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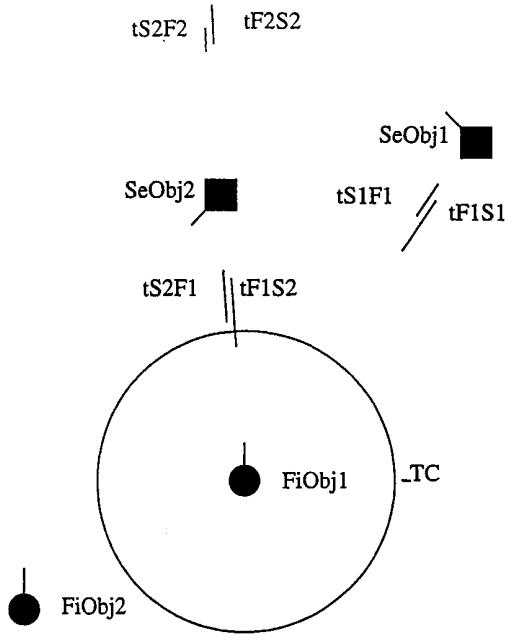
(54) Title: METHOD TO PRESENT THE THREAT SITUATION ON A DISPLAY



(57) Abstract: Method to present on a display at least one threat (tSF, tFS) between at least one first object, FiObj, and at least one second object, SeObj, characterized by that only one threat circle, TC, is presented on the screen for all the first objects, FiObj, and all the second objects, SeObj. The threats (tSF, tFS) are marked with symbols placed, in relation to the threat circle, in radial direction from the centre of the threat circle, TC, to respective second object, SeObj. The threat circle marks the boundary between the area inside the threat circle in which the threat exists and the area outside the threat circle in which the threat does not exist. The radial distance of the threat symbol, to the threat circle, constitute a measure, in suitable threat scale (time, length, etc.), of closeness to this transition.

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Method to present the threat situation on a display

The present invention is intended to present the threat situation on a display. The invention is intended to present civilian as well as military threats and others possible events between objects. An object can be an aircraft, an air-defence gun, a ship, an obstacle, etc. An example of a civilian threat is the risk for collision between aircraft. An example of a military threat is the risk for impact with a missile. An example of a military possible event is to get a sensor to lock on a target. Yet another civil possible event is the risk for a ship to collide with other ships and the risk to run aground.

The objects are divided into two groups, first objects and second objects. In a military combat situation between a first object (FiObj) and a second object (SeObj) it is interesting to know how to present the threat (tSF) to the first object (FiObj) from the second object (SeObj) and the threat (tFS) to the second object (SeObj) from the first object (FiObj). Important information is the position in space of the object, their performance (speed and so on) and the range of their weapons and so on.

An unsophisticated way to present the situation of the threat is to reproduce the space with the first object situated at the origin in a system of polar co-ordinates, where the distance to the others objects are marked. The threat in the shape of the range of the robots (missiles) can be marked with circles around respective object. Such presentation is, at least in complicated situations with several objects, difficult to rapidly estimate.

The idea is to solve the mentioned problem so that the observer gets a rapid overview of the total situation of the threat. The observer should also at the same time be able to decide quickly whether or not he is superior or inferior to the threat. Theirs goals are met by my invention as specified in the first claim below. Suitable implementation of the invention gives in the others claims.

The invention is characterised by a common circle, called the threat circle, TC, for all the objects, in the general case called the circle of possible events, in relation to which all the threats are presented. The invention is also characterised by that both the threat, tSF, to the first object, FiObj, from the second object, SeObj, and the threat, tFS, to the second object, SeObj, from the first object, FiObj, is marked with its own symbol located in the direction from the centre of the threat circle to the second object, SeObj. The latter makes it possible to overlay the picture of the threat situation plane on the plane of location and

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in the same time presents the true location and the true threat situation of the different objects.

The threat circle, TC, marks the boundary between the area inside the threat circle in which the threat exists and the area outside the threat circle in which the threat does not exist. The distance of the threat symbol to the threat circle tells nothing about how close in time the threat symbol is from crossing the threat circle. This, however, is obtained from the radial dynamics of the threat symbol together with their position in the threat situation plane.

The invention makes it possible to easy present the uncertainty in forming judgement of the threat, witch normally is important to show. In practice there is a lot of uncertain facts. E. g. in a military situation you do not know if the antagonist shall discover the firing of your robot and run away or continue on the same course. Also, you do not have complete information of the robotic ranges of the antagonist, perhaps even insecurity on the range of your own robot. Knowledge on the position and velocity of the antagonist can also be insufficient. All this insecurity and others can, fundamentally, be taken over into the radial range of the symbol in the threat situation plane.

The invention makes it possible to change the scale of the location plane and/or the scale of the threat situation plane. It is also possible to move the centre of the threat circle to a suitable position in the location plane and at the same time present the real positions and situations of the threat of the different objects.

The situation of the threat, i.e. the radial distance of the threat symbol to the threat circle, can, at least, be computed in three ways, each of which gives a certain form of presentation. Namely presentations with respect to normalized distance, distance and time.

In the normalized distance presentation mode, tSF is computed as the quotient of the distance from FiObj to SeObj and the range of the missile of SeObj. A value of tSF less than one leads to a position of the threat symbol inside the threat circle, otherwise the position is outside.

In the distance presentation mode, tSF is computed as the difference of the distance between FiObj and SeObj and the range of the robot of SeObj. A value of tSF less than

zero leads to a position of the threat symbol inside the threat circle, otherwise the position is outside.

Finally, in the time presentation mode, tSF is computed as the time it takes for SeObj, with preserved velocity, to move the distance to FiObj minus the range of the robot of SeObj. If the range of the robot of SeObj is greater than the distance between FiObj and SeObj, the threat situation, tSF, is positioned inside the threat circle, otherwise the position is outside.

