SECURE AVIATION DATA INFORMATION SERVICE (SADIS)
USER GUIDE

Part 1 – General and Administrative
To be read in conjuction with Part 2 - Technical

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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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GLOSSARY

ABBREVIATIONS AND TERMS

AFS	Aeronautical fixed service
AFTN	Aeronautical fixed telecommunication network
AIREP	Air-report
ANP	Air navigation plan
ATC	Air traffic control
BCC	Bulletin compiling centre
BUFR	Binary universal form for the representation of meteorological data
DLCI	Data link connection identifier
EANPG	European Air Navigation Planning Group
Eb/No	Signal-to-Noise Ratio
EPROM	Erasable programmable read only memory
FASID	Facilities and services implementation document
FBU	Flight briefing unit
FIR	Flight information region
FL	Flight level
FTP	File transfer protocol
GAMET	Area forecast for low-level flights
GRIB1	Gridded binary code (WMO) — Edition 1
GRIB2	Gridded binary code (WMO) — Edition 2
HDLC	High-level data link control
IFR	Instrument flight rules
INTELSAT	International Telecommunications Satellite Organization
IP	Internet Protocol
ISCS	International Satellite Communication System
LAN	Local area network
LDC	Least developed countries
LNB	Low-noise block
METAR	Aerodrome routine meteorological report
METP	Meteorological Panel (ICAO)

MHz	Megahertz
MTBF	Mean time between failure
NATS	National Air Traffic Services
NST	NetSys SADIS transcoder
OPMET	Operational meteorological (information)
PCB	Printed circuit board
PNG	Portable network graphics
PVC	Permanent virtual circuit
RMA	Return materials authorization
SADIS	Secure Aviation Data Information Service (formerly, until 1 August 2016, Satellite Distribution System for Information Relating to Air Navigation)
SADISOPSG	SADIS Operations Group (disbanded 2015, but reference retained for historical context)
SADIS Provider	United Kingdom Met Office
SADIS Provider State	United Kingdom, represented by the Head of the Meteorological Authority, United Kingdom Civil Aviation Authority
SARPs	Standards and Recommended Practices
SCRAG	SADIS Cost Recovery Administrative Group
SIGMET	Information concerning en-route weather phenomena which may affect the safety of aircraft operations
SIGWX	Significant weather (charts, forecasts)
SPECI	Aerodrome special meteorological report
SVC	Switched virtual circuit
SWH	High-level SIGWX
SWM	Medium-level SIGWX
TAF	Aerodrome forecast
TCAC	Tropical cyclone advisory centre
TCP	Transmission control protocol
UDP	User datagram protocol
UPS	Uninterruptable power supply
UTC	Co-ordinated Universal Time
VAAC	Volcanic ash advisory centre
VSAT	Very small aperture terminal
WAFC	World Area Forecast Centre (London and Washington)
WAFS	World area forecast system
WAFSOPSG	WAFS Operations Group (disbanded 2015, but retained for historical context)
WIFS	WAFS internet file service
WG-MOG	Meteorological Operations Group (reporting to METP)

WG-MIE   Meteorological Information Exchange (reporting to METP)
WG-MISD   Meteorological Information and Service Development (reporting to METP)
WG-MRI   Meteorological Requirements and Integration (reporting to METP)
WMO   World Meteorological Organization
WIFS Provider   United States National Weather Service Aviation Weather Center
WIFS Provider State   United States, represented by the Head of the Meteorological Authority, United States Federal Aviation Administration

DOCUMENTS

Doc 7910   *Location Indicators*

Doc 9082   *Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services*

Doc 9855   *Guidelines on the Use of the Public Internet for Aeronautical Applications*

Air Navigation Plans

Doc 7754   *Air Navigation Plan — European Region*

Doc 7474   *Air Navigation Plan — Africa-Indian Ocean Region*

Doc 8733   *Air Navigation Plan — Caribbean and South American Regions*

Doc 8755   *Air Navigation Plan — North Atlantic, North American and Pacific Regions*

Doc 9634   *Air Navigation Plan — North Atlantic Region*

Doc 9673   *Air Navigation Plan — Asia and Pacific Regions*

Doc 9708   *Air Navigation Plan — Middle East Region*

Documents available from ICAO Regional Offices

AFI MET Bulletin Exchange (AMBEX) Handbook (available from the ICAO WACAF and ESAF Offices)

Regional OPMET Bulletin Exchange (ROBEX) Handbook (available from the ICAO APAC Office

EUR OPMET Data Management Handbook (available from the ICAO EUR/NAT Office)

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Chapter 1

INTRODUCTION TO THE <u>SECURE AVIATION DATA INFORMATION SERVICE</u> (SADIS)

1.1 BACKGROUND

1.1.1   The objective of the world area forecast system (WAFS) is to supply meteorological authorities and other users with global meteorological en-route forecasts in digital form. This objective is to be achieved through a comprehensive, integrated worldwide, and, as far as is practicable, uniform system and in a cost-effective manner, taking full advantage of evolving technologies (Annex 3 — *Meteorological Service for International Air Navigation*[1], 3.1 refers). The meteorological information to be provided comprises forecasts of global:

a)   upper wind;

b)   upper-air temperature;

c)   upper-air humidity;

d)   geopotential altitude of flight levels;

e)   direction, speed and flight level of maximum wind;

f)   flight level and temperature of tropopause;

g)   horizontal extent and flight levels of base and top of cumulonimbus clouds;

h)   icing potential;

i)   clear-air turbulence potential; ~~and~~

j)   in-cloud turbulence potential; and

k)   significant weather phenomena.

To facilitate computerized processing, the system provides the products under a) to j) in standardized digital format using gridded binary (WMO GRIB Edition 2 (GRIB2)) codes (WMO FM 92-IX Ext. GRIB refers). Product k) is made available in the binary universal form for the representation of meteorological data (BUFR) code (WMO FM 94-XII Ext. BUFR refers), and as "charts" in the portable network graphics (PNG) format (as a backup to the BUFR format).

1.1.2   The foregoing products are made available globally by the two world area forecast centres (WAFCs), London and Washington, via the <u>Secure Aviation Data Information Service (SADIS) FTP</u> ~~Satellite~~

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[1] "Annex 3" will be used to refer to ICAO Annex 3 — *Meteorological Service for International Air Navigation*, as opposed to Annex 3 of the SADIS User Guide which will be referred to as "SUG Annex 3".

Distribution System for Information Relating to Air Navigation (SADIS), including the Secure SADIS file transfer protocol (FTP) service and the WAFS internet file service (WIFS) systems, respectively. Note that the United Kingdom is both the SADIS Provider State and the WAFC London Provider State. Similarly, the United States is the WIFS Provider State and the WAFC Washington Provider State. A major component of WAFC London's SADIS service is the satellite-based delivery system "SADIS 2G" which forms part of the ICAO aeronautical fixed service (AFS). WAFC London also distributes data via the Secure SADIS FTP, using uses the public Internet as their delivery mechanismas a method of making data available, as described in Annex 3. WAFC Washington's satellite based service (ISCS G2) was withdrawn on 1 July 2012 in lieu of itsmakes its data available via the replacement WIFS service. WAFS products consist of aeronautical meteorological information of an operational nature. There is, therefore, an obligation for ICAO to ensure that all ICAO States have access to WAFS products via SADIS or WIFS.

1.1.3   Following the withdrawal of the ISCS G2 system on 1 July 2012, the satellite communications component of the AFS (SADIS 2G) is provided by a single geostationary International Telecommunications Satellite Organization (INTELSAT) satellite positioned at 60° E.

1.1.4   To meet the requirements for WAFS dissemination in Europe, the European Air Navigation Planning Group (EANPG) developed a system for the distribution of WAFS forecasts via satellite, as one component of the AFS. Originally, the system was intended to serve the ICAO European (EUR) and Middle East (MID) Regions, but was subsequently extended to serve the Africa-Indian Ocean (AFI) Region and the western part of the ASIA Region. The system is now capable of serving all States in the AFI and MID Regions and the ASIA and EUR States up to about 140° E and is known as SADIS.

1.1.5   In order to achieve the eastward extension, SADIS 2G uses the Indian Ocean INTELSAT 904 at 60° East. States in the AFI, MID, EUR and western part of ASIA Regions are able to receive WAFS products from the SADIS 2G satellite broadcast from WAFC London. The "footprint" of the SADIS is shown in Appendix A. States outside the SADIS 2G footprint will only be able to receive WAFS forecasts via the internet-based WIFS (in accordance with regional air navigation agreement).

1.1.6   In order to meet growing requirements for operational meteorological (OPMET) information in alphanumeric form, such as aerodrome routine meteorological reports (METAR), aerodrome forecasts (TAF), SIGMET and special air-reports (special AIREP), a separate channel (permanent virtual circuit 2) is provided on SADIS through which alphanumeric OPMET information can be disseminated.

1.2   A BRIEF DESCRIPTION OF THE SYSTEMSERVICE

1.2.1   SADIS FTP2G is an operational system dedicated primarily to aeronautical meteorological information in line with ICAO worldwide provisions. WAFS forecasts and OPMET information is disseminated without conflict or delay which could be caused by the dissemination of non-operational data. As an ICAO system forming part of the AFS, it has been designed to meet the worldwide Standards and Recommended Practices (SARPs) promulgated in Annex 3 and Annex 10 — *Aeronautical Telecommunications*. This ensures full availability of the service and the largely error-free transmission of all information required for pre-flight planning. made available via the public Internet. WAFS GRIB and BUFR forecasts are backed up, with WAFC London and WAFC Washington products being interchangeable.

1.2.2   SADIS 2G provides a point to multi-point service on a 24-hour basis via satellite. The SADIS 2G uplink is situated at the Cable & Wireless hub at Whitehill Earth Station, north of Oxford in the United Kingdom. WAFS forecasts are provided from WAFC London at the United Kingdom Met Office (referred to as "Met Office"), Exeter, via terrestrial 64 kilobits per second (kbps) lines and are uplinked from the hub at Whitehill to the INTELSAT satellite 904 located over the Indian Ocean at 60°E. OPMET information is

provided by the National Air Traffic Services (NATS) SADIS Gateway facility at Swanwick near Southampton, United Kingdom. Data from the SADIS Gateway is transmitted via a switched virtual circuit (SVC) to the Met Office for onward promulgation via the aforementioned terrestrial leased lines to Whitehill. The data are downlinked via a global beam to users anywhere in the EUR, AFI and MID Regions and in the ASIA Region as far eastwards as 140°E.

1.2.3   The system is designed to deliver the data to the end user in either the "open" industry standard X.25 format or using the Internet Protocol (IP) (multicast on user datagram protocol (UDP) or transmission control protocol (TCP) WMO sockets), allowing freedom to process those data in whatever manner is convenient. The hardware component of greatest interest to users is the one-way, very small aperture terminal (VSAT) supplied by iSat or Paradigm Communications (based in the United Kingdom). The terminal is simple and consists of a 2.4 m diameter receiving antenna, low-noise block (LNB) and a receiver unit mounted indoors. A processing/display unit, designed to meet the individual user's requirements and/or communications system, may be linked into the output port of the VSAT. The components which make up SADIS are shown in Appendix B. The VSAT and external connections are shown in Appendix C.

1.2.4   SADIS 2G delivers WAFS forecasts in digital format, as well as alphanumeric OPMET information required for pre-flight planning. Details on these products are given in Chapter 2.

1.2.5   In addition to the SADIS 2G satellite service, and internet based service, Secure SADIS FTP, is also available. Users may choose to use SADIS 2G, Secure SADIS FTP, or both. Users wishing to access the Secure SADIS FTP service should contact the SADIS Manager to initiate account setup. Contact details are available in Section 6.3. WAFC London has produced a Secure SADIS FTP User Guide, available for download from the SADISOPSG website (click "Guidance Material").The document is reviewed on a regular basis and updated as required.

1.2.2   Secure SADIS FTP makes use of digital certification certificates and digital signatures to allow users to prove categorically that data downloaded from the SADIS Provider's servers did indeed come from the SADIS Provider, and has not been corrupted or tampered with in any way. This approach meets the requirementsis consistent with the guidance provided in of Doc 9855 — *Guidelines on the Use of the Public Internet for Aeronautical Applications.*

1.3   MANAGEMENT OF SADIS

1.3.1   As the SADIS (satellite and internet-based service) is a multi-regional service provided by one State to serve a numbermultiple of ICAO States, it is necessary to enable the user States to have an influence over the content and schedule of SADIS and the medium— and long-term management of the system service to ensure that their requirements and those of the end-users are adequately met. Consequently, the ICAO Satellite Distribution System Operations Group (SADISOPSG)Meterorological Panel (METP) – through its constituent Working Groups, , composed of representatives of the SADIS Provider and user States in the SADIS "footprint" area and international organizations concernedoversees the SADIS to, ensures that the information required by users is provided so as to meet their requirements, and will act on behalf of users to address complaints and any difficulties which have not been resolved by the normal day-to-day operational control over the system by WAFC Londonthe SADIS Provider. It also integrates new requirements on the system and identifies operational adjustments to the service. The composition and terms of reference of the group METP, and constituent Working Groups, is available from the SADISOPSG METP website http://www.icao.int/airnavigation/METP/Pages/default.aspx.

1.3.2   The United Kingdom, as the SADIS Provider State, has been invited by ICAO to implement the SADIS in accordance with ICAO specifications for the system. Contractual agreements exist between the

United Kingdom Met Office and commercial service providers for the operation and maintenance of the SADIS service. As a consequence, the SADIS Provider manages the day-to-day operational control of the system in direct contact with the commercial service providers. The SADIS Provider ensures that the data required by all users are delivered via SADIS in accordance with ICAO provisions. In addition, the SADIS Provider liaises with the commercial service providers on matters related to the users' VSAT equipment and any problems experienced (see Chapter 6).

1.4   AUTHORIZED ACCESS TO SADIS

1.4.1   It is incumbent upon user States to arrange for authorized access to SADIS for the reception ofin order to obtain OPMET information and WAFS forecasts, and to arrange for their national distribution, in line with the provisions of Annex 3, Chapter 2, 2.1. In order for authorities in individual States to retain control over the national distribution, it is necessary to identify those users who are authorized to receive the SADIS directly. Appendix A provides information on the SADIS area of responsibility, in essence, the ICAO EUR, MID, AFI and western and central APAC regions.

1.4.2   Authorized access to the SADIS by an end user is subject to the direction in the appropriate ICAO Regional Air Navigation Plan, and will only be granted after authorization by the ICAO State concerned. The authorization will be based upon advice from the meteorological authority of the State concerned as defined in Annex 3, Chapter 1, and Chapter 2, 2.1.4, and will be communicated to ICAO and also to the United Kingdom Met Office (as the SADIS Provider) by the authorizing State itself. Guidelines to assist States in authorizing access to SADIS are reproduced in Appendix DB.

1.4.3   In order for a user to determine from which distribution service (SADIS or WIFS) they should obtain their data, the process is described in detail in Appendix EC. In order to differentiate between operational use and backup use of SADIS (or WIFS), SADISOPSG Decision 17/18 defined thresholds of use to apply. The thresholds are provided in Appendix FD.

1.5   SADIS COST ALLOCATION AND RECOVERY

A mechanism for the recovery of the costs incurred by the SADIS Provider State has been developed. The SADIS cost allocation and recovery scheme is based on mandatory participation by the SADIS user States and is administered by the ICAO SADIS Cost Recovery Administrative Group (SCRAG). States included in the United Nations list of Least Developed Countries (LDCs) are exempt from the cost recovery scheme. The participating States will contribute towards the scheme in proportion to the number of Available Tonne Kilometers (ATKs) performed in scheduled services (international and domestic) in the preceding calendar year by air carriers based in the territory of the State and recover these contributions from the airspace users through en-route charges. A copy of the agreement for sharing of costs for SADIS is available at:

http://www.icao.int/sustainability/Joint-Financing/Pages/SCRAG-Reports.aspx, specifically
http://www.icao.int/sustainability/Joint-Financing/SCRAG/ScragAgreement.pdf
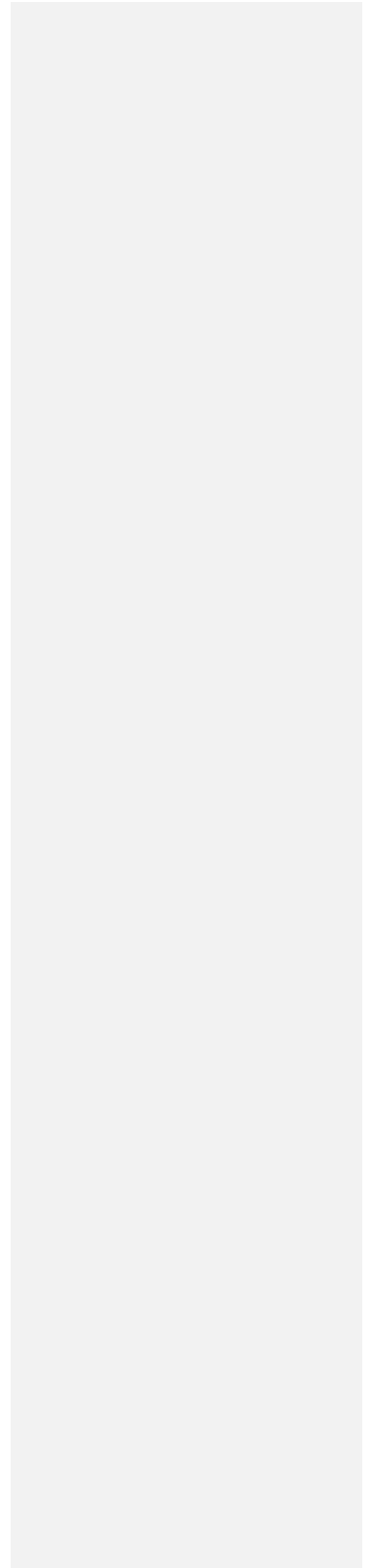
Chapter 2

PRODUCTS AND DATA ~~BROADCAST~~ AVAILABLE ON SADIS

2.1 OVERVIEW OF PRODUCTS AND DATA ~~BROADCAST~~ AVAILABLE ON SADIS

2.1.1   The information ~~broadcast~~ made available on the SADIS comprises WAFS forecasts as defined in Annex 3 — *Meteorological Service for International Air Navigation*, Chapter 3 and Appendix 2, in digital format using the WMO GRIB2 and BUFR code forms, as well as OPMET information in alphanumeric format.

2.1.2   The set of information available on SADIS is as follows:

a)   WAFS upper-air forecasts in WMO GRIB Edition 2 code form (GRIB2);

b)   WAFS significant weather (SIGWX) forecasts in WMO BUFR code form bulletins and PNG chart format;

c)   volcanic ash advisory information and (where available) tropical cyclone advisory information in graphical format (PNG chart); and

d)   OPMET information in alphanumeric format.

2.1.3   The required levels for upper-air forecasts (including upper-wind forecasts) and for SIGWX forecasts with corresponding valid times are contained in Annex 3, Appendix 2. The WAFS SIGWX forecasts for high levels (i.e. FL 250 to FL 630) have a global coverage. The WAFS SIGWX forecasts for medium levels (i.e. FL 100 to FL 250) are prepared for limited geographical areas. The ~~receiver~~ user of WAFS forecasts can freely select the area of coverage using BUFR visualisation tools; however, as a minimum, it is recommended that a set of fixed areas of coverage as shown in Figures A8-1, A8-2 and A8-3 of Annex 3 (and reproduced in SUG Appendix G~~E~~) can be readily produced using the decoding software and can be issued when required by users.

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2.2 DIGITAL GRID POINT (GRIB) DATA

2.2.1   WAFCs London and Washington products consist of forecasts of global:

a)   upper wind;

b)   upper-air temperature;

c)   upper-air humidity;

d)   direction, speed and flight level of maximum wind;

e)   flight level and temperature of tropopause;

f) geopotential altitude of flight levels;

g) horizontal extent and flight levels of base and top of cumulonimbus clouds;

h) icing potential;

i) clear-air turbulence potential; and

j) in-cloud turbulence potential.

Each ~~centre~~ WAFC provides a backup for the other so that if a failure occurs at one centre, routine products can be generated using the data from the other centre. The data are generated on an agreed grid and coded in a binary format using the GRIB2 code form (WMO FM *92*-IX Ext. GRIB Edition 2) for efficient distribution. Users intending to use the data must therefore have a data processing system able to read the binary code, decode the information and manipulate the data for the user's specific purpose. To produce charts, visualization software is required.

