



ADVISORY CIRCULAR

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SIERRA LEONE CIVIL AVIATION AUTHORITY

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Guidance on Aerodrome Quality Data System



Director General
Sierra Leone Civil Aviation

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1 GENERAL

The Sierra Leone Civil Aviation Authority’s Advisory Circulars contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

An AMC is not intended to be the only means of compliance with a Regulation, and consideration will be given to other methods of compliance that may be presented to the Authority

Information considered directive in nature is described in this AC in terms such as “shall” and “must”, indicating the actions are mandatory. Guidance information is described in terms such as “should” and “may” indicating the actions are desirable or permissive, but not mandatory.

1.1 Purpose

This AC prescribes procedures governing the management of aerodrome data at aerodromes intended for use by the public transport aircraft. It will ensure the production, publication and quality system of aerodrome data are in compliance with Standards as specified in SLCAR’s Part 14A.

1.2 Applicability

This AC is applicable to aerodrome operators conducting Aerodrome Quality Data System for all aerodromes, except military aerodromes.

1.3 Description of Changes

This AC is the first to be issued on this subject

1.4 References

- a) SLCAR’s Part 14A– Aerodromes Design and Operations Standards
- b) SLCAR’s Part 15 – Aeronautical Information Services
- c) ICAO World Geodetic System — 1984 (WGS-84) Manual (Doc 9674)
- d) ICAO Doc 10066 – PANS AIM

1.5 Cancelled Documents

N/A

2 INTRODUCTION

All aerodrome operational data which are relevant for the safe and efficient operations of aircraft at an aerodrome must be promulgated in the appropriate Aeronautical Information Publication. This data will range from permanent descriptive material of the aerodrome to information of a short term and temporary nature. The responsibility for the provision, accuracy and reliability of aerodrome data rest with the aerodrome operator.

2.1 Requirement to promulgate aeronautical information

The SLCAR Part 14A (Aerodrome Design and Operations Standards), requires the SLCAA to ensure the publication of aeronautical information that is essential to air navigation. This aeronautical information is promulgated by the Aeronautical Information Service (AIS), operated by the Roberts FIR. The promulgated aeronautical information shall include aerodrome data and related information and various aerodrome charts.

2.2 Purpose of promulgating aerodrome data and information

2.2.1 Before any person uses any place as an aerodrome, they must:

- a) ensure that the place has aerodromes physical characteristics, established obstacle limitation surfaces and visual aids commensurate with the characteristics of the critical aeroplane to be used, the lowest meteorological minima to be used, and the ambient light conditions; and
- b) ensure that the place is suitable for landing and taking-off.

To enable airline operators and other aerodrome users (international and domestic) to assess the suitability and condition of an aerodrome for their aircraft operations, the Aeronautical Information Service is required to publish aerodrome data and related information in the Sierra Leone Aeronautical Information Publication, and to promulgate any significant change to that data or information by NOTAM, where the change is of direct significance to the safe operations of aircraft. The aircraft operator can rely on the currency and accuracy of the data and information published in the Sierra Leone AIP and promulgated by NOTAM to meet the requirements of the applicable regulations, to determine the suitability and operating conditions of an aerodrome for their flight operations.

2.3 Types of published aerodromes

Certified aerodromes or aerodromes required to be certified. Verified data and information on all certified aerodromes or aerodromes required to be certified under the SLCAR Part 14C, must be published by the AIS in the Sierra Leone AIP. Operationally, significant changes to that data and information, must be promulgated by NOTAM as applicable.

2.4 Procedure for promulgation

- a) For the promulgation of aerodrome data and related information in the Sierra Leone AIP and by NOTAM, the accountable manager responsible for an aerodrome, shall submit the aerodrome data to the AIS for review in coordination with the SLCAA, before they are published in the AIP.
- b) Holders of aerodrome certificates are required under the SLCAR Part 14C to:
 - i) establish any limitations on the use of the aerodrome that arise from the aerodrome design or the facilities or services provided at their aerodrome;
 - ii) notify the AIS and the SLCAA of the aerodrome data and information that is specified in this AC for publication in the Sierra Leone AIP; and
 - iii) notify the AIS without delay of any aerodrome operational condition or defect at their aerodrome that may affect the safe operations of aircraft. Such notification requires the issuance of a NOTAM.
- c) The certificate holder is responsible for -
 - i) Ensuring the accuracy and timeliness of the aerodrome data and any information forwarded, and
 - ii) Maintaining the currency of that data and information and notifying any changes, including changes to the operational data and status of the aerodrome,

2.5 Data and information to be notified

Data can be divided into three broad groups as follows:

- a) **Permanent data:** this comprises basic descriptive material for the aerodrome which rarely if ever, changes. The data which would fall into this category would include aerodrome reference points, runway strength, runway dimensions and layout, elevations and permanent obstacles. The SLCAR Part 14A chapter 2, describes most of the data in this category.
- b) **Variable data:** data in this category are of a semi-permanent nature but are liable to change and provision must be made for such changes to be promulgated promptly. Data in this category would include such items as runway declared distances, obstacles, hours of operation, visual aids and such facilities as rescue and firefighting and salvage.
- c) **Temporary data:** data in this category are subject to short-term variations. These include limitations and warnings such as temporary runway or taxiway closures, temporary obstacles, runway surface condition reports, system failures and bird hazards.

The aerodrome data and information to be provided to the AIS for publication in the AIP is as listed in IS 3.2.1 of the SLCAR Part 15 for international aerodromes

2.6 Qualifying Surveying Companies.

- a) The Aerodrome Operator shall satisfy itself and the Authority (as may be required) as to the qualification and competence of the surveyors it employs for conducting aerodrome surveys. The following is a list of characteristics that should be considered (list not exhaustive):
 - i) Accredited to an ISO 9001:2000 standards or operate an equivalent quality control system.
 - ii) Professionally qualified surveyors and project managers to oversee the survey.
 - iii) Field survey staff competent in aerodrome surveying techniques and experienced at working in an operational aerodrome environment.
 - iv) Professional indemnity cover.
 - v) Field survey staff is a licensed, qualified in land surveying, civil engineering and land planning.
- b) All surveying companies employed in survey work for aerodromes shall be registered with, and accepted by the Authority. Registration ensures that surveyors are informed of changes to policy or procedures. Applicants shall apply in writing, giving relevant credentials, to the Director General, Sierra Leone Civil Aviation Authority.