The analogous is valid for the threat situation, tFS, of the second object, SeObj, concerning the computation of the threat situation.

The different kinds of presentations have different advantages and are dependent of the current applications. It can be suitable to use just as a particular mode of presentation. It is convenient to make it possible for the presentation equipment to change between the alternative modes of presentation.

The invention is to be described in more detail using the figures of this document. We now briefly describe these figures.

Fig. 1 shows a picture of the presentation of location,
Fig. 2 shows a picture of the presentation of the threat situation,
Fig. 3 shows the threat situation according to fig. 2 superposed (overlaid) on a picture of presentation of location,
Fig. 4 shows a picture of the threat situation superposed on a picture of presentation of location with two first objects,
Fig. 5 shows a picture of an one-sided threat situation to the second objects, SeObj, from the first objects, FiObj,
Fig. 6 shows a picture of the threat situation with insecurity in the threat,
Fig. 7 shows a picture of the threat situation superposed on a picture of presentation of location with the second objects (SeObj1 and SeObj2) close to and nearly at the same bearing, and finally
Fig. 8 shows another form of a representation of the threat situation with the second objects close to and nearly at the same bearing.

Below follows a description of the invention from an application inside a combat aircraft. However it is clear that the invention can be used also in other situations, military as well

as civilian, for similar presentations and it is my propose that this invention shall cover such applications.

One can present the threat, using each of the 3 modes. However all modes have a common threat circle for all displayed objects. The figures in the examples are valid for an arbitrary choice of any of the three modes.

Fig. 1 shows a picture of the presentation of location that can be used together with the picture of the presentation of threat. In fig. 1 the current location of one first object, FiObj, and two seconds objects, SeObj1 and SeObj2, are presented on a monitor, for example a tactic indicator. Of course there could be several first objects and second objects. It is appropriate that the symbol for the first object is different from the symbol of the second object. Even the colour should be different.

Fig. 2 presents a situation where the threats (tFS, tSF) are located, in relation to the common threat circle, TC, in radial direction from the centre of the circle to each respective second object. This is the main idea. The threat, tS1F, to FiObj from SeObj1 is marked with an unfilled ring in radial direction from the centre of the threat circle to SeObj1. The threat, tFS1, to SeObj1 from FiObj is also marked, with a filled ring, in radial direction from the centre of the threat circle to SeObj1. The circle tells us that the threat is imminent when the threat is inside the circle. In this case the object SeObj2 is a danger threat to the object FiObj, which is evident by the position of tS2F inside the threat circle. Fig. 2 shows also that FiObj is inferior to SeObj1 in the sense that tS1F is more close to the area inside TC, in which the threat exist, than tFS1.

A threat can be represented e. g. as a ring in the equipment of presentation. The threat can also be represented as a short line (bar). If you choose a bar instead of a ring to present the threat, you must decide on which end of the bar that indicates the threat position. In the case of rings as well as in the case of bars one may use different colours, for example blue for first threat situation, tSF, and red for second threat situation, tFS.

Fig. 3 shows that one may overlay fig. 1 and fig. 2 and at the same time represent both the true location and the threats for the different objects.

In the text above the threat has be represented for one first object, FiObj, and two second objects, (SeObj1, SeObj2). However, one may also represent the threat from several first objects in the same presentation of threat. Fig. 4 presents the threat, tS2F1, to FiOb1 from

SeObj2 and tF1S2 presents the threat to SeObj2 from FiObj1. The threat to FiObj2 from SeObj2 is denoted by tS2F2 and the threat to SeObj2 from FiObj2 is denoted by tF2S2. What restricts the number of objects is the fact that the display can be quite messy and difficult to interpret with many objects. It is, of course, possible to let a user choose which objects to display. After that the others are suppressed until new choices are made, after some time has passed or another simple criterion is fulfilled.

In fig. 4 the object FiObj2 is located deliberately at long range from SeObj1 in order to illustrate that its threat situation is not interesting and for that reason it is not necessary to be presented. It is evident from the figure that the threat, tF1S2, to SeObj2 from FiObj1 is imminent and that the same is valid for tS2F1. It is evident that SeObj2 is somewhat inferior to FiObj1 in the sense that tS2F1 is more close to the area outside TC, where the threat does not exist, than tF1S2. It is also evident that FiObj1 is somewhat inferior to SeObj1 in the sense that tS1F1 is more close to the area inside TC, where the threat exists, than tF1S1.

Likewise it is possible to allow the user to specify which threats shall be computed and presented, amongst a number of imaginable (thinkable) threats. The user can choose not to present some improbable threats, though they are possible, with the purpose of making the threat situation plane easy to interpret. An example of such a threat can be the threat from a long-range robot.

In the case that a picture of presentation of location shall be superposed, one must decide which of the first objects, if any, shall be located at the centre of the threat circle. There are several possibilities. Fig. 4 shows two first objects where none of them are placed at the centre of the threat circle. FiObj1 or FiObj2 could have been selected to lie at the centre or the centre could be selected to lie in some kind of mean value between the objects. Specially, in a case with a group of first objects that have weapons with larger ranges than the group spreading in space, it is appropriate to place the group in the centre of the threat circle. The equipment of presentation of threat can easily be designed so that relative transfer between the overlay pictures can be made.

Fig. 5 shows one-sided threat to second objects from first objects. It must be pointed out that there are two different scales in the same picture. One is the scale of the threat-situation plane and the other is the scale of the location plane of the objects. If, for example, in the threat situation plane 1 cm corresponds to 10 km then the threat, tF1S2, to SeObj2 from FiObj1 is placed about 15 km inside the robot range of FiObj1. This is

because the filled ring is placed about 1.5 cm from the threat circle inside it. In the plane of location 1 cm can, for example, corresponds to 5 km and consequently the distance between FiObj1 and SeObj2 is about 40 km.