~~2.2.2 The WAFS products in the GRIB2 code form are presented as a series of bulletins. Each bulletin contains a grid point field of a single parameter at a single level as a continuous bit stream made of a sequence of bytes (1 byte = 8 bits) within a communications envelope.~~

2.2.2   The parameters listed in a) to j) above are presented for a number of Flight Levels. Wind (u and v components), temperature, geopotential altititude are available for the following flight levels: 50 (850 hPa), 080 (750hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125hPa) and 530 (100 hPa). Humidity is available on the following levels: 50 (850 hPa), 080 (750hPa) 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa). Icing potential (mean and maximum) forecasts are provided for 100hPa layers centred on 60 (800 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa); clear-air turbulence potential (mean and maximum) forecasts are provided for 50hPa layers centred on 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa); in-cloud turbulence potential (mean and maximum) are provided for 100hPa layers centred on 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa). Parameters such as maximum wind, height of maximum wind, Tropopause temperature, Tropopause height, Cb horizontal extent, Cb base, and Cb top are not provided for specific levels.

2.2.3   The WAFS GRIB2 digital grid point data are based on a grid defined as a 1.25° x 1.25° latitude/longitude *regular* grid. Each individual GRIB2 bulletin covers the whole globe. To enable efficient distribution of the data, each GRIB2 bulletin is provided in compressed form using the JPEG2000 standard. Advice on decompression and decoding software is available from WAFC London to enable the information to be interpolated and presented on a regular latitude/longitude grid. ~~GRIB2 is available via SADIS 2G and Secure SADIS FTP.~~

2.2.4   The GRIB2 data set covers forecasts valid for 06, 09, 12, 15,18, 21, 24, 27, 30, 33 and 36 hours after the time of the synoptic data on which they are based, and contain at each grid point data on all the parameters listed under 2.2.1 above. This amounts to approximately 38 Mbytes of *uncompressed* data per model run. The JPEG2000 compression algorithms reduce this to approximately 19 Mbytes per model run. These forecast data are available on the SADIS every 6 hours based on the 0000, 0600, 1200 and 1800 UTC synoptic data with transmission (including harmonized cumulonimbus cloud, icing and turbulence data) normally completed by 0435, 1035, 1635 and 2235 UTC, respectively.

2.2.5   The WAFS gridded global forecasts have a number of applications for users, e.g. to calculate specific leg winds for detailed flight planning, or to create charts of selected map areas or routes using

visualization software. The visualization software of the workstations should permit the flexible use of the data to the benefit of the user.

A tabulated representation of the WAFS upper-air forecasts made available on SADIS is provided in SUG Annex 4.

2.3   DIGITAL SIGWX IN THE BUFR CODE FORM

2.3.1   The SADIS ~~broadcast~~ makes available~~includes~~ forecasts of global SIGWX for high levels (i.e. between FL 250 and FL 630) issued by WAFCs London and Washington. Furthermore, SIGWX forecasts for medium levels (i.e. between FL 100 and FL 450[1]) are issued by the WAFCs for limited areas. Each centre provides a backup for the other so that if a production failure or communications outage occurs at one centre, routine products can be prepared and disseminated using the data from the other centre. The data are coded in a binary format using the BUFR code form (WMO FM 94-XII Ext. BUFR) for efficient distribution. Users intending to use the data must therefore have a data processing system able to read the binary code, decode the information and manipulate the data for the user's specific purpose. To produce charts, visualization software is required.

2.3.2   The WAFS SIGWX forecasts in the BUFR code form are presented as a series of bulletins. Each bulletin contains a single parameter (except the bulletin used for in-cloud medium-level icing and turbulence), as a continuous bit stream made of a sequence of bytes (1 byte = 8 bits) within a communications envelope, as follows:

SIGWX for high levels

a)   ISOL EMBD CB, OCNL EMBD CB, OCNL CB and FRQ CB;

b)   clear-air turbulence;

c)   flight level of tropopause;

d)   tropical cyclones, sandstorms, volcanic eruptions and the release of radioactive material into the atmosphere; and

e)   jetstreams.

SIGWX for medium levels

a)   ISOL EMBD CB, OCNL EMBD CB, OCNL CB and FRQ CB;

b)   clear-air turbulence;

c)   in-cloud turbulence and icing from non-CB cloud;

d)   flight level of tropopause;

e)   tropical cyclones, sandstorms, volcanic eruptions and the release of radioactive material into the atmosphere; and

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[1] FL100 to FL450 exceeds the ICAO Annex 3 requirement, stated as FL100 to FL250.

    f)   jetstreams.

Note.— Amendment 74 to Annex 3 removed the requirement for surface fronts and convergence zones on WAFS SIGWX forecasts. To minimize downstream impacts for users by withdrawing the related BUFR bulletins, the two WAFCs have continued to transmit high-level SIGWX (SWH) frontal system bulletins (JUFE00 EGRR/KKCI), but they are empty (i.e. they contain no data).

2.3.3   The BUFR data sets (high- and medium-level) cover forecasts valid for 0000, 0600, 1200 and 1800 UTC. This amounts to approximately 2 Mbytes of data per day. These forecast data are available on SADIS every 6 hours based on the 0000, 0600, 1200 and 1800 UTC synoptic data. Transmission of high-level and medium-level BUFR data sets is at 0700, 1300, 1900 and 0100 UTC, respectively (i.e. 17 hours ahead of validity). When operating in backup mode, the high-level and medium-level BUFR data set will be transmitted at 15 hours ahead of validity (i.e. 0900, 1500, 2100 and 0300 UTC for forecasts based on 0000, 0600, 1200 and 1800 UTC respectively).

2.3.4   The BUFR data is used to create charts of selected map areas or routes. Workstations should have visualization software which permits the conversion of BUFR bulletins into chart form. Software vendors should also make sure to include in their visualization software a feature which will depict the boundaries of the WAFS medium-level BUFR-coded SIGWX forecasts when reproduced in the chart form.

A tabulated representation of the WAFS SIGWX forecasts made available on SADIS in BUFR format is provided in SUG Annex 4.

2.4   DIGITALLY CODED CHARTS

Digitally coded WAFS SIGWX charts in PNG format are available on SADIS every 6 hours as a backup to the BUFR-coded SIGWX forecasts. They are transmitted at the same time as the SIGWX BUFR data (including a delay of 2 hours in the event of a backup). Volcanic ash advisory information and (where available) tropical cyclone advisory information in graphical format (PNG chart or BUFR code form) are available on SADIS when issued by a volcanic ash advisory centre or tropical cyclone advisory centre, respectively.

A tabulated representation of the WAFS SIGWX forecasts made available on SADIS in PNG format is provided in SUG Annex 4.

2.5   OPMET INFORMATION IN ALPHANUMERIC FORMAT

2.5.1   OPMET information in alphanumeric format includes METAR, SPECI, TAF, SIGMET and AIRMET information, GAMET area forecasts, volcanic ash and tropical cyclone advisories, and special AIREP.

2.5.2   Aeronautical meteorological information exchanged on the aeronautical fixed telecommunication network (AFTN) is in the so-called AFTN message format described in Annex 10 — *Aeronautical Telecommunications*, Volume II — *Communication Procedures including those with PANS status*, Figures 4-1 and 4-4. Examples of the format are given in SUG Appendix FH.

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2.5.3   When METAR, SPECI or TAF are intended for distribution in bulletin form, a WMO abbreviated heading is added in the first line of the text of the message to facilitate the compilation of the various METAR, SPECI and TAF into the appropriate bulletins. The WMO abbreviated heading is described in detail in document WMO-No. 386 — *Manual on the Global Telecommunication System,* and is explained briefly in SUG Appendix H.

~~2.5.4   The AFTN message format reflects the point-to-point nature of the network and is not appropriate for distribution of aeronautical meteorological information by means of a broadcast. In this case, the WMO abbreviated heading is used to identify the information being broadcast and the message is stripped of its AFTN message envelope. The resulting message is in the format used for the SADIS broadcast. An example of a TAF message in the AFTN envelope as it would be sent by a TAF collection centre, and stripped of the AFTN envelope for broadcast on SADIS, is given in Appendix H.~~

2.6   ADMINISTRATIVE MESSAGES

Information available on SADIS includes administrative messages disseminated in an alphanumeric format.

2.7   ~~BROADCAST SCHEDULES~~SCHEDULE OF AVAILABILITY

2.7.1   The information ~~broadcast~~ made available via the~~on~~ SADIS will be disseminated as soon as it becomes available ~~at the uplink~~. Therefore, the system will not operate to an absolute timetable. However, there will be a general schedule for the transmission of the various products to ensure that the information is received when it is needed, and, in the case of forecasts, before the commencement of the period of validity.

2.7.2   Digital grid point data are available on SADIS four times per day, derived from the global model forecast runs based on 0000, 0600, 1200 and 1800 UTC synoptic data with transmission to be completed by 0420, 1020, 1620 and 2220 UTC, respectively for wind, temperature, geopotential height, humidity, maximum wind, height of maximum wind, Tropopause temperature, height of Tropopause.   Data for harmonized cumulonimbus cloud, icing and turbulence by 0435, 1035, 1635 and 2235 UTC respectively (see SUG Annex 4, Section 1).

2.7.3   OPMET information in alphanumeric format will be disseminated as soon as the messages are received.

2.7.4   SIGMET and AIRMET information, volcanic ash and tropical cyclone advisories, and special AIREP are ~~information of immediate concern to aircraft in flight or about to depart. In line with Annex 10, Volume II, 4.4.1.1.3 and 4.4.1.1.4, these messages are~~ distributed without delay.

2.7.5   A complete list of SADIS broadcast content, bulletin headers, etc. is provided in SUG Annexes 1, 4 and 5, which are kept up to date and provided on the ~~SADISOPSG~~ METP – WG-MOG website (~~click~~ Select SADIS from "~~Guidance Material~~Reference documents"). SUG Annex 1 is a "formal" statement of METAR/SPECI and TAF requirements and is identical to FASID Table MET2A. In response to periodic enquiries by ICAO, States concerned have indicated their agreement to, or in some cases not indicated disagreement to, the inclusion of OPMET information for METAR/SPECI/TAF from aerodromes listed in SUG Annex 1 being ~~broadcast~~ made available on the SADIS. SUG Annexes 2 and 3 are prepared routinely every six months by EUR OPMET Data Management Group. SUG Annex 4 lists all the WAFS forecasts available on SADIS. SUG Annex 5 identifies additional aeronautical meteorological information available on SADIS that is not specified in SUG Annexes 1 or 4.

2.8   THE EVOLUTION OF PRODUCTS AND DATA ON SADIS

It is expected that the list of products available on SADIS will evolve with time to respond to new requirements of States and end users. This evolution of product availability is currently managed by the ~~SADISOPSG in coordination with the WAFSOPSG~~Working Groups tasked by the Meteorological Panel (METP) to oversee SADIS.

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Chapter 3

SECOND-GENERATION SADIS
SATELLITE BROADCAST (SADIS 2G)

3.1   INTRODUCTION

3.1.1   The second-generation SADIS satellite broadcast (SADIS 2G) was introduced during November 2004 as an addition to the original, first-generation SADIS satellite broadcast (SADIS 1G). The two services were provided in parallel until 31 December 2008, when the SADIS 1G service was withdrawn.

3.1.2   The SADIS 2G satellite service is engineered to be flexible and non-prescriptive with regard to end-user protocols, and takes advantage of modern communication technologies. The SADIS 2G satellite service is provided using the INTELSAT 904 satellite, located over the Indian Ocean at 60º E.

3.2   OVERVIEW OF THE SADIS 2G SATELLITE SERVICE

3.2.1   The SADIS 2G satellite service utilizes duplicate communications hardware, wherever possible, to minimize single points of failure. It is engineered around the IP but uses the VSAT protocol over the sky for maximum efficiency. The VSAT protocol is demodulated at the user site and data are presented to user end systems via either simulated TCP/IP (UDP multicast – recommended, or WMO sockets) or X.25 PVCs. The preference of output protocol needs to be specified by the user prior to hardware purchase so that the appropriate configuration can be implemented within the indoor equipment. The components which make up the SADIS 2G are shown in Appendix B.

3.2.2   Since SADIS 2G is a one-way broadcast-only service, genuine two-way communication is not possible. This requires the indoor equipment to provide simulated X.25 or TCP/IP output protocol because both protocols normally require a two-way flow of information.

3.2.3   Overall data throughput through the service is provided at speeds of up to 64 Kbps. OPMET information is sourced from the SADIS Gateway provided by NATS in the United Kingdom.

3.3   DATA DISTRIBUTED VIA SADIS 2G

OPMET information and WAFS forecasts distributed via SADIS 2G are outlined in SUG Annexes 1 to 5. SUG Annexes 1, 4 and 5 define the requirements, whereas SUG Annexes 2 and 3 reflect data received and forwarded by the SADIS Gateway during bi-annual monitoring periods.

3.4   USER SUPPORT

SADIS 2G satellite service support is detailed in Chapter 6. The list of SADIS 2G hardware suppliers is provided in Appendix L.

Chapter 43

RECOMMENDED BASIC REQUIREMENTS
FOR DATA PROCESSING SYSTEMS

43.1   GENERAL REQUIREMENTS

4.1.1   To receive SADIS, users need a VSAT from one of the two hardware providers based in the United Kingdom, iSat or Paradigm Communications. Users are then free to choose their own processing and display systems to connect to the VSAT according to their individual requirements.

4.1.2   Users should investigate whether or not their own message switch and/or computer system is SADIS compatible. Users are also advised to check that any display system which they may consider purchasing is capable of generating products which comply with the formats and specifications laid down in Annex 3 — *Meteorological Service for International Air Navigation*, including the generation of products from GRIB and BUFR-coded bulletins. It is recommended that users consult with a number of different suppliers prior to committing to expenditure. With the recent availability of compressed GRIB2 bulletins, appropriate decompression and decoding software will be required.

4.1.3   Users should check specific system configurations with individual suppliers.

4.1.4   A set of recommended basic requirements for VSAT data processing systems is given in Appendix I.

4.1.5   Data processing systems for processing these data must ensure the integrity of the information and be compatible with the SADIS delivery of data. Data can be presented to the end-users' system either as X.25 PVCs or IP. The choice of protocol needs to be made at the time of purchase from the hardware supplier referred to in 4.1.1 above. For flight safety reasons, it is essential that any data outside of their validity period be neither retained on the system nor displayed for operational use. However, the system should ensure that data received via SADIS be stored and displayed for a user on request during their validity period or until they are amended or overwritten by an updated version.

3.1.1   The data stored on the system should be made available to a user by visual reference on a screen display, and printed for permanent reference, e.g. as flight documentation. All products either displayed or printed should include a clear reference to the date and time of access and the validity times of the data. Systems should be programmed to avoid data from a previous day being incorrectly used. It should be noted that there is an obligation for States to retain flight documentation for at least 30 days in case of an enquiry (Annex 3, 9.3.4). This storage requirement should be considered by users when making their choice of end-user system.

3.1.2   A number of the display packages enable users to manipulate the information presented to the workstation in BUFR format. This may be a useful feature for users who wish to use their workstation for the production of national products. However, it is important that users appreciate that any modification to the meteorological content of information available on SADIS invalidates that information as being a de facto WAFS forecast. In such a case, the forecast becomes a national product. It is imperative that such a change be clearly reflected in the legend that would be assigned to the forecast.

3.2   SOURCES OF INFORMATION REGARDING POTENTIAL SUPPLIERS
OF EQUIPMENT TO PROCESS/DISPLAY PRODUCTS
AND DATA ~~BROADCAST~~ MADE AVAILABLE ON THE SADIS

3.2.1   The names of suppliers and their websites are available from URL:

http://www.metoffice.gov.uk/aviation/sadis/manufacturers.

~~4.2.2   Information concerning potential suppliers of processing equipment may also be obtained from:~~

~~Director, Technical Co-operation Bureau~~
~~International Civil Aviation Organization~~
~~999 University St., Suite 25-098~~
~~Montreal, Quebec~~
~~Canada H3C 5H7~~

~~E-mail: procurement@icao.int~~
~~Central telephone number: +1 514 954-8219~~
~~Central facsimile number: +1 514 954-6287~~

Note.— The inclusion of an individual supplier in these lists does not imply that their system has been evaluated or approved by ICAO or the SADIS Provider.

Additional advice is provided in Appendix ~~I~~G to users considering purchasing a data processing system.

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Chapter 5

INSTALLING SADIS VSAT

5.1 VSAT INSTALLATION — FACTORS TO BE CONSIDERED

Full installation instructions will be provided with VSAT hardware. However, the following matters should be addressed prior to any other preparatory work.

a) Is there a clear line of sight to the satellite from the proposed location?

b) Is there access for the transport of equipment (e.g. check lifts (elevators), doorways etc.)?

c) Are there structural implications if roof mounted, e.g. load bearing capability, non penetrable mounts and ballast? Total weight of antenna (2.4 m diameter) plus brackets and base assembly is approx. 450 kg; ballast to secure structure is 1 500 kg; total weight including ballast is 1 950 kg; footprint required for non-penetrating mount is approximately 25 m^2. A civil engineer consultancy may be required to ascertain this.

d) Is planning or installation permission required in any particular State/location?

e) Do any changes to be made comply with local building regulations?

f) Consider runs of cable to end user. In this respect 75 m is the normal maximum; beyond this, ascertain line amplifier requirements.

g) The main power requirement is 90 to 265 volts AC, 50/60 Hz, 300 watts.

h) How reliable is the power supply? An uninterruptible power supply backup may need to be considered.

i) Third party insurance, e.g. in the event of a dislodged antenna causing injury.

j) Storage of sub-systems and equipment prior to installation.

k) Interference. Spurious emissions may cause problems with air navigation equipment or explosive devices.

l) Survivability of the antenna. Although the manufacturer will specify this, due regard must be paid to the support structure that holds it in place.

m) Access for maintenance of the equipment.

Note.— The required ballast must be supplied by the user. This can be sandbags, concrete blocks or any other suitable medium providing the required weight.

5.2   ALIGNMENT AND TESTING OF THE VSAT UNIT

5.2.1   Once installation is complete, final alignment and testing can take place. Only three connections need to be made to the receiver for alignment purposes:

a)   mains connector;

b)   co-axial (RG6) feed from the antenna; and

c)   data output. This is 37- or 25-way D-type connector (depending on the modem type) labelled "composite data".

5.2.2   The downlink frequency for SADIS 2G VSATs is 4078.25 MHz.

5.2.3   Full details can be provided by iSat or Paradigm Communications, but in general, for the installation of one-way VSATs, the procedure is straightforward and is a matter of aligning the antenna to the satellite initially by either:

a)   compass and inclinometer, using the satellite finder diagram shown in Appendix J; or

b)   utilizing the modem to look at the receive (Rx) level and signal-to-noise ratio (Eb/No) for final peeking of the antenna.

An analogue voltmeter (such as an AVO) in preference to a digital voltmeter may also be used to fine-tune the electrical alignment when employing method a).

Chapter 4

USER SUPPORT

4.1 TECHNICAL SUPPORT BY THE SADIS PROVIDER

End users of the SADIS ~~equipment may~~ are encouraged to ~~obtain technical support directly from~~contact the SADIS Provider in the event of problems. The SADIS Provider staff will assist ~~in any way~~where possible to resolve problems experienced by users if the fault lies within the SADIS. ~~They~~ It may of course be the case that ~~find that~~ the fault ~~lies~~ is with~~in~~ the user's own ~~receiving~~ SADIS equipment ~~downstream of the VSAT~~or internet connection. Under such circumstances, the supplier of the original hardware/software or the user's Internet service provider should be contacted.

