PRELIMINARY SYSTEM INTERFACE CONTROL DOCUMENT

FOR THE

INTERCONNECTION OF ACC CENTERS OF THE CARSAM REGION
PREFACE

This document defines the external interfaces and messages of the ATC Systems in the countries from the CARSAM Region. It includes those interfaces that are external to the ATC Automation System. It is based on source material obtained from a Survey coordinated by ICAO Office in Lima. This document was prepared for the purpose of registering the current interfaces between the ATC Automation Systems and the external sensors and Centers. This document is subject to change based on continuing review by ICAO Office and the countries members.
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1.0 Scope

The purpose of this document is to provide details of the external interfaces existing in each ATC System installed on countries of the CARSAM Region. The Air Traffic Control Automation System (ATCS) is part of the ACC that is responsible for the FIR control.

1.1 Identification

This document is identified as the System Interface Control Document (SICD) for the ATC Systems in the CAR/SAM region. The following diagram shows the hierarchical structure of the documents and identifies the relative position of this document.

![Diagram](image)

**Figure 1.1-1 Document hierarchy**

1.2 System Overview

The Interconnection Plan is a strategy to interconnect the ATC System in the CAR/SAM Region involving analysis of the infrastructure to provide the better flight coordination and flow control between adjacent control centers, promoting improvements in safety as well.

ATC Systems are composed of a great quantity of sensors and flight plan interfaces connected to Data Processing Servers by a telecommunications network (REDDIG). These data-processing centers are known variously as Data Treatment and Visualization centers (STVs) which include necessary local telecommunications equipments.

Various sensors provide the data concerned to the Air Traffic and meteorological information. The supporting subsystems include:
- Primary and secondary air traffic control radars,
- Weather radars,
- Air navigation aids,
- Radio and telephone communications.
These sensors collect data that are transmitted through one integrated telecommunications network to the STVs. A local network of computer workstations provides the necessary ambient for the processing, exploitation and analysis of collected data; the development and use of application software and program development tools; the management and use of databases from varied sources and for the training of system users.

![System Architecture Diagram](image-url)

**Figure 1.2-1 System Architecture**
<table>
<thead>
<tr>
<th>SEGMENT</th>
<th>DESIGNATOR</th>
<th>SUBSYSTEM NAME</th>
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<tr>
<td>Air Traffic Control</td>
<td>ATC System</td>
<td></td>
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<tr>
<td></td>
<td>RDP System</td>
<td>Radar Data Processor</td>
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<tr>
<td></td>
<td>FDP</td>
<td>Flight Data Processor</td>
</tr>
<tr>
<td></td>
<td>AIS</td>
<td>Aeronautical Information System</td>
</tr>
<tr>
<td></td>
<td>AFTN</td>
<td>Aeronautical Fixed Telecommunication Network</td>
</tr>
<tr>
<td></td>
<td>AMHS</td>
<td>Aeronautical Message Handling System</td>
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</table>

Table 1.2-1 ATC Systems

1.3 Document Overview

This document defines the external interfaces that connect to the Air Traffic Control Automation System. Messages that are internal to the ATCS should be detailed in the Interface Design Document (IDD) from each System Supplier.

The method of describing each of the external interfaces follows the same pattern. Each subsection addresses one interface. The objective is to identify all the parameters of the interface including the point of connection. This is defined as a point between two areas of responsibility. Each side of the interface will agree on this line of demarcation and the interface definition presented.

2.0 Referenced Documents

The documents listed below form a part of this System Interface Document (SICD) to the extent specified herein.

2.1 ICAO Documents

ICAO Annex 10 Aeronautical Communications


2.2 EUROCONTROL Documents

Ref. 005-1-93 Eurocontrol Standard Document for Radar Data Exchange – All Purpose Structured Eurocontrol Radar Information Exchange (ASTERIX), 31 January 1995


2.3 Other Documents

ISO 3309 Data Communications High-Level Data Link Control (HDLC) Procedures, Frame Structure

WMO Manual on Codes

Publication #306 World Meteorological Organization Manual on Codes
- Vol. I International Codes
- Vol. II National and Regional Codes