If one wants to visualize the insecurity in the threat, which usually is important, then a short line (bar) is a suitable choose, where the length of the bar indicates the degree of insecurity. The insecurity of the threat can then be presented as a bar in radial direction where the probability that the threat is inside the threat circle is proportional to the quotient between the length of the part of the bar inside the threat circle and the length of the whole bar.

In fig. 6 the different lengths of the bars state the different degrees of insecurity. In the other figures equally long bars or rings are use meaning that the insecurity is either unknown or hidden. The threat, tF1S2, to SeObj2 from FiObj1 shows more insecurity than the threat, tS2F1, to FiObj1 from SeObj2 . The threat tF1S2 overlaps somewhat the area inside the threat circle, which means that there is a little probability that FiObj1 can impact SeObj2 when its missile is fired.

Normally, the threat, for example the threat from a missile by its range, is dependent of several factors like the flying altitude, the relative differences in altitude between aircraft, launch direction, etc. Fore those reasons the presentation is constantly changing with respect to the current threat distance, for example the range of the missile.

The presentation of the objects can be excellent as can be seen by the figures. The type of object is given by the symbol, which also gives the speed and direction of the speed vector, etc. In some cases with several objects and threats it is suitable, at least some time, to omit the objects to make the picture more easy to interpret. This can be done with an easy choice on the presentation.

If several others objects are lying near each other at almost the same bearing, it can be difficult to see witch symbol of threat belong to which object, as illustrated in fig 7. Fig. 8 shows how one may, by relative removal of the two pictures, render the presentation more clear. If the centre of the threat circle moves near SeObj1 and SeObj2, then the angle difference between the objects, as seen from the centre of the threat circle, is bigger and consequently threat bars are more separated in angle.

In order to more easily estimate the radial position of the different threats symbols on the display in relation to the threat circle (TC), one or more concentric circles, with respect to the threat circle, can be placed on the display.

It has in the beginning been mentioned that the invention can be used even for civilian air traffic. The reason for that is, of course, that every aircraft in the neighborhood of the own aircraft gives a potential risk of collision. Likewise the own aircraft is a potential risk of collision against nearby aircraft. Proximity to a stationary object constitutes also a risk, the closer the bigger.

The advantage with this presentation, apart from what already has been mentioned, is that one can define the meaning of the risk an aircraft can be exposed to. This risk can be different for different aircraft, and still have the same threat circle for all the aircraft involved.

Ultimately, one must remember that the threat circle can, more generally, be called the event circle (TC). Inside the event circle it is assumed that possible events occur while outside it, possible events do not occur.

I claim:

1. Method to present on a display at least one threat (tSF, tFS) between at least one first object, FiObj, and at least one second object, SeObj, characterized by that only one threat circle (TC) is presented on the screen for all the first objects, FiObj, and all the second objects, SeObj, and that the threats are marked with symbols placed, in relation to the threat circle, in radial direction from the centre of the threat circle to respective second object, SeObj, whereby the threat circle marks the boundary between the area inside the threat circle in which the threat exists and the area outside the threat circle in which the threat does not exist, and where the radial distance of the threat symbol, to the threat circle, constitute a measure, in suitable threat scale (time, length, etc.), of closeness to this transition.

2. Method according to claim 1, characterized by that tSF and tFS are presented with different colours.

3. Method according to any of the previous claims, characterized by that the insecurity in the position of the threat, in relation to the threat circle (TC), is presented by a bar that states, with its radial range, where the threat is located.

4. Method according to any of the previous claims, characterized by a picture that with symbols shows the geographic position of first objects (FiObj) and second objects (SeObj) superposed on the threat situation plane.

5. Method according to any of the previous claims, characterized by that the threat situation is presented as a picture that presents the normalized distance to the threat circle.

6. Method according to any of claims 1 - 4, characterized by that threat situation is presented as a picture that presents the distance to the threat circle.

7. Method according to any of claims 1-4, characterized by that the threat situation is presented as a picture that presents the time to the threat circle.

8. Method according to any of the previous claims, characterized by that threat is a possible event and that the threat circle is an event circle (TC) that marks the boundary

between the area inside the event circle in which the possible event happens and the area outside the event circle in which the possible event does not happen.

AMENDED CLAIMS

[received by the International Bureau on 18 April 2001 (18.04.01)
original claims 1-8 replaced by new claims 1-11 (2 pages)]

1. Method to present at least one possible event, between at least two objects, on a display, characterised by a common possibility (event) circle (TC), for all the objects, in relation to which all the possible events are presented.

2. Method according to claim 1, characterised by that the possible events are marked with symbols placed in radial direction from the centre of the possibility circle.

3. Method according to any of previous claims, characterised by that the possible events between at least one first object, FiObj, and at least one second object, SeObj, are placed from the centre of the possibility circle in direction to respective second object, SeObj.

4. Method according to any of the previous claims, characterised by that the possibility circle marks the boundary between the area, inside the possibility circle, in which the possible events are possible (happen) and the area, outside the possibility circle, in which the possible events are not possible (do not happen), and where the radial distance of the possible event symbols, to the possibility circle, constitute a measure, in suitable possibility scale (time, length, etc.), of closeness to this transition.

5. Method according to any of the previous claims, characterised by that the possible events to at least one first object and the possible events to at least one second objects are presented with different colours.

6. Method according to any of the previous claims, characterised by that the insecurity in the position of the possible events, in relation to the possibility circle (TC), are presented by bars in the radial directions inside of which the possible events are located.

