Accident

Aircraft Type and Registration:	Cessna T210M, N761JU
No & Type of Engines:	1 Continental TSIO-520-R piston engine
Year of Manufacture:	1977 (Serial no: 21062300)
Date & Time (UTC):	11 April 2024 at 1609 hrs
Location:	Leeds East Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Minor) Passengers - 1 (Fatal)
Nature of Damage:	Propeller and nose landing gear damaged. Structural damage from becoming inverted. Aircraft damaged beyond repair
Commander's Licence:	UK Private Pilot's Licence (Aeroplanes) and FAA Private's Pilot's Licence (Foreign Based)
Commander's Age:	79 years
Commander's Flying Experience:	1,378 hours (of which 62 were on type) Last 90 days - 10 hours Last 28 days - 5 hours
Information Source:	AAIB Field Investigation

Synopsis

An undetected pitch trim setting resulted in the pilot attempting to takeoff with close to full NOSE DOWN elevator trim. The pilot rejected the takeoff, whereupon the aircraft briefly became airborne, but the pilot was unable to effectively control the aircraft in pitch. The aircraft bounced several times causing the aircraft's nosewheel to fail and the aircraft to slew off the runway. The remains of the aircraft's nose landing gear dug into the soft ground and N761JU came to rest inverted. The pilot suffered only minor injuries while his more securely restrained passenger sustained major injuries which he succumbed to several days later.

The investigation detected an intermittent fault with the autopilot system which might have contributed to the elevator trim moving towards the NOSE DOWN position. This would have likely been undetectable by the pilot unless he was looking at the trim wheel as it moved. The investigation could not determine why the autopilot might have been engaged for the takeoff roll. The Pilot's Operating Handbook and Quick Reference Handbook did not contain supplementary instructions for the autopilot system, nor did they contain autopilot related checklists or abnormal procedures.

The CAA has taken safety action to promote best practice for pilots in the operation of the autopilot systems fitted to the aircraft they fly. This includes updates to differences training to include autopilot systems. A Safety Recommendation has been made to the CAA to publish guidance and best practice for pilots, covering the use of autopilots in General Aviation.

History of the flight

On the day of the accident the pilot and his passenger boarded N761JU at Sturgate Airfield and flew to Fadmoor Airfield, an unlicensed airfield in the North York Moors National Park (Figure 1). The pilot reported that, en route to Fadmoor, the autopilot trim warning light illuminated "three or four times" and when the TRIM warning light was illuminated the manual trim wheel was "locked by the autopilot." On each occasion, he was able to retrim the aircraft using the electric trim switch on the pilots control wheel, which also disengaged the autopilot. He also reported that during the flight "the autopilot height keeping was less accurate than normal."

After departing Fadmoor, the pilot and passenger flew to Leeds East Airport to refuel before returning to Sturgate. The pilot did not encounter any handling difficulties during the flight from Fadmoor to Leeds East. While the pilot could not recall the precise pitch trim setting when he landed at Leeds East, given the amount of fuel on board at the time, he surmised it would have been a little more nose-up than the takeoff setting.

Having taxied to the refuelling point the pilot shut the engine down and turned off the aircraft master switches. After refuelling he taxied to Runway 24 for departure. Recorded data showed that N761JU stopped on the taxiway twice before entering the runway; once for about 30 seconds, and the second time for about two minutes at the holding point. The data indicated a 45° turn on the taxiway before the first stop, corresponding to the pilot's report that he turned to position into wind to complete pre-takeoff checks. Having completed the pre-takeoff checks and reaching the holding point, he declared over the radio his intention to line up on the runway. At this point the airfield radio operator alerted him to the presence of an aircraft on short finals, so he delayed entering the runway until it had landed.

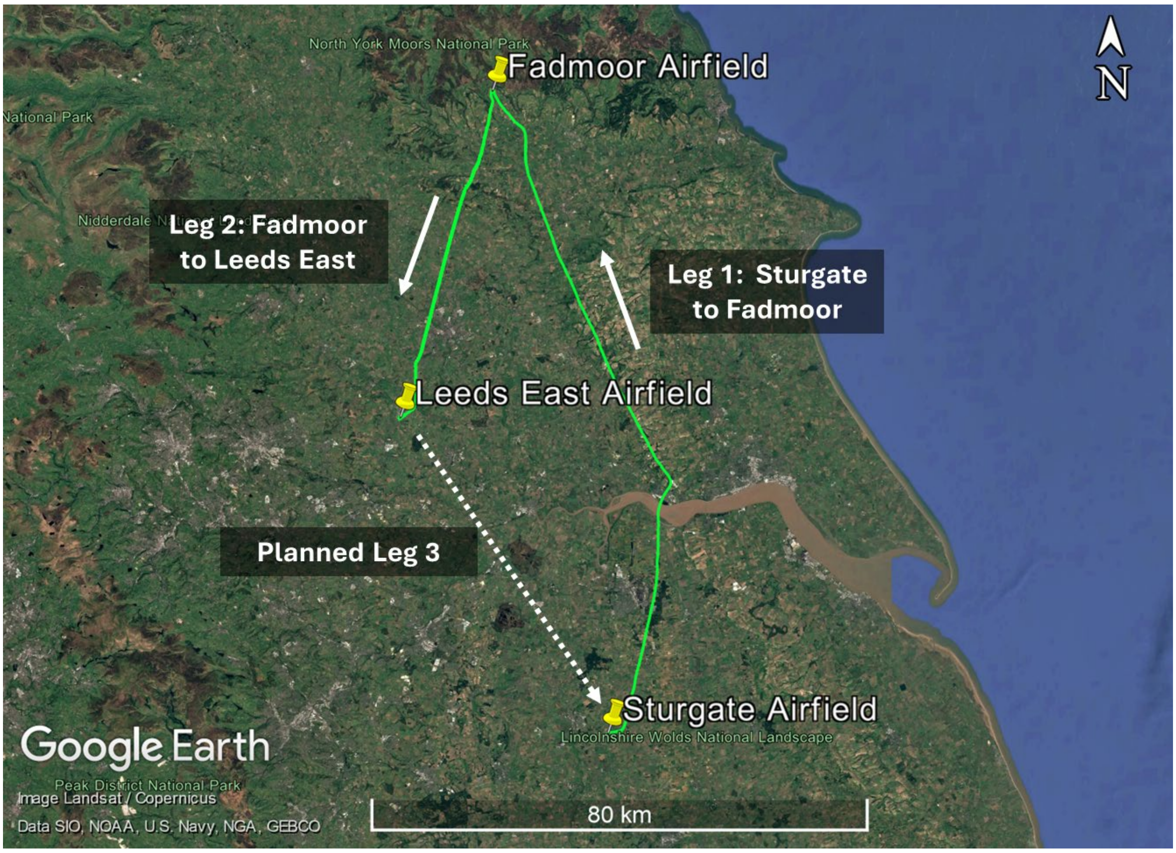

Figure 1

Completed flight legs recorded by the pilots' tablet, and the intended third leg from Leeds East to Sturgate
© 2025 Google, image © 2025 Landsat/Copernicus

After lining up, the pilot set the power and began the takeoff roll. He reported that the initial stages of the takeoff proceeded normally. At approximately 70 kt he tried to rotate the aircraft for lift off but found the "stick would not move" and the aircraft continued to accelerate. The pilot later described that it felt like "the autopilot was on" and was restricting his pitch authority. With sufficient runway ahead, he decided to reject, rather than continue, the takeoff. At this stage he estimated the airspeed would have been in the region of 100 kt. He reported that when he closed the throttle to initiate the stop, the aircraft "jumped off the ground" and climbed to approximately 20 ft. Once N761JU was off the ground the pilot was unable to hold its nose-up and the aircraft descended rapidly, landing heavily on the nosewheel. Eyewitnesses reported seeing the aircraft touchdown and bounce two or three times before, on the last bounce, the nosewheel detached and N761JU settled onto its nosewheel strut. The pilot only recalled one bounce before the aircraft adopted a nose-down attitude with its propeller striking the runway. Despite the pilot's application of brake and rudder to try and keep the aircraft on the centreline, he was unable to stop it drifting to the right as it decelerated. At approximately 40 kt groundspeed, N761JU left the paved surface, the remains of the nose landing gear dug into soft ground and the aircraft inverted (Figure 2).

Figure 2

N761JU inverted at the edge of Runway 24

The pilot described that, when the aircraft came to rest, both he and the passenger were "hanging in [their] seat straps." When the pilot asked him if he was okay, the passenger did not respond and appeared to be unconscious. The pilot turned the aircraft master switch off before releasing his lap belt and vacating the cockpit. He immediately went round to the passenger's side of the aircraft, by which time the airfield rescue services had arrived and taken control of the situation. The pilot was asked to move clear of the aircraft while the fire crew extricated the unresponsive passenger. Once the passenger was moved clear of the immediate vicinity of the aircraft, one of the fire crew began performing CPR. Fuel was leaking from the wings, so the other member of the fire crew returned to the aircraft and confirmed its battery switch was turned off to minimise the risk of subsequent fire. The fireman reported seeing the autopilot engage switch in the ON position when he checked the battery switches were OFF. The photograph he took around that time showed the switch to be in the OFF position (Figure 3).

The passenger was taken to hospital by air ambulance. He remained in a critical condition for eight days until he passed away due to complications associated with cervical spine fractures sustained in the accident. The pilot received minor head and back injuries and was discharged from hospital on the day of the accident.

Figure 3

Photograph taken by fire crew showing autopilot engage switch off
(Note: Aircraft is inverted)

Accident site

The aircraft came to rest inverted off the right side of Runway 24 between the touchdown markers and Precision Approach Path Indicator lights for Runway 06 (Figure 4). There was a furrow created by the remains of the nose landing gear leg leading up to the aircraft. The left wing was over the runway surface with fuel leaking from the filler cap. The aircraft was structurally intact with damage to the propeller and vertical fin, and the nose landing gear wheel was missing.

All the missing nose landing gear components were recovered from the runway and surrounding run off areas. A continuous scrape along the runway surface had been created by the nose leg from the point at which the nosewheel had failed, which led to the edge of the runway and the furrow in the soft ground.

There was also evidence of propeller ground strikes at two locations along N761JU's path. The first set of strikes appeared to have occurred before the nosewheel hub separated from the nose strut.