G630621 INTERFACE CONTROL DOCUMENT BETWEEN THE SIVAM 3-D TRANSPORTABLE RADAR AND THE AUTOMATION SYSTEM

G535530 INTERFACE CONTROL DOCUMENT BETWEEN THE ASR23SS AND THE AUTOMATION SYSTEM INTERFACE CONTROL DOCUMENT

IC808466/801 FOR THE CONDOR MK2D ASTERIX RADAR DATA OUTPUT SIVAM - FREE-STANDING INSTALLATIONS

E-277-01-2132 SSDD - USER APPLICATION PROFILE (UAP) FOR TRANSMISSION OF MONORADAR TARGET REPORT (ASTERIX CATEGORY 34 & 48) FROM ALENIA

CD2 FPS-117 Specification

TVT2 Inter-facility Radar Message Formats. “Procedure De Transmission TVT2”

C.A.006.13.D.TV.710.AT.T02.DK.001.03 - ESPECIFICAÇÃO DAS INTERFACES EXTERNAS (SICD) – ACC CINDACTA I

Formato de Mensajes Radar ASTERIX con UAPs de Alenia. COCESNA

ESPECIFICACIÓN DEL INTERFACE DE SALIDA DE DATOS EN FORMATO DDE DEL RADAR IRS-20MP/L, Ceselsa, 15/11/95

ESPECIFICACIÓN DEL INTERFACE DE SALIDA DE DATOS EN FORMATO ASTERIX DEL RADAR IRS-20MP/L, Ceselsa, 15/11/95

ESPECIFICACIÓN DEL INTERFAZ SDC-2000/AIRCON2000 INDRA, 25/10/01

3.0 External Interfaces

Each external interface is identified and listed in Table 3.0-1 below. Where multiple instances of the same interface type occurs, they are indicated in the list by the letter ‘M’. Interfaces used with ATC Automation Systems are usually duplicated to provide increased availability, especially, where telecommunications channels used are maintained by a third party. Dual data links provide identical information simultaneously, when fully operational. These links are indicated in the list by the letter ‘D’.

<table>
<thead>
<tr>
<th>Number</th>
<th>Name of External Interface</th>
<th>Dual Links/Multiple Occurrence</th>
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<td>R001, R005, R011</td>
<td>3D PSR/MSSR</td>
<td>D, M</td>
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<tr>
<td>R002-R004, R006-R010, R012-R016</td>
<td>2D PSR/MSSR</td>
<td>D, M</td>
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<td>R017-R024</td>
<td>MSSR</td>
<td>D, M</td>
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<td>R025-R027</td>
<td>ATCS to ATCS (for Radar Track Updates)</td>
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<td>ATCS to ATCS (for Flight Plan Data)</td>
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<td>033</td>
<td>RCMS</td>
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<td>032</td>
<td>AFTN Server (to/from FDPS)</td>
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<td>T035</td>
<td>Time Server to ATCS (for Time Synchronization)</td>
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Table 3.0-1 List of External Interfaces

The following tables indicate the allocation of the various interfaces to the ATC Operational Centers. All ATCs have direct access to the international AFTN network via the AFTN Server, and hence links to all other AFTN Subscribers.
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✓* - Not installed yet

Table 3.0-2 Radar Types Allocation Table

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<th>Surveillance Interface to Adjacent Centers</th>
<th>Interface ID</th>
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<td>Inter-CINDACTA</td>
<td>IR026</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDRA Interface</td>
<td>IR027</td>
<td>√**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓* - With minor software changes used in the Essay Brazil-Venezuela
✓**- As verified in the SSS, but this requirement was not tested yet

Table 3.0-3 Radar Interface to Adjacent Centers Allocation Table
### Flight Plan Interface with Adjacent Centers

<table>
<thead>
<tr>
<th>Flight Plan Interface</th>
<th>Interface ID</th>
<th>Argentina</th>
<th>Brazil</th>
<th>Chile</th>
<th>COCESNA</th>
<th>Colombia</th>
<th>Ecuador</th>
<th>Panamá</th>
<th>Peru</th>
<th>Uruguay</th>
<th>Venezuela</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICAO 4444 &amp; Hand-off Coordination</td>
<td>IF028</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IF032</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓*</td>
</tr>
<tr>
<td>ICAO 4444 without Hand-off Coordination</td>
<td>IF029</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLDI</td>
<td>IF030</td>
<td>✓*</td>
<td>✓**</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIDC</td>
<td>IF031</td>
<td>✓***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- ✓ - Not configured
- ✓** - Only for APP and ACC interconnection
- ✓*** - To be implemented

