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**REPORT ON THE ACCIDENT IN GEIRANGERFJORDEN, AT
GEIRANGER ON 11 JULY 1998 WITH FIRDAFLY AS CESSNA U206G,
LN-DBZ**

SUBMITTED OCTOBER 1999

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Aircraft type: Cessna U206G

Registration: LN-DBZ

Owner: Firdafly AS, P.O.Box 183, 6860 Sandane

User: Same as owner

Crew/Commander: Male, 61 years, minor injuries

Passengers: 4 fatalities, German tourists, two females and two males

Accident site: Geirangerfjorden at Geiranger, in Møre og Romsdal county,
Norway

Time of accident: 11 July 1998, at 1645 hrs

All times given in this report are local times (UTC +2 hours), if not otherwise stated.

NOTIFICATION

The AAIB/N was notified about the accident by telephone from the Main Rescue Centre at Sola and from the Police Operations Centre in Oslo, on 11 July at 17:08 hrs. The message stated that there had been an accident in Geirangerfjorden with a Cessna 206 from Firdafly AS. At that time it was neither known how many persons that were onboard the aircraft, nor whether there were any survivors. Confirmed information on these matters was provided to the Aircraft Accident Investigation Board/Norway (AAIB/N) later that evening. Two inspectors from the AAIB/N arrived in Geiranger later that night, and started their investigations on the accident site next morning, on 12 July.

SUMMARY

On Saturday 11 July at 16:45 hrs, there was an accident in Geirangerfjorden, in the harbour just outside Geiranger, with a Cessna U206G, LN-DBZ. The accident occurred during landing on the water, after a sightseeing trip with German tourists over the Geirangerfjord area. During the landing phase the aircraft hit the water in such a way that it bounced up again. At the second impact with the surface, the left float cut its way into the water, making the aircraft nose over, ending up inverted in

the water and kept afloat by its floats. The Commander managed to get out through the left side window with minor injuries. He made several attempts to rescue his four passengers, but did not succeed. The four passengers did not survive the accident. The AAIB/N concludes that an unfortunate, and for the Commander totally unexpected, wave situation in the landing area was the main causal factor for the accident. On 16 July 1998, the AAIB/N proposed a temporary safety recommendation, asking the Civil Aviation Authorities of Norway (CAA/N) to evaluate whether passenger safety is sufficiently taken care of during sightseeing flights with Cessna U206G, unless certain measures are taken to improve the possibilities for an emergency evacuation from the aircraft under water.

1. FACTUAL INFORMATION

1.1 History of the flight

- 1.1.1 In the morning on 11 July, the Commander and a conductress, both employees in Firdafly AS, flew from Sandane to Geiranger with LN-DBZ. The purpose was to fly sightseeing trips in the Geirangerfjord area, with tourists from a cruise ship that was visiting Geiranger. The company, Firdafly AS, and the Commander had been engaged in this kind of operations for many years, and the Commander had long experience from flying in the Geirangerfjord area.
- 1.1.2 Before departure from Sandane, a licensed technician from the company had performed daily inspection on the aircraft according to normal instructions. In addition, the Commander also checked the aircraft himself, as he always used to do before the first flight of the day. The trip to Geiranger took 20 minutes, in excellent weather conditions.
- 1.1.3 During the day, the Commander flew 8 sightseeing trips with various numbers of passengers. These trips were all performed without any problems. The departures were mainly carried out on the north side of the fjord, in a north-westerly direction, away from Geiranger. The landings were made on the south side of the fjord, in a south-easterly direction, towards Geiranger. This selection of landing site meant that the landings often were performed between the shoreline on the south side of the fjord and an Italian cruiseship that was anchored a short distance from the southern shoreline, in a north/south direction. The Commander has stated that this ship was acting like a breakwater to the waves arising from the many passenger ferries that were operating in the northern part of the harbour area of Geiranger.
- 1.1.4 The ninth trip that day started out normally, this time with four German tourists onboard. A male passenger was seated in the right front seat next to the Commander, two female passengers were seated in the middle row, and the last male passenger was seated in one of the two rear seats. The passengers were

routinely briefed on the emergency exits and life jackets, and finally asked to fasten their seatbelts. These instructions were given in English. The takeoff was performed without anomalies. The Commander routinely flew along the fjord to the waterfall "De syv søstre", before setting course back to Geiranger. The Commander once again decided to land along the shoreline on the south side of the fjord. There were no boats in the landing area, and the Commander did not observe any waves or other factors that could influence the landing. The surface of the water was calm and flat, but the Commander has explained that he had the necessary references to make a safe landing.

- 1.1.5 The approach was uneventful, and the Commander performed the "Before landing checklist". 20° flap was set, which according to the Commander gave the best controllability of the aircraft. He usually landed with this flap setting. Photographs taken just before the landing shows a concentration of waves in the landing area (see the appendix). Just before the expected touchdown, the floats hit something that the Commander claims must have been a wave. The aircraft bounced up in the air, and the Commander applied full power in order to try to stabilise the aircraft before hitting the surface again. He did not succeed, and as the aircraft hit the surface for the second time the left float hit a new wave, and the aircraft plunged into the water. The aircraft floated nose down for a short while, before tumbling over on its back, with the floats in the surface.
- 1.1.6 The Commander remembers shouting to his passengers to unfasten their seatbelts, but cannot say for sure whether this was done or not. He tried to open the left door, but the water pressure on the door was too heavy. As the water rose inside the cabin, he succeeded in opening the left window and got out. He then tried to open the door from the outside, but had to give up the attempt due to the pain caused by injuries in his chest and arm. These injuries arose as the control wheel hit the Commander. At this time the Commander felt like he was drowning and that he had to get to the surface. He was now very cold, as the water temperature was only 6-8°C. The crew on a tender from the Italian cruise ship that was anchored close to the accident site, immediately manoeuvred their boat close to the aircraft and got the Commander out of the water. The Commander tried to tell the crew on the boat to fasten a rope to the aircraft and then tow the aircraft into more shallow water. He did not succeed in making himself understood, however.
- 1.1.7 This tender from the cruise ship was the first to get to the aircraft, and to rescue the Commander. Two other tenders soon followed this boat. A tender is a boat that cruise ships use to ferry their passengers onshore as the ship arrives at different tourist sites, like Geiranger.
- 1.1.8 After a short while a rescue boat from a supply ship that arrived at Geiranger at the time of the accident also arrived at the accident site. Several leisure boats also arrived at the scene. A person from one of these leisure boats stepped onto one of

