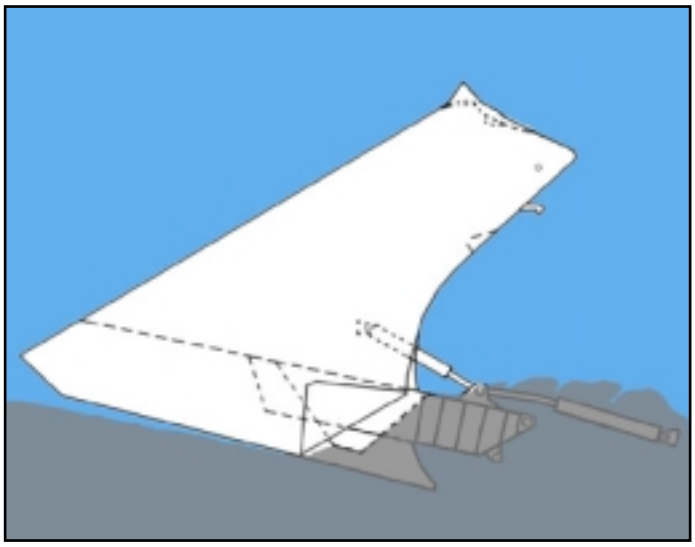
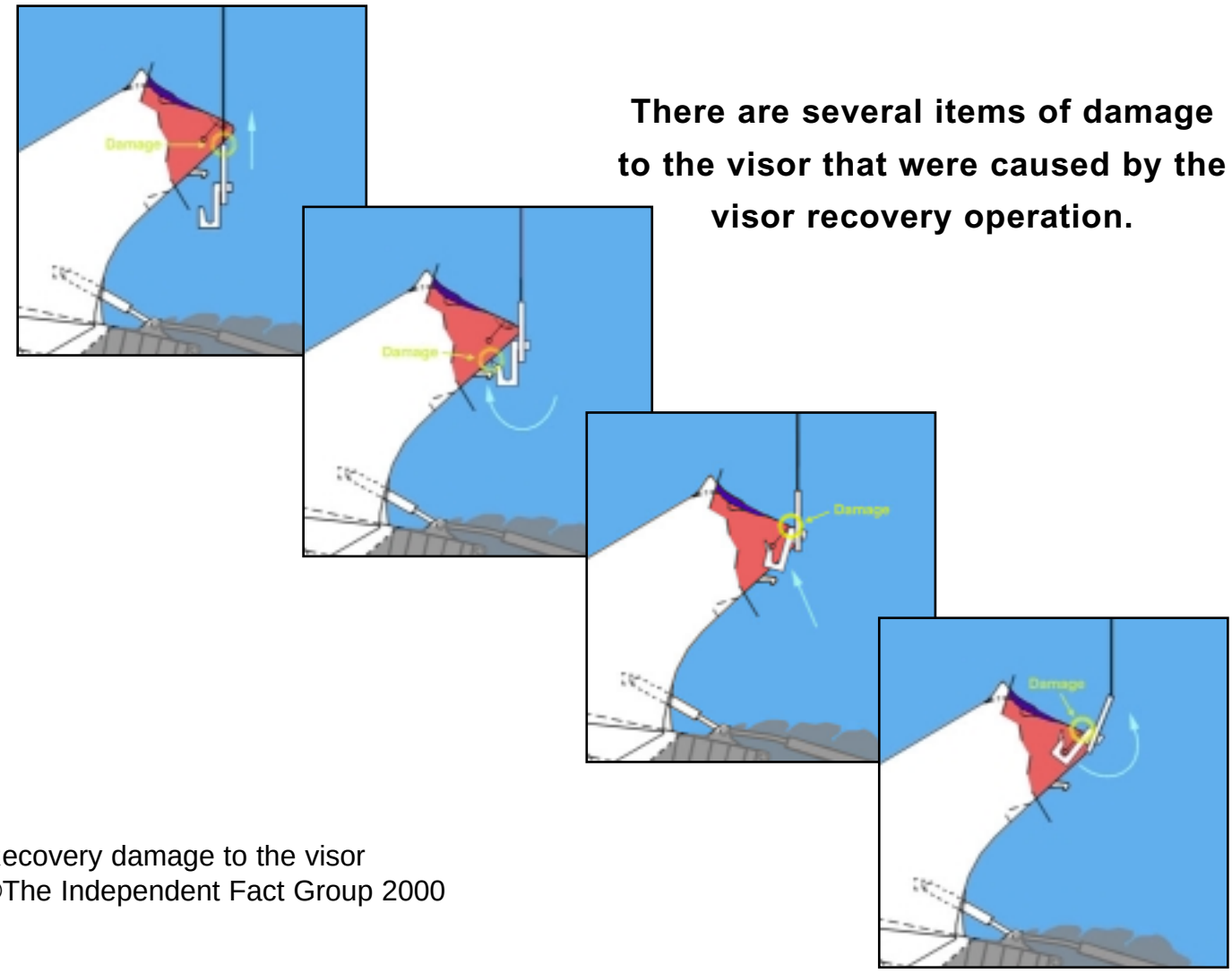
The Independent Fact Group

Recovery damage to the visor

The Commission (JAIC) failed to identify damage to the visor other than that related to the accident scenario.



There are several items of damage to the visor that were caused by the visor recovery operation.



Recovery damage to the visor

The Independent Fact Group

Box 5145, S-102 43 STOCKHOLM, SWEDEN
e-mail: factgroup@hotmail.com

STATEMENT REPORT

Subject: **Recovery damage to the visor**
Type Statement
By: Johan Ridderstolpe and Björn Stenberg
Status: Proved
Date: 1 May 2000
Version: Report - English

The Fact Group's aims and objectives:

The Independent Fact Group was formed in early 1999 to clear up the many question marks about the MV Estonia disaster, in a structured and methodical manner. There has been considerable speculation concerning the efforts of the Joint Accident Investigation Commission (JAIC) and the political, legal and media treatment of the accident and its tragic consequences.

The aim is to give those in authority an opportunity, based on the facts of the case, to decide to review this matter, with a view to further action. Our efforts also enable the media and the general public to decide on the basis of the objective information which is available concerning the accident, and the conclusions to be drawn from a technical and civic perspective.

The overall objective is the setting up of a new investigation of the accident which can describe the course of the accident in detail, and its causes, with subsequent assessment of the moral and legal responsibilities, where this is feasible.

We are motivated by the belief that a properly conducted investigation will contribute to maritime safety and by our concern for Sweden's reputation as a nation which upholds safety at sea and the rule of law.

Methodology:

In the course of this task, we have assumed that the solution of a problem is never better than the validity of the basic assumptions. As a result, we have stipulated some methodological principles, of which the following are the most fundamental:

1. All scenarios must be considered to be true until the contrary is proved.
2. All observations, assumptions or statements on which a scenario is based must be considered false until the contrary is proved.

We have defined a number of criteria for concluding that an observation, assumption or statement may be considered to be true or false, and processes and routines for the route to be taken in clarifying an observation, assumption or statement. These criteria involve technical, empirical, statistical and/or semantic requirements which, if they are relevant must all be met if the observation, assumption or statement is to be classified as an objective fact.

The materials we have worked with are primarily the documents, audio recordings and films in the Swedish Accident Investigation Commission's Estonia archive, together with supplementary information from other public sources and, in addition documentation from the Meyer shipyard and its independent commission.