3 SURVEYED DATA

3.1 Reference system specification

- a) In accordance with section 1.2.1 of the SLCAR's Part 15, all horizontal aeronautical points shall be referenced to WGS-84.
- b) Survey control points shall conform to the ICAO Doc 9674-AN/946 (WGS-84 Manual)
- c) WGS-84 geodetic control and format requires that the methods deployed must prove that the accuracy for the various surveys has been met. Survey companies undertaking these surveys shall be responsible for the accuracy of the control data and any transformation sets used. An analysis of the accumulated error, evidence confirming the required accuracies have been met and the transformation parameters used shall be included in the Survey Report.
- d) All surveys shall record the height/elevation of the surveyed point relative to mean sea level together with the assumed geoid ellipsoid separation (geoid undulation).
- e) In all cases appropriate survey checks shall be applied to prove the quality of vertical control. These checks shall be included within the survey report. Standard survey practice shall be used to produce the elevation to the required specification accuracy, and the integrity of the control points used shall be proved.

3.2 Facilities and corresponding minimum data requirements

Requirements

- a) The requirements stated in Appendix A shall be achieved as a minimum. In particular:
 - i) All significant obstacles shall be surveyed to meet the accuracy requirements of Table A-2.
 - ii) The navigation facility data requirements specified in Table A-3 shall be achieved for all facilities listed in Table A-4.
- b) All position accuracies shall relate to a probability of 95% (2 x sigma) containment, unless otherwise stated.
- c) Survey accuracies shall be such that the accumulated errors of observations and computations are sufficiently small to support the positional accuracy requirements for facilities laid down in this document.
- d) An analysis of the accumulated error shall be presented for each survey.

NOTE-1: This includes, but is not limited to:

- i) The accumulated error being presented in its component parts, each showing the accuracy achieved and that the result is consistent with the survey technique used;***
- ii) The accumulated error calculations being clearly reported and compared against the declared accuracy requirement.***

NOTE-2: The geographical coordinate accuracy of the various facilities has been set in accordance with both current and anticipated operational requirements.

3.3 Units

- a) All published positions and dimensions shall be in accordance with the requirements laid down by the Authority.
- b) In this regard, positions shall be published in the form of sexagesimal degrees (Degrees Minutes Seconds and decimals of a Second) to the resolutions laid down in SLCAR Part 15.
- c) Dimensions and distances shall be quoted in one of the following units;
 - i) Metres;
 - ii) Feet (1 ft = 0.3048 m) ;

- iii) Nautical Miles (1 NM = 1852 Km =6076.04 ft).

3.4 Survey requirements for aerodrome facilities

a) Runway centrelines and thresholds

- i) For surveying purposes, the centreline reference point of a runway shall be the centre-line of the defined landing area on the load-bearing surface.
- ii) Where the edge of the runway is irregular, or connected to a taxiway, an appropriate theoretical line shall be selected, which best identifies the probable edge of the runway.
- iii) Where the thresholds are marked by appropriate threshold markers, then these should be taken as the threshold point.
- iv) Where no threshold marker exists, the threshold shall be determined by the Authority and marked according with SLCAR Part 14A.
- v) Where there is no threshold marker, or threshold lighting, then the Surveyor shall select an appropriate point for survey in accordance with Appendix B.
- vi) Survey witness marks shall be installed to enable the threshold survey point to be re-established in the event of re-surfacing, re-painting or verification.
- vii) In addition, two associated runway centreline points, at a separation of not less than 10% of the runway length, shall be surveyed to aid co-linearity testing.
- viii) The Surveyor shall, in processing the survey data, determine and report on the co-linearity of the three points.
- ix) The distance from the point surveyed as the threshold to the end of the paved surface at the near end of the runway shall be determined to an accuracy of 0.1m.

Recommendation: Where a runway has a threshold at each end, the two thresholds and two further runway centreline points should be surveyed. The co-linearity should then be determined for the group of four points.

b) Aircraft stands

- i) The front, nose-in point of the stand, where the taxiway centreline intersects the limit of the stand, shall be surveyed.

- ii) Numerous different stand paint markings exist and a diagram shall be prepared by the Surveyor showing the arrangement of markings in use together with an indication of the point surveyed.

NOTE: Where all the stands at the aerodrome are marked uniformly then only a single diagram needs to be prepared.

- c) All other aerodrome radio navigation facilities
 - i) For all other aerodrome radio navigation facilities which require survey, the centre of the transmitting antenna shall be surveyed, except where a different specific survey point is standardised for the facility as indicated in Appendix B.
 - ii) If the organisation is in doubt about the facilities described in Appendix B, the SLCAA shall be responsible for clarification.

3.5 Surveying requirements for off-aerodrome radio navigation facilities

- a) General requirements
 - i) The coordinates of off-aerodrome radio navigation facilities shall meet the data requirements laid down in Table A-3.
 - ii) Where the quality of existing coordinates cannot be determined they shall be re-determined to the accuracy laid down in Table A-3.
- b) Description of off-aerodrome radio navigation facilities
 - i) For off-aerodrome radio navigation facilities not described in Appendix B, the horizontal coordinates of the geometric centre of the facility antenna shall be surveyed.
 - ii) If the organisation is in doubt about the facilities described in Appendix B, the SLCAA shall be responsible for clarification.
 - iii) Where coaxial co-located VOR/DME are surveyed, the position of the DME element shall be taken as the position.

NOTE: For non-coaxial co-located VOR/DME with a separation between antennas greater than 30 metres, it will be necessary to survey both antennas.

- iv) Where it is not possible to connect directly to ITRF, the method of local connection shall be described.

3.6 Survey report requirements

- a) All survey work undertaken to determine the coordinates of en-route/off-aerodrome navigation facilities shall be reported in the format laid out in Appendix C.
- b) The geodetic connection shall be fully described in detail where monumental survey control stations are not installed as part of an off-aerodrome radio navigation facility survey.

3.7 Quality assurance

- a) Calibration of survey equipment
 - i) All survey equipment deployed in relation to surveys covered by this standard shall be shown to be calibrated and to perform to an accuracy appropriate to the task.
 - ii) Equipment calibration shall be shown to be valid for the time of use.
 - iii) Details of the calibration process and results shall be included in the survey report.
- b) Quality records
 - i) All coordinates shall be traceable to their source of production by an unbroken audit trail, as required by the SLCAR Part 15.
 - ii) Information on the source of production shall include:
 - 1) Name of Surveyor;
 - 2) Surveying organisation;
 - 3) Date of survey;
 - 4) Method of survey;
 - 5) Equipment used
 - 6) Method of marking employed
 - 7) Description of surveyed point (textual supported by explanatory photographs sufficient to ensure correct identification of the point surveyed)).
 - iii) Records shall be maintained for a period of ten (10) years for all designated coordinates which are published in the AIP.
- c) Plan Sheet Size

Recommendation: The sheet size should be limited to A0 size for easy storage and handling. Where this is not practical due to the extent of the survey area, out-size and

adjoining sheets may be used. When using an adjoining sheet system, it should be capable of being abutted and orientated to give the most economical coverage.

d) Plan Sheet Layout

- i) Where multi-sheets are used, full reference shall be given to the total number in the series.
- ii) Each sheet shall have a title panel. The information shown should consist of the following:
 - 1) Aerodrome
 - 2) Drawing Title
 - 3) Drawing number or reference number including current amendment status.
 - 4) Date of survey
 - 5) Scale
 - 6) Survey company name and address including telephone number
 - 7) Surveyed by
 - 8) Checked by
 - 9) Sheet number
 - 10) Sheet lay-out and diagram, if applicable
 - 11) Abbreviations used
 - 12) A reference to the appropriate survey report
 - 13) Statement of vested copyright

3.8 Maintenance of data

- a) Each Requesting Agency and Origination Agency shall be responsible for maintaining data at all times in accordance with the requirements of this document.
- b) This shall apply throughout the lifetime of each data item.

