AIRCRAFT ACCIDENT REPORT

SAHCO/AAL/2022/02/03/F

Nigerian Safety Investigation Bureau

Final Report on ground collision between a conveyor belt TUG660 truck with fleet number 49/9 operated by Skyway Aviation Handling Company (SAHCO) Plc and a parked Boeing 737-800 aircraft with nationality and registration marks 5N-MJQ owned and operated by Arik Air Limited which occurred at Nnamdi Azikiwe International Airport Abuja on 3 February 2022.

This report is produced by the Nigerian Safety Investigation Bureau, (NSIB) formerly the Accident Investigation Bureau, Nigeria (AIB), Nnamdi Azikiwe International Airport, Abuja.

The report is based on the investigation carried out by Nigerian Safety Investigation Bureau, in accordance with Annex 13 to the Convention on International Civil Aviation, Nigerian Safety Investigation Bureau (Establishment) Act, 2022, and Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2023.

In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of aircraft accident/serious incident investigations to apportion blame or liability.

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The Nigerian Safety Investigation Bureau believes that safety information is of great value if it is passed on for the use of others. Hence, readers are encouraged to copy or reprint for further distribution, acknowledging the Nigerian Safety Investigation Bureau, Nigeria as the source.

Safety Recommendations in this report are addressed to the Regulatory Authority of the State (NCAA) as well as other stakeholders, as appropriate. This authority ensures enforcement.

Printed in Nigeria for the Nigerian Safety Investigation Bureau (NSIB)

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GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

DNAA	Nnamdi Azikiwe International Airport Abuja
DNKN	Mallam Aminu Kano International Airport Kano
DNMM	Murtala Muhammed International Airport
GSE	Ground Safety Equipment
NCAA	Nigeria Civil Aviation Authority
NSIB	Nigerian Safety Investigation Bureau
SAHCO	Skyway Aviation Handling Company
VHF	Very high frequency
VMC	Visual meteorological condition

Report number:	SAHCO/AAL/2022/02/03/F
Registered Owner	SAHCO PLC
operator:	SAHCO PLC
Vehicle type and model:	TUG660
Chassis number:	WBD 970012L777472
Manufacturer:	Textron GSE
Year of manufacture:	2006
Year of purchase:	2006
Fleet number:	49/9
Location:	International apron Nnamdi Azikiwe International Airport Abuja (DNAA)
Date and time:	3rd February, 2022 @17:10 (*All times in this report are local time, equivalent to UTC+1 unless otherwise stated*)

SYNOPSIS

On 3 February 2022, an Arik Airlines Boeing 737-800 with nationality and registration markings 5N-MJQ departed Murtala Muhammed International Airport (DNMM) at 15:10 h on a scheduled flight to Nnamdi Azikiwe International Airport Abuja (DNAA). The flight arrived at DNAA at 16:50 h.

Passengers disembarked, and the aircraft prepared for their next leg, which was DNAA to Mallam Aminu Kano International Airport Kano (DNKN). While the boarding was ongoing, the captain reported hearing a loud bang. On hearing this, the crew came down and saw a conveyor belt truck belonging to Skyway Aviation Handling Company (SAHCO) LTD under the aircraft towards the forward cargo hold. On inspecting the scenario, they discovered that the equipment had broken the VHF antennae and punctured the aircraft's fuselage.

Causal factor

Failure of the brake proportioning valve resulting from wear and tear.

Contributory factors

Failure to monitor and diagnose for failing components of the brake system of the TUG660 Truck.

One Safety recommendations was made.

1.0 FACTUAL INFORMATION

1.1 History of the Event

On 3 February 2022, an Arik Airline Boeing 737-800 with nationality and registration marks 5N-MJQ departed Murtala Muhammed International Airport (DNMM) Lagos at 15:10 h on a scheduled flight to Nnamdi Azikiwe International Airport (DNAA) Abuja.