4.2 24-HOUR HELPLINE/FAULTS DESK

Tel.: +44 (0) 1392 886 666
~~Fax: +44 (0) 1392 884 412~~
E-mail: servicedesk@metoffice.gov.uk

4.3 GENERAL CONTACT FACILITIES DURING OFFICE HOURS (UK time)

The SADIS Manager
International Services, WAFC London,
Met Office, Fitzroy Road
Exeter, Devon
United Kingdom EX l 3PB

Tel.: +44 (0) 1392 884 892
Fax: +44 (0) 1392 885 681

~~iSat~~
~~(VSAT receiver technical enquiries relating to iSat-supplied SADIS 2G reception hardware)~~
~~Tel.: +44 (0) 1252 750 812~~
~~Fax: +44 (0) 1252 371 878~~
~~URL: http://www.isatnetworks.com/~~

~~Paradigm Communications~~
~~(VSAT receiver technical enquiries relating to Paradigm-supplied SADIS 2G reception hardware)~~
~~Tel.: +44 (0) 8709 024 000 or +44 (0) 1420 88199~~
~~Fax: +44 (0) 8709 024 001 or +44 (0) 1420 88842~~
~~URL: http://www.paracomm.co.uk/~~

4.4   SYSTEM DEVELOPMENT CONTACT FACILITIES

4.4.1   Sample data for each of the products available via SADIS can be provided by the SADIS Provider for individual system development and trials. Requests to access the test database should be directed to the SADIS Manager.

4.4.2   WAFC London can also provide advice and guidance on GRIB and BUFR code form data and applications.

4.5   INFORMATION ON SADIS

4.5.1   The purpose of this *SADIS User Guide* is to give an overview of the system and provide helpful information to potential users. It is intended to complement the technical manuals which will accompany the individual SADIS 2G VSAT and workstation and software provided by 3rd parties. equipment. The *SADIS User Guide* is only made available on the ICAO SADISOPSG METP website (click "Guidance Material").

4.5.2   Additional system information is available from the Met Office SADIS website at URL: http://www.metoffice.gov.uk/aviation/sadis.

4.5.3   WAFC London also publishes an Aviation Newsletter (at least annually) which contains the latest news on developments concerning SADIS as well as other matters related to aeronautical meteorology. The newsletter is available for download at URL: http://www.metoffice.gov.uk/aviation/sadis/info.

4.6   ASSISTANCE FOR IMPLEMENTATION

4.6.1   Seminars and workshops on the implementation of the WAFS and SADIS are organized periodically in close coordination between ICAO, WMO and WAFC London. The *SADIS User Guide* forms part of the material to accompany these events.

4.6.2   Technical assistance may be obtained in various forms. It is recommended that requests for technical assistance from ICAO be included in the framework of existing ICAO technical co-operation projects.

4.6.3   Information is available concerning the GRIB2 code and decompression, and about the way in which features encoded in BUFR should be displayed, directly from the SADIS Manager, or from http://www.icao.int/safety/meteorology/wafsopsg/Pages/default.aspx (click "Guidance Material"). Guidelines for representing WAFS SIGWX data in BUFR available from http://www.icao.int/safety/ meteorology/wafsopsg/Pages/default.aspx (click "Guidance Material").

6.7   SADIS VSAT RETURNS PROCEDURE

6.7.1   The following procedure will apply to any SADIS VSAT receiving equipment that has become defective and needs to be repaired, including items that are still under warranty. Any item returned without seeking prior authorization from the SADIS 2G VSAT hardware providers (iSat and Paradigm Communications) may only be repaired at the discretion of the company.

6.7.2   Before returning any equipment, **please fax/e-mail a request for a return materials authorization (RMA) number as indicated in Appendix K to:**

For all hardware that was procured through iSat contact:

iSat Customer and Technical Support
Tel.: +44 (0) 1252 750 812
Fax: +44 (0) 1252 371 878
E-mail: info@isatnetworks.com

Customers may also use the iSat RMA portal: http://isat.rmaportal.com/

or, for hardware procured through Paradigm Communications, contact:

Paradigm Communications Support
Tel.: +44 (0) 8709 024 000
Fax: +44 (0) 8709 024 001
E-mail: support@paracomm.co.uk

Please state clearly the following:

a)   equipment type;

b)   serial number;

c)   date of purchase (approximately);

d)   purchase order number (if known);

e)   nature of defect;

f)   sender's name;

g)   sender's fax number;

h)   company name/address; and

i)   return address if different from above.

6.7.3   An RMA number will then be issued together with details of where to send the equipment and paperwork for customs purposes. Following receipt of an RMA number, a SADIS receiver fault report should be completed and faxed to the appropriate SADIS 2G VSAT hardware provider (iSat or Paradigm Communications), as indicated in Appendix K.

6.7.4   The following conditions will apply to all items returned for repair, unless subject to separate agreements:

a)   repairs will be returned in "as received" condition and NOT refurbished to "as new" standard;

b)   the SADIS 2G VSAT hardware provider reserves the right to charge a fee and shipping costs for "no fault found"; and

~~c) the SADIS 2G VSAT hardware provider will issue a quotation for the minimum inspection costs of equipment that is outside of the manufacturer's warranty period.~~

4.7   SADIS BACKUP PROCEDURES

~~6.8.1   In the unlikely event of a failure of the SADIS 2G satellite broadcast, users who have arragned access to the Secure SADIS FTP service will have a readily available alternative source of data.~~

4.8.1   In the unlikely event of a failure of the Secure SADIS FTP service, the WIFS can be used as an operationally available backup. Authorized SADIS users can be granted access to the WIFS by the WIFS Provider State in order to enable access to the OPMET information and WAFS forecasts using the WIFS over the public Internet. Authorized SADIS users wishing to access the WIFS as a backup to SADIS, but who do not yet have account access, should contact the WIFS Provider to initiate an account. The WIFS Provider monitors WIFS to ensure that authorized SADIS users only make use of the service during times of backup contingency.

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Appendix A

SADIS ~~FOOTPRINT~~ AREA OF RESPONSIBILITY
(See 1.1.5.)

~~COVERAGE OF THE SATELLITE DISTRIBUTION SYSTEM FOR INFORMATION~~
~~RELATING TO AIR NAVIGATION (SADIS) USING INTELSAT 904 AT 60º E~~

As described in the Regional Air Navigation Plans, SADIS provides WAFS and OPMET data to the Africa, Europe, and Middle East ICAO Regions; and to west and central parts of the ICAO Asia and Pacific Region.

WIFS (administered by the USA) is provided to the Americas; and to east and central parts of the ICAO Asia and Pacific Region.

Under reciprocal arrangements with the WIFS Provider State, and subject to certain restrictions, SADIS users are encouraged to arrange backup accounts with the WIFS Provider. WIFS users may, under similar restrictions, arrange SADIS accounts for backup purposes.

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Appendix B

**COMPONENTS OF SECOND-GENERATION
SADIS SATELLITE BROADCAST (SADIS 2G)**
(See 1.2.3.)

SIMPLIFIED END-TO-END TOPOLOGY OF SADIS 2G SERVICE

Appendix C

**CONFIGURATION OF SECOND-GENERATION SADIS
SATELLITE BROADCAST RECEPTION SEGMENT (SADIS 2G)**
(See 1.2.3.)

1.   SADIS 2G comprises of a one-way VSAT and a processing/display unit at the end-user's site. The VSAT is simple and consists of a 1.8 or 2.4 m diameter receiving antenna, an LNB, a demodulator and an AEP Networks VadEDGE router or NetSys SADIS transcoder. The processing/display unit can be linked to the output port of the VSAT. Running SADIS 2G software, the processing/display unit is designed to meet the individual users requirements and/or communication system. Optional coaxial lightning arrestors can be placed at either end of the coaxial cable between receiving dish and demodulator.

2.   Management of end-user systems encompasses the ability to remotely enable and disable data recovery at the remote station. Since every AEP Networks VadEDGE router and NetSys SADIS transcoder (NST) board is pre-configured with a unique identification code (MAC address or board ID) it can be addressed and controlled by management commands broadcast to it as part of the normal SADIS transmission.

AEP NETWORKS VADEDGE ROUTER

3.   The VadEDGE 4200 series router replaced the MegaPAC in July 2006, and forms part of a SADIS 2G package. AEP Networks, suppliers of this technology, will continue to support customers with the MegaPAC range. The VadEDGE-series routers provide additional benefits over the MegaPAC 2003 range, including: dual 10/100 Ethernet ports; 32-bit processor with 8 mb RAM; dual flash based operating system (no EPROM); environmental monitoring, auto link-backup, speed and cable detection on WAN ports; and high mean time between failure (MTBF).

4.   SADIS 2G is designed to deliver the data to the end user in either:

a)   the "open" industry standard X.25 format; or

b)   the Internet Protocol (IP) multicast on UDP format; or the IP TCP WMO sockets format.

This allows the user the freedom to process data in whatever manner is convenient.

5.   To change configurations between X.25, UDP or TCP, it is necessary to run a "configurator" script supplied by AEP Networks. The configurator script runs on a Windows XP system connected to the VadEDGE (or MegaPAC) router control port via the PC COM port.

6.   In December 2008, the SADIS Provider State completed an evaluation of a VadEDGE 4100 series router. The 4100-series router is an IP-only solution from AEP Networks, thus supporting TCP/IP or UDP-multicast outputs, but not the legacy X.25. The 4100-series offers customers a lower cost solution to the 4200-series.

7.   The figure below shows a simplified connection topologies required for the different configurations. X.25 configurations use the port labelled WAN2 to connect to the workstation. A transition cable is required to provide a 15-way D-type socket for connection to the X25 terminal. The TCP and UDP configurations require the VadEGDE 4200 series (or MegaPAC 2003) router to be connected to a LAN, either via the 10bT or AUI via an external transceiver.

*Note.   In all cases, the demodulator **must** be connected to WAN1.*

8.   The figures below provide a rear view of the MegaPAC 2003 and VadEDGE 4200 series routers, showing optional expanders.

MegaPAC 2003

VadEDGE 4200

Further information on the VadEDGE 4100- and 4200-series routers can be obtained direct from the supplier, AEP Networks Ltd (see Appendix L for contact details).

NETSYS SADIS TRANSCODER

9.   In December 2008, the SADIS Provider State completed an evaluation of an alternative SADIS 2G hardware unit. The NST is simply a printed circuit-board (PCB) pre-installed within a standard Linux desktop PC. NetSys International (Pty) Ltd, an approved SADIS workstation provider, offers the NST only as part of a NetSys SADIS 2G upgrade package comprised of LNB, satellite modem, lightning protection kit, NetSys workstation, printer, uninterruptable power supply (UPS) and the necessary visualisation software and services to provide pre-flight MET briefings. The NST is a custom-made solution focussed on the needs of States included in the United Nations list of LDCs.

10.   The NST is implemented on the Quaint E1WIZ4H PCB that offers one channel RS422 (receive only) as input and bidirectional RS233 and an IEEE 802.3 (Ethernet) ports for output. Programmed with the firmware in support of SADIS the board has the ability to extract 64 Kbit/sec serial data, decode the HDLC

layer and transport the recovered data via LAN or serial port (or both). A Quaint developed MS Windows utility is used to configure and set-up the E1WIZ4H card via the serial port. A proprietary serial data cable in various lengths is provided to connect to the modem.

11. The firmware on the NST is responsible for clock recovery and byte alignment of the serial bit stream as output by the satellite modem. The reconstructed frames are inspected to detect and process management strings. The configuration in flash memory is updated when a management command addressed to the board is detected.

12. Management strings are always forwarded, even when board output is disabled (result of a "DIS" command). The frames presented for onward transmission are encapsulated in UDP packets addressed to the IP address and port number configured in flash memory.

13. The driver software in the workstation receives the UDP packets and assembles the data content into SADIS messages per logical channel (GRIB, OPMET, T4 and management). The reconstructed messages are then presented to the data manager for processing and storage into the workstation database.

14. Further information on the NST can be obtained directly from the supplier, NetSys International Pty (see Appendix L for contact details).

OVERVIEW OF SADIS 2G PROTOCOLS USED

X.25 Protocol

15. X.25 is presented on WAN 2. Connect the transition cable into WAN2 to provide a standard X.21 15-way DCE socket.

16. This interface is functionally equivalent to the interface X.21 interface provided on the earlier SADIS 1G systems.

17. Notably, the 2003 WAN2 interface will be:

Physical DCE, providing clocks

Address DCE
Packet size 256
T.1 timer 0.5 seconds
Level 2 window 7
Level 3 window 7

PVC 1 – GRIB
PVC 2 – OPMET
PVC 3 – T4 (BUFR data and PNG charts)

TCP Internet Protocol

18. Using TCP, a session is created between the VadEDGE 4200 (or MegaPAC 2003) router and the workstation for each of the three different data types. By default the port numbers used are 10001 for GRIB, 10002 for OPMET and 10003 for T4 (i.e. BUFR data and PNG charts). These are configurable via the Configurator script. It is possible to configure a backup workstation (server) using the Configurator script. This workstation will be used if the primary workstation is not contactable.

UDP Internet Protocol

19. Using UDP, all data streams can be multicast to many workstations or sent to a single workstation. The data streams all share the same UDP port number, and can be distinguished at the workstation be a 5 byte header.

20. The first data byte is a HEX counter which starts at 00, increments up to FF, then back to 00. The next three bytes are for internal use (they might not always be zero entries): 00 00 00. The next two bytes are the frame relay header. From this the user can work out the data link connection identifier (DLCI) number.

Example:

Convert the bytes from hex into binary

aaaaaann
1C = 00011100

bbbbnnnn
51 = 01010001

The user then takes the aaaaaa and bbbb sections and combines them as indicated below:

aaaaaabbbb
0001110101

The user should then convert the binary number into decimal to obtain the DLCI number. In the above example, the DLCI number is 117.

Appendix ~~D~~B

GUIDELINES FOR AUTHORIZING ACCESS
TO THE ~~WAFS SATELLITE BROADCAST~~SADIS

(S*ee 1.4.2.*)

~~Note.— Where reference is made to the satellite broadcast, it is to be understood that this includes the Internet-based availability of OPMET information and WAFS forecasts.~~

1. GENERAL

~~1.1 The satellite broadcast constitutes a sub-system of the AFS providing an international point-to-multipoint telecommunication service via satellite for the dissemination of aeronautical information to States.~~

1.1 The aeronautical information made available on the ~~satellite broadcast includes~~SADIS primarily OPMET information and WAFS forecasts in gridded binary and graphical formats, and alphanumeric format.

1.2 Through access to the SADIS, States may wish to meet their obligation under Article 28 of the Convention on International Civil Aviation regarding the supply to users of meteorological information for the provision of meteorological service for international air navigation.

1.3 In particular, with regard to use of WAFS products, Section 2.1 of ICAO Annex 3, Appendix 2 notes:

> 2.1.1 Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.
>
> 2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data received shall be decoded into standard WAFS charts in accordance with relevant provisions in this Annex, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

1.4 Recovery by States of associated costs through charges on international civil aviation should be based on the principles contained in Article 15 of the Convention and the *Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services* (Doc 9082).

2. AUTHORIZED ACCESS TO THE ~~SATELLITE BROADCAST~~SADIS

2.1 It is the prerogative of each State to determine the distribution of the OPMET information and WAFS forecasts to users, in the State concerned, as well as means, links and information flow to be used for this purpose. In view of this, it is for each State to determine the users in the State concerned to be provided with the authorized access to the ~~satellite broadcast~~SADIS.

2.2   Where the meteorological service for international air navigation is provided by or through arrangements made by the meteorological authority in compliance with Annex 3 — *Meteorological Service for International Air Navigation*, 2.1.4, the meteorological authorities, WAFCs, and aerodrome and other meteorological offices should fully enjoy the benefits of the ~~satellite broadcast~~SADIS FTP to receive OPMET information and WAFS forecasts. Furthermore, it is at the discretion of each State to determine, on advice from its meteorological authority, whether any of the following users will be provided with authorized access to the ~~satellite broadcast~~SADIS FTP: operators; air traffic services units; search and rescue services units; aeronautical information services units; VAACs; and other aeronautical users.

2.3   Each State will notify ICAO and, for the purpose of efficiency, also the SADIS Provider ~~State for the satellite broadcast concerned~~, regarding the users in that State it has authorized to access the ~~satellite broadcast~~SADIS.

———————————

Appendix ~~E~~C

PROCESS FOR DETERMINING FROM WHICH SERVICE
(SADIS OR WIFS) A USER SHOULD OBTAIN
OPMET INFORMATION AND WAFS FORECASTS
(*See 1.4.3.*)

GENERAL

1.   In order for the SADIS and WIFS Provider States to appropriately manage and maintain viable, mutually existing services delivering OPMET information and WAFS forecasts, the following process should be followed in order to determine from which service (SADIS or WIFS) a user within a particular State should arrange to obtain their data.

STATES REQUIRED IN ICAO REGIONAL AIR NAVIGATION PLANS
TO OBTAIN WAFS FORECASTS FROM SADIS FOR PRIMARY OPERATIONAL USE

2.   For those States required by the ICAO Regional Air Navigation Plans to use SADIS as their primary source from which to obtain WAFS forecasts, the following procedure applies:

a) SADIS accounts will be provided (following normal authorization processes) on request to the SADIS Provider State; and,

b) participation in the SADIS cost recovery scheme will be required (except for LDCs as defined by United Nations).

WIFS accounts will be provided to authorized SADIS users by the WIFS Provider State for backup purposes on condition that:

— a SADIS account has been authorized and provided;

— there are no outstanding balances in respect of the SADIS cost recovery scheme; and

— use is restricted to backup purposes and periodic testing.

STATES REQUIRED IN ICAO REGIONAL AIR NAVIGATION PLANS
TO OBTAIN WAFS FORECASTS FROM WIFS FOR PRIMARY OPERATIONAL USE

3.   For those States required by the ICAO Regional Air Navigation Plans to use WIFS as their primary source from which to obtain WAFS forecasts, the following procedure applies:

a) WIFS accounts will be provided (following normal authorization processes) on request to the WIFS Provider State; and

b) SADIS accounts will be provided to authorized WIFS users by the SADIS Provider State for backup purposes on condition that:

— a WIFS account has been authorized and provided; and

— use is restricted to backup purposes and periodic testing.

**STATES IDENTIFIED IN THE ICAO REGIONAL AIR NAVIGATION PLANS
AS BEING ABLE TO OBTAIN WAFS FORECASTS
FROM EITHER SADIS OR WIFS FOR PRIMARY OPERATIONAL USE**

4.   The State, having determined which of the two services (SADIS or WIFS) to obtain their primary operational supply of WAFS forecasts, the procedures in 2 and 3 will apply.

5.   In exceptional circumstances, States that have an operational requirement to obtain data from both WIFS and SADIS FTP on a continuous basis will have their requests considered on a case-by-case basis. Under such circumstances, a State taking both services will be required to contribute fully to the SADIS cost recovery scheme (unless recognized as United Nations LDC).

6.   The definition of the threshold for operational versus backup purposes to be used on the SADIS and WIFS Internet-based services will be that as defined and endorsed by the SADISOPSG. The current definition of operational versus backup status is provided in Appendix F.

_____

Appendix ~~F~~D

CRITERIA FOR DETERMINATION
OF THE OPERATIONAL USE OF SADIS AND WIFS

(S*ee 1.4.3 and Appendix E.*)

1. SADISOPSG Decision 17/18 defined the policy to be applied with regard to determining "operational use". The policy is necessary to prevent those users who have been granted access to SADIS or WIFS as a backup to their normal service misusing the backup account by continuously accessing the backup service. The policy allows users to implement regular testing (up to one day in seven), but denies continuous 24/7 access to the service.

2. The following criteria were endorsed by the SADISOPSG (Decision 17/18) with regard to determining whether SADIS and/or WIFS are being used for operational purposes by States/users:

a) when a WIFS account has been provided to an authorized State/user who is required, by regional air navigation agreement, to obtain their WAFS data via SADIS, the State/user should not access the contingent WIFS service more frequently than one day in every seven;

b) when a SADIS account has been provided to an authorized State/user who is required, by regional air navigation agreement, to obtain their WAFS data from WIFS, the State/user should not access the contingent SADIS service more frequently than one day in every seven; and

c) in the extremely unlikely event of the SADIS or WIFS services failing, temporary unlimited access will be permitted to the contingent service until full resumption of service.

Note 1.— The criteria of "no more than one day in every seven" will allow users to test the backup account on a schedule of at least once every week. As long as the "no more than one day in seven" criteria is not exceeded, the specific days/times States/users wish to test their accounts is at the State/user's discretion, and they may do so less frequently (monthly, for example) if they so wish.

Note 2.— Backup accounts will be maintained in a "live" status in order that immediate access is available in the event of a genuine need to access the alternative Provider's service for backup purposes.