- c) A check of valid navigation related facilities shall be performed every year, paying particular attention to the presence of new obstacles.
- d) Each surveyed data item shall be re-calculated no less than once every five years in order to take account of long term changes in geodetic relationships. The control should be checked by re-measurement every five years, and if there was a significant change then the Nav aids positions and obstacle coordinate data could be re-computed using a datum transformation. This relies upon the aerodrome maintaining a control network.

APPENDIX A - SURVEY DATA REQUIREMENTS

1.0. Introduction

- a) The minimum accuracy for surveyed aeronautical data items is specified in the SLCAR Part 11 and Part 14A. The requirements and specification for the publication of this data is specified in the SLCAR Part 15 and Part 4.
- b) The requirement for surveyed data presented in this Appendix applies to those given in the SLCAR Parts 4, 11, 14 and 15.
- c) This document requires that surveyed accuracy shall always be greater than or equal to the maximum published data accuracy.
- d) The survey data requirements are divided into three categories: terrain, obstacle and navigation related facilities. This manual applies to obstacle and navigation related facility data.

NOTE: It might be stated that there is a 95% probability that a particular coordinate value is within 10cm of the truth. It is usually assessed through precision, which is a measure of the internal consistency of data. Precision and accuracy will be identical when coordinates are free of the effects of any biases and outliers in the data.

2.0. Obstacle data requirements

- a) Significant obstacles shall be surveyed to the data accuracy requirements presented in Table A-2.
- b) Significant obstacles within Area 1 may be defined as En-route obstacles. Significant obstacles within Area 2 and the Aerodrome Terminal Control Area (TMA) include obstacles within circling area, approach and take-off areas as well as the aerodrome itself.

Areas/Attributes	Area 1	Area 2	Area 3
Horizontal Accuracy	50.0 m [SLCAR Part 15]	5.0 m [SLCAR Part 15]	0.5 m
Vertical Accuracy	30.0 m [SLCAR Part 15]	3.0 m [SLCAR Part 15]	0.5 m
Vertical Resolution	1.0 m [SLCAR Part 15]	0.1 m [SLCAR Part 15]	0.01 m
Confidence Level	90%	90%	90%

Table A-2: Summary of Obstacle Data Requirements

NOTE: No obstacles should be located within Area 4.

3.0. Navigation facility data requirements

a) Table A-3 presents the minimum requirements for aeronautical navigation facility data.

Areas/Attributes	Area 1 + 2	Area 3 & Area 4
Horizontal Accuracy	30 m [SLCAR Part 4]	0.5 m [SLCAR Part 14]
Horizontal Resolution	1 m	0.1 m
Vertical Accuracy	30 m [SLCAR Part 4, 11, 15]	0.25 m [SLCAR Part 14]
Vertical Resolution	1 m	0.1 m
Magnetic variation	1 degree [SLCAR Part 11]	1 degree [SLCAR Part 14]
Declination	1 degree	0.1 degree
Confidence Level	95%	95%

Table A-3: Summary of Navigation Facility Data Quality Requirements

b) Further guidance on satisfying the height requirements presented in Table A-2 and Table A-3 is provided within the SLCAR Part I5.

c) Table A-4 presents the navigation related facilities to be surveyed.

Point	Horiz. (m)	Vert. (m)	Mag. (0)	Dec. (0)
Landing Threshold to Runway Centreline	√			
Landing Threshold to Taxiway Centreline	√			
Precision Approach Rwy LTP and FRAP	√	√		
CAT I/II/III Rwy End and Landing Threshold	√	√		
LTP Ellipsoid Height		√		
Non-precision Rwy End and Landing Threshold	√	√		
Runway Threshold	√			
Runway End (flight path alignment point)	√			
Runway centre line points	√	√		
Taxiway centre line points	√			
FATO	√	√		
TLOF	√	√		
LAHSO location	√			
Arrest gear location	√			
Runway shoulder	√			
Stopway	√			
Clearway	√			
Taxiway segment	√			

Taxiway shoulder	√			
Taxiway guidance line	√			
Taxiway intersection marking	√			
Taxiway holding position	√			
Exit line	√			
Apron	√			
Stand guidance line	√			
Parking stand location	√			
Deicing area	√			
Construction area	√			
VHF Navaid – Terminal	√	√		√
NDB Navaid – Terminal	√	√	√	
VHF Navaid – En-route	√	√		√
NDB Navaid – En-route	√	√	√	
TACAN	√	√		
DME	√	√		
ILS Localizer (Azimuth) Antenna	√	√	√	
ILS Glide Slope Antenna	√	√		
MLS Localizer (Azimuth) Antenna	√	√	√	
MLS Glide Slope Antenna	√	√		
ILS or MLS DME	√	√		
MLS DME/P	√	√		
GBAS (LAAS) Reference Point	√	√		
Aerodrome Surface Movement Points	√			
Aircraft stand-points/INS check-points	√			
Significant obstacles in the approach and take-off	√	√		
Obstacles in the circling area and at the	√	√		
Obstacles en-route	√	√		
Navigation Check points	√			
Aerodrome	√	√		√
Survey control point	√	√		