the floats, and was assisted by the crew on the rescue boat in fastening a rope to the aircraft floats. The rope was thrown to him from the supply ship. He now tried to tell the crew on the supply ship to use the crane, in order to bring the aircraft out of the water. The crane was then directed towards the aircraft, but after a short while the captain of the supply ship stopped this manoeuvre. No further attempts were made to use this crane. According to the information received by the AAIB/N, the captain was afraid that the floats would break off, making the aircraft sink. The ropes were then fastened to the rescue boat, and the aircraft was then towed to more shallow water. During these events no one had made any attempts to get into the water, in order to get the passengers out of the aircraft.

- 1.1.9 As the aircraft was brought closer to the shoreline, an ambulance driver on duty arrived at the scene. He put on his snorkelling equipment and dived underwater, down to the aircraft cabin. He observed a woman inside the cabin, but could not see any other details, due to the darkness. Lack of oxygen and the cold water made him give up the attempt to save the passengers.
- 1.1.10 The local police finally got in contact with two Czech scuba divers on holiday in Geiranger. These scuba divers were brought to the accident site, and they managed to get the four passengers out of the aircraft. Resuscitation was started, but all four passengers died.
- 1.1.11 The Commander had been brought onboard the Italian cruise ship for medical treatment and did not witness any of this.

1.2 Injuries to persons

INJURIES	CREW	PASSENGERS	OTHERS
FATAL		4	
SERIOUS			
MINOR/NONE	1		

1.3 Damage to aircraft

- 1.3.1 The aircraft was substantially damaged in the accident, and the insurance company has stated that the aircraft was damaged beyond repair.

1.4 Other damages

None

1.5 Personnel information

- 1.5.1 The Commander, male, 61 years of age, obtained his private pilot's licence (PPL) in Sweden in the nineteensixties, and his commercial pilot's licence (CPL) in the USA in the seventies. His first Norwegian CPL-A was issued on 5 January 1981. This CPL-A was converted from a Swedish CPL-A. He got his typerating on floatplane when Firdafly employed him thirteen years ago. Since then he has been flying and obtained his flight training in this company.
- 1.5.2 At the time of the accident he had a total of 5 910 flight hours, of which 2 651 flight hours on the current type. He is holder of CPL-A, class SES and SEL valid until 24 September 2006 and a medical licence class 1, valid until 26 August 1998.
- 1.5.3 According to Norwegian regulations (ref. BSL 1-5, 3.1.4) the Commander did not have the privileges necessary to perform commercial flying. Norwegian regulations BSL C 1-5, 3.1.4, cover limitations in the privileges for pilots older than 60 years of age. After the age of 60, a holder of a pilot's license is only allowed to perform duty as first officer, in commercial aviation. This means that, in a single pilot operation, the Commander must not be older than 60 years. In a two-crew operation, only one of the pilots can be older than 60 years. These regulations cover national aviation.
- 1.5.4 His last LPT-2 was performed on 14 May 1997.
- 1.5.5 Flight time

FLYING EXPERIENCE	TOTAL	ON TYPE
LAST 24 HOURS	3:30	3:30
LAST 3 DAYS	8:50	8:50
LAST 30 DAYS	49:25	49:25
LAST 90 DAYS	95:20	95:20

- 1.5.6 The Commander has stated that he was in good physical and mental shape, when he started the flight from Sandane the same morning.

1.6 Aircraft information

- 1.6.1 The Cessna U206G is a six-seat, single engine aircraft, mainly used in non-scheduled operations for transportation of passengers and goods, including sightseeing trips. The current aircraft was equipped with floats for operation on water, and had a six-seat configuration. There are two front seats, two in the middle and two rear seats in the aircraft.

- 1.6.2 The aircraft is equipped with two doors, one main door in the forward left side, and a cargo door on the rear right side, which is divided into two parts. Normal embarking and disembarking of the aircraft is made through the left main door, while the cargo door on the right side is used for loading and unloading of goods. This door is also an emergency exit. The main door has a top hinged window that can be opened. Both doors are closed and locked from the inside during the flight, in order to prevent unauthorized opening. The doors are placarded with information in both Norwegian and English that explains the procedure of opening and closing the doors.
- 1.6.3 The cabin- and cargo doors are constructed and approved with a mechanism for the opening and closing that does not allow these to be opened from the outside, when closed and locked from the inside. Therefore, the crew or the passengers are the only ones who can open the doors, when these are locked from the inside. The Commander closes the cabin-door by pulling the door into the frame, and then the door handle must be pushed forward and down into the armrest. The door is then secured in the locked position. To open the door, the door handle must be pulled up from the armrest, out of the secured position, and then 90° backwards.
- 1.6.4 The cabin-door window is hinged in the upper part and may be opened 30°, limited by a window stop (ref. fig. 3.3, item 5). With this window stop installed, which is normal, a full opening of the window is impossible, thus preventing an evacuation through this window. This window stop had been removed from LN-DBZ.
- 1.6.5 The cargo-door is locked and secured by moving the rear door into the frame, using a little pressure. At the same time the door handle (ref. fig. 46, item 51) is moved up from a horizontal to a vertical position, making the upper and lower hook (ref. fig. 3.5, item 8 and 19), become integrated with the frame. The door handle is now visible only in the forward part of the rear door, and with the forward door closed it is not visible at all. The forward door is pulled into the frame, and the door handle must be moved from "open" to "locked" position (ref. fig. 3.6, item 20 and 22).
- 1.6.6 To open the cabin-door from the outside, the forward part of the door handle (ref. fig. 3.6, item 2) must be pushed inwards, and the door handle may then be pulled outwards. This procedure is not possible to perform if the door has been closed and secured from the inside. The door may be locked from the outside by using a key.
- 1.6.7 The cargo-doors are opened from the inside, by moving the door handle on the forward door from "locked" to "open" position. The door will then be open. The door handle on the rear door is moved forwards from the edge of the door. The handle must then be pushed downward, making the upper and lower hooks unlock. At this point it is important to note that, if the flap has been extended by more than 10°, the door opening will only be 8-10 cm. Despite this, the narrow opening will provide access to the door handle on the rear door, making it possible to open the

door. The position of the door handle on the rear door is making it very difficult to open the door, especially for people not being familiar with the opening procedure.

