ORDER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AVIATION STANDARDS NATIONAL FIELD OFFICE

VN 8260.4

11/25/86

SUBJ: ILS OBSTACLE RISK ANALYSIS

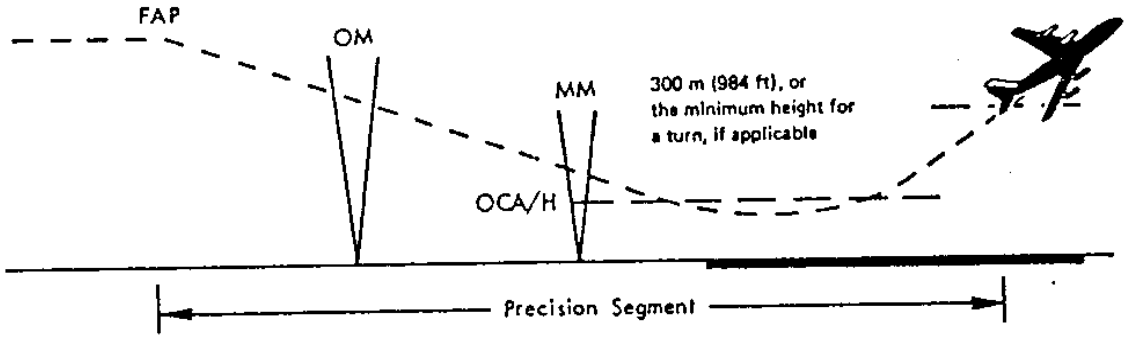
1. PURPOSE. This order provides direction for processing the Collision Risk Model (CRM) and using the CRM to analyze obstacles located in and near the precision approach and straight portion of the missed approach obstacle clearance areas.

2. DISTRIBUTION. This order is distributed to the Flight Inspection Field Offices (FIFO's); Flight Procedures Branch, AVN-220; Flight Procedures Standards Branch, AFS-230; Flight Simulation Technical Unit, AAC-954B; and Regional Flight Standards Divisions (EUFS Staff). (Distribution by AVN-210).

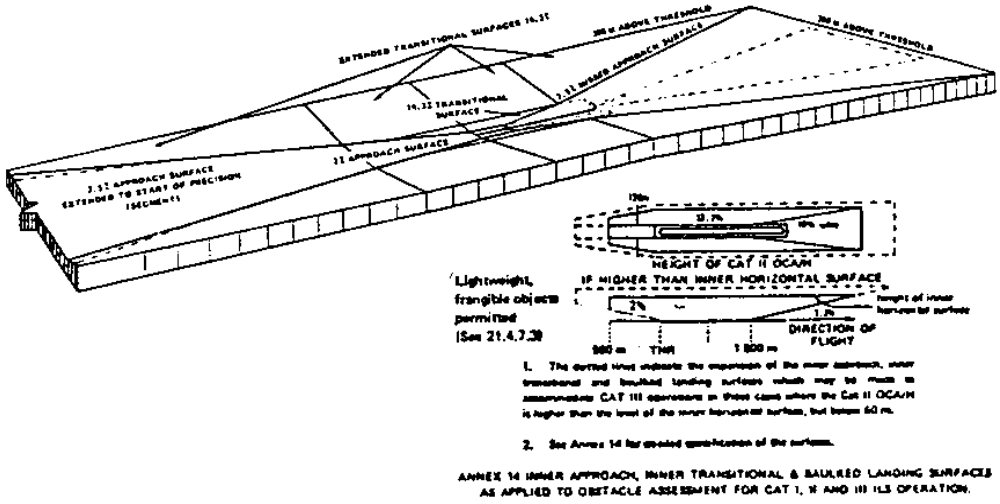
3. CANCELLATION. Order FSNFO 8260.4A, ILS Obstacle Risk Analysis, is canceled.

4. BACKGROUND. The development of Instrument Landing System (ILS) approach and missed approach obstacle surfaces for the International Civil Aviation Organization (ICAO) brought to light the need for a method of measuring in simple terms the effect of obstacles in the approach, missed approach, and transitional areas of ILS procedures. Flight track data were recorded for analysis in the United States, United Kingdom, Germany, and the Netherlands. Over 2,000 Instrument Flight Rules (IFR) approaches made by aircraft under Instrument Meteorological Conditions (IMC) were logged. Based upon these data, the CRM was developed. The CRM is a computer program that calculates a numerical risk for the precision segment of an ILS approach. The risk is calculated for that portion of the approach after the aircraft is established on the final approach course from the precision final approach fix (PFAF) until the aircraft reaches the decision height (DH), and for the straight portion of the missed approach. The CRM DOES NOT consider the risk associated with the visual descent below the DH and with the landing. A complete description of the program and instructions on its use, including the precise format of both data required as input and output results, are given in ICAO Document 9274-AN/904, Manual on the Use of the CRM for ILS Operations.

5. APPLICATION. A risk analysis is not necessary if an approach meets the criteria in Order 8260.3B, United States Standard for Terminal Instrument Procedures (TERPS), and Advisory Circular 120-29, Criteria for Approving Category I and Category II Landing Minima for FAR-121 Operators. If obstacles penetrate the surfaces, a waiver to approve a precision approach procedure may be requested under Order 8260.3B, paragraph 141, if an equivalent level of safety can be identified to support the waiver. A CRM must be processed for each nonstandard precision approach procedure. However, the result CANNOT be used as the sole basis for an equivalent level of safety. When numerous obstacles are constructed, or proposed for construction in the approach areas, their cumulative effect on the risk level may derogate safety even when they do NOT penetrate the surfaces.



Profile



ILS Surfaces

Figure 1. Precision Approach.

The risk analysis may be used to identify this problem when surveys and airport airspace analyses are conducted.

6. PROCEDURES TO PROCESS A CRM. When certified, Instrument Approach Procedures Automation (IAPA) will be used to process the CRM and record the obstacles. Until IAPA is available, a request for a CRM may be submitted to the Standards Development Branch, AVN-210.

a. ALL obstacles in the approach and the straight portion of the missed approach areas (including the transition areas) shall be placed in the work file, NOT the controlling obstacle alone.

b. Taxiways meeting U.S. standards need not be considered to the extent that the CRM is required to determine the acceptability of taxiing aircraft. However, for the purpose of the CRM analysis, the holding bays will be considered to be occupied with the largest aircraft expected or intended to use the airport.

c. Obstacles should not be eliminated from consideration on the basis of shadowing. Shadowing is taken into account by the CRM. The concept of shadowing modifies an individual obstacle in such a way that the risk of that modified obstacle is no longer influenced by surrounding obstacles.

d. Obstacles will be analyzed by the CRM, individually, and as a total group. The information will be extracted and the risk level of the procedure identified in terms of probability function. If the TOTAL RISK LEVEL OF THE PROCEDURE is significant (greater than 1×10^{-7}), alternative means of improving the procedure should be considered.

7. SPECIFIC INSTRUCTIONS. Specific instructions are provided in the attached extracted Part 1 of ICAO Document 9274-AN/904 included as appendices 1, 2, 3, 4, and 5.

a. Appendix 1 discusses modeling of obstacles and describes coordinate systems. They are artificially treated in the form of a "spike" or a "wall." It is important to remember that they have height and width for CRM application, but they do not have length. It is, therefore, necessary to represent a solid obstacle such as a building or a hill as a series of cross-sections. Detailed instructions are shown in this appendix.

b. Appendix 2 is a sample CRM request form. This form should be carefully completed when submitting data for a CRM study. This form may be photocopied.

c. Appendix 3 provides instructions for completion of the CRM request form. Disregard references requiring use of ICAO PANS-OPS. (OCA/H is DH/HAT)

d. Appendix 4 is an example of a CRM printout.

e. Appendix 5 identifies CRM error and warning limits.

8. CRM AREAS. Figure 1 shows the profiled and pictured areas of the CRM. It also illustrates the plan view and profile view of Annex 14 inner approach, inner transitional, and baulked landing surfaces, as applied to obstacle assessment for CAT I, II, and III ILS operations, which commonly are referred to as the obstacle free zone.

9. STANDARD AIRPLANE DIMENSION. The standard airplane dimensions on which the CRM is developed are 98.5 feet semispan, and 19.7 feet vertical distance between the flightpaths of the wheels and the glidepath antenna. In some cases, the risk associated with aircraft which are other than the standard dimensions should be considered. To obtain the risk for an airplane with a different distance between the glidepath antenna and the wheels refer to Order 8260.34, Glide Slope Threshold Crossing Height Requirements.

Robert L. Goodrich

ROBERT L. GOODRICH
Director, Aviation Standards
National Field Office

Modelling of Obstacles and Description of Coordinate Systems

1 INTRODUCTION

1.1 The Collision Risk Model (CRM) requires position and dimension data for all relevant obstacles. The data can be entered in the coordinate system (x, y, z) of Part II, Figure II-2-2 directly or in another coordinate system (see 5 below) to be converted into the (x, y, z) coordinate system. In order to simplify discussions, obstacle description will be considered in the (x, y, z) coordinate system only.

2 DESCRIPTION OF ARTIFICIAL OBSTACLES

2.1 For processing by the CRM, obstacles must be of a specific form (see Figure I-A-1); namely they are either

- "spike" obstacles defined by the coordinates (x_k, y_k, z_k), or
- "wall" obstacles defined by the coordinates $(x_k, y_{k_1}, y_{k_2}, z_k)$.

Either way, when adjusted by the CRM to take account of the aeroplane's dimensions, an obstacle takes the "wall" form (see Part II, Figure II-2-3). For the purposes of the CRM, therefore, obstacles after adjustment have height and width but do not have length.

3 SIMPLE OBSTACLE MODELLING

3.1 In reality obstacles may be of complex shape, are unlikely to be orientated at right angles to the line of approach, and may well extend longitudinally for considerable distance. However, in these cases, most obstacles can readily be expressed as a number of simple obstacles of the required form. For example, an aeroplane in a holding bay may be represented as two "spike" obstacles; one for the nose, being the closest point to the runway centre line, and one for the tail fin, being the highest point above threshold elevation. Similarly if an obstacle has a considerable length it

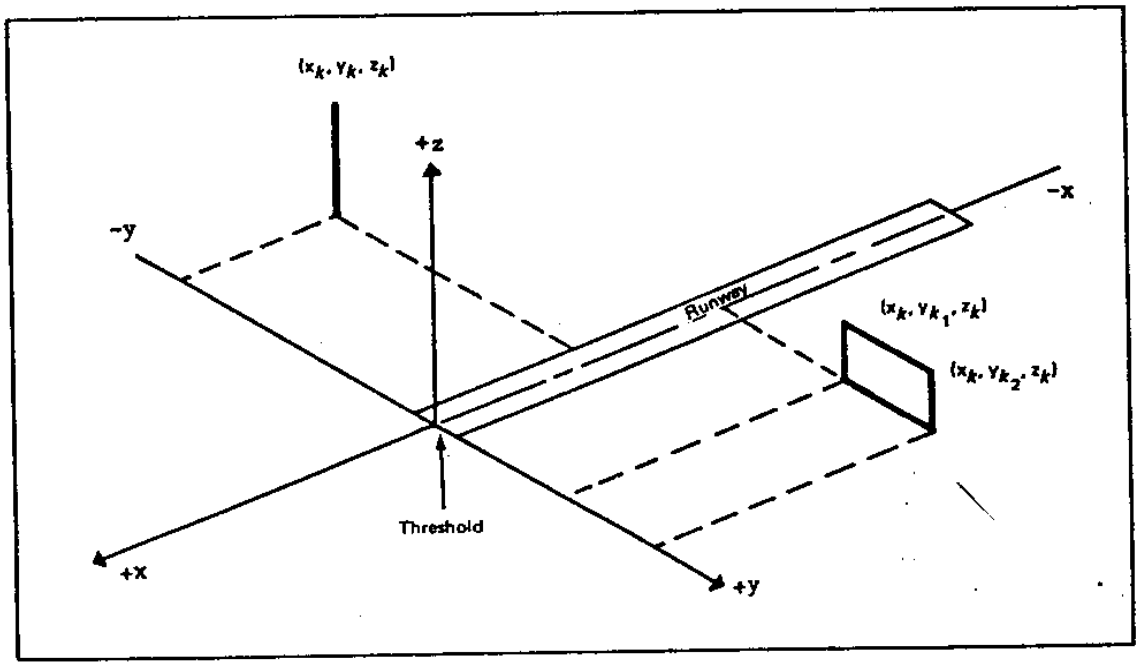


Figure I-A-1. "Spike" and "Wall" Obstacles as Required by the CRM

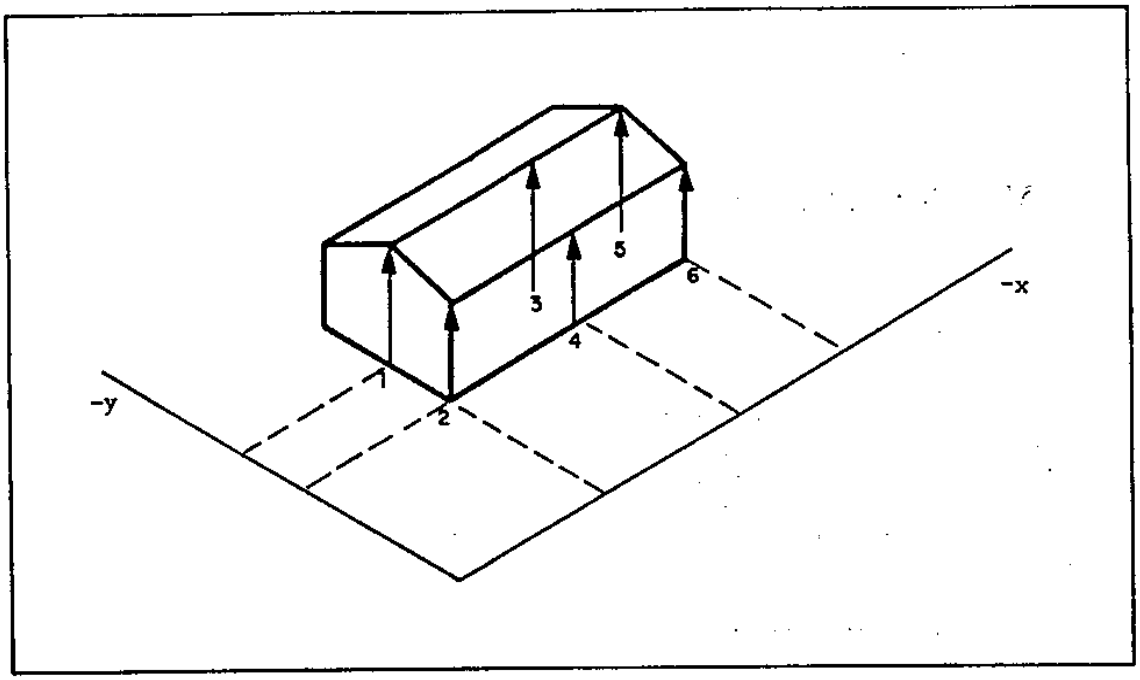


Figure I-A-2. Example of Obstacle Modelling

may be expressed as a series of obstacles. Figure I-A-2 illustrates how a building might be represented by a series of six "spike" obstacles. The figure on page I-D-34 (Example 4) illustrates how a hill may be expressed as a number of "spike" obstacles using the principle shown in Figure II-1-2.