The flight arrived at DNAA at 16:50 h, passengers disembarked, and the aircraft was prepared for the next leg, which was DNAA to Mallam Aminu Kano International Airport (DNKN) Kano. While the boarding was ongoing, the Pilot Flying reported hearing a loud bang. The crew came down and saw a conveyor belt truck belonging to Skyway Aviation Handling Company (SAHCO) LTD under the aircraft towards the forward cargo hold. Upon inspecting the scenario, they discovered that the equipment had broken the VHF (high frequency) antennae and punctured the aircraft's fuselage.

According to the Ground Safety Equipment (GSE) operator, he was busy servicing the toilet browser for aero contractors' aircraft when the ramp officer called him to remove the conveyor belt truck from the aero contractors' Airbus aircraft to Arik's B737-800 5N-MJQ to offload cargo.

The GSE operator further stated that he mounted the equipment, reversed, applied the brakes, and then moved forward. When positioning on the Arik Air B737 5N-MJQ, he tested the brakes twice, and his foot was steadily on the brake pedal. Suddenly, the brake went flat, and the equipment couldn't be stopped, eventually hitting the aircraft.

He added that after removing the truck from the underneath of the aircraft, the brake was tested and found defective. Passengers were disembarked and returned to the departure hall.

The serious incident occurred at 17:10 h in visual meteorological condition (VMC)

1.2 Injuries to persons

Nil

1.3 Damage to aircraft

The aircraft was substantially damaged

1.4 Other damage

The head protector of TUG 660 was damaged.

1.5 Personnel information

1.5.1 Ground Support Equipment (GSE) Operator

Nationality:	Nigerian
Age:	53 years
License type:	National Driver's License (Class B), Airside Drivers Permit
National driver's license:	Valid till 15 June, 2020
Airside driver's permit:	Valid till 31 July, 2022

1.6 Aircraft information

1.6.1 General information

Aircraft type:	Boeing 737-800
Manufacturer:	Boeing Aircraft Company, USA

Year of manufacture:	2006
Serial number:	38971
Registered owner/operator:	Arik Air Limited
Nationality and registration marks:	5N-MJQ
Airframe time:	16,548:55 h

1.6.2 Conveyor Belt Loader Information

Vehicle type:	TUG 660
Manufacturer:	Textron GSE
Date of manufacture:	2006
Chassis number:	WDB970012L777472
Registered owner/operator:	SAHCO PLC
Fleet number:	49/9

1.6.3 Excerpts from Tug 660 operations manual

The Emergency Stop Switch is a push button located on the dash. All control points are on the conveyor belt assembly and the belt loader. In an emergency, it stops the conveyor and engine immediately. The Emergency stop switch must be turned off before the unit can be restarted.

The parking brake is located on the drive shaft and is activated by an Orchellin over-centre lever. With the parking brake engaged, the loader will not move even when shifted into gear.