1.6.8 Technical information

Manufacturer: Cessna Aircraft Company, Kansas, U.S.A.
Type: Cessna U206G
Serial number: 03847
Year of manufacture: 1977
Technical flight hrs.: 4 743:50
Engine: Continental IO-520F
Propeller: Mc. Cauley D3A 32C90-R/S-82NC-2
Landing gear: Floats
Fuel: AVGAS 100LL

1.6.9 The aircraft mass and centre of gravity were within limits at the time of the accident.

1.7 Meteorological information

1.7.1 It was partly cloudy, good weather conditions at the time of the accident. There was only light winds and excellent visibility. The temperature was 15°C and the QNH was 1 000 hPa, measured at Sandane airport at 14:50 hrs.

1.8 Aids to navigation

N/A

1.9 Communications

N/A

1.10 Aerodrome information

N/A

1.11 Flight recorders

Not required, not installed

1.12 Wreckage and impact information

1.12.1 The accident site

- 1.12.1.1 The accident site was in the inner part of Geirangerfjorden, just outside the centre of Geiranger.
- 1.12.1.2 Pictures taken just before the impact show a concentration of waves in the landing area. These waves can be seen moving, both parallel to and across the flight path and landing direction.
- 1.12.1.3 The water temperature at the time of the accident was estimated to be 6-8° C.

1.12.2 The wreckage

- 1.12.2.1 After the accident, the aircraft floated in the water at the accident site on its floats and was later to be towed to more shallow water, closer to the shoreline.
- 1.12.2.2 The aircraft was raised the next day and placed on the quay in Geiranger.
- 1.12.2.3 The AAIB/N performed routine technical investigations of the aircraft, but did not reveal any discrepancy that could have caused the accident.
- 1.12.2.4 The damages to the aircraft included the nose section and the wings. The left wing suffered major damages. There were minor damages to the ailerons and the tail section. The propeller was torn off from its attachments. The major damages came from staying under water, however.

1.13 Medical and pathological information

- 1.13.1 The Commander was routinely checked for alcohol, narcotics and medicine, non of which were found.

1.14 Fire

There was no fire.

1.15 Survival aspects

- 1.15.1 After having studied the accident and performed the technical investigations of the aircraft, the AAIB/N has reason to believe that this was a survivable accident. The aircraft was not damaged in a way that would cause major injuries to the passengers from hitting the water. It is a fact, however, that the death of one of the passengers was caused by a combination of internal injuries, and drowning. The three other passengers died from drowning. This is according to the autopsies.

- 1.15.2 The seatbelts were installed and in use at the time of the accident
- 1.15.3 Previous experience has shown that for this aircraft type it is decisive that the occupants are assisted in an evacuation. It is shown to be very difficult, even for people familiar with the aircraft, to get out by oneself when the aircraft lies upside down, with the cabin under water. Even if one succeeds in opening one of the doors, it would be necessary to wait for the water to fill the cabin before the water pressure is sufficiently reduced, making it possible to get out.
- 1.15.4 The cargo door is divided into two parts. The forward door has to be opened first, before making it possible to open the rear door. A flap setting of more than 10°, which is normal during landing, makes it almost impossible to open the door, as it gets blocked by the flap. The approach and landing was performed with 20° flap, but somehow the Commander managed to raise the flap to 10°. By this action he prevented the flap from blocking the cargo door.
- 1.15.5 Another important aspect in this accident is the fact that it is impossible to open any of the doors from the outside when they are locked from the inside. The doors are always closed and locked from the inside during flight. If, like in this accident, the occupants cannot open the doors by themselves, people on the outside have to break the doors open or break the windshield glass or any of the side windows, to be able to assist the occupants in evacuating the aircraft.
- 1.15.6 In this case the Commander was able to open his side window and get out. His injuries, however, made it impossible for him to open the door from the outside, in order to help his passengers getting out of the aircraft. As he got to the surface he was immediately assisted by the crew on the "tender" and brought up from the water. He tried to tell the crew to tow the aircraft to shallow water, in order to make it possible to save the passengers. But his condition, injured and very cold from staying in the water combined with the language barrier (the crew were Italians), made him fail in this attempt.
- 1.15.7 The water in Geirangerfjorden is very cold, due to the great amount of cold water coming from the many rivers and waterfalls in the area. According to the local police, the water temperature at the time of the accident was around 6-8°C. On the one hand this would make any attempt to save the passengers more difficult, but on the other hand the possibility of surviving a stay underwater would increase.
- 1.15.8 At 1745 hrs, 50 minutes after the accident, the two Czech scuba divers went down to the cabin. 10 minutes later the four passengers were brought out of the aircraft. Resuscitation was started, but the four passengers died.

1.16 Test and research

The AAIB/N did not perform any extraordinary tests or research in relation to this accident.

1.17 Organizational and management information

Firdafly AS was established in 1976 with the purpose of performing ambulance flights, transportation of passengers (sightseeing flights) and transportation of goods, using aircraft on floats. The company operated two aircraft in the beginning, increasing to three aircraft in 1979 and four in 1981. They were operating during the summer season, mainly using the same pilots every season. The pilots were thus familiar with the operations and the geographical areas in which the company were operating.

