information

1.7.1 Meteorological information as obtained from the SA Weather Services:

Wind direction	320º	Wind speed	9kt	Visibility	CAVOK
Temperature	23º	Cloud cover	None	Cloud base	None
Dew point	14º				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with the standard factory-fitted navigational equipment approved by the Regulator. There were no recorded defects to navigational equipment prior to the flight.

1.9 Communications.

1.9.1 The aircraft was equipped with one VHF (Very High Frequency) radio approved by the Regulator. There were no recorded defects regarding the communication equipment prior to the flight.

1.10 Aerodrome Information

1.10.1 The table below provides information on the aerodrome.

Aerodrome Location	Vryheid (FAVY) in KwaZulu Natal	
Aerodrome Co-ordinates	S 27º47'13.71", E030º47'37.17"	
Aerodrome Elevation	3799 ft	
Runway Designations	11/29	01/19
Runway Dimensions	1139m×13m	944m×45
Runway Used	Right-hand shoulder of Runway 11	
Runway Surface	Grass area	
Approach Facilities	None	

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder or cockpit voice recorder. Neither of these was required by the relevant aviation regulations.

1.12 Wreckage and Impact Information

Figure 3: Impact sequence of the aircraft

1.12.1 During a wheels-up landing on a grass surface alongside of Runway 11, the aircraft impacted and both propellers broke off on impact. The belly followed and skidded to the point of hold. The aircraft turned to the right and came to a halt at a direction approximately 150 degrees to the right-hand side of the initial landing direction. The wreckage distribution was located within a radius of 10m from the main wreckage. The aircraft sustained substantial damage to the propeller, engine and the fuselage belly.

Figure 4: The damage to the aircraft surface

1.12.2 The recovery team informed the investigator that during their post-accident inspection they noticed that the left landing gear up-lock was jammed. The main gear extension rod (figure 5) was damaged because of compression overload as shown in Figure 6 below. The team also mentioned that they observed that the up-lock (figure 6) on the main gear brace assembly had stopped on the wrong side.

The following photographs (Figures 5 and 6) show the damage observed during the post-accident inspection.