Table 3.0-4  Flight Plan Interface with Adjacent Centers

<table>
<thead>
<tr>
<th>ATCS Automation System Supplier</th>
<th>Version</th>
<th>Argentina</th>
<th>Brazil</th>
<th>Chile</th>
<th>COCESNA</th>
<th>Colombia</th>
<th>Ecuador</th>
<th>Panamá</th>
<th>Peru</th>
<th>Uruguay</th>
<th>Venezuela</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATECH</td>
<td>X-4000</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ATECH/RAYTHEON</td>
<td>SCO</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THOMSON</td>
<td>MITRA</td>
<td>✓*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THALES</td>
<td>EUROCAT1000</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDRA</td>
<td>AIRCON2000</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDRA</td>
<td>AIRCON2010</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDRA</td>
<td>AIRCON2100</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALENIA/MARCONI</td>
<td>CMS</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NORTHROP GRUMMAN</td>
<td>AMS2000</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

- ✓* - To be changed to ATECH X-4000 this year

Table 3.0-5  ACC ATCS Automation Systems
3.1 3D-PSR/MSSR TPS-B34 3D Transportable Radar Interface

3.1.1 General

The 3D-PSR/MSSR sensor is a transportable primary radar (TPS-B34) system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.1.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX messages types
001 Radar target report
002 Radar service message
008 Mono-radar derived weather information
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: G630621 - INTERFACE CONTROL DOCUMENT BETWEEN THE SIVAM 3-D TRANSPORTABLE RADAR AND THE AUTOMATION SYSTEM

3.1.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames. These radar systems are transportable and may be relocated to meet the needs for required radar coverage. In addition, the host radar (PSR) can operate in either of two turning modes (rpm of antenna) which needs a separate re-configuration for each radar (PSR and MSSR).
3.1.4 Typical Interface Connection for HDLC

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

![Diagram of interface connection point](image)

- **FROM**
  - RADAR
  - RS 232 Cable

- **TO**
  - ATCS
  - RDU Splitter

<table>
<thead>
<tr>
<th>SATCOM Equipment</th>
<th>ATC Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector 25 pin ‘D’ type (F) DCE</td>
<td>Connector 25 pin ‘D’ type (F) DTE</td>
</tr>
<tr>
<td>Pin Configuration</td>
<td>Pin Configuration</td>
</tr>
<tr>
<td>1  Protective Ground (Frame)</td>
<td>1  Protective Ground (Frame)</td>
</tr>
<tr>
<td>3  Receive data</td>
<td>3  Receive data</td>
</tr>
<tr>
<td>7  Signal Ground (Common Return)</td>
<td>7  Signal Ground (Common Return)</td>
</tr>
<tr>
<td>17 Receive Clock</td>
<td>17 Receive Clock</td>
</tr>
</tbody>
</table>

3.1.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.1.5-1 HDLC Frame Structure

3.2 PSR/SSR LP23M + RSM870 Thomson Interface

3.2.1 General

The PSR/SSR sensor is a co-mounted primary (LP 23M) and secondary radar system with plot extraction facilities and remote control and monitoring capability. These radar sites are existing radar facilities. Each site provides radar track data in a standard format to the ATCS. Information provided by the radar supports ATC Operations. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.
3.2.2 Interface Definition

Type: Serial – binary-synchronous
Description: Simplex (TVT2)
Data Type: Radar data
Format: PR 800
Message Definition: TVT2 messages types – Ref. ‘Procedure de Transmission TVT2’
Message ‘Status’ (Sector Message)
Message ‘Piste’ (Track Report)
Message ‘Correspondance Horloge’ (North Mark)
Message ‘Suppression Piste’ (Track Drop)
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Units
Reference: SICD ACC-BS

3.2.3 Special Features

These radars use a common format (TVT2) for data transmission between the radar site and the existing ATC centers.

3.2.4 Typical Interface Connection for BI-SYNC Protocol

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.
3.2.5 Interface Connection

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>SYN</th>
<th>SYN</th>
<th>SOH</th>
<th>HEADER</th>
<th>STX</th>
<th>TEXT</th>
<th>ETX/ETB</th>
<th>BCC</th>
</tr>
</thead>
</table>

Table 3.2.5-1 Binary Synchronous Frame Structