INTERNATIONAL CIVIL AVIATION ORGANIZATION
NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE

TWENTY-SIXTH EASTERN CARIBBEAN INFORMAL WORKING GROUP MEETING
(26TH E/CAR IWG)

(Barbados, 3 to 7 June 2002)

Agenda Item 2: **AIS Developments**

THE COMPLETE IMPEMENTATION ON WGS-84 SYSTEM

(Working Paper presented by the Secretariat)

SUMMARY

This paper was prepared to emphasize the importance for the States to complete this significant task as son as possible, and the need to establish coordination meetings among nationhood States in order to agree the publication for common FIR, ATS and ATS/MET WGS-84 coordinates.

1 Introduction

1.1 ICAO and International Organizations declare our concern for the overall status of the implementation of WGS-84 in the Region and the low-key action plans by some States. Aircraft rely on FMS Databases, which are supported on WGS-84 coordinates. Therefore, WGS-84 has to be considered as an essential element to CNS/ATM.

1.2 Once more we ask to Civil Aviation Administrations to make additional efforts to achieve the total implementation of the WGS-84, as well as to continue with the necessary actions to update and recalculate the rest of the geographic coordinates, that will be used for air navigation operations such as fixed points and FIR, ATS, ATS/MET obstacles, in different flight phases within the flight procedure areas, and which must be published in the corresponding Aeronautical Information Publication (AIP).

2. Discussion

2.1 During the last E/CAR IWG Meeting the results of a technical study on the status of implementation of the referred system were presented, concluding that it is necessary to establish a tight collaboration among Aeronautical Administrations and the Geodetic/Geographic Institutes in order to complete the WGS-84 System Implementation.

2.2 The objective of these studies are to provide details and descriptive guides of WGS-84 coordinates data to be provided by States and to complete the requirements contained on Annexes 4, 11, 14, 15, and Document 9674 (World Geodetic System, 1984). The referred information has been developed gathering information from AIP publications and WGS-84 surveys in the E/CAR Region that were coordinated by International Governmental Agencies of the United Sates, such as the Federal Aviation Administration (FAA), the National Imagery and Mapping Agency (NIMA), and National Geodetic Survey (NGS).

2.3 For Civil Aviation Administrations and ICAO, it is very important to know what type of data has been surveyed and to what level of accuracy and resolution this was done. In addition to the production of accurate positional data, the other aim of the programme is to be able to recall the history of that data. It is the survey report that will provide the details of the acquisition method used. This quality record will be used for assessment and future reference.

2.4 It is therefore essential that the surveyors record all the necessary information that will be required. To ensure this, a minimum survey report specification should be given in the Surveying Standard. This way all survey work undertaken to determine the coordinates of navigation facilities can be reported in a predefined format. Where existing national reporting practice differs from that shown in the Surveying Standard, the National Administration may make a case in support of the national standard where this can be shown to be compatible.

2.5 An advantage in having consistency of report formats will be seen in the assessment phase. Checklists drawn up based on the Standard format and cross referenced to the mandatory points would facilitate an efficient audit process. A further advantage can also be seen in providing the surveyors with the checklists before operations as a guidance document for the reporting requirement.

2.6 This analysis will show the real status on States/Territories with more progress in the WGS-84 implementation. Other significant information is to know which States/Territories have a minor implementation level. In this regard, it is important to emphasize that in some States/Territories there exists a mayor complexity in its airspace and airport infrastructure.

2.7 Subsequently and considering all categories within the Inventory Questionnaire, as well as other categories such as NAVAIDS, SID, STAR, etc, this analysis will allow to have the required details, complexity of information and volume data to obtain an implementation status profile even on a Subregional level. It is noted that the WGS-84 data from some States in the E/CAR has not been received at the ICAO NACC Regional Office, due to the possibility that it has not been published through the corresponding AIP.

3. **Conclusion**

3.1 According with the aforementioned, the Meeting is invited to adopt the following conclusion:

CONCLUSION 26/XX ADOPT THE INVENTORY QUESTIONNAIRE FOR THE WGS-84 IMPLEMENTATION STATUS.