Note 3.— The SADIS and WIFS Providers will monitor their services to determine access behaviour.
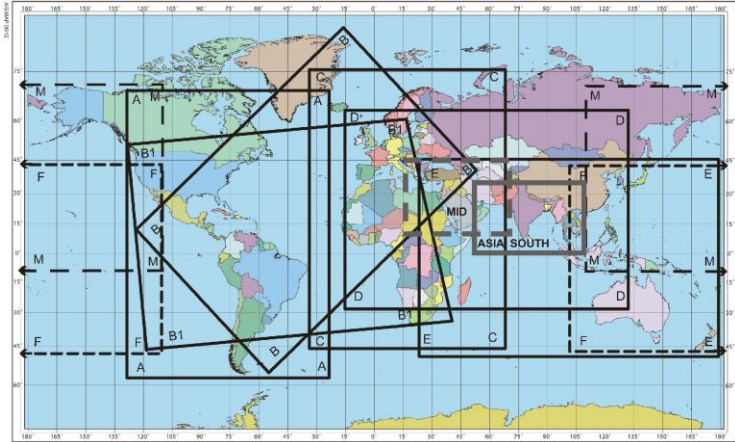
Note 4.— It remains the sole responsibility of the State/user to determine if they require a backup account from the alternative Provider, and if so, to arrange for that account.
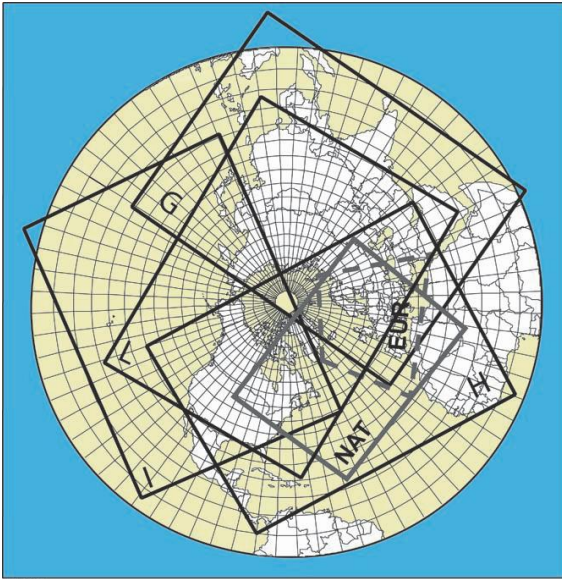
_____

Appendix ~~G~~E
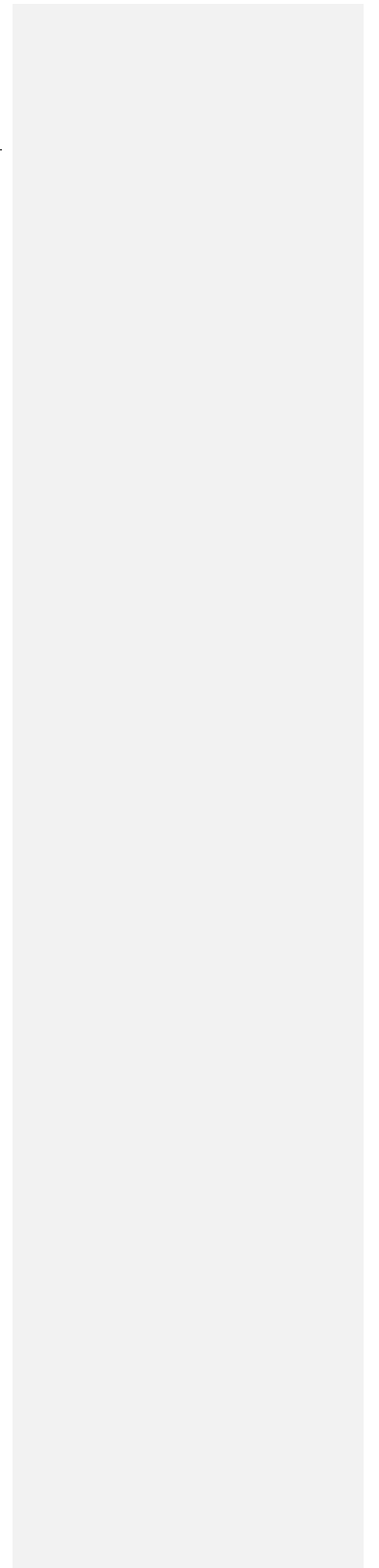
FIXED AREAS OF COVERAGE
(S*ee 2.1.3.*)

Fixed areas of coverage of WAFS forecasts in chart form – Mercator projection.
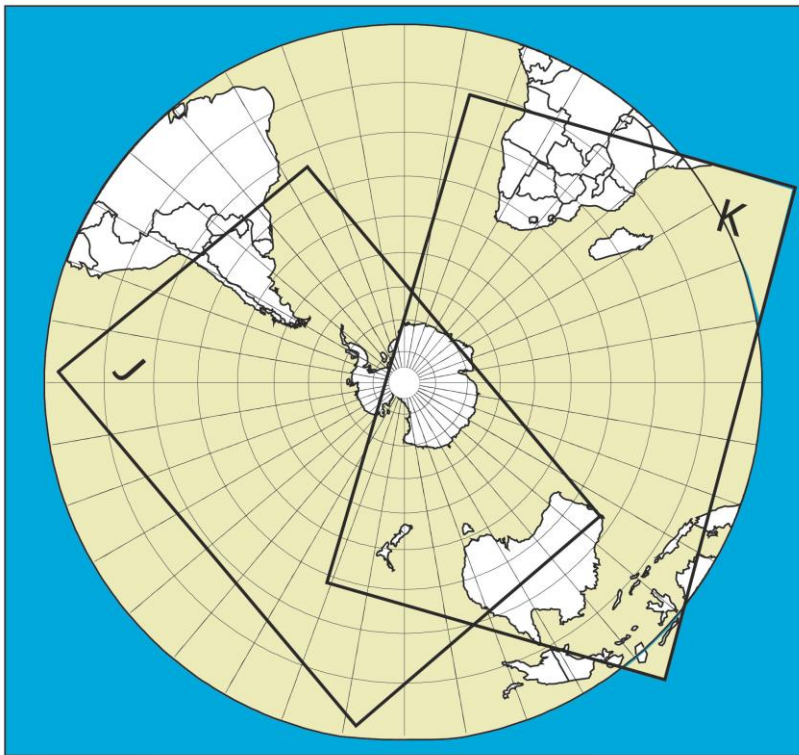
Table of latitude and longitude values provided at end of this Appendix

AIS/MMP 05/12

AIS/MAP 05/12

Fixed areas of coverage of WAFS forecasts in chart form – Polar Stereographic projection (southern hemisphere).

Table of latitude and longitude values provided at end of this Appendix

_____

Fixed areas of coverage of WAFS Forecasts in Chart Form - Mercator projection

CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
B	N0304	W13557	F	N5000	E10000
B	N7644	W01545	F	N5000	W11000
B	N3707	E06732	F	S5242	W11000
B	S6217	W05240	F	S5242	E10000
B1	N6242	W12500	M	N7000	E10000
B1	N6242	E04000	M	N7000	W11000
B1	S4530	E04000	M	S1000	W11000
B1	S4530	W12500	M	S1000	E10000
C	N7500	W03500	MID	N4400	E01700
C	N7500	E07000	MID	N4400	E07000
C	S4500	E07000	MID	N1000	E07000
C	S4500	W03500	MID	N1000	E01700

Fixed areas of coverage of WAFS Forecasts in Chart Form - Polar Stereographic projection (southern hemisphere)

CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
EUR	N4633	W05634	I	N1912	E11130
EUR	N5842	E06824	I	N3330	W06012
EUR	N2621	E03325	I	N0126	W12327
EUR	N2123	W02136	I	S0647	E16601
G	N3552	W02822	L	N1205	E11449
G	N1341	E15711	L	N1518	E04500
G	S0916	E10651	L	N2020	W06900
G	S0048	E03447	L	N1413	W14338
H	N3127	W14836	NAT	N4439	W10143
H	N2411	E05645	NAT	N5042	E06017
H	S0127	W00651	NAT	N1938	E00957
H	N0133	W07902	NAT	N1711	W05406

Fixed areas of coverage of WAFS Forecasts in Chart Form - Polar Stereographic projection (northern hemisphere)

CHART	LATITUDE	LONGITUDE
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

Appendix ~~H~~F

OPMET MESSAGE FORMATS
(See 2.5.2.)

AFTN MESSAGE FORMAT
(ITA-2 C teletypewriter)

Part of message	Example
Transmission and service information	`ZCZC NRA062 271100`
Priority indicator and addresses	`GG DIAPYMYX GOOYMYX`
Filing time and originator	`271103 DGAAYMYX`
Text	`TAF DGAA 271045Z 2712/2818 13010KT 9000 SCT020 TEMPO 1524 3000 DZ OVC003=`
(seven line feeds)	
End of message	`NNNN`

WMO ABBREVIATED HEADING

`TTAAii CCCC YYGGgg (BBB)` **where:**

`TT`	=	data designator, e.g. SA for METAR, FC and FT for TAF and WS for SIGMET[1]
`AA`	=	geographical designator, e.g. GH for Ghana, HU for Hungary[1]
`ii`	=	number used to differentiate bulletins with the same types of data from the same geographical area
`CCCC`	=	International four-letter location indicator for station originating or compiling the bulletin (ICAO Doc 7910 — *Location Indicators*)
`YY`	=	the day of the month
`GGgg`	=	time in hours and minutes for the time of observation in the case of METARs, and in the case of TAFs the full hour preceding the transmission time
`BBB`	=	optional group to indicate whether the message is an amendment, a correction or a delayed message (WMO GTS Manual, A-11.4)

---

[1] ~~See WMO Manual on GTS for lists of designators.~~

EXAMPLES[2]

WMO abbreviated heading

```
FTEA31 HKNA 080400 CCA
```

```
FT              TAF with validity more than 12 hours
EA              East Africa
31              TAF Bulletin No.31
HKNA            message originated by Nairobi
08              transmitted on the 8th day of the month
0400            full hour preceding the transmission was 0400 UTC
CCA             first correction of this TAF
```

TAF Message sent to a Bulletin compiling centre (BCC)

```
ZCZC
GG DIAPYMYX
271103  DGAAYMYX
FTGH31  DGAA  271100
TAF DGAA 271045Z 2712/2818 13010KT 9000 SCT020 TEMPO 1524 3000 DZ OVC003=
```

(seven line feeds)

```
NNNN
```

Message stripped of the AFTN envelope and as made available on for the SADIS FTP broadcast

```
FTGH31 DGAA 271100
TAF DGAA 271045Z 2712/2818 13010KT 9000 SCT020 TEMPO 1524 3000 DZ OVC003=
```

----

[2] See Annex 10, Volume II, Chapter 4 for teletypewriter operating procedures.

Appendix ~~I~~G

DATA PROCESSING SYSTEMS
(*~~See 4.1.4.~~*)

~~**1. RECOMMENDED BASIC REQUIREMENTS
FOR DATA PROCESSING SYSTEMS**~~

~~The system should:~~

~~a) interface with IP protocols (UDP multicast recommended, WMO TCP sockets can be supported) and (if specifically required by the user) X.25 from the VSAT receiving unit at data speeds up to 64 kbps;~~

~~b) have ample capacity to receive the data required by the user (PNG charts, BUFR and GRIB coded data, alphanumeric information);~~

~~c) have sufficient speed to display and process data in near real time;~~

~~d) NOT be capable of displaying or printing time expired data or charts;~~

~~e) be user friendly for documentation in an ATC/FBU environment;~~

~~f) be password protected for ATC/FBU;~~

~~g) ensure that products are displayed in Annex 3 — *Meteorological Service for International Air Navigation* compliant formats; and~~

~~h) ensure that if any modification to the meteorological content of transmitted information takes place, it is with the clear understanding that the product ceases to be a WAFS product, and this is automatically reflected in any associated chart legends.~~

**1. SPECIFIC REQUIREMENTS FOR DIGITAL GRID POINT (GRIB) DATA
AND DIGITALLY CODED SIGWX DATA**

The system should:

a) display wind and temperature information generated from the GRIB data, and SIGWX information from the BUFR data on a map background in the appropriate Annex 3 format;

b) select the map area for a selected route;

c) be able to zoom in on a selected area;

d) display all the grid point data along a route;

e) print the screen display;

f) display valid data with the correct date and time group at all times;

g) ensure that the standard ICAO areas are available on the system as map area defaults;

h) be able to produce wind and temperature charts from GRIB data, and SIGWX charts from BUFR data that are largely identical to the equivalent PNG chart-format products;

i) be able to produce charts that span the international date line, and cover all of the standard ICAO areas; and

j) have the capability to automatically generate Annex 3 compliant charts from the GRIB and BUFR code forms.

2. SPECIFIC REQUIREMENTS FOR DIGITALLY CODED CHARTS

The system should:

a) display WAFS SIGWX in PNG chart format;

b) display charts with the correct orientation and map projection;

c) be able to zoom into part of a chart if required with a valid date and time displayed at all times; and

d) print whole charts on A4 paper.

3. SPECIFIC REQUIREMENTS FOR OPMET INFORMATION IN ALPHANUMERIC FORMAT

The system should:

a) display all OPMET information in alphanumeric format (METAR - SA, TAF - FC, FT and SIGMET - WS, WV, WC and special AIREP - UA, tropical cyclone and volcanic ash advisories - FK, FV, and GAMET - FA and AIRMET - WA).

b) display only valid OPMET information by FIR, bulletin, country or route;

c) include an option to select all data;

d) be able to build a user's own route list which can be saved for future use;

e) display SIGMET at all times and in particular when linked by requests for TAF and METAR information by FIR, country or selected route; and

f) print out OPMET information.

4. GENERAL INFORMATION AND ADVICE
WHEN IMPLEMENTING A DATA PROCESSING SYSTEM

a) Establish how the hardware/software will be supported ~~in your country~~.

~~b) Determine hardware reliability and the mean time between failures and what parts are likely to fail.~~

~~c) Determine if the supplier holds spares and how many other systems have been sold in your country.~~

~~d) Identify the cost of spares and turn-round time in getting new spares.~~

~~e~~b) Does the hardware/software carry sufficient extended warranty? Is it worth the extra cost?

~~f~~c) Does the supplier provide a 'hot-line' for customer support, what is its availability, is it in your own language?

~~g~~d) Identify the cost of additional copies of the application software and operating software.

~~h) Prepare information on the required layout of where the VSAT and the data processor are to be installed.~~

~~i) Determine whether or not remote systems are required and the cost of terrestrial circuits.~~

~~j~~e) Identify, as much as possible, the volume of data and the type of products that are required to be processed, through WAFC London, and ensure that your system will be able to cope and meet future requirements cheaply and effectively.

~~k~~f) Identify the cost of software upgrades and enhancements that will be required when the WAFS product suite changes.

~~l~~g) Review the SADIS hardware and software procurement guidelines available from the SADIS website at URL: http://www.metoffice.gov.uk/aviation/sadis/procure.

———————————————

Appendix J

INTELSAT 904 — SATELLITE FINDER DIAGRAM
(See 5.2.3 a).)

Azimuth

Elevation

DETERMINE THE AZIMUTH AND ELEVATION OF THE SATELLITE FROM THE TERMINALS INTENDED INSTALLATION LOCATION

The satellite used for the transmission via SADIS 2G is INTELSAT 604, located at 60°E longitude. Use this satellite finder to determine the azimuth and elevation of the satellite from the desired installation location. For example, the azimuth bearing from London is between 110° and 120°, say 117°. The elevation bearing is between 5° and 10°, say 9°.

CHECK THAT THE PATH TO THE SATELLITE IS CLEAR OF OBSTRUCTIONS

Having determined the azimuth and elevation bearings, use a compass and inclinometer to check that the path from the desired installation location to the satellite is clear of obstructions.

Note that the azimuth diagram relates to the true rather than the magnetic bearing. It is important to correct for the true/magnetic variation for your particular location when deriving an azimuth bearing from a compass reading.

Note also that if the terminal is to be located adjacent to large metal objects or on a steel framed building, the compass may give a false reading and the azimuth bearing will have to be resolved using an appropriate large scale map.

The path to the satellite must be clear of obstructions such as buildings, trees or vehicle movements; otherwise, reception of SADIS data will be impaired. Check also that there are no planned building works that could cause an obstruction in the future.

———————————

Appendix K

SADIS VSAT RETURNS PROCEDURES
(See 6.7.2.)

1. FOR ISAT HARDWARE

The following procedure will apply to any SADIS VSAT receiving equipment that has become defective and needs to be repaired, including items that are still under warranty.

a) Any item returned without seeking prior authorisation from iSat may only be repaired at the discretion of iSat.

b) If a fault occurs in a piece of equipment, the customer should contact iSat Customer and Technical Support (details below) and request an RMA number. When issuing the RMA number, iSat will require as much detail of the fault as possible. Based on the information received, iSat will be able to ascertain whether the faulty unit is still covered by the manufacturer's warranty.

c) At this stage an iSat engineer will be consulted as sometimes, equipment can be repaired remotely as a result of equipment reconfiguration on site. If this is not the case, the customer will be requested to return the equipment using the RMA number provided.

d) Customers should send the faulty piece of equipment back to iSat, freight prepaid in the original packaging, or ensure units are carefully packed to avoid damage in transit. Failure to do so may void any warranties or cause further damage to the product.

e) It should be noted that iSat reserves the right to charge a fee and shipping costs for "no fault found. The customer should ensure that they enclose a copy of RMA form with the unit being shipped to the repair centre.

f) If still under warranty iSat will repair the equipment and return it to the customer, freight prepaid.

Out-of-warranty equipment

If equipment is found to be out of warranty, iSat will evaluate the faulty equipment, send the customer a quotation for the repair, and request payment in advance. The quoted cost will include the return freight to the customer. Once payment has been received and the equipment repaired, the equipment will be returned to the customer.

Note 1.   The customer should send the equipment to iSat, freight pre-paid and adequately packed.

Note 2.   Once evaluated by the repair centre, the cost could increase if replacement parts are needed to complete the repair. The customer would be notified if there is a difference to the original quote and could decide if they wished to proceed with the repair. If it were decided that the extra cost of the repair was not practical, iSat would return the unrepaired unit, at the customers cost, back to the requested delivery address. However, the customer would still be liable to pay the minimum charge as in the original quotes. The customer would pay for the cost of the associated repair and shipment back to country of installation.

<table>
<tr><td>

iSat Customer and Technical Support

Tel.: +44 (0) 1252 750 812
Fax: +44 (0) 1252 371 878

E-mail: info@isatnetworks.com

Customers may also use the iSat RMA portal: http://isat.rmaportal.com/

</td><td>

iSat Ltd
Unit 11 Armstrong Mall
Southwood Business Park
Farnborough
Hampshire
GU14 0NR
United Kingdom

</td></tr>
</table>

2. FOR PARADIGM COMMUNICATIONS HARDWARE

The following procedure will apply to any SADIS VSAT receiving equipment that has become defective and needs to be repaired, including items that are still under warranty.

a) Any item returned without seeking prior authorisation from Paradigm may only be repaired at the discretion of Paradigm.

b) If a fault occurs in a piece of equipment, the customer should contact Paradigm Support (details below) and request an RMA form. A sample pro-forma is provided on the following page. The RMA form should be completed by the customer in as much detail as possible and sent back to Paradigm Support. From this, Paradigm can ascertain whether the faulty unit is still covered by the manufacturer's warranty.

c) At this stage, a Paradigm engineer will be consulted as sometimes equipment can be repaired remotely as a result of equipment reconfiguration on site. If this is not the case, the customer will be given an RMA number under which to return the equipment.

d) Customers should send the faulty piece of equipment back to Paradigm, freight prepaid in the original packaging, or ensure units are carefully packed to avoid damage in transit. Failure to do so may void any warranties or cause further damage to the product.

e) It should be noted that Paradigm reserves the right to charge a fee and shipping costs for "no fault found". The customer should ensure that they enclose a copy of RMA form with the unit being shipped to the repair centre.

f) If still under warranty, Paradigm will repair the equipment and return it to the customer, freight prepaid.

Out-of-warranty equipment

If equipment is found to be out of warranty, Paradigm will issue a quotation for the minimum inspection cost.

On receipt of a Purchase Order from the customer, an RMA number will be issued under which to return the equipment. The customer should send the equipment to Paradigm freight pre-paid and adequately packed.