- 1.17.1 The activities during the winter mainly consisted of technical maintenance of the aircraft. During these periods the pilots were either hired by other aviation companies, or had other kinds of jobs. The company's activities have gradually been reduced over the past years, and at the time of the accident only the managing director were hired on a permanent, full time basis. The only operation was sight-seeing flights with tourists as described in this report.
- 1.17.2 The managing director was acting both as flight operations manager and technical manager, and was assisted by the chief pilot, who also acted as deputy in charge.

1.18 Additional information

- 1.18.1 At an early stage in the investigation the AAIB/N was provided with photographs taken from a favourable position and in good lighting conditions, showing the approach and landing area for LN-DBZ. The photographs show LN-DBZ during the approach and just after the impact. The photographs give an excellent view of the wave situation in the landing area. The photographs show waves that run parallel to and across the landing path. The waves, moving in a shiny surface, must have been difficult, if not impossible, for the Commander to detect during the approach.
- 1.18.2 The AAIB/N has also received other photographs, showing the scene of the accident just after impact. These photographs reveal that a lot of people arrived at the scene of the accident shortly after the accident. They arrived in the tenders, leisure boats and on the supply-boat. The photographs show the efforts that were made to start a rescue operation. Only one of these photographs has been taken into this report. A picture that illustrates how a crane on the supply-boat was directed towards the aircraft.

1.18.3 A Canadian survey reveals that of 168 victims from 103 different seaplane accidents, 118 (70%) were found inside the aircraft cabin, 37 (22%) were found just outside the aircraft and 3 (2%) were found onshore nearby. The cause of death for 18 (11%) persons was impact injuries, 17 (10%) drowned as they lost their consciousness during impact. The major part of the victims 113 (67%) drowned as they were not able to get out of the aircraft. These figures are taken from accidents with various types of seaplanes, but clearly shows the general difficulties of evacuating a seaplane after an accident.

1.19 Useful or effective investigation techniques

The AAIB/N did not use any extraordinary investigation techniques that deserve special mentioning, in relation to this accident.

2. ANALYSIS

2.1 Introduction

2.1.1 The AAIB/N performed routine technical investigations of the aircraft, but did not reveal any discrepancy that could have caused the accident.

2.1.2 In his statement to the Board, the Commander stated that the aircraft was in a good technical condition, and that he had not experienced any technical problems in relation to the accident. The AAIB/N has therefore concentrated the investigation on the operational aspects of the accident.

2.1.3 It is a fact that the Commander did not have the privileges necessary to perform commercial flight as a Commander, due to his age. The AAIB/N does not consider this to be a causal factor in this accident.

2.1.4 The AAIB/N has investigated the chain of events regarding the landing area, the topography of the Geirangerfjord area, wave conditions, the boat traffic in the area and the possibility of making a go-around from the approach/landing phase. The Board has also evaluated the suitability of the aircraft regarding transportation of passengers, when operated with floats. Another aspect has been to look into whether passengers on these kind of sightseeing trips are exposed to a higher degree of risk than in other kinds of air transportation.

2.2 The chain of events

2.2.1 The accident happened on the ninth flight of that day. The eight previous trips had, according to the Commander, been performed without any problems.

As LN-DBZ was approaching the landing area on this ninth trip, there was nothing to indicate any change in landing conditions. The Commander therefore prepared for a normal landing in the area between the Italian cruise ship and the shoreline on the southern part of the fjord.

- 2.2.2 Photographs taken just before the accident, from a mountainous area well above and to the west of the accident site in very good lighting conditions, shows a concentration of waves running in a south-easterly direction along with the aircraft. These waves are also seen to hit the side of the cruise ship and then to be returned in a south-westerly direction, i.e. straight across the landing direction of LN-DBZ. That means there were waves, not breaking, moving both along and across the landing direction of the aircraft. These waves were most probably impossible for the Commander to observe from the approach altitude. The sea surface was calm, and these waves appeared as "invisible", without breaking. The only place they were clearly visible was along the side of the cruise ship. These waves probably arose from a ferry arriving in the area just before the accident, and they disappeared shortly after.
- 2.2.3 The AAIB/N has been told that these ferries are of great importance to the landing conditions in the area, due to the waves they create. Experienced seamen have told the Board that these large ferries create sizeable and almost invisible waves as they enter the Geiranger harbour area. It is often necessary for the pilots operating in Geiranger to overfly the landing area once before landing, waiting for the waves to disappear.
- 2.2.4 Pilots familiar with the area have told the Board that a decision to make a circuit before landing has to be made early in the approach phase. Once you have started the landing procedure and set the landing flap, it is almost impossible to discontinue the landing. The inner part of the fjord is not wide enough to perform a late go-around. Several experienced pilots that the Board has spoken to have confirmed this situation. The choice of landing site will often be a compromise between, on the one hand the need for sufficient landing distance, and on the other hand a need for shortest possible taxiing distance. This means that the landings are performed quite close to the shoreline, which means reduced possibilities for making a go-around.
- 2.2.5 On this ninth trip the Commander was unaware of these parallel and crossing waves in the landing area. The waves were described by witnesses to be 50-60 cm high. The Commander has told the Board that the first contact with the sea surface was by hitting one of these unexpected waves, something that took him by surprise. To the extent possible, the photographs mentioned before confirm this scenario and clearly shows the wave activity in the landing area. It was the left float that first hit one of these waves, resulting in the aircraft to bounce up in the air. The Commander applied full power in order to try to stabilize the aircraft before the next touchdown. He did not succeed, and the left float hit another wave, digging its way into the sea.

The propeller was torn off the engine, and the aircraft slowly turned over on its back along an axis from the left wingtip and to the nose section.