That E/CAR States/Territories:

a) Fill and complete the Inventory Questionnaire for the WGS-84 Implementation Status;

b) Maintain updated the historical data by Aeronautical Authority trough basic reporting structure for: Geodetic survey, En-route survey and Aerodrome/heliport survey;

c) Present the Inventory Questionnaire fulfilled to the NACC Regional Office, by 31st. July 2002 at the latest. **(See** Appendix **to this WP)**

4. **Suggested Action**

4.1 The Meeting is invited to discus and take note of this working paper, in order to provide the information required in support to the completion of the WGS-84 Implementation.

4.2 The Meeting is invited to adopt the Conclusion 26/XX.

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Appendix G

SAMPLE QUESTIONNAIRE

Survey inventory related to WGS-84 implementation

Notes on the completion of Parts I and II:

1. *Part I should be completed by national aviation administrations.*

2. *One copy of the last page of Part I (items i to ix) should be completed for each navigation aid.*

3. *Part II should be distributed by national aviation administrations to aerodrome/heliport authorities for completion — one questionnaire for each aerodrome/heliport — the cover page to be completed by national administrations.*

4. *Initially, Part II should be completed for those aerodromes/heliports which have established instrument approach procedure(s) for the runway(s).*

5. *For aerodromes/heliports where visual approach procedures only are established, the requirement is for information on the aerodrome/heliport reference point (ARP).*

6. *Parts I and II have been designed so that the responses can be scanned automatically into a digital format. The majority of the questions can be answered using a multiple choice format. The scanning and formatting of the data will permit analysis using a PC-based tool. This PC programme is available to States upon request from ICAO.*

7. *Blank templates of the questionnaire form are available upon request from ICAO. These may be used by national administrations to insert text in their own national language. It is important that the format and layout be maintained so that translated questionnaires may be scanned and analysed by the standard PC programme referred to in 6. above.*

Part I — En-route navigation aids

State

Civil Aviation Administration

Address

Contact name

Telephone

Facsimile

Navigation Aid Survey Inventory

Questionnaire

Part I — En-route navigation aids

(DME, VOR, DME/VOR, NDB, VORTAC and TACAN)

1. By which organization is co-ordination of navigation aids performed?

[ ] National aviation administration's internal survey unit
[ ] Aerodrome/heliport staff surveyors
[ ] National mapping agency
[ ] Local government survey unit
[ ] Military survey department
[ ] Private survey contractor
[ ] Other — please specify _____

2. Is a written specification used for the method of measurement?

[ ] Yes [ ] No

3. Which facilities are surveyed?

DME	[ ]	Yes	[ ]	No
VOR	[ ]	Yes	[ ]	No
VOR/DME	[ ]	Yes	[ ]	No
NDB	[ ]	Yes	[ ]	No
VORTAC	[ ]	Yes	[ ]	No
TACAN	[ ]	Yes	[ ]	No

4. Is co-ordination done by instrument survey or by graphical methods?

DME	[ ]	Instrument survey	[ ]	Graphical method
VOR	[ ]	Instrument survey	[ ]	Graphical method
VOR/DME	[ ]	Instrument survey	[ ]	Graphical method
NDB	[ ]	Instrument survey	[ ]	Graphical method
VORTAC	[ ]	Instrument survey	[ ]	Graphical method
TACAN	[ ]	Instrument survey	[ ]	Graphical method

5. If coordinates are obtained graphically from map products, what map scale (or nearest equivalent) is generally used?

	DME	VOR	DME/VOR	NDB	VORTAC	TACAN
>1/5 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/5 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/10 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/20 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/25 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/50 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/100 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1/250 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1/250 000	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

6. To what accuracy are the coordinates determined?

Note.— This may differ from the resolution quoted in the AIP.

	DME	VOR	DME/VOR	NDB	VORTAC	TACAN
>1 NM	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1 NM	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
0.1 NM	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
100 m	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
10 m	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
1 m	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

INFRASTRUCTURE

7. If coordinates are extracted from a map, is it known on which datum the map is based?

[ ] Yes [ ] No

8. Is the information in 7 above recorded as part of the survey?

[ ] Yes [ ] No

9. If instrument surveys are performed,

a) Is a record made of the reference frame used?

[ ] Yes [ ] No

b) Are permanent survey stations established as part of the survey?