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Summary

In this report, the Independent Fact Group shows that damage to the visor was caused by the visor recovery operations, and that the JAIC failed or did not care to identify damage related to the recovery.

As a consequence, the damage to the visor has been consistently identified as caused by the “loss of the visor”, and was identified by JAIC as directly related to the sinking of the MV Estonia.

The Independent Fact Group shows that it is probable that a considerable propotion of the damages previously found to be a result of the loss of the visor, was instead the result of the recovery operation.

However the Independent Fact Group does not draw any conclusions in this report make related to damage to the visor, other than damage proven by this report to be caused by the recovery operation.

We leave it to a coming new independent investigation group to draw the correct conclusion as to which damage was caused by the accident, and which damage was caused by the visor recovery operation, and of course how this would influence the reconstruction of the sinking scenario.

To summarise this report in a few sentences: The JAIC has failed to identify damage to the visor other than that related to the accident scenario. There are several items of damage to the visor that were caused by the visor recovery operation. It must therefore be concluded that it is impossible to describe the sinking scenario as due to damage to the visor, before this damage has been correctly identified.

Definitions of certain language marks used in this report:

Text presented from the JAIC final report and its supplements are quoted as printed.

Our comments, explanations or clarifications, within quotes, appear within square brackets [ ].

Text in quotes that has no relevance for the issue at hand has been left out and is presented in the form of a number of dots ".....".

We have underlined certain sentences and words to denote their importance.

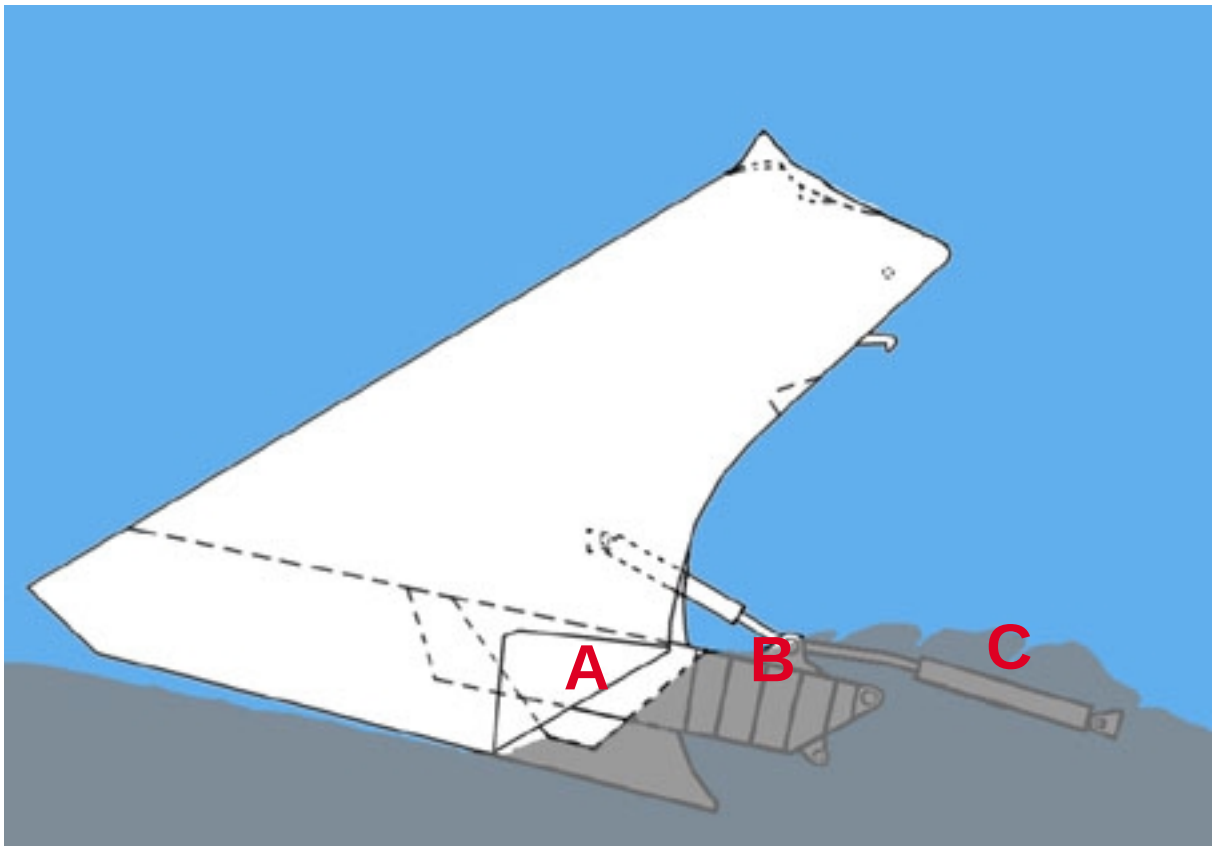
The visor - “as found position”

The visor was officially found on 18 October 1994 at the position 5923,0' N 2139,2' E about one nautical mile west of the wreck. It was confirmed by ROV video-recordings. The Commission decided that the bow visor should be recovered and brought ashore for a detailed survey.

The recovery was carried out on 12 - 19 November 1994. The Swedish Navy mine-sweeper FURUSUND and the Finnish Maritime Administration icebreaker NORDICA participated in the work. The bow visor was recovered on 18 November. It was taken ashore in Hanko, Finland.