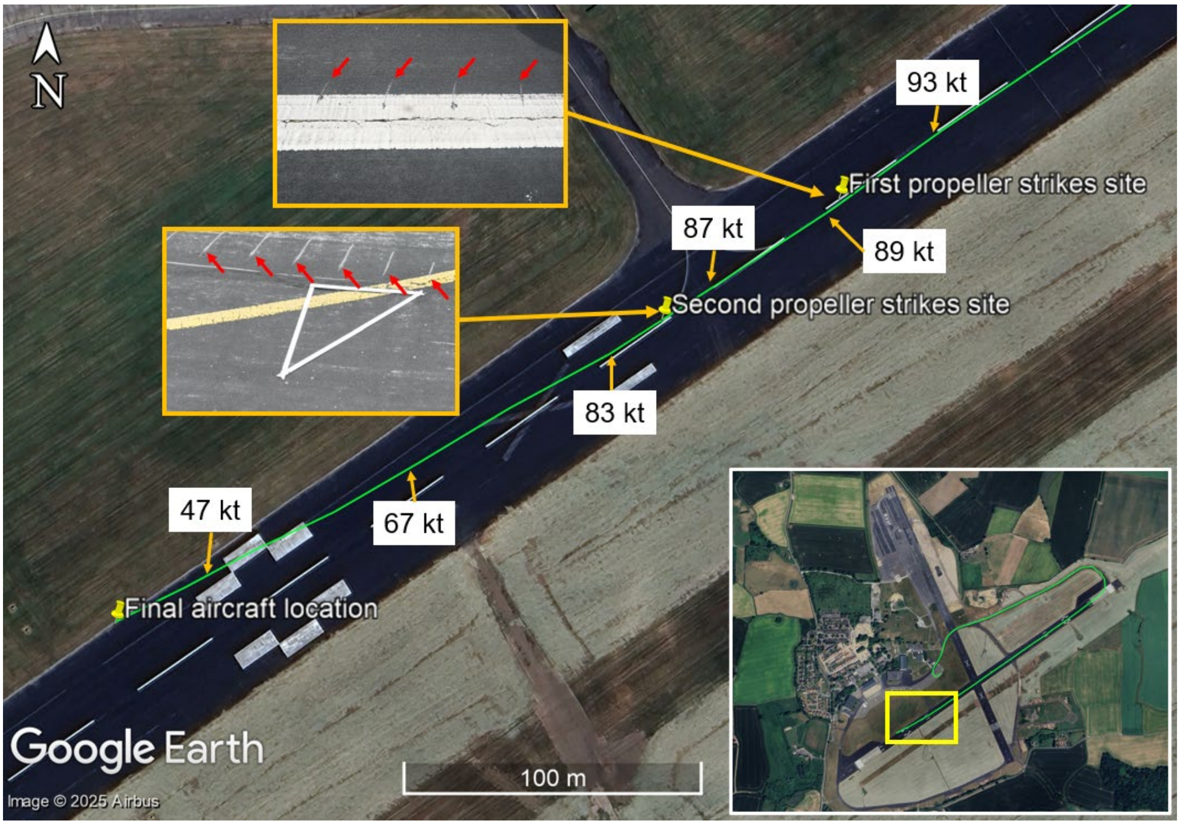

Figure 4

Accident site near Runway 06 threshold & location of propeller strike marks.
Recorded groundspeeds overlaid
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Propeller strike analysis

Using the groundspeed recorded by a navigation application (see *Recorded information*), and measurements of the ground strikes, the propeller was estimated to have been rotating at around 1,440 rpm when it first struck the ground. According to the T210M Pilot's Operating Handbook (POH), the takeoff engine speed is between 2,600 and 2,700 rpm. The calculation therefore indicates that the propeller was rotating significantly below takeoff speed when it first struck the runway.

Recorded information

Accident flight tablet app recording

The pilot used a navigation application on a tablet computer that recorded raw GPS-derived position, altitude, heading, and groundspeed, which was sampled at 1 Hz from the tablet's onboard GPS processor.

Figure 5 shows the ground track recorded by the tablet navigation application. Point A shows the location at the start of the recording, which was next to the refuelling bowser. The recordings indicate that N761JU made a 45° turn on the taxiway before stopping at point B. N761JU remained stationary for approximately 30 seconds, before taxiing to point C, corresponding to the runway holding point. N761JU then waited at the holding point for two minutes. N761JU then entered the runway and commenced the takeoff roll, aligning with the centreline at point D. The recorded groundspeed peaked at 93 kt at point E, before coming to rest at point F.

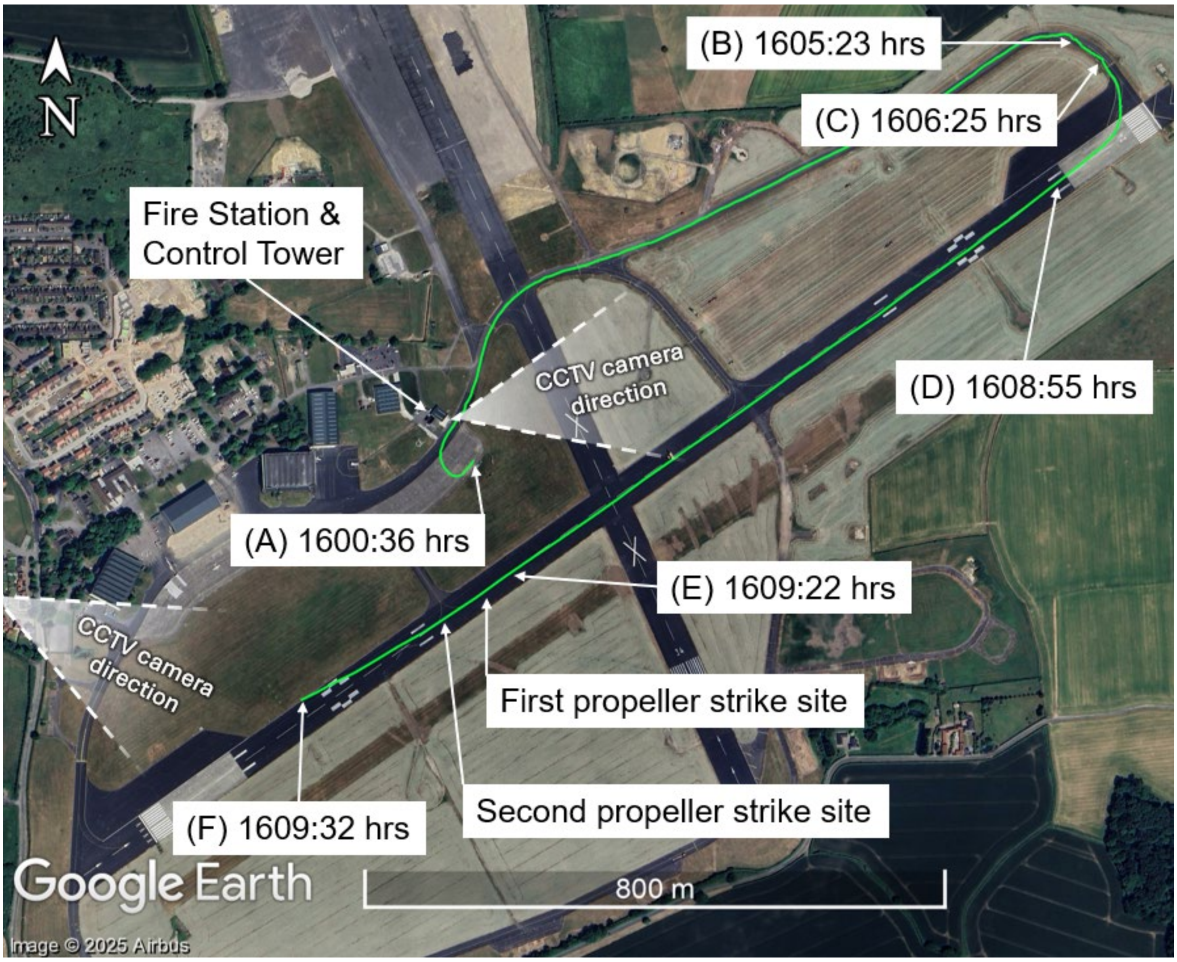

Figure 5

N761JU ground track and notable locations
© 2025 Google, image © 2025 Airbus

Figure 6 shows the recorded GPS groundspeed and altitude during the takeoff roll, with points D, E and F from Figure 5 overlayed. Derived groundspeed from recorded position data is also shown.