3.2 In general obstacle modelling should be as simple as possible with conservative dimensions assigned.

4 SOPHISTICATED OBSTACLE MODELLING

4.1 If analysis of the CRM results shows that the precise shape of an obstacle is critical with respect to the total risk, more sophisticated obstacle modelling techniques may be used. Figures I-A-3 to I-A-6 show progressively sophisticated modelling of obstacles.

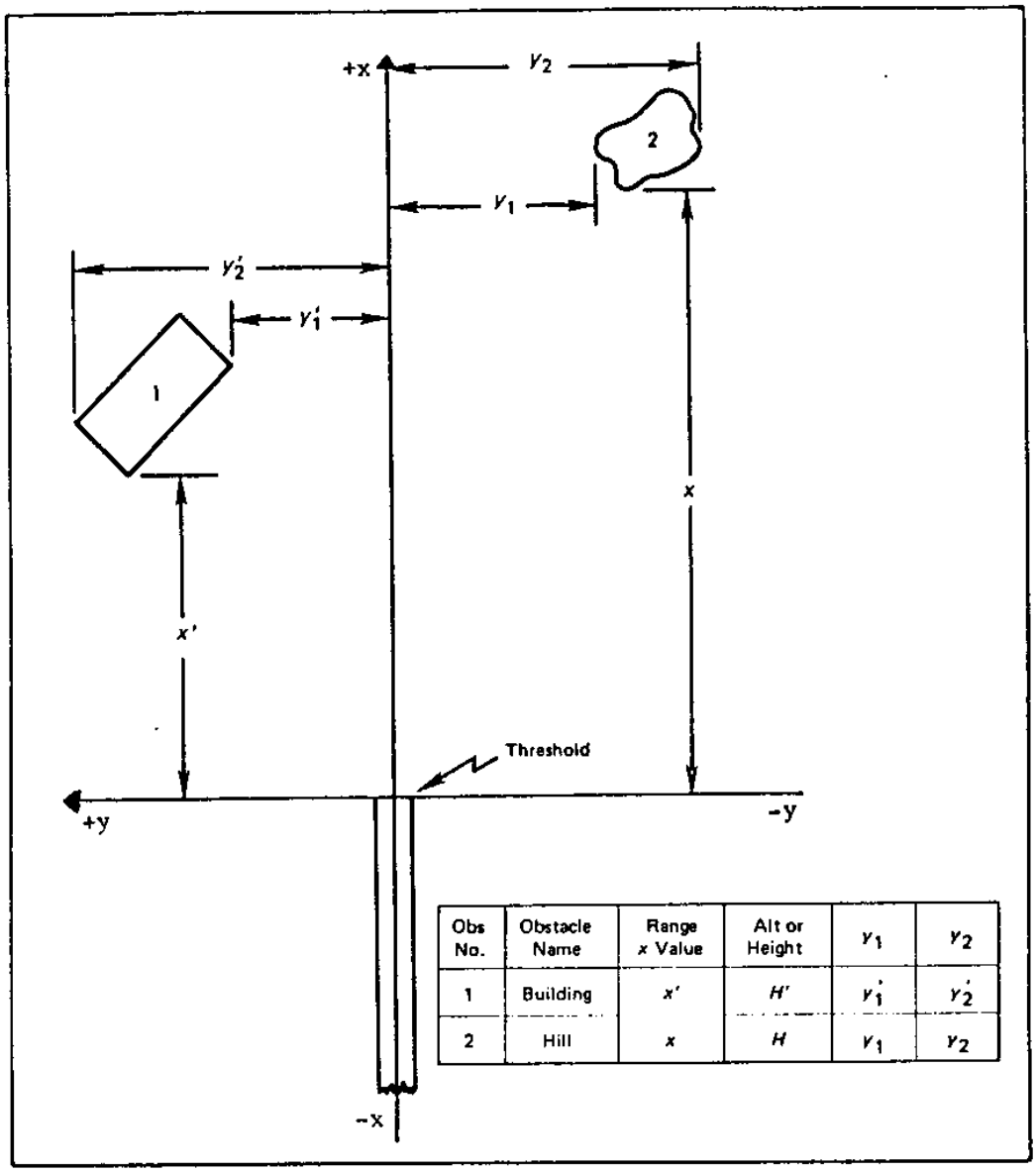
4.2 The procedure for modelling irregular shaped obstacle is given by the following steps (see Figure I-A-3):

1. Construct lines parallel to the x-axis through the one (y_1) and the other edge (y_2) of the obstacle. The perpendicular distances from these lines to the x-axis are the lateral boundary dimensions.
2. The height (z) of the obstacle is taken to be that of the highest point above threshold elevation.
3. The range (x) is the perpendicular distance from the obstacle boundary point nearest to the threshold.

4.3 If a solid obstacle is modelled by spike obstacles, lateral spacing should be not more than aeroplane wing-span.

4.4 If the difference between the most distant point and the nearest point of the obstacle to the threshold exceeds 100 m, the obstacle should be partitioned into a series of wall obstacles separated by no more than 100 m in range. (A discussion of the use of this 100 m value is given in Part II, Chapter 8.) The height assigned to such a "wall" obstacle should be the highest elevation of the obstacle in the area away from the runway. See Figures I-A-4, I-A-5 and I-A-6 for examples of this modelling. In cases where the obstacle height varies with distance from centre line, each wall may be broken up into two or more adjacent walls.

4.5 Consideration should also be given to the accuracy with which the obstacle data has been collected. Suitable adjustments should be made to take account of inaccuracies in the obstacle data; these should result in a greater height, a smaller (absolute) range, and a smaller (absolute) lateral displacement. If these adjustments lead to unacceptable operational penalties, more accurate surveying may reduce these penalties. In addition adjustments for such things as tree growth may be taken into account by adding a tolerance to the height (see the example in Figure I-A-6).



Obs No.	Obstacle Name	Range x Value	Alt or Height	y_1	y_2
1	Building	x'	H'	y_1'	y_2'
2	Hill	x	H	y_1	y_2

Figure I-A-3. Irregular Shaped Objects

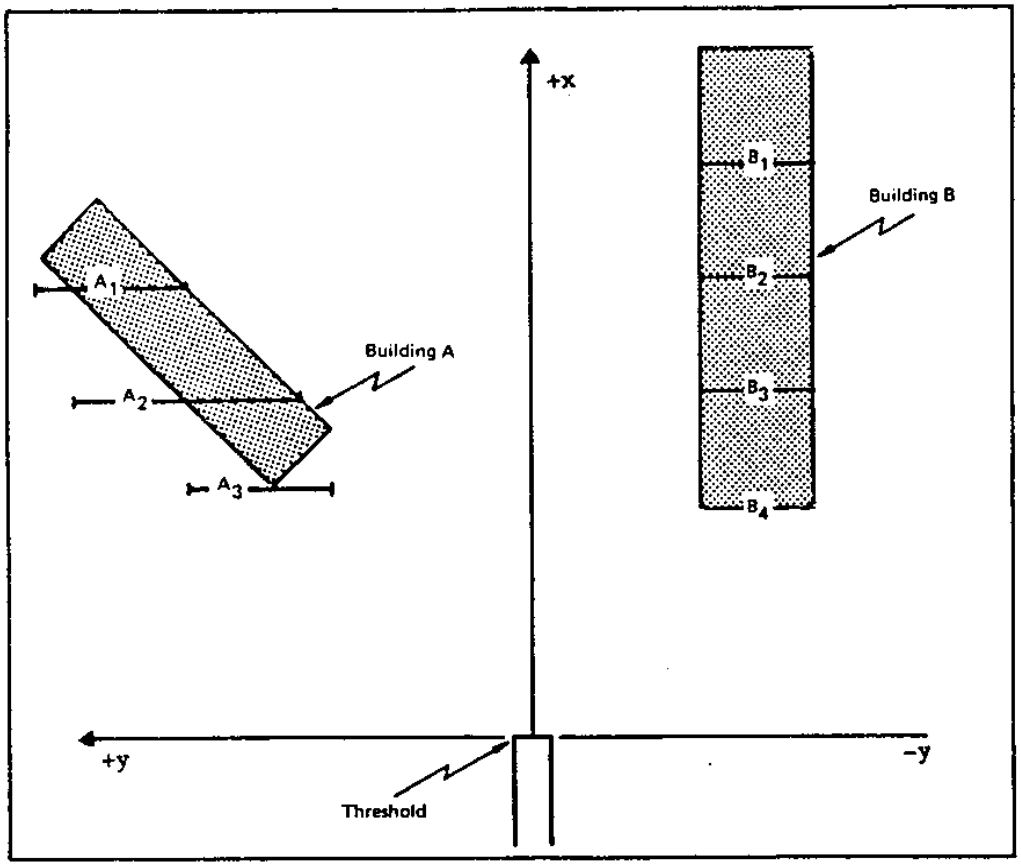
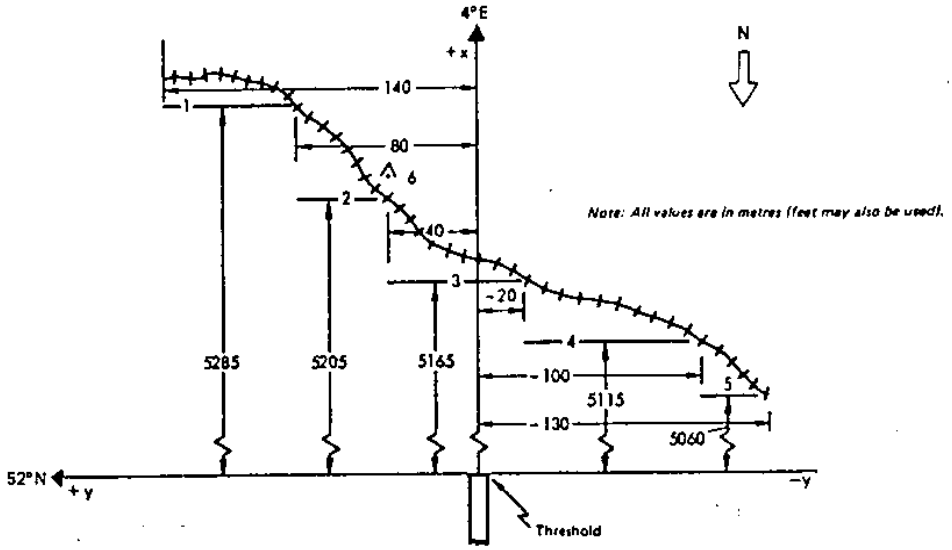


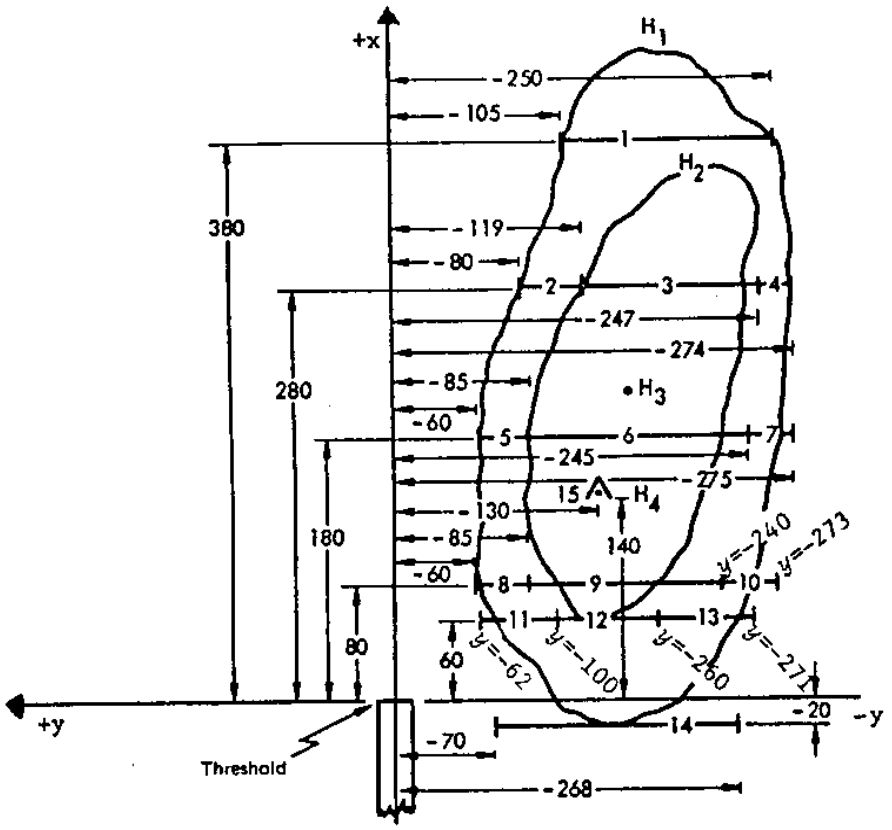
Figure I-A-4. Partitioning of Continuous Obstacles (Buildings)



Obs. No.	Obstacle Name	Obstacle Height* (m)	Runway Co-ordinate System			Geographical Co-ordinate System											
						x				y_1				y_2			
			x(m)	y_1(m)	y_2(m)	N/S	degrees	minutes	seconds	E/W	degrees	minutes	seconds	E/W	degrees	minutes	seconds
1	Railroad	127	5285	80	140	N	51	57	08.78	E	4	00	04.21	E	4	00	07.37
2	Railroad	125	5205	40	80	N	51	57	11.37	E	4	00	02.10	E	4	00	04.21
3	Railroad	121	5165	-20	40	N	51	57	12.67	E	3	59	58.95	E	4	00	02.10
4	Railroad	125	5115	-20	-100	N	51	57	14.29	E	3	59	58.95	E	3	59	54.74
5	Railroad	120	5060	-100	-130	N	51	57	16.07	E	3	59	54.74	E	3	59	53.16
6	Tower	155	5215	40	40	N	51	57	11.05	E	4	00	02.10	E	4	00	04.10

* Altitude may also be used. If the obstacle is a road or railroad interval, use the maximum height (or altitude) in the interval with an allowance for traffic on the road or railroad.