7. Method according to any of the previous claims, characterised by a picture that with symbols shows the geographic position of first objects (FiObj) and second objects (SeObj) superposed on the plane of possible events.

8. Method according to any of the previous claims, characterised by that the plane of possible events is presented as a picture that presents the normalised distances to the possibility circle.

9. Method according to any of claims 1 - 7, characterised by that the plane of possible events is presented as a picture that presents the distances to the possibility circle.

10. Method according to any of claims 1-7, characterised by that the plane of possible events is presented as a picture that presents the times to the possibility circle.

11. Method according to any of the previous claims, characterised by that the possible events are threats and that the possibility circle is a threat circle (TC) that marks the boundary between the area inside the threat circle in which the threats exist and the area outside the threat circle in which the threats do not exist.

Statement under article 19(1).

The claim 1, as original filed, is not the main idea of the invention. This claim encloses several attributes of the method of presentation such as the common threat circle, which is the main idea. The old claim 1 describes an important, and frequent by occurring, case in where the objects are divided into two groups, e.g. enemy and friends or first objects and second objects. In such a case the centre of the threat circle can be put at the position of the object carrying the presentation equipment, here called the first object. Then the threat symbols can be put in direction from the centre of the threat circle to respective second object. However, my intention is to consider all possible cases and not just this particular example. The original claim 1 is now divided into four amended claims (1 - 4). I comment the amended claims (1 - 3).

Amended claim 1.

The main idea of the invention is a common threat/possibility circle. The basic thing of the invention is that if there are several threats/possible-events to consider between objects, that can be located at random in space, then all the threats/possible-events are presented in relation to the same threat/possibility circle. In this way, at each time instant, all the threats/possible-events will be shown in such manner that they can be compared using the single threat/possibility circle. Then it will be easy to make rational decisions and, before all, take care of the most important threats/possible-events. In this presentation the geographical range of the objects representing threats/possible-events is not shown but only how significant the threat/possible-event is. As an extension to the mentioned presentation the geographical positions of the objects can be shown overlaid in the same picture but this has actually nothing to do with the invention.

Amended claim 2.

It is clear, as a consequence of using a common threat circle for all the objects, that the threat symbols can be placed in arbitrary radial directions from the centre of the threat circle. This is the case when e.g. the radial directions to the objects are unknown or the radial directions to the objects are considered irrelevant.

Amended claim 3.

As a consequence of the main idea, the common threat circle, the threats between two objects (first object, second object) can be placed in the same direction, e.g. in the direction to one of the objects, then it is easier to estimate which of the two objects is superior. In the

example of the description, as well as in the corresponding part of the old claim 1 and in this claim, the threats are placed in direction to respective second object.