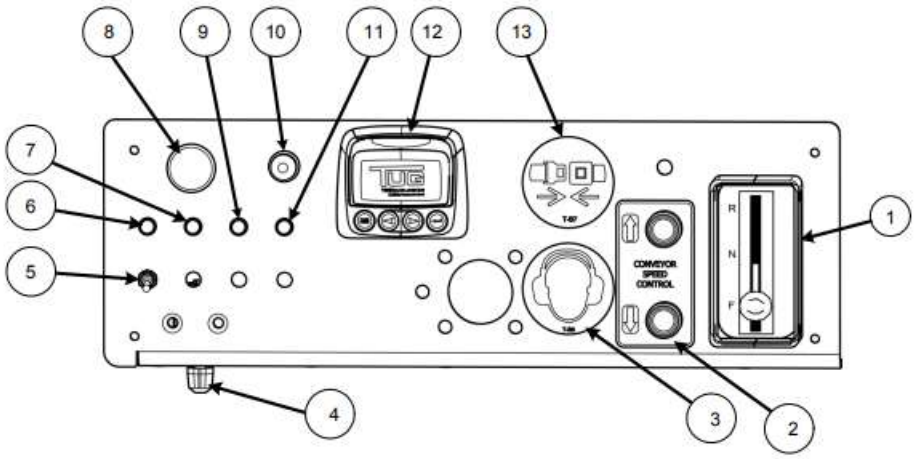


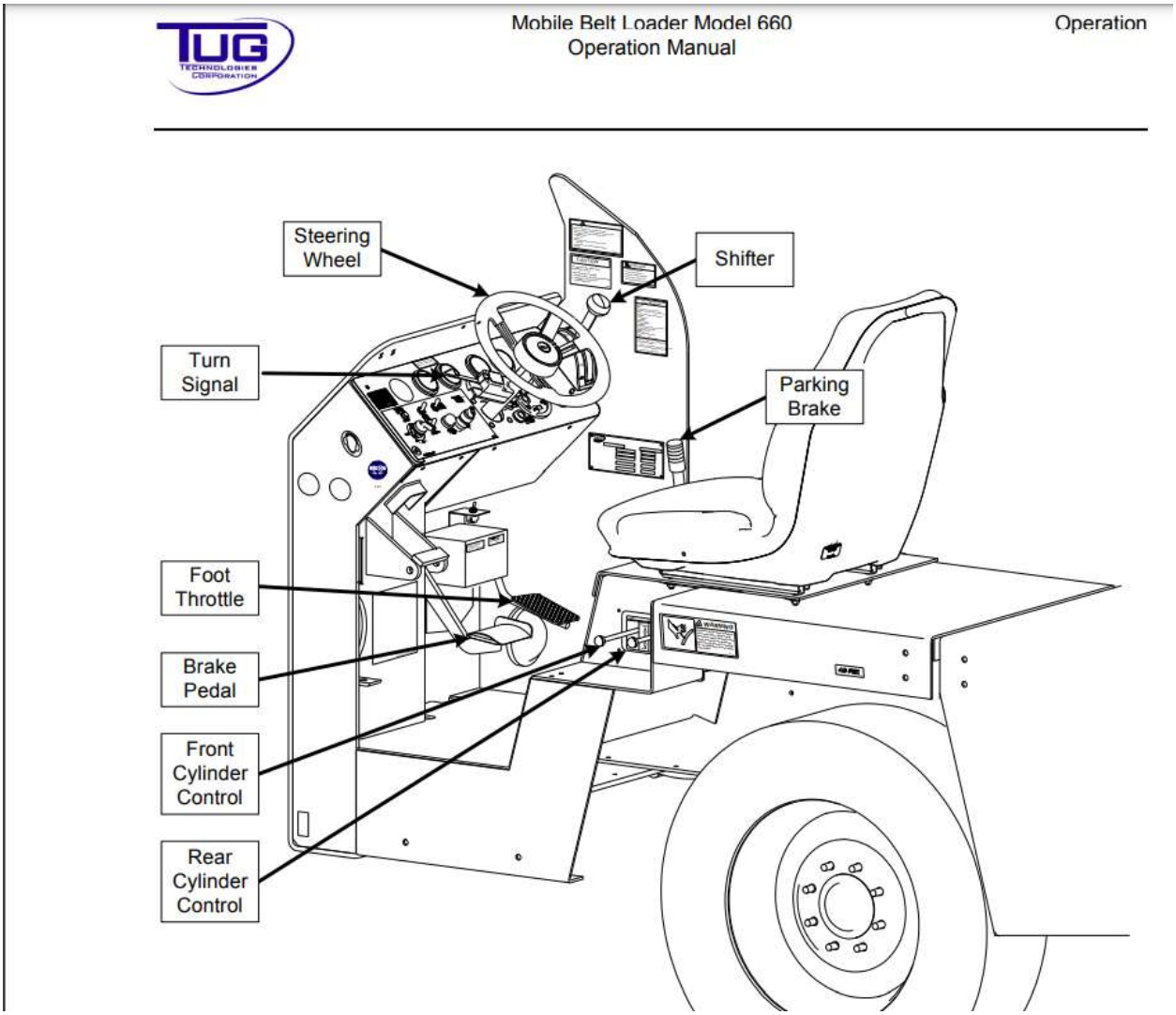
Figure Operation - 2 - 2 Instrument Panel - Deutz 2.9L