~~Once evaluated by the repair centre, the cost could increase if replacement parts are needed to complete the repair. The customer would be notified if there is a difference to the original quote and could decide if they wished to proceed with the repair. If it was decided that the extra cost of the repair was not practical, Paradigm would return the unrepaired unit, at the customers cost, back to the requested delivery address. But, the customer would still be liable to pay the minimum charge as in the original quotes. The customer would pay for the cost of the associated repair and shipment back to country of installation.~~

~~Paradigm Communications Support~~	~~Paradigm Communication Systems Ltd~~
	~~Paradigm House~~
~~Tel.: +44 (0) 1420 88199~~	~~14 Wilsom Road~~
~~Fax: +44 (0) 1420 88842~~	~~Alton, Hampshire GU34 2PP~~
	~~United Kingdom~~
~~E-mail: support@paracomm.co.uk~~	

Paradigm
Clear Sighted Solutions

RMA Form

Date:

Customer Name & Address: **Tel:** **Fax:** **Contact person:** **Email:**	**Return Shipping information:** ☐ Paradigm to ship to address shown on left using our courier ☐ Ship using customer courier (details below) Courier _____ Account No _____

Customer Reference number:

RMA Reference number:

Make and Product Description:	
Serial Number:	
Fault Description:	
Is fault intermittent? (Y/N)	
Is fault immediately apparent? (Y/N)	
Test carried out and details:	
Accessories (qty/ description / S/N)	
Has unit been returned to repair centre previously (if so date/details):	

Any comment:	Please complete this form and dispatch to: Paradigm Communication Systems Ltd, Repair Centre Paradigm House 14 Wilsom Road Alton, Hampshire GU34 2PP support@paracomm.co.uk Tel : +44 (0) 1420 88199 Fax : +44 (0) 1420 88842

Failure Analysis Report

Paradigm Terms and conditions

On submission of this form you will be issued with an RMA number and shipping instructions on how to return the faulty goods, items for repair should not be shipped to Paradigm without first receiving an RMA number from Support. Equipment being returned for warranty repair must have the manufacturers warranty stickers/ties intact otherwise charges may be made for any work undertaken.

Please ship goods in the original packaging or ensure they are carefully packed to avoid damage in transit - failure to do so may void any warranties or cause further damage to your product. **Note that we reserve the right to charge a fee and shipping costs for 'no fault found'.** Goods should be shipped to the above address on a 'door to door' basis, any freight costs subsequently incurred because of incorrect shipping will be charged back to the customer. Please ensure a copy of this form is enclosed with the units being shipped to our repair centre.

Note that for non warranty repairs once the fault is evaluated /investigated repair costs may increase depending on work/parts required. Customers would be notified if there is a difference to the original minimum quote and given the option to decide if they wish to continue with the repair. If it was decided that the extra cost of the repair was not practical the faulty unit would be returned unrepaired, but customers are still liable to pay the minimum repair fee.

Customers should note that if charges are applicable for a repair, that Paradigm cannot give credit terms on any repair items. This is applicable to all customers, and means goods cannot be returned to customers until the invoice relating to the repair has been paid.

Appendix ~~L~~H

LIST OF ~~SADIS 2G HARDWARE, AND~~
DATA PROCESSING AND DISPLAY SUPPLIERS
~~(See 3.4.)~~

~~**ISAT (PREVIOUSLY L-TEQ/OMNIGLOBE NETWORKS)**~~

~~**Products provided**~~

~~SADIS 2G hardware (antenna, LNB, cabling, receivers and router)~~
~~Satellite earth stations~~
~~VSAT networks~~
~~Flyaway and quick-deploy VSAT terminals~~
~~Network management systems~~

~~Note.— The 2G compatible receivers can be provided as standalone units, or incorporated into a single unit along with VadEDGE router.~~

~~**Services provided**~~

~~System design, integration and installation~~
~~Link budgets~~
~~Project management~~
~~Product configuration, support and maintenance~~
~~Communication equipment repair~~
~~Training~~

~~**Contact details**~~

~~Yvonne Sheridan~~
~~SADIS 2G Sales Account Manager~~
~~iSat~~
~~Unit 11 Armstrong Mall~~
~~Southwood Business Park~~
~~Farnborough~~
~~Hampshire~~
~~GU14 0NR~~
~~United Kingdom~~

~~Tel.: +44 (0) 1252 750 812~~
~~Fax: +44 (0) 1252 371 878~~
~~E-mail: ysheridan@isatnetworks.com~~
~~URL: http://www.isatnetworks.com/~~

PARADIGM COMMUNICATIONS

Products provided

Satellite products
Satellite earth stations
Flyaway and quick-deploy satellite and FWA systems
Wireless solutions
IP solutions
Network management systems

Services provided

System design
Equipment sales
Programme management
Installation services
Customer services
Logistics
Repair centre
Bonded warehouse
Quick delivery
Application development
Factory and field training

Contact details

Paradigm
Technology House
Station Road
Alton
Hampshire GU34 2PZ.
United Kingdom

Tel.: +44 (0) 8709 024 000 or +44 (0) 1420 88199
Fax: +44 (0) 8709 024 001 or +44 (0) 1420 88842
E-mail: sales@paracomm.co.uk or elmira.thacker@paracomm.co.uk
URL: www.paracomm.co.uk

AEP NETWORKS LTD

Services provided

SADIS 2G Migration Solutions
SADIS 2G data streams output over IP
SADIS 2G data streams output over X.25

AEP Networks is the manufacturer of the SADIS 2G system components. With many years involvement with the SADIS project they are seen by the user community as providers of highly reliable equipment with the knowledge and experience that will ensure these systems fit your requirements.

Sales contact details

AEP Networks Ltd
Silwood Park,
Buckhurst Road,
Ascot,
Berkshire SL5 7PW.
United Kingdom
Tel.: +44 (0) 1344 637 300 (Please ask for the "SADIS 2G team")
Fax: +44 (0) 1344 637 386 (Please mark with: "For the attention of SADIS 2G team")
E-mail: sadis2g@aepnetworks.com
URL: www.aepnetworks.com

NETSYS INTERNATIONAL (PTY) LTD

Services provided

SADIS 2G migration solutions
SADIS 2G datastream output over IP

NetSys is the supplier of the NST, an alternative SADIS 2G hardware system component. The NST is simply a printed circuit board pre-installed within a standard Linux desktop PC. NetSys offers the NST only as part of a complete NetSys SADIS 2G package.

Sales contact details

NetSys International (Pty) Ltd
P.O. Box 82
Persequor Park 0020
South Africa
Tel.: + 27 12 349 2056
Fax: + 27 12 349 2757
E-mail: info@netsys.co.za
URL: www.netsys.co.za

In addition to the above hardware suppliers, some users may prefer to purchase their hardware through one of the established workstation suppliers. This option may be particularly applicable when users choose to purchase SADIS visualization software at the same time as procuring hardware. The list of workstation suppliers is provided below.

SADIS DISPLAY PROCESSING AND DISPLAY SUPPLIERS

Information on SADIS workstation and software providers is available at this link:

http://www.metoffice.gov.uk/aviation/sadis/manufacturers/manufacturers-full

Supplier	Product
Telvent Netherlands BV Mr Jacco Mulders PO Box 422 4100 AK Culemborg Netherlands or Landzichtweg 70 4105 DP Culemborg Netherlands	**METAPS** www.telvent.com Tel.: +31 345 544080 Fax: +31 345 544099 E-mail: jacco.mulders@telvent.abengoa.com
Corobor Mr Michel Bourgues 5/7 rue de l'Amiral Courbet 94160 Saint Mandé France	**MESSIR - AERO** www.corobor.com Tel.: +33 1 4573 6060 Fax: +33 1 4573 2080 E-mail: sales@corobor.com
GST Mr Paul Heppner 7855 Walker Drive Suite 200 Greenbelt MA 20770 USA	**METLAB** http://www.gst.com Tel: +1 301 474 9696 Fax: +1 301 474 5970 E-mail: Paul.Heppner@gst.com
IBL Software Engineering Mr Michal Weis Galvaniho 17/C SK-82104 Bratislava Slovakia	**Aero Weather** www.iblsoft.com Tel.: +421 23266 2111 Fax: +421 23266 2110 E-mail: aeroweather@iblsoft.com

Supplier	Product
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Institute of Radar Meteorology (IRAM) Dr Tatiana Bazlova 15, p. Voejkovo, Vsevolozhskij rajon, Leningradskay oblast, Russia 188685	**MeteoExpert/MeteoConsultant Applications** www.iram.ru (Russian language only) Tel.: +7 813 707 5171 Fax: +7 813 707 5592 E-mail: expert@iram.com
MapMaker Group Ltd. Mr Alexey Solomakhov B. Predtechensky per. 11, Moscow Russia 123242	**GIS Meteo** http://www.mapmakers.ru/en/main/products/gis/gismeteodljasadis.aspx Tel.: +7 495 255 2303 Fax: +1 646 365 3167 E-mail: alex@gismeteo.com
Meteo France International (MFI) Park Avenue 9 rue Michel Labrousse 31100 Toulouse France	**AeroMetWeb** http://www.mfi.fr/en/aerometweb-the-ultimate-pre-flight-meteorological-briefing-system-fiche-produit.php Tel.: +33 5 6143 2940 Fax: +33 5 6143 2941 E-mail: info@mdi.fr
Netsys Mr André van der Walt NetSys International (Pty) Ltd P.O. Box 82 Persequor Park 0020 South Africa	**nsWAFS/nsGIB** www.netsys.co.za Tel.: +27 12 349 2056 Fax: +27 12 349 2757 E-mail: andre@netsys.co.za

Note.— Further information about the SADIS 2G service can be obtained from the Met Office website at URL: http://www.metoffice.gov.uk/aviation/sadis/sadis2g.

Annex 1

**FASID TABLE MET 2A —
OPMET INFORMATION (METAR, SPECI AND TAF)
REQUIRED ~~IN~~ TO BE MADE AVAILABLE BY WIFS AND SADIS**

Available at: http://www.icao.int/safety/meteorology

————————————

Annex 2

BI-ANNUAL MONITORING RESULTS OF OPMET INFORMATION ON THE SADIS ~~BROADCAST~~ — LISTED IN TERMS OF AERODROMES/LOCATION INDICATORS AND STATES

Available at: http://www.icao.int/safety/meteorology/sadisopsg (click "Guidance Material").

Note.— SUG Annex 2 does not define the METARs/SPECIs/TAFs/SIGMETs that are available via SADIS. They are a snapshot of METARs/SPECIs/TAFs distributed over SADIS during the bi-annual EUR OPMET Data Management Group monitoring exercises.

LEGEND

Station	ICAO location indicator of the aerodrome
Aerodrome	Name of the aerodrome as listed ICAO Doc 7910
IATA	IATA location indicator of the aerodrome (if known)
SA bulletins	List of the METAR bulletins (SA) in which the aerodrome can be found
SA REQ	Y = METAR defined as a requirement for SADIS in SUG Annex 1
SADIS	Y = METAR for the aerodrome contained in the WAFC London SADIS routeing table
SA MON	Y = METAR for the aerodrome recently monitored on SADIS
FC REQ	Y = short TAF defined as a requirement for SADIS in SUG Annex 1
FC DIS	Y = short TAF for the aerodrome contained in the WAFC London SADIS routeing table
FC MON	Y = short TAF for the aerodrome recently monitored on SADIS
FT REQ	Y = long TAF defined as a requirement for SADIS in SUG Annex 1
FT DIS	Y = long TAF for the aerodrome contained in the WAFC London SADIS routeing table
FT MON	Y = long TAF for the aerodrome recently monitored on SADIS
FC bulletins	List of the short TAF bulletins (FC) in which the aerodrome can be found
FT bulletins	List of the long TAF bulletins (FT) in which the aerodrome can be found.

―――――――――――

Annex 3

**BI-ANNUAL MONITORING RESULTS OF OPMET INFORMATION
ON THE SADIS ~~BROADCAST~~ — LISTED IN TERMS OF BULLETIN
NUMBERS AND LOCATION INDICATORS OF AERODROMES
CONTAINED IN EACH BULLETIN**

Available at: http://www.icao.int/safety/meteorology/sadisopsg (click "Guidance Material").

Note.— *SUG Annex 3 does not define the METARs/SPECIs/TAFs/SIGMETs that are available via SADIS. They are a snapshot of METARs/SPECIs/TAFs distributed over SADIS during the bi-annual EUR OPMET Data Management Group monitoring exercises.*

LEGEND

TTAAii	The first group of the WMO Abbreviated Header Line of the bulletin
CCCC	The second group of the WMO Abbreviated Header Line of the bulletin
Stations	List of the aerodromes included in the bulletin for the scheduled bulletins or the FIR/UIRs for the unscheduled bulletins (if known)
Monitor	Y = this bulletin monitored on the SADIS FTP ~~broadcast~~ on any of the last three monitoring cycles carried out by the bulletin management group.

—————————————

> **Comment [c2]:** What are we doing about presenting this information now?

Annex 4

WAFS FORECASTS ~~DISSEMINATED ON~~MADE AVAILABLE VIA THE SADIS

~~Date~~	~~Amendment~~
~~31.5.2013~~	~~4-2, 4-5 to 4-15~~
~~29.05.2014~~	~~4-2 to 4-4 deleted (GRIB1 information). Original 4-5 to 4-16 updated to reflect status of FL410 data, and CB, icing and turbulence data; and renumbered. 4-17 to 4-20 updated to reflect changes to WAFS backup procedures, and renumbered. 4-21 to 4-38 renumbered.~~
~~DD.M.2015~~	~~4-2, 4-12, 4-13, 4-14, 4-15, 4-17,~~

1. FORECASTS IN NUMERICAL CODE FORMS

a) WAFS upper-air temperature, wind, geopotential height, humidity, Tropopause, icing potential, in-cloud turbulence potential, clear-air turbulence potential, extent of cumulonimbus, flight level of cumulonimubus base and flight level of cumulonimbus top are made available in GRIB2 code form.

WAFC London WAFS forecasts in GRIB2 format using the WMO AHL $T_1T_2A_1A_2$ii identifiers below (CCCC = EGRR) are ~~transmitted over SADIS 2G and also~~ made available on Secure SADIS FTP. WAFC Washington WAFS forecasts WAFS forecasts in GRIB2 format (CCCC = KWBC) ~~are not transmitted over SADIS 2G, but~~ are also made available on Secure SADIS FTP.

GRIB2 Bulletins on **Secure SADIS FTP**.

YUX(C-M) (85/75/70/60/50/45/40/35/30/27/25/23/20/18/15/13/10)	U-component of the wind
YVX(C-M) (85/75/70/60/50/45/40/35/30/27/25/23/20/18/15/13/10)	V-component of the wind
YTX(C-M) (85/75/70/60/50/45/40/35/30/27/25/23/20/18/15/13/10)	Temperature
YRX(C-M) (85/75/70/60/50)	Relative humidity
YHX(C-M) (97)	Flight level of tropopause
YTX(C-M) (97)	Temperature of tropopause
YUX(C-M) (96)	U-component of the max wind
YVX(C-M) (96)	V-component of the max wind
YHX(C-M) (96)	Flight level of the max wind
YHX(C-M) (85/75/70/60/50/45/40/35/30/27/25/23/20/18/15/13/10)	Geopotential altitude of flight levels
YIX(C-M) (80/70/60/50/40/30)	Mean icing
YIX(C-M) (81/71/61/51/41/31)	Max icing
YFX(C-M) (70/60/50/40/30)	Mean in-cloud turbulence
YFX(C-M) (71/61/51/41/31)	Max in-cloud turbulence
YLX(C-M) (40/35/30/25/20/15)	Mean clear-air turbulence
YLX(C-M) (41/36/31/26/21/16)	Max clear-air turbulence
YBX(C-M) (01)	Horizontal extent of CB
YHX(C-M) (02)	ICAO height at CB base
YHX(C-M) (03)	ICAO height at CB top

Note: Bulletins in this format will be made available 9 November 2016, with effect from forecast data based on 1200 UTC model run in accordance with applicability of Amendment 77 to ICAO Annex 3. Monitor administrative notifications from the SADIS Manager.

The schedule of availability of WAFS Aviation GRIB2 data for WAFS GRIB2 data (other than Cumulonimbus cloud, icing and turbulence) is given below

0330-0420 UTC for data based on 0000 UTC
0930-1020 UTC for data based on 0600 UTC
1530-1620 UTC for data based on 1200 UTC
2130-2220 UTC for data based on 1800 UTC

For Cumulonimbus cloud, icing and turbulence the availability times are:

0415-0450 UTC for data based on 0000 UTC
1015-1050 UTC for data based on 0600 UTC
1615-1650 UTC for data based on 1200 UTC
2215-2250 UTC for data based on 1800 UTC

Note 1.— WAFS GRIB 2 forecasts are based on a regular 1.25*1.25 degree (un-thinned) grid. Bulletins will contain a global field of data for each element;

Note 2.— Total number of bulletins is 1122 (increasing to 1265 with effect from 1200 UTC model run, 9th November 2016) for all WAFS forecasts in the GRIB 2 code form (including icing, turbulence and cumulonimbus clouds which in total amount to 407 bulletins).

Note 3 – Very rarely, if corruption to the originally issued files is identified, corrections (not amendments) to the above forecasts will be identified by appending of the appropriate correction indicator (CCA, CCB etc) to the WMO AHL.

Formatted: Superscript

b) SIGWX in the BUFR code form

Global BUFR-encoded SWH forecasts are produced by WAFC London and WAFC Washington.

SWH or SWM	BUFR FEATURES	COMMON NAME	WMO HEADER used by WAFC London	WMO HEADER used by WAFC Washington
SWH	Jet-streams	JETS	JUWE96 EGRR	JUWE96 KKCI
	Clear Air Turbulence (CAT)	CAT	JUCE00 EGRR	JUCE00 KKCI
	Embedded Cumulonimbus	CLOUD	JUBE99 EGRR	JUBE99 KKCI
	Tropopause height	TROP	JUTE97 EGRR	JUTE97 KKCI
	Frontal Systems	FRONTS	JUFE00 EGRR	JUFE00 KKCI
SWH and SWM	Tropical Cyclone, Sandstorms & Volcanoes	V_T_S or Other_Parameters	JUVE00 EGRR	JUVE00 KKCI
SWM	SWM Tropopause height	M-TROP	JUOE00 EGRR	JUOE00 KKCI
	SWM jet-streams	M-JETS	JUTE00 EGRR	JUTE00 KKCI
	SWM fronts	M-FRONTS	JUJE00 EGRR	JUJE00 KKCI
	SWM cloud, in-cloud icing and turbulence	M-CLOUD	JUNE00 EGRR	JUNE00 KKCI
	SWM Clear Air Turbulence (C.A.T.)	M-CAT	JUME00 EGRR	JUME00 KKCI

The above table can be related to the folder structure within **Secure SADIS FTP**, thus:

```
H_CAT              Clear Air Turbulence (SWH)
H_EMBEDDED_CB      Embedded cumulonimbus cloud (SWH)
H_FRONTS           Frontal systems (SWH)[5]
H_JETS             Jetstream information (SWH)
H_TROP             Tropopause information (SWM)
M_CAT              Clear Air Turbulence (SWM)
M_CLOUD            Embedded cumulonimbus cloud (SWM)
M_FRONTS           Frontal systems (SWM)[6]
M_JETS             Jetstream information (SWM)
M_TROP             Tropopause information (SWM)
OTHER_PARAMETERS   Volcano, Tropical Cyclone, Radioactive release
                   (SWM and SWH)
```

---

[5] The need to depict fronts was removed from SIGWX charts in accordance with Amendment 74 to ICAO Annex 3 (2007). However, the essentially empty bulletins are provided by default for legacy compatibility reasons.

[6] The need to depict fronts was removed from SIGWX charts in accordance with Amendment 74 to ICAO Annex 3 (2007). However, the essentially empty bulletins are provided by default for legacy compatibility reasons.

In both the EGRR and KKCI folders, the SWH datasets are global in nature. However, the SWM datasets are different, with the EGRR subfolder containing data for SWM areas EURO, MEA and ASIA SOUTH whilst the KKCI subfolder contains data for the single SWM area NAT.