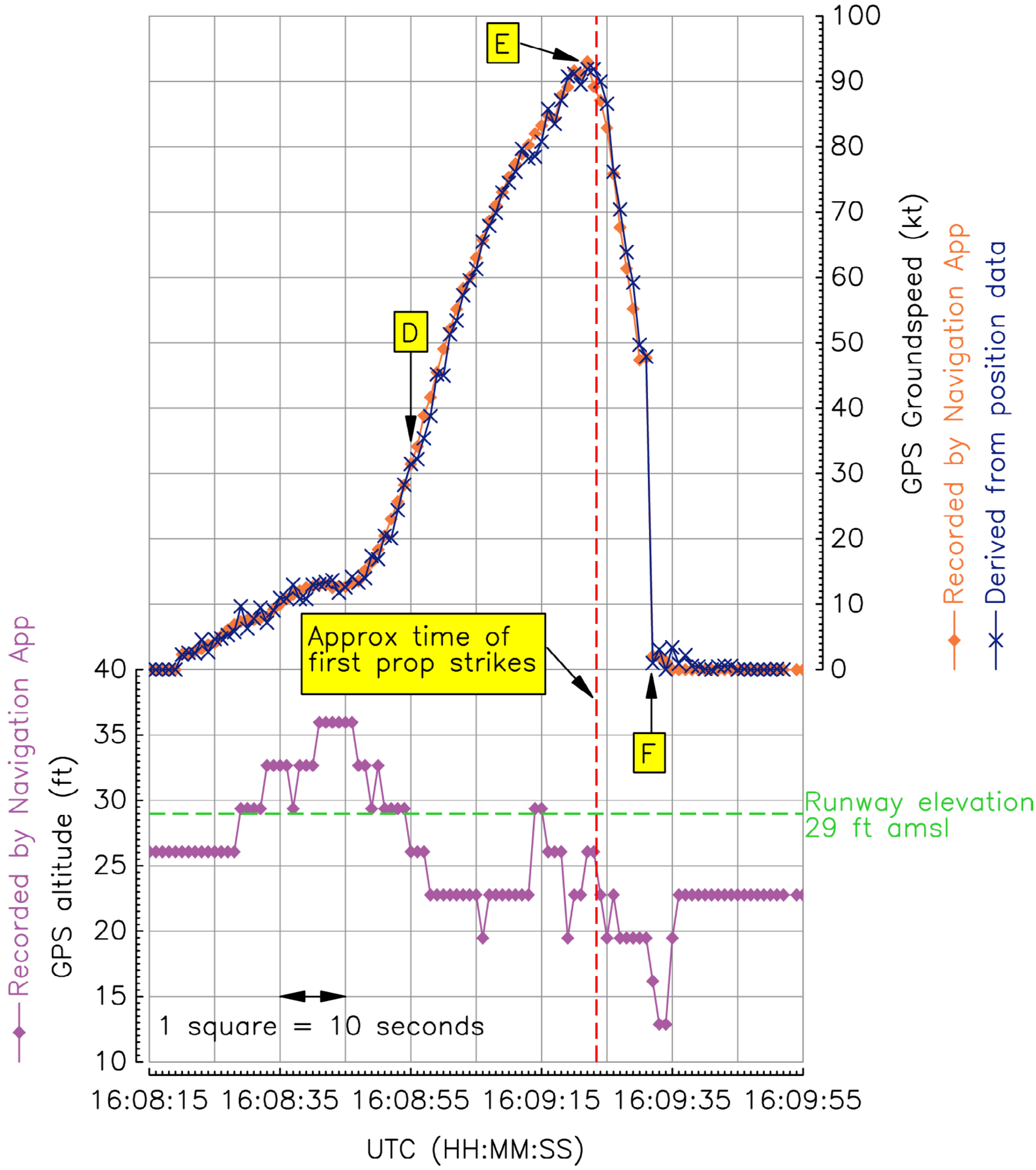

Figure 6

GPS altitude and groundspeed recorded during the takeoff roll

From terrain model data, the variation in height profile along the runway bared no relation to the recorded variation in GPS altitude. Previous AAIB experience with data from the navigation app used on the accident flight indicates that the best accuracy achieved in GPS altitude measurements is typically ± 20 ft. Therefore, no conclusions could be drawn from the GPS altitude data.

Earlier flights on the day of the accident

Both previous legs on the day of the accident, shown in Figure 1, were also recorded by the tablet application. Data for the first leg indicated a variation in GPS altitude throughout the flight, where on several occasions the aircraft appeared to have descended following brief periods of level flight (typically no longer than about one minute), then subsequently climbed again. Recordings for the second leg indicated that a relatively constant GPS altitude of about 3,100 ft was flown during the cruise.

The pilot told the AAIB that he used the autopilot on the first leg (Sturgate to Fadmoor), but that “autopilot height keeping was less accurate than normal.” The autopilot did not have a recording capability, precluding a determination of actual times during which it was used.

The two previous takeoffs were also compared with the accident flight. Groundspeed data from both takeoffs exhibited a smooth increasing speed similar to that shown in Figure 6.

CCTV recordings

Two CCTV sources were obtained which captured parts of the aircraft’s motion along the runway. The camera positions are shown in Figure 5.

The AAIB performed a photogrammetry analysis of a CCTV recording which captured the first part of the takeoff roll. The groundspeeds obtained from this analysis were consistent with those recorded by the tablet and indicated that N761JU was accelerating through about 80 kt as it went out of view of the camera. The edge of the camera’s field of view corresponded with the aircraft having used nearly half of the available runway length.

The second CCTV source, from a residential property near the airfield perimeter, captured N761JU near the edge of the camera’s view as it inverted. The video exhibited significant compression artefacts, lens distortion and a variable framerate, which precluded a detailed analysis. Based on these limitations and by assuming that the change in relative angle between the camera and aircraft was negligible, the groundspeed was estimated to have been between 15 kt and 35 kt in the final second before N761JU began to invert.

Digital engine monitor

N761JU was equipped with an engine monitoring instrument which was capable of recording engine parameters, propeller speed and GPS information to non-volatile memory. However, when the AAIB downloaded the memory, it was found that the last flight recorded was in January 2020. It was therefore not possible for the investigation to determine the throttle settings during the takeoff.

The investigation found that the firmware version installed to the engine monitor was from its date of manufacture and had a known bug affecting recording functionality. The manufacturer stated that one symptom of the bug would be a ‘warning’ on the display during device power-on, although this did not appear when the AAIB powered on the accident unit in its recorder laboratory.

An updated firmware which fixed the issue was available from the manufacturer’s website. Most manufacturers of General Aviation (GA) digital avionics periodically release firmware updates containing updated functionality, databases and/or bug fixes. Avionics with integrated recording functionality can provide useful data to support activities such as 'on condition' engine monitoring for maintenance purposes, flight efficiency monitoring, and pilot training debriefs. Regularly applying the manufacturer's latest firmware to avionics with recording capability, in accordance with manufacturer-approved maintenance processes, can reduce the possibility of data not being recorded.

Aircraft information

N761JU was a Cessna T210M which is a high wing, six seat GA aircraft with a turbo-charged Continental TSIO-520-R piston engine and a variable pitch three bladed propeller. It is fitted with conventional flying surfaces which are operated via steel cables and pulleys. The aircraft is trimmed in pitch by a trim tab fitted to the right elevator and is moved by a pitch trim wheel operating a series of cables. The trim wheel is a black hard moulded plastic wheel, with 24 evenly spaced tactile bumps spaced equally around the circumference. A trim position indicator is positioned adjacent to the trim wheel (Figure 7) in the cockpit on the centre pedestal. It is labelled NOSE UP, NOSE DOWN and TAKE OFF.

The full NOSE UP, full NOSE DOWN and TAKE OFF trim tab deflections were measured relative to the neutral position on the elevator. The TAKE OFF position corresponded to a 4° upwards trim tab deflection, with NOSE DOWN corresponding to a 24° upwards deflection. Full NOSE UP deflection corresponded to the trim tab deflecting 10° down relative to the elevator surface. From the neutral position the trim wheel turns two full revolutions to NOSE UP and one and half revolutions to NOSE DOWN.

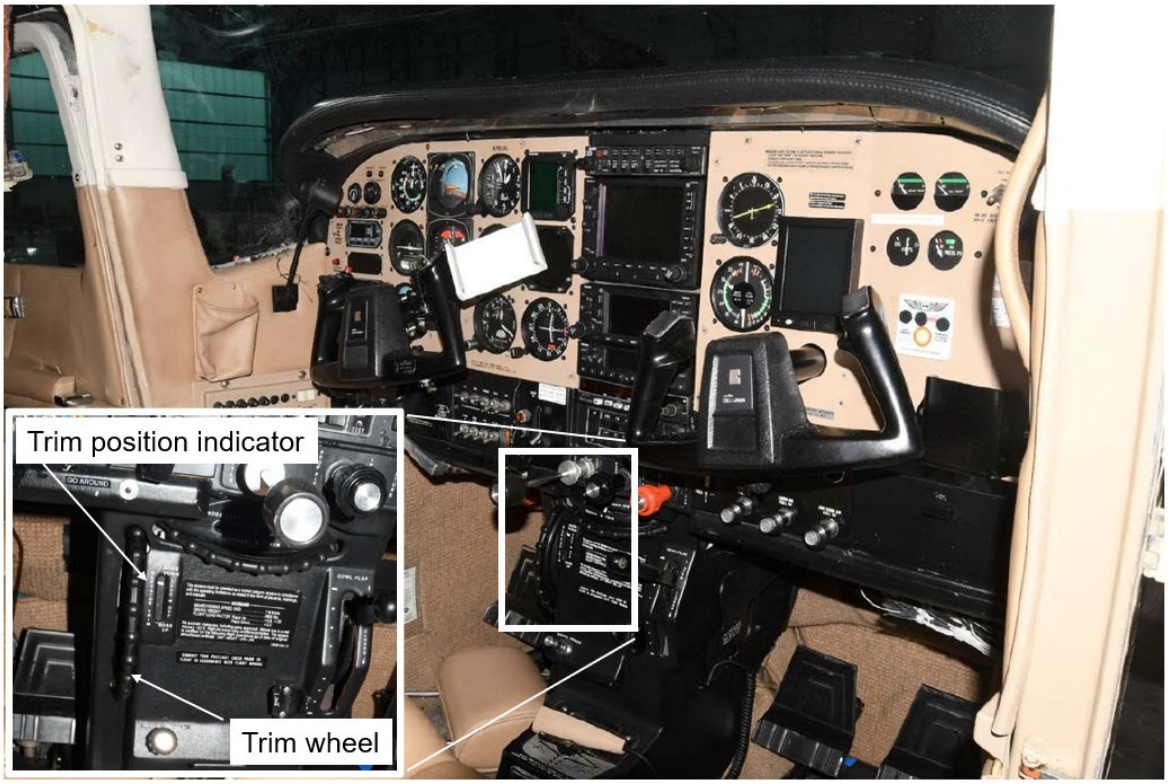

Figure 7

Location of the aircraft's elevator trim wheel and position indicator

Autopilot

N761JU had been fitted with a King KFC 200 autopilot in June 1978, several months after it had been delivered new in November 1977. The FAA Form 337[1] states that the autopilot was fitted in accordance with King installation prints and Supplementary Type Certificate (STC) SA1202CE and there was a Flight Manual Supplement.

Despite mention of the supplement in the STC, the supplements section of the POH did not include reference to, or guidance for, the installed KFC 200 autopilot system. Nonetheless, filed in the POH binder was a standalone '*Pilot's Manual*' for the '*King KFC 200 Flight Control System*' published by the King Radio Corporation (Figure 8). This manual did not contain a publication date or version number.