Table Operation-2-2 Instrument Panel Description - Deutz 2.9L

No.	Name	Description
1	Shifter	This is the main drive control for forward or reverse direction. The shifter is labeled: ***F=Foward***, ***R=Reverse***, and ***N=Neutral***.
2	Converter Speed Control	These buttons control the engine speed ***only*** while the belt loader is in neutral and the parking brake is applied. Press the button closest to the UP arrow: engine RPMs and belt speed increases. Press the DOWN arrow: engine RPMs and belt speed decreases.
3	Hearing Protection Decal	Always wear hearing protection.
4	Ignition Switch	Turn this switch to start or turn off the engine.
5	Headlight Switch	This switch turns the headlights on or off. Flip switch up to turn lights ON and down to turn lights OFF.
6	Warning Light	This warning light illuminates when headlights are on.

Table Operation-2-2 Instrument Panel Description - Deutz 2.9L (Continued)

No.	Name	Description
7	Deutz Cold Start Wait Light	When the ignition switch is turned on, this light illuminates. When the light goes out, it shows that the glow plugs are heated and the vehicle can be started.
8	Emergency Stop Switch	Press the switch down to shut the engine off. The switch must be rotated clockwise and pulled out to allow the engine to restart.
9	Warning Light	Optional warning light.
10	Emergency Lift Pump Switch	Press this button for emergency hydraulic pressure to the conveyor.
11	Warning Light	Optional warning light.
12	Murphy CAN Display	Information displayed is provided by the ECM and may include: • Engine Speed • Engine Torque • Coolant Temperature • Intake Air Temperature • Exhaust Gas Temperature • Oil Pressure • Coolant Pressure • Fuel Level • Battery Voltage • Total Operating Hours • Error Messages
13	Fasten Seat Belt Decal	Always fasten seat belt before operating the Mobile Belt Loader Model 660.



1.7 Meteorological information

Not applicable

1.8 Aids to navigation

Not applicable

1.9 Communications

Not applicable

1.10 Aerodrome information

Not applicable

1.11 Flight recorders

Not applicable

1.12 Wreckage and impact information

The aircraft was mainly in one piece; one of the right-hand VHF antennae was broken, and the fuselage of the aircraft was punctured.

The following were observed on the aircraft;

i. The right-hand VHF antennae was damaged
ii. Punctured fuselage underneath the aircraft towards the forward cargo hold

Figure 1: Parked Arik Air Boeing 737-700 after the occurrence

Figure 2: The conveyor belt truck still under the aircraft after the occurrence

Figure 3: Puncture to the fuselage of the Arik air aircraft (a pressurised section of the aircraft)

Figure 4: Point of the conveyor belt that hit the aircraft

Figure 5: Brake assembly of the conveyor belt truck

Figure 5: Brake proportioning valve of the truck where the leakage was traced to

Figure 6: Head protector of the conveyor belt that punctured the fuselage of the aircraft

1.13 Medical and pathological information

No medical or pathological tests were conducted.

1.14 Fire

There was no fire.

1.15 Survival aspect

The incident was survivable, as the speed on impact was minimal, and the contact between the conveyor belt truck and the aircraft was to the truck's 'head protector'.