The following availability times for SWH and SWM BUFR SIGWX files currently applies:

- SWH and SWM BUFR SIGWX data based on 0000 UTC model run –
  T+24 issued at 0700 UTC (No later than 0900 UTC when operating in backup mode)

- SWH and SWM BUFR SIGWX data based on 0600 UTC model run -
  T+24 issued at 1300 UTC (No later than 1500 UTC when operating in backup mode)

- SWH and SWM BUFR SIGWX data based on 1200 UTC model run -
  T+24 issued at 1900 UTC (No later than 2100 UTC when operating in backup mode)

- SWH and SWM BUFR SIGWX data based on 1800 UTC model run -
  T+24 issued at 0100 UTC (No later than 0300 UTC when operating in backup mode)

Note.— As indicated above, uUnder conditions of the pre-planned quarterly WAFS SIGWX backup tests, SIGWX forecasts will be issued to the normal schedule. Under conditions of real WAFS backup events, issuance of the SIGWX forecasts may be up to two hours later than the normal issuance time (i.e. under real backup conditions SIGWX forecasts may will be issued no later than 0900, 1500, 2100 and 0300 UTC).

2.   FORECASTS IN THE PNG CHART FORM

a)   SIGWX forecasts in the Portable Network Graphics (PNG) chart form

   Note.— These charts are provided, as a back-up to the BUFR-coded products.

High Level SIGWX forecasts (SWH):

Directory	Containing PNG file	Number of issues per day	ICAO equivalent name	Chart projection
AREA_A	PGEE05_KKCI_hhmm	4	AMERICAS	Mercator
AREA_B	PGSE05_EGRR_hhmm	4	EURSAM	Mercator
AREA_B1	PGIE05_KKCI_hhmm	4	AREA B1	Mercator
AREA_C	PGRE05_EGRR_hhmm	4	EURAFI	Mercator
AREA_D	PGZE05_EGRR_hhmm	4	ASIA	Mercator
AREA_E	PGGE05_EGRR_hhmm	4	INDOC	Mercator
AREA_F	PGGE05_KKCI_hhmm	4	S PACIFIC	Mercator
AREA_G	PGCE05_EGRR_hhmm	4	MID	Polar Stereographic
AREA_H	PGAE05_EGRR_hhmm and PGAE05_KKCI_hhmm	Both 4	NAT	Polar Stereographic
AREA_I	PGBE05_KKCI_hhmm	4	N PACIFIC	Polar Stereographic
AREA_J	PGJE05_KKCI_hhmm	4	S POLAR	Polar Stereographic
AREA_K	PGKE05_EGRR_hhmm	4	SIO	Polar Stereographic
AREA_M	PGDE29_KKCI_hhmm	4	N PACIFIC	Mercator

Medium Level SIGWX forecasts (SWM):

Directory	Containing PNG file	Number of issues per day	ICAO equivalent name	Chart projection
AREA_ASIA_SOUTH	PGZE14_EGRR_hhmm	4	ASIA SOUTH	Mercator
AREA_EURO	PGDE14_EGRR_hhmm	4	EURO	Polar Stereographic
AREA_MID	PGCE14_EGRR_hhmm	4	MID (or MEA)	Mercator
AREA_NAT	PGNE14_KKCI_hhmm	4	NAT	Polar Stereographic

Currently, the following issue times for SWH and SWM PNG SIGWX applies:

- SWH and SWM PNG SIGWX charts based on 0000 UTC model run –
  T+24 issued at 0700 UTC (No later than 0900 UTC when operating in backup mode)

- SWH and SWM PNG SIGWX charts based on 0600 UTC model run -
  T+24 issued at 1300 UTC (No later than 1500 UTC when operating in backup mode)

- SWH and SWM PNG SIGWX charts based on 1200 UTC model run -
  T+24 issued at 1900 UTC (No later than 2100 UTC when operating in backup mode)

- SWH and SWM PNG SIGWX charts based on 1800 UTC model run -
  T+24 issued at 0100 UTC (No later than 0300 UTC when operating in backup mode)

Note.— As indicated, u̶Under conditions of the pre-planned quarterly WAFS SIGWX backup tests, SIGWX forecasts will be issued to the normal schedule. Under conditions of real WAFS backup events, issuance of the SIGWX forecasts may be up to two hours later than the normal issuance time (i.e. under real backup conditions SIGWX forecasts m̶a̶y̶ will be issued no later than 0900, 1500, 2100 and 0300 UTC).

List of WAFS SIGWX PNG charts, including common name, ICAO area, flight levels, and WMO AHL:

Regional Areas	Area of coverage code (ANP)	Flight levels	WMO AHL $(T_1T_2A_1A_2ii\ CCCC)$
AMERICAS	A	FL250-FL630	PGEE05 KKCI
EURSAM	B	FL250-FL630	PGSE05 EGRR
AMERICAS-AFI	B1	FL250-FL630	PGIE05 KKCI
EURAFI	C	FL250-FL630	PGRE05 EGRR
EURASIA	D	FL250-FL630	PGZE05 EGRR
INDOC	E	FL250-FL630	PGGE05 EGRR
PACIFIC (North Pacific)	F	FL250-FL630	PGGE05 KKCI
MID (SWH)	G	FL250-FL630	PGCE05 EGRR
NAT (SWH)	H	FL250-FL630	PGAE05 EGRR
NAT (SWH)	H	FL250-FL630	PGAE05 KKCI
PACIFIC (North Pacific)	I	FL250-FL630	PGBE05 KKCI
SOUTH POLAR	J	FL250-FL630	PGJE05 KKCI
SIO	K	FL250-FL630	PGKE05 EGRR
NORTH PACIFIC	M	FL250-FL630	PGDE29 KKCI
NAT (SWM)	NAT	FL100-FL450	PGNE14 KKCI
EURO	EURO	FL100-FL450	PGDE14 EGRR
MID (SWM)	MEA	FL100-FL450	PGCE14 EGRR
ASIA SOUTH	ASIA SOUTH	FL100-FL450	PGZE14 EGRR

Note 1 — NAT (SWH) and NAT (SWM) cover different geographical areas; MID (SWH) and MID (SWM) cover different geographical areas.
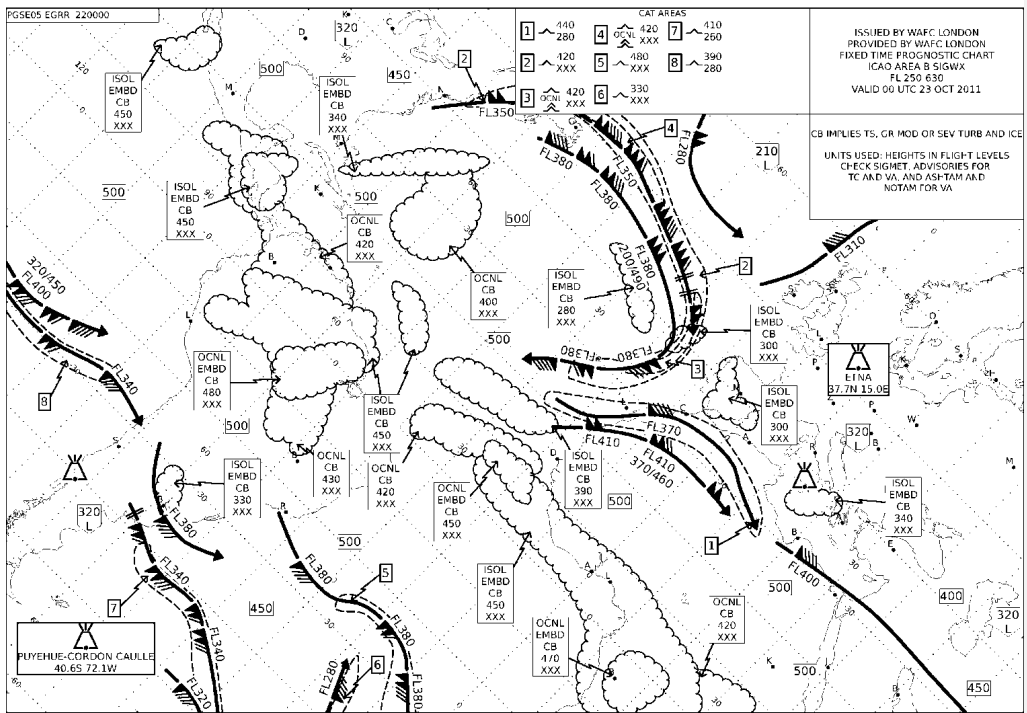
Note 2 – Corrections (not amendments) to the above forecasts will be identified by appending of the appropriate correction indicator (CCA, CCB etc) to the WMO AHL.

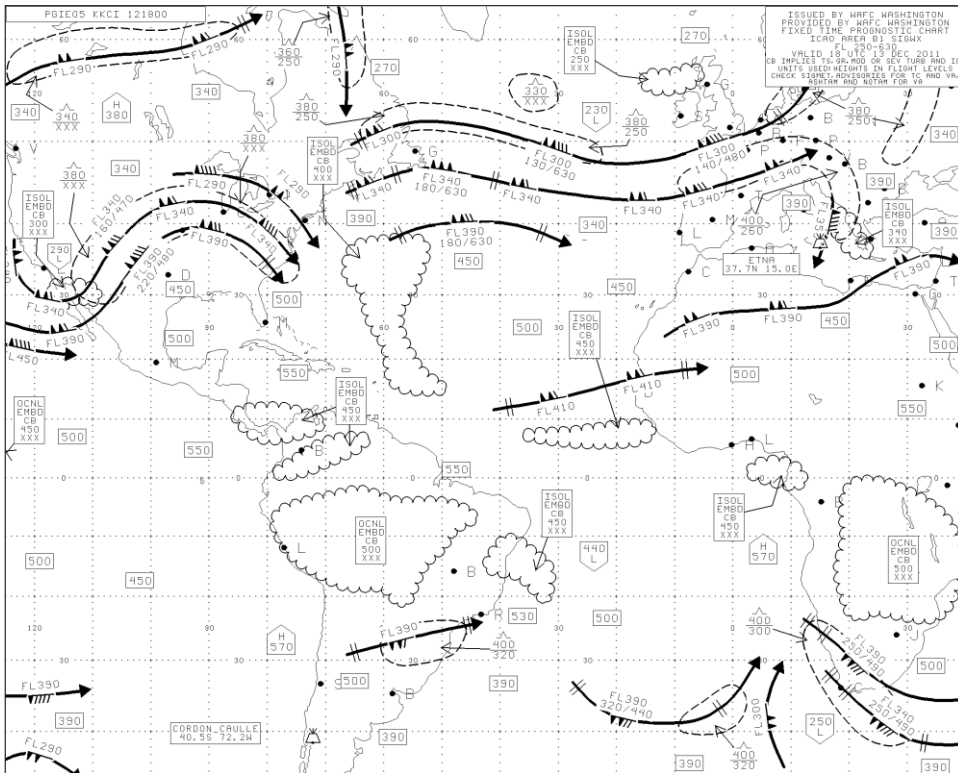b)   Examples WAFS Charts in PNG format are provided below, in the order of the above table.
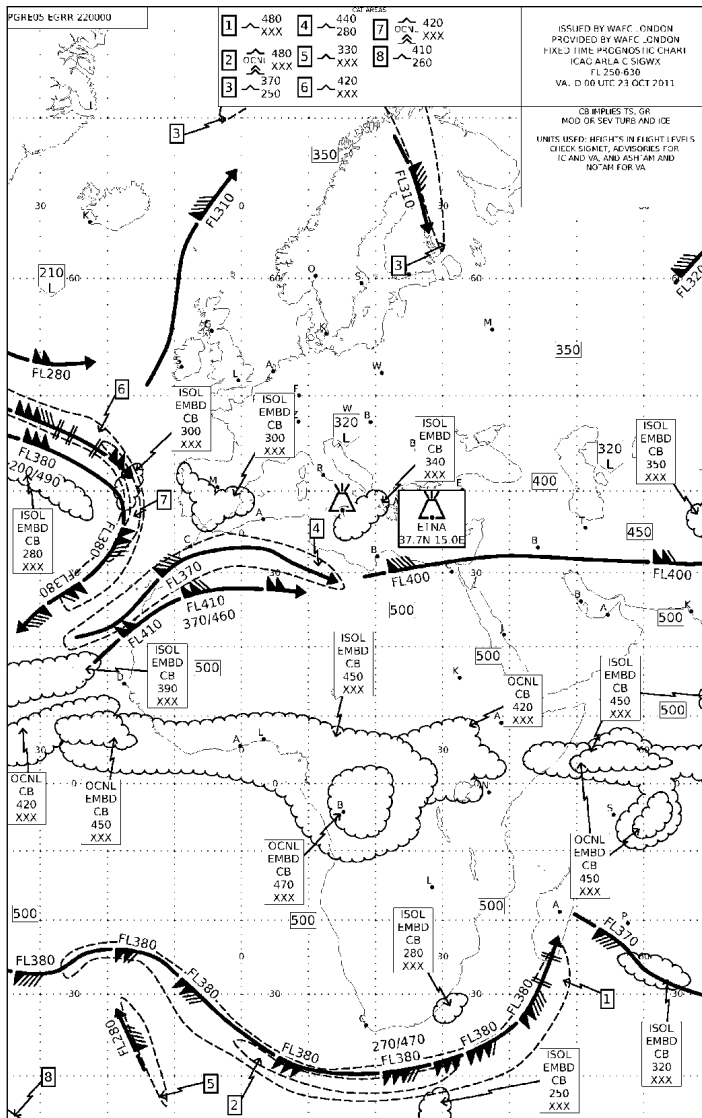
ICAO REGION A — AMERICAS
(CHART AHL: PGEE05 KKCI)
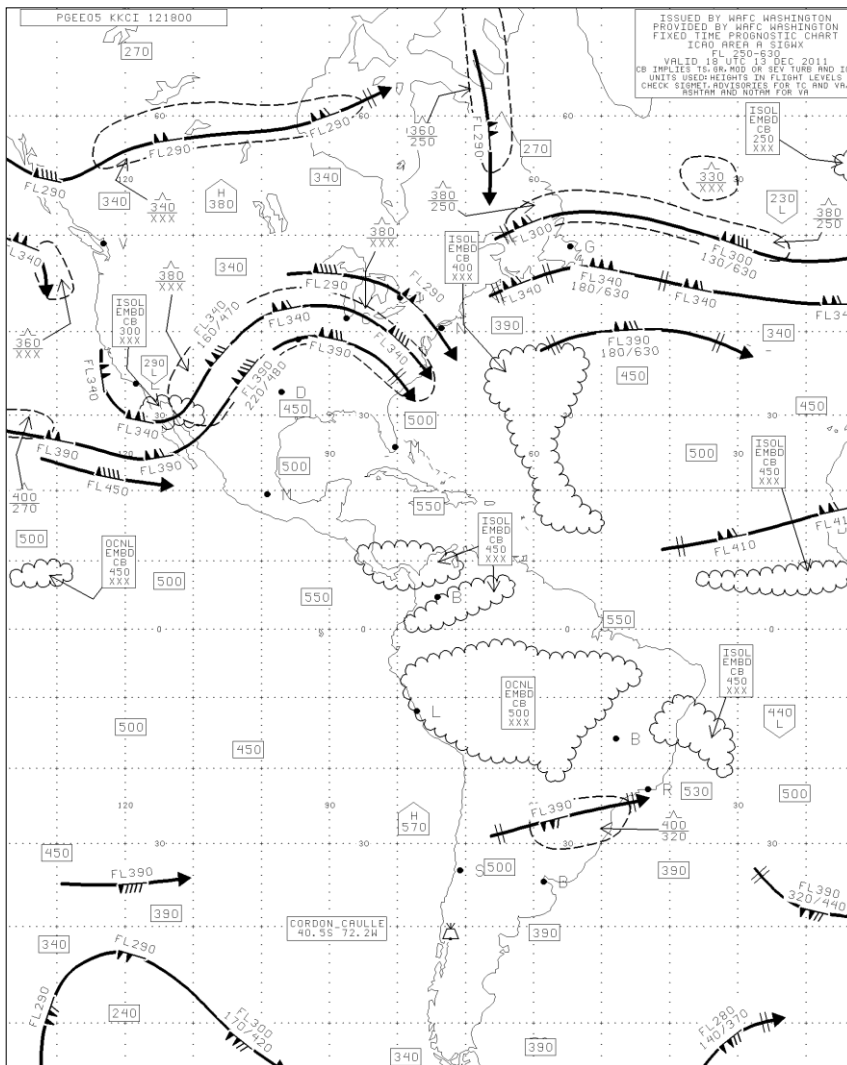
ICAO REGION B — EURSAM
(CHART AHL: PGSE05 EGRR)

ICAO REGION B1 AMERICAS AFI
(CHART AHL: PGIE05 KKCI)

ICAO REGION C — EURAFI
(CHART AHL: PGRE05 EGRR)