Figure 5: Damage to the landing gear extension rod

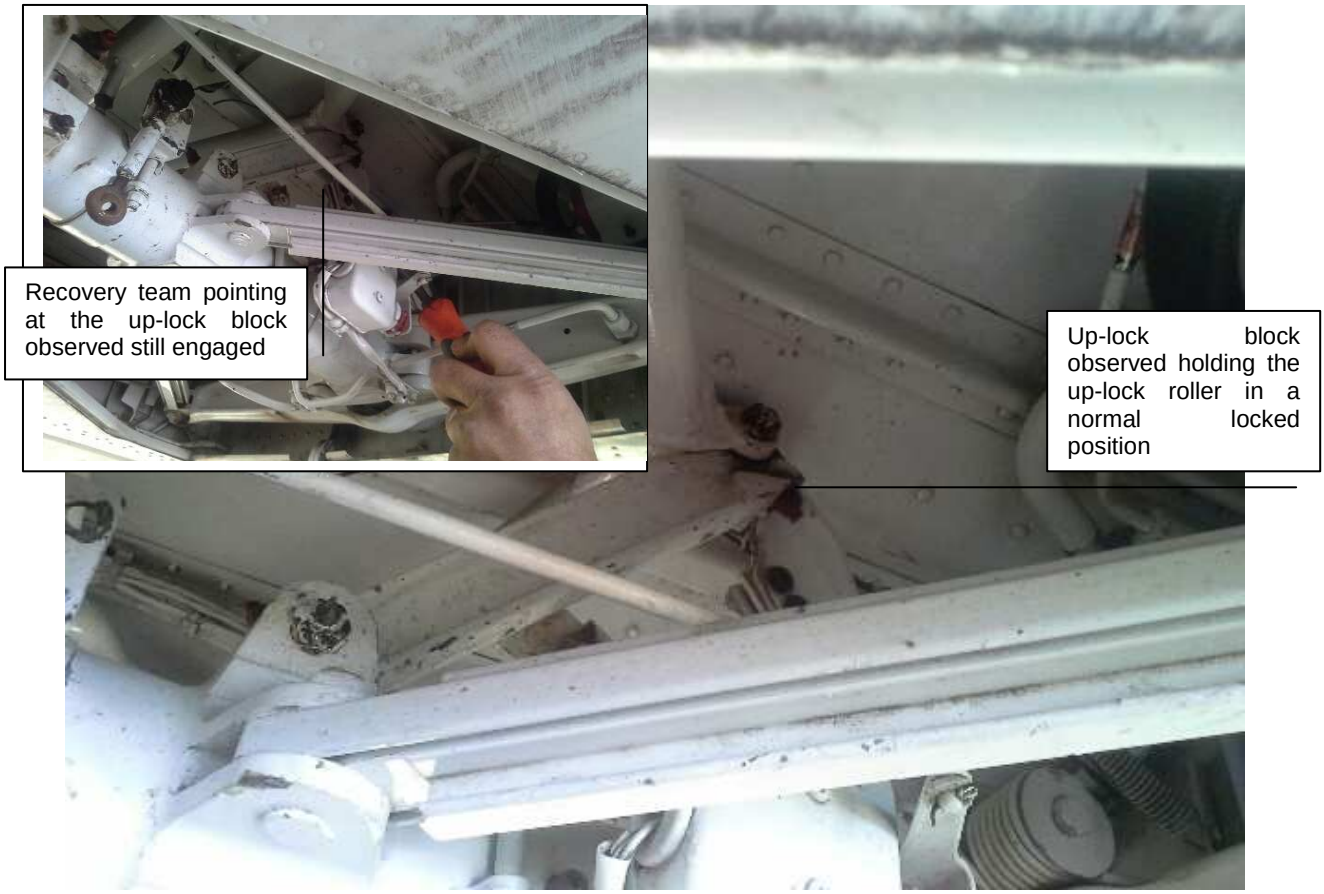

Figure 6: Up-lock stop bracket bolt installed from front to back

1.13 Medical and Pathological Information

1.13.1 No medical attention was required at the accident scene.

1.14 Fire

1.14.1 There was no pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The aircraft is equipped with shoulder harnesses on each seat and the pilot and his passengers used them during the flight. They were able to dis-embark from the aircraft unassisted after the accident. There was no failure of the shoulder and harness fitted to the aircraft, during the accident sequence.

1.16 Tests and Research

1.16.1 A post-accident inspection revealed that the left main landing gear jammed in an up and locked position. According to the recovery team, who also maintained the aircraft prior to the accident, the damage on the landing gear was preventing any rigging tests that could be attempted for the post-accident investigation.

1.16.2 The last MPI with Job card No: 4453 was conducted on the aircraft during the period 1 September 2013 to 2 October 2013 at 3268.4 Airframe Hour. The rigging that was carried out on the landing gear system indicates the following readings as the final recorded adjustments made.

Rigging test on Landing gears	**Left-hand Side**	**Right-hand Side**
Up-Lock Cable Tension	52 lbs	60 lbs
Down-Lock Cable Tension	62 lbs	62 lbs
Up-Lock Roller clearance	0.020"	0.020"

1.16.3 On the day of the accident the recovery team informed the investigation team that they observed that the main gear up-lock block stopped on the wrong side of the main gear brace assembly (forward of up-lock rolled). The up-lock consists of a bracket assembly which operates by forming a geometric brace between its mounting on the gear leg, and the roller. The bracket is connected to the gear bay structure by a spring, the tension of which opposes a cable linking the bracket to the gear operating motor lever assembly. The system is designed so that the cable is under tension when the gear is retracted.