Figure I-A-5. A Method of Partitioning a Continuous Obstacle (Railroad)



Tg is an allowance for tree height or growth.

All values are in metres (feet may also be used).

Obs. No.	Obstacle Name	Range x Value	Obstacle Height*	y_1	y_2
1	Hill	380	$H_2 + T_g$	-105	-250
2	Hill	280	$H_2 + T_g$	-80	-119
3	Hill	280	$H_3 + T_g$	-119	-247
4	Hill	280	$H_2 + T_g$	-247	-274
5	Hill	180	$H_2 + T_g$	-60	-85
6	Hill	180	$H_3 + T_g$	-85	-245
7	Hill	180	$H_2 + T_g$	-245	-275
8	Hill	80	$H_2 + T_g$	-60	-85
9	Hill	80	$H_3 + T_g$	-85	-240
10	Hill	80	$H_2 + T_g$	-240	-273
11	Hill	60	$H_2 + T_g$	-62	-100
12	Hill	60	$H_3 + T_g$	-100	-260
13	Hill	60	$H_2 + T_g$	-260	-271
14	Hill	-20	$H_2 + T_g$	-70	-268
15	Tower	140	H_4	-130	-130

*Altitude may also be used.

Figure I-A-6. Partitioning of a Continuous Obstacle (Hill)

5 COORDINATE SYSTEMS FOR OBSTACLE DESCRIPTION

The CRM allows obstacles to be described in four different coordinate systems. Any combination of one or more of these may be used (see Appendix D, Example 3).

5.1 Runway Coordinate System

The runway coordinate system is a rectangular right-handed xyz-coordinate system (see PANS-OPS, Vol. II, Figure 21-9 for the orientation of such a system). The conditions are:

a) the xy-plane is horizontal and at the threshold $x = y = 0$; and
b) the x-axis is oriented such that the LLZ antenna is on the negative x-axis.

5.2 Grid Coordinate System

The grid coordinate system is a rectangular right-handed coordinate system. The origin and the orientation of the horizontal axes are defined by the user via specification of the positions of threshold and localizer antenna. For illustration of a grid coordinate system see Figure I-A-7.

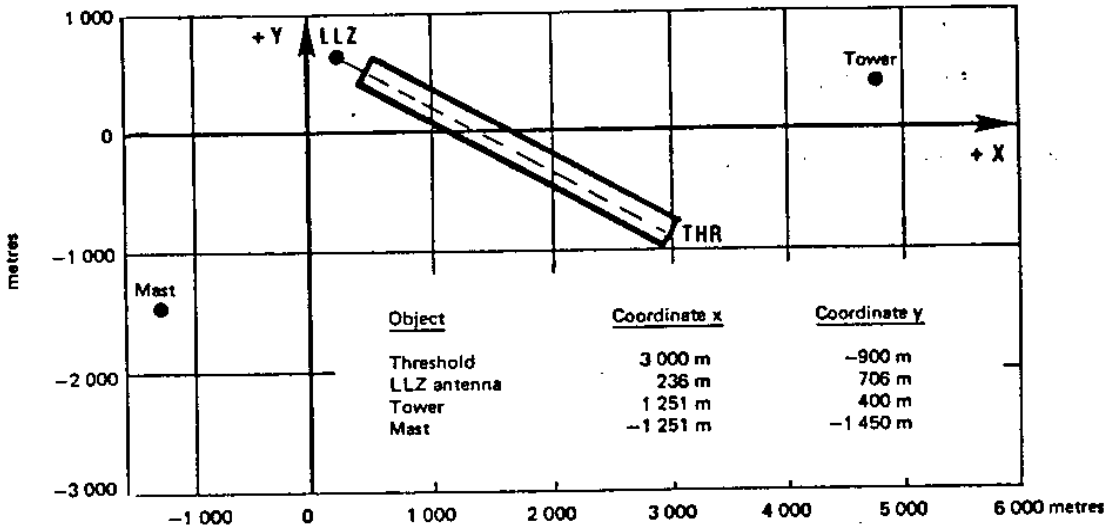


Figure I-A-7. Illustration of a Grid Coordinate System

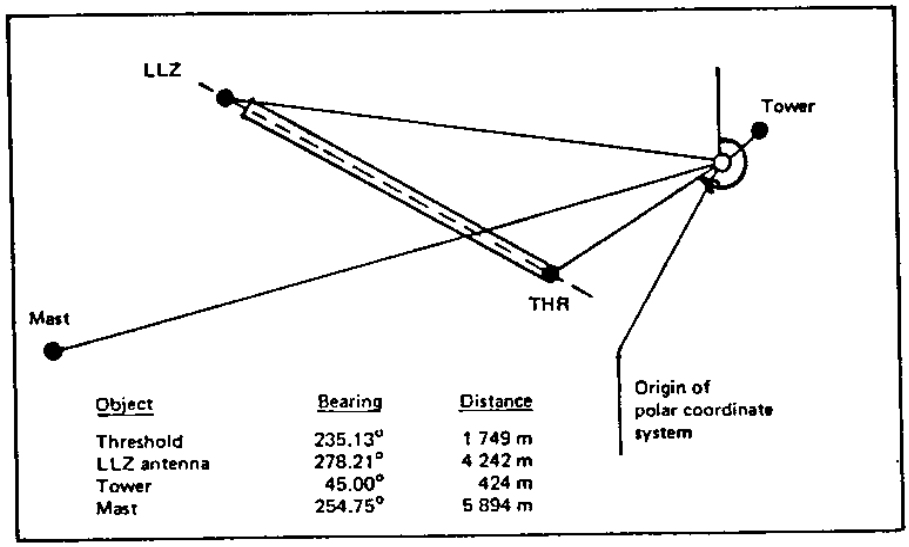


Figure I-A-8. Illustration of a Polar Coordinate System

5.3 Polar Coordinate System

In a polar coordinate system locations are given in terms of directions and distances from a reference point. Direction is measured clockwise. The origin and the orientation of the direction axes are defined by the user via specification of the positions of threshold and localizer antenna in terms of direction (bearing) and distance. For illustration of a polar coordinate system see Figure I-A-8.

5.4 Geographical Coordinate System

In the geographical system locations are given in terms of latitude and longitude. For this system the latitude and longitude of threshold and localizer antenna must be specified.

5.5 Height Reference

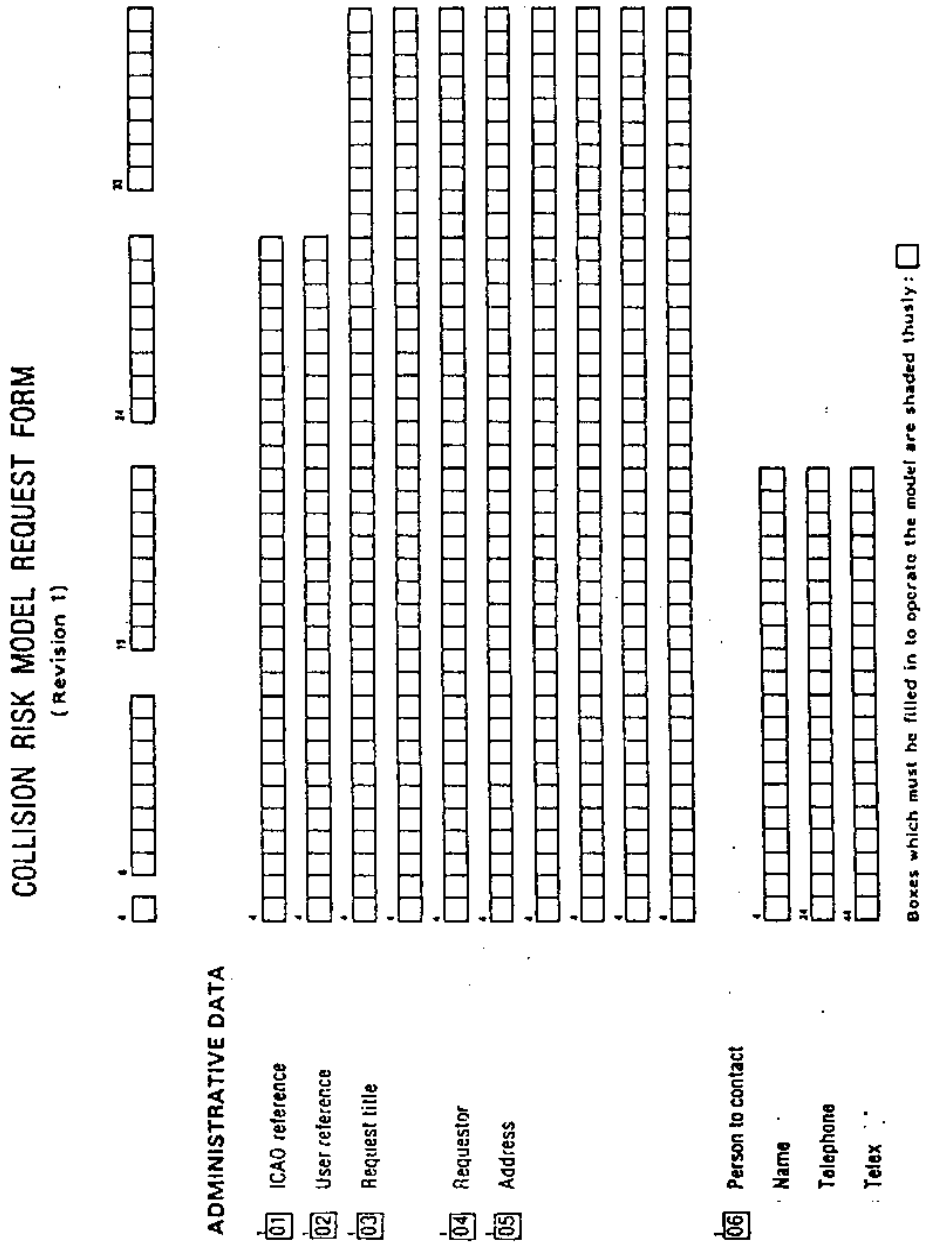
In all systems, the positive z-axis is in the upward direction and describes the height. The height reference is defined by the user via specification of the threshold height in the system under consideration.

5.6 Non-standard Localizer Alignment
(See PANS-OPS, Volume II, Part III, Chapter 2 3)

The CRM can be used to calculate the precision segment OCA/H (See PANS-OPS, Volume II, Part III, 23.3) for ILS with non-standard localizer alignment. In this case, a fictitious runway is established on the localizer centre line. The threshold of this fictitious runway shall be at the same distance from the runway and localizer centre lines' intersection point and at the same elevation as the actual threshold. All obstacle information, including obstacle coordinate system specifications, shall be determined by reference to this fictitious runway, although the ILS reference datum height shall be the same as that calculated for the actual runway.

Appendix 2. Sample Collision Risk Model Request Form

Sample CRM Request Form



GROUND DATA

07	ILS glide path angle	□.□□	degrees
08	ILS reference datum height	□□.□ □	M/F
09	Distance between ILS localizer antenna and runway threshold	□□□□□. □	M/F
10	Localizer course width at threshold	□□□. □	M/F
11	Threshold elevation	□□□□□. □	M/F
12	Distance from final approach point to threshold	□□□□□. □	M/F
13	Standard termination of precision segment	□	Y/N
	If No then:		
	a) Termination point before threshold	□	Y/N
	b) Specify distance from termination point to threshold	□□□□□. □	M/F

AEROPLANE DATA

14	Standard dimensions	□	Y/N
	If No then specify:		
	a) Distance between the flight paths of the wheels and the GP antenna	□□.□ □	M/F
	b) Wing semispan	□□□.□ □	M/F
15	Standard missed approach climb gradient	□	Y/N
	If No then specify climb gradient	□.□	per cent

REQUESTED CASES

16 ILS approach category
1 Category I
2 Category II
3 Category I (radio altimeter only)
4 Category II (autopilot only)

4 ☐ 1/2/3/4

17 Select choice of OCA or OCH
1 OCA (above mean sea level)
2 OCH (above threshold)

4 ☐ 1/2

18 Specify unit of measurement for OCA/H

4 ☐ M/F

19 Speed category	Risk for specified OCA/H requested? If Yes then OCA/H		Minimum acceptable OCA/H requested?
A	4 ☐ Y/N	8 ☐☐☐☐.	12 ☐ Y/N
B	14 ☐ Y/N	18 ☐☐☐☐.	22 ☐ Y/N
C	24 ☐ Y/N	28 ☐☐☐☐.	32 ☐ Y/N
D	34 ☐ Y/N	38 ☐☐☐☐.	42 ☐ Y/N

Note: A maximum of six (6) multiple pages of this requested cases form may be used as necessary to include additional cases. Each page will cause a complete report to be generated.