1.16 Test and research

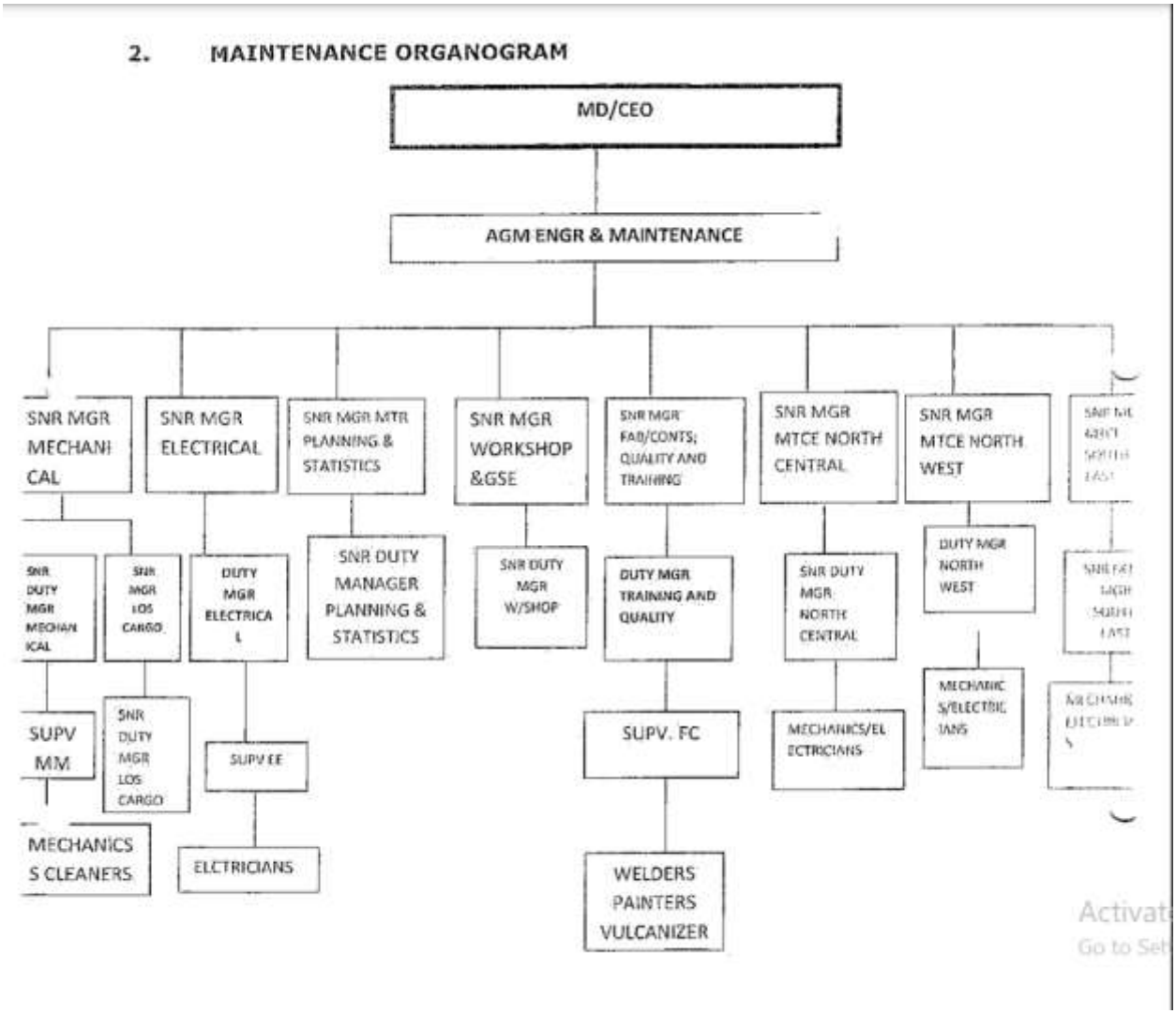
Not applicable

1.17 Organisational and management information

The Skyway Aviation Handling Company PLC (SAHCO) is a Public Liability Company incorporated as an Aviation Ground Handling Services Provider under the Nigerian Companies and Allied Matters Act of 1990.

SAHCO, formerly Skypower Aviation Handling Company Limited, was carved out of the liquidated Nigeria Airways Limited as part of the Nigerian Federal Ministry of Aviation's Reform of 1996.

The duties of SAHCO involve all the actions that take place from the time an aircraft touches down on the tarmac to the time it is airborne. They also ensure that the Ground Handling assignment is carried out efficiently, speedily, and safely while deploying the right tools.



1.18 Additional Information

On 26 December 2021, the brake of the TUG Truck was reported on the SAHCO Equipment Operator's Report (SAH/E&M/EOR/001) to be ineffective as described in the SAHCO Job Card (SAH/E&M/002). The work to be done was to check the brake system and correct the fault. The brake system was checked as incidented in the job card, and

a bleeding nipple was seen leaking. It was tightened, brake fluid was added, bled, and no leakage was seen. The Tug truck was certified for service by the supervisor.