2.3 Evacuation

2.3.1 As described earlier, the Cessna U206G is a single engine, transport category aircraft, meant for transportation of passengers (like sightseeing flights) and goods. LN-DBZ was equipped with two doors, one main door up front on the left side and one cargo door/emergency exit on the rear right hand side. This is a normal construction, but what makes this aircraft special is the fact that the doors can not be opened from the outside once they are locked from the inside. It is the Board's opinion that this is very unfortunate, when related to an emergency situation where an evacuation is necessary. One of the manufacturer's arguments for this solution is to prevent unwanted access to the aircraft, when parked. The manufacturer also refers to the Pilots Operating Manual and the emergency landing procedure for the Cessna 206. The procedure requires the doors to be unlocked from the inside, when an emergency landing is performed. The scene in this and several other accidents were a normal approach and an expected normal landing. There was no need for any emergency-landing checklist. It is the Board's opinion that it is a disadvantage and an element of risk that it is impossible to access the aircraft from the outside, when an accident like this one occurs. Regarding the difficulties of underwater egress from the Cessna U206G, even for people familiar with the aircraft, the AAIB/N questions whether the aircraft is suited for this kind of passenger transportation at all.

2.4 The passengers

2.4.1 The average passengers attending these sightseeing flights are tourists from the cruise ships that visit Geiranger during the summer season. For most of these people this kind of flying is a totally new experience. They are on holiday and most probably regard these sightseeing trips as a possibility to experience "even more". They will not be mentally prepared for a flight like this in the same way as most people will be prepared for a regular scheduled flight with an airline. They will be more occupied with the thought of what they are about to experience, than to listen carefully to what the Commander states in his pre-flight briefing to the passengers. Even though the passengers are thoroughly briefed on emergency exits, life jackets and how to open the doors, it is most possible that the passengers have not taken notice of this vital information in a way that could be of help in an emergency situation.

2.4.2 Others will be nervous before the flight and will rather not hear about emergency exits, evacuation, life jackets etc. Mentally they "block out" this kind of

information, because it is regarded as frightening and unpleasant. Several pilots with experience from this kind of operation confirm this, and tell the Board that they often have to be very careful when selecting the words they use in passenger briefings. It is the AAIB/N's opinion that this special group of passengers is even less prepared to handle an emergency situation than is the average airline- or charter passenger.

- 2.4.3 This may to a certain extent be confirmed by a similar accident in USA, where four passengers died from drowning in an accident that was, under the circumstances, fully survivable. The accident occurred during an emergency landing in the sea, just a short distance from the shoreline. All passengers managed to get out of the aircraft, but drowned, as they had not got their life jackets on. The Commander stated after the accident that she had given her passengers a thorough briefing on emergency exits, emergency equipment, life jackets etc., but one of the surviving passengers could not remember that part of the briefing at all. It was other parts, the "pleasant" parts of the briefing, that he could remember.
- 2.4.4 It is the opinion of the Board that lives could have been saved in Geiranger, if an effective rescue operation had been started earlier. The supply boat that arrived at the scene shortly after the accident did have the equipment onboard that was needed to start a rescue operation. By using the crane and ropes the aircraft could have been brought out of the water, making the aircraft cabin accessible for the other people that had gathered on the scene. It is a fact though, that it is impossible to determine exactly how long the passengers could have survived staying under water. But their chances of being rescued would have been greatly improved if the aircraft had been raised from the water. The argument that the captain on the supply boat used for stopping the rescue attempt was that he was afraid the floats would break off the airframe, making the aircraft sink and an evacuation impossible. It is a paradox, however, that by not trying to raise the aircraft, the result was exactly the same.

3. CONCLUSIONS

3.1 Findings

3.1.1 The Commander

- 3.1.1.1 The Commander was holder of a valid license, and type rated on the Cessna 206. He had a valid Medical license, Class 1 with no limitations. He also had a valid LPT 2.
- 3.1.1.2 The Commander did not have the privileges necessary to perform commercial flying as a Commander, due to his age. Ref. BSL C 1-5, 3.1.4.1.

3.1.2 The aircraft

3.1.2.1 The investigation has not revealed any discrepancies relating to the maintenance of the aircraft, that could have had any influence on the accident.

3.1.2.2 The aircraft mass and centre of gravity were within limits at the time of the accident.

3.1.2.3 There have not been found any discrepancies that can be related to the condition of the aircraft before the accident.

3.1.2.4 The aircraft doors are constructed in such a way that they can not be opened from the outside, when they have been locked and secured from the inside. This makes a rescue operation from the outside very difficult.

3.1.2.5 The cargo doors are almost impossible to open if the flaps have been extended to more than 10°. Normal flapsetting for landing is 20° or more.

3.1.3 The company

3.1.3.1 The company, Firdafly AS, is the holder of a valid Air Operator's Certificate AOC (CAA-N-011) and an Operator's license (011) for this type of operations.

3.1.4 Operational conditions

3.1.4.1 The weather conditions were good and can not be considered as a causal factor in this accident.

3.1.4.2 The AAIB/N has found it most likely that an unfortunate, and for the Commander totally unexpected, wave situation in the landing area was a main contributing factor to the accident.

3.1.5 The rescue operation

3.1.5.1 The AAIB/N considers the accident to have been survivable.

3.1.5.2 Several persons and vessels arrived at the scene of the accident shortly after the accident, with the necessary equipment to start a rescue operation.

4. SAFETY RECOMMENDATIONS

On 16 July 1998, the AAIB/N issued a temporary safety recommendation, in which the Civil Aviation Authority/Norway was asked to consider whether passenger safety is sufficiently taken care of during sightseeing flights with Cessna U206G,

unless certain measures are taken to improve the possibilities for an emergency evacuation from the aircraft under water. The AAIB/N maintains this safety recommendation:

The AAIB/N recommends the Civil Aviation Authority/Norway to consider whether passenger safety is sufficiently taken care of during sightseeing flights with the Cessna U206G, unless certain measures are taken to improve the possibilities for an emergency evacuation from the aircraft under water.
(Recommendation no. 19/99)

5. APPENDICES

4 sketches from the maintenance manual, showing the door construction.
3 photographs showing the landing area just before and after the accident.
1 photograph from the rescue attempt.
Abbreviations