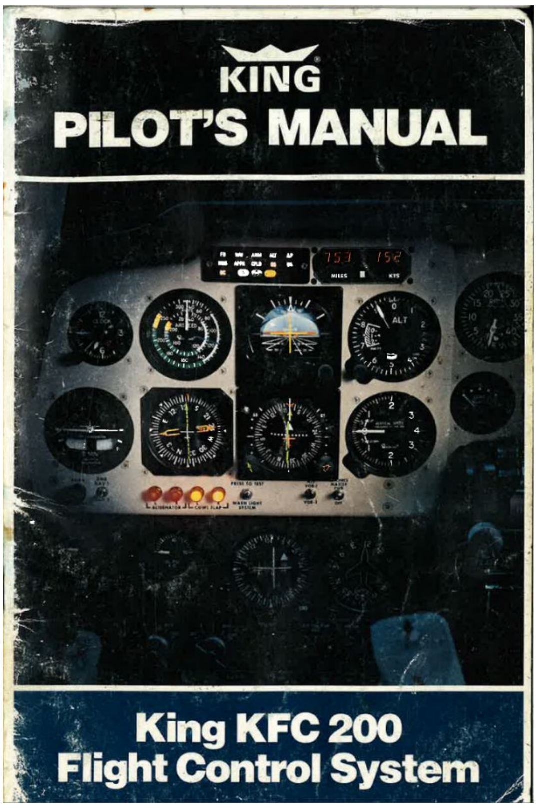

Figure 8

King Pilot's Manual for the KFC 200 Flight Control System

The King Pilot's Manual provided an overview of the KFC 200 installation and gave guidance for the normal operation of the autopilot system. While it did mention the presence of a '*Trim warning light*' on the annunciator panel, it did not contain further information as to the implications associated with that light illuminating nor did it specify any associated remedial actions to be taken. The manual also defined a '*preflight test* [to determine] *before takeoff,*

Footnote

[1] An FAA form to authorise Major Repairs and Alterations (Airframe, Powerplant, Propeller or Appliance), https://www.faa.gov/forms/index.cfm/go/document.information/documentID/185675 [accessed September 2025].

that the system is operating normally.' It did not specify any requirement for when this test should be conducted, eg before all flights, only before flights when planning to use the autopilot, or some other periodicity.

The investigation found a more comprehensive version of a manual on the manufacturer's website[2] (Figure 9). This document was also undated but contained additional information not included in the version found in the aircraft POH binder.

Figure 9

Expanded version of the King Pilot's Guide for the KAP/KFC 200 flight control systems

Footnote

2 Available at https://www.bendixking.com/content/dam/bendixking/en/documents/document-lists/downloads-and-manuals/006-08262-0000-KAP-KFC-200-Pilots-Guide.pdf [accessed 26 April 2024].

One of the additional sections included in the updated version was a section titled '*General Emergency Procedures*.' This section did not list the specific actions to be taken should the TRIM warning light illuminate, but it did contain direction for pilots to refer to the FAA Approved Aircraft Flight Manual Supplement:

> *'IMPORTANT: This Pilot Guide provides a general description of the various operational characteristics of the KFC 200 Flight Control System. However, operation of the system should not be attempted without first reviewing your FAA Approved Aircraft Flight Manual Supplement for complete system familiarization.*
>
> *Pertinent limitations, procedures and warning statements from your aircraft Flight Manual Supplement are contained in this Pilot's Guide.'*

Autopilot functionality

The primary autopilot interface is the mode controller situated in the lower centre of the instrument panel (Figure 10). Through this panel the different modes can be selected via push button switches, and the autopilot is engaged with a solenoid-held ON/OFF switch. This switch will return to OFF when power is removed by switching off either the aircraft or the avionics master switch. In the lower right corner of the controller is a pre-flight test switch.

Figure 10

Autopilot mode controller and annunciator panel

Fitted to the left side of the aircraft instrument panel is the autopilot annunciator panel (Figure 10) which displays to the pilot which modes have been selected and incorporates a TRIM failure warning light in the lower right corner. This warning light will illuminate when an auto-trim failure occurs or when the trim circuit breaker is pulled. During the pre-flight checks detailed in the King manuals, when the TEST button is pressed on the mode controller the TRIM warning light will flash at least four times to indicate proper operation of the auto-trim monitoring system.

To engage the autopilot, first the desired mode is selected, then the AP switch is operated and the solenoid will latch it to ON. If a mode is not pre-selected, it is not possible to engage the autopilot. In normal conditions to disconnect the autopilot, the pilot either operates the control wheel mounted electric trim switches, presses the AP disconnect button on the control wheel, or moves the AP switch to OFF. This results in all the selected modes deselecting, and their associated lights being extinguished from the annunciator panel. The electric trim switches are only present on the left hand control wheel and are not installed on the right hand control wheel.

The physical installation of the autopilot consists of multiple electrical and electromechanical components, most of which are in the aft fuselage behind the passenger cabin (Figure 11).

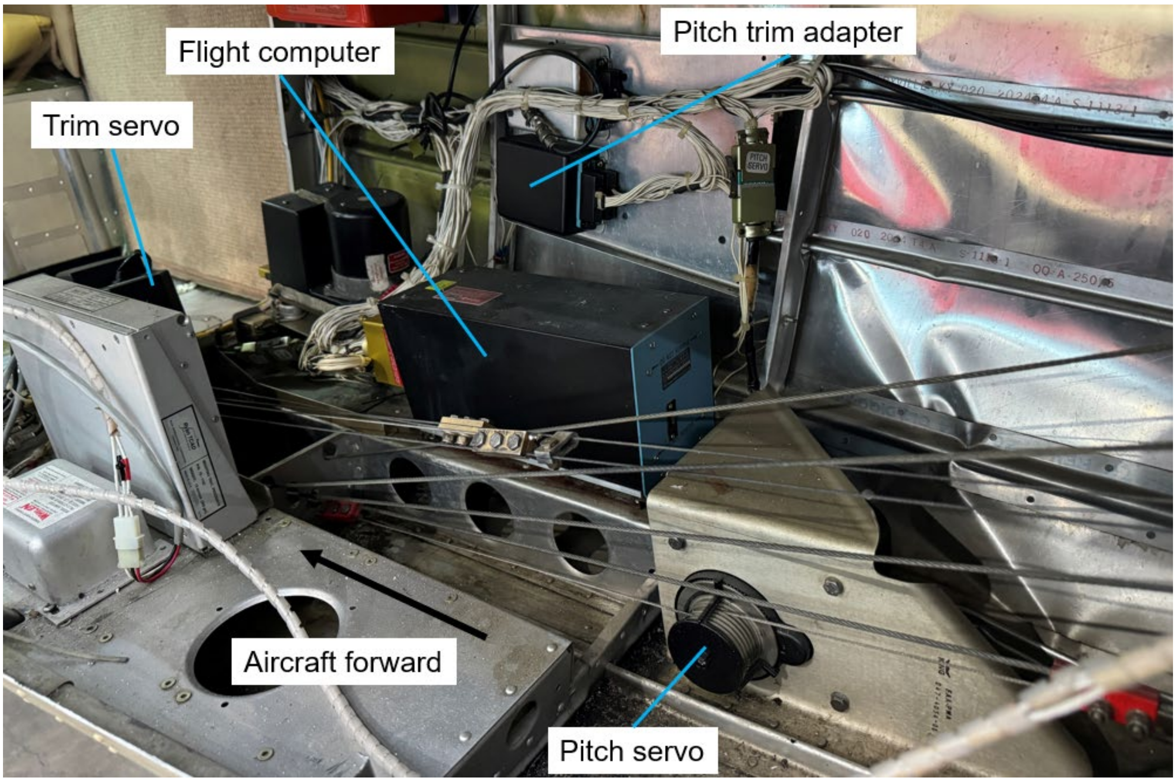

Figure 11

Location of some of the autopilot components

The auto-trim system is controlled by the flight computer and operates the aircraft's pully and cable system for the trim tab by a dedicated trim servo. When the servo is running the mechanical trim wheel in the cockpit also moves. The auto-trim system can be operated by either; the vertical trim switch on the left of the mode controller (which can adjust the altitude without disengaging the autopilot), the flight computer in the appropriate mode, or by the control wheel switches (which will result in the autopilot disengaging).

Another component of the auto-trim system is the pitch trim adapter KA 117 (Figure 12) which interfaces with the flight computer and provides additional control functions due to the inclusion of the specific model of trim servo (KA 273) in the autopilot system. The pitch trim adapter comprises two printed circuit boards with discrete soldered components. The upper board is the control side of the adapter, and the lower board is the drive controller for the trim servo.

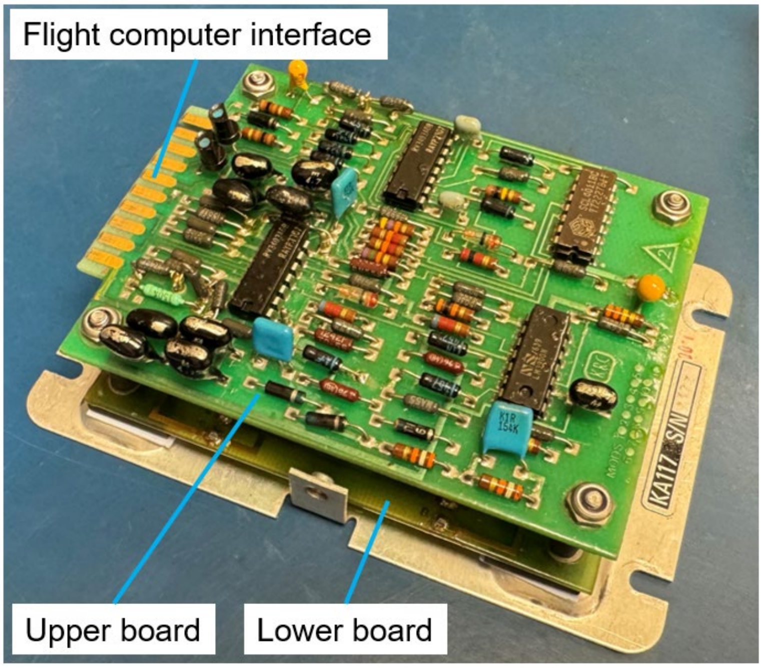

Figure 12
PCBs inside the KA 117 pitch trim adapter

Aircraft examination

The aircraft was recovered to the AAIB facilities and subjected to a detailed examination. No pre-existing defects could be found with the engine or the airframe. The pitch trim tab was found in the full NOSE DOWN position with the cockpit indicator showing the same position. Damage was identified to the top of the vertical fin with corresponding damage to the aft fuselage structure consistent with an impact to the top of the fin. The propeller blades were scraped and curled backwards demonstrating continued striking with a hard abrasive surface such as the runway. The nosewheel hub had shattered into multiple pieces and there was evidence on the side wall of the tyre of it being highly compressed. The remains of the wheel fork had been highly abraded and little of it remained. The lower end of the oleo was also highly abraded, with runway material and soil embedded in the end.

Autopilot survey

A survey of the aircraft revealed that the autopilot components installed were not in accordance with the STC for the Cessna T210M. Appendix 1 shows the components of the autopilot as referenced in the STC and what was found installed on the aircraft. No records were found to certify these variations and therefore it was assumed that this was the system installed in 1978 and had been operated in this configuration ever since.