ICAO REGION D — EURASIA
(CHART AHL: PGZE05 EGRR)
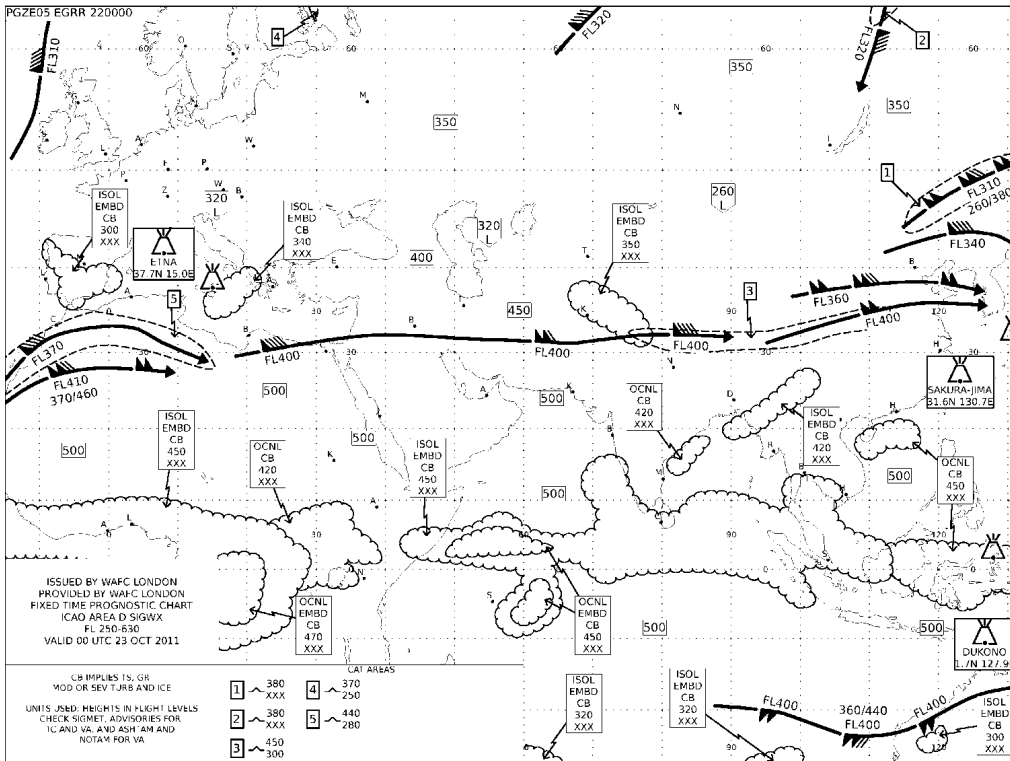
ICAO REGION E — INDOC
(CHART AHL: PGGE05 EGRR)
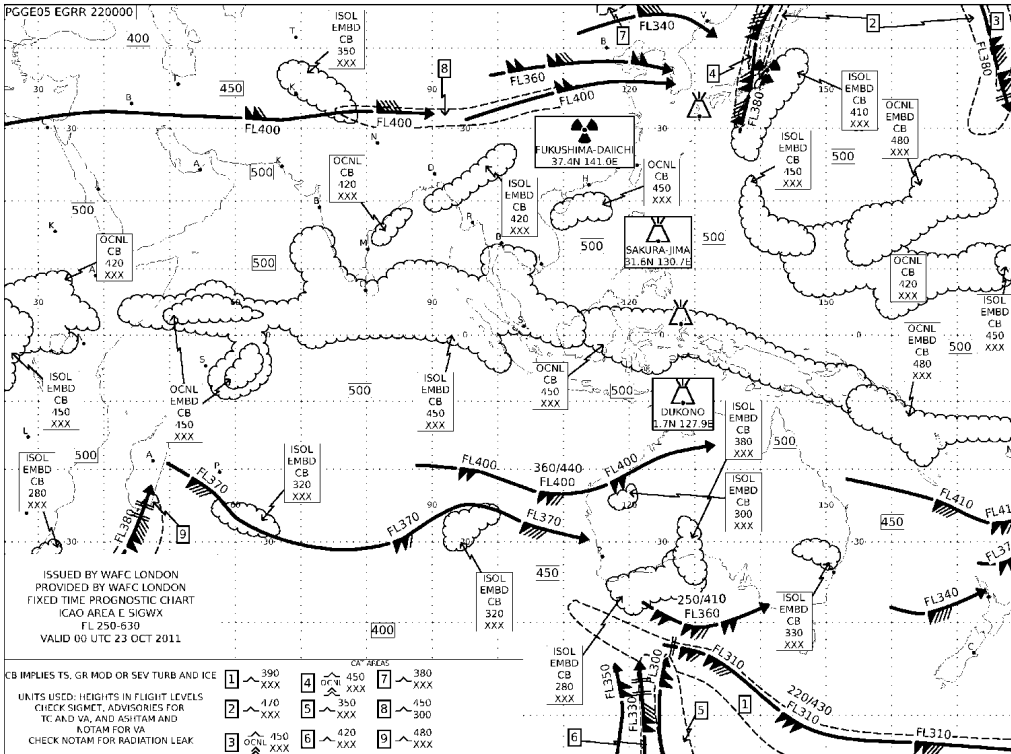
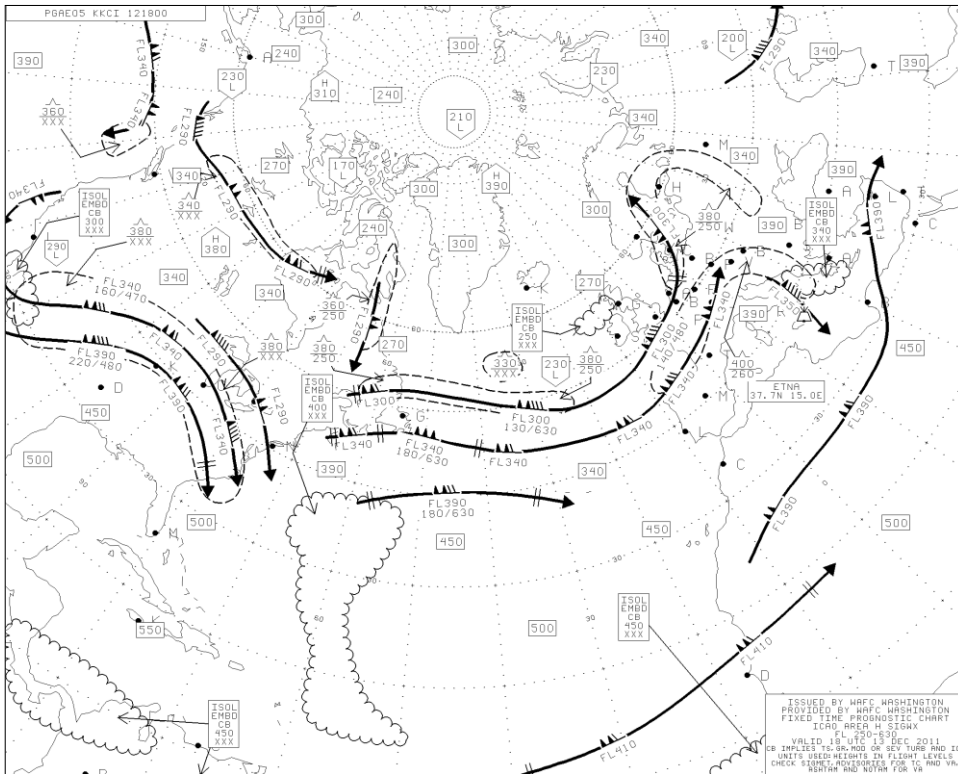## ICAO AREA F — PACIFIC (NORTH PACIFIC)
(CHART AHL: PGGE05 KKCI)
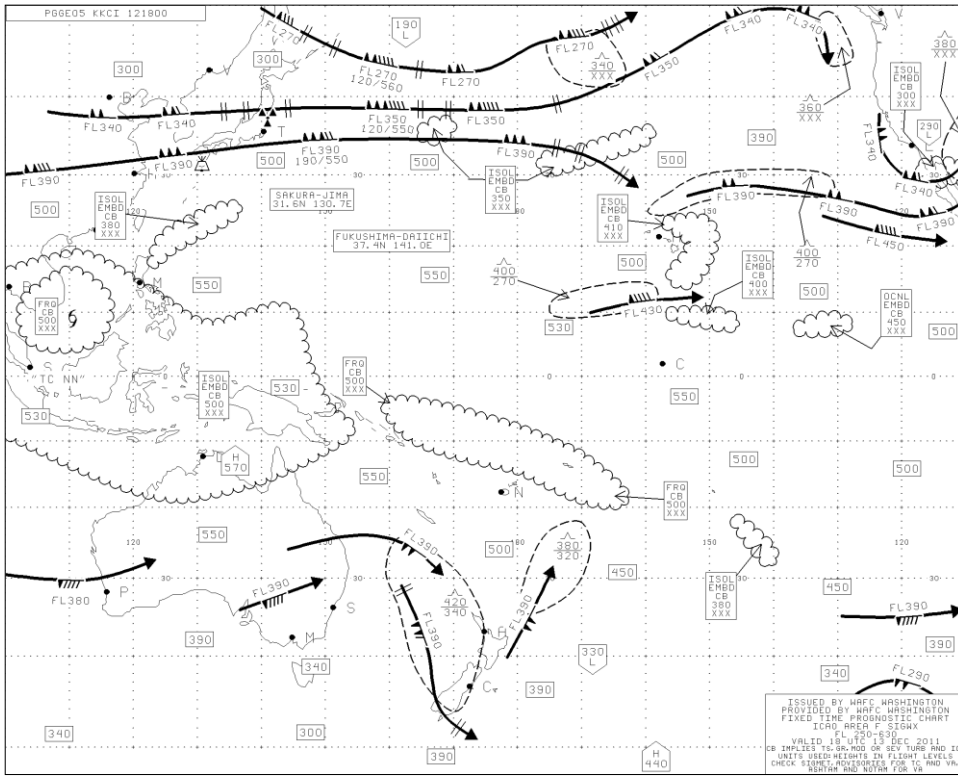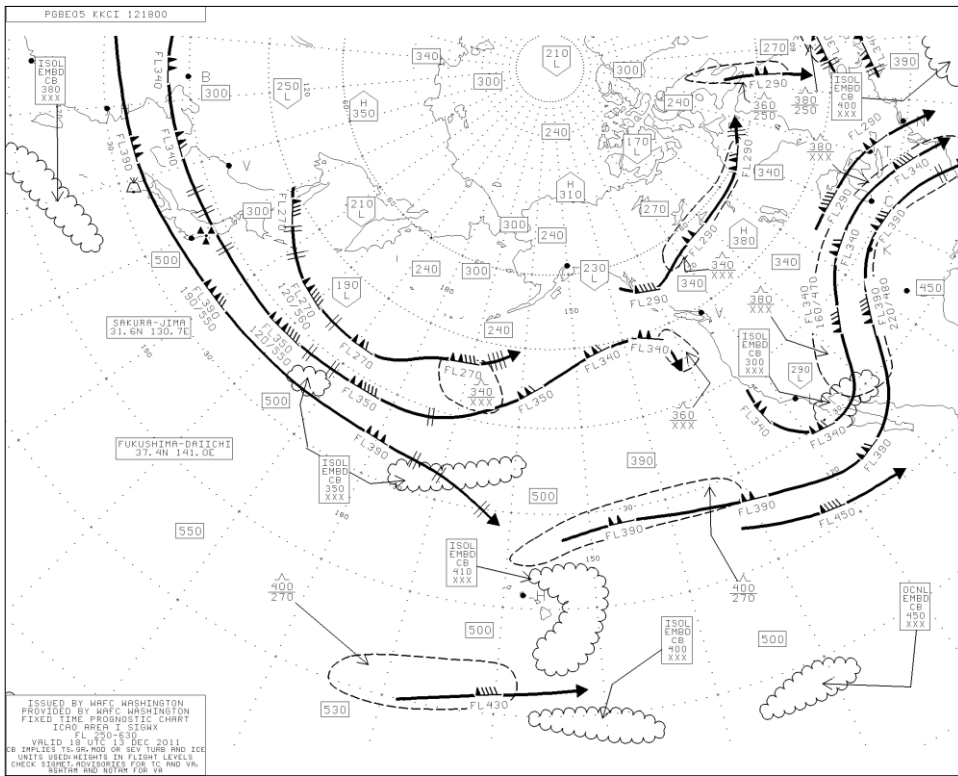
ICAO REGION G — MID (SWH)
(CHART AHL: PGCE05 EGRR)
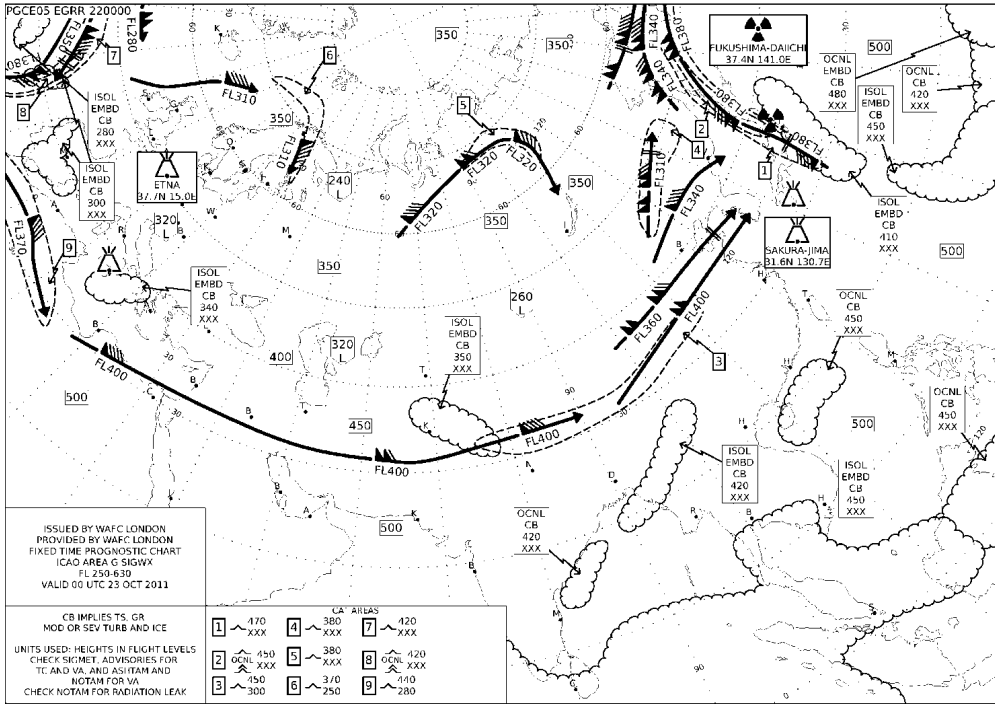
ICAO REGION H — NAT (SWH)
(CHART AHL: PGAE05 EGRR)
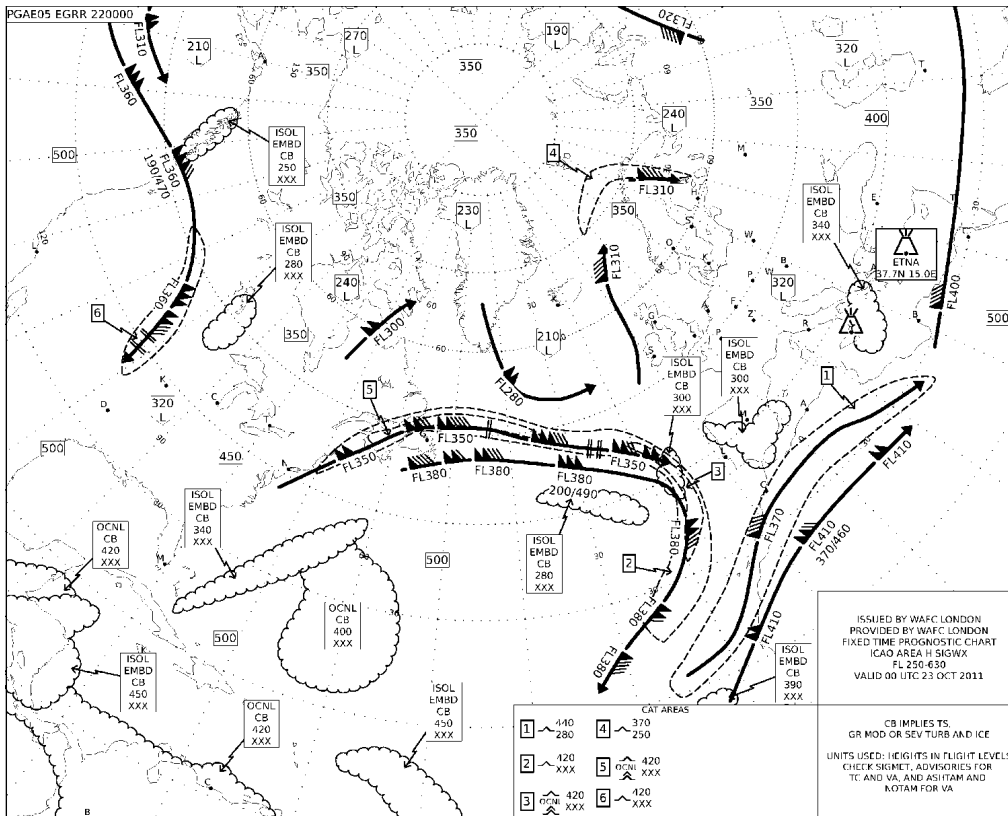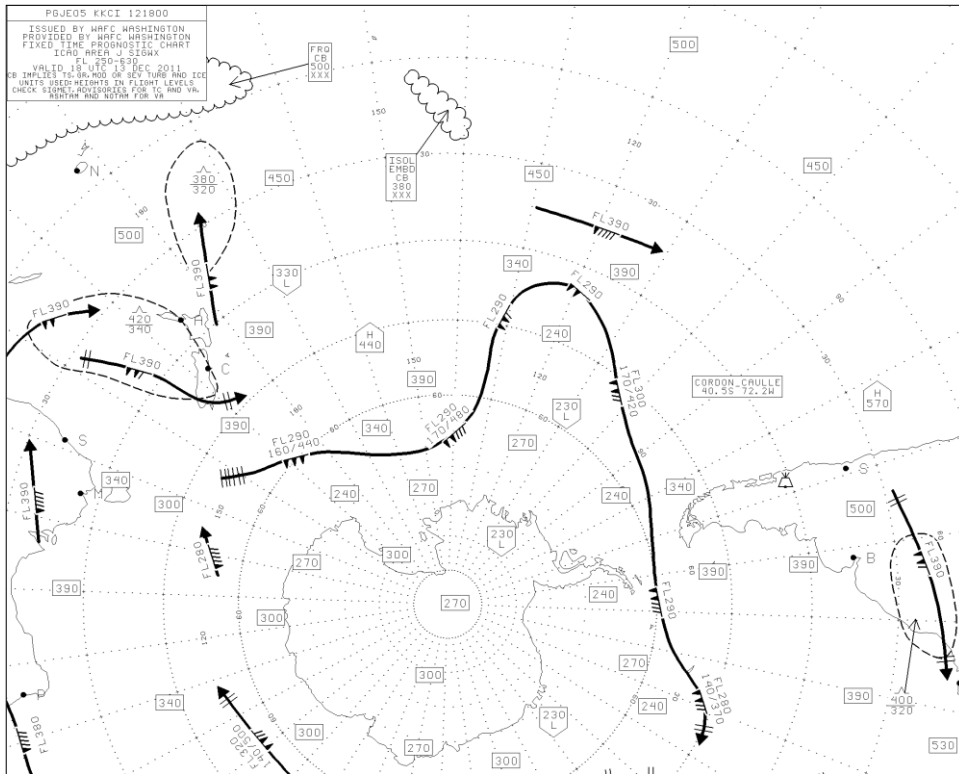
ICAO AREA H — NAT (SWH)
(CHART AHL: PGAE05 KKCI)

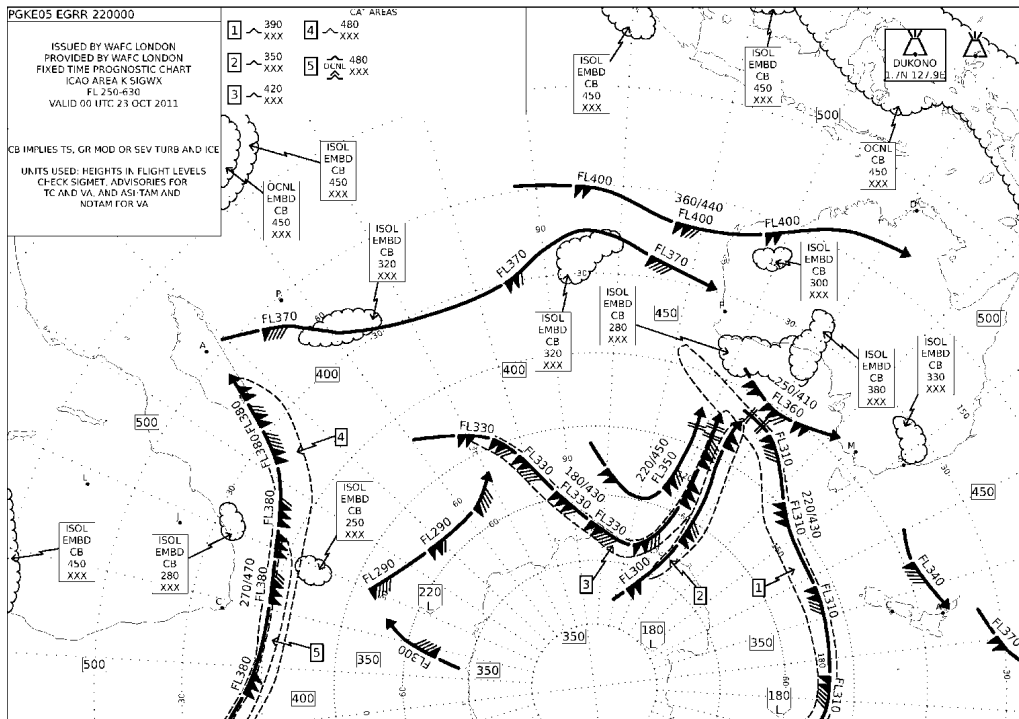**ICAO REGION I — PACIFIC (NORTH PACIFIC)**
(CHART AHL: PGBE05 KKCI)