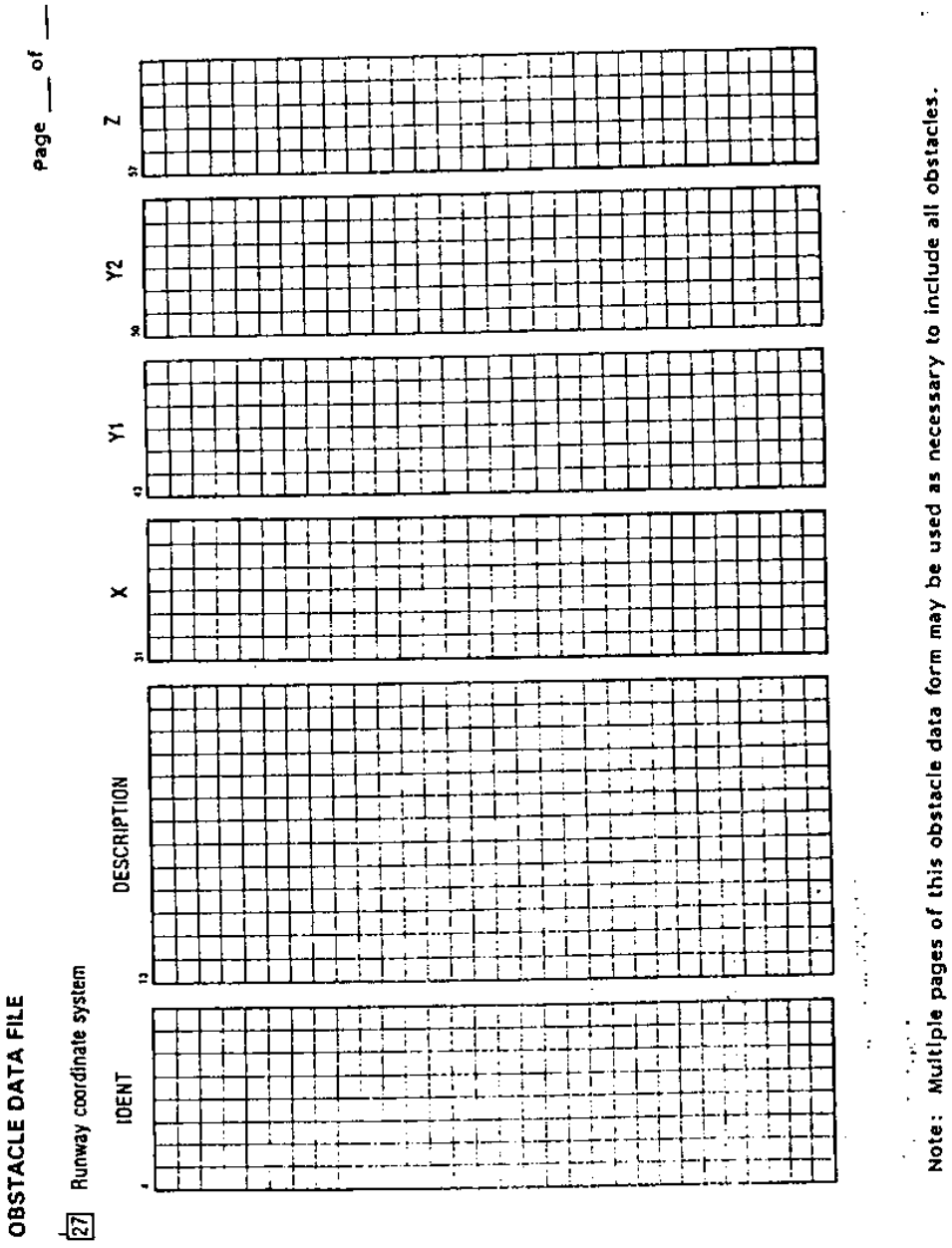
REPORT FORMAT

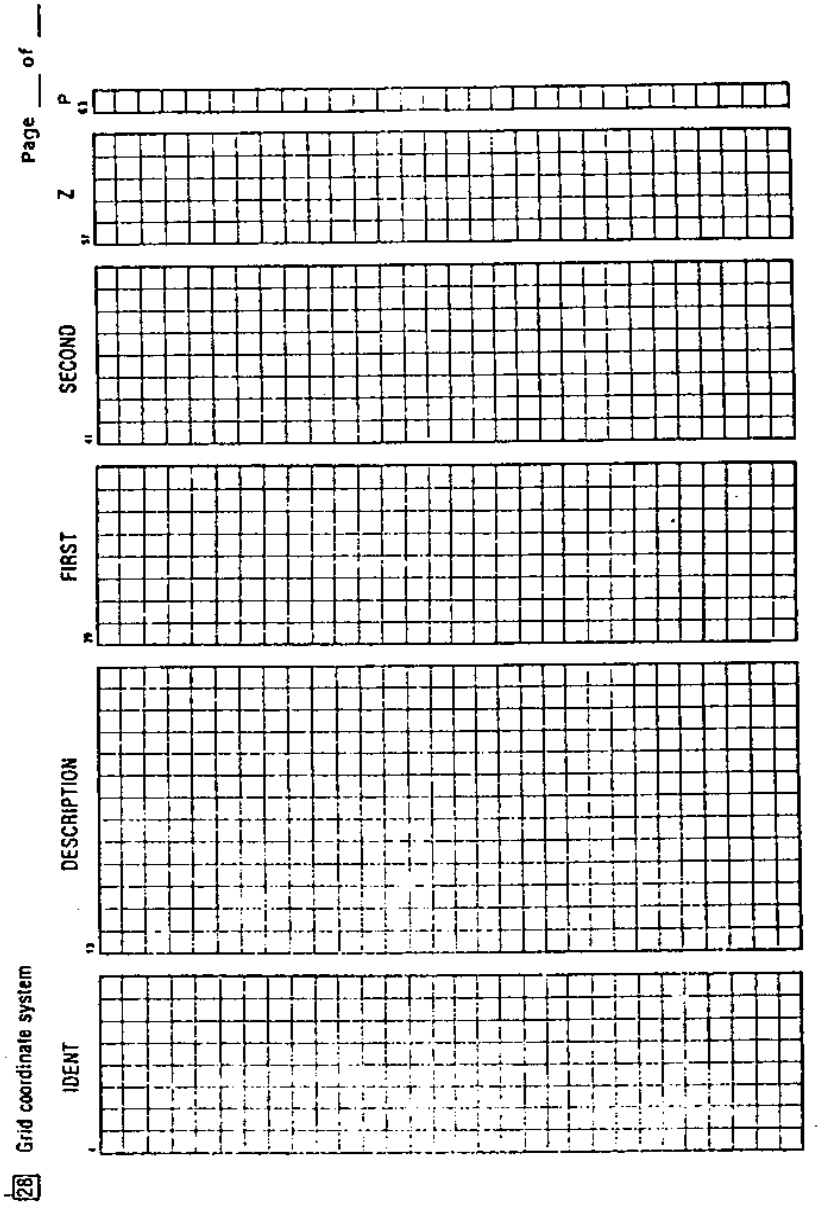
20	Language 1 English 2 French 3 Russian 4 Spanish	☐ 1/2/3/4
21	Total number of obstacles to be processed	☐☐☐☐
22	Individual obstacle risk requested for 1 Obstacle with highest individual risk 2 Obstacles with individual risk higher than 1.0×10^{-10} 3 All obstacles	☐ 1/2/3

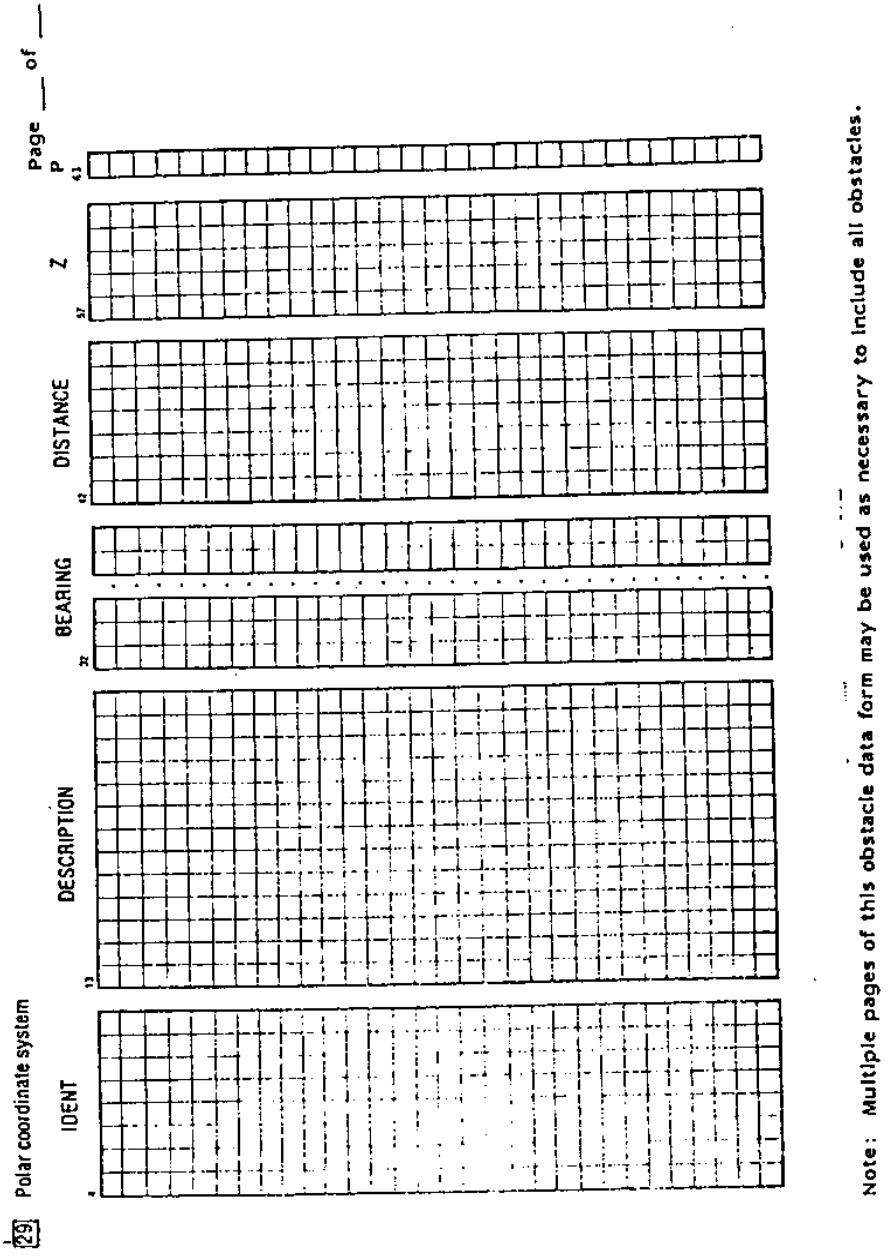
OBSTACLE COORDINATE SYSTEM SPECIFICATIONS

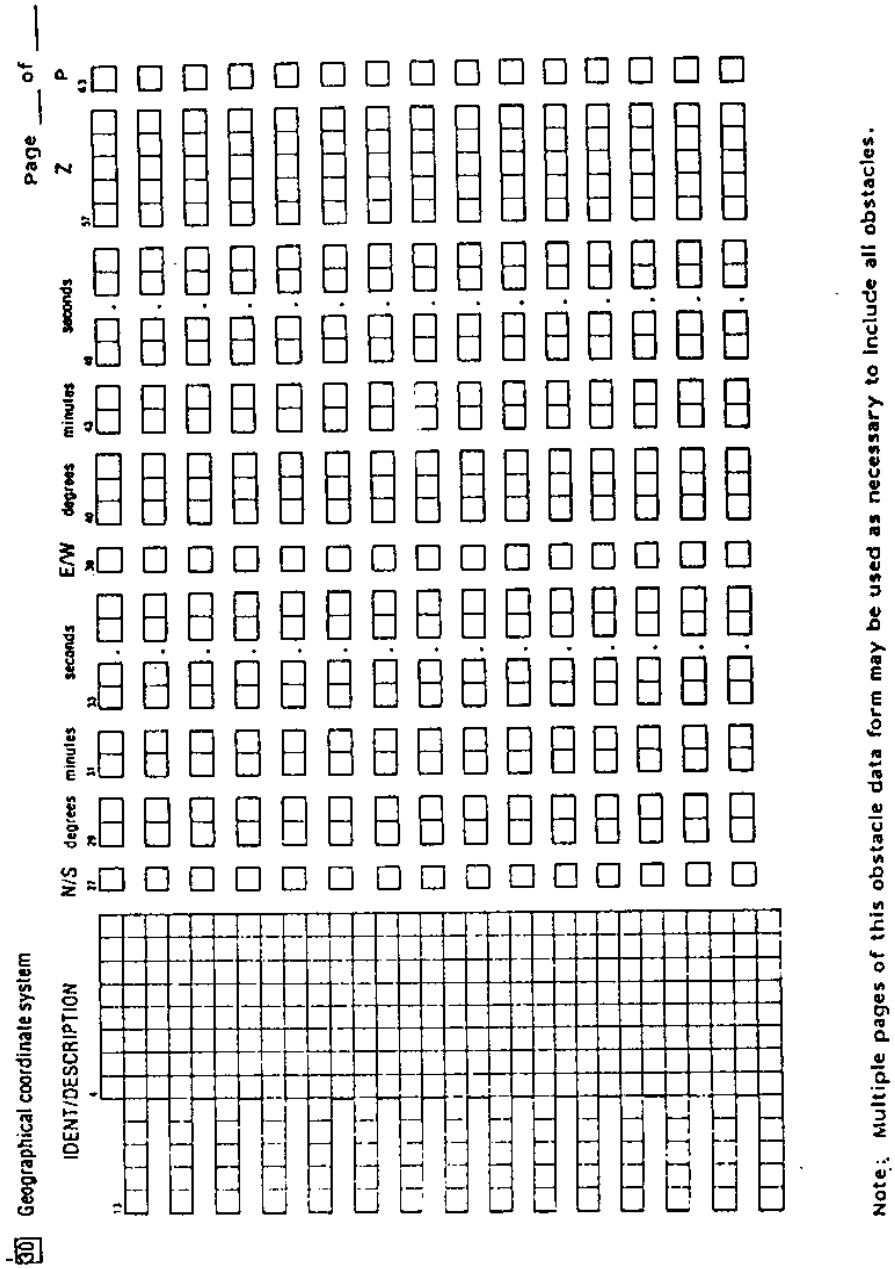
23	Runway coordinate system used If Yes then specify:	☐ Y/N
	a) Unit of horizontal measurement	☐ M/F
	b) Unit of vertical measurement	☐ M/F
	c) Height of threshold measured from this system reference	☐☐☐☐☐
24	Grid coordinate system used If Yes then specify:	☐ Y/N
	a) Unit of horizontal measurement	☐ M/F
	b) Unit of vertical measurement	☐ M/F
	c) First coordinate of threshold	☐☐☐☐☐☐☐☐.
	d) Second coordinate of threshold	☐☐☐☐☐☐☐☐.
	e) Height of threshold measured from this system reference	☐☐☐☐☐.
	f) First coordinate of LLZ antenna	☐☐☐☐☐☐☐☐.
	g) Second coordinate of LLZ antenna	☐☐☐☐☐☐☐☐.