Survivability

N761JU was equipped with three-point seat harnesses for both pilot and front seat passenger. Each of these harnesses consisted of a lap strap attached to the cockpit floor either side of the seat and a detachable shoulder strap anchored on the outboard cockpit rear doorposts (Figure 13). Both are static belts which can be adjusted in length to suit the occupant.

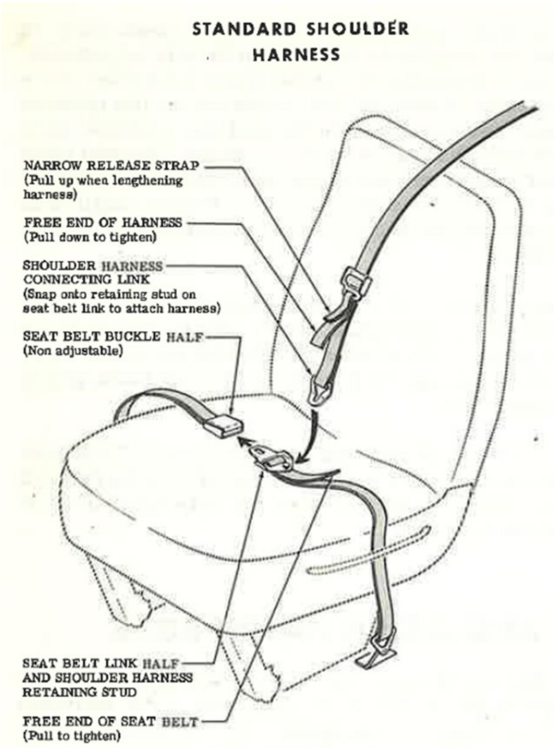

Figure 13

Extract from POH showing C210 front seat harness arrangement

The pilot secured his lap belt for takeoff but left the shoulder strap unfastened. He survived the accident with only minor injuries while the passenger fastened both of his straps and suffered cervical spinal injuries which ultimately proved fatal. The investigation did not find evidence the passenger had experienced any significant disabling forces before the aircraft left the runway. Despite the occupants having their lap straps secured, both of their heads struck the cabin roof as the aircraft came to rest inverted. Figure 14 shows the clearance from the seat headrests to the cockpit roof when the aircraft was upside down after the accident.

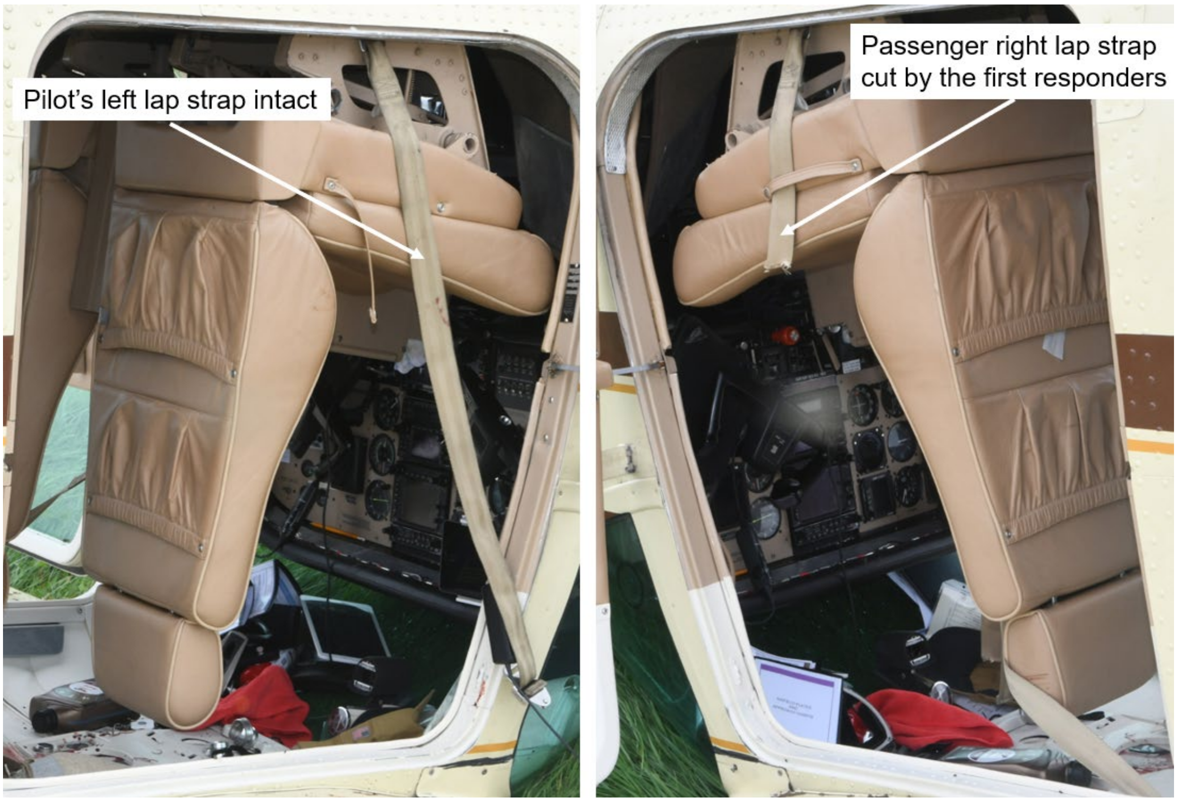

Figure 14
The proximity of the seat headrests to the cockpit roof

Meteorology

The weather at the time of the accident was benign. The wind was approximately aligned with the runway at 240°/10 kt and there was no precipitation or low cloud.

Personnel

The pilot gained his PPL in 1983 and bought N761JU in 2023. He held a valid PPL, UK IMC rating and Class 2 medical. He stated that when he flew, he would invariably be accompanied by the passenger who had been a close friend for many years. The passenger was himself an experienced private pilot, although his medical was lapsed and hence had recently only ever flown as a passenger.

The pilot described the passenger as meticulous and engaged on all flights. While he would not take part in the operation of the aircraft, he would follow through the checklists and procedures carried out by the pilot and would highlight if he thought anything had been missed. The pilot reported that the passenger would often take it upon himself to manage the aircraft's Garmin 530 navigation system, and that he had been setting it up for the return flight to Sturgate before they lined up on the runway for the accident flight.

The pilot had a basic knowledge of the KFC 200 autopilot system and stated that his passenger had been encouraging him to improve his proficiency with using it. His knowledge had in part been gained through an explanation of its operation from another pilot who had previously owned N761JU. This other pilot's understanding of the TRIM warning light on the annunciator panel was that it illuminated if the aircraft was out of trim, and that pilot input was needed to correct the trim setting. The pilot would respond by using the control wheel mounted electric trim switches, whose use would electrically drive the trim in the commanded direction and disengage the autopilot, leading to the TRIM light extinguishing.

The accident pilot reported that he would check the autopilot was OFF before engine start, as per the '*Before Start Engine*' checklist (see *Other Information* section) and would only ever switch it ON once airborne. He told the investigation that when he sets the trim for takeoff, he normally uses the manual trim wheel and does not operate the electric trim switches on the ground.

Tests

Initial on aircraft testing

With the assistance of a CAA Part 66, B2 licensed avionics engineer, who was familiar with the Cessna 210 and the KFC 200 autopilot system, the autopilot system fitted to N761JU was inspected and various ground tests were performed. The aircraft and the autopilot system had not been dissembled following the accident, except for the removal of the wings for transportation from the accident site to the AAIB facilities.

Following the initial inspection, the engineer determined that the pitch trim was observed to be in the full NOSE DOWN position with the mechanical stops correctly adjusted. The manual trim system indicated and operated correctly. The pitch trim wheel travelled smoothly in both directions with no sudden jumps or restrictions, and the trim indicator position was consistent with trim wheel movement and the trim tab position. The electric trim system appeared to function normally using the control wheel trim switches, with the trim servo driving the tab between both mechanical stops.

The mode controller AP engage switch operated correctly and the autopilot could be disconnected in all the expected ways: engage switch, control wheel disconnect button, circuit breaker, operating the control wheel electric trim switches (in both directions) and by switching off the avionics or aircraft master switch.

With the autopilot system engaged in a level flight mode (heading hold) the auto-trim system indicated a fault with an associated failure light on the annunciator panel and an audible alarm. The TRIM warning light on the annunciator panel was found to extinguish when the electric trim switch was driven. The TRIM warning was seen to re-illuminate 21 seconds after releasing the electric trim switches. The function of the autotrim system was tested and it was found that there was no pitch trim drive from the autopilot.

When selecting the autopilot pre-flight test function, only two flashes of the TRIM warning light were seen, instead of the four required to indicate correct function as per the KFC 200 manual. This indicated a fault on either the UP or DOWN control channel. After the self-test, the TRIM warning light extinguished, then returned 21 seconds later. Exploration of the trim system fault indicated that it was possibly related to the KA 117 pitch trim adaptor.

KA 117 testing

The pitch trim adaptor was removed from the aircraft, by disconnecting the two multi-pin plugs, and taken to a company specialising in King autopilot systems. The KA 117 was plugged into a King test set in accordance with the KA 117 maintenance manual and a series of test points performed. The unit failed the first test point because the TRIM UP CMD [command] LED was permanently lit, indicating that the KA 117 was sending a continuous trim UP command to the flight computer.

Functional testing

Following the rig testing of the KA 117, it was re-installed, and additional functional testing was performed. This included verifying the functionality of the electric trim system when operated using the pilot control wheel mounted trim switches, and in different autopilot modes.

When engaging the autopilot in any mode except ALT HOLD mode, the TRIM warning light would immediately extinguish, then return approximately 34 seconds later. No effect on the electric trim was otherwise observed.

With ALT HOLD mode selected and the autopilot engaged, the TRIM warning immediately extinguished, and the electric trim drive system would begin to operate a few seconds later. Analysis of the operation indicated that trim system drove in a pulsed motion, with two pulses per second. The test was repeated several times, and the time for the trim tab to move from TAKE OFF to NOSE DOWN ranged between four minutes and 30 seconds, and about three minutes. The TRIM warning light remained extinguished when the autopilot was ON with ALT HOLD mode engaged.