[ ] Yes [ ] No

QUALITY CONTROL

10. Is the determination of the geographical coordinates of navigation aids covered by a formal system of quality assurance, such as ISO 9000 or equivalent?

[ ] Yes — please specify

[ ] No

11. What classification of staff is used for co-ordinating en-route navaids?

[ ] Professional surveyors
[ ] Qualified cartographers or draughtsmen
[ ] Qualified technicians
[ ] Junior grade staff
[ ] Untrained staff
[ ] Not known

12. Is specific training given for the particular task of surveying navigation aids?

[ ] Yes [ ] No

13. Are field inspections undertaken to verify the location of the navigation aids and, if yes, are they part of an ongoing programme for inspection?

[ ] Yes [ ] No
[ ] Yes [ ] No

14. Are such inspections, or similar inspections, part of an ongoing programme for inspection or calibration?

[ ] Yes [ ] No

15. Where coordinates are supplied by other government agencies, is any further form of checking performed?

[ ] Yes [ ] No

RECORDS AND ARCHIVES

16. Are comprehensive records kept on positioning and coordinate data ?

[ ] Yes [ ] No

17. Are such records free of inconsistencies?

[ ] Yes [ ] No

18. Is it possible to trace the data and the method of the survey/coordination of individual navaids?

[ ] Yes [ ] No

19. Are the survey records held centrally and, if yes, are they easily accessible?

[ ] Yes [ ] No
[ ] Yes [ ] No

20. Are the survey records held on computer?

[ ] Yes [ ] No

21. Are the survey records subject to regular maintenance?

[ ] Yes [ ] No

22. In the case of collocated navigation aids (VOR/DME), is it known to which facility the published coordinates relate?

[ ] Yes [ ] No

23. Is the physical separation of such pairs of facilities known?

[ ] Yes [ ] No

24. Where central records of precise coordinates of navigation aids are kept, are the published AIP coordinates checked for consistency?

[ ] Yes [ ] No

CONFIRMATION OF AIP ENTRY

25. Please indicate in Column A the number of navaids for which coordinates are published. In Column B state the number of navaids for which the coordinates are determined by the national civil aviation administration itself.

AID	Column A	Column B
DME		
VOR		

VOR/DME

NDB

VORTAC

TACAN

The following information is required for each DME, VOR, DME/VOR, TACAN and VORTAC. The information is not required for NDBs.

(i) Identifier |_|_|_|_|

(ii) Type of aid

[ ] DME [ ] VOR [ ] DME/VOR
[ ] TACAN [ ] VORTAC

(iii) Is there any documentary record of the date of survey (i.e. date on which coordinates were determined)?

[ ] Yes [ ] No

(iv) Method of survey, please specify.

|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

(v) To which geodetic datum do the coordinates refer?

[ ] WGS-84 [ ] National Mapping Datum
[ ] ED 50 [ ] Not known

(vi) If the answer to (v) was national mapping datum, please state its name.

|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

(vii) Are original survey observations available?

[ ] Yes [ ] No

(viii) In the case of VOR, TACAN and VORTAC, please state, if available, the value of the SITE DECLINATION (VARIATION) set at the last calibration.

DEGREES.XX |_|_| . |_|_| [ ] East [ ] West

Date of last calibration |_|_|_|_|_|_|

(ix) For collocated aids (e.g. VOR/DME), do the coordinates relate to the distance measuring element?

[ ] Yes [ ] No

Part II — Aerodrome/heliport points

Aerodrome/heliport ICAO location indicator

Aerodrome/heliport

Address

Contact name

Telephone

Facsimile

Navigation Aid Survey Inventory

Questionnaire

Part II — Aerodrome/heliport points

This section to be completed by national administrations.

First name

Family name

Position

Address

Telephone

Facsimile

This section to be completed by the technical officer responsible for providing survey details.

First name

Family name

Position

Address

Telephone

Facsimile

SURVEY CONTROL NETWORK

1. Is there an existing survey control network at the aerodrome/heliport?

[ ] Yes [ ] No [ ] Not known

2. If yes, who installed and surveyed the network?

[ ] National aviation administration's internal survey unit
[ ] Aerodrome/heliport staff surveyor
[ ] National mapping agency
[ ] National geodetic agency
[ ] Local government survey unit
[ ] Military survey department
[ ] Private survey contractor
[ ] Other — specify

3. State the name of the survey organization. (If more than one survey organization has been involved, state the name of the organization having done the most work.)