25	Polar coordinate system used If Yes then specify:				☐ Y/N
	a) Unit of distance measurement				☐ M/F
	b) Unit of vertical measurement				☐ M/F
	c) Bearing to threshold				☐☐☐.☐☐ degrees
	d) Distance to threshold				☐☐☐☐☐☐☐.
	e) Height of threshold measured from this system reference				☐☐☐☐☐.
	f) Bearing to LLZ antenna				☐☐☐.☐☐ degrees
	g) Distance to LLZ antenna				☐☐☐☐☐☐☐.
26	Geographical coordinate system used If Yes then specify:				☐ Y/N
	a) Unit of vertical measurement				☐ M/F
	b) Latitude of threshold	☐ N/S	☐☐ degrees	☐☐ minutes	☐☐.☐☐ seconds
	c) Longitude of threshold	☐ E/W	☐☐☐ degrees	☐☐ minutes	☐☐.☐☐ seconds
	d) Height of threshold measured from this system reference				☐☐☐☐☐.
	e) Latitude of LLZ antenna	☐ N/S	☐☐ degrees	☐☐ minutes	☐☐.☐☐ seconds
	f) Longitude of LLZ antenna	☐ E/W	☐☐☐ degrees	☐☐ minutes	☐☐.☐☐ seconds


OBSTACLE DATA FILE
27 Runway coordinate system
Page ___ of ___
IDENT
DESCRIPTION
X
Y1
Y2
Z
Note: Multiple pages of this obstacle data form may be used as necessary to include all obstacles.


Page ___ of ___
P
Z
SECOND
FIRST
DESCRIPTION
IDENT
28 Grid coordinate system
Note: Multiple pages of this obstacle data form may be used as necessary to include all obstacles.


Page ___ of ___
P
Z
DISTANCE
BEARING
DESCRIPTION
IDENT
Polar coordinate system
29
Note: Multiple pages of this obstacle data form may be used as necessary to include all obstacles.



Note: Multiple pages of this obstacle data form may be used as necessary to include all obstacles.

Appendix 3. Instructions for the Completion of the Collision Risk Model Request Form

1 GENERAL INSTRUCTIONS

1.1 It is preferred that only typewritten completed forms be sent to ICAO. If it is not possible to complete the form using a typewriter, then use block letters and write numbers clearly; write numbers one and seven as 1 and 7. All numeric values should be right-justified in the designated space on the CRM Request Form. On the form, a decimal point is represented by a period (.). It is stressed that it is the user's responsibility to check the final computer-generated report against the input information appearing on the original request.

1.2 Any special information (requests for special results, special instructions, clarifications, etc.) should be given in plain language on a separate sheet of paper.

1.3 If information is submitted by telex or parts of it are amended by telex at a later stage a Request Form should first be filled in and the information then transmitted in exactly the same form and order as listed in the Request Form (see Appendix D, Example 5). The plain language part of the data required by the form need not be included in the telex. It is sufficient to include the item number only.

1.4 Completed sample forms are attached in Appendix D.

1.5 Note that the CRM calculations are in metres only. However, input data may be inserted in feet where indicated. All calculations are in metres and the final results are in metres. However, OCA/H values can be given in feet if so requested.

2 SPECIFIC INSTRUCTIONS

The following detailed instructions refer to item numbers on the Collision Risk Model Request Form (see Appendix B). It is divided into seven parts:

A. Administrative data
B. Ground data
C. Aeroplane data
D. Requested cases
E. Report format
F. Obstacle coordinate system specifications
G. Obstacle data file

A. ADMINISTRATIVE DATA

The first line, "ICAO Identification", will contain information for ICAO internal use and should be left blank by the user.

Item 01. ICAO reference

In the case of first contact, leave this line blank.
In the case of subsequent contacts referring to a previous request, enter the reference appearing on the previous ICAO reply.

Item 02. User reference

Enter user's reference number, file number, etc., in any order suitable to the user.

Item 03. Request title

Two lines of 40 characters each may be entered. The contents of these lines are not restricted and will not be edited in any way. It is suggested that one use of this space might be to specify in plain language the subject of the request, e.g., place/runway/type of operation. This title will be transcribed verbatum onto the computer generated reports.

Item 04. Requestor

Enter the name of the requestor.

Item 05. Address

Enter the full mailing address of the requestor.

Item 06. Person to contact

Enter the name, telephone and telex/cable number of the person ICAO should contact to clear possible omissions or mistakes in the form before running the computer. If this space is left blank, requestor will be contacted by correspondence.

B. GROUND DATA

Item 07. ILS glide path angle

Enter the nominal ILS glide path angle rounded to the nearest hundredth of a degree (nearest tenth of a degree acceptable if unable to provide greater accuracy). The CRM is valid only for glide path angles between 2.5° and 3.5°.

Item 08. ILS reference datum height

Enter the height rounded to the next lowest tenth of a unit. Specify the unit (metre or foot).

Item 09. Distance between ILS localizer antenna and runway threshold

Enter the distance rounded to the nearest metre or foot (nearest 10 m or 10 ft is acceptable). Specify the unit (metre or foot).

Item 10. Localizer course width at threshold

Enter the localizer course width at threshold rounded to the nearest unit. Specify the unit (metre or foot).

Item 11. Threshold elevation

Enter the threshold elevation rounded to the nearest unit. Specified the unit (metre or foot).

Note. The term elevation always refers to height above the mean sea level (MSL).

Item 12. Distance from final approach point to the threshold

The precision segment starts at the final approach point (FAP). Enter the distance from this position to the runway threshold rounded to the nearest metre or foot (nearest 10 m or 10 ft is acceptable). Specify the unit (metre or foot).

Note. When the FAP is marked by a fix the distance from FAP to threshold is appropriate. However if no fix marks the FAP obstacle clearance analysis is required outside the FAP and therefore the distance to be specified under this Item must be increased sufficiently to include the furthest obstacle listed.

Item 13. Standard termination of precision segment

The standard termination of the precision segment is calculated to be at a point where the missed approach climb surface starting 900 m past threshold reaches a height of 300 m above threshold. Enter Y if the standard termination is desired. The corresponding distance, depending on the climb gradient of the missed approach surface need not be indicated. Enter N if the precision segment is terminated for other reasons (e.g., turning missed approach) prior to the normal terminating range. In this case:

a) if the termination point is before the threshold enter Y and if it is after the threshold enter N; and
b) specify the distance between the threshold and the early termination point (always a positive value) and specify the unit (metre or foot).

C. AEROPLANE DATA

Item 14. Standard dimensions

Enter Y if standard aeroplane dimensions are to be used (i.e., 6 m vertical distance between the flight paths of the wheels and the aeroplane glide path antenna and 30 m aeroplane wing semispan). Enter N if other values are to be used for these dimensions. In this case:

a) Enter the vertical distance between the flight paths of the aeroplane wheels and the aeroplane glide path antenna in normal approach attitude. Specify the unit (metre or foot).
b) Enter the wing semi-span of the aeroplane. Specify the unit (metre or foot).

Item 15. Missed approach climb gradient

Enter Y if the minimum missed approach climb gradient is 2.5 per cent. Enter N if another climb gradient is to be used. In this case, enter the applicable missed approach climb gradient to the nearest tenth of a per cent.

D. REQUESTED CASES

Item 16. ILS approach category

Enter one of the following numbers to indicate the ILS approach category:

1 indicates a Category I operation;
2 indicates a Category II operation;
3 indicates a Category I operation restricted to the use of radio altimeter; and
4 indicates a Category II operation restricted to the use of autopilot.

Item 17. Choice of OCA or OCH

Enter one of the following numbers to indicate whether obstacle clearance altitude (OCA) or obstacle clearance height (OCH) is used:

1 indicates OCA (above MSL); and
2 indicates OCH (above threshold).

All subsequent expressions of OCA/H on the request and on the computer generated reports will be to this specified reference.

Item 18. Unit of measurement for OCA/H

Specify the unit (metre or foot). All subsequent expressions of OCA/H on the request and on the computer generated reports will be in the specified units of measure.

Item 19. OCA/H calculations

For each speed category of aeroplane (A, B, C and D):

a) enter Y if computations are requested for a specified OCA/H and specify the OCA/H in the area provided *or* enter N if computations are not requested and leave the specified OCA/H area blank; and
b) enter Y if a computed minimum acceptable OCA/H is requested *or* enter N if this computation is not requested.

Note that for each Y entered in this item a separate Risk Report will be generated.

Special Instructions

Multiple pages of this form may be used to generate additional reports. Each page included will cause the generation of a set of reports. Any items on a subsequent page which is completely blank will retain the parameters from the previous page.

E. REPORT FORMAT

Item 20. Language

The significant information of the computer generated report will be numeric and thus language independent. For the user's convenience, the text on the computer generated report may be provided in any of the offered ICAO languages. Enter one of the following numbers to indicate preference as follows:

1 indicates English;
2 indicates French;
3 indicates Russian; and
4 indicates Spanish.

Note: In the interim period, if the desired language is not available, English language reports will be provided.

Item 21. Total number of obstacles

Enter the total number of obstacles to be processed. This number will be compared to a count of the obstacles entered into the computer to identify possible omissions.

Item 22. Risk calculations

A risk is computed and associated with each obstacle submitted. (The risk is computed as though the obstacle in question were the only obstacle, i.e., without taking into account other obstacles). For large obstacle files it may be desirable to print only selected obstacles and associated risk values on the computer report. Enter one of the following numbers to indicate the amount of obstacles for which data is to be printed.

1 indicates that only the obstacle with the highest risk should be printed on reports.
2 indicates that the obstacle with the highest risk together with any obstacle with individual risk higher than 1.0×10^{-10} should be printed.
3 indicates that all obstacles should be printed on the reports.

F. OBSTACLE COORDINATE SYSTEM SPECIFICATIONS

General

For the convenience of the user, four coordinate systems are provided by which obstacles may be described. Any combination of one or more of these coordinate systems may be used to describe obstacles. For each system to be used information must be provided that will allow the identification of the runway threshold location and localizer antenna location in that coordinate system. Since these locations are the basis for all CRM obstacle coordinate transformations they must be given as accurately as possible. For description of the coordinate systems see Appendix 1, paragraph 5.

Item 23. Runway coordinate system

Enter N if this system is not used in which case the remainder of the item is blank. Enter Y if this system is to

be used. In this case:

a) specify the unit of horizontal measurement (metre or foot);

b) specify the unit of vertical measurement (metre or foot); and

c) in the area provided enter the height of the threshold with reference to the same units and basis of measurement to be used in describing obstacle heights. This may be a negative number if the basis of measurement is above the threshold in which case a negative sign must be entered in front of the height value.

Item 24. Grid coordinate system

Enter N if this system is not used in which case the remainder of the item is blank. Enter Y if this system is to be used. In this case:

a) specify the unit of horizontal measurement (metre or foot);

b) specify the unit of vertical measurement (metre or foot);

c) and d) Enter the first and second coordinate of the threshold expressed in terms of the coordinate system. These coordinates must be in units (metres or feet) as defined in a) above expressed to the nearest whole unit and if the value of either number is negative a minus sign must be entered in front of the number.

e) Enter the height of the threshold in this coordinate system. This value must be expressed in the unit (metre or foot) as defined in b) above and should be provided to the nearest whole unit. If the vertical basis of measurement is above the threshold, the height of the threshold will be a negative number in which case a minus sign must be entered in front of the height value.

f) and g) Enter the first and second coordinates of the localizer antenna expressed in terms of the coordinate system. These coordinates must be in units (metres or feet) as defined in a) above expressed to the nearest whole unit and if the value of either number is negative a minus sign must be entered in front of the number.

Item 25. Polar coordinate system

Enter N if this system is not used in which case the remainder of the item is blank. Enter Y if this system is to be used. In this case:

a) Specify the unit of horizontal distance measurement (metre or foot).

b) Specify the unit of vertical distance measurement (metre or foot)

c) Enter bearing (magnetic or true) from the coordinate system origin to the threshold. This value should be expressed in degrees to the nearest hundredth of a degree and will be between 0° and 360°. If the coordinate system origin is the threshold, this item should be blank.

d) Enter the distance from the coordinate system origin to the threshold. This value must be in the unit (metre or foot) as defined in a) above and should be provided to the nearest whole unit. Enter zero if the coordinate system origin is the threshold.

e) Enter the height of the threshold in this coordinate system. This value must be expressed in the unit (metre or foot) as defined in b) above and should be provided to the nearest whole unit. If the vertical basis of measurement is above the threshold, the height of the threshold will be a negative number in which case a minus sign must be entered in front of the height value.

f) Enter the bearing (true or magnetic with respect to the same basis as in c) above) from the coordinate system origin to the LLZ antenna. This value should be expressed in degrees to the nearest hundredth of a degree and will be between 0° and 360°.

g) Enter the distance from the coordinate systems origin to the localizer antenna. This value must be in the unit (metre or foot) as defined in a) above and should be provided to the nearest whole unit.

Item 26. Geographical coordinate system

Enter N if this system is not used in which the remainder of the item should be blank. Enter Y if this system is to be used. In this case:

a) Specify the unit of vertical distance measurement (metre or foot).

b) Enter the latitude for the threshold as follows: Enter N for North latitudes or S for South latitudes, enter degrees of latitude, enter minutes of latitude, enter seconds of latitude to the nearest hundredth of a second. Note that if the seconds are not known to the hundredths, zeros should be entered in the remaining spaces. (One second of latitude approximates 31 m.)

c) Enter the longitude of the threshold as follows: Enter E for East longitudes or W for West longitudes, enter degrees of longitude, enter minutes of longitude, enter seconds of longitude to the nearest hundredth of a second. Note that if the seconds are not known to the hundredths, zeros should be entered in the remaining spaces. (One second of longitude varies from approximately 31 m at the equator to 0 m at the pole.)

d) Enter the height of the threshold in this coordinate system. This value must be expressed in the unit (metre or foot) as defined in a) above and should be provided to the nearest whole unit. If the vertical basis

is above the threshold, the height given for the threshold will be a negative number in which case a minus sign must be entered in front of the height value.

e) Enter the latitude of the localizer antenna as follows: Enter N for North latitudes or S for South latitudes, enter degrees of latitude, enter minutes of latitude, enter seconds of latitude to the nearest hundredth of a second. Note that if seconds are not known to the hundredths, zeros should be entered in the remaining spaces. (One second of latitude approximates 31 m.)

f) Enter the longitude of the localizer antenna as follows: E for East longitudes or W for West longitudes, enter degrees of longitude, enter minutes of longitude, enter seconds of longitude to the nearest hundredth of a second. Note that if seconds are not known to the hundredths, zeros should be entered in the remaining spaces. (One second of longitude varies from approximately 31 m at the equator to 0 m at the pole.)