These tests were repeated several times during the investigation with the autopilot demonstrating the same behaviour each time. However, late into the investigation the ALT HOLD test was being demonstrated, and the behaviour of the autopilot had changed. The pre-flight test returned four flashes of the trim annunciator light, and the trim system did not operate. Throughout the remainer of the investigation the autopilot did not fail a pre-flight test, nor did it drive the trim tab with ALT HOLD mode engaged.

Other information

Pre-flight procedures

When the cockpit was inspected at the accident site, the Cessna POH and a commercial quick reference card for the Cessna 210 were found, along with a homemade Pilot's Quick Reference Handbook (QRH) which had been compiled by the passenger. It was labelled version 1.2 and dated August 2023. This QRH contained the checklists, normal and abnormal operations for the aircraft in a simplified form and included useful information specific to flying N761JU in the Northeast of England.

Figure 15 shows the '*preflight checks*' (left) from the QRH with a step to check that the autopilot is OFF, and the '*before take off*' checks (right) with a step to check that the trim is set correctly for takeoff.

PREFLIGHT CHECKS CESSNA T210M

IN CABIN — Note Tacho

SEAT, HARNESSES	Locked, Secure
BATTERY MASTER SWITCH	All Off
ALTERNATOR SWITCH	
MAGNETO SWITCH	
AVIONICS MASTER SWITCH	
LANDING GEAR LEVER	Down
CIRCUIT BREAKERS	Check, All In
BATTERY / ALTERNATOR MASTER	On
GEAR LIGHT	On, Green
FUEL QUANTITY	Check
FUEL SELECTOR VALVE	On Lowest Tank

BEFORE STARTING ENGINE

ROTATING BEACON	On
DOORS	Closed, Locked
AUTOPILOT	Off
COWL FLAPS	Full Open
AVIONICS SWITCH	Off
ENGINE PRE-OILER	Check

Check - Operate until Pressue Rises into Green Sector, Caution with Low OAT.

The Avionics Power Switch Must be OFF during Engine Start to prevent possible damage to Avionics.

ON THE GROUND

BEFORE TAKE OFF CESSNA T210M

POWER CHECKS

PARKING BRAKE	Set
RADIOS	Set
TEMPERATURES AND PRESSURES	Check
FLIGHT CONTROLS	Free and Correct
FLIGHT INSTRUMENTS	Check
FUEL SELECTOR VALVE	Fullest Tank
MIXTURE	Rich
ELEVATOR and RUDDER TRIM	Take Off
THROTTLE	1700 RPM

a. MAGNETOS Check (RPM drop should not exceed 150 RPM on either Magneto or 50 RPM diferencial between Magnetos).
b. PROPELLER Cycle from High to Low RPM; Return to High RPM (Full Forward).
c. ENGINE Instruments and Ammeter - Check
d. SUCTION GAUGE - Check in Green Arc.

THROTTLE	Idle, 800-1000, Reset 1200 RPM
CIRCUIT BREAKERS	Check, All In
AMMETER / VOLTMETER	Check
SPEED BRAKES	Check Retracted
NAV. LIGHTS, STROBE LIGHT	On as required
TAXI, LANDING LIGHT	On as required
THROTTLE FRICTION NUT	Adjust
TRANSPONDER	7000, Standby

ON THE GROUND

Figure 15

QRH – '*Preflight Checks*' and '*Before Take Off*' checks

The homemade QRH checklists were reviewed against the Cessna 210 POH procedures and were found to comprehensively reflect the manufacturer documentation. Neither the POH recovered from the aircraft, nor the homemade QRH, referred to any pre-flight autopilot functional checks or emergency procedures for the autopilot system.

Differences training

The CAA requires that, in order to change to a different type or variant of aeroplane, differences training or familiarisation must be carried out by an appropriately qualified Type or Class Rating Instructor or Flight Instructor. Differences training requires both theoretical knowledge instruction and practical training whereas familiarisation training requires the acquisition of relevant additional knowledge. The CAA has determined certain aircraft systems to be '*complex*.' Differences training is specifically required before a pilot first flies a single engine piston aircraft with any of the '*complex'* systems listed below:

- Variable Pitch Propellers
- Retractable Undercarriage
- Turbo/Super-charged Engines
- Cabin Pressurisation
- Tailwheel

- Electronic Flight Information Systems
- Single Lever Power Control

The investigation noted that autopilot systems were not included in this list despite their complex nature of operation and their ability to affect the operation of an aircraft[3].

Related events

In June 2025 the AAIB published an investigation into G-BKJW[4], a Piper PA-23-250, in which a pitch trim runaway during an approach to landing was considered a possible cause. Tests and research conducted for this investigation identified that a significant out of trim condition can require the pilot to apply large forces to the control wheel which many pilots may struggle to maintain for more than a few seconds. It discusses autopilot systems and the training to use them in GA aircraft. The CAA took eight safety actions following the investigation which included producing safety material regarding the use of autopilots, how to deal with pitch trim runaways, and publishing a safety notice recommending that inoperative autopilots or electrical trim systems are deactivated.

In 2013, a Cessna 210M, registration N450EM[5], suffered a similar accident to N761JU and was investigated by the NTSB. As N450EM lifted from the runway, the pilot reported the controls feeling "heavy" and aborted the takeoff at about 25 ft above the runway. The aircraft bounced several times before the nose gear collapsed, the propeller struck the runway, and the aircraft inverted as it veered off the side of the runway. The NTSB investigation did not identify any pre-existing fault and concluded that the accident was probably caused by the pilot's "failure to properly configure the elevator trim prior to flight."

Analysis

The accident

During the flight to Fadmoor the pilot had experienced several instances of the TRIM warning light illuminating on the annunciator panel, associated with inaccurate autopilot height keeping. Operating the electric pitch trim switch disconnected the autopilot and removed the problem. Based on his understanding of the system, the pilot assessed this as a nuisance and none of the documentation found in the aircraft contained guidance as to remedial or abnormal procedures to be followed in the event of the TRIM warning light illuminating or a pitch trim runaway.

It is likely that the pilot had set the trim to sightly nose-up when the aircraft landed at Leeds East after which the aircraft master switches were turned off before refuelling. This would have removed power from the autopilot engage switch solenoid meaning the autopilot would have been off with all modes disarmed when the pilot started the aircraft for the

Footnote

3 Differences Training in Single Pilot Piston Engine Aeroplanes | UK Civil Aviation Authority [accessed September 2025].

4 https://assets.publishing.service.gov.uk/media/6859549cf05cab1603ade629/Piper_PA-23-250_G-BKJW_08-25.pdf [accessed September 2025].

5 https://data.ntsb.gov/carol-repgen/api/Aviation/ReportMain/GenerateNewestReport/87597/pdf [accessed September 2025].

accident flight. The pilot recalled carrying out a pre-takeoff check of the trim setting and was confident that if it had been set incorrectly his passenger would have pointed it out to him. The investigation determined that the trim had most likely been set appropriately during the pre-takeoff checks.

The pilot reported he thought the control column was jammed in pitch when he tried to rotate the aircraft, however the investigation did not find any evidence of a physical restriction in the pitch control circuit. The pilot thought he was experiencing a control restriction which felt like "the autopilot was on" but, unknown to him at the time, the pitch trim was in the full NOSE DOWN position. He described deciding to abort the takeoff and believed that, when he cut the throttle, the aircraft suddenly became airborne before pitching down. He then thought the aircraft bounced once. Witness reports and impressions left on the runway show there were probably at least one or two additional bounces on the nose landing gear before the nosewheel hub failed and the propeller contacted the runway surface. It is probable that as the pilot tried to get airborne, he could not apply and maintain sufficient force to counter the nose-down trim and, if the autopilot was engaged, this would have added to the control forces experienced.

Recorded data indicates a maximum groundspeed of 93 kt was reached during the takeoff roll which, when the reported winds were accounted for, would have corresponded to an airspeed of about 100 kt. This was sufficient for the aircraft to become airborne and is consistent with the pilot's estimate of the airspeed when he realised he was unable to control the aircraft in pitch.

An analysis of the first series of propeller strike marks on the runway indicated that the engine speed was approximately 1,440 rpm at that point. This was significantly less than the full power takeoff setting, consistent with the pilot's account that he had reduced the throttle to abort the takeoff. The aircraft was initially on the runway centreline but, despite the pilot's application of brake and rudder to try and keep it straight, he was unable to stop it drifting to the right as it decelerated. The separation of the nose gear would have made it difficult to maintain directional control, contributing to the aircraft leaving the runway surface. The aircraft left the paved surface with sufficient speed that when the remains of the nose landing gear leg dug into the soft ground it caused the aircraft to invert.

Elevator trim setting

When the aircraft was inspected at the accident site, it was observed that the pitch trim was set to the full NOSE DOWN position. For the trim to have moved to this position from the TAKE OFF position, it could only have been through direct action by the pilot or the passenger or commanded by the autopilot. The pilot recalled checking that the autopilot was OFF and that TAKE OFF trim was set as per the pre-flight checklist. His passenger was reported to have been attentive to following checklists and would prompt the pilot where required. As there was no electric trim switch on the passenger's control wheel, an electrically operated trim movement could only have been commanded by the pilot. The pilot reported that, on the ground, he would not operate the electric trim switches and would set TAKE OFF trim using the manual trim wheel. Had the pilot or his passenger forgotten to set TAKE OFF trim during the before takeoff checks, the trim would most likely have been in the configuration from the previous landing (slightly nose-up) which would not explain the full NOSE DOWN elevator trim as found after the accident. Therefore, the investigation considered it unlikely that the trim was set to this NOSE DOWN position by the pilot or the passenger before takeoff.

Electric trim runaway

The electric trim system was extensively tested by commanding pitch changes using the control wheel mounted switches, without the autopilot engaged, and it functioned normally. It was possible to deactivate the electric trim system by pulling its circuit breaker and it was therefore considered unlikely that an electric trim runaway could have occurred with the autopilot disengaged.

Autopilot induced pitch change

For the autopilot to have commanded a change to the pitch trim after it was set to TAKE OFF by the pilot, it would require an autopilot mode being armed and then the autopilot being engaged. During the pre-take off checks the pilot checked that the autopilot was OFF and that the controls were '*full and free*.' No further control wheel inputs were required until the pilot rotated the aircraft to take off. At about 70 kt the pilot noted that the "stick would not move" and he thought the autopilot was engaged. When the first responders arrived at the aircraft, they thought the autopilot was still ON despite the pilot switching off the aircraft master switch and thereby removing power to the AP engage switch solenoid, before he exited the aircraft. This action would have disengaged the autopilot but with the aircraft inverted it is possible that the switch position was mistaken. The photograph (Figure 3) supplied by the first responders showed the autopilot OFF. The investigation could not determine if the autopilot was engaged on the ground after the pre-take off checks.