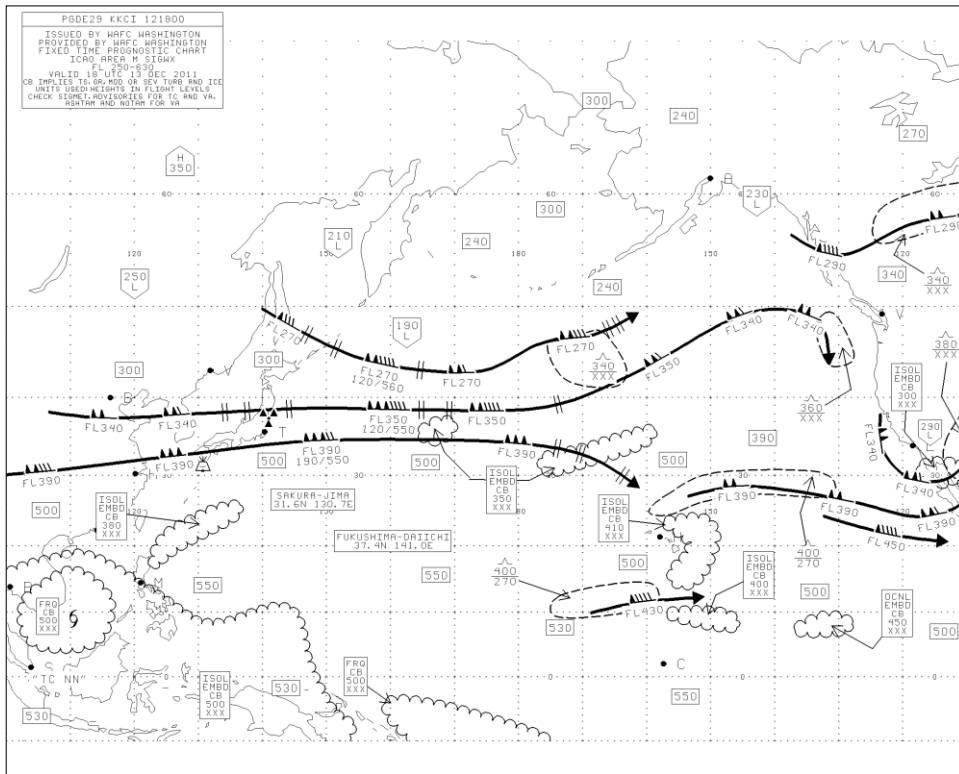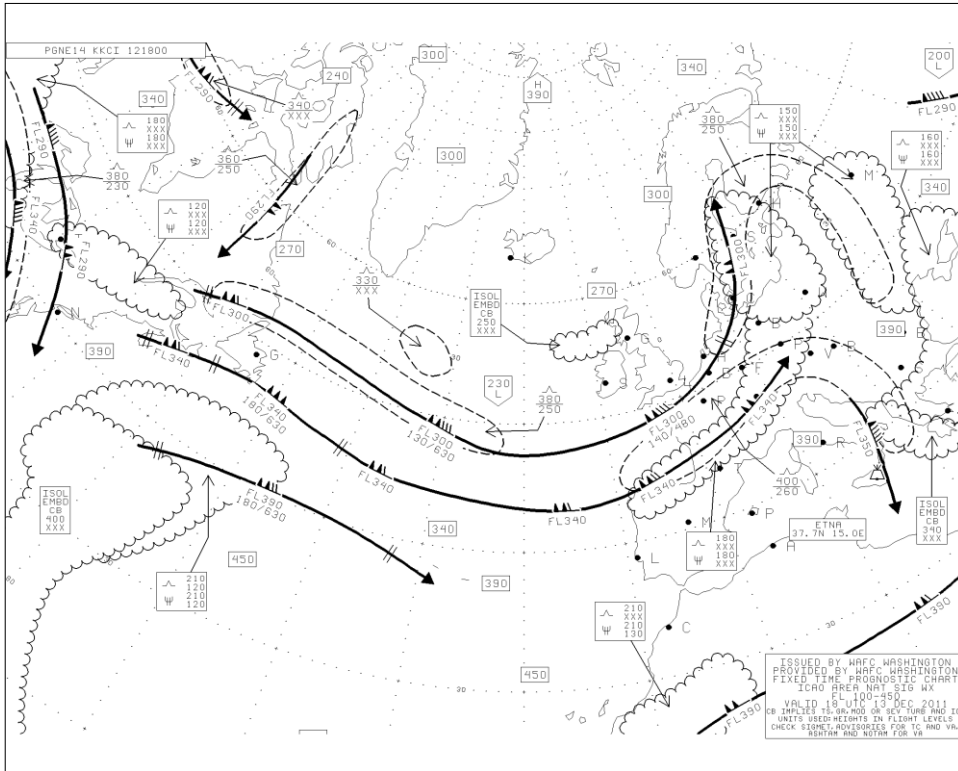**ICAO AREA J — SOUTH POLAR**
(CHART AHL: PGJE05 KKCI)
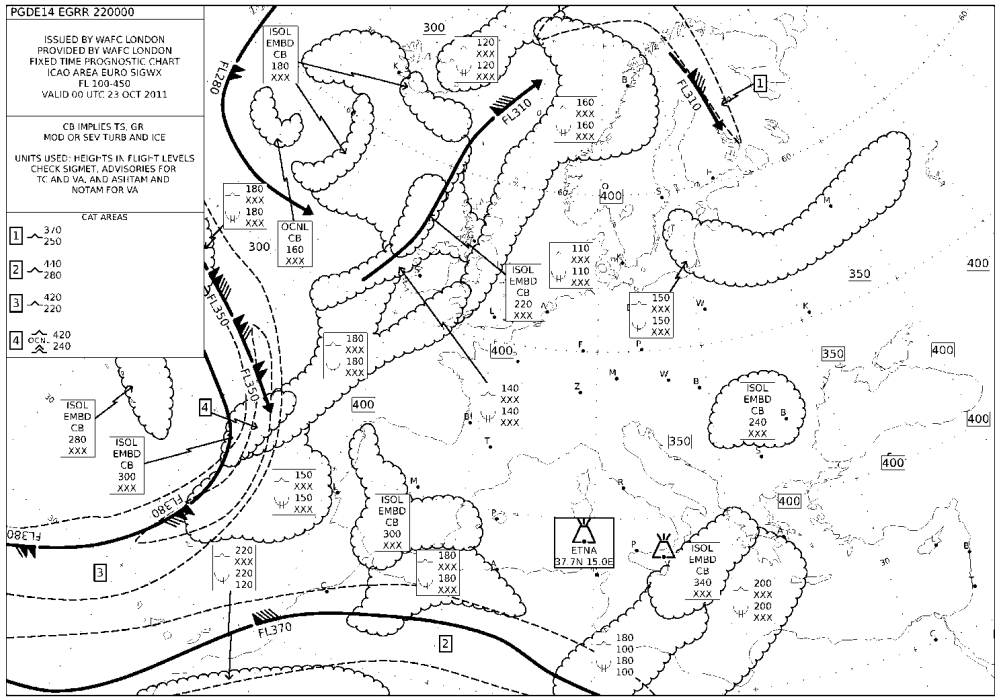
ICAO REGION K — SIO
(CHART AHL: PGKE05 EGRR)

ICAO AREA M — NORTH PACIFIC
(CHART AHL: PGDE29 KKCI)

ICAO AREA NAT (SWM)
(CHART AHL: PGNE14 KKCI)

ICAO AREA EURO
(CHART AHL: PGDE14 EGRR)

ICAO AREA MID (SWM)
(CHART AHL: PGCE14 EGRR)
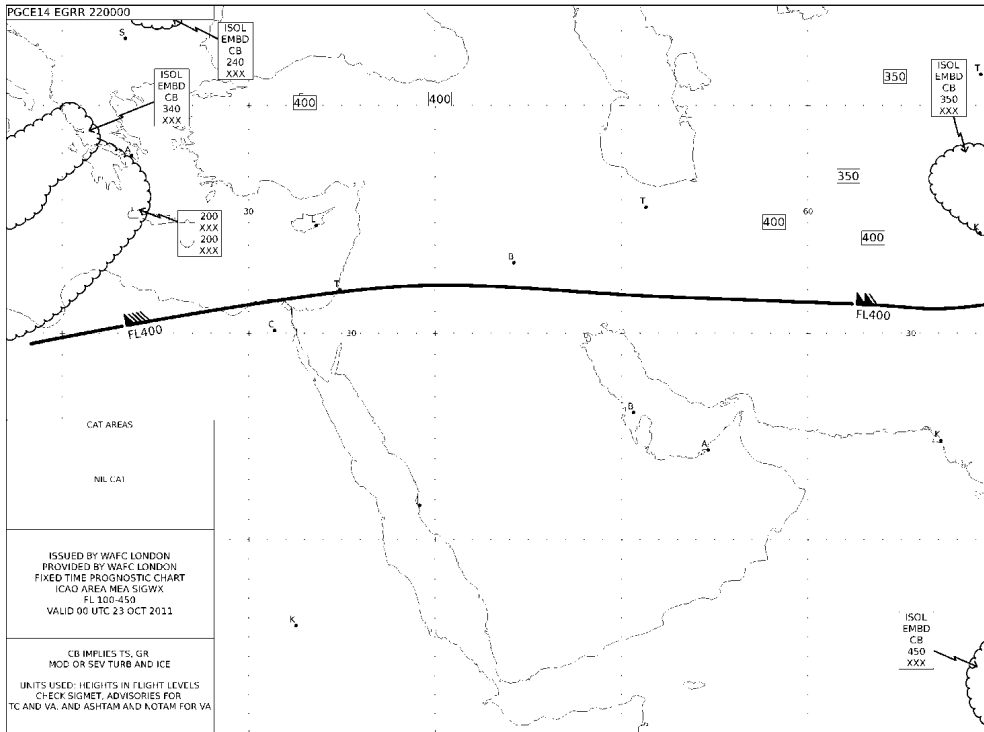
ICAO AREA ASIA SOUTH
(CHART AHL: PGZE14 EGRR)
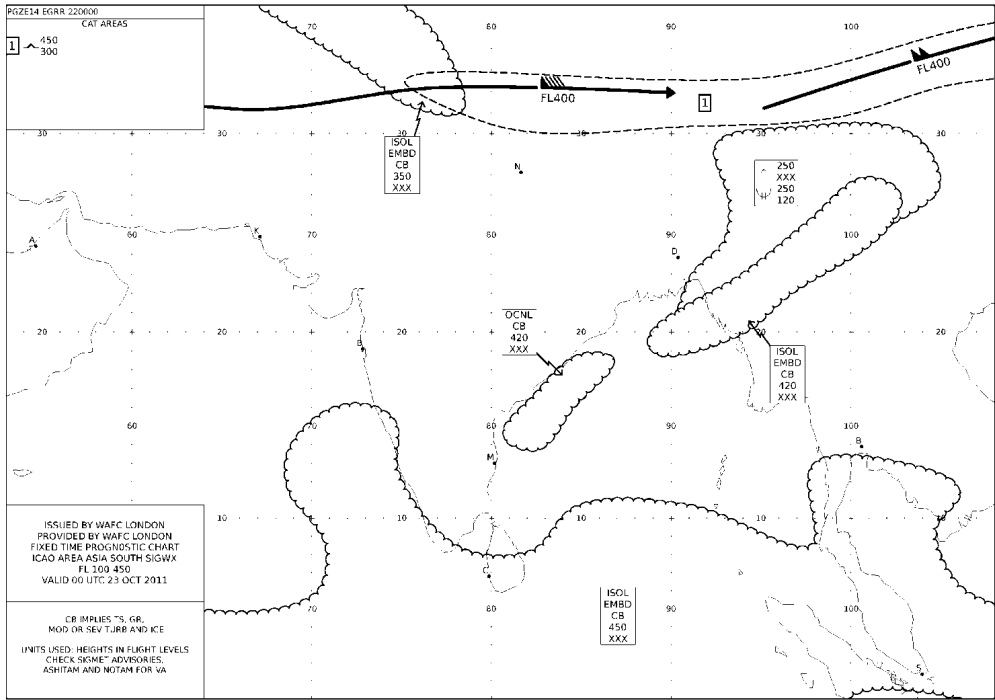
Annex 5

**ADDITIONAL AERONAUTICAL METEOROLOGICAL INFORMATION
(BEYOND THAT DESCRIBED IN SUG ANNEXES 1 AND 4)
AVAILABLE ON SADIS**

~~DOCUMENT CHANGE RECORD~~

~~Date~~	~~Amendment~~
~~15.3.2013~~	~~5-4 and 5-5~~
~~29.05.2014~~	~~Special air-reports; Forecasts in T4 Chart Form~~
~~DD.MM/2015~~	~~Updates to NOUK message definitions; information pertaining to AIS data (VA NOTAM and ASHTAM).~~

INTRODUCTION

This Annex to the *SADIS User Guide* is intended to inform users of additional data ~~distributed~~ o~~made~~ available via the~~n~~ SADIS that is not otherwise identified in SUG Annex 1 (METAR/SPECI/TAF to be distributed over SADIS) or in SUG Annex 4 (WAFS forecast products distributed over SADIS).

1.   ADDITIONAL OPMET INFORMATION IN ALPHANUMERIC CODE FORM

a) SIGMET

All SIGMET bulletins that are routed to the SADIS Gateway (in accordance with Annex 3 — *Meteorological Service for International Air Navigation*, Appendix 6, 1.2.2) will be distributed on SADIS, subject to that data meeting minimum standards of conformity with Annex 3 (Template A2-1).

WMO headers ($T_1T_2A_1A_2$ii CCCC)

WS//// ////   All SIGMETs other than for tropical cyclones and volcanic ash

WC//// ////   All tropical cyclone SIGMETs

WV//// ////   All volcanic ash SIGMETs

   Where "/" represents any character at the appropriate position (wildcard routing).

b) AIRMET

In accordance with SADISOPSG Conclusion 7/8, AIRMETs from those ICAO Regions which have expressed an aeronautical requirement for them in the ANPs will be distributed on SADIS.

c) GAMET

In accordance with SADISOPSG Conclusion 7/8, GAMETs from those ICAO Regions which have expressed an aeronautical requirement for them in the ANPs will be distributed on SADIS.

d) Special air-report

WMO headers $(T_1T_2A_1A_2ii\ CCCC)$

```
UA//6/ ////          UAIE61 EIDB          UARM31 LUKK
UA//7/ ////          UAIE71 EIDB          UARM41 LUKK
UABX61 EBBR          UAIS60 LLBG          UARM61 LUKK
UABX71 EBBR          UAIS70 LLBG          UARM71 LUKK
UACY60 LCLK          UALJ61 LJLJ          UARO60 LROM
UACY70 LCLK          UALJ71 LJLJ          UARO70 LROM
UACZ61 LKPW          UALT60 EYVI          UASN61 ESWI
UACZ71 LKPW          UALT70 EYVI          UASN62 ESWI
UADL61 EDZO          UALV60 EVRA          UASN71 ESWI
UADL71 EDZO          UALV70 EVRA          UASN72 ESWI
UADN61 EKCH          UANO61 ENMI          UASQ60 LZIB
UADN71 EKCH          UANO62 ENMI          UASQ70 LZIB
UAEO60 EETN          UANO64 ENMI          UAUK60 EGRR
UAEO70 EETN          UANO65 ENMI          UAUK70 EGRR
UAEW60 LPMG          UANO66 ENMI          UAUR61 UKBV
UAEW70 LPMG          UANO71 ENMI          UAUR62 UKLV
UAFI61 EFHK          UANO72 ENMI          UAUR63 UKOV
UAFI71 EFHK          UANO74 ENMI          UAUR64 UKFV
UAFR61 LFPW          UANO75 ENMI          UAUR65 UKDV
UAFR62 LFPW          UANO76 ENMI          UAUR71 UKBV
UAFR63 LFPW          UANT60 EGRR          UAUR72 UKLV
UAFR64 LFPW          UANT70 EGRR          UAUR73 UKOV
UAFR65 LFPW          UAOS61 LOWW          UAUR74 UKFV
UAFR71 LFPW          UAOS71 LOWW          UAUR75 UKDV
UAFR72 LFPW          UAPL60 EPWA          UAYG61 LYBM
UAFR73 LFPW          UAPL70 EPWA          UAYG71 LYBM
UAFR74 LFPW          UARH60 LDZM
UAFR75 LFPW          UARH70 LDZM
```

Where "/" represents any character at the appropriate position (wildcard routing).

e)   Volcanic ash advisory

Routing is in place to distribute the following volcanic ash advisory bulletins on SADIS, on receipt at the SADIS Gateway:

WMO headers ($T_1T_2A_1A_2ii$ CCCC)	**Originating VAAC**
FVAK(21-25) PAWU	Anchorage VAAC
FVAG(01-05) SABM	Buenos Aires VAAC
FVAU(01-10) ADRM	Darwin VAAC
FVXX(01-03,05) EGRR	London VAAC
FVCN(01-04) CWAO	Montreal VAAC
FVFE01 RJTD	Tokyo VAAC
FVXX(01-04) LFPW	Toulouse VAAC
FVXX(20-27) KNES	Washington VAAC
FVPS(01-05) NLKL	Wellington VAAC

f)   Tropical cyclone advisory

All tropical cyclone advisory bulletins that are routed to the SADIS will be distributed on SADIS.

WMO headers ($T_1T_2A_1A_2ii$ CCCC)

FK//// ////   All tropical cyclone advisories

Where "/" represents any character at the appropriate position (wildcard routing).

For reference, the following list identifies the source of tropical cyclone advisories:

WMO headers ($T_1T_2A_1A_2ii$ CCCC)	**Originating TCAC**
FKAU(01-06) ADRM	TCAC Darwin
FKIN(20-21) VIDP	TCAC New Delhi
FKIO20 FMEE	TCAC La Réunion
FKNT(21-25) KNHC	TCAC Miami
FKPZ(21-25) KNHC	TCAC Miami
FKPA(21-25 PHFO	TCAC Honolulu
FKPQ(30-33) RJTD	TCAC Tokyo
FKPS01 NFFN	TCAC Nadi

2.   FORECASTS IN PNG CHART FORM

a)   Volcanic ash advisory in graphical format (VAG)

Routing is in place to distribute the following VAG in PNG format on SADIS:

WMO headers ($T_1T_2A_1A_2$ii CCCC)	**Originating VAAC**
PFXD(21-25) PAWU	Anchorage VAAC
PFXD(01-05) SABM	Buenos Aires VAAC
PFXD(01-10) ADRM	Darwin VAAC
PFXD(01-03,05) EGRR	London VAAC
PFXD(01-04) CWAO	Montreal VAAC
PFXD01 RJTD	Tokyo VAAC
PFXD(01-04) LFPW	Toulouse VAAC
PFXD(20-27) KNES	Washington VAAC
PFXD(01-05) NZKL	Wellington VAAC

   Note.— These products are only ~~broadcast~~ available on SADIS_FTP when they are ~~made available~~forwarded to the WAFC London messages switch by the VAAC concerned. All nine VAACs now provide volcanic ash advisories in graphical format for distribution via SADIS as necessary.

b)   Tropical cyclone advisory in graphical format (TCG)

Routing is in place to distribute the following TCG in portable PNG format on SADIS:

WMO headers ($T_1T_2A_1A_2$ii CCCC)	**Originating TCAC**
PZXD(01-05) FMEE	TCAC La Réunion

   Note.— These products are only ~~broadcast~~ available on SADIS_FTP when they are ~~made available~~forwarded to the WAFC London messages switch by the TCAC concerned and following notification of the WMO AHL by the originator. Some, but not all, of the seven TCACs provide tropical cyclone advisories in graphical format for distribution via SADIS as necessary.

3. ADMINISTRATIVE MESSAGES

WMO headers (T₁T₂A₁A₂ii CCCC)	Intended use
NOUK10 EGRR	Messages used to advise on model or product delays/difficulties, or service outages. This message is also used to advise of forthcoming product changes that may require actions by users. This is the preferred bulletin header for messages that have an impact on the service itself.
NOUK11 EGRR	For messages that provide useful information to users but do not have an immediate impact on the service. An example would be the notification of SADIS or WAFS documentation updates (with the exception of SADIS User Guide updates, for which a NOUK13 EGRR will be used).
NOUK12 EGRR	This provides a text message directing users how to decode GRIB values. It is mainly used by workstation suppliers.
NOUK13 EGRR	*SADIS User Guide* updates (ICAO can only authorize these messages).
NOUK31 EGGY	NATS advisory messages
NOUK32 EGGY	NATS advisory messages, Automatic SADIS Monitor Messages (see below)
NOUK33 EGGY	NATS advisory messages, Manually generated by SADIS Gateway Operators for data providers and communications centres requesting information on missing data.
NOUK34 EGGY	NATS advisory messages, Manually generated by SADIS Gateway Operators for SADIS users informing them of the nature of a problem
NOBX99 EBBR	DMG METNOs describing changes to bulletins promulgated in the EUR Region.
~~PLUK30 EGRR~~ ~~PLUK31 EGRR~~ ~~PLUK32 EGRR~~ ~~PLUK33 EGRR~~ ~~PLUK34 EGRR~~	~~The PL series have been reserved for any graphical ADMIN messages but users would be alerted and directed from a NOUK10 EGRR message~~

A special "administrative message" is transmitted over SADIS during ISDN backup tests. This bulletin demonstrates that the complete path from the NWSTG is available. It should be ignored by users.

```
NTUS50 KWBC
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3. AERONAUTICAL INFORMATION SERVICES (AIS) DATA RELATED TO VOLCANIC ASH

NOTAMS relating to Volcanic Ash (VA NOTAMs), and ASHTAMs are made available on the SADIS in accordance with 4.3a of Doc 9766 — Handbook on the International Airways Volcano Watch (IAVW) and 5.3.4 of Annex 15 - Aeronautical Information Services.

VA NOTAMs and ASHTAMs are distributed over SADIS using `NWXX01 EGRR` WMO AHLs.

— END —