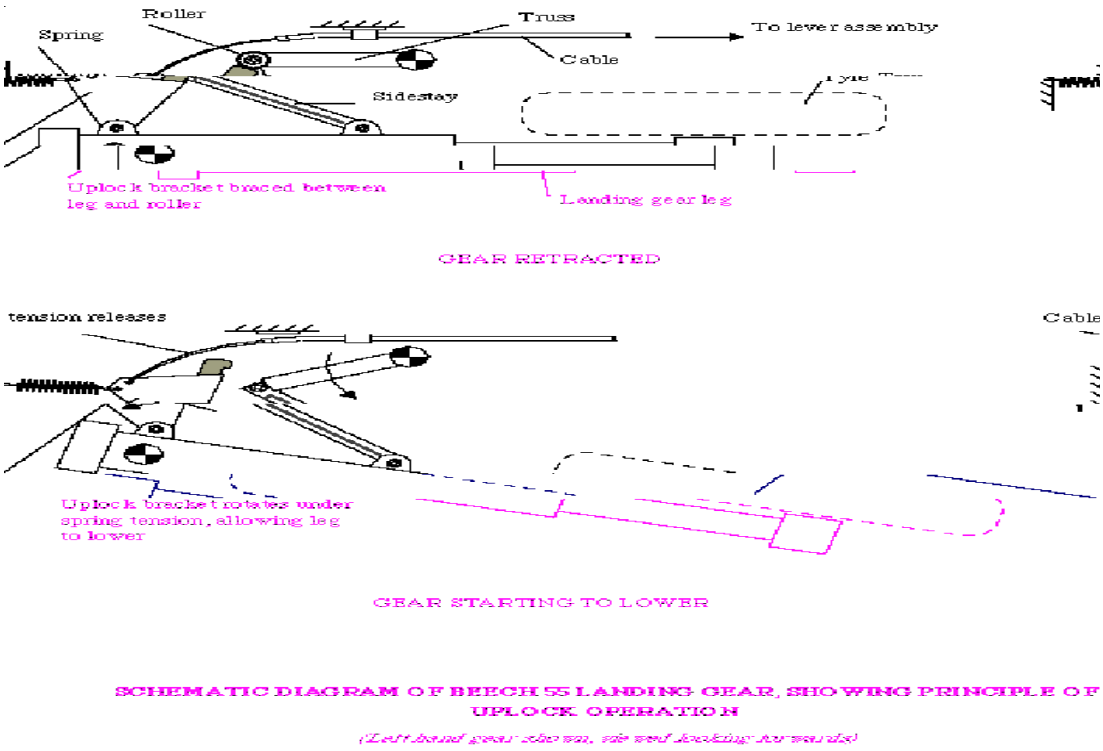

Figure 7: Schematic diagram of up-lock mechanism

When the gear is selected down, the first effect of the motor lever assembly is to relax the cable tension. This results in the spring tension moving the up-lock bracket away from the roller, thus allowing movement of the truss/side stay assembly, and in consequence, extension of the gear. The principle of operation is shown in Figure 7 above.

1.16.4 **Landing gear detailed maintenance**

(NOTE: The following information is supplied from the source: American Bonanza Society Air Safety Foundation: Landing Gear Repair Guide http://bonanza.org/documents/ABS%20Landing%20Gear%20Maintenance%20Guide.pdf)

Rigging test on Landing gears	**Left-hand Side**	**Right-hand Side**
Up-Lock Cable Tension	52-62 lbs	52-62 lbs
Down-Lock Cable Tension	52-62 lbs	52-62 lbs
Up-Lock Roller clearance	0.020"	0.020"

Retract the main landing gear fully and ensure that the up-lock is in the locked position. Check for a deflection of not more than 0.002 inch. Rig the cable to a tension of **52-62 pounds.**

Checklist Step 5: Check landing gear down tension on main and nose gear

Discrepancy: Baron 55, down-lock block moves/tension is low

1. If the block moves down there is no safety protection.

Discrepancy: Baron 55, down-lock not over centre and can be moved away from roller