The KFC 200 mode controller enables modes to be pre-selected without the autopilot being engaged. These modes remain pre-selected unless the mode switch is pressed again, or electrical power is removed. It was considered possible that a mode was consciously pre-selected by one of the occupants as part of preparation for the flight ahead, and that the autopilot switch was then inadvertently moved to the ON position without it being noticed. An engaged autopilot would have contributed to the resistance the pilot felt on the controls as he tried to rotate, consistent with his recollection that he felt like the autopilot was on.

In the KFC 200 Pilot's Manual and Pilot's Guide (Figures 8 & 9) both included a pre-flight test of the autopilot system whereby the TRIM annunciator light would flash at least four times to indicate the system was operating correctly. During the initial post-accident testing of the system fitted to N761JU, the TRIM light would only flash twice, indicating a fault in the auto-trim system. Following the reinstallation of the KA 117 pitch trim adaptor and more testing, the pre-flight test function started to return four flashes. This indicated that the fault in the auto-trim system was intermittent, and this aligns with the pilot's statement that on some flights (notably Sturgate to Fadmoor) the TRIM warning light would come on and sometimes it did not (Fadmoor to Leeds East).

The subsequent testing of the auto-trim system identified a fault with the KA 117 pitch trim adapter, which manifested in an intermittent TRIM warning light on the autopilot annunciator panel. Specialist testing of the KA 117 showed that it was outputting a continuous TRIM

UP command to the flight control computer. The test results did reveal a scenario where, with both the ALT HOLD mode armed and the autopilot ON, the autopilot would drive the elevator trim electrically NOSE DOWN and would continue to drive unless the autopilot was disconnected, or the up/down rocker switch on the autopilot panel, which moved the flight director bar up/down, was adjusted upwards.

The time taken for the elevator trim to drive from TAKE OFF to fully NOSE DOWN varied, ranging from between four minutes and 30 seconds and about three minutes during testing. More than four minutes elapsed between the completion of power checks on the taxiway and N761JU coming to rest inverted off the runway. This indicated that there was sufficient time for the autopilot to have commanded full NOSE DOWN trim by the time it came to rest inverted and the master switch was turned off.

It was not possible to determine the exact trim position at the time the pilot rejected the takeoff, but the investigation determined the accident could only have occurred if the autopilot had been engaged at some point after power checks had been completed and before N761JU commenced the takeoff roll. The investigation considered this scenario more likely than either the electrical trim system having experienced an uncommanded runaway, or the pilot setting the trim to the NOSE DOWN position before takeoff.

Detection of autopilot trim movement

If the autopilot had been inadvertently engaged before the pre-takeoff checks, it would have been detected by the pilot, since resistance would have been felt when moving the control wheel to complete the pre-flight control checks due to having to overcome the autopilot servos. Furthermore, it would also not have been possible to move the manual trim wheel to the TAKE OFF setting for the same reason.

Once the pre-takeoff checks had been completed there were no further checklist items related to the autopilot. Visual detection that the autopilot was engaged would have been by noticing the position of the AP switch or looking at the autopilot annunciator panel, which could have been obscured by the position of the control wheel. Autopilot trim changes in ALT HOLD mode, which moved the manual trim wheel, were pulsed and continuous over several minutes. Therefore, if the pilot were to look at the manual trim wheel with a quick, short glance, the trim wheel may have appeared stationary. The trim wheel is black in colour, located low on the centre instrument panel and set against black trim panels, which limited the opportunity to visually detect the movement. The sound of the servos operating the trim system would not have been audible to the pilot or the passenger with the engine running and whilst wearing a headset.

The rudder pedals were used to steer the aircraft along the taxiway and onto the runway, and with no crosswind present during the takeoff, no aileron deflection would have been required to compensate. With the autopilot ON, the control wheel would have felt ‘locked’ in position had it been moved. Accordingly, the first point at which the pilot would have discovered the out of trim position was when he attempted to pull back on the control wheel to lift off from the runway, at which stage he would have experienced significant resistance to his pitch input.

Autopilot installation

The pilot stated that he had been having an issue with the autopilot, notably that its “height keeping was less accurate than usual” on flights prior to the accident flight. The pilot’s knowledge of the autopilot system came from his own experience of using it and from conversations with a previous owner. The investigation found that the pilot was not aware that the TRIM warning light on the annunciator panel indicated a fault in the system. He believed it was an indication that the aircraft was out of trim and required pilot input to adjust the trim. This was based upon what he had been told by the previous owner. This belief was likely reinforced by the intermittent nature of the fault, which was also identified during the post-accident testing.

During the examination of the aircraft, it was found that the autopilot components installed were not in accordance with the STC. Different or additional components had been fitted, and some were mounted in different locations in the aircraft. The investigation considered that as the autopilot had been installed for nearly all of the aircraft’s life, there were no records of system modification, and it had functioned correctly, these deviations had little or no effect on the operation of the system. However, it was the KA 117 pitch trim adaptor (a component that was not included in the STC) which was identified as a potential source for the trim system to intermittently fail the pre-flight test, effect the ‘height keeping’ and illuminate the TRIM failure warning light. No visible defects could be found when the KA 117 was examined and so it was considered likely that the properties of an individual component, such as a capacitor, were degrading due to age and thus affecting the operation of the component.

The STC for the installation of the autopilot into N761JU stated that a Flight Manual Supplement should be included in the POH, but no document for the KFC 200 autopilot was found within the POH. Appended to the POH was the King Pilot’s Manual which referred to a ‘trim failure warning’ light on the annunciator panel and described a pre-flight test. The test defined the pass criteria but did not include any actions to be taken should the test fail. The updated Pilot’s Guide includes a similar pre-flight check and included General Emergency Actions for some failures including an electrical trim runaway. Neither publication explained what to do if the TRIM failure warning illuminated or any actions to be taken if the pre-flight test failed. The autopilot pre-flight test was not included in the homemade QRH, and the investigation did not establish if the pre-flight test was ever performed by the pilot.

There was no information readily available to the pilot or the previous owners, to inform them of a potential flight safety risk, or steps to perform in the event of the fault or any other failure relating to the autopilot or electric trim system.

Guidance and training

Autopilot systems have a significant impact on the operation of an aircraft due to their effect on the primary flying controls. By extension, an autopilot fault can have a major impact on the safe conduct of the flight, even when it is not planned to use the autopilot. The investigation found there was a general lack of guidance and advice regarding the use of autopilot systems fitted to GA aircraft to help pilots understand the implications of flying with an autopilot system fitted to their aircraft. This is particularly true on flying with an inoperative or faulty autopilot system as in the AAIB investigation into G-BJKW, and the steps required to quickly respond to system faults or emergencies such as trim runaways.

To help GA pilots understand best practice when using autopilot systems, the CAA is planning to produce a new webinar on best practice for the use of autopilots and how to respond to trim runaways. The publication of the webinar is planned for early 2026. In the interim period, the CAA plans to review their existing website content related to autopilots and trim runaways and promulgate a reminder to industry through their Skywise communication channels and Safety Notices.

The investigation also found that there is currently no requirement for a pilot with a single engine piston rating to undertake differences training on autopilots when transitioning to a new aircraft equipped with an autopilot system. The information on the CAA's website at the time of the accident about the differences training requirement was not as clear as it could be. As a result, the CAA has taken the following safety action:

> The CAA has consulted on proposals to amend the guidance material in the UK Aircrew Regulation on differences training that will incorporate specific elements for autopilots and electric trim. The CAA will be implementing changes from the General Aviation Licensing Review CAP 3094 during the last quarter of 2025.

The CAA has published guidance on its website in the form of Safety Sense Leaflets[6] and Safety Notices[7] covering a variety of GA subjects. These include awareness of risks associated with flying during winter, using electronic navigation aids such as 'moving map devices', carbon monoxide safety and fuel handling and storage considerations. Some of these have been published in response to themes identified from AAIB investigations, as well as feedback from pilots as part of CAA engagement activities. The investigation reviewed all the current safety guidance published by the CAA and it was considered that GA pilots would benefit from the readily accessible guidance on the best practice on the use of autopilots. The objective would be to improve knowledge and awareness of autopilot functionality, integration into appropriate checklists and procedures including pre-flight functional tests, and actions to take in the event of failures such as autopilot induced trim runaways or in-flight mode failures. Therefore, the following Safety Recommendation is made:

> **Safety Recommendation 2025-009:**
>
> It is recommended that the Civil Aviation Authority publish guidance and best practice on the use of autopilots in General Aviation aircraft to improve knowledge and awareness of autopilot functionality, normal procedures, and actions to take in the event of a failure.

Footnote

6 Safety Sense Leaflets | UK Civil Aviation Authority [accessed September 2025].
7 Safety notices | UK Civil Aviation Authority [accessed September 2025].

Survivability

The pilot, who was the least-restrained occupant, survived with only minor injuries, while the passenger sustained unsurvivable injuries despite having all his seat harness straps secured. Given the passenger was unresponsive after the aircraft came to rest, he was likely rendered unconscious by his head striking the cabin roof as the aircraft came to rest inverted. The cervical spine fractures sustained were indicative of a sudden compressive force transferred into the spinal column from impact forces imparted to his head.

In trying to understand why the pilot suffered less-serious injuries than the passenger, the investigation considered it likely that:

- Because the pilot's upper torso was unrestrained, it would have pivoted forward as the aircraft rapidly decelerated and inverted after leaving the runway (Figure 16a).
- The passenger's upper torso would likely have remained more erect, restrained by the shoulder strap (Figure 16b).
- As the aircraft landed on its roof, the pilot's head and torso would have moved rearwards and down in an arc, leading to a more tangential head impact (Figure 16c).
- Any movement of the passenger in his straps would have been primarily vertical in nature leading to an impact with the roof along the axis of his spine (Figure 16d).