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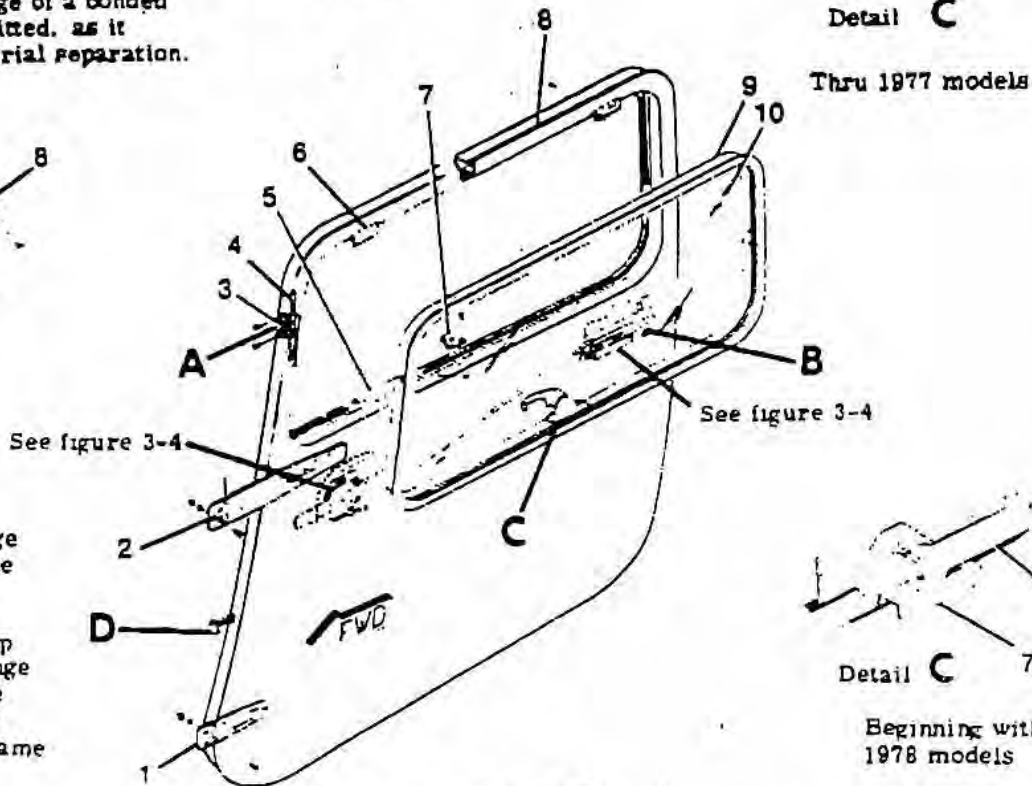
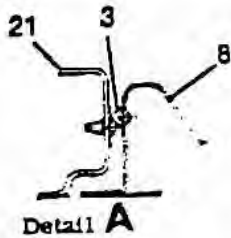
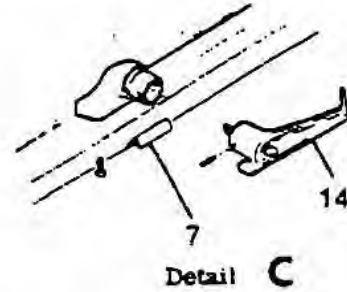
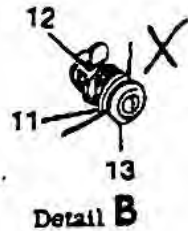
MODEL 206 & T206 SERIES SERVICE MANUAL

NOTE

Spray cabin doors and window seals with MS-122 (Miller-Stephenson Chemical Corp.) or equivalent. DO NOT OVERSPRAY.

NOTE

Forming the flange of a bonded door is not permitted, as it could cause material separation.



Thru 1977 models

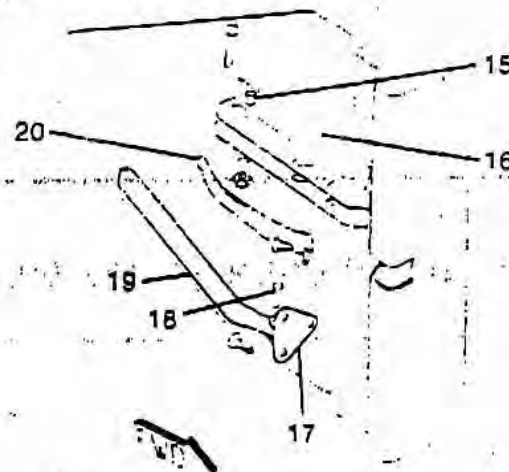


Beginning with 1978 models

- 1. Lower Hinge
- 2. Upper Hinge
- 3. Wedge
- 4. Spring
- 5. Window Stop
- 6. Window Hinge
- 7. Latch Plate
- 8. Cabin Door
- 9. Window Frame
- 10. Window
- 11. Washer
- 12. Nut
- 13. Lock Assembly
- 14. Latch Assembly
- 15. Spacer
- 16. Guide
- 17. Hinge
- 18. Pin
- 19. Door Stop Arm
- 20. Door Stop Spring
- 21. Door Jamb

NOTE

Lubricate surface of spring (20) in contact with spacers (15) with hi-temperature grease (MIL-G-21164C). Make sure spacers (15) turn freely after installation.