1. Adjust down-lock cable tension at the clevis if possible.
2. The cable clamp may have slipped, extending clevis to the witness hole. Adjust clamp as per instructions in the Maintenance Manual.
3. Some down-lock cables are wedged to the up-lock cable and are not adjustable.
4. Adjust clevis to pull down-lock over centre and set.
5. Check and/or adjust cable tension to 52lbs +10-0 measured inside of cabin. Tension on the cable can also be adjusted at the #3 wing rib. Check for up-lock cable tension because it will be affected when using this adjustment point.

Note: Lube down-lock pivot points and cable pulley in the wheel well prior to performing adjustments to minimize drag and improve adjustment quality.

Discrepancy: Main landing gear lift leg - down tension low

Four issues can cause down tension to be low while a fifth possible cause is most unlikely in practice. These five issues are summarized below.

1. *Main landing gear retract rods, loose attachment hardware at the upper gear actuator retract arm.*

   If the bolt is discovered to be loose, then remove it and inspect the bolt hole in the actuator arm for elongation. If good, reinstall the bolt then tighten it to a standard torque for a shear nut, and safety. If the bolt hole is elongated then replace the actuator arm.

   Note: *The main gear may be sagging off the up stop in the up position if the attach hardware is loose.*

   Inspect the bronze retainer for the bearing ball (P/N LS6). Ensure the retainer is not loose in the bearing race by rocking the retract rod left and right with the main wheel. Bearing retainers can work loose if the landing gear has been operated with loose hardware for a period of time. If the LS6 bearing or retainer is worn or loose, then the bearing can be replaced in the retract rod.

2. *Main landing gear retract rod flexing/bending in the flat area. The flexing of the rod will provide the down tension to the lift leg, not compressing the spring on the plunger.*

   Inspect the flat area of the retract rod for flexing up or down. Preload the rod by lifting the main wheel and collapsing the plunger on the outboard end of the rod, or watch the operation of the rod during an extension cycle for flexing. A frozen plunger may cause this problem.

3. *Main gear retract rod end jam nut not tight against the plunger.*

Use a wrench to ensure that the jam nut is tight against the plunger. A backed-off jam nut will reduce tension on the spring and create low down tension readings.

4. *Retract rod spring tension low*

   Install additional washer if spring is not stacking or replace the spring if it is weak and close to stacking.

5. *Landing gear incorrectly rigged, not full travel down and inboard gear doors fully closed*
   This is an unlikely cause of low down tension

Discrepancy: Large up-lock spring and/or spring attach points corroded or broken

The large up-lock spring between the up-lock bracket and the wing rib is one of the least expensive and one of the most important parts on the airplane. The spring holds the up-lock bracket clear of the gear if the up-lock cable breaks. However, if the large spring breaks or a spring attach point fails when the gear is retracted, then there is a very high probability that the gear will not extend.

Checklist Step 10: Check Lift Leg Joint Play

The lift leg attached to the main gear strut bushing should not have any visible movement.

Discrepancy: Movement or “slop” in main gear lift leg

1. Move the strut left to right to check for end wear. If movement is noted replace the bushing.
2. Check lift leg attach bolt at the strut to make sure that it is not rotating or loose.
3. Do not over-tighten the attach bolt at the strut (25 to 75 inch-pounds of torque on the nut).

Discrepancy: Excessive play in lift leg knee

A small amount of end play is normal, as is some lateral side play to assist in gear alignment during the extension and retraction cycle.

1. Excessive bushing wear will affect down tension, because the retract rod will travel further to push the lift leg over centre.
2. The landing gear strut will also sag in the up position. The wing-to-knee clearance will remain the same, but the strut may start wearing on the inboard gear door as a result of the bushing wear.
3. If play is excessive replace the bushing.
4. When reinstalling, the up-lock roller and bolt head must be on the aft side of the lift leg.