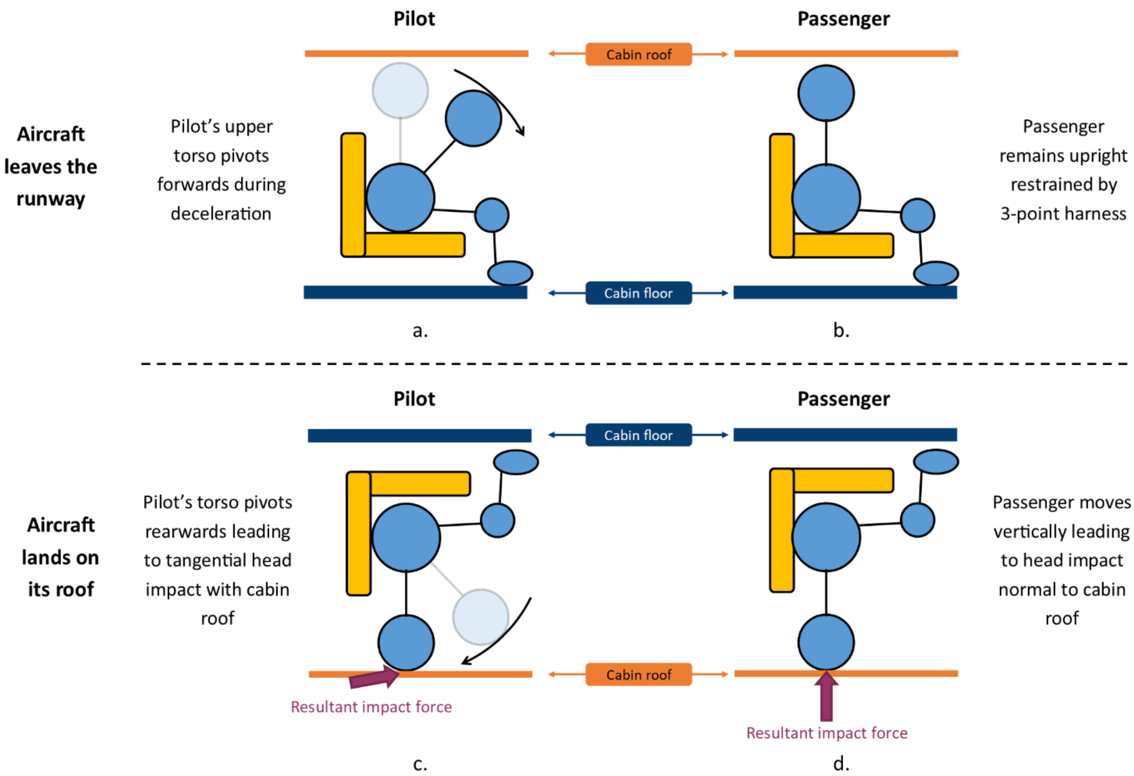

Figure 16

Analysis of potential body movement during later stage of accident sequence

It was not possible to determine how tight the passenger's lap strap had been during the accident nor what clearance existed above his head when he was sat upright and was strapped in for the accident flight. Any slack in either occupant's lap straps would have increased the potential for vertical movement away from the seat cushion once they were inverted, thereby further reducing clearance from the cabin roof. Notwithstanding the circumstances of this accident, it is prudent that pilots ensure that during critical stages of flight all restraint harnesses are sufficiently fastened and tight, but do not restrict the pilot's ability to reach all controls and switches in the cockpit. This is because, overall, the correct use of harnesses can reduce the extent of injuries sustained during an accident.

Conclusion

The investigation found the accident was the result of attempting to takeoff with the aircraft pitch trim set to full NOSE DOWN. The forces required to rotate the aircraft would have been high due to the aerodynamic loads and potentially further exacerbated by having to overcome the autopilot servos. The pitch trim setting was most likely caused by an intermittent latent fault within the autopilot system, but this required the autopilot to be ON with the ALT HOLD mode selected. The investigation was not able to determine how or why these modes were selected and engaged before the aircraft took off.

The pilot appropriately rejected the takeoff, but after the nosewheel broke away he was unable to control the aircraft's ground track, which resulted in the runway excursion. The investigation considered the runway excursion would have been less likely had the nose landing gear remained intact and that the passenger would likely have survived but for the subsequent inversion of the aircraft. The investigation found the loss of the nosewheel was a contributory factor to the aircraft coming to rest inverted after it left the paved surface.

The passenger suffered fatal spinal injuries, despite having his full harness fastened, while the less-restrained pilot survived with only minor injuries. The injuries sustained by the passenger were thought to have occurred because of an impact to the top of head when the aircraft inverted. While it was not a proven factor in the fatality, the investigation considered it prudent to remind all pilots and passengers of the vital importance of ensuring their seat harnesses are fully secure for critical phases of flight.

The POH and QRH did not contain any checks to enable the pilot to identify the fault in the autopilot. Neither did they include any actions to take in the event of an autopilot fault. There was a pre-flight autopilot check detailed in the POH-appended Pilot's Manual which would have identified the fault, but it did not include any appropriate remedial actions. The pilot's knowledge of the autopilot was based upon his own experience of using it and through conversations with the previous owner. This proved to misinform the pilot on the function of the TRIM warning light.

The investigation considered that there was a lack of guidance and advice to pilots regarding the use of autopilots in GA aircraft. Furthermore, there was no explicit requirement in differences training to include the use of autopilots. As a result, the CAA has taken two safety actions, and a Safety Recommendation has been made.

Safety actions taken

The following safety actions have been taken by the CAA:

> The CAA has consulted on proposals to amend the guidance material in the UK Aircrew Regulation on differences training that will incorporate specific elements for autopilots and electric trim. The CAA will be implementing changes from the General Aviation Licensing Review CAP 3094 during the last quarter of 2025.

Safety Recommendations

The following Safety Recommendation has been made to the CAA:

> **Safety Recommendation 2025-009:**
>
> It is recommended that the Civil Aviation Authority publish guidance and best practice on the use of autopilots in General Aviation aircraft to improve knowledge and awareness of autopilot functionality, normal procedures, and actions to take in the event of a failure.

Appendix 1

Locn (Fig 17)	Model Number (STC)	Description (STC)	Part Number (STC)	Model Number (Actual)	Description (Actual)	Part Number	Serial Number	Notes
1	KG 258	Attitude horizon indicator	060-0020-07	KG 258	Attitude horizon indicator	Unknown	Unknown	
2	KS 271A	Roll servo	065-0060-01	KS 271A	Roll servo	Unknown	Unknown	Behind instrument panel
3	KI 525A	Pictorial navigation indicator	066-3046-00 or -01 or -07	KI 525A	Pictorial navigation indicator	Unknown	Unknown	
4	KC 290	Mode controller	065-0033-01	KC 290	Mode controller	Unknown	Unknown	
5	KA 285	Annunciator panel	065-0032-01	KA 285	Annunciator panel	Unknown	Unknown	
6	KG 102A	Directional gyro	060-0015-00	KG 102A	Directional gyro	060-0015-00	31533	
7	KS 272A	Pitch trim servo	065-0061-31	KS 273	Trim servo	065-0040-00-R04	1207	
8	KC 295	Flight computer	050-0034-09 & 065-5014-53 Adapter Board	KC 295	Flight computer	065-0034	8248	Adapter Board 28
9	KS 270A	Pitch servo	065-0059-04	KS 270A	Pitch servo	065-0059-04	24720	
10	K 51B	Slaving accessory	071-1242-01	K 51A	Slaving meter			
11	KM 112	Magnetic azimuth transmitter	071-1052-00	KMT 112	Magnetic azimuth transmitter	071-1052-00	5358	
12	KA 142	Pitch trim adaptor	065-5020-01	KA 117	Pitch trim adapter	065-5006-01-R08	1173	
12				KA 118	Demodulator	071-1095-00-R	1410	

Table 1

Autopilot STC components versus aircraft survey

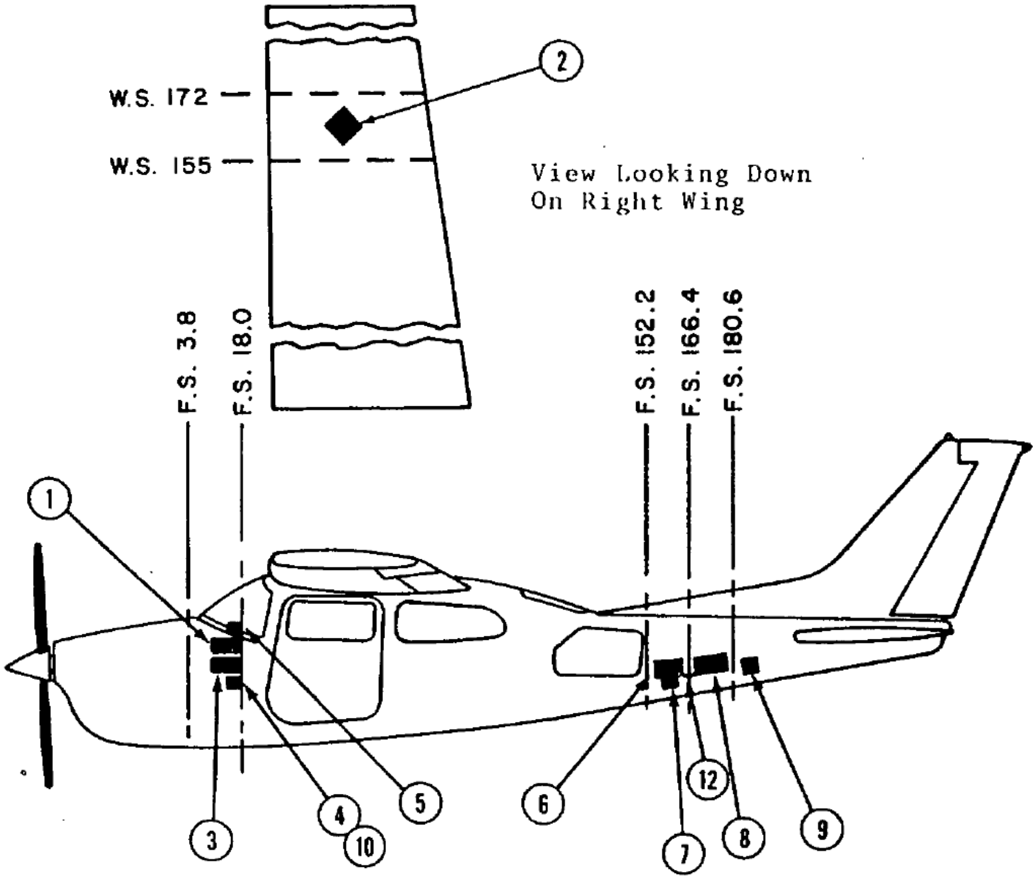

Figure 17
Location of autopilot components (refer to Table 1)

Published: 6 November 2025.