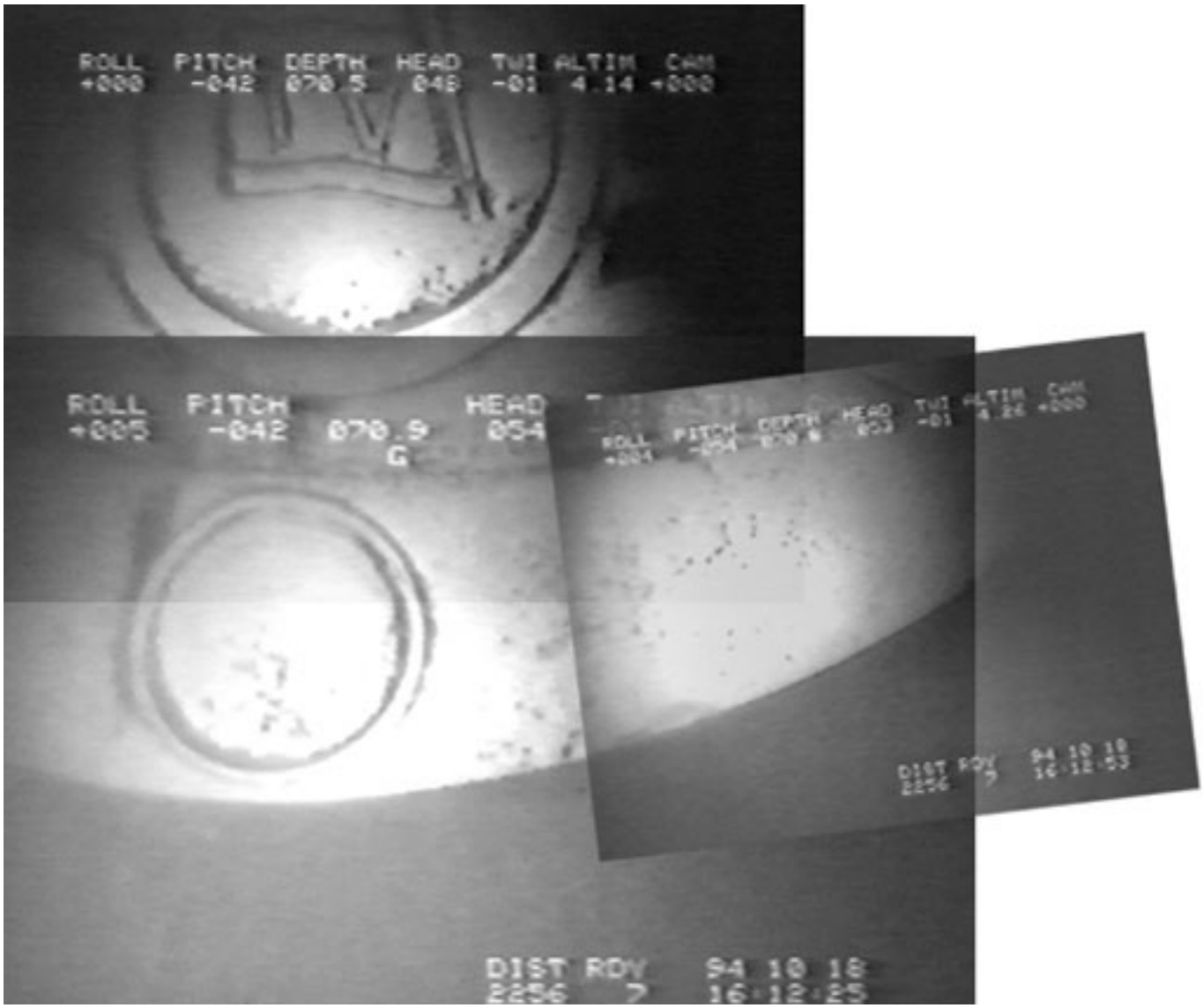
From a video recorded by the Finish authorities on 18 October 1994 (Finnish archive “visiri 17-18/10 -94”) the visor positioncan be seen on the bottom of the Baltic. The visor was standing upside down with all of its gunwale (i.e the upper part) free from the seabed. The only parts of the visor that had sunk into the mud were the visor arms and the housing for the ramp. See the picture below.

In a telefax 26/10 1994 from Kari Lehtola (Finnish Accident Investigation Board) to Olof Forssberg (Swedish Accident Investigation Board) there is an enclosure, “A preliminary summary of observations on the bow visor video” (SHK archive Estonia I 33). The visor position was confirmed as “The bow visor lies on the seabed upside down. The visor arms are buried in clay and cannot be seen. A large part of the visor operating cylinder on the right side (starboard side) is also under the clay.”



Picture 1. The picture shows the visor seen from the starboard side, standing upside down resting on the visor housing (A) with the visor arms (B) and the starboard hydraulic actuator (C) covered with mud. On the video (visiri) it can be seen that the rest of the visor was standing free from the bottom and that there were no contact marks on the bottom around the front of the visor.

The upper part of the visor, now closest to the seabed, can be seen free from the seabed all way around the visor.



Picture 2, Mosaic. The picture show the front of the visor and a part of the starboard upper side. The visor is standing upside down on the seabed. From the video “visiri” 94.10.18 at 16.12.25.

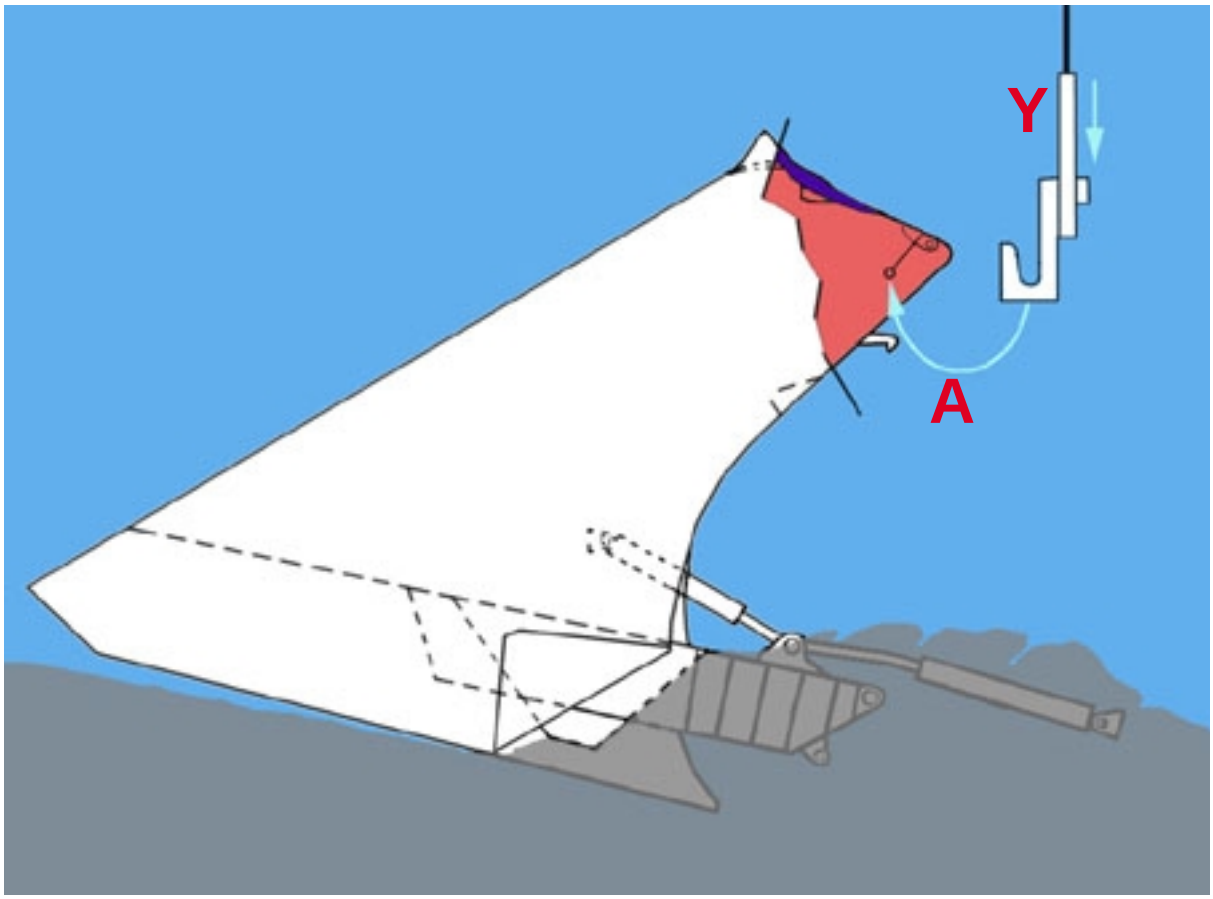
General description of the recovery method

It was obviously decided that the recovery should be performed by construction of a special yoke with four hooks. It was to be attached to the visor construction near its bottom. The yoke was made from a 100 mm thick steel plate, 4 metres wide and 2 metres high. According to a diver who participated in the recovery operation, the weight was 12 tons. The calculated weight was less, around 8 - 9 tons. The first design of the yoke (that we have found) is shown in picture 3 below. The yoke was marked with the letters G and R on one side, and G, X and R on the other side, and the edge of the yoke was painted white to be visual to the ROV cameras under water. Four hooks were attached to the yoke.

The recovery plan was to lower the yoke in the sea down to the visor and then "catch" the visor with the hooks. The operation was to be monitored by a ROV (Sjöugglan) and the control of the ROV was manned on the HMS Furusund. The theory of the "catch" is described in picture 5 on the next page. It can also be compared with picture 6 which shows the yoke hooked to the visor after the visor was recovered to the surface.

Picture 3. The picture shows the yoke hanging from the aft crane on the MSV Nordica. The four hooks can be seen hanging from the yoke (H).

Picture 4. The picture shows the yoke hanging over the water at the first attempt to recover the visor. In the background, HMS Furusund.



Picture 5. The yoke (Y) lowered to hook into the visor, arrow (A).

Picture 6. The yoke (marked G X R) hooked into the visor after recovery.

The recovery operation, “HMS Furusund” report

The Swedish military wrote a report dated 14.12.1994 “Report after the recovery [lifting] of the MV Estonia bow visor”. File no. 02 709: 1226 (KAB 2 / KA 1). The report is in Swedish, 8 pages, and is partly summarised in this paper.

The report describes the complete operation including the background, allocation of responsibility between parties, operation, working hours, invoices, gifts and experiences. People involved on the Swedish side are also presented.

The ships involved were from Sweden (HMS Furusund) and from Finland (MSV Nordica).

Section 3.5 in the report states that the operation started on Saturday 13 November 1994, but due to training and also bad weather the recovery of the visor could not start until 17 November. The sea was rough but became better during the afternoon.

They tried to adapt the lifting yoke but something was wrong with the design of the yoke. It was redesigned and a second attempt to attach the yoke to the visor was made during the night. At 05.30, the second attempt was cancelled and the lifting yoke had to be further redesigned. Cutting gear was ordered from ashore. At 08.15 on 18 November the yoke was changed again and this work was finished at noon.

A new [third] attempt to recover the visor was made and after 40 stages with the yoke and MSV Nordica, the visor was attached at 14.21 and the visor withdrawnfrom the sea at 16.15.

From the report, it is clear that the underwater operation was videofilmed by a ROV (Sjöuggla) from HMS Furusund. Also that the seabed was inspected by ROV after recovery of the visor, and that the lifting operation was inspected at 1, 25 and 40 metres from the seabed. The original report in Swedish is attached as a supplement to this report.

During the operation, the work on deck at MSV Nordica was filmed by the Finnish police. According to Kari Lehtola, the police have 7 videotapes from the recovery operation as “raw material”. Based on this material, one official video has been released, from which we have obtained some of the photos used in this report.

Summary of the recovery operation - relationship between time and action

03.11.1994 SHK made a proposal to Swedish Government to get help from the Swedish Navy to connect lifting gear to the visor from MV Estonia. An agreement was signed between Sweden - SHK and Finland - Sjöfartsstyrelsen. Under the agreement, the SHK (Swedish Accident Investigation Board) had full responsibility for the complete operation, and it was also led by a Swedish "on site commander", Anders Björknander.

11.11.1994 HMS Furusund left for Finland, but due to bad weather anchored at Korsö (Sweden) in the evening.

12.11.1994 HMS Furusund left Korsö in the morning and arrived at the accident site at 17.15. Position N 59°22'97 E 21°39'33. Started to search for the visor which they found at 18.15. They verified that it was the visor with ROV Sjöugglan. At around 20.00 they left for Nådendal in Finland, entering via Utö. At 05.00 they arrived at Nådendal.

13.11.1994 The operation started at 08.00. Exercises and meetings.

14.11.1994 HMS Furusund and MSV Nordica left Nådendahl for Nötöfjärden and more exercises.

14.11.1994 Left for the accident site in the evening.

15.11.1994 MSV Nordica was on the accident site, HMS Furusund was on a triangular course due to bad weather.

17.11.1994 First attempts to lift the visor (attach the yoke) during the day. Various redesigns of the yoke.

18.11.1994 At midnight, the second attempts failed at 05.30. Redesign between 08.15 and 12.00. Third attempts started at 12.20. Visor attached to the yoke at 14.21. Visor recovered to surface at 16.15. HMS Furusund performed a search of the seabed, found one light [searchlight probably from the visor] left at the bottom.

The Fact Group commentary:

It is clear from the military report that there were extensive problems in attaching the yoke to the visor. At least three major attempts were made. Each attempt extended over several hours and involved various redesigns. It is also clear that there is no report on the problems involved or the consequences (damage).

Furthermore there is no report on the actual redesigns that were carried out at least four times. The redesigns have been reconstructed from photos and videos taken during the operation, however.

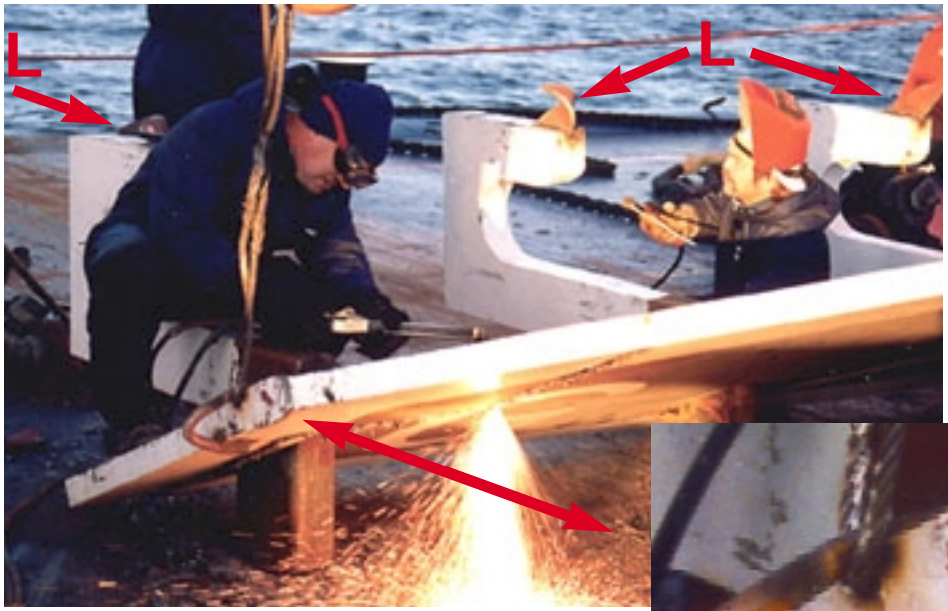
Redesign of the yoke, reconstructed by the Fact Group, and damage to the yoke between the various attempts to recover the visor.

The original design of the yoke is shown in Picture 3. Note that the wires in the upper outer corners were the first items to be redesigned.

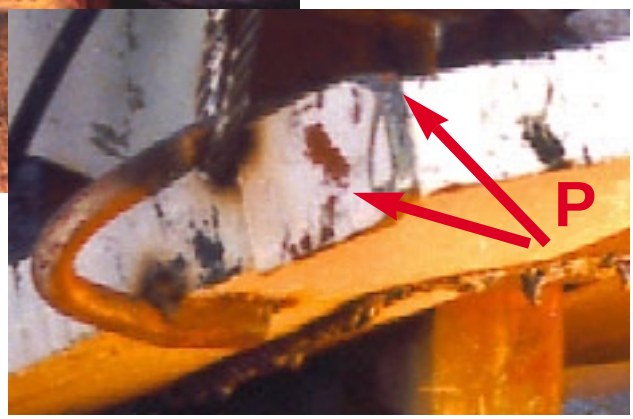
The fastening points have been cut off and moved down slightly. The second design are shown here in picture 7.

Picture 7. The picture show the second redesign before the second attempt to recover the visor. The fastening points for the side wires have been cut off and rewelded further down, see the arrows.

The third redesign is shown in picture 8a. This involved welding triangular lugs to the four hooks on the yoke (L).



This picture shows that there was a third attempt to recover the visor. It resulted in severe damage to the triangular lugs which were all bent sideways (L).



Picture 8a and 8b. There is some red paint (P) that indicates contact points between the yoke and the visor.

Picture 9. The picture shows the fourth redesign. It involved removing major parts of the upper corners of the yoke by means of cutting, and also cutting away material on each side of the yoke to make it narrower.

Picture 10. The picture shows the result of the fourth redesign. Material from the hooks was also cut away, and the relative angle between the yoke and the hooks was changed. New holes were cut for the two wires or thick ropes (W) that were attached on each side of the yoke. The triangular lugs on the hooks have been repaired (L).

The recovery of the visor

When the visor finally emerged from the water it could be seen that the yoke had become attached to the bottom construction of the visor. The four hooks were connected around the transverse tube beam close to the bottom of the visor, as seen in picture 11 and 12.

Picture 11. The visor emerging from the water.

Picture 12. The hooks on the redesigned yoke attached to the transverse visor beam slid slightly towards the starboard side of the visor.

A close up on the hook position on the starboard side of the visor shows that the outer hook had become attached around the beam and through the large round hole in the construction. It will be shown that the hooks damaged the visor construction in the course of all the attempts to get the yoke attached to the visor.

Picture 13. Detail of the hook attached to the visor starboard side.

On the port side, the outer hook had become attached just beside the round hole in the construction. However, both the round holes, on the starboard and port side (in the construction) were demolished during the recovery operation. As the construction here was a part of the bottom plating of the visor (the most destroyed part of the visor), any damage here would have had an effect on this same bottom plating.

Picture 14. Detail of the hook attached to the visor port side.

As the yoke was redesigned and made narrower, it could “move” in a transverse direction during the various attempts to get the yoke attached and therefore the construction on both sides was demolished during the recovery operation.

The yoke after the recovery of the visor

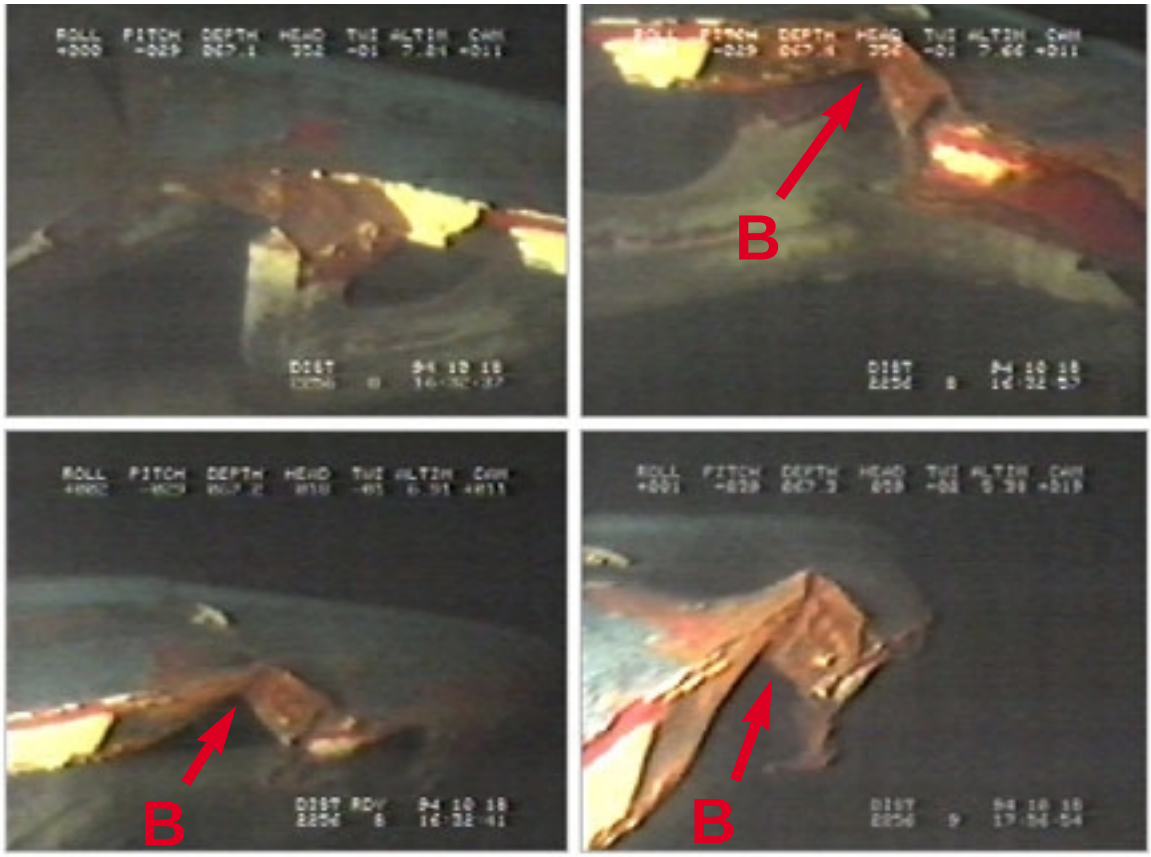
The yoke was also damaged due to the final attempt to recover the visor. This can be seen from the damage to the hooks, more specifically the triangular lugs, where the three “starboard” lugs have again been bent to “starboard”.

Picture 15. Three hooks are damaged. The outer port side hook, to the right of the picture, was not damaged.

Picture 16. The two middle hooks seen here have been severe damaged.

The visor bottom - status BEFORE recovery - damage

The damage to the visor was videofilmed before the visor was recovered. The video shows that at least 5 damaged items “were missing” in relation to the damage found after recovery. This can clearly be seen when comparing the videos before and after the recovery. The location of the “missing damaged items” can be seen in pictures 20, 21 and 22 and compared with the same areas shown below.



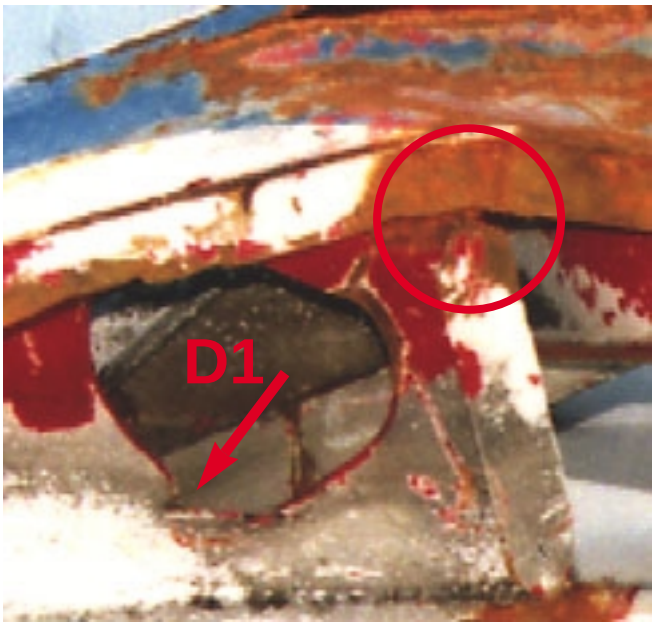
Picture 17 from “visiri 94.10.18 at around 16.32. The beam (B) on the port side of the visor bottom was not completely broken before the recovery, but damaged. Compare with pictures 22 and 23.

Pictures 18 and 19 from “visiri 94.10.18 at around 17.57. The two round holes (arrows) on both the starboard and port side were not damaged before the recovery. Compare with the damage after the recovery, pictures 21 and 22. Also compare the connection between the vertical and transverse beam within the red circles with the same area in pictures 21 and 22. This clearly shows that the bottom of the visor was bent further forward as a result of the recovery operation, resulting in separation between the horizontal and vertical beam.

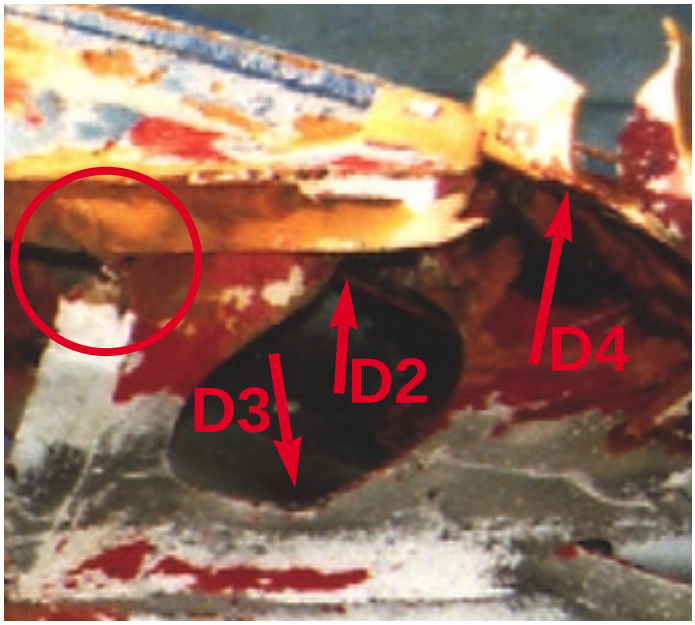
The visor bottom - status AFTER recovery - damage

After the visor was recovered, it was found to be extremely damaged. The bottom plate itself was “pushed up” and the aft part of the same plate was bent up. Other damage seemed to have been “pushed down” indicating damage in both a downward and upward direction. The Commission did not, however, identify the damages caused by the recovery operation. Five items of the damage are identified below.

Picture 20. Overview of the bottom plate damage and details below.

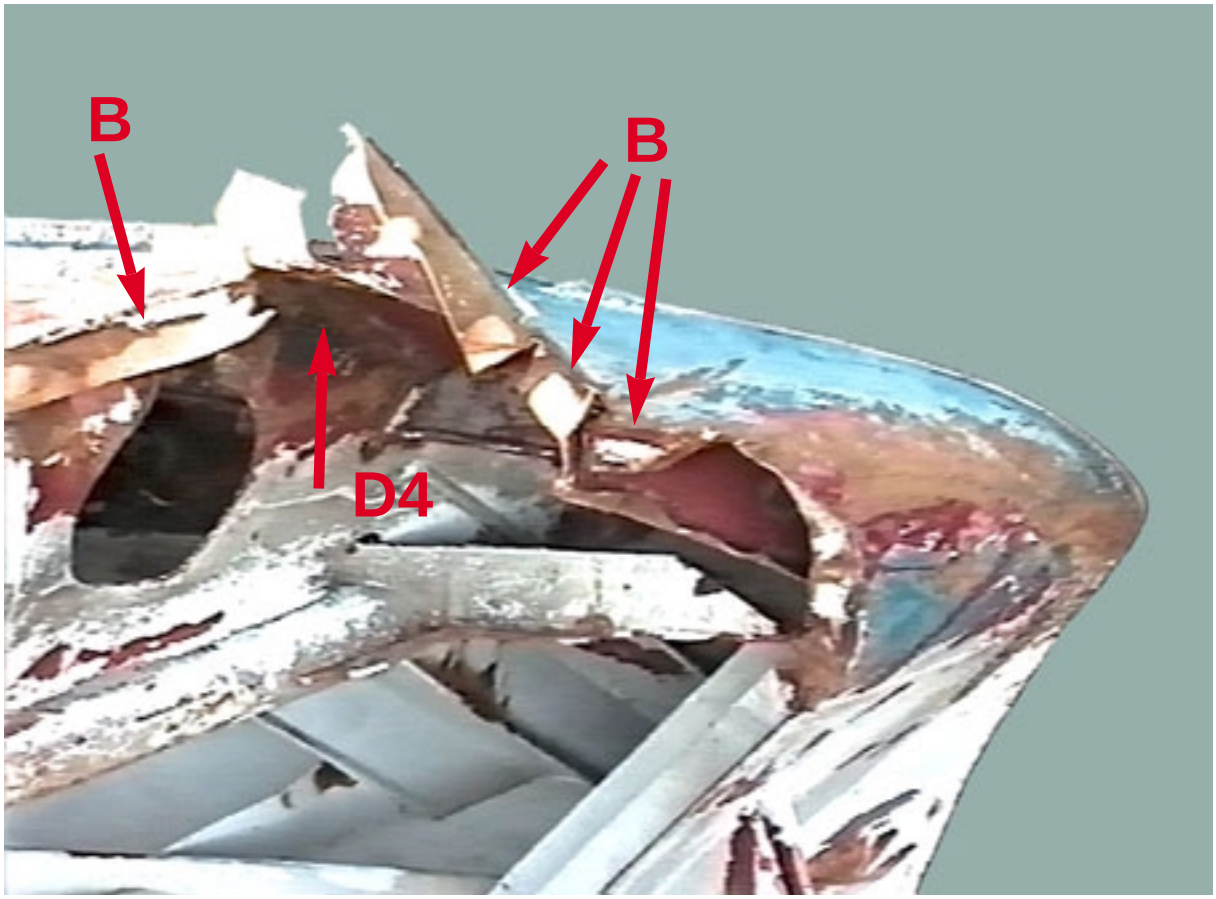


Picture 21. The round hole is damaged (D1) in an aft direction. The outer starboard hook on the yoke has broken the plate with the hole when twisting around the transverse beam.



Picture 22. The round hole is damaged (D2) in an forward direction. The outer port hook on the yoke has broken the plate with the hole when twisting around the transverse tube beam. It has also created buckling (D3). The yoke also broke the beam (D4) as can also be seen in picture 23.

In the picture below, it can be seen that the transverse beam (B) has been ripped apart in an upward direction (D4) in the picture.



Picture 23. The port bottom side of the visor after the recovery.

The JAIC conclusions regarding damage to the visor

There are no indications that the visor may have been damaged during the recovery, either in the final report or the supplements.

JAIC 8.3 Recovery of the visor

"The Commission decided at its meeting in Turku on 3 - 4 October that a search was to be made for the bow visor. This was done by the TURSAS, equipped with a side-scan sonar and a low-frequency echosounder. The Estonian Coast Guard vessel EVA-200, equipped with a side-scan sonar, took part in the search.

The visor was found at 5923,0' N 2139,2' E about one nautical mile west of the wreck, on 18 October. That it was the visor was confirmed by ROV video-recordings.

The Commission decided that the bow visor should be recovered and brought ashore for a detailed survey. The recovery was carried out on 12 - 19 November. The Swedish Navy mine-sweeper FURUSUND and the Finnish Maritime Administration multipurpose icebreaker NORDICA participated in the work.

The bow visor was recovered on 18 November. It was taken ashore in Hanko, Finland."

The Fact Group commentary:

The report onm the recovery made by the Swedish military on 14 December 1994 (KAB 2/ KA 1) has not been evaluated by the Commission. This is more than remarkable since the damage to the visor was regarded as major evidence for the "loss of the visor" scenario . It must have been assumed that such a difficult operation as recovery of the visor could easily have lead to considerable damage as a result of the operation.

JAIC 8.5.3 Visor damage

...."The bottom of the visor was heavily pounded and distorted"

...."It was compressed upwards, varying up to about 0.5 m compared to the original shape."

...."The inner vertical bulkheads of the visor had indentations and score marks on the port side"

...."Various impact marks from heavy contact between the visor and the hull were noted with some visor displacement to starboard and upwards."

The Fact Group commentary:

It is proven in this report that several items of damage were caused by the yoke, or the hooks on the yoke during the recovery operation. Therefore, it cannot be concluded that the damage described in the final report was actually caused by the accident and sinking of the ship. Therefore, the damage cannot be used as evidence until the damage caused by the recovery operation has been identified. The sharp hooks on the yoke could also have produced several of the scoring marks in and on the visor.

JAIC 13.5 Failure sequence of bow visor and ramp

...."Impact marks indicate violent transverse movements, and upward movements of about 1.4 m."

The Fact Group commentary:

This conclusion is worthless until the damage from the recovery operation has been identified.

JAIC 15.9 Other damage to the visor

"Other damage to the visor that is related to the accident includes extensive pounding of its bottom and indentations on its front. The bottom plating was forced upwards and had cracks in many places, primarily in welds. The stem post had separated from the side plating and been folded inwards together with the bottom plating (Figure 8.6)[not shown here]. Damage marks indicate that this happened when the visor started to tumble forward and was rotating downwards on the ice-breaking prong of the bulbous bow. This damage caused by the ice prong continues upwards along the stem, culminating in large mid-height indentation (Figure 8.5)[not shown here]. Further indentations, scratch marks and paint marks on the starboard side of the visor indicate its continued movement when it slid off the bulbous bow and sank underneath the vessel.

It is concluded that the bottom plating of the visor became deformed when the visor was dropping back after having been lifted by waves, initially pounding on the forepeak deck and, secondly and extensively, on the stem head.

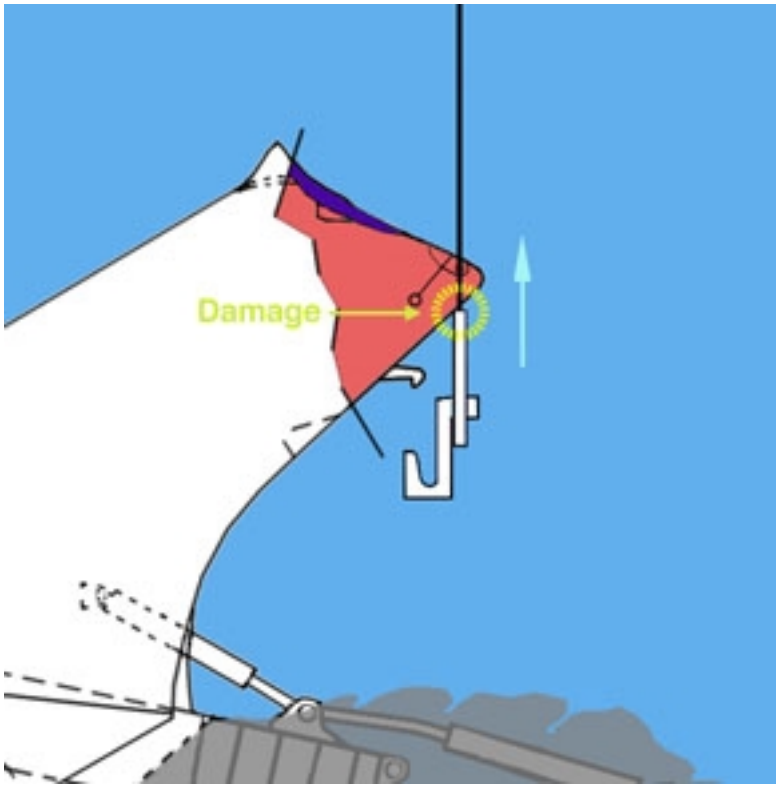
....Two longitudinal flat bars, though shown on the visor steel drawing as running one on each side of the recess for the locating horn on the bottom plate of the visor, seem not to have been installed. The bottom of the visor therefore had no other structural continuity in its load-carrying members than its aftmost beam to which the visor locking lug was attached. The bottom is therefore considered to have been weaker than intended, in particular when taking vertical loads. This is also likely to have affected the amount of deformation occurring during the accident influencing the ability of the visor bottom structure to resist vertical forces that may have developed during the failure."

The Fact Group commentary:

It is proven in this report that cracks and damage that the Commission concluded were caused by the accident, were really caused by the recovery operation. Therefore the conclusions drawn by the Commission are not conclusive and cannot be used to support the accident scenario.

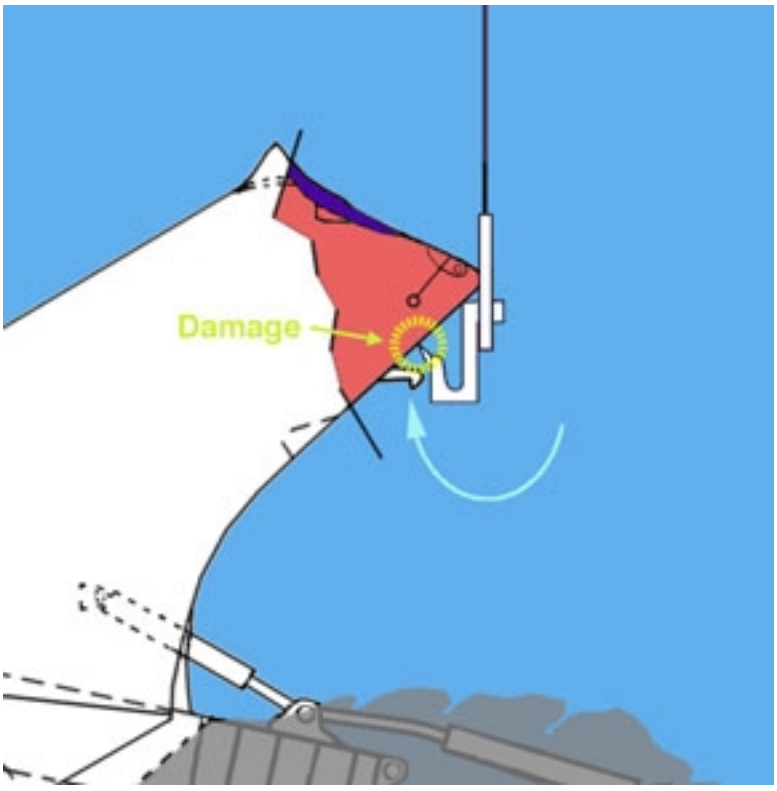
We leave it to a new investigation group to investigate which damage was caused by the accident or the recovery operation. Until this is done, it is impossible to describe the accident scenario on the basis of damage to the visor.

Possible explanation of the damage caused during the recovery



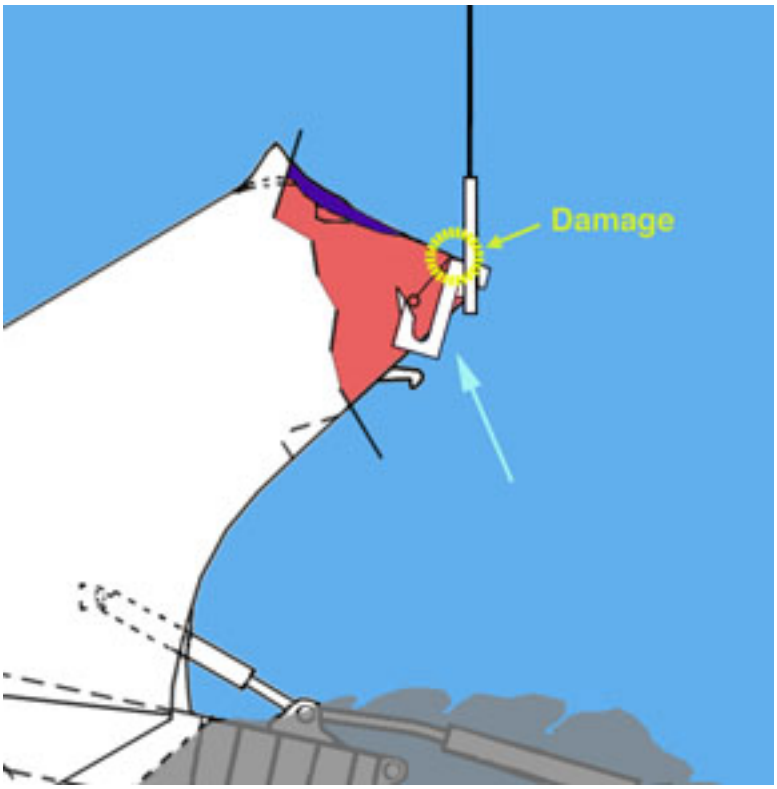
Damage type one. Damage from the yoke due to failure to attach it to the visor (dimensioning problems). The yoke may have hit the visor in several places.

Picture 24. Possible damage caused during the first attempt to recover the visor.



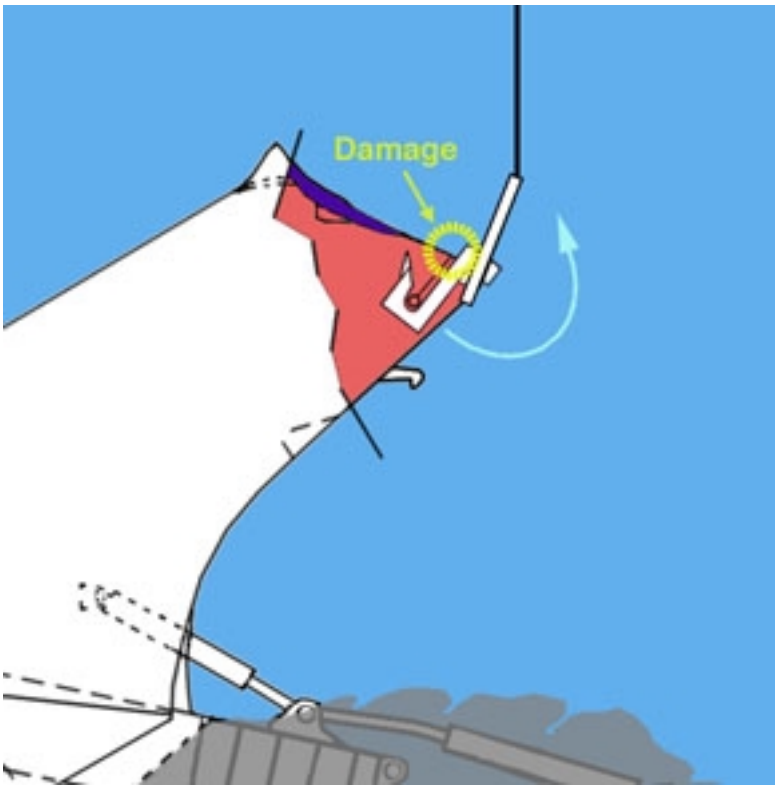
Damage type two. Damage from the yoke as the modified hooks with sharp lugs hit the visor. The lugs were bent as a result of hitting the visor. Score marks must have been caused. The hooks may also have ripped and damaged other parts of the visor.

Picture 25. Possible damage caused during the second, third and fourth attempts to recover the visor.



Damage type three. Damage from the yoke as it was forced to attach to the visor beam.

Picture 26. Possible damage caused during the third and fourth attempts to recover the visor.



Damage type four. Damage from the yoke after it was forced to attach to the visor. When the visor was lifted it was damaged due to bending force. This caused further separation between the transverse beams and the plating and may also have damaged the visor bottom plating further.

Picture 27. Possible damage caused during the finalt attempt to recover the visor.

The Fact Groups conclusions

The video films taken before and after the recovery of the visor show that the visor suffered further damage during the recovery.

The Commission has not indicated by a single word that it even suspected that damage might have occured during the recovery. Furthermore, the Commission did not describe the recovery operation, and therefore it must have been presumed that the recovery did not affect the visor in any way. Obviously, all the damage to the visor have been regarded as a result of the accident.

The Commission concluded that the various items of damage to the visor indicated that:

> the visor hit the forepeak deck while loose but still rotating around the visor hinges,
>
> the visor was moving up and down 1.4 metres along the front bulkhead during the loss of the visor,
>
> score marks were the result of those occurences.

This damage has provided substantial evidence for the accident scenario described by the Commission.

As some of the damage has now been proved to be the result of the recovery operation, the complete scenario in accordance with the JAIC’s conclusions must be regarded as unconfirmed.

Therefore, it is clear that a new investigation must take place.

Sources

- JAIC (Joint Accident Investigation Commission);
  Final report on the capsizing on 28 September 1994 in the Baltic Sea of the Ro-ro passenger vessel, MV ESTONIA
- Supplement to the Final Report

The Swedish Board of Accident Investigation archive:

Paper	Date	archive No.
telefax preliminary report visor video	1994.10.26	I 33
Pictures; recovery of visor	1994.12.15	A 81 k
Video recording visor	1994.10.26	B 7

The Finnish Board of Accident Investigation archive:

Video recording “visiri”	17-18/10 -1994	

Other:

Swedish Military report; “Report after the recovery of the MV Estonia bow visor”. (Supplement 1)	14.12.1994	File no. 02 709: 1226 (KAB 2 / KA

DEDICATION

We dedicate this report to all those who lost their lives at sea as a result of a ships lack of seaworthiness.

If MV Estonia had been seaworthy many of the more than 850 persons who lost their lives would have had a chance to survive.

Stockholm 1 May 2000

For the Independent Fact Group

Björn Stenberg Johan Ridderstolpe