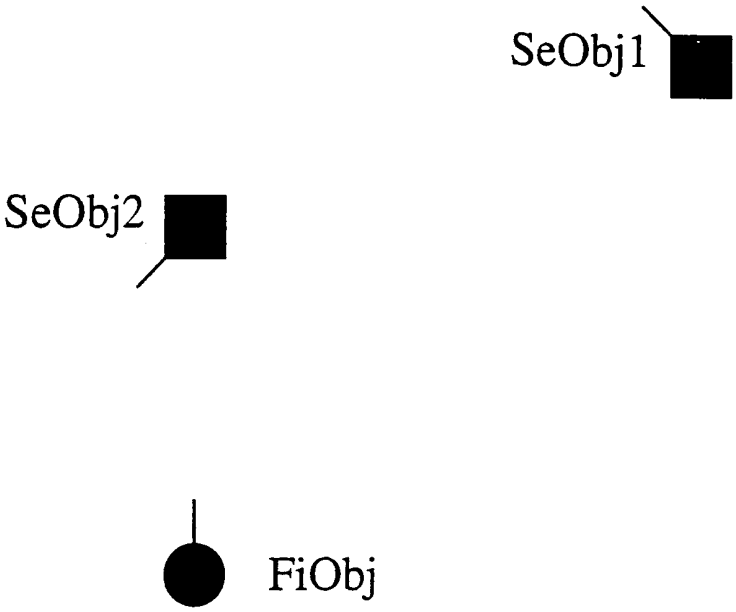


Fig 1

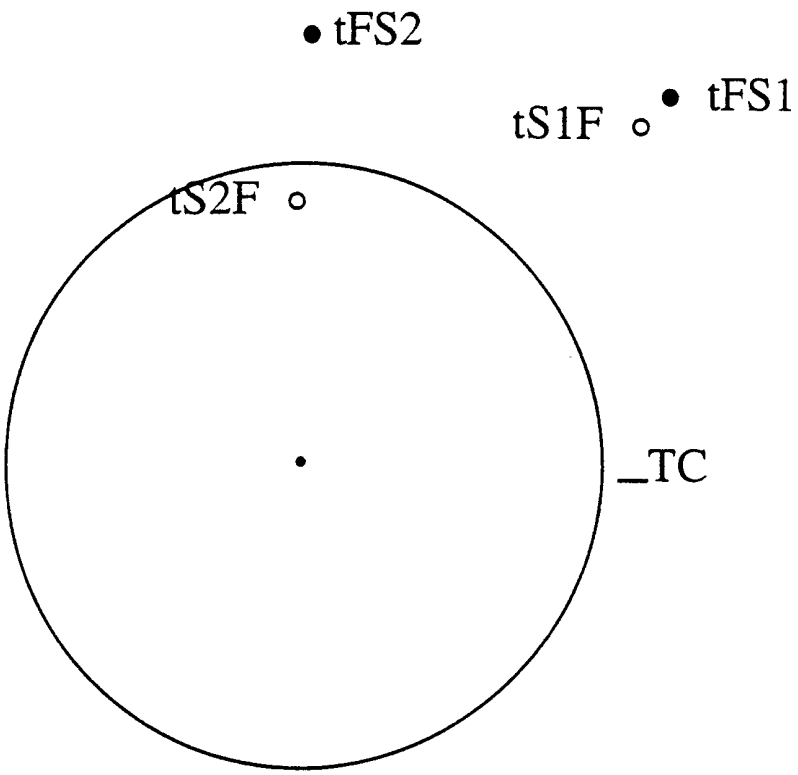


Fig 2

