Report on the investigation of the

collision between the ro-ro ferry

Stena Gothica

and the eastern approach jetty at

Immingham on 2 April 2002

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Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ABP	-	Associated British Ports
ARPA	-	Automatic Radar Plotting Aid
BST	-	British Summer Time
CHA	-	Competent Harbour Authority
DGPS	-	Differential Global Positioning System
dwt	-	Deadweight tonnage (tonnes)
ECS	-	Electronic chart system
ETA	-	Estimated time of arrival
HPL	-	Humber Pilots Ltd
IOT	-	Immingham Oil Terminal
kW	-	kilowatt
LPG	-	Liquefied Petroleum Gas
PEC	-	Pilotage exemption certificate
ro-ro	-	roll-on roll-off
SOLAS	-	Safety Of Life At Sea Convention
UK	-	United Kingdom
ULCC	-	Ultra large crude carrier
VDR	-	Voyage data recorder
VLCC	-	Very large crude carrier

SYNOPSIS

At 0020 BST on 2 April 2002, the Swedish registered ro-ro vessel *Stena Gothica* struck the eastern jetty, during a spring ebb tide, while approaching Immingham lock. A 3-metre gash was sustained in the port side shell plating below the waterline, leading to a large ingress of water into the lower cargo hold.

The vessel was moved into the lock and, shortly after, began to list to starboard, reaching a maximum heel of 14.5° at 0333. Firefighters and a local salvage team attended and, after several hours, the rate of ingress of water was slowed and the water level in the lower hold reduced. The quick and effective action of the firefighters and salvors prevented a capsize.

The vessel was moved to berth No 4 where she was all fast at 1442. An MAIB inspector arrived at the vessel shortly after she berthed to start the investigation.

The cause of the collision with the jetty was the master losing control of his vessel during the approach to the lock entrance. A further 11 contributing factors were identified which included:

- the master's decision to take over the conduct of the navigation just before the approach to the lock entrance;
- the master under-estimating the strength of the tidal current; and
- a missing fender on the eastern approach jetty at the position the vessel impacted, which had not been replaced by temporary fendering.

The investigation also revealed conflicting evidence with regard to the pilot's advice, after the master took over the conduct of the navigation. This could not be resolved because no Voyage Data Recorder was fitted. The design of *Stena Gothica* was also found to be inherently dangerous as she had an open ro-ro deck below the waterline which, if flooded, could have led to a rapid capsize.

Recommendations have been addressed to Stena Line and Associated British Ports (Humber) which, if implemented, will help to prevent a recurrence.

Stena Gothica

Figure 1

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *STENA GOTHICA* AND ACCIDENT

Vessel details

Registered owner	:	Stena Line
Manager(s)	:	Stena Line
Port of registry	:	Göteburg
Flag	:	Swedish
Type	:	ro-ro cargo vessel
Built	:	1975 in Sandefjord, Norway
Classification society	:	Norske Veritas
Construction	:	Steel
Length overall	:	188.67m
Gross tonnage	:	14406
Engine power and/or type	:	Twin Lindholmem Pielstick 4413kW
Service speed	:	16 knots
Other relevant info	:	Twin bow thrusters, twin controllable pitch propellers, twin Becker rudders.

Accident details

Time and date	:	0020 BST, 2 April 2002
Location of incident	:	Eastern approach jetty to Immingham locks
Persons on board	:	21 (20 crew + one pilot)
Injuries/fatalities	:	None
Damage	:	3 metre gash in port side shell plating, which allowed a large ingress of water into the lower cargo hold.

1.2 BACKGROUND

Immingham is the UK's largest east coast ro-ro port, handling over eight million tonnes of ro-ro cargo a year. With over 40 sailings a week to ports in northern Europe and Scandinavia, it is the second busiest ro-ro port in the UK.

The majority of ro-ro vessels trading to Immingham are regular visitors whose masters hold pilotage exemption certificates (PECs).

Stena Gothica **(see Figure 1)** was a ro-ro cargo vessel owned and operated by Stena Line. She was on a regular schedule trading between Gothenburg and Harwich, with occasional visits to Ghent and Immingham. She could carry up to 11 lorry drivers as passengers. As she was not a regular visitor to Immingham none of her masters held a PEC for the port.

1.3 THE CREW

At the time of the incident *Stena Gothica* carried a crew of 20. All were Swedish except for a Norwegian seaman.

The master was 56 years of age and had been at sea for 35 years. He joined Stena Line in 1976 and obtained his master's licence in 1978. He served as chief officer for 6 years and had been relief master since 1998. He was promoted to master in October 2000 and since then had served only on *Stena Gothica*. Normally his trip lengths were 14 days on and 14 days off. He joined the trip, on which the incident occurred, on 19 March. He had slept from 1600 to 2200 on the night of the incident. He had been to Immingham on four or five previous occasions, all on *Stena Gothica*, and did not hold a PEC for the port.

The chief officer was also 56 years old and had been at sea for 27 years. He had been 23 years with Stena Line and had served as chief officer on *Stena Gothica* for 10 years. He had slept from 1630 to 2050 on the night of the incident before taking his watch on the bridge. He had been to Immingham many times before but did not hold a PEC.

1.4 THE PILOT

The pilot was 48 years of age, had been at sea for 32 years and had held a master's certificate for 20 years. He had served as master for 13 years on a variety of vessels including VLCCs, ULCCs, product tankers and LPG tankers. He left his last vessel in October 2001 and joined ABP as a trainee pilot on 2 January 2002. He passed his pilotage examination for the lower part of the Humber on 28 January. He then understudied other pilots until 21 February when he was authorised as a third class pilot, which has an upper limit of 5 metres draught and 10000 dwt. He then piloted 32 vessels before being authorised as a second class pilot on 24 March. This class has an upper limit of 6.5 metres draught and 20000 dwt. *Stena Gothica* was the ninth vessel he had piloted since becoming a second class pilot, of which five or six were second class size. He had, therefore, piloted a total of 41 vessels since obtaining his

pilotage authorisation. Thirteen of these vessels were to or from Immingham, five or six of which were during spring tides. The spring tides at the time of the incident were the first the pilot had encountered since he had obtained his second class authorisation. He had not been on board *Stena Gothica* before.

He was on the final day of his 15-day working period and had slept from 0900 to 1230/1300 and from 1830/1930 to 2030 on 1 April.

1.5 BRIDGE EQUIPMENT

Stena Gothica had a forward bridge with outside bridge wings. Helm and engine controls were on each bridge wing. The following bridge equipment was among that fitted **(see Figure 2)**:

Shipmate GN30 DGPS

Transas Navisailor Electronic chart system

Kelvin Hughes 2020 Nucleus ARPA radar

Kelvin Hughes HR3061 10cm radar

Kelvin Hughes HR2044 3cm radar

Robertson AP9 MK11 autopilot.

The speed log input to the Transas ECS was not operational at the time of the incident.

Figure 2

Bridge layout

1.6 ENVIRONMENTAL CONDITIONS

The incident occurred 3 hours after high water on a spring tide. The ebb tide was setting about 3.5 knots in a direction of about 130°. Visibility was in excess of 12 miles, the skies were clear and the wind was WNW at about 10 knots. The river in the vicinity of Immingham lock was in sheltered waters.

1.7 NARRATIVE (ALL TIMES BST, ALL COURSES TRUE, ALL SPEEDS OVER THE GROUND)

Stena Gothica left Harwich at 1400 on 1 April 2002, with 20 crew onboard and a cargo of trailers weighing 1736 tonnes. Some of the cargo consisted of hazardous materials. Her draught was 4.1m forward and 5.2 aft.

The pilot was called by the pilot office at 2030 and given *Stena Gothica'*s ETA. He prepared himself and went into the pilot office and then on to Spurn Point to embark on the launch.

Stena Gothica's chief officer and a lookout went on watch together at 2100. The master woke up at 2200 and, shortly after, also went up to the bridge. As the vessel approached the pilot station, the master took over the conduct of the navigation and reduced speed. The pilot boarded at 2250 and made his way to the bridge. The vessel was in automatic steering.

The master and pilot exchanged information. The master showed the pilot how to use the autopilot. Speed was increased to full ahead. The pilot then took over the conduct of the navigation and advised the master that an inbound vessel, *Dutch Progress*, bound for Saltend, would be overtaken.

Dutch Progress was duly overtaken about 10 minutes after the pilot boarded. There was little traffic moving in the river.

At 0005 on 2 April 2002, approaching Immingham Oil Terminal (IOT) No 3, *Stena Gothica*'s speed was reduced to about 5 knots. At about this time, the pilot asked the master how many times he had been to Immingham; he formed the impression the master had been to the port more times than he actually had. The pilot asked the master if he wanted to do his own manoeuvring. The latter replied he would. The pilot talked the master through the manoeuvre, and advised him to stem the tide and crab inside the bellmouth, the intention being to come alongside the eastern jetty closest to the lock. The crew stood by fore and aft for manoeuvring stations.

IOT berth No 1 was abeam at 0010. The speed was 5.4 knots, heading 297° and the course made good was 291°. At 0013, A1 light, on the western end of the IOT, was abaft the beam. At about that time, the master took over the conduct of the navigation. The pilot continued to provide the master with advice. The master went on to the port bridge wing with the pilot close by. The chief officer stayed by the port side bridge door relaying communications. The vessel was now being set about 24° from her heading **(see Table 1)**.

The master then altered course to port to bring his vessel closer to the bellmouth[1] entrance.

At 0015, the vessel was being set about 30° from her heading. The master brought his vessel's head around towards the general direction of the temporary approach light (see Section 1.9) on the western jetty; the pilot had pointed out this light to him earlier.

At 0017, the vessel was now being set about 33° and was heading 290°, her speed was 2.5 knots. She was about 150m from the eastern jetty at that time.

At 0019, *Stena Gothica* was being set about 34° and was heading 294°. Her port side was about 70m from the eastern jetty and her bow about 60m from a line extended from the centre of the lock into the river. At about this time the master stopped the engines because he realised that the tidal effect was greater than he expected. In an attempt to turn the vessel quickly to port towards the lock entrance, he put the port engine astern, the starboard engine ahead, applied port rudder and full port bow thruster.

With the tide now firmly on the starboard bow the vessel was set bodily down on to the eastern jetty. The pilot informed the master of an area of scaffolding on the jetty and that he could not land alongside this area.

At 0020, the vessel contacted the eastern jetty heavily. The point of impact was at the location of a missing fender which was under repair (see Section 1.9). The vessel "bounced" off the fendering and came alongside the eastern jetty closest to the lock, as was originally planned.

The officers in the engine room contacted the master and informed him that the vessel was taking on water. The vessel was then moved into the lock. The impact had caused a 3 metre gash in the port side shell plating, below the waterline just aft of midships in the vicinity of frame 100. This led to a large ingress of water into the lower cargo hold. The lower hold lift housing, located in the aft starboard corner of the hold, filled first. About 20 minutes after entering the lock the vessel started to list to starboard.

The lock gate was closed. Around 60 firefighters from Hull and Barton, and a local salvage team, were contacted and arrived on the scene. The ship's crew and port marine staff rigged a tarpaulin over the damaged area to reduce the rate of ingress before the arrival of the firefighters and salvors. Extra lashings were placed on some of the trailers on the vessel's ro-ro decks, including those containing hazardous cargo.

[1] The approach to Immingham lock as defined by two open piled lead-in jetties

The vessel continued to list and reached a maximum heel of 14.5° at 0333, when there was about 2.5m of water in the starboard aft corner of the lower hold **(see Figures 3 & 4)**. The firefighters and salvors were able to both slow the rate of ingress of water and, also, to lower the water level in the hold so that during the course of the morning the list was gradually reduced. *Stena Gothica* remained in the lock throughout this period.

After some temporary repairs using timber wedges and quick drying cement, the ingress of water was stopped completely and the vessel brought slowly upright as the hold was emptied.