G. OBSTACLE DATA FILE

Item 27. Runway coordinate system
Item 28. Grid coordinate system
Item 29. Polar coordinate system
Item 30. Geographical coordinate system

a) In order for the total risk value or the computed minimum acceptable OCA/H value (see Item 13) to have operational significance *all* obstacles penetrating the refined Annex 14 surfaces (see PANS-OPS, Volume II, Part III, 21.4.7.2) *must* be entered.

Note: The computer is so programmed that it will automatically exclude those obstacles which are outside the precision segment area and the area prior to the FAP if so specified in Item 12. Such obstacles will have no effect on the rsik and OCA/H calculations. It is therefore, recommended that if the location of some obstacles in relation to the borderline of the precision segment area cannot be established these obstacles be included in listing.

b) In listing obstacle locations and heights/elevations survey and charting accuracies must be considered (see PANS-OPS, Volume II, Part III, 1.15).

c) Any combination of these coordinate systems may be used.

d) On each obstacle data file, the units of measurement (i.e. horizontal, vertical) and the basis of measurement *must* be the same as that specified and used in defining the respective coordinate systems (Items 23, 24, 25 and 26). Also, for polar coordinate systems the bearing of the obstacle (true or magnetic) must be referenced to the same as that used in Item 25 c) and f).

e) Obstacle "IDENT" and "DESCRIPTION" can be selected by the user. It is recommended that "IDENT" be a number/letter combination which uniquely identifies the obstacle (limited to 8 characters) and "DESCRIPTION" a plain language description of the obstacle (e.g., tower, hangar, tree, hill) consisting of not more than 13 characters. For example see the Request Examples in Attachment D.

f) To model a wall using the grid, polar or geographical coordinate systems two lines of the form must be used, each describing one of the end points of the wall. These points are paired by use of the "P" column. A "1" in the P column indicates the first line of a pair and must always be followed by a line with a "2" in the P column. If a line is not to be part of a pair then P column must be blank.

g) Multiple pages of obstacle data file forms (Items 27, 28, 29 and 30) are acceptable.

Appendix 4. An Example of a Collision Risk Model Printout

ICAO COLLISION RISK MODEL/ EDIT REPORT — PAGE 1

ICAO REFERENCE CRM EXAMPLE 4
USER REFERENCE FANTASY AERODROME

DATE NOV 01, 1982
TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E
EXAMPLE 4

ILS CATEGORY I

THE COLLISION RISK MODEL IS A COMPUTER PROGRAM THAT CALCULATES A NUMERICAL RISK FOR THE PRECISION SEGMENT OF AN ILS APPROACH. THIS RISK IS THEN COMPARED TO THE TARGET LEVEL OF SAFETY (1.0E-07) TO DETERMINE THE ACCEPTABILITY OF THE PROCEDURE. (SEE PANS-OPS, VOLUME II, PARAGRAPH 21.4.9)

ICAO TAKES NO RESPONSIBILITY FOR THE CORRECTNESS OF THE DATA ENTERED INTO THIS MODEL OR FOR THE APPLICABILITY OF THIS MODEL TO ANY SPECIFIC CASE. IT IS THE RESPONSIBILITY OF THE USER TO VERIFY ALL DATA USED BY THIS MODEL FOR THIS SPECIFIC ILS APPROACH.

ICAO COLLISION RISK MODEL/ EDIT REPORT

PAGE 2

ICAO REFERENCE CRM EXAMPLE 4
USER REFERENCE FANTASY AERODROME

DATE NOV 01, 1982
TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E EXAMPLE 4

ILS CATEGORY I

COLLISION RISK MODEL REQUEST FORM -- BASIC DATA

ICAO IDENTIFICATION (FOR ICAO USE ONLY)	3 FANTASY EXAMPLE4 6 10 82 ORIGINAL

ADMINISTRATIVE DATA

01 ICAO REFERENCE	CRM EXAMPLE 4
02 USER REFERENCE	FANTASY AERODROME
03 REQUEST TITLE	CRM MANUAL DOC 9274-AN904 PART I APP D/E EXAMPLE 4
04 REQUESTOR	DEPARTMENT OF AVIATION FANTASYLAND
05 ADDRESS	HILL ROAD 35 BIGCITY BOX 999 FANTASYLAND

06 PERSON TO CONTACT

NAME	MR JOHN OBSTACLE
PHONE	111-222-334
TELEX	44-555

ICAO COLLISION RISK MODEL/ EDIT REPORT — PAGE 3

ICAO REFERENCE CRM EXAMPLE 4 — DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME — TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E EXAMPLE 4 — ILS CATEGORY I

GROUND DATA

07	ILS GLIDE PATH ANGLE	3.00	DEGREES
08	ILS REFERENCE DATUM HEIGHT	15.0	M
09	DISTANCE BETWEEN ILS LOCALIZER ANTENNA AND RUNWAY THRESHOLD	3200.	M
10	LOCALIZER COURSEWIDTH AT THRESHOLD	210.	M
11	THRESHOLD ELEVATION	150.	M
12	DISTANCE FROM FINAL APPROACH POINT TO THRESHOLD	18520.	M
13	STANDARD TERMINATION OF PRECISION SEGMENT		Y
	IF NO THEN:		
	A. TERMINATION POINT BEFORE THRESHOLD		
	B. SPECIFY DISTANCE FROM TERMINATION POINT TO THRESHOLD		

AIRCRAFT DATA

14	STANDARD DIMENSIONS		Y
	IF NO THEN SPECIFY:		
	A. DISTANCE BETWEEN THE FLIGHTPATHS OF THE WHEELS AND THE GP ANTENNA		
	B. WING SEMISPAN		
15	STANDARD MISSED APPROACH CLIMB GRADIENT		Y
	IF NO THEN SPECIFY CLIMB GRADIENT		

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 4

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

REQUESTED CASES

16 ILS APPROACH CATEGORY 1
1 CATEGORY I
2 CATEGORY II
3 CATEGORY I (RADIO ALTIMETER ONLY)
4 CATEGORY II (AUTOPILOT ONLY)

17 SELECT CHOICE OF OCA OR OCH 2
1 OCA (ABOVE MEAN SEA LEVEL)
2 OCH (ABOVE THRESHOLD)

18 SPECIFY UNIT OF MEASUREMENT FOR OCA/H M

19 SPEED CATEGORY	RISK FOR SPECIFIED OCA/H REQUESTED IF YES THEN OCA/H		MINIMUM ACCEPTABLE OCA/H REQUESTED
A	N		N
B	N		N
C	N		N
D	Y	60.	Y

REPORT FORMAT

20 LANGUAGE 1
1 ENGLISH
2 FRENCH
3 RUSSIAN
4 SPANISH

21 TOTAL NUMBER OF OBSTACLES TO BE PROCESSED 97

22 INDIVIDUAL OBSTACLE RISK REQUESTED FOR 3
2 OBSTACLES WITH INDIVIDUAL RISK HIGHER THAN 1.0E-10
1 OBSTACLE WITH HIGHEST INDIVIDUAL RISK
3 ALL OBSTACLES

ICAO COLLISION RISK MODEL/ EDIT REPORT

PAGE 5

ICAO REFERENCE CRM EXAMPLE 4
USER REFERENCE FANTASY AERODROME

DATE NOV 01, 1982
TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E
EXAMPLE 4

ILS CATEGORY I

OBSTACLE COORDINATE SYSTEM SPECIFICATIONS

23	RUNWAY COORDINATE SYSTEM USED	Y
	IF YES THEN SPECIFY:	
	A. UNIT OF HORIZONTAL MEASUREMENT	M
	B. UNIT OF VERTICAL MEASUREMENT	M
	C. HEIGHT OF THRESHOLD IN THIS SYSTEM	0.
24	GRID COORDINATE SYSTEM USED	N
	IF YES THEN SPECIFY:	
	A. UNIT OF HORIZONTAL MEASUREMNT	
	B. UNIT OF VERTICAL MEASUREMENT	
	C. FIRST COORDINATE OF THRESHOLD	
	D. SECOND COORDINATE OF THRESHOLD	
	E. HEIGHT OF THRESHOLD IN THIS SYSTEM	
	F. FIRST COORDINATE OF LLZ ANTENNA	
	G. SECOND COORDINATE OF LLZ ANTENNA	
25	POLAR COORDINATE SYSTEM USED	Y
	IF YES THEN SPECIFY:	
	A. UNIT OF DISTANCE MEASUREMENT	M
	B. UNIT OF VERTICAL MEASUREMENT	M
	C. BEARING TO THRESHOLD	235.13 DEGREES
	D. DISTANCE TO THRESHOLD	1749.
	E. HEIGHT OF THRESHOLD IN THIS SYSTEM	0.
	F. BEARING TO LLZ ANTENNA	278.21 DEGREES
	G. DISTANCE TO LLZ ANTENNA	4242.
26	GEOGRAPHICAL COORDINATE SYSTEM USED	N
	IF YES THEN SPECIFY:	
	A. UNIT OF VERTICAL MEASUREMENT	
	B. LATITUDE OF THRESHOLD	
	C. LONGITUDE OF THRESHOLD	
	D. HEIGHT OF THRESHOLD IN THIS SYSTEM	
	E. LATITUDE OF LLZ ANTENN	
	F. LONGITUDE OF LLZ ANTEN	

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 6

ICAO REFERENCE CRM EXAMPLE 1 DATE OCT 13, 1982
USER REFERENCE FANTASY AERODROME TIME 19:39:56

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY II
EXAMPLE 1

SUMMARY OF ILS APPROACH PARAMETER INFORMATION

GROUND DATA

ILS GLIDE PATH ANGLE	3.00 DEGREES
ILS REFERENCE DATUM HEIGHT	15.00 METRES
DISTANCE FROM THRESHOLD TO ILS LOCALIZER ANTENNA	3000.00 METRES
LOCALIZER COURSEWIDTH AT THE THRESHOLD	210.00 METRES
LOCALIZER COURSE SECTOR ANGLE	4.01 DEGREES
THRESHOLD ELEVATION (ABOVE MEAN SEA LEVEL)	0.00 METRES
BEGINNING OF THE PRECISION SEGMENT	10807.00 METRES
TERMINATION OF THE PRECISION SEGMENT	-12700.00 METRES

AIRCRAFT DATA

DISTANCE BETWEEN WHEELS AND GLIDE PATH ANTENNA	6.00 METRES
WING SEMISPAN	30.00 METRES
MISSED APPROACH CLIMB GRADIENT	2.50 PERCENT

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 7

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

OBSTACLE DATA FILE IN USER RUNWAY COORDINATE SYSTEM						OBSTACLES IN CRM RUNWAY COORDINATE SYSTEM				
IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	X METRES	Y1 METRES	Y2 METRES	Z METRES	
A5-01	RAILROAD	5285.	80.	140.	127.	5285.00	80.00	140.00	127.00	
A5-02	RAILROAD	5205.	40.	80.	125.	5205.00	40.00	80.00	125.00	
A5-03	RAILROAD	5165.	-20.	40.	121.	5165.00	-20.00	40.00	121.00	
A5-04	RAILROAD	5115.	-100.	-20.	125.	5115.00	-100.00	-20.00	125.00	
A5-05	RAILROAD	5060.	-130.	-100.	120.	5060.00	-130.00	-100.00	120.00	
A5-06	TOWER	5215.	40.	40.	155.	5215.00	40.00	40.00	155.00	
A6-01	HILL	380.	-105.	-250.	15.	380.00	-250.00	-105.00	15.00	
A6-02	HILL	280.	-80.	-119.	15.	280.00	-119.00	-80.00	15.00	
A6-03	HILL	280.	-247.	-119.	15.	280.00	-247.00	-119.00	15.00	
A6-04	HILL	280.	-247.	-247.	15.	280.00	-247.00	-247.00	15.00	
A6-05	HILL	180.	-60.	-85.	15.	180.00	-85.00	-60.00	15.00	OFZ PENETRATED ?
A6-06	HILL	180.	-85.	-245.	25.	180.00	-245.00	-85.00	25.00	
A6-07	HILL	180.	-245.	-275.	15.	180.00	-275.00	-245.00	15.00	
A6-08	HILL	80.	-60.	-85.	15.	80.00	-85.00	-60.00	15.00	OFZ PENETRATED ?
A6-09	HILL	80.	-85.	-240.	25.	80.00	-240.00	-85.00	25.00	
A6-10	HILL	80.	-240.	-273.	15.	80.00	-273.00	-240.00	15.00	
A6-11	HILL	60.	-62.	-100.	15.	60.00	-100.00	-62.00	15.00	OFZ PENETRATED ?
A6-12	HILL	60.	-100.	-260.	25.	60.00	-260.00	-100.00	25.00	
A6-13	HILL	60.	-260.	-271.	15.	60.00	-271.00	-260.00	15.00	
A6-14	HILL	-20.	-70.	-268.	15.	-20.00	-268.00	-70.00	15.00	
A6-15	TOWER	140.	-130.	-130.	40.	140.00	-130.00	-130.00	40.00	OFZ PENETRATED ?
A-03	HILL A	2000.	0.	0.	42.	2000.00	0.00	0.00	42.00	
A-04	HILL A	2000.	200.	200.	60.	2000.00	200.00	200.00	60.00	
A-05	HILL A	2000.	400.	400.	70.	2000.00	400.00	400.00	70.00	
A-06	HILL A	2000.	600.	600.	79.	2000.00	600.00	600.00	79.00	
A-07	HILL A	2000.	800.	800.	86.	2000.00	800.00	800.00	86.00	
A-08	HILL A	2000.	1000.	1000.	88.	2000.00	1000.00	1000.00	88.00	
A-09	HILL A	2000.	1200.	1200.	89.	2000.00	1200.00	1200.00	89.00	
A-13	HILL A	1800.	0.	0.	56.	1800.00	0.00	0.00	56.00	
A-14	HILL A	1800.	200.	200.	66.	1800.00	200.00	200.00	66.00	
A-15	HILL A	1800.	400.	400.	76.	1800.00	400.00	400.00	76.00	
A-16	HILL A	1800.	600.	600.	90.	1800.00	600.00	600.00	90.00	
A-17	HILL A	1800.	800.	800.	104.	1800.00	800.00	800.00	104.00	
A-18	HILL A	1800.	1000.	1000.	112.	1800.00	1000.00	1000.00	112.00	
A-19	HILL A	1800.	1200.	1200.	110.	1800.00	1200.00	1200.00	110.00	
A-20	HILL A	1800.	1400.	1400.	100.	1800.00	1400.00	1400.00	100.00	
A-23	HILL A	1600.	0.	0.	52.	1600.00	0.00	0.00	52.00	
A-24	HILL A	1600.	200.	200.	57.	1600.00	200.00	200.00	57.00	
A-25	HILL A	1600.	400.	400.	74.	1600.00	400.00	400.00	74.00	
A-26	HILL A	1600.	600.	600.	100.	1600.00	600.00	600.00	100.00	
A-27	HILL A	1600.	800.	800.	108.	1600.00	800.00	800.00	108.00	
A-28	HILL A	1600.	1000.	1000.	116.	1600.00	1000.00	1000.00	116.00	
A-29	HILL A	1600.	1200.	1200.	109.	1600.00	1200.00	1200.00	109.00	