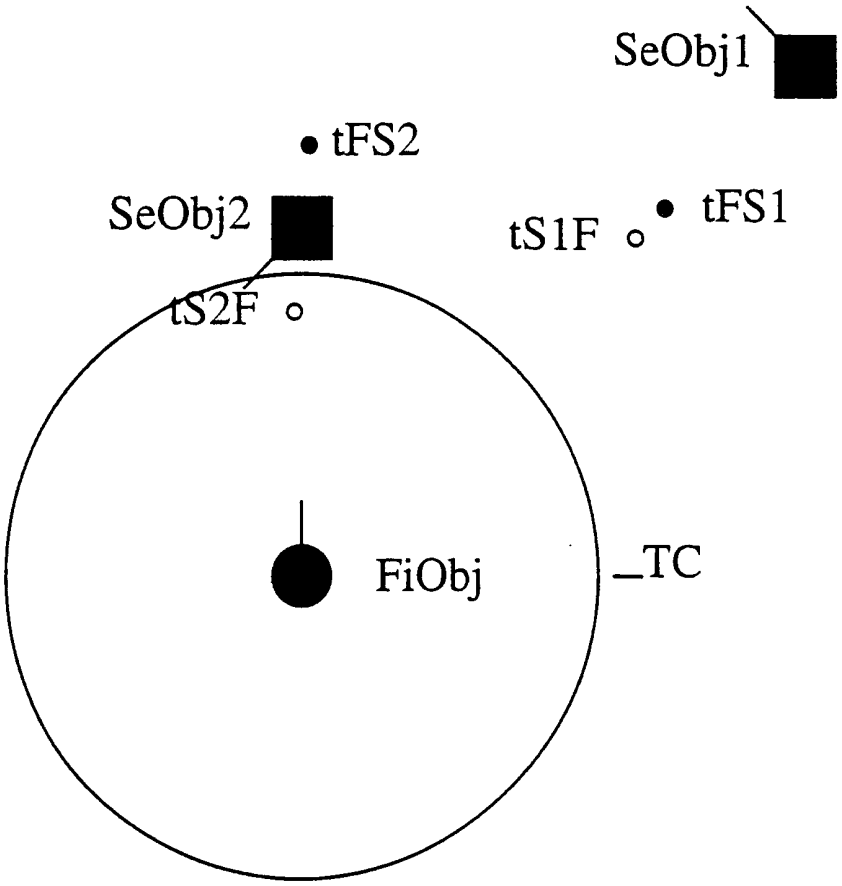


Fig 3

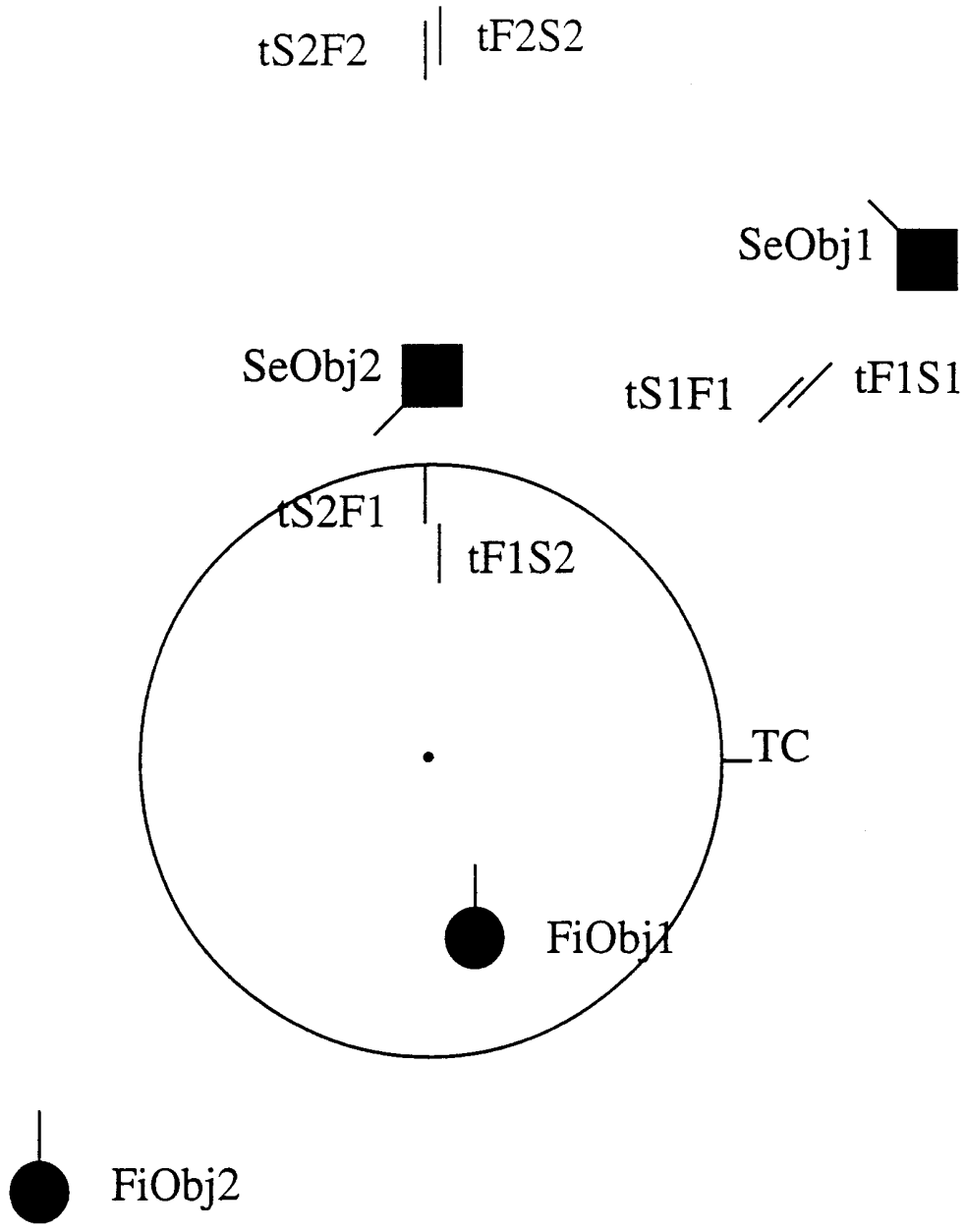

tS2F2
tF2S2
SeObj1
SeObj2
tS1F1
tF1S1
tS2F1