4. State the age of the aerodrome/heliport survey control network, in years.

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

5. To which geodetic datum or control frame is the network referenced?

[ ] WGS-84 [ ] National Mapping Datum

[ ] ED 50 [ ] Not known

6. To which order of geodetic network is the aerodrome/heliport survey network connected?

[ ] Primary [ ] Secondary [ ] Tertiary

7. Name of geodetic network.

8. Method of connection.

[ ] Static GPS [ ] EDM Traverse

[ ] Triangulation [ ] Not known

9. How many stations are in place at the aerodrome/heliport?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

10. What is the relative survey accuracy of the aerodrome/heliport survey control network?

[ ] < 1 metre [ ] < 0.1 metre [ ] < 0.02 metre

11. Types of survey control markers (monuments) used on network.

Concrete:

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

Earth anchor:

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

Surface mark (rivet, stud, metal plate, etc.):

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

12. Are survey station descriptions available?

[ ] Yes [ ] No [ ] Not known

13. Was the survey performed in accordance with the guidance in this manual?

[ ] Yes [ ] No [ ] Not known

14. Is the survey work performed in accordance with a quality assurance scheme (such as ISO 9000)?

[ ] Yes — specify  [ ] No scheme

15. Is a survey report available?

[ ] Yes [ ] No [ ] Not known

16. Has a record been kept of the original survey observations?

[ ] Yes [ ] No [ ] Partial

17. Were independent checks made on the survey?

[ ] Yes [ ] No [ ] Not known

18. Which organization made the checks?

19. Were records kept of the checks?

[ ] Yes [ ] No [ ] Not known

AERODROME OBSTACLES

20. Which organization performed the obstacle survey?

[ ] National aviation administration's internal survey unit
[ ] Aerodrome/heliport staff surveyor
[ ] National mapping agency
[ ] National geodetic agency
[ ] Local government survey unit
[ ] Military survey department
[ ] Private survey contractor
[ ] Other — specify

21. State the name of survey organization. (If more than one survey organization has been involved, state the name of the organization having done the most work.)

22. State how frequently, in years, the aerodrome/heliport obstacle survey is performed?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

23. How long ago, in years, was the last aerodrome/heliport obstacle survey carried out?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

24. To which geodetic datum is the aerodrome/heliport obstacle survey referenced?

[ ] National datum [ ] Local datum

25. Are the obstacle coordinates obtained by original instrument survey or by graphical means from existing mapping?

[ ] Instrument survey [ ] Existing mapping

26. Was the survey performed in accordance with any declared specifications?

[ ] Yes [ ] No [ ] Not known

27. Do full survey records for the aerodrome/heliport obstacles exist?

[ ] Yes [ ] No [ ] Not known

28. Is the survey work performed in accordance with a quality assurance scheme (such as ISO 9000)?

[ ] Yes — specify [ ] No scheme

29. Is the survey report available?

[ ] Yes [ ] No [ ] Not known

30. Has a record been kept of the original survey observations?

[ ] Yes [ ] No [ ] Not known

31. Were independent checks made on the survey?

[ ] Yes [ ] No [ ] Not known

32. Which organization made the checks?

AERODROME/HELIPORT NAVIGATION ELEMENTS

33. Which organization performed the aerodrome/heliport navigation elements survey?

[ ] National aviation administration's internal survey unit
[ ] Aerodrome/heliport staff surveyor
[ ] National mapping agency
[ ] National geodetic agency
[ ] Local government survey unit
[ ] Military survey department

[ ] Private survey contractor
[ ] Other — specify

34. State the name of survey organization. (If more than one survey organization has been involved, state the name of the organization having done the most work.)

RUNWAY THRESHOLDS

35. How many runway thresholds are on the aerodrome/heliport?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

36. How many runways with precision approach facilities are on the aerodrome/heliport?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

37. How many thresholds have been surveyed?

[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
<1	1	2	3	4	5	6	7	8	9	10	>10

38. To which accuracy have these thresholds been surveyed?

[ ] < 10 metres [ ] < 3 metres [ ] < 1 metre [ ] < 0.1 metre

— END —