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 8

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

OBSTACLE DATA FILE IN USER RUNWAY COORDINATE SYSTEM						OBSTACLES IN CRM RUNWAY COORDINATE SYSTEM				
IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	X METRES	Y1 METRES	Y2 METRES	Z METRES	
A-30	HILL A	1600.	1400.	1400.	103.	1600.00	1400.00	1400.00	103.00	
A-33	HILL A	1400.	0.	0.	46.	1400.00	0.00	0.00	46.00	
A-34	HILL A	1400.	200.	200.	53.	1400.00	200.00	200.00	53.00	
A-35	HILL A	1400.	400.	400.	65.	1400.00	400.00	400.00	65.00	
A-36	HILL A	1400.	600.	600.	100.	1400.00	600.00	600.00	100.00	
A-37	HILL A	1400.	800.	800.	106.	1400.00	800.00	800.00	106.00	
A-38	HILL A	1400.	1000.	1000.	108.	1400.00	1000.00	1000.00	108.00	
A-39	HILL A	1400.	1200.	1200.	107.	1400.00	1200.00	1200.00	107.00	
A-43	HILL A	1200.	0.	0.	39.	1200.00	0.00	0.00	39.00	
A-44	HILL A	1200.	200.	200.	47.	1200.00	200.00	200.00	47.00	
A-45	HILL A	1200.	400.	400.	60.	1200.00	400.00	400.00	60.00	
A-46	HILL A	1200.	600.	600.	94.	1200.00	600.00	600.00	94.00	
A-47	HILL A	1200.	800.	800.	100.	1200.00	800.00	800.00	100.00	
A-48	HILL A	1200.	1000.	1000.	102.	1200.00	1000.00	1000.00	102.00	
A-49	HILL A	1200.	1200.	1200.	102.	1200.00	1200.00	1200.00	102.00	
A-53	HILL A	1000.	0.	0.	33.	1000.00	0.00	0.00	33.00	
A-54	HILL A	1000.	200.	200.	40.	1000.00	200.00	200.00	40.00	
A-55	HILL A	1000.	400.	400.	55.	1000.00	400.00	400.00	55.00	
A-56	HILL A	1000.	600.	600.	90.	1000.00	600.00	600.00	90.00	
A-57	HILL A	1000.	800.	800.	94.	1000.00	800.00	800.00	94.00	
A-58	HILL A	1000.	1000.	1000.	97.	1000.00	1000.00	1000.00	97.00	
A-63	HILL A	800.	0.	0.	28.	800.00	0.00	0.00	28.00	OFZ PENETRATED ?
A-64	HILL A	800.	200.	200.	33.	800.00	200.00	200.00	33.00	
A-65	HILL A	800.	400.	400.	43.	800.00	400.00	400.00	43.00	
A-66	HILL A	800.	600.	600.	82.	800.00	600.00	600.00	82.00	
A-67	HILL A	800.	800.	800.	90.	800.00	800.00	800.00	90.00	
A-68	HILL A	800.	1000.	1000.	91.	800.00	1000.00	1000.00	91.00	
A-73	HILL A	600.	0.	0.	22.	600.00	0.00	0.00	22.00	OFZ PENETRATED ?
A-74	HILL A	600.	200.	200.	28.	600.00	200.00	200.00	28.00	
A-75	HILL A	600.	400.	400.	37.	600.00	400.00	400.00	37.00	
A-76	HILL A	600.	600.	600.	48.	600.00	600.00	600.00	48.00	
A-77	HILL A	600.	800.	800.	75.	600.00	800.00	800.00	75.00	
A-83	HILL A	400.	0.	0.	16.	400.00	0.00	0.00	16.00	OFZ PENETRATED ?
A-84	HILL A	400.	200.	200.	21.	400.00	200.00	200.00	21.00	
A-85	HILL A	400.	400.	400.	31.	400.00	400.00	400.00	31.00	
A-86	HILL A	400.	600.	600.	39.	400.00	600.00	600.00	39.00	
A-87	HILL A	400.	800.	800.	50.	400.00	800.00	800.00	50.00	
A-93	HILL A	200.	0.	0.	10.	200.00	0.00	0.00	10.00	OFZ PENETRATED ?
A-94	HILL A	200.	200.	200.	13.	200.00	200.00	200.00	13.00	
A-95	HILL A	200.	400.	400.	16.	200.00	400.00	400.00	16.00	
A-96	HILL A	200.	600.	600.	19.	200.00	600.00	600.00	19.00	
A-97	HILL A	200.	800.	800.	24.	200.00	800.00	800.00	24.00	
A-13A	HILL A	1800.	100.	100.	62.	1800.00	100.00	100.00	62.00	

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 9

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

OBSTACLE DATA FILE IN USER RUNWAY COORDINATE SYSTEM						OBSTACLES IN CRM RUNWAY COORDINATE SYSTEM				
IDENT	DESCRIPTION	X METRES	Y1 METRES	YZ METRES	Z METRES	X METRES	Y1 METRES	YZ METRES	Z METRES	
A-23A	HILL A	1600.	100.	100.	55.	1600.00	100.00	100.00	55.00	
A-33A	HILL A	1400.	100.	100.	49.	1400.00	100.00	100.00	49.00	
A-43A	HILL A	1200.	100.	100.	42.	1200.00	100.00	100.00	42.00	
A-53A	HILL A	1000.	100.	100.	36.	1000.00	100.00	100.00	36.00	
A-63A	HILL A	800.	100.	100.	30.	800.00	100.00	100.00	30.00	OFZ PENETRATED ?
A-73A	HILL A	600.	100.	100.	24.	600.00	100.00	100.00	24.00	
A-83A	HILL A	400.	100.	100.	18.	400.00	100.00	100.00	18.00	
A-93A	HILL A	200.	100.	100.	12.	200.00	100.00	100.00	12.00	

ICAO COLLISION RISK MODEL/ EDIT REPORT PAGE 10

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

OBSTACLE DATA FILE IN USER POLAR COORDINATE SYSTEM					OBSTACLES IN CRM RUNWAY COORDINATE SYSTEM			
IDENT	DESCRIPTION	BEARING DEGREES	DISTANCE METRES	Z METRES	X METRES	Y1 METRES	Y2 METRES	Z METRES
A8-02	LLZ ANTENNA	278.21	4242.	17.	-3196.17	0.00	0.00	17.00
A8-03	TOWER	45.00	424.	40.	847.01	1995.34	1995.34	40.00
A8-04	MAST	254.75	5894.	25.	-3399.54	-2611.74	-2611.74	25.00

ICAO COLLISION RISK MODEL/ EDIT REPORT

PAGE 11

ICAO REFERENCE CRM EXAMPLE 4
USER REFERENCE FANTASY AERODROME

DATE NOV 01, 1982
TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E
EXAMPLE 4

ILS CATEGORY I

SUMMARY OF OBSTACLE INFORMATION

TOTAL NUMBER OF OBSTACLES ENTERED 97

ALL OBSTACLES ARE IN THE PRECISION SEGMENT.

NO OBSTACLES WERE EDITED FROM THE ENTERED DATA.

ICAO COLLISION RISK MODEL/ RISK REPORTS PAGE 12

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

SPEED CATEGORY D SPECIFIED OCH ABOVE THRESHOLD 60 METRES

TOTAL RISK FOR THIS APPROACH 1.1E-04

RISK OF HITTING THE GROUND PLANE 1.4E-10

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
OBSTACLE WITH HIGHEST INDIVIDUAL RISK						
A-63	HILL A	800.00	0.00	0.00	28.00	4.4E-05
ALL OBSTACLES						
AS-01	RAILROAD	5285.00	80.00	140.00	127.00	3.6E-11
AS-06	TOWER	5215.00	40.00	40.00	155.00	1.5E-08
AS-02	RAILROAD	5205.00	40.00	80.00	125.00	9.8E-11
AS-03	RAILROAD	5165.00	-20.00	40.00	121.00	1.2E-10
AS-04	RAILROAD	5115.00	-100.00	-20.00	125.00	2.0E-10
AS-05	RAILROAD	5060.00	-130.00	-100.00	120.00	1.1E-11
A-03	HILL A	2000.00	0.00	0.00	42.00	9.1E-11
A-04	HILL A	2000.00	200.00	200.00	60.00	1.8E-13
A-05	HILL A	2000.00	400.00	400.00	70.00	*
A-06	HILL A	2000.00	600.00	600.00	79.00	*
A-07	HILL A	2000.00	800.00	800.00	86.00	*
A-08	HILL A	2000.00	1000.00	1000.00	88.00	*
A-09	HILL A	2000.00	1200.00	1200.00	89.00	*
A-13	HILL A	1800.00	0.00	0.00	56.00	7.3E-07
A-14	HILL A	1800.00	200.00	200.00	66.00	1.5E-11
A-15	HILL A	1800.00	400.00	400.00	76.00	*
A-16	HILL A	1800.00	600.00	600.00	90.00	*
A-17	HILL A	1800.00	800.00	800.00	104.00	*
A-18	HILL A	1800.00	1000.00	1000.00	112.00	*
A-19	HILL A	1800.00	1200.00	1200.00	110.00	*
A-20	HILL A	1800.00	1400.00	1400.00	100.00	*
A-13A	HILL A	1800.00	100.00	100.00	62.00	3.7E-08
A-23	HILL A	1600.00	0.00	0.00	52.00	3.4E-06
A-24	HILL A	1600.00	200.00	200.00	57.00	2.6E-12
A-25	HILL A	1600.00	400.00	400.00	74.00	*
A-26	HILL A	1600.00	600.00	600.00	100.00	*
A-27	HILL A	1600.00	800.00	800.00	108.00	*
A-28	HILL A	1600.00	1000.00	1000.00	116.00	*
A-29	HILL A	1600.00	1200.00	1200.00	109.00	*
A-30	HILL A	1600.00	1400.00	1400.00	103.00	*

* REPRESENTS A RISK LESS THAN 1.0E-15.

ICAO COLLISION RISK MODEL/ RISK REPORTS PAGE 13

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

SPEED CATEGORY D SPECIFIED OCH ABOVE THRESHOLD 60 METRES
CONTINUED

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
A-23A	HILL A	1600.00	100.00	100.00	55.00	3.1E-08
A-33	HILL A	1400.00	0.00	0.00	46.00	5.9E-06
A-34	HILL A	1400.00	200.00	200.00	53.00	2.9E-12
A-35	HILL A	1400.00	400.00	400.00	65.00	*
A-36	HILL A	1400.00	600.00	600.00	100.00	*
A-37	HILL A	1400.00	800.00	800.00	106.00	*
A-38	HILL A	1400.00	1000.00	1000.00	108.00	*
A-39	HILL A	1400.00	1200.00	1200.00	107.00	*
A-33A	HILL A	1400.00	100.00	100.00	49.00	3.8E-08
A-43	HILL A	1200.00	0.00	0.00	39.00	7.1E-06
A-44	HILL A	1200.00	200.00	200.00	47.00	1.4E-12
A-45	HILL A	1200.00	400.00	400.00	60.00	*
A-46	HILL A	1200.00	600.00	600.00	94.00	*
A-47	HILL A	1200.00	800.00	800.00	100.00	*
A-48	HILL A	1200.00	1000.00	1000.00	102.00	*
A-49	HILL A	1200.00	1200.00	1200.00	102.00	*
A-43A	HILL A	1200.00	100.00	100.00	42.00	3.2E-08
A-53	HILL A	1000.00	0.00	0.00	33.00	2.1E-05
A-54	HILL A	1000.00	200.00	200.00	40.00	9.9E-13
A-55	HILL A	1000.00	400.00	400.00	55.00	*
A-56	HILL A	1000.00	600.00	600.00	90.00	*
A-57	HILL A	1000.00	800.00	800.00	94.00	*
A-58	HILL A	1000.00	1000.00	1000.00	97.00	*
A-53A	HILL A	1000.00	100.00	100.00	36.00	7.0E-08
A8-03	TOWER	847.01	1995.34	1995.34	40.00	*
A-63	HILL A	800.00	0.00	0.00	28.00	4.4E-05
A-64	HILL A	800.00	200.00	200.00	33.00	8.5E-13
A-65	HILL A	800.00	400.00	400.00	43.00	*
A-66	HILL A	800.00	600.00	600.00	82.00	*
A-67	HILL A	800.00	800.00	800.00	90.00	*
A-68	HILL A	800.00	1000.00	1000.00	91.00	*
A-63A	HILL A	800.00	100.00	100.00	30.00	8.3E-08
A-73	HILL A	600.00	0.00	0.00	22.00	1.9E-05
A-74	HILL A	600.00	200.00	200.00	28.00	8.5E-13
A-75	HILL A	600.00	400.00	400.00	37.00	*
A-76	HILL A	600.00	600.00	600.00	48.00	*
A-77	HILL A	600.00	800.00	800.00	75.00	*
A-73A	HILL A	600.00	100.00	100.00	24.00	4.3E-08
A-83	HILL A	400.00	0.00	0.00	16.00	1.9E-06

* REPRESENTS A RISK LESS THAN 1.0E-15.