Checklist Step 14: Check Retract Rods and Rod Ends

Rod ends should be able to rotate freely when the load is removed, and should not bind during gear operation.

Discrepancy: Main landing gear retract rod end not centered

1. The main landing gear retract rod LS6 bearing is fixed in the rod.
2. A simple method to centre the rod end at the lift leg:
   - Rotate the retract rod clockwise (looking inboard) until it stops.
   - Holding the rod in this position, loosen the jamb nut and rotate the outboard rod end clockwise until it stops.
   - Tighten the jamb nut. The rod will now rotate freely during its full travel.

1.17 Organizational and Management Information

1.17.1 This was a private flight

1.17.2 The AMO that maintained the aircraft was licensed in accordance with existing regulatory approved procedures.

1.17.3 The accident occurred on 18 March 2014 and a follow-up investigation was held on

25 September 2014. During that follow-up investigation the only evidence available was the photographs taken on the day of aircraft recovery; these provided only limited information for the investigation.

1.18 Additional Information

1.18.1 The investigation was not held on-site. Evidence of the accident was provided to the investigating team but it had insufficient detail to add to the findings determined during recovery inspection. By the time of the follow-up investigation, most of the evidence had been rendered useless by the AMO that bought the aircraft wreckage. Thus, the aircraft wreckage was completely dismantled upon purchase by the AMO without the knowledge of the investigation department.

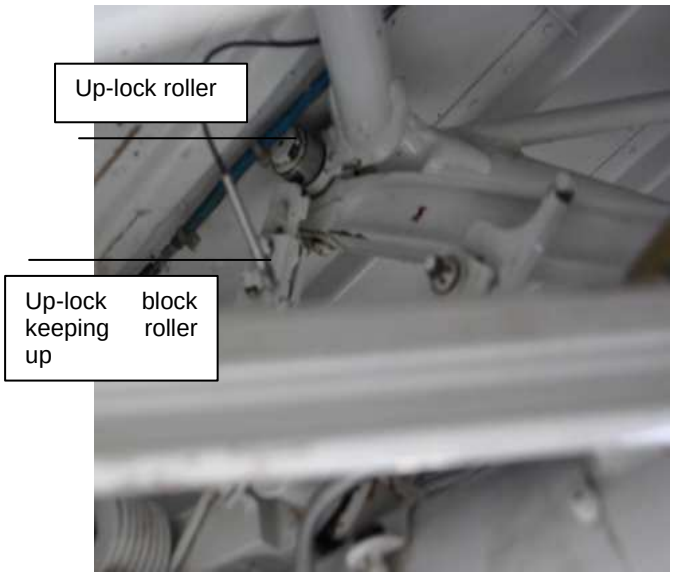

Figure 8: Up-lock block at locked positions

Figure 9: Up-lock block of the accident aircraft

As part of the follow-up investigation, a test demonstration was conducted on an aircraft with a landing gear system similar to that of the aircraft involved in the accident. The position at which the up-lock block mechanism was observed on the aircraft in the accident was the same as in the demonstration aircraft. The up-lock block was at a normal position when compared to the demonstration aircraft's up-lock block. The method used to mount the up-lock block generally reduces any possibility of sideway play unless the bolt or pin used is of the wrong specification and size. The up-lock block stop prevents further movement of the leg brace as the up-lock block settles under the up-lock roller.

A Service Instruction was released as follows: Instruction No. 0448-211: In order to prevent a wheels-up landing due to the possibility of seizure of the main landing gear up-lock rollers, one should accomplish the following:

1. Inspect the MLG up-lock rollers, per Beechcraft Service Instruction No. 0448-211.

   Replace non-greasable up-lock rollers with the greasable type and install hollow zerk-ended mounting bolts on the up-lock rollers, as per Beechcraft Service Instruction (SI) No. 0448-211, before further flight.