On the day of the occurrence, the truck has 36,763 hours.

2.0 ANALYSIS

2.1 TUG Truck Driver

Although the driver's licence has expired since 15 June 2020, the TUG Tru15 Junes airside driver's permit was still valid till 31 July. Therefore, the driver operated with the airside vehicle.

2.2 Operation of the TUG

The Truck was operated according to SAHCO Standard Operating Procedures. When he was called from operating on the Aero-Contractors aircraft, the driver confirmed that he tested the brakes twice before approaching the Arik aircraft B737 MJQ. However, on approaching the aircraft, the brake became ineffective, leading to the collision, which stopped the truck.

The daily serviceability report sheet for that day indicated that the brake fluid was checked and found to be okay. The investigation believes that a thorough and detailed check that morning should have detected any fault in the brake system. Should the fault have been detected earlier before approaching the aircraft, it would have been rectified before commencing the operation.

Alternatively, the ground safety equipment (GSE) operator could have explored stopping the tug. In the case of unresponsive brakes, operating the emergency stop switch would have immediately stopped the tug 660 engine from running. This could have been complemented by engaging the parking brake at the right-hand side of the tug's operator's seat. It is not apparent why these options were not explored.

According to the manufacturer's operations manual, disengaging the gear system and restricting the tow tug's drive shaft movement slows down the equipment's speed, which could have averted an emergency situation.

2.3 TUG 660 Brake System Condition

During the post-occurrence inspection and diagnosis by the SACHO engineers, it was discovered that the brake proportion valve was the source of hydraulic fluid leakage. The brake component of the TUG 660 belt loader comprises a brake master, hydro booster, brake pipes, brake proportioning valve, brake callipers, brake pads, brake discs, brake drum, brake linings, and wheel cylinders. The brake system is set up with brake discs in the front and brake drums in the rear.

Recall that on 26 December 2021, the brake of the TUG 660 Truck was reported on the SAHCO Equipment Operator's Report (SAH/E&M/EOR/001) to be ineffective as described in the SAHCO Job Card (SAH/E&M/002). The work to be done was to check the brake system and correct the fault; whenever the fluid ran low, it was topped up to make the brakes effective. However, having been working on another aircraft before being redirected to the Arik aircraft, the brake fluid would have been exhausted due to leakage from the proportioning valve, leading to the brake failure.

It is worthy of note that the Bureau cannot be certain that the entire brake system was checked on 26 December 2021. If this had been done, the source of the leakage would have been detected and addressed.

The Bureau is of the opinion that the maintenance department was only looking for leakage, not wear and/or tear.

If SAHCO plc had undertaken periodic checks for component wear and tear, failing components could have been detected and replaced.

3.0 CONCLUSIONS

3.1 Findings

1. Arik Air 5N-MJQ was boarding passengers at the International Apron of Nnamdi Azikiwe International Airport.
2. While boarding, the Pilot heard a loud bang.
3. The Ground Service Equipment operator was operating a toilet browser on another aircraft when he was called to operate conveyor belt service on 5N-MJQ.
4. The GSE operator steadily pressed the brake pedal and suddenly noticed that his foot went flat, and the truck would not stop.
5. The truck went right under the aircraft and stopped due to the impact.
6. The right-hand VHF antennae of 5N-MJQ were destroyed.
7. 5N-MJQ forward cargo hold was torn and ripped open.
8. The conveyor belt truck sustained minor damage.
9. The GSE operator's national driver’s license had expired.
10. The airside driver's permit of the GSE operator was valid.
11. The conveyor belt truck had been removed from the scene before the arrival of safety investigators.

3.2 Causal factor

Failure of the brake proportioning valve resulting from wear and tear.

3.3 Contributory factors

Failure to monitor and diagnose for failing components of the brake system of the TUG660 Truck.

4.0 SAFETY RECOMMENDATIONS

4.1 Safety recommendation 2024-043

SAHCO PLC should ensure adherence to the provisions section 19 (1) of the Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2019 regarding tampering with evidence.