ICAO COLLISION RISK MODEL/ RISK REPORTS

PAGE 14

ICAO REFERENCE CRM EXAMPLE 4
USER REFERENCE FANTASY AERODROME

DATE NOV 01, 1982
TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E
EXAMPLE 4

ILS CATEGORY I

SPEED CATEGORY D SPECIFIED OCH ABOVE THRESHOLD 60 METRES
CONTINUED

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
A-84	HILL A	400.00	200.00	200.00	21.00	5.8E-13
A-85	HILL A	400.00	400.00	400.00	31.00	*
A-86	HILL A	400.00	600.00	600.00	39.00	*
A-87	HILL A	400.00	800.00	800.00	50.00	*
A-83A	HILL A	400.00	100.00	100.00	18.00	7.6E-09
A6-01	HILL	380.00	-250.00	-105.00	15.00	1.1E-09
A6-02	HILL	280.00	-119.00	-80.00	15.00	1.7E-08
A6-03	HILL	280.00	-247.00	-119.00	15.00	6.6E-10
A6-04	HILL	280.00	-247.00	-247.00	15.00	1.4E-15
A-93	HILL A	200.00	0.00	0.00	10.00	4.3E-08
A-94	HILL A	200.00	200.00	200.00	13.00	4.3E-13
A-95	HILL A	200.00	400.00	400.00	16.00	*
A-96	HILL A	200.00	600.00	600.00	19.00	*
A-97	HILL A	200.00	800.00	800.00	24.00	*
A-93A	HILL A	200.00	100.00	100.00	12.00	6.9E-10
A6-05	HILL	180.00	-85.00	-60.00	15.00	1.1E-07
A6-06	HILL	180.00	-245.00	-85.00	25.00	2.0E-06
A6-07	HILL	180.00	-275.00	-245.00	15.00	2.3E-14
A6-15	TOWER	140.00	-130.00	-130.00	40.00	2.2E-06
A6-08	HILL	80.00	-85.00	-60.00	15.00	1.3E-07
A6-09	HILL	80.00	-240.00	-85.00	25.00	2.9E-06
A6-10	HILL	80.00	-273.00	-240.00	15.00	3.2E-13
A6-11	HILL	60.00	-100.00	-62.00	15.00	1.2E-07
A6-12	HILL	60.00	-260.00	-100.00	25.00	1.2E-06
A6-13	HILL	60.00	-271.00	-260.00	15.00	7.3E-14
A6-14	HILL	-20.00	-268.00	-70.00	15.00	8.8E-08
A8-02	LLZ ANTENNA	-3196.17	0.00	0.00	17.00	*
A8-04	MAST	-3399.54	-2611.74	-2611.74	25.00	*

* REPRESENTS A RISK LESS THAN 1.0E-15.

ICAO COLLISION RISK MODEL/ RISK REPORTS PAGE 15

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE . FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

SPEED CATEGORY D MINIMUM ACCEPTABLE OCH ABOVE THRESHOLD 88 METRES

TOTAL RISK FOR THIS APPROACH 9.0E-08

THE RISK OF HITTING THE GROUND PLANE IS LESS THAN 1.0E-15.

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
OBSTACLE WITH HIGHEST INDIVIDUAL RISK						
A-23	HILL A	1600.00	0.00	0.00	52.00	3.3E-08
ALL OBSTACLES						
A5-01	RAILROAD	5285.00	80.00	140.00	127.00	3.6E-11
A5-06	TOWER	5215.00	40.00	40.00	155.00	1.5E-08
A5-02	RAILROAD	5205.00	40.00	80.00	125.00	9.8E-11
A5-03	RAILROAD	5165.00	-20.00	40.00	121.00	1.2E-10
A5-04	RAILROAD	5115.00	-100.00	-20.00	125.00	2.0E-10
A5-05	RAILROAD	5060.00	-130.00	-100.00	120.00	1.1E-11
A-03	HILL A	2000.00	0.00	0.00	42.00	9.7E-15
A-04	HILL A	2000.00	200.00	200.00	60.00	2.1E-14
A-05	HILL A	2000.00	400.00	400.00	70.00	*
A-06	HILL A	2000.00	600.00	600.00	79.00	*
A-07	HILL A	2000.00	800.00	800.00	86.00	*
A-08	HILL A	2000.00	1000.00	1000.00	88.00	*
A-09	HILL A	2000.00	1200.00	1200.00	89.00	*
A-13	HILL A	1800.00	0.00	0.00	56.00	2.9E-08
A-14	HILL A	1800.00	200.00	200.00	66.00	5.6E-12
A-15	HILL A	1800.00	400.00	400.00	76.00	*
A-16	HILL A	1800.00	600.00	600.00	90.00	*
A-17	HILL A	1800.00	800.00	800.00	104.00	*
A-18	HILL A	1800.00	1000.00	1000.00	112.00	*
A-19	HILL A	1800.00	1200.00	1200.00	110.00	*
A-20	HILL A	1800.00	1400.00	1400.00	100.00	*
A-13A	HILL A	1800.00	100.00	100.00	62.00	7.0E-09
A-23	HILL A	1600.00	0.00	0.00	52.00	3.3E-08
A-24	HILL A	1600.00	200.00	200.00	57.00	1.4E-13
A-25	HILL A	1600.00	400.00	400.00	74.00	*
A-26	HILL A	1600.00	600.00	600.00	100.00	*
A-27	HILL A	1600.00	800.00	800.00	108.00	*
A-28	HILL A	1600.00	1000.00	1000.00	116.00	*
A-29	HILL A	1600.00	1200.00	1200.00	109.00	*
A-30	HILL A	1600.00	1400.00	1400.00	103.00	*

* REPRESENTS A RISK LESS THAN 1.0E-15.

ICAO COLLISION RISK MODEL/ RISK REPORTS PAGE 16

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

SPEED CATEGORY D MINIMUM ACCEPTABLE OCH ABOVE THRESHOLD 88 METRES
CONTINUED

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
A-23A	HILL A	1600.00	100.00	100.00	55.00	8.7E-10
A-33	HILL A	1400.00	0.00	0.00	46.00	4.4E-09
A-34	HILL A	1400.00	200.00	200.00	53.00	1.0E-13
A-35	HILL A	1400.00	400.00	400.00	65.00	*
A-36	HILL A	1400.00	600.00	600.00	100.00	*
A-37	HILL A	1400.00	800.00	800.00	106.00	*
A-38	HILL A	1400.00	1000.00	1000.00	108.00	*
A-39	HILL A	1400.00	1200.00	1200.00	107.00	*
A-33A	HILL A	1400.00	100.00	100.00	49.00	1.4E-10
A-43	HILL A	1200.00	0.00	0.00	39.00	1.4E-10
A-44	HILL A	1200.00	200.00	200.00	47.00	3.0E-14
A-45	HILL A	1200.00	400.00	400.00	60.00	*
A-46	HILL A	1200.00	600.00	600.00	94.00	*
A-47	HILL A	1200.00	800.00	800.00	100.00	*
A-48	HILL A	1200.00	1000.00	1000.00	102.00	*
A-49	HILL A	1200.00	1200.00	1200.00	102.00	*
A-43A	HILL A	1200.00	100.00	100.00	42.00	7.8E-12
A-53	HILL A	1000.00	0.00	0.00	33.00	4.1E-11
A-54	HILL A	1000.00	200.00	200.00	40.00	5.8E-15
A-55	HILL A	1000.00	400.00	400.00	55.00	*
A-56	HILL A	1000.00	600.00	600.00	90.00	*
A-57	HILL A	1000.00	800.00	800.00	94.00	*
A-58	HILL A	1000.00	1000.00	1000.00	97.00	*
A-53A	HILL A	1000.00	100.00	100.00	36.00	2.7E-12
A8-03	TOWER	847.01	1995.34	1995.34	40.00	*
A-63	HILL A	800.00	0.00	0.00	28.00	1.4E-11
A-64	HILL A	800.00	200.00	200.00	33.00	5.8E-15
A-65	HILL A	800.00	400.00	400.00	43.00	*
A-66	HILL A	800.00	600.00	600.00	82.00	*
A-67	HILL A	800.00	800.00	800.00	90.00	*
A-68	HILL A	800.00	1000.00	1000.00	91.00	*
A-63A	HILL A	800.00	100.00	100.00	30.00	7.8E-13
A-73	HILL A	600.00	0.00	0.00	22.00	2.1E-12
A-74	HILL A	600.00	200.00	200.00	28.00	4.8E-15
A-75	HILL A	600.00	400.00	400.00	37.00	*
A-76	HILL A	600.00	600.00	600.00	48.00	*
A-77	HILL A	600.00	800.00	800.00	75.00	*
A-73A	HILL A	600.00	100.00	100.00	24.00	1.6E-13
A-83	HILL A	400.00	0.00	0.00	16.00	9.4E-14

* REPRESENTS A RISK LESS THAN 1.0E-15.

ICAO COLLISION RISK MODEL/ RISK REPORTS PAGE 17

ICAO REFERENCE CRM EXAMPLE 4 DATE NOV 01, 1982
USER REFERENCE FANTASY AERODROME TIME 12:41:41

CRM MANUAL DOC 9274-AN904 PART I APP D/E ILS CATEGORY I
EXAMPLE 4

SPEED CATEGORY D MINIMUM ACCEPTABLE OCH ABOVE THRESHOLD 88 METRES
CONTINUED

IDENT	DESCRIPTION	X METRES	Y1 METRES	Y2 METRES	Z METRES	RISK
A-84	HILL A	400.00	200.00	200.00	21.00	*
A-85	HILL A	400.00	400.00	400.00	31.00	*
A-86	HILL A	400.00	600.00	600.00	39.00	*
A-87	HILL A	400.00	800.00	800.00	50.00	*
A-83A	HILL A	400.00	100.00	100.00	18.00	1.5E-14
A6-01	HILL	380.00	-250.00	-105.00	15.00	1.8E-15
A6-02	HILL	280.00	-119.00	-80.00	15.00	7.2E-15
A6-03	HILL	280.00	-247.00	-119.00	15.00	1.3E-15
A6-04	HILL	280.00	-247.00	-247.00	15.00	*
A-93	HILL A	200.00	0.00	0.00	10.00	2.5E-15
A-94	HILL A	200.00	200.00	200.00	13.00	*
A-95	HILL A	200.00	400.00	400.00	16.00	*
A-96	HILL A	200.00	600.00	600.00	19.00	*
A-97	HILL A	200.00	800.00	800.00	24.00	*
A-93A	HILL A	200.00	100.00	100.00	12.00	*
A6-05	HILL	180.00	-85.00	-60.00	15.00	1.7E-14
A6-06	HILL	180.00	-245.00	-85.00	25.00	2.7E-12
A6-07	HILL	180.00	-275.00	-245.00	15.00	*
A6-15	TOWER	140.00	-130.00	-130.00	40.00	7.0E-10
A6-08	HILL	80.00	-85.00	-60.00	15.00	3.8E-15
A6-09	HILL	80.00	-240.00	-85.00	25.00	9.9E-13
A6-10	HILL	80.00	-273.00	-240.00	15.00	*
A6-11	HILL	60.00	-100.00	-62.00	15.00	2.6E-15
A6-12	HILL	60.00	-260.00	-100.00	25.00	4.4E-13
A6-13	HILL	60.00	-271.00	-260.00	15.00	*
A6-14	HILL	-20.00	-268.00	-70.00	15.00	*
A8-02	LLZ ANTENNA	-3196.17	0.00	0.00	17.00	*
A8-04	MAST	-3399.54	-2611.74	-2611.74	25.00	*

* REPRESENTS A RISK LESS THAN 1.0E-15.

CRM SUMMARY REPORT FOR TELEX TRANSMISSION

TO TELEX NUMBER: 44-555

MESSAGE FOR: MR JOHN OBSTACLE

THIS IS A SUMMARY REPORT FROM THE ICAO COLLISION RISK MODEL.
A COMPLETE REPORT WILL BE MAILED TO YOU ON
IT IS IMPORTANT THAT INFORMATION ON THIS SUMMARY REPORT BE CHECKED
AGAINST THE COMPLETE REPORT BEFORE ANY OFFICIAL USE IS MADE OF IT.

REQUEST TITLE: CRM MANUAL DOC 9274-AN904 PART I
EXAMPLE 4
YOUR REFERENCE: FANTASY AERODROME
ICAO REFERENCE CRM EXAMPLE 4

WARNING - OFZ APPEARS TO BE PENETRATED

PRELIMINARY RESULTS FOR ILS CATEGORY I

SPEED CAT.	TYPE OF REPORT		OCA/H METRES	TOTAL RISK	HIGHEST RISK OBSTACLE IDENT	DESCRIPTION	RISK
D	SPECIFIED	OCH	60	1.1E-04	A-63	HILL A	4.4E-05
D	MINIMUM	OCH	85	9.0E-08	A-23	HILL A	3.3E-08

Appendix 5. Collision Risk Model Error and Warning Limits

A list of errors and warnings applying to entered parameters is shown in table 5-1. Errors prevent the use of the CRM; warnings do not.

Error messages will appear when the CRM detects missing data, an invalid entry, or inconsistent parameters. If an error message occurs, verify that the items were entered correctly. If they were, the CRM cannot be used to evaluate the procedures. (Example: glide path angle is not between 2.5° and 3.5°.)

Warning messages will be given when limits are exceeded, but will not prevent the use of the CRM.

Item No.	*Description*	*Error Limits*		*Warning Limits*	
		Minimum	*Maximum*	*Minimum*	*Maximum*
07	ILS glide path angle	2.5°	3.5°		
08	ILS reference datum height	0 m		12 m	20 m
09	Distance between LLZ and THR	900 m	6 000 m	2 000 m	4 500 m
10	LLZ course width at THR	60 m		170 m	250 m
10*	LLZ course sector angle				6°
11	THR elevation above MSL			-100 m	4 000 m
12	Distance from FAP to THR			2 400 m	18 520 m**
13*	Glide path height at termination of precision segment				300 m
14A	Distance between flight paths of aeroplane wheels and GP antenna	0 m			10 m
14B	Aeroplane wing semi-span	0 m		7 m	50 m
15	Missed approach climb gradient	1%		2.5%	5%
19	OCH above THR elevation	0 m		PANS-OPS Vol II Part III Table 21-4	CAT I: 120 m CAT II: 60 m
21	Total number of obstacles	0		1	
23-26	THR height			-100 m	4 000 m
25C, F	Bearing	0°	360°		
25D, G	Distance	0 m			
26B, E	Latitude (North or South)	0°	85°		
26C, F	Longitude (East or West)	0°	180°		
24-26*	Difference between calculated and input LLZ to THR distance		100 m		10 m

* These values are not input; they are calculated within the CRM.
** This warning will be provided also if the distance from FAP to THR is increased beyond 18 520 m because the FAP is not marked by a fix

Table 5-1. CRM Error and Warning Limits