1.18.2 Landing gear extension rod

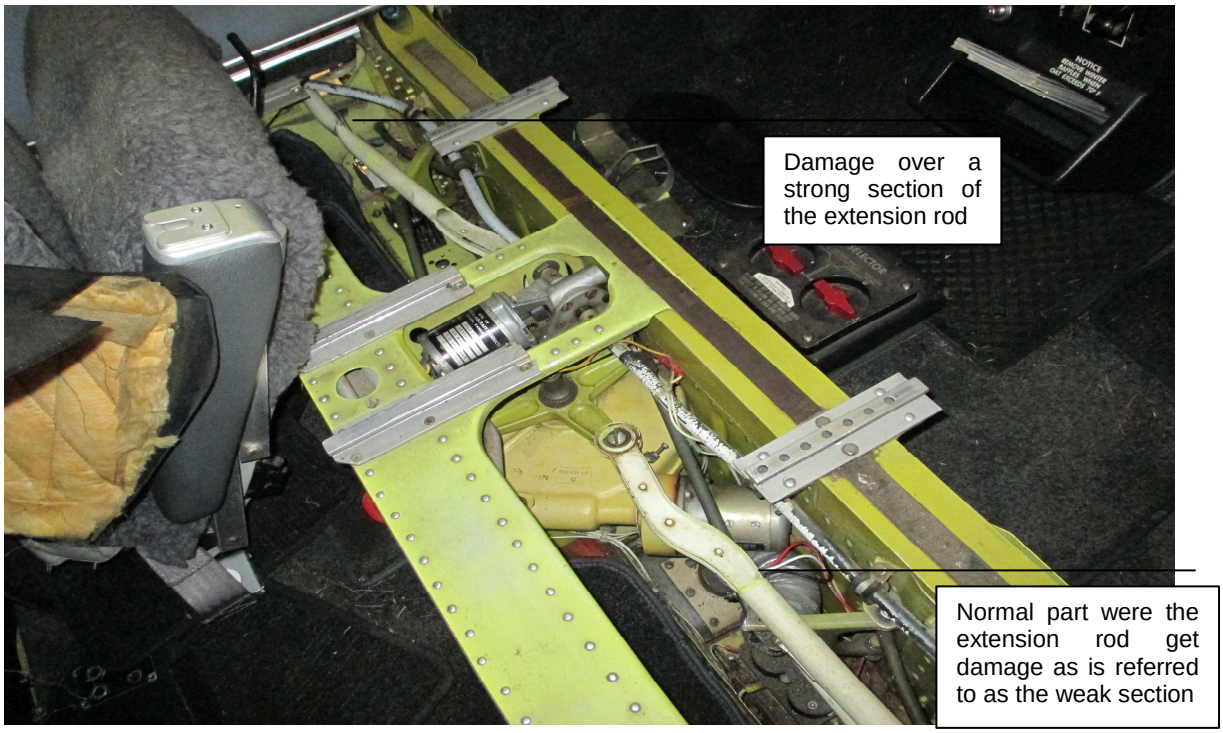

Figure 10: The retraction rod connection

According to an expert from the maintenance organisation rated on the relevant aircraft type:

“When conducting maintenance on the landing gear system, the aircraft must be put on jacks. Care must be taken with aircraft jacking to allow enough clearance space for landing gears, to enable travel during extension and retraction tests. If the landing gear should be restricted by any objects during system extension and retraction tests, then the result will be the bending or breaking of the extension rod,

most probably at its weak point near the gear box connection (flat area) although any position is possible."

Even during take-off, the pilot should select wheels-up. This is because of the possibility that aircraft might fall back and touch the ground slightly with its landing gears still retracting; any resulting bending or breaking could affect the strength of the extension rod. The position at which the extension rod was damaged in the aircraft accident is normally a strong part of the rod. That damage on the extension rod is consistent with an object that was subjected to unusual compression and tensile forces on more than just one or two occasions before a total failure occurred.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 The pilot was qualified for the flight and licensed in accordance with existing regulations.