In mid-afternoon the vessel was moved to berth No 4 where she was all fast at 1442. The cargo was discharged and further temporary repairs involving welding carried out **(see Figure 5)**. An MAIB inspector arrived at the vessel shortly after she berthed to start the investigation.

The vessel later sailed to Sweden for permanent repairs before re-entering service.

There were no injuries or pollution as a result of the incident. Some cargo damage was caused by the ingress of water into the lower hold.

Table 1. Course, heading and ground speed as recorded on the ECS

Time	COG	SOG	HDG
0012	276.0	5.4	288.5
0013	255.0	5.6	274.3
0014	238.0	6.3	260.8
0015	243.0	4.7	273.3
0016	249.0	3.4	284.0
0017	257.0	2.5	290.5
0018	260.0	2.3	292.0
0019	260.0	2.1	294.3
0020	211.0	3.6	261.6

COG - Course over ground
SOG - Speed over ground
HDG - Heading.

Figure 3

Vessel listing in lock

Figure 4

Lower cargo hold looking aft (taken 2/4/02 pm)

Figure 5

Temporary repair made to damage

1.8 NORMAL APPROACH TO IMMINGHAM

The ebb tide flows across the entrance to Immingham locks from a direction of about 310°. Care has to be taken to avoid being set on to the A1 light at the western end of the IOT when starting the approach into the bellmouth.

The normal procedure for entering the lock entrance, on an ebb tide, is to stem the tide and then “crab” the vessel slowly over the ground to a position where the bow is very close to the western jetty **(see Figure 6)**.

If the vessel is coming too close to the eastern jetty knuckle, the tide can be placed on the port bow which will bodily force the vessel out. Putting the tide on the starboard bow will move the vessel closer in, keeping the tide ahead with the vessel stopped over the ground will hold position.

This is a delicate operation using the tide to advantage, but always keeping the manoeuvre under control, using the power of the engines as required.

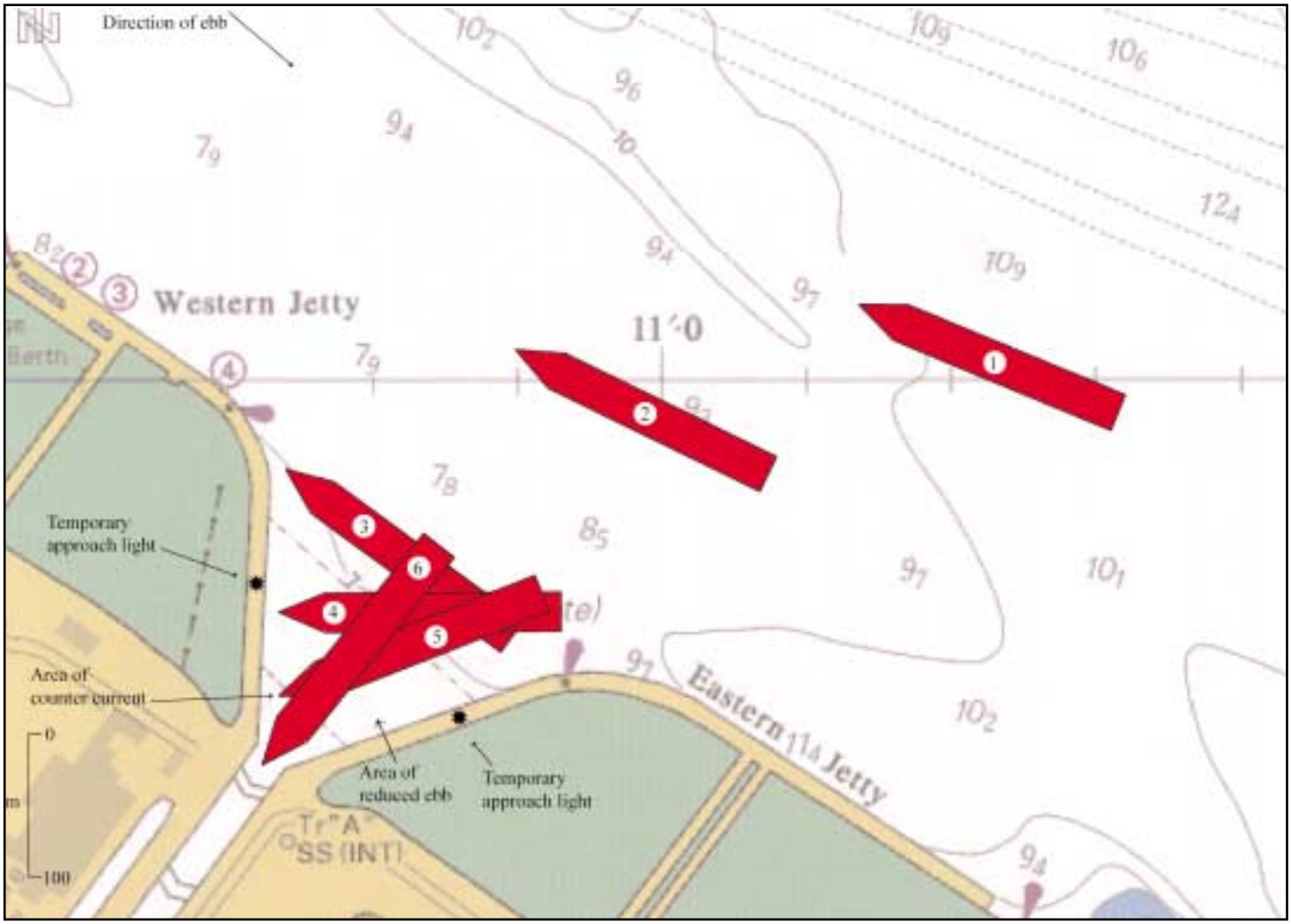
It is important that the vessel is uptide, and as close to the western jetty as is possible, before turning to port using helm and, where necessary, bow thruster and engines. This manoeuvre requires turning the stern of the vessel against the flow of the ebb. The full force of the ebb is lost the further the vessel gets into the bellmouth, however the ship’s head will not be aligned with the lock until the bow is almost in the lock. Close in to the lock is a small counter current which can set the bow to starboard.

Conventional vessels with a single-screw always use a tug during a spring tide or wait until the next slack water.

A vessel will sometimes come alongside the eastern jetty on the part closest to the lock, after completing the turn to port, and then enter the lock. This allows an easier, more controlled entry into the lock, as opposed to completing the manoeuvre in one stage.

The CHA had completed a series of written risk assessments as part of the Port Marine Safety Code.

Figure 6



Normal approach during ebb

1.9 IMMINGHAM APPROACH JETTY

The eastern jetty consisted of continuous fendering for 117m from the knuckle of the lock **(see Figures 7 & 8)**. There was then a gap of 15m to the first dolphin and a further gap of 32m to the second dolphin. The fendering on each dolphin consisted of three large moulded rubber twin-cell fender panels of dimensions 8m x 2.6m. Each was secured to a vertical cylindrical dolphin support by upper and lower horizontal tubing. The tubing was attached to upper and lower circular flanges on the dolphin support. The fender was further secured by chains attached to lugs above and below the flanges **(see Figures 9,10 & 11)**.

At the time of the incident the outermost fender on the second dolphin (No 24) from the lock was under repair and missing due to an earlier incident. The missing fender had scaffolding around it and was marked by a flag. The pilots had been informed.

The damage to *Stena Gothica* was caused by the lug underneath the flange. In **Figure 9**, paint marks from the hull can be seen on one of the shackles attached to this lug. The middle fender (No 23) was also damaged as a result of this incident and was taken away for repair.

Temporary approach lights were established on 20 March 2002 as part of a trial to improve the visibility of the lock entrance against the background lights of shore installations. These lights consisted of a quick-flashing red light on the eastern jetty and a quick-flashing white light on the western jetty **(see Figure 12 for location)**.

Since the incident, the fendering has been fully repaired **(see Figure 8)**.

Fender no 24

Figure 7

Immingham lock from the river

Figure 8

Eastern approach jetty
(taken June 2002 after fender repaired)

Figure 9

Fenders 24 and 23

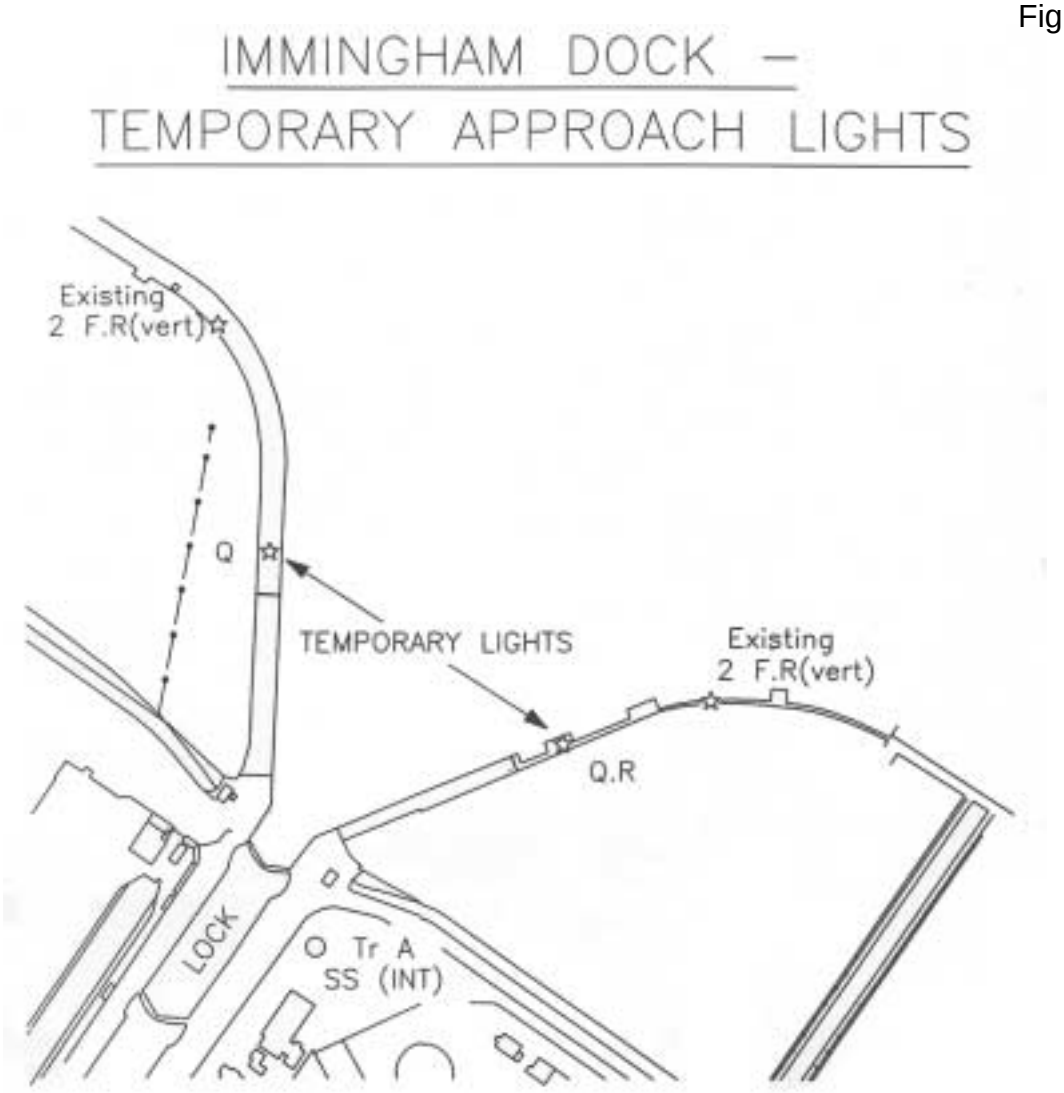
Figure 10

Fender 24
(note damage to scaffolding)

Figure 11

Fender 24

Figure 12



1.10 VESSEL DESIGN

Stena Gothica was a ro-ro cargo vessel built in 1975. She had a continuous open ro-ro deck below the waterline for about 60% of her length. This is not contrary to any regulations, but, had she been built as a ro-ro passenger vessel, bulkheads would have been required in this space.