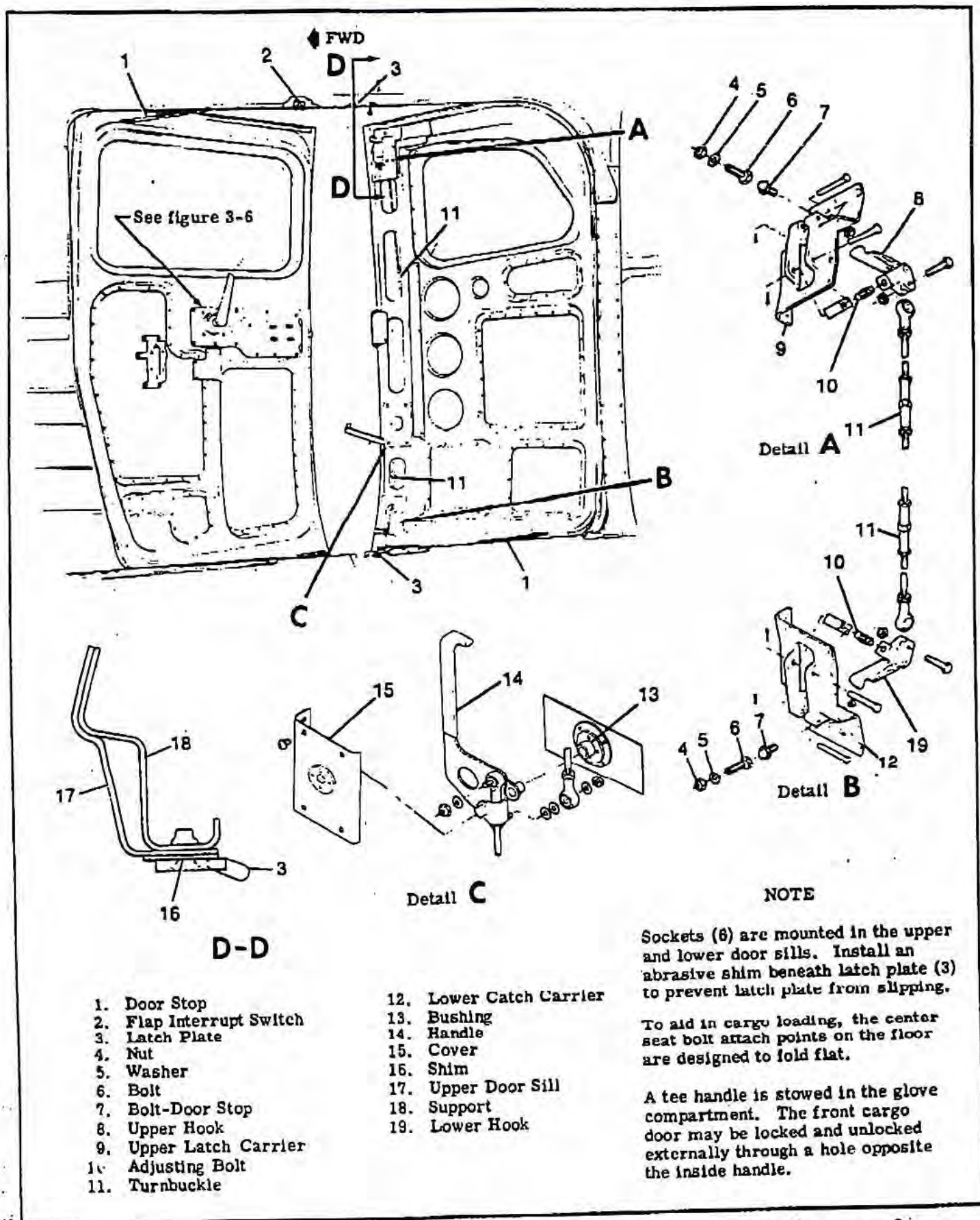


Detail D Rotated 180°

Figure 3-3. Cabin Door Installation

BILAG 1

MODEL 206 & T206 SERIES SERVICE MANUAL



- 1. Door Stop
- 2. Flap Interrupt Switch
- 3. Latch Plate
- 4. Nut
- 5. Washer
- 6. Bolt
- 7. Bolt-Door Stop
- 8. Upper Hook
- 9. Upper Latch Carrier
- 10. Adjusting Bolt
- 11. Turnbuckle

- 12. Lower Catch Carrier
- 13. Bushing
- 14. Handle
- 15. Cover
- 16. Shim
- 17. Upper Door Sill
- 18. Support
- 19. Lower Hook

Figure 3-5. Cargo Door Installation

BILAG 2

14

206 & T206 Parts Catalog

Fuselage (Cont)