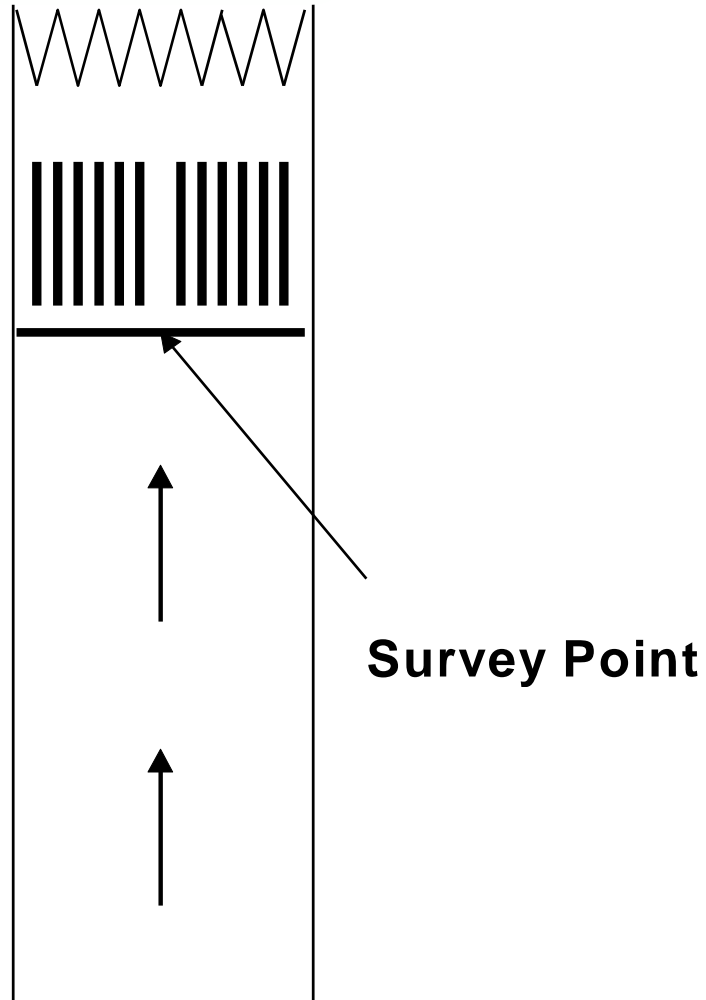
Table A-4: Navigation related facilities

APPENDIX B - DESCRIPTION OF FACILITIES

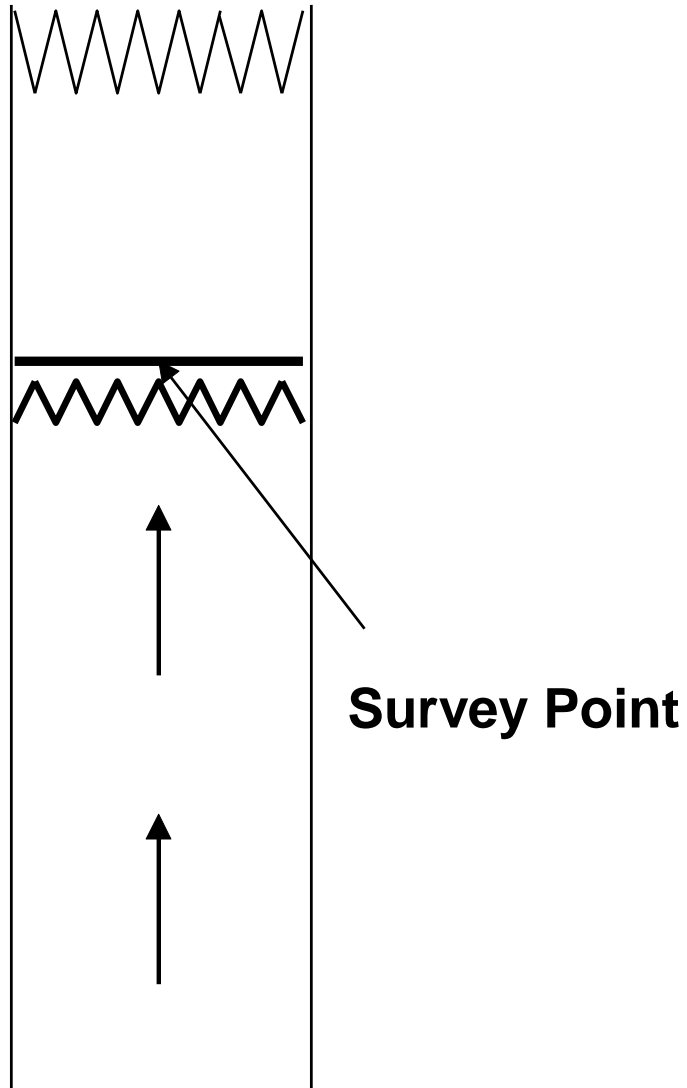
1.0. General

- a) This appendix sets out to standardise the determination of threshold points and nav aids for survey purposes. For guidance on survey points for runway and taxiway intersections and holding points see ICAO Doc 9674 (WGS-84 Manual).
- b) Where the location of the actual threshold is not known and imbedded threshold lights do not exist, then the most appropriate 'Type a' diagram shall be selected to indicate the point surveyed.
- c) Where none of the diagrams of Appendix B is appropriate, a new diagram shall be prepared, showing the actual arrangement of markings and the point selected for survey.
- d) Wing-bar threshold lights and lights installed ahead of the runway hard surface shall have no direct survey status with respect to thresholds.
- e) The following illustrations shall indicate the plan metric position to be surveyed.

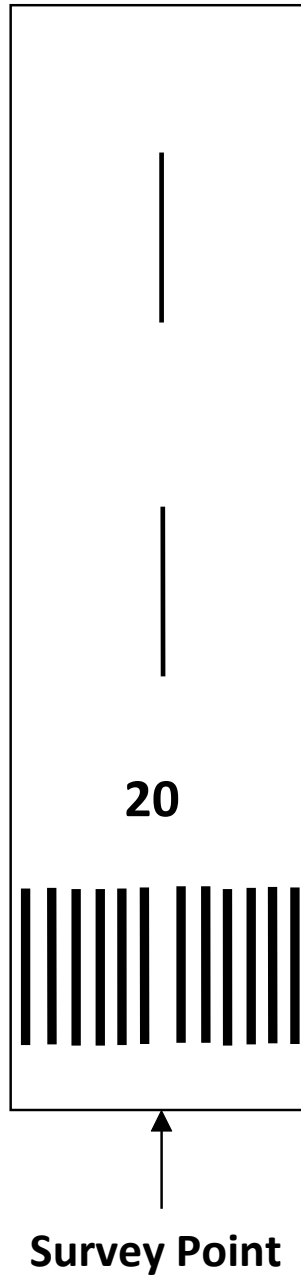
2.0 Marking example Type 1 (Normative)



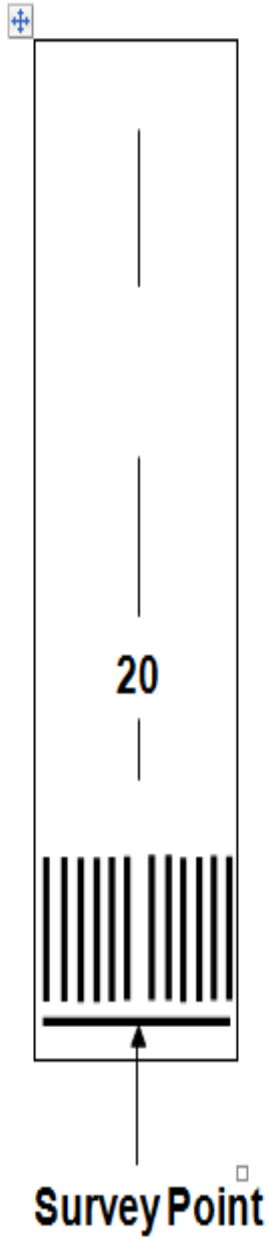
3.0 Marking example Type 2 (Normative)



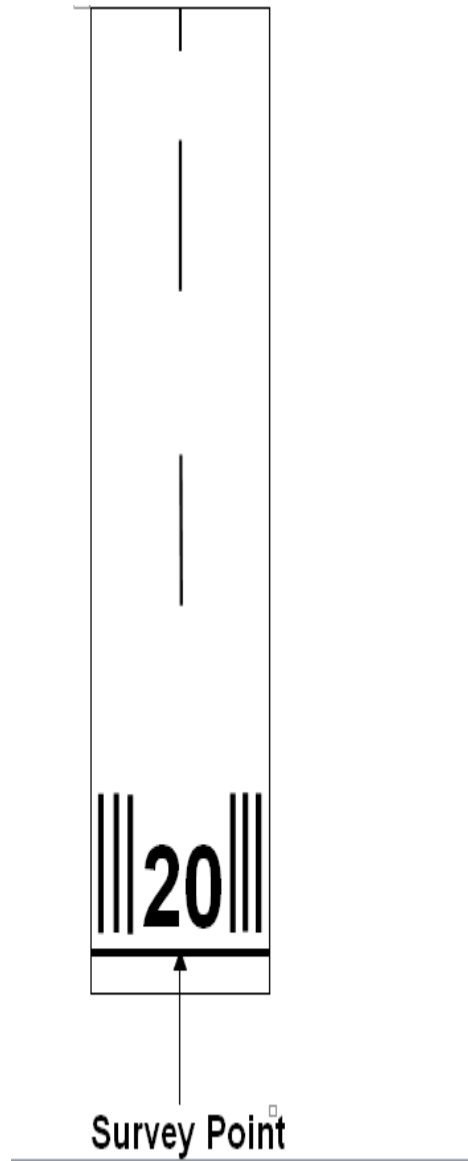
4.0 Marking example Type 3 (Informative)



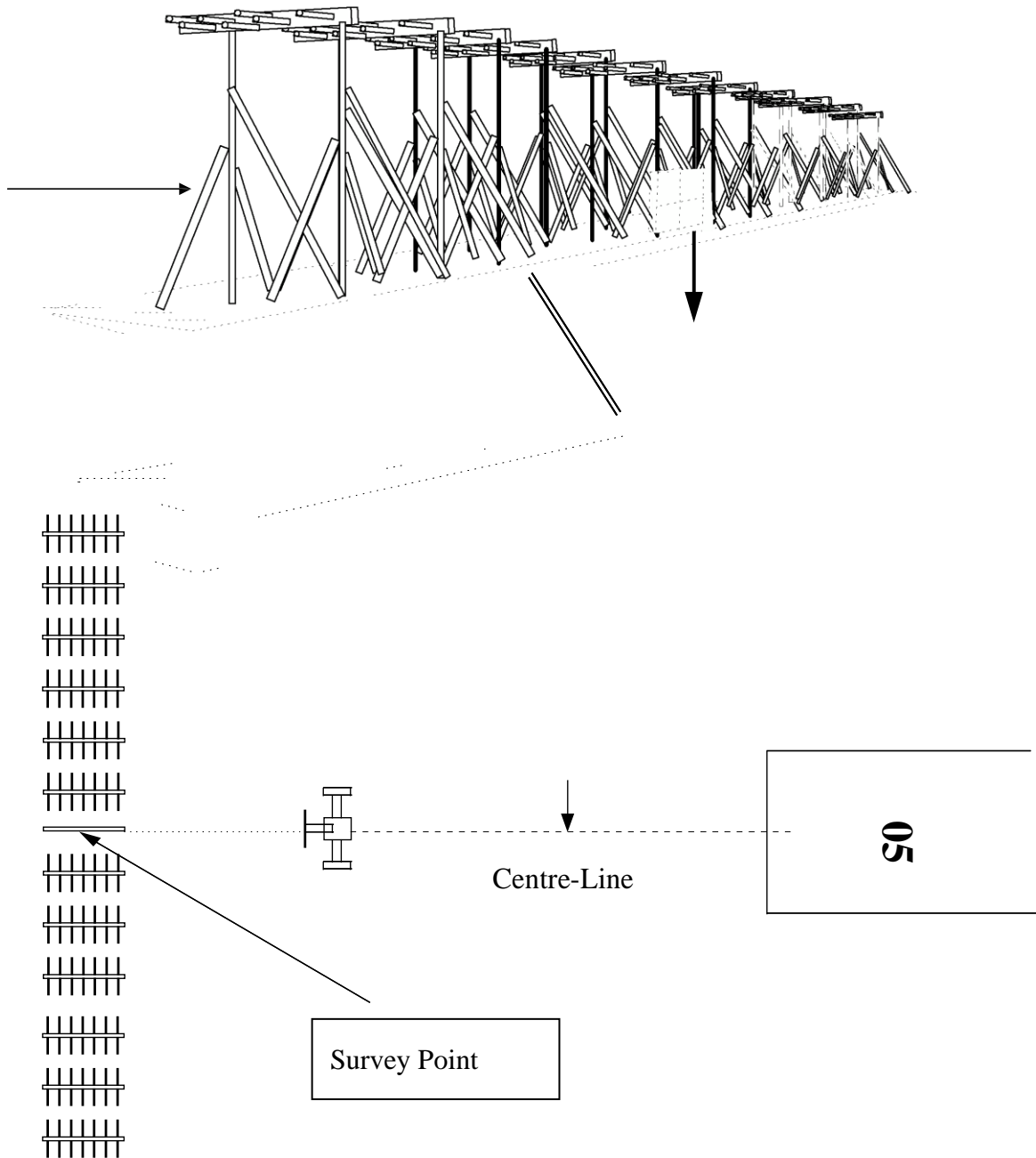
5.0 Marking example Type 4 (Informative)



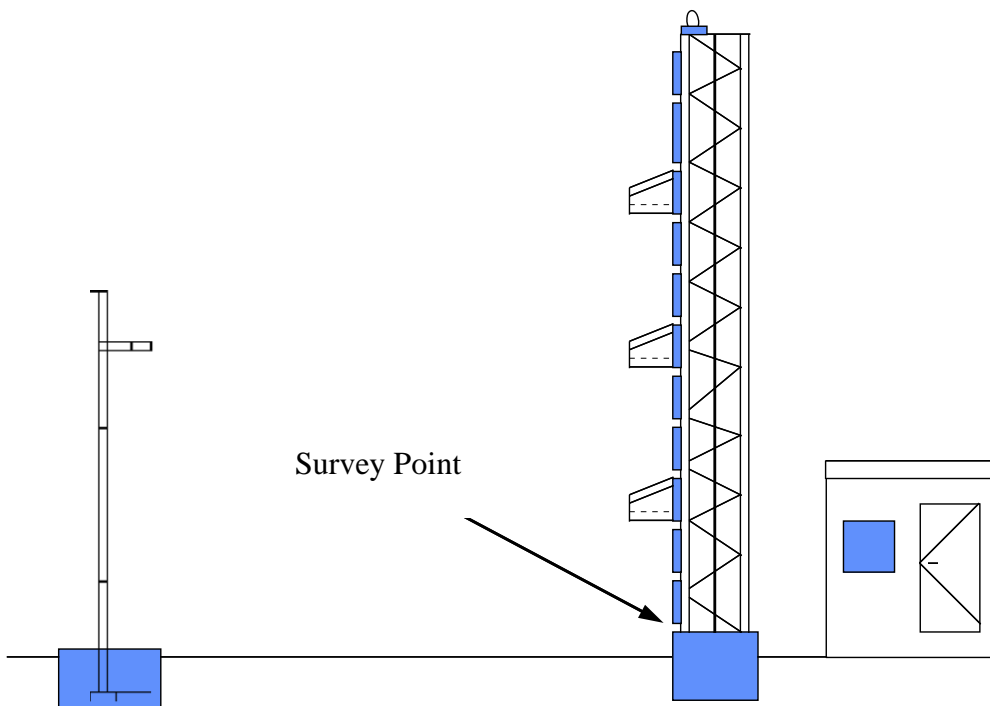
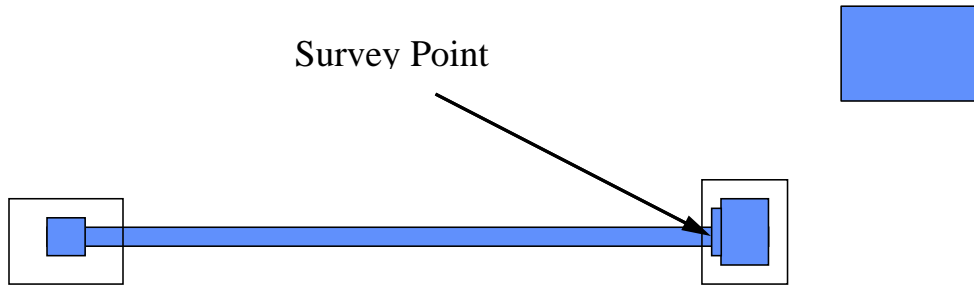
6.0 Marking example Type 5 (Informative)



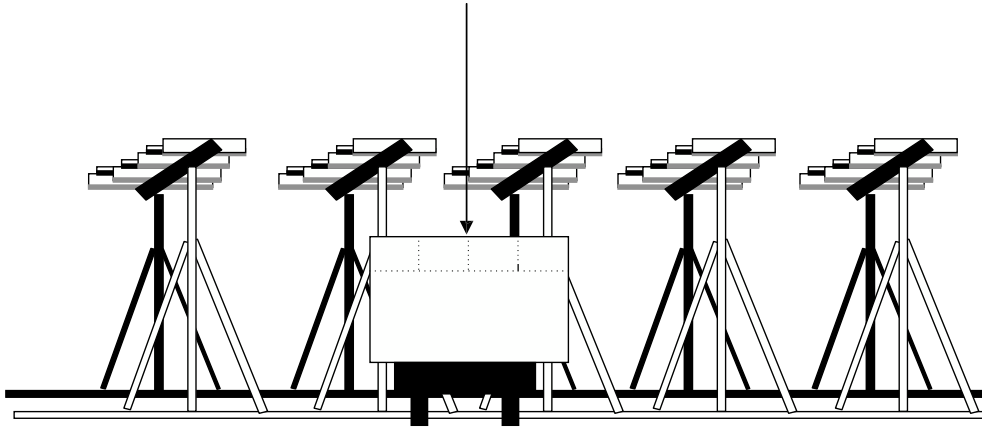
7.0 ILS Localiser (Example)



8.0 ILS glide path (Example)

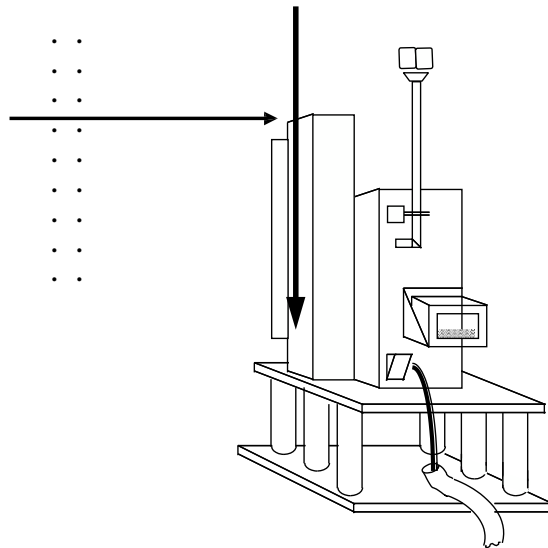


9.0 MLS azimuth (Example)

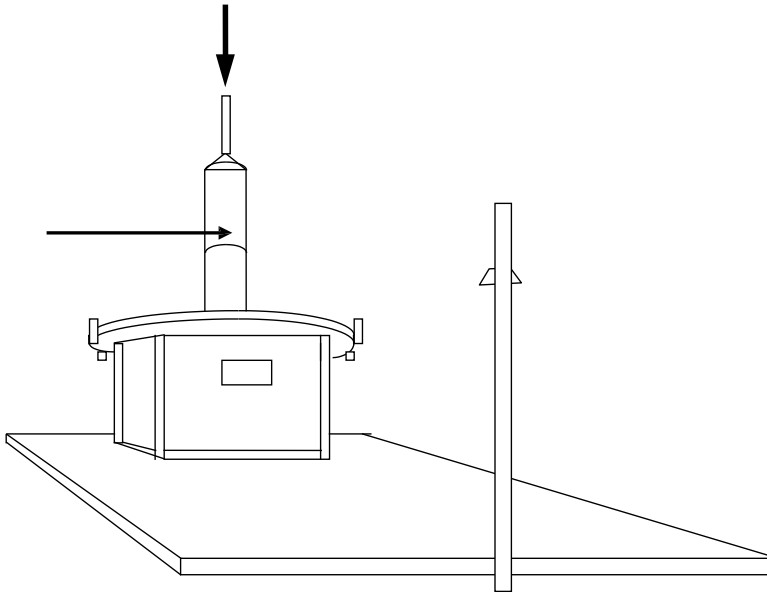


NOTE: It is recommended that you refer to the local authority for the survey point.

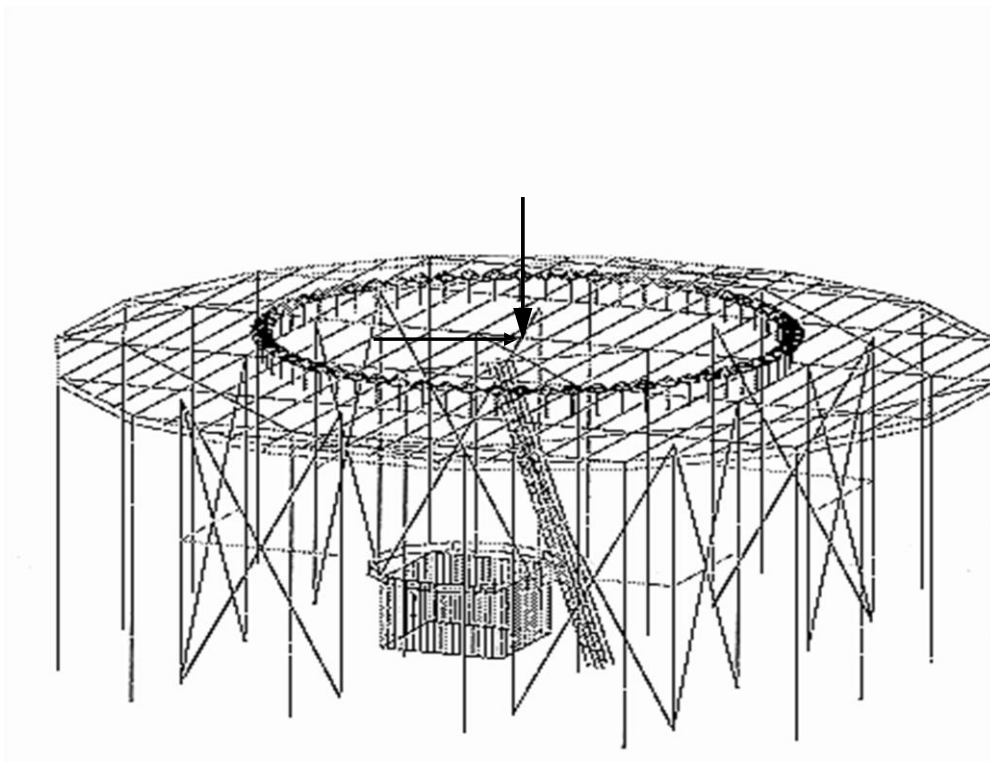
10 MLS glide path (Example)



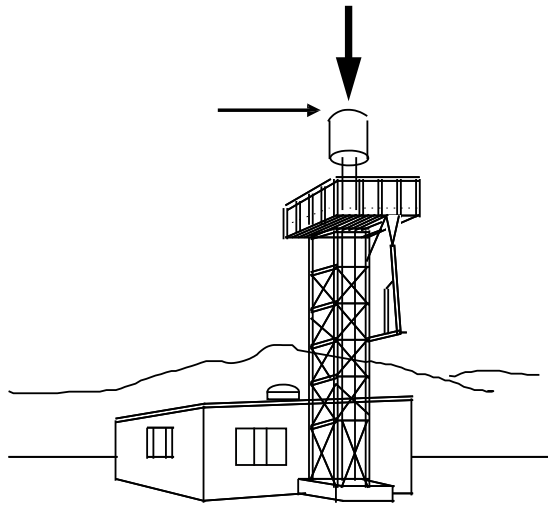
11 VOR/DME (Example)



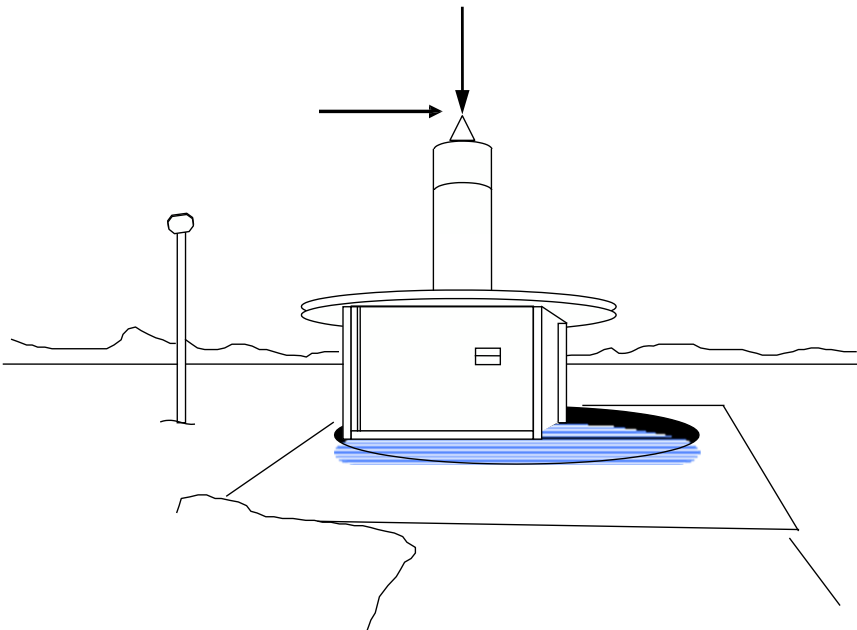
12 DVOR/DME (Example)



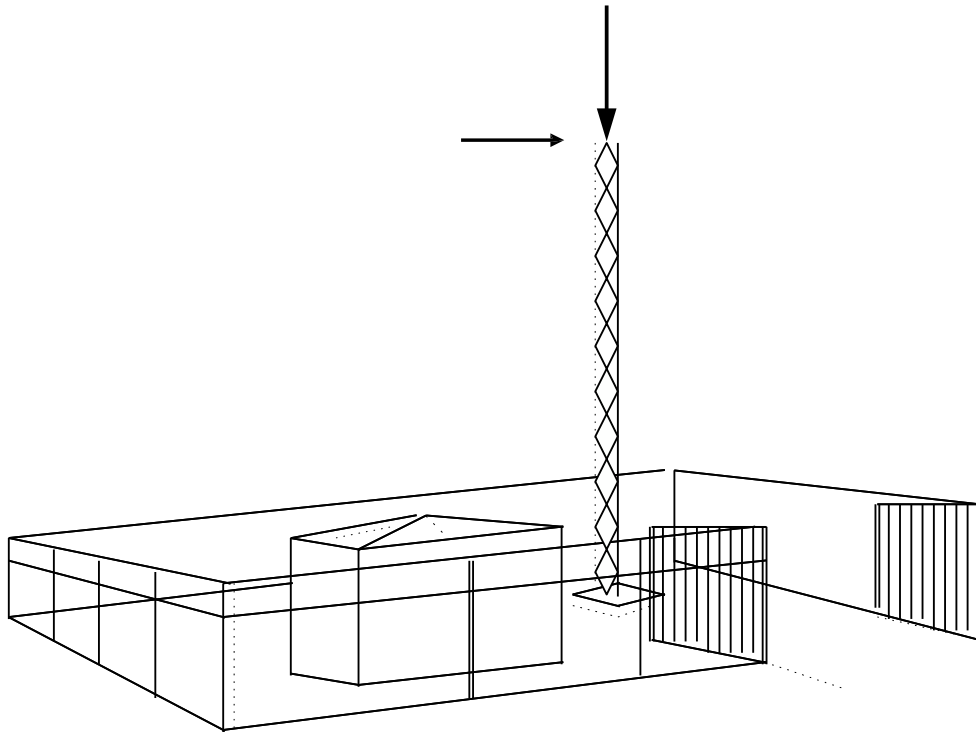
13 TACAN (Example)



14 VOR (Example)



15 NDB, locator (Example)



APPENDIX C - SURVEY REPORTS

1.0 Geodetic connection

- a) A survey report conforming to the following general format shall be provided

1	Receipt note signed on behalf of the commissioning organisation indicating the date of receipt of the survey report and confirming its completeness.
2	Historical data, including: Name of Surveyor, Surveying organisation, date of survey, method of survey, and equipment used.
3	Description of the method of survey.
4	Full details of the connection of the existing aerodrome survey control network to the existing geodetic network and the source of the control coordinates (lists cross-referenced to previous surveys).
5	Aerodrome Survey network plan
6	Survey station descriptions, and/or photos, including station labelling and numbering
7	Schedule of points surveyed showing date of documentation, description and survey.
8	Quality control report indicating equipment calibration information and the method of checking of the survey. Demonstrable evidence that the accuracy requirements have been met, including details of the error budget analysis.

Table C-1: Contents List - Geodetic Connection

- b) Records of actual observations shall be provided in a separate indexed volume.
- c) Cross references to observations shall be made in the survey report.

2.0 Aerodrome Survey

a) A survey report conforming to the following general format shall be provided

1	Receipt note signed on behalf of the commissioning organisation indicating the date of receipt of the survey report and confirming its completeness.
2	Historical data, including: Name of Surveyor, Surveying organisation, date of survey, method of survey, and equipment used.
3	Description of the method of survey.
4	Details of the observations made cross referenced to the control survey (i.e. those observations that provide connection to the control points).
6	Description and/ or photographs of each navigation facility surveyed.
5	Facility survey plan and cross referenced witness diagrams (where necessary).
6	Schedule of points surveyed showing horizontal coordinates, vertical coordinates, Magnetic variation, Declination and date of survey where the requirement is indicated in Appendix A.
7	<p>Quality control report indicating details of calibration process and results, the method of checking of the survey. See Section 1.0 of this Appendix.</p> <p>Accumulated error analysis, including:</p> <p><i>f</i> The accumulated error being presented in its component parts, each showing the accuracy achieved and that the result is consistent with the survey technique used;</p> <p><i>f</i> The accumulated error calculations being clearly reported and compared against the declared accuracy requirement.</p> <p>See Section 3.1 of this document.</p> <p>Demonstrable evidence that the requirements in Appendix A have been met.</p>

Table C-2: Contents List - Aerodrome Survey

b) Records of actual observations shall be provided in a separate indexed volume.

c) Cross references to observations shall be made in the survey report.

3.0 Radio navigation survey

a) A survey report conforming to the following general format shall be provided

1	Receipt note signed on behalf of the commissioning organisation indicating the date of receipt of the survey report and confirming its completeness.
2	Historical data, including: Name of Surveyor, Surveying organisation, date of survey, method of survey, and equipment used. See Section 2.0 of this Appendix.
3	Description of the method of survey.
4	Details of the local connection for the individual radio navigation aids. The geodetic connection shall be fully described in detail where monumented survey control stations are not installed as part of an off-aerodrome radio navigation facility survey. See Section 3.5 of this document.
6	Description and/or photographs of each navigation facility surveyed.
5	Survey diagram showing the local survey connection by which the coordinates of the centre of the aid were obtained.
6	Schedule of points surveyed showing horizontal coordinates, vertical coordinates, Magnetic variation, Declination and date of survey where the requirement is indicated in Appendix A.
7	Quality control report indicating details of calibration process and results, the method of checking of the survey. See Section 2.0 of this Appendix. Accumulated error analysis, including: <i>f</i> The accumulated error being presented in its component parts, each showing the accuracy achieved and that the result is consistent with the survey technique used; <i>f</i> The accumulated error calculations being clearly reported and compared against the declared accuracy requirement. Demonstrable evidence that the requirements in Appendix A have been met.

Table C-3: Contents List – Radio Navigation Aid Survey

b) Records of actual observations shall be provided in a separate indexed volume.

c) Cross references to observations shall be made in the survey report

APPENDIX D - HELIPORT DATA

1.0 Heliport survey points

- a) In order to clarify the points to be surveyed for those heliports for which coordinates are required to be published, the following requirements are provided, reference SLCAR Part 14B.
- b) The order of accuracy of the field work shall be such that the resulting operational navigation for the phases of flight shall be within the maximum deviations, with respect to an appropriate reference frame, as indicated herein: (SLCAR Part 14B, 2.1.2).
- c) The geometric centre of the touchdown and lift-off area, thresholds of the final approach and take-off area (where appropriate) shall be 1m. (SLCAR Part 14B, 2.1.2 'b').
- d) The geographical coordinates of the geometrical centre of the touchdown and lift-off area and/or of each threshold of the final approach and take-off area (where appropriate) shall be measured and reported to the aeronautical information services in degrees, minutes, seconds and hundreds of seconds. (SLCAR Part 14B, 2.4.2)

***Recommendation:** Where there is an aiming point marking, the geometric centre of the equilateral triangle should be taken as the surveyed point.*

2.0 Aiming point marking

An aiming point marking shall be provided at a heliport where it is necessary for a pilot to make an approach to a particular point before proceeding to the touchdown and lift-off area. (SLCAR Part 14B, 5.2.7.1)

- a) The aiming point marking shall be located within the final approach and take-off area. (SLCAR Part 14B, 5.2.7.2)
- b) The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction. (SLCAR Part 14B, 5.2.7.4)