The Stockholm agreement enhanced the subdivision requirements for passenger ro-ro vessels.

A ro-ro cargo vessel does not have the same requirements as a ro-ro passenger vessel. Because it is below the waterline, a continuous open ro-ro deck is susceptible to flooding in the event of hull damage. A small amount of water on such a deck could cause a rapid capsize.

On 1 February 1992 subdivision requirements were introduced for cargo vessels over 100m in length, which prevented any further ships being built to a similar design as *Stena Gothica*.

1.11 HUMBER PILOTS

At the end of 2001, a new pilotage service was introduced on the Humber with the competent harbour authority (CHA), Associated British Ports (ABP), employing pilots directly. The previous pilotage service, Humber Pilots Limited (HPL), was involved in an industrial dispute with ABP which included strike action from 12 December 2001, the date the new service took over pilotage.

As part of the MAIB's investigation into this incident three HPL senior pilots were among those consulted about the normal manoeuvre into Immingham docks.

1.12 MASTER/PILOT RELATIONSHIP

The vessel's master is charged with the responsibility for the safety of his vessel; pilots are engaged to assist with navigation in confined waters and to facilitate port approach, berthing and departure. The pilot is the local expert and has unique specialised knowledge and ability, but he never takes command of the vessel. He will normally advise the master as necessary and usually have full conduct of the navigation. This is, however, very different from having command of the vessel. The master has the ultimate responsibility and it is often the case, especially on ferries, that, during manoeuvring, the master chooses to take the conduct of the navigation himself with the pilot continuing to provide advice.

Good communication is essential in the master/pilot relationship, especially when the pilot is unfamiliar with the vessel and the master unfamiliar with the port.

1.13 VOYAGE DATA RECORDER

There was no voyage data recorder (VDR) fitted on board *Stena Gothica*. The revised Chapter V of SOLAS will require a VDR to be fitted to existing ro-ro passenger vessels not later than the first survey on or after 1 July 2002. There is, at present, no future international requirement for ro-ro cargo vessels to fit a VDR.

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 THE APPROACH

The master made a navigational misjudgment in his approach to the lock entrance during the spring ebb tide. The approach, during this period, is a delicate manoeuvre requiring an understanding of, and respect for, the strong tidal current.

With the ebb setting 130° at 3.5 knots, the master needed to get his vessel's head around to 310° to stem the tide and to be in control of the manoeuvre. With reference to Table 1, it can be seen that the furthest round *Stena Gothica*'s heading reached was 294° at 0019, immediately before the impact. The tide was therefore acting on the starboard bow throughout, trying to push the head to port and the vessel bodily astern in a general southerly direction. The master's failure to stem the tide resulted in his never being fully in control of the manoeuvre.

The master stated he was, initially, trying to steady up on the temporary approach light on the western jetty, although the annex shows he was actually about mid-way between stemming the tide and steadying on the approach light. This is further discussed in Section 2.3.3.

The master also needed to get his bow as close as possible to the western jetty before starting the turn to port towards the lock. With reference to the annex (time 2319 UTC) it can be seen that his bow never actually crossed a line extending from the centre of the lock into the river, before he started the turn to port. By using his engines to drive his vessel through the tide, much closer to the western jetty, his vessel would have been in a better position to begin the turn. The position the vessel was in, when he did turn, was about a ship's length further away from the western jetty than the optimum position.

It was about this time that the master stopped the engines; he did not appreciate the tidal rate and thought he could obtain a better idea by stopping his vessel in the water. He then realised the effect that the tidal stream was having on his vessel and decided to turn to port immediately. He went astern on the port engine and ahead on the starboard, and applied port rudder and full port bow thruster.

The master's positioning and heading of his vessel, and the fact that he had stopped his engines, albeit briefly, had the combined effect of leaving his vessel fully exposed to the effects of the tide. It was less than a minute later that the vessel hit the eastern jetty, bodily, at a rate of about 3.5 knots, the speed of the tidal stream.

The decision to turn to port, made earlier than normal, with the intention of landing alongside, was instinctive because the master could see the lock and the eastern jetty quite clearly and turned his vessel, the shortest distance, towards the jetty. It was not instinctive for him to move further uptide and away from the jetty before turning once he realised the effect the tide was having on his vessel. Unfortunately this error augmented the poor position his vessel was in and shortly afterwards the vessel impacted the jetty with the full force of the tidal stream.

An instant appreciation of the set the vessel was experiencing could have been obtained by the chief officer, or another crew member, viewing the ECS inside the bridge. However, as the chief officer was standing close to the port bridge wing door, dealing mainly with communications, this source of information was not used. As can be seen from the annex, the ECS was providing heading, ground track and ground speed throughout. The speed log input, however, was not working at the time of the incident.

2.3 MASTER/PILOT RELATIONSHIP

2.3.1 The master taking the conduct

The master decided to take the conduct of the navigation himself for the approach to the lock. He preferred to do his own manoeuvring and at the bridge wing control station there is only space for one person to stand and have access to the controls. It is quite normal on ro-ro ferries entering Immingham, especially Scandinavian vessels, for the master to take over the conduct of the navigation himself with the pilot continuing to advise.

Normally, the master is more familiar with his vessel's manoeuvring characteristics than the pilot, although the pilot is more familiar with the port than the master. In this incident, the master did not appreciate the strength of the tidal stream. The manoeuvre had been discussed before the approach, with the pilot taking the master through the procedure. The master was also aware it was a spring ebb tide.

It was the master's decision to take the conduct himself before entering the lock, the pilot was quite prepared to carry out the manoeuvre himself. Because of the strength of the tidal current, and the master's subsequent surprise at the set his vessel was receiving, he would have been well advised to have allowed the pilot to continue to have the conduct of the navigation until the vessel was in the lock.

The master has indicated that he would have taken the conduct of the navigation at the same stage of the manoeuvre if the Humber pilotage dispute had not taken place and one of the HPL pilots was on board.

There was also a misunderstanding when the manoeuvre was being discussed, which led the pilot to believe that the master had visited Immingham more times than he actually had. Had the pilot realised that the master had only been to the port on four or five previous occasions he might have resisted the master's decision to take the conduct himself.

2.3.2 Planning

The discussion as to who was to have the conduct during the approach took place around the time the vessel was off IOT. The pilot and master had been together on the bridge for the previous hour and a half. The discussion should have been made as part of the passage plan, shortly after the pilot boarded.

This would have allowed more time and thought to be spent on the manoeuvre and, possibly, could have led to the master becoming more aware of the strength of the ebb tide he would be manoeuvring against. This might have led to him allowing the pilot to retain the conduct for the approach. The pilot might also have become more aware of the few times the master had been to the port previously if the discussion had been held shortly after boarding.

2.3.3 The pilot's advice

After the master had taken the conduct of the navigation, the pilot continued to advise him. There is a conflict of evidence regarding the nature of this advice, in particular, with regard to whether or not the pilot advised the master to steady up on the temporary approach light, on the Western jetty.

As there was no VDR fitted on board *Stena Gothica*, it has not been possible to resolve this conflict through voice recordings. It is therefore unclear if the pilot's advice was correct or not. It is equally unclear if the master followed the pilot's advice or not. (See Section 2.4 for comment concerning the pilot's advice with regard to the missing fender).

The pilot's training period was considerably shorter than an HPL pilot would have had before piloting a vessel the size of *Stena Gothica*. His training period was, however, intensive and included detailed examination of the approach into Immingham at all states of tide. He had therefore duly satisfied the CHA that he was suitable to pilot a vessel of that size. He had also successfully performed the manoeuvre during spring tides, before this incident and was a very experienced shiphandler on all sizes of vessel.

The MAIB is unable to comment on the pilot's capabilities or advice and the conflict of evidence relating to what was said on the bridge, because no VDR and voice recordings were available.

2.4 FENDERING

The fendering on the approach jetties to Immingham lock is to protect vessels and the jetties from damage caused by contact. It is a control measure based on the likelihood of vessels striking the jetties because of the strength of the tidal currents experienced, and past incidents. It was not uncommon for vessels to touch the fendering with varying levels of impact.

At the time of the incident, the outermost fender on the second dolphin (No 24) from the lock was under repair and missing because of an earlier incident. The missing fender had scaffolding around it and was marked by a flag, but was not marked at night. No temporary fendering had been put in place during the repair period. The pilot was aware that the fender was missing, but masters had not been notified. The pilot did, however, inform the master immediately before the contact, of an area of scaffolding on the jetty around the missing fender and that he could not land alongside this area.

Stena Gothica had the misfortune to impact the Eastern jetty at the location of the missing fender and sustained most of her damage from the lug under the flange shown in **Figure 9**.

The master was unaware of the missing fender. The pilot knew about it, but had failed to inform the master, despite the intention being to lie alongside the eastern jetty before entering the lock. The vessel's length overall was 188.67m. If the vessel was berthed with her bow close to the lock knuckle she would have had her stern on, or close to, the missing fender even allowing for the curvature of the stern. The original plan to lie alongside appears to have failed to take the missing fender into account.

The pilot and ABP should have informed the master of the missing fender before the vessel's arrival at Immingham. The master could then have assessed the risks involved and might have conducted the operation differently, for example, with the use of tugs or waited until slack water.

The fender was a missing control measure which would, most likely, have prevented the severity of the damage experienced by *Stena Gothica*. The reason for it being missing, recent damage by another vessel, indicates the high likelihood of vessels touching the approach jetties.

2.5 RO-RO DESIGN

Stena Gothica has a continuous open ro-ro deck below the waterline. This is inherently dangerous. If the vessel's side plating were to be breached below the waterline this deck would flood and, if the ingress of water was not stopped, would most likely lead to a rapid capsize. This was one of the lessons learned from the *Herald of Free Enterprise* disaster in 1987, and also the loss of the *Estonia* in 1994.

If the damage sustained in this incident had occurred at sea, because of a collision, the vessel would most likely have been lost. The decision to move the vessel into the lock, together with the quick and effective action of the firefighters and salvors, prevented a capsize. It was also fortunate that the lower hold lift housing, located in the aft starboard corner of the hold, filled first, causing the vessel to list to starboard, bringing the damaged area closer to the waterline, reducing the head of water, and keeping the water already in the lower hold away from the damaged side.

Had the vessel capsized at the lock entrance, it is possible injury and/or loss of life might have occurred. In addition, the port could have been blocked for a considerable period of time.

The only vessels similar to *Stena Gothica* presently in service are existing ro-ro cargo vessels built before the subdivision regulations were introduced in 1992. New ro-ro cargo vessels and all passenger ro-ro vessels would not be permitted to be designed in this manner.

2.6 FATIGUE

The master had had 6 hours continuous sleep before he arrived on the bridge just before the vessel reached the pilot station. He did not feel tired at the time of the incident and, therefore, it is considered unlikely that fatigue affected his performance during the course of the incident.

The pilot had slept for between 4.5 and 6 hours in two periods during the day preceding the incident. He was on the last day of his 15-day working period and was looking forward to his 3 days off. He did not feel unduly tired when he boarded, but might have been suffering from the effects of cumulative fatigue, having worked a shift pattern for the previous 15 days.

SECTION 3 - CONCLUSIONS

3.1 CAUSE AND CONTRIBUTING FACTORS

3.1.1 The cause

The cause of the collision was loss of control of the vessel during the approach to the lock entrance at Immingham. [2.2]

3.1.2 Contributing factors

1. The master's decision to take over the conduct of the navigation just before the approach to the lock entrance. [2.3.1]

2. The strength of the tidal current at the time of the incident. [2.2]

3. Failure to stem the tide to keep the manoeuvre under control. [2.2]

4. Stopping the engines during the course of the manoeuvre. [2.2]

5. Turning to port towards the lock entrance before the vessel was in the optimum position to do so. [2.2]

6. The master under-estimating the strength of the tidal current. [2.2]

7. The information provided by the ECS, in particular the amount of set the vessel was experiencing, was not being used during the incident. [2.2]

8. A missing fender on the eastern approach jetty at the position the vessel impacted. [2.4]

9. Notice of the missing fender not being promulgated to masters. [2.4]

10. The pilot, who was aware the fender was missing, not informing the master, despite intending to lie alongside the Eastern jetty before entering the lock. [2.4, 3.2.7]

11. No temporary fendering being in place during the repair period. [2.4]

3.2 OTHER FINDINGS

1. There was a misunderstanding between the pilot and the master with regard to the number of previous times the master had been to the port. [2.3.1]

2. The decision as to who was to take the conduct of the navigation during the approach into the lock and a discussion regarding the manoeuvre, was not made shortly after the pilot boarded. [2.3.2]

3. The master would have taken the conduct of the navigation at the same stage of the manoeuvre if the Humber pilotage dispute had not taken place, and one of the HPL pilots was on board. [2.3.1]

4. There is conflicting evidence with regard to the pilot's advice after the master took over the conduct of the navigation, in particular steadying up on a temporary approach light. [2.3.3]

5. Due to a voyage data recorder not being fitted to *Stena Gothica* at the time of the incident, it was not possible to resolve the conflicting evidence with regard to the pilot's advice. [2.3.3]

6. The pilot's training period was considerably shorter than an HPL pilot would have had, before piloting a vessel the size of *Stena Gothica.* [2.3.3]

7. The original plan was to lie alongside the eastern jetty prior to entering the lock. If the vessel was berthed with her bow close to the lock knuckle she would have had her stern on or close to the missing fender. The original plan to lie alongside appears to have failed to take into account the missing fender. [2.4]

8. The design of *Stena Gothica* is inherently dangerous, because an open ro-ro deck below the waterline could, if flooded, lead to a rapid capsize. [2.5]

9. The pilot had been working for the previous 15 days. [2.6]

10. The decision to move the vessel into the lock, along with the quick and effective action of the firefighters and salvors, prevented a capsize. [2.5]

11. The lower hold lift housing, located in the aft starboard corner of the hold, filled first, causing the vessel to list to starboard, bringing the damaged area closer to the waterline, and keeping the water already in the lower hold away from the damaged side. [2.5]

SECTION 4 - RECOMMENDATIONS

Stena Line is recommended to:

1. Take due care in the operation of *Stena Gothica* and conduct risk assessments as appropriate, having regard to the inherent danger of the vessel design.

2. Ensure that its masters fully assess the risks before taking the conduct of the navigation when a pilot is available and are aware of the advantages of advanced planning.

Associated British Ports (Humber) is recommended to:

3. Ensure that whenever control measures, such as fenders, are missing, masters are informed before their arrival at the port.

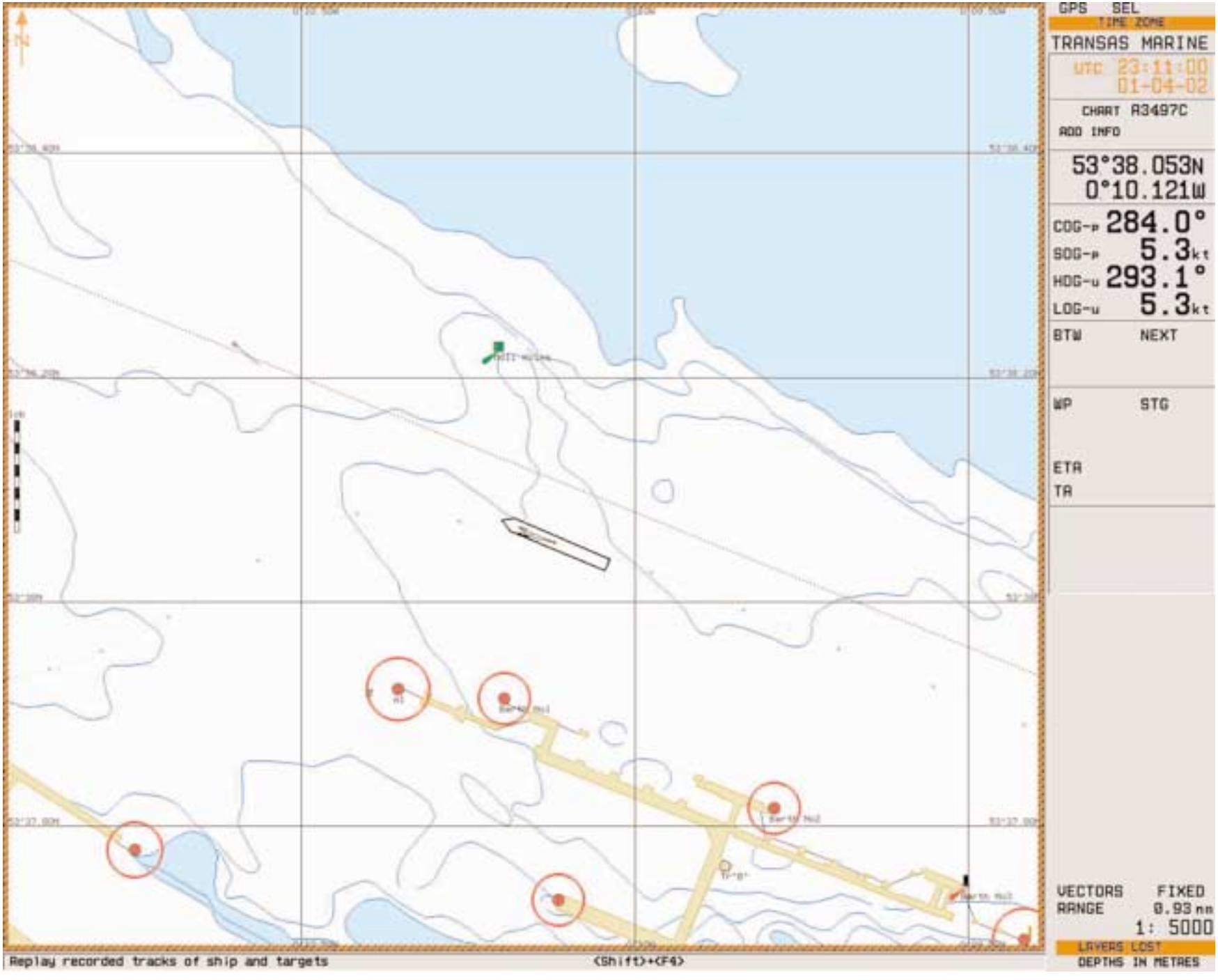
4. Ensure that whenever fendering is removed, for repair or any other reason, that it is replaced by temporary fendering of equivalent strength.

5. Emphasise the advantages of advanced planning among its pilots.

Marine Accident Investigation Branch
December 2002

ANNEX

Electronic chart system historical data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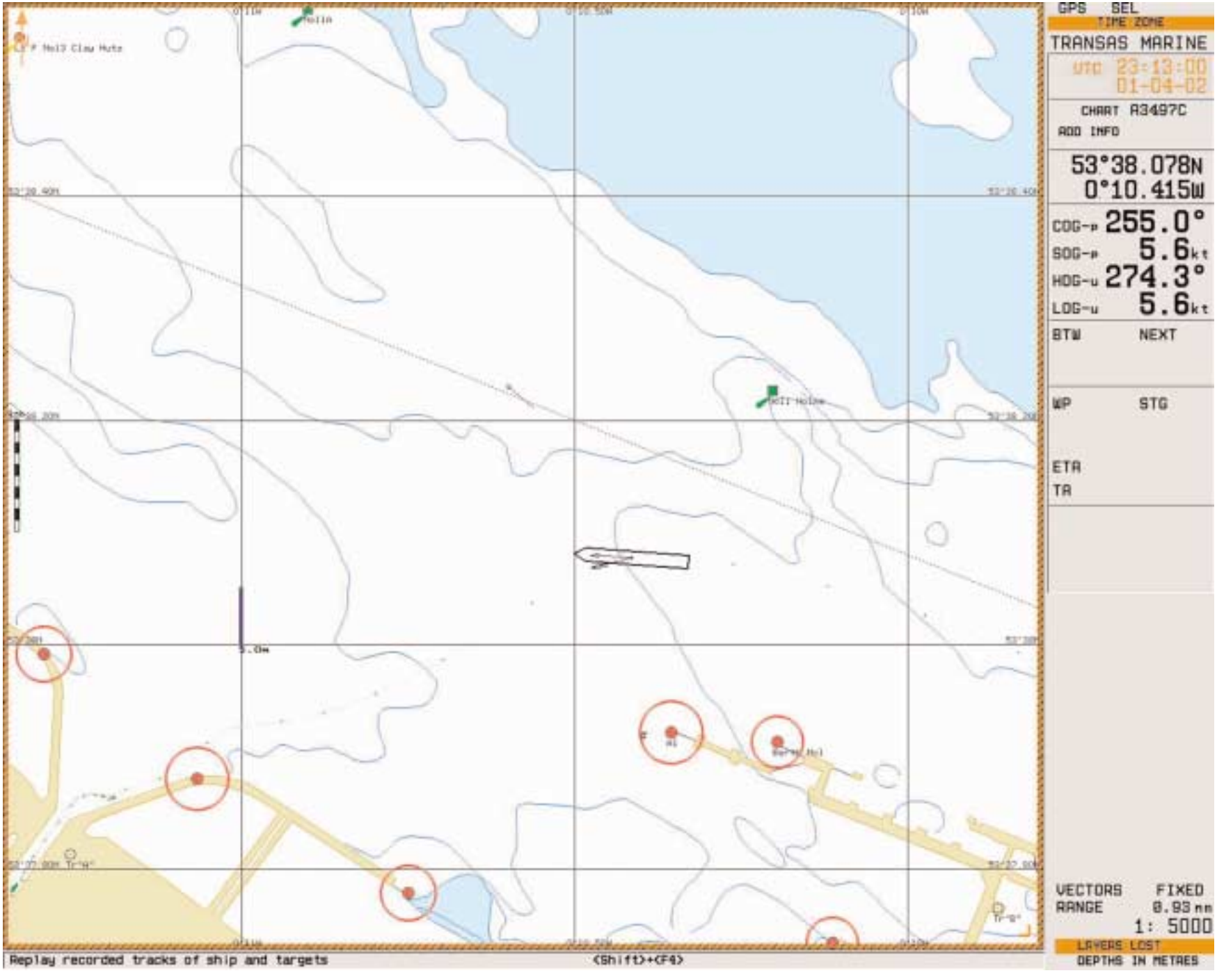
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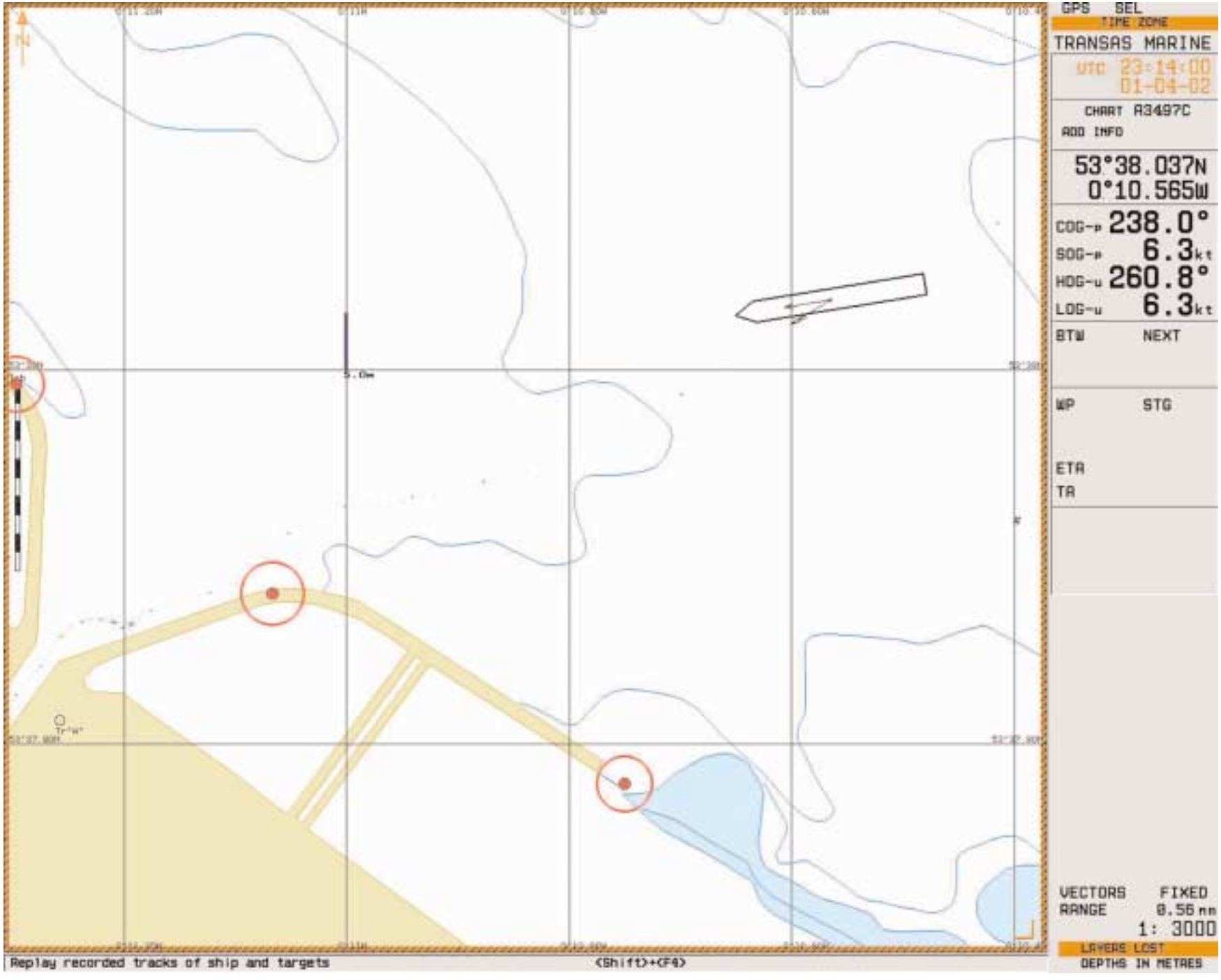
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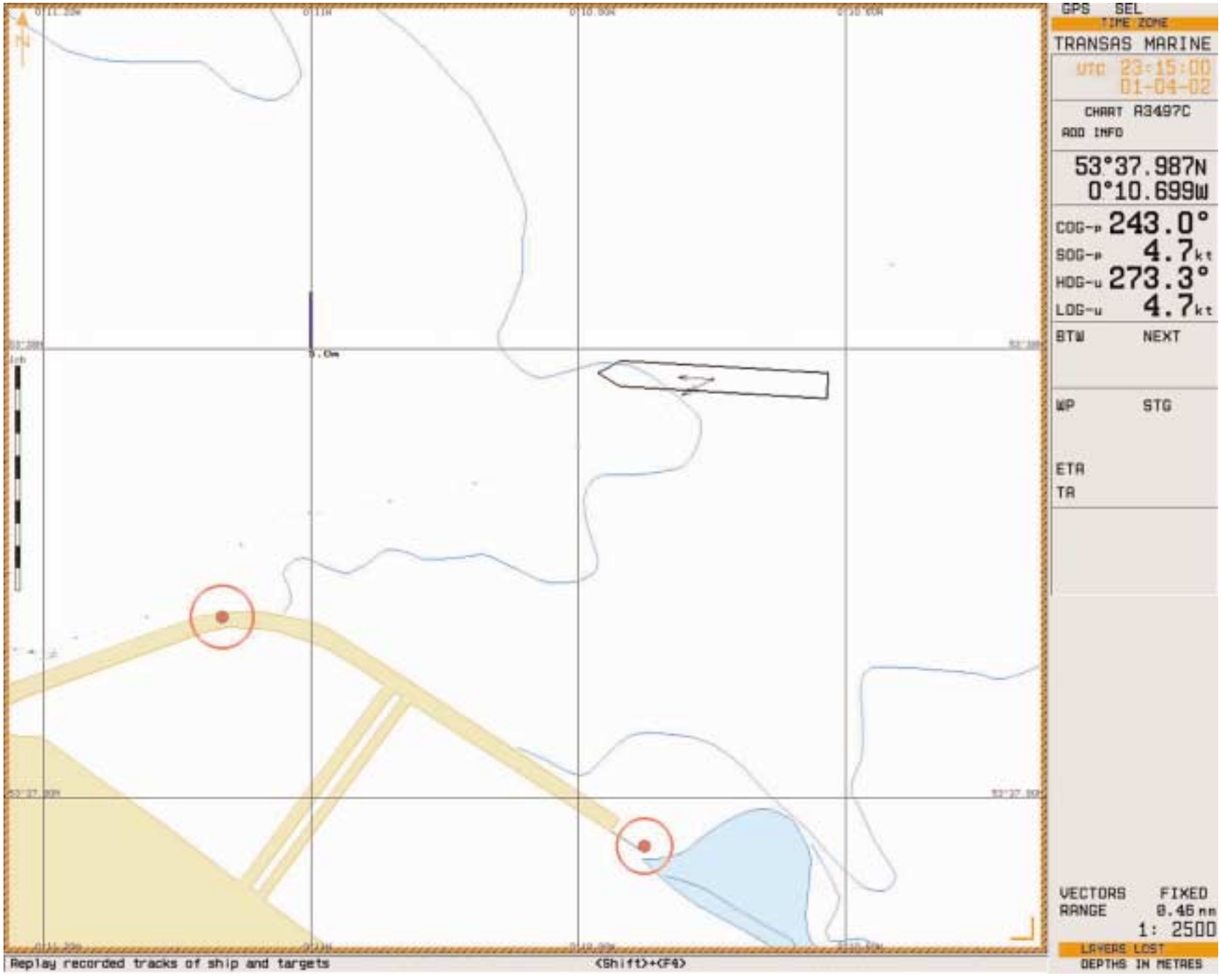
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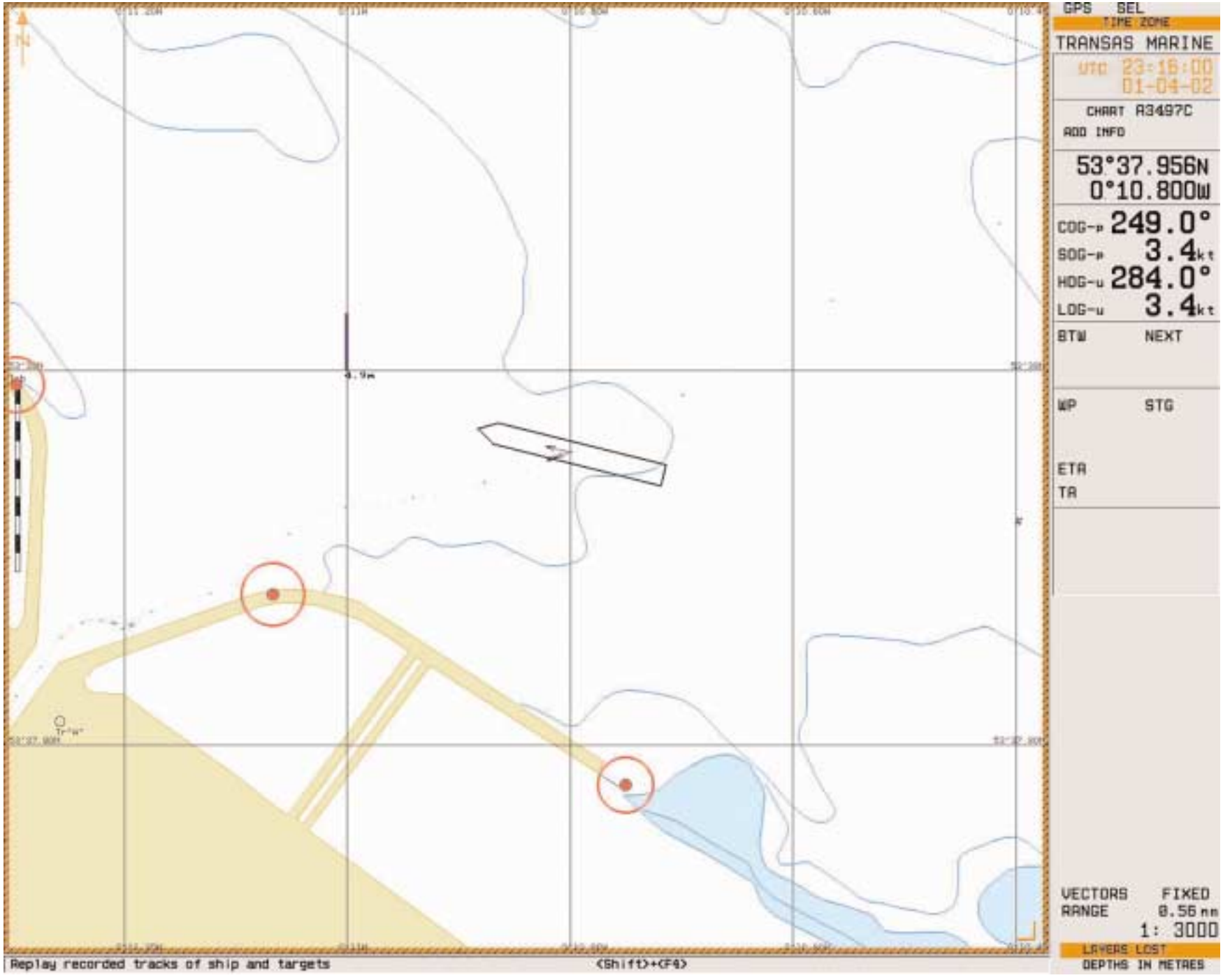
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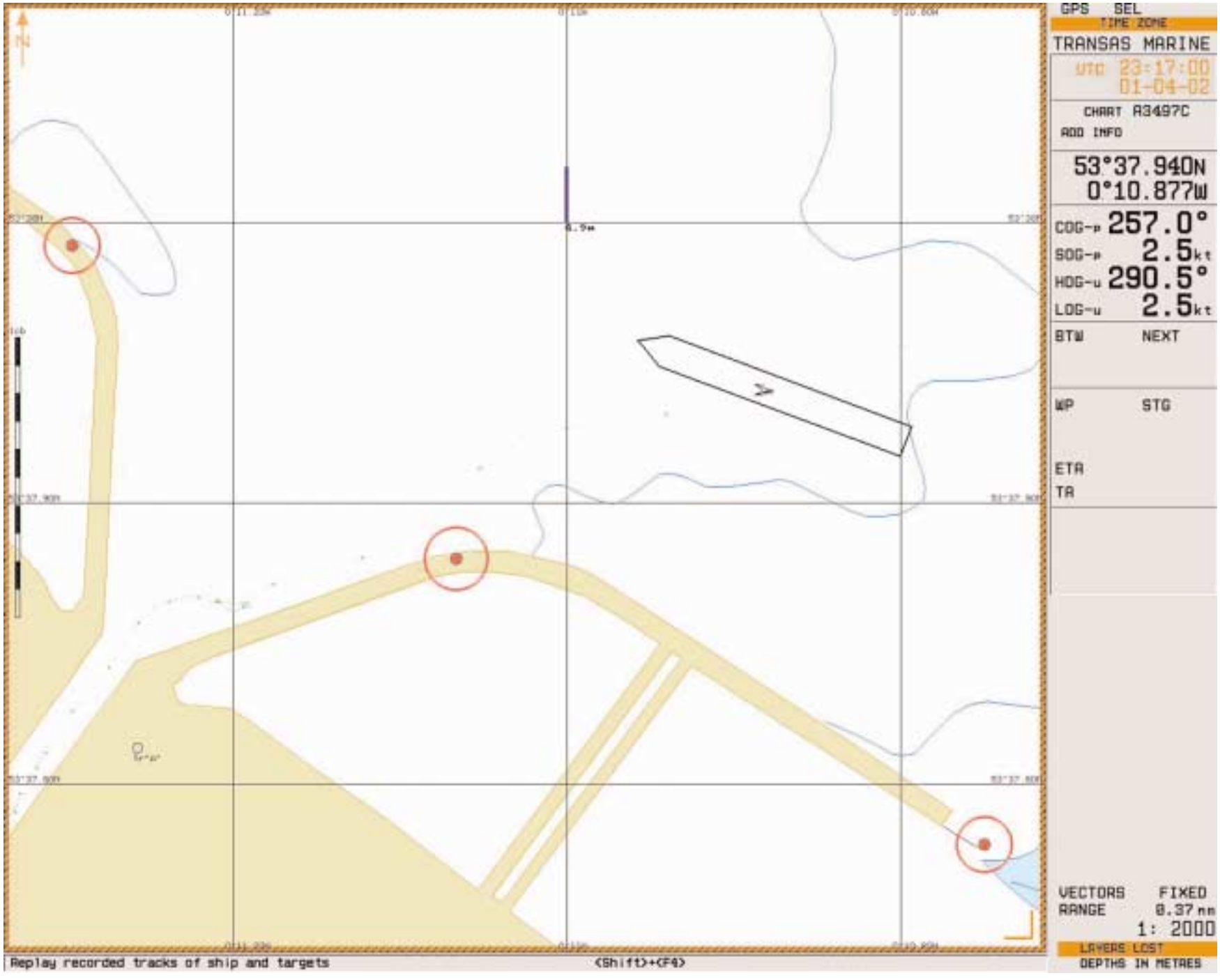
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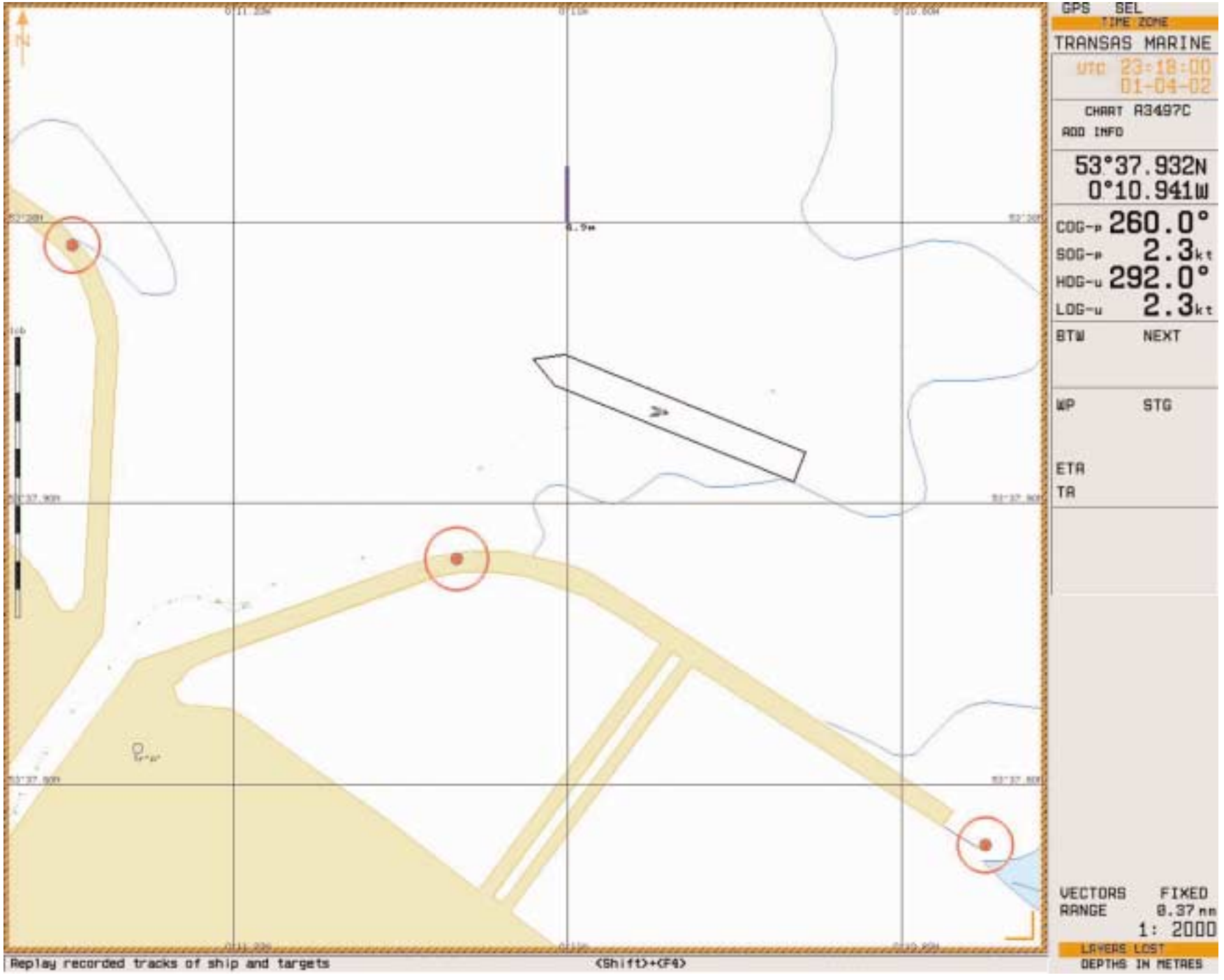
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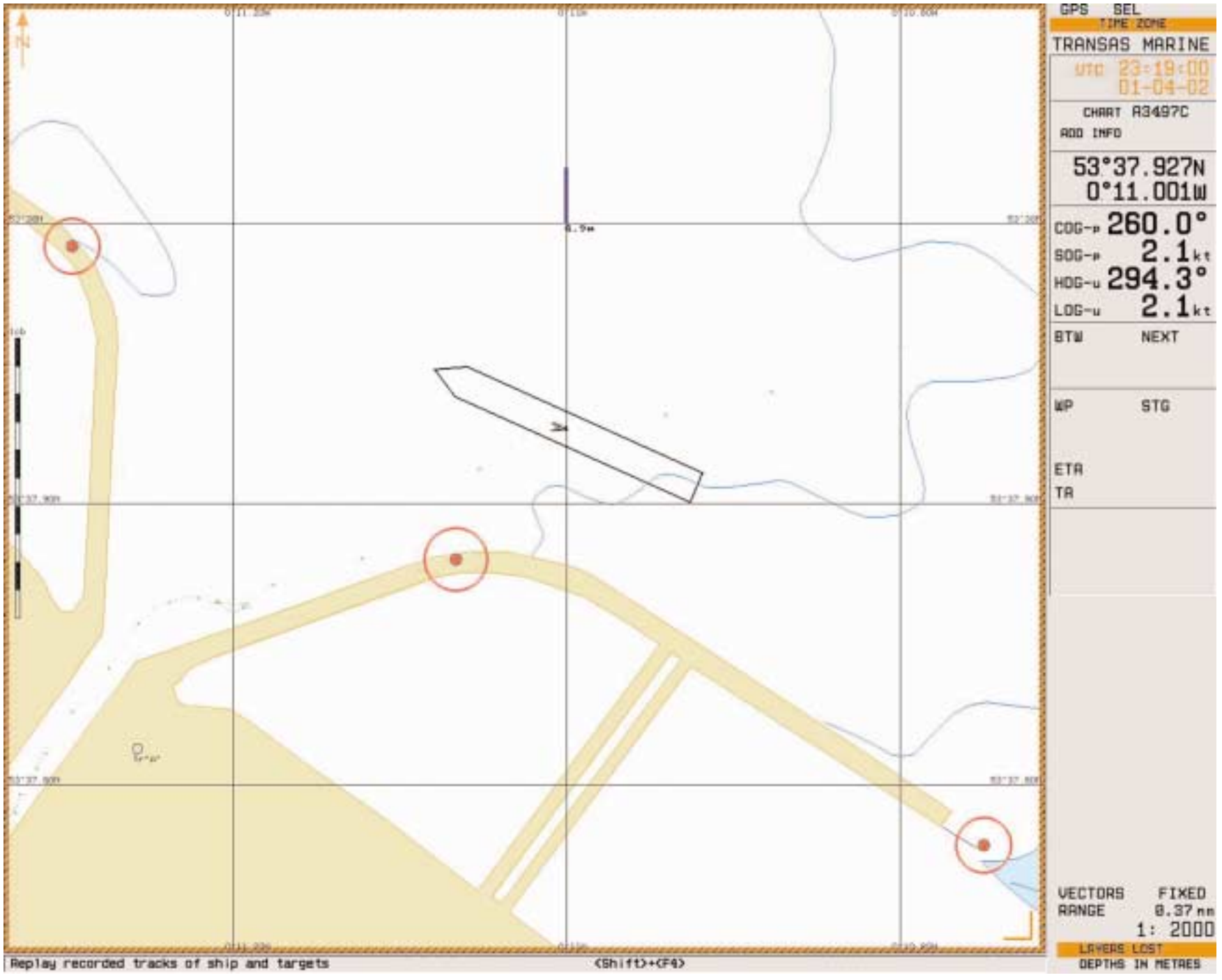
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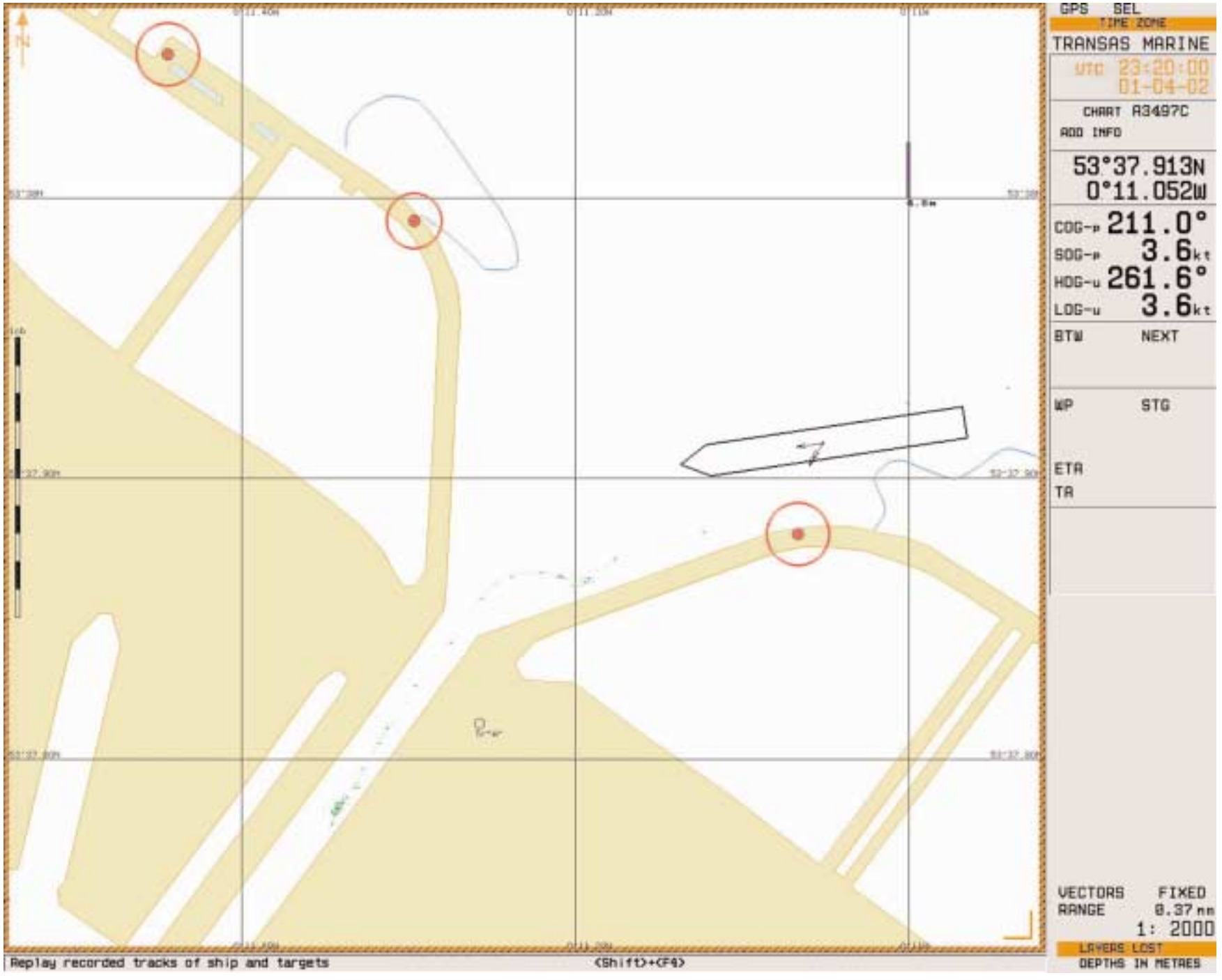
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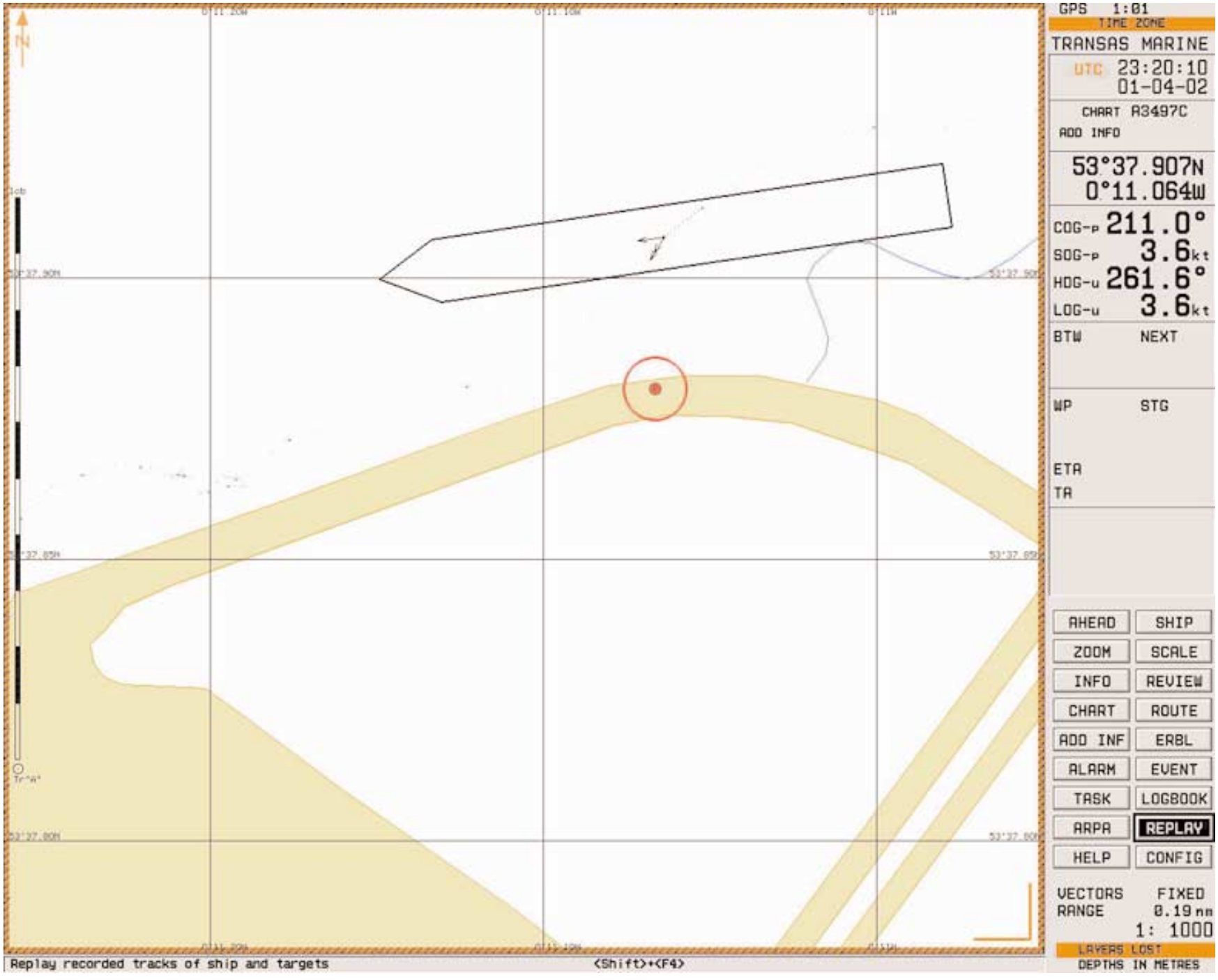
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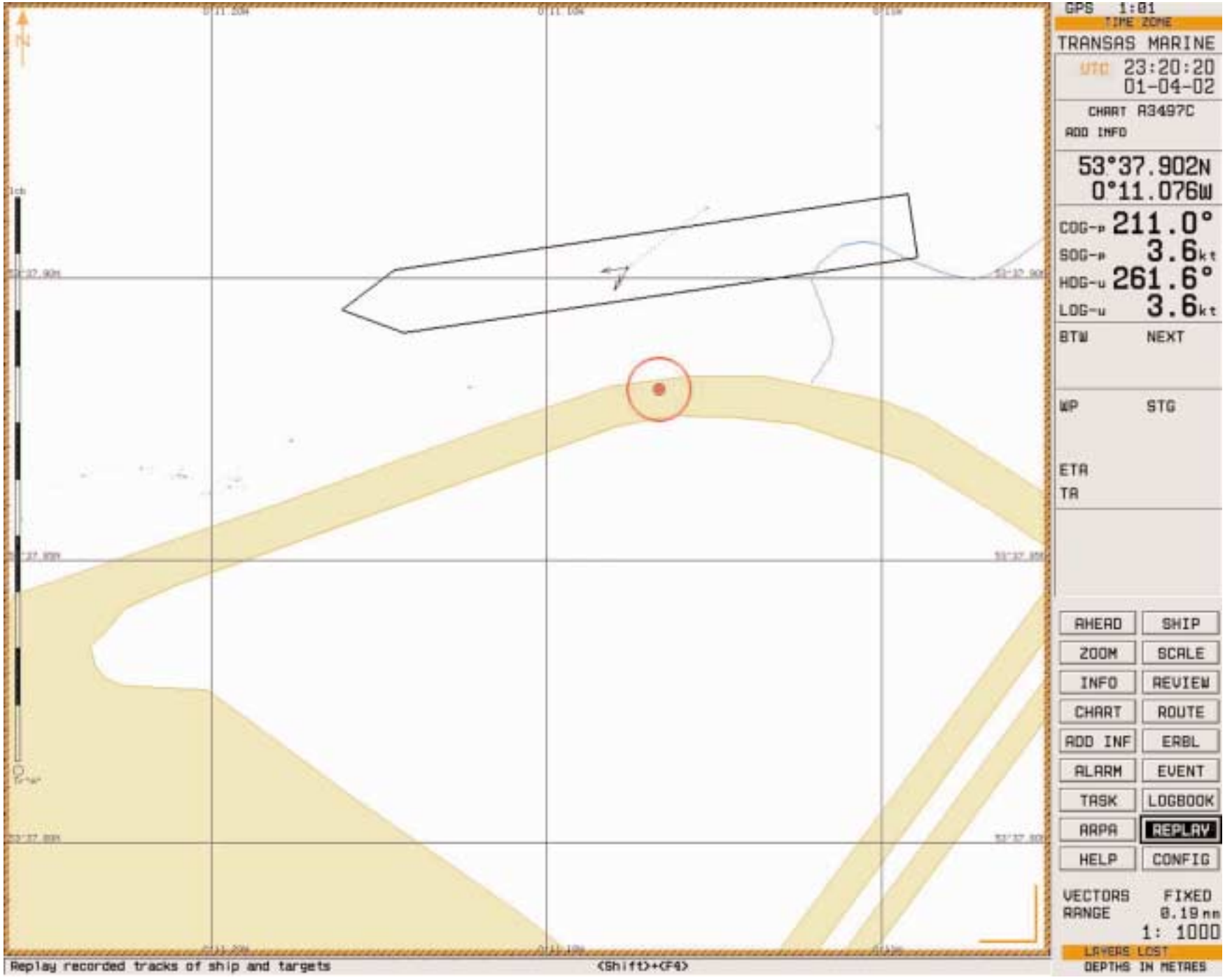
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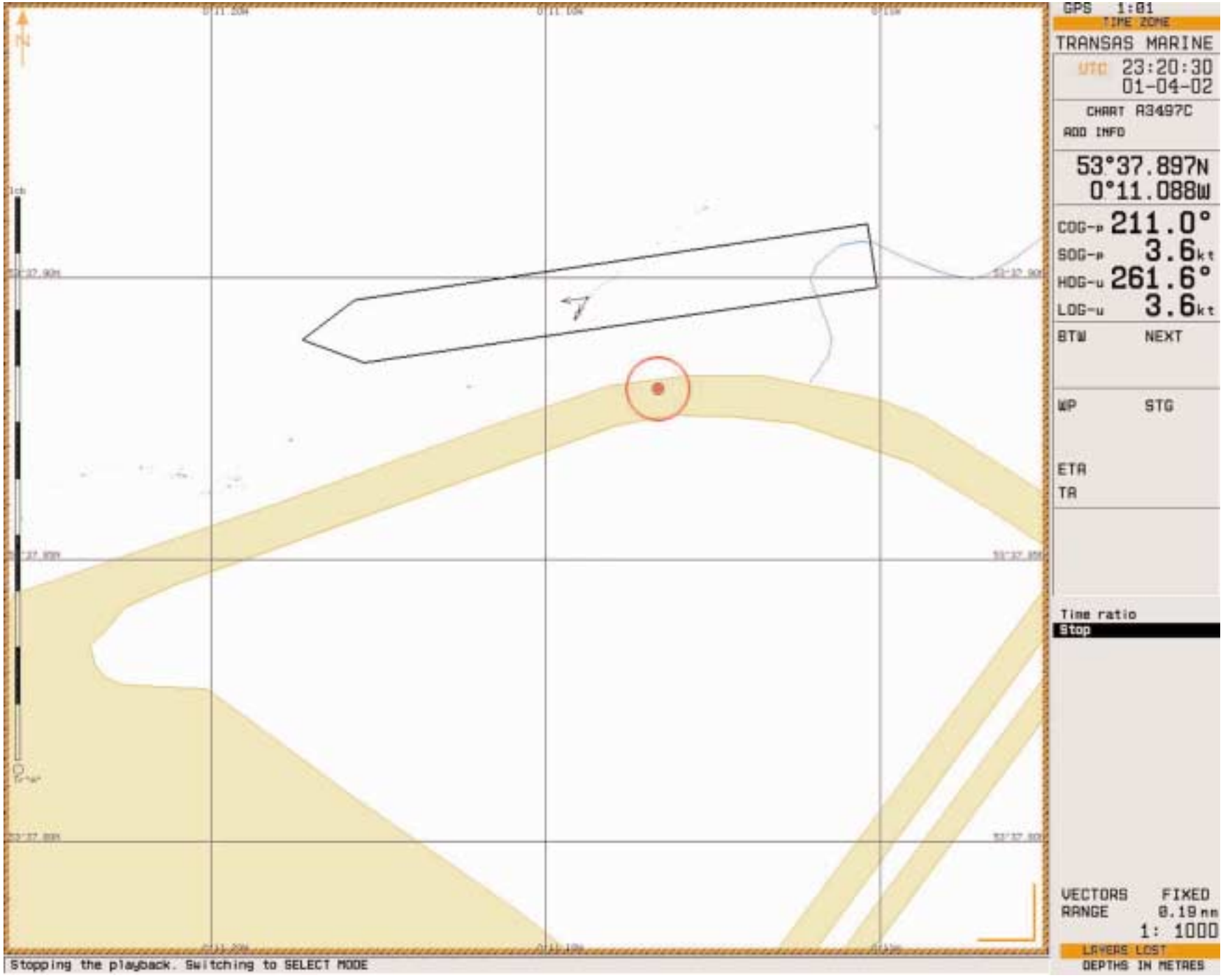
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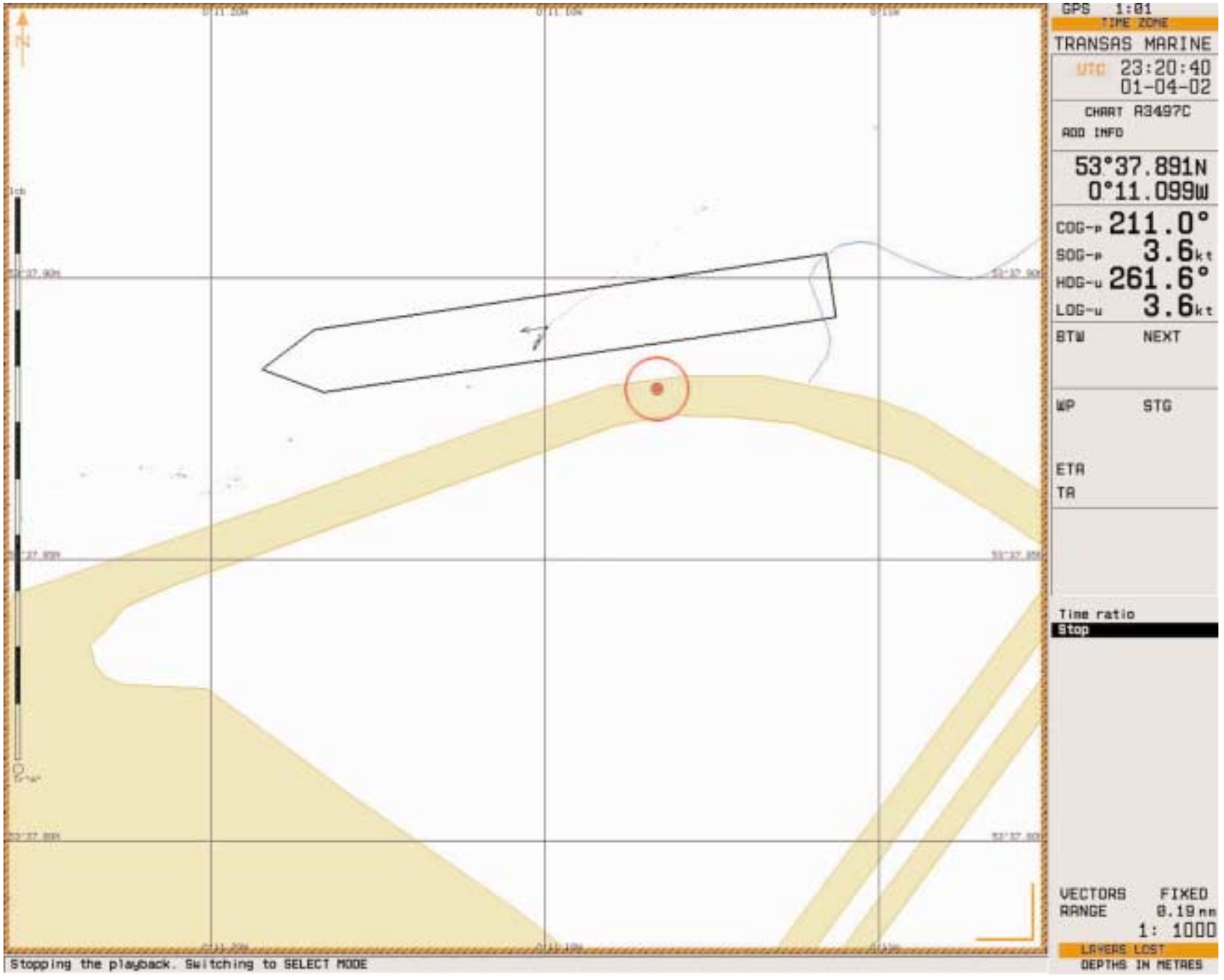
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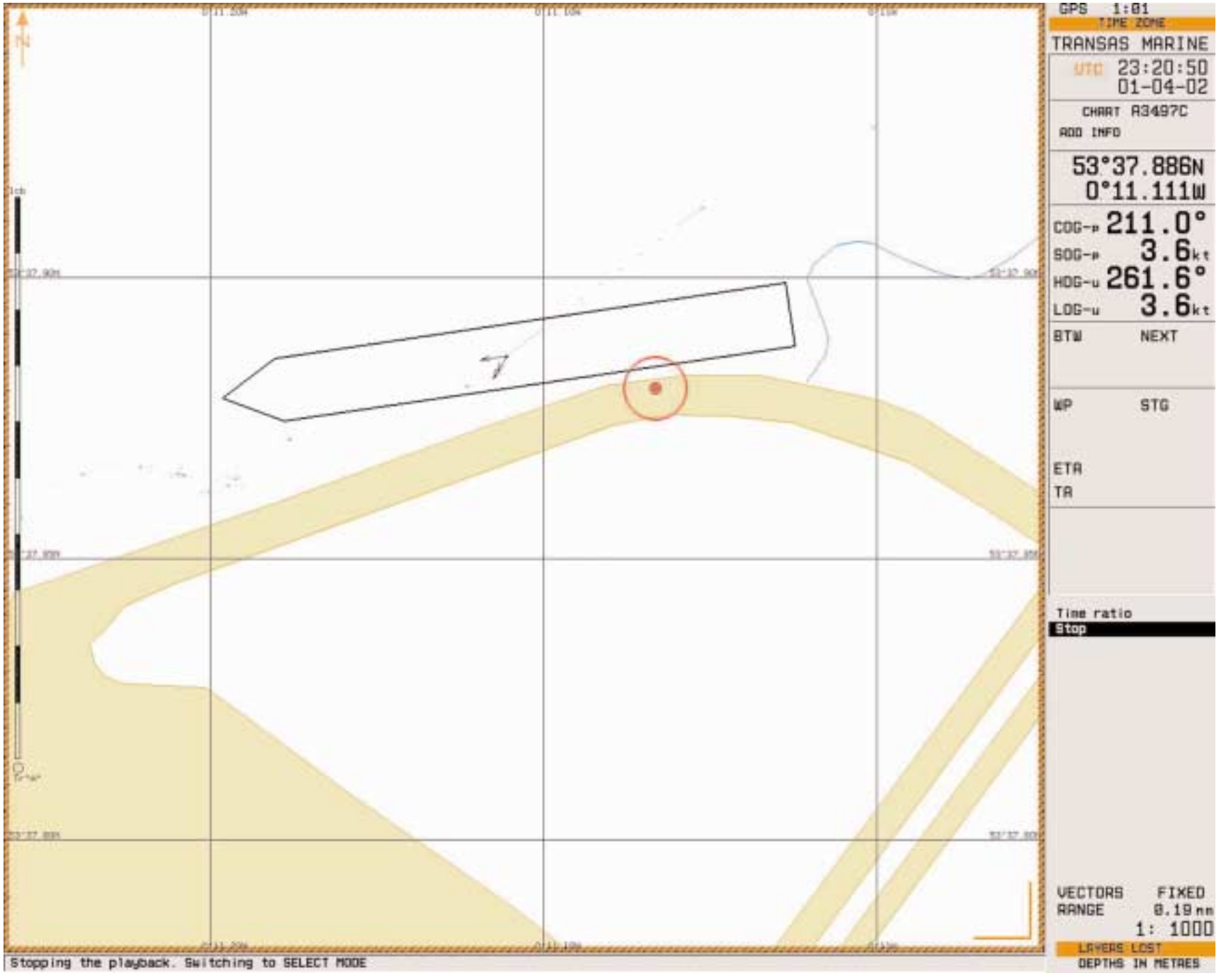
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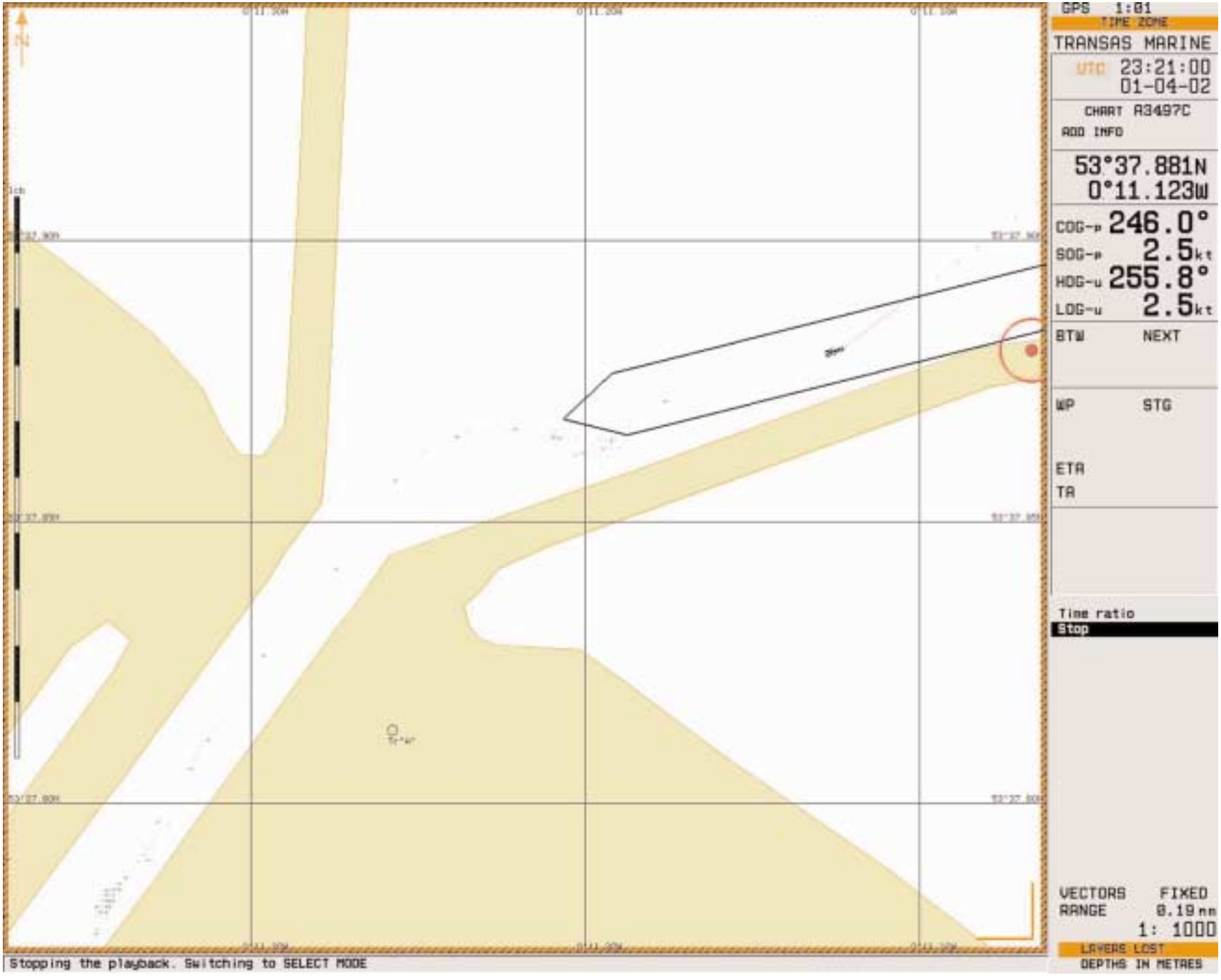
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