2.2 The pilot made several unsuccessful attempts to extend the landing gears, after which he decided to prolong the flight around the airfield in order to burn off the fuel before making a wheels-up landing. The pilot had no option but to take this safety measure before making a belly landing: this landing was by far the best option available to him, especially as the sides of the main runway were prepared and the space along the sides was sufficient to land the aircraft.

The pilot's actions and statements indicated that his knowledge and understanding of the aircraft systems was adequate.

2.3 According to the statement made by the recovery team who also maintained the aircraft, the damage to the left main landing gear prevented any rigging test from being carried out. The AMO was not allowed to conduct the post-accident

inspection as this would have resulted in a conflict of interest. After all, it could have created the perception that the AMO could “cover its tracks” by giving false statements. The Accident Incident Investigation Department did not visit the accident site upon notification of the accident.

2.4 According to the recovery team, the up-lock block was also found jammed on the wrong side of the up-lock roller. Because of the design and method used to mount the up-lock block, it is not possible for the up-lock block to be at the wrong side of the roller unless the up-block stop has not been fitted. If the up-lock block was indeed on the wrong side of the up-lock roller, then it would not have been possible for the recovery team to release the landing gear without removing the up-lock roller first.

Given this background, it can be stated with certainty that the up-lock block was just holding the landing gear in a locked position. Also if the up-lock roller seized because of a lack of greasing and clearance, this could have caused the up-lock block to jam on the roller preventing the landing gear from extending. However the pilot stated that during the landing gear extension only the left landing gear could not extend. The rigging recordings made by the AMO were in line with the manufacturer’s recommendations. It should be noted that the aircraft was flown for 27.7 hours after maintenance but prior to the accident.

2.5 The landing gear extension/retraction rod was found to be damaged. That damage was caused by the compression and tensile forces imposed on it. During the initial attempt to land, both the right hand main landing gear and the nose gear were extended with only the left main landing gear not extended. This implies that the left main landing gear extension rod was broken either prior or during an attempt to land. The following three possibilities exist to account for damage to the landing gear extension rod:

- Damage could have been caused during the maintenance tests.

- If the rod had been damaged during maintenance, this damage might not have been detected immediately. The bending on the extension rod would show an effect after a certain period of time. This is because the bending would cause further weakness and a consequent loss of strength each time

the landing gear operation took place. The speed at which this deterioration took place would depend on the severity of the initial bending damage.

- Another possibility is that damage could have occurred during take-off. Here, the most likely scenario would be that the pilot, during lift-off, had immediately selected the landing gears up and then the aircraft sank back, making a slight contact with the surface. The exerted opposite or direct forces on the retracting landing gears could have caused the bending damage to the extension rod.

Nevertheless, the damage to the extension rod was consistent with an object which has been subjected to compression and tensile forces for a considerable period of time: during that time the aircraft had been in operation with the damage gradually becoming worse.

2.6 All other damage to the aircraft, control surfaces and systems could be accounted for as being the result of the accident sequence.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was qualified and licensed in accordance with the existing regulatory procedures.

3.1.2 The pilot's actions and statements indicated that his knowledge and understanding of the aircraft systems was adequate.

3.1.3 The aircraft up-lock block could not release.

3.1.4 The maintenance organisation followed the manufacturer's recommended maintenance procedure.

3.1.5 The aircraft accident evidence was tampered with during the investigation, without the knowledge of the investigation team. Therefore, tests could not be conducted during the investigation.

3.1.6 All damage to the aircraft controls and systems was accounted for as being attributable to the accident sequence.

3.2 Probable Cause/s

3.2.1 Wheels-up landing following the failure of the left landing gear to extend.

3.3 Contributory Factor/s

3.3.1 Extension rod failure attributable to compression forces during extension.

3.3.2 A possible up-lock block release failure.

The cause of any up-lock release failure could not be determined.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None