tF1S2
TC
FiObj1
FiObj2

Fig 4

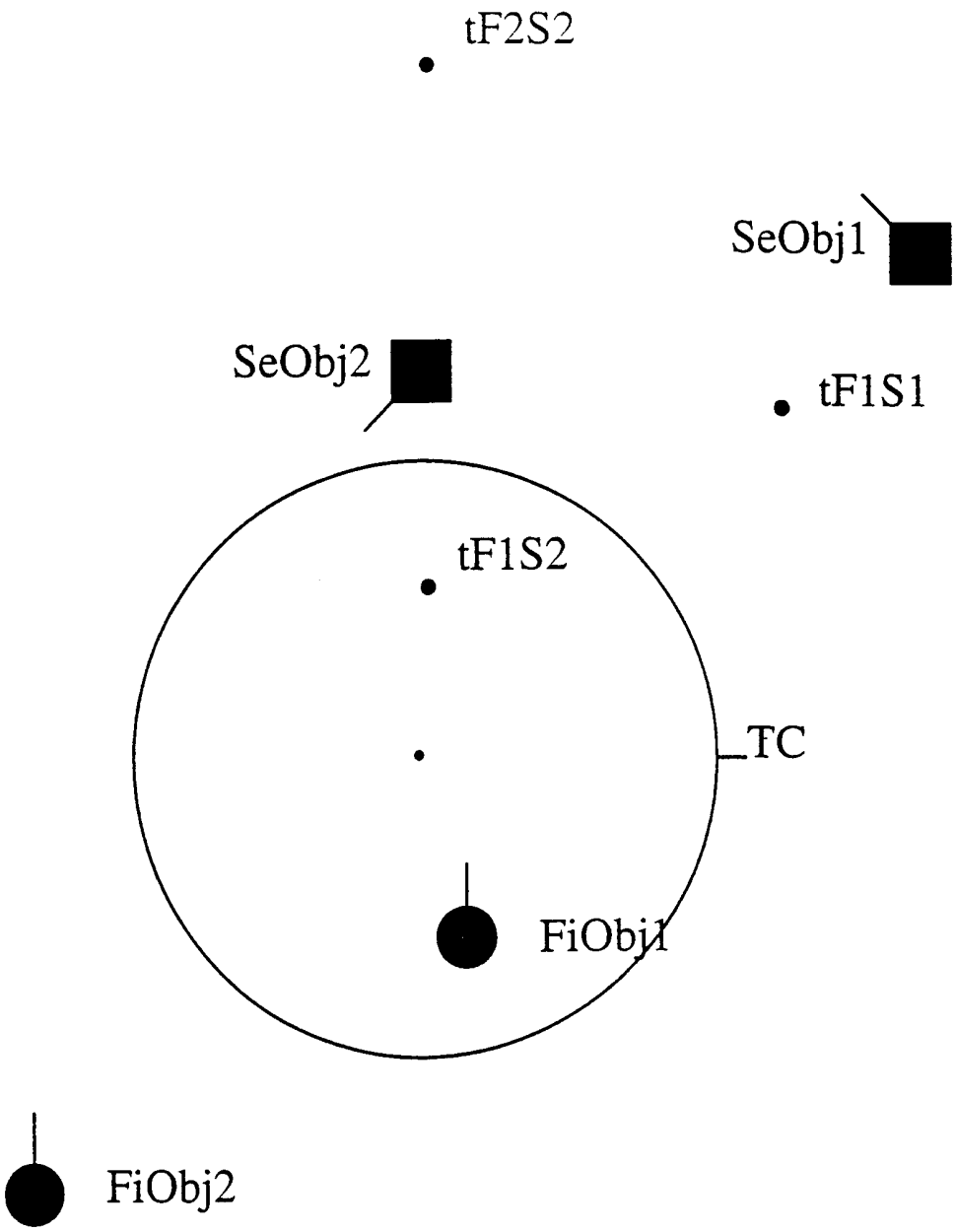
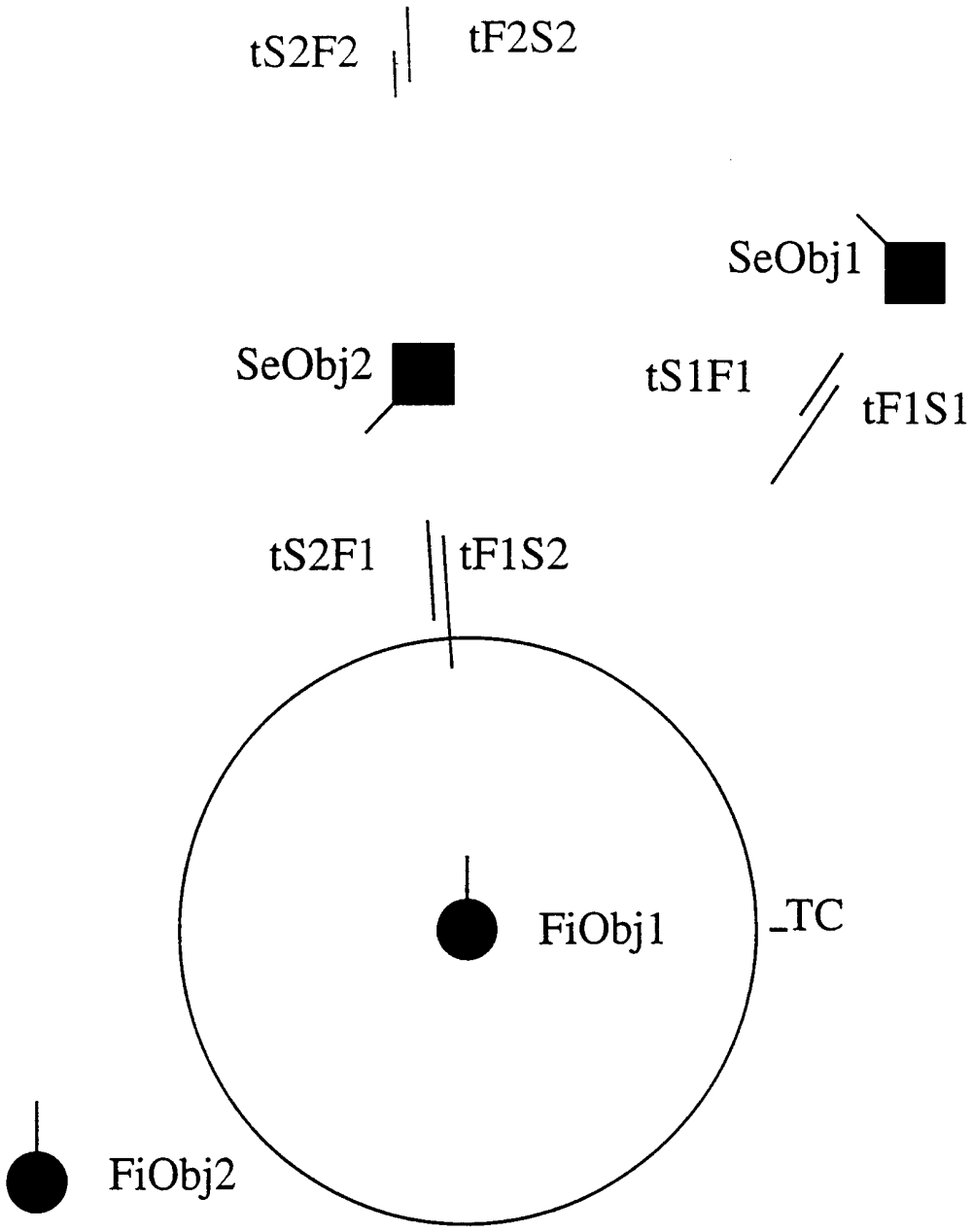