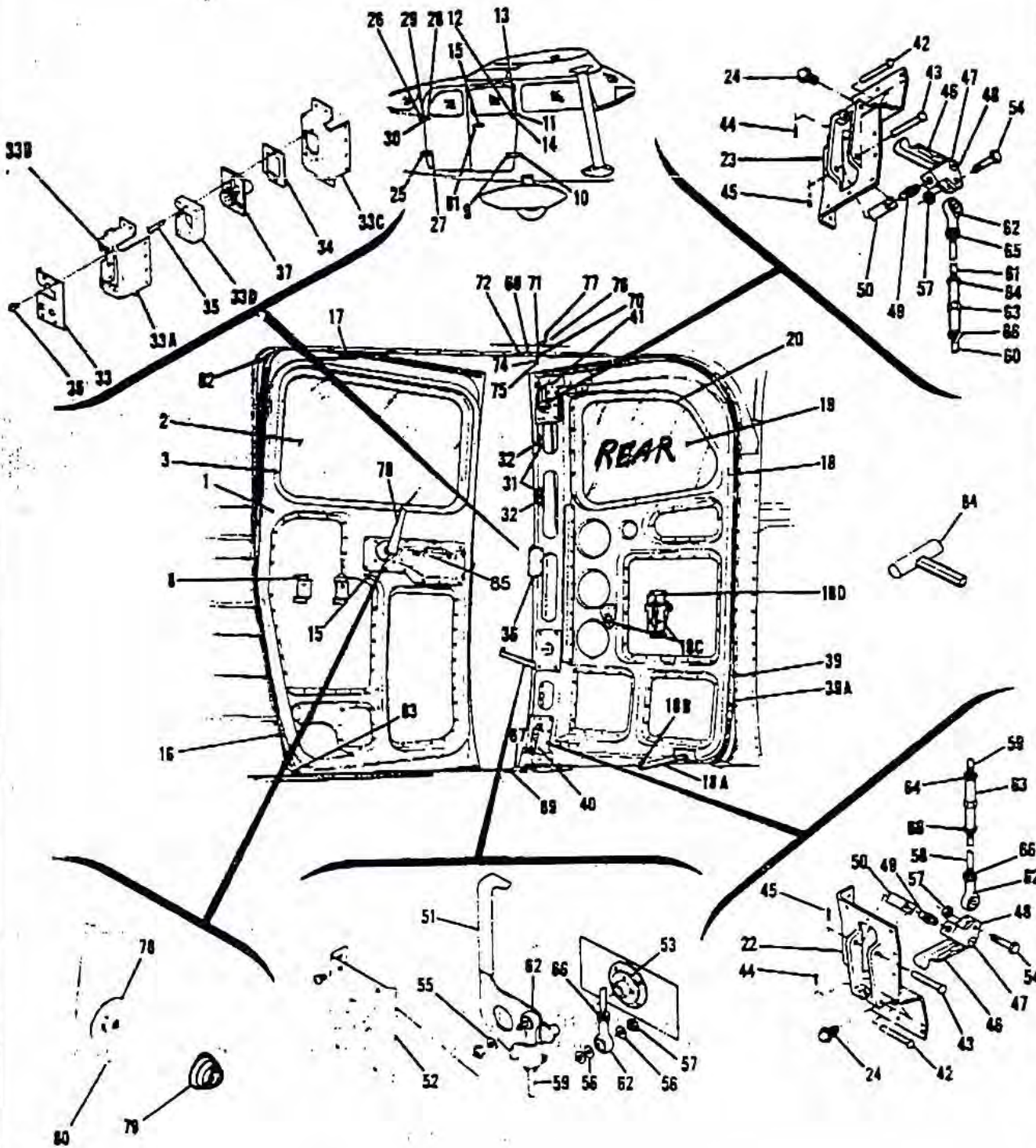


Figure 46. Cargo Doors Installation

MODEL 206 & T206 SERIES SERVICE MANUAL

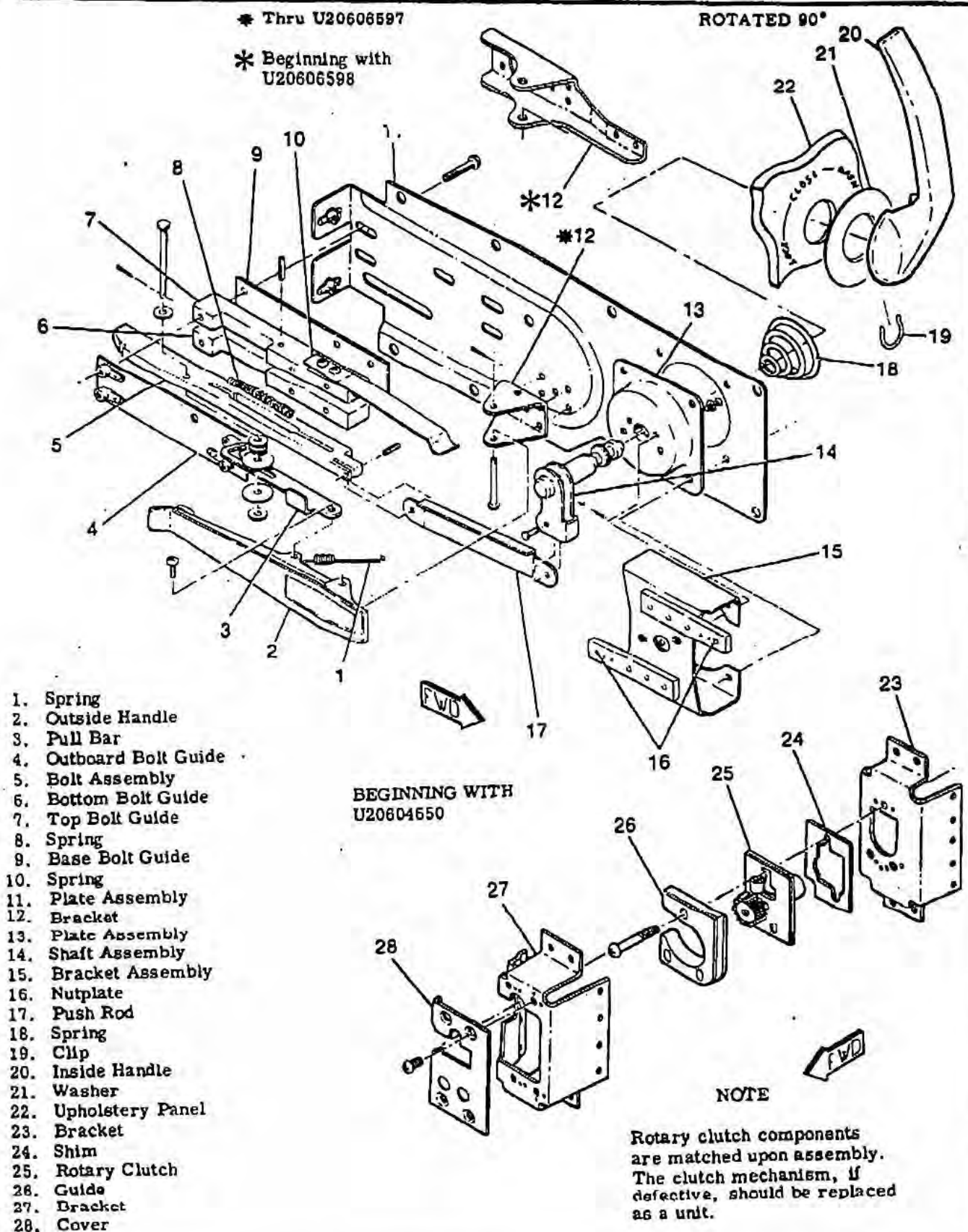


Figure 3-6. Cargo Door Latch Installation (Sheet 2 of 2)

BILAG 4



TYDELIG BØLGEMØNSTER
MED KRYSSENDE
BØLGERETNINGER

LN-DBZ UNDER
INNFLYGING



LN-DBZ HAR
HAVARERT

BÅTER PÅ VEI TIL
HAVARISTEDET



DE FØRSTE BÅTENE
FREMME VED LN-DBZ



FORKORTELSER

AOC	Air Operator Certificate
BSL	Bestemmelser for Sivil Luftfart
CAA	Civil Aviation Authority
CPL-A	Comercial Pilots Liscence-Airplane
HSL	Havarikommisjonen for Sivil Luftfart
SES	Single Engine Sea
SEL	Single Engine Land