Fig 5


tS2F2
tF2S2
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SeObj2
tS1F1
tF1S1
tS2F1
tF1S2
FiObj1
TC
FiObj2

Fig 6

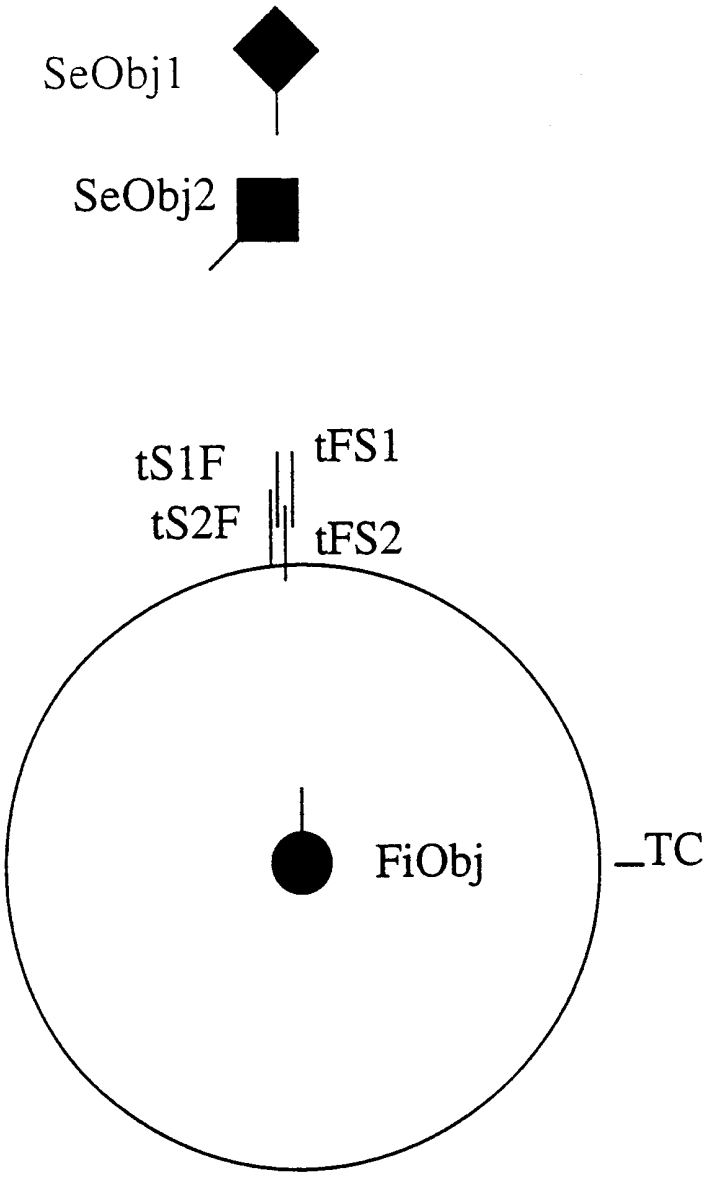

Fig 7

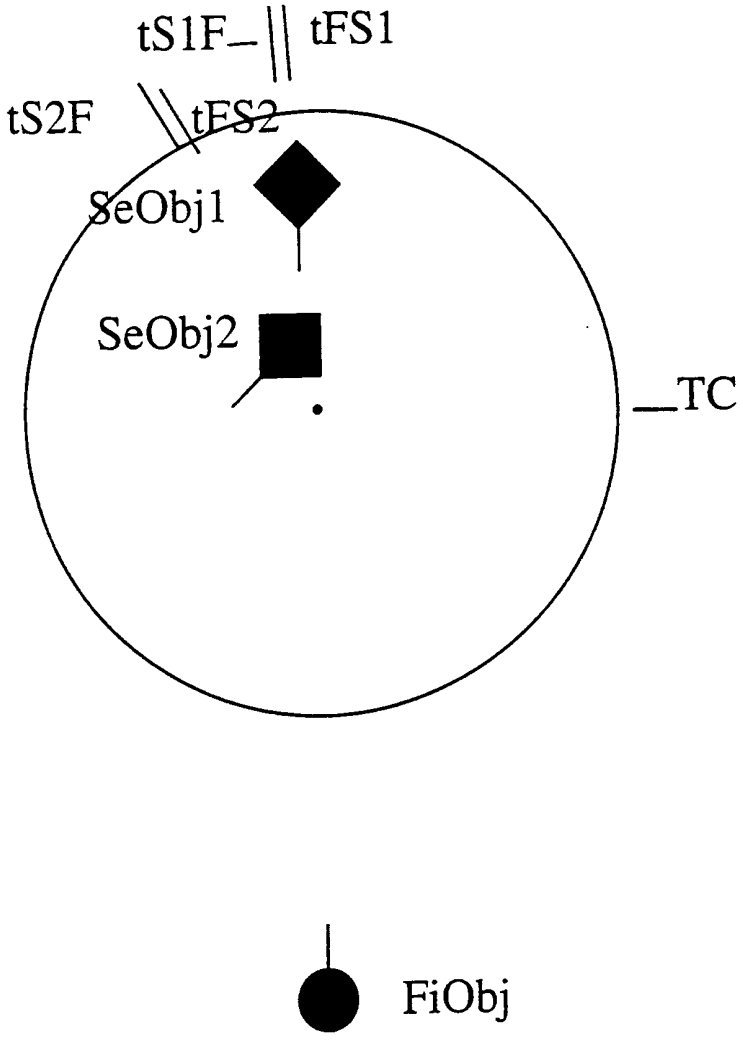

Fig 8

INTERNATIONAL SEARCH REPORT

Inter...ional Application No
PCT/IB 00/01580

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06T11/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 853 700 A (FUNATSU CHUHEI ET AL) 1 August 1989 (1989-08-01) claim 1; figures 5,6 ---	1-8
A	EP 0 928 952 A (DASSAULT ELECTRONIQUE) 14 July 1999 (1999-07-14) claim 17 ---	1-8
A	DEGRE T ET AL: "A new anti-collision system" NAVIGATION, OCT. 1980, FRANCE, vol. 28, no. 112, pages 412-425, XP000986511 ISSN: 0028-1530 page 421, paragraph 5 - paragraph 7; figure 4 --- -/--	1-8

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 March 2001	02/04/2001

Name and mailing address of the ISA	Authorized officer
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1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	HERTHER J C ET AL: "A fully automatic marine radar data plotter" JOURNAL OF THE INSTITUTE OF NAVIGATION, JAN. 1971, UK, vol. 24, no. 1, pages 43-49, XP000981890 ISSN: 0020-3009 page 47, paragraph 3 - paragraph 4 ---	1-8
A	WO 95 19545 A (HONEYWELL INC) 20 July 1995 (1995-07-20) ---	
A	PETTERSSON G ET AL: "Temporal decision support and datafusion in BVR-combat" PROCEEDINGS OF EUROFUSIO 98. INTERNATIONAL DATA FUSION CONFERENCE, PROCEEDINGS OF EUROFUSION 98. INTERNATIONAL DATA FUSION CONFERENCE, GREAT MALVERN, UK, 6-7 OCT. 1998, pages 71-75, XP000981852 1998, Malvern, UK, DERA, UK -----	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. ational Application No
PCT/IB 00/01580

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4853700 A	01-08-1989	JP 61105700 A	23-05-1986
		EP 0200787 A	12-11-1986
		GB 2181616 A,B	23-04-1987
		GB 2201062 A,B	17-08-1988
		WO 8602761 A	09-05-1986
EP 0928952 A	14-07-1999	FR 2773609 A	16-07-1999
		JP 11259799 A	24-09-1999
WO 9519545 A	20-07-1995	CA 2181458 A	20-07-1995
		EP 0740773 A	06-11-1996
		JP 9507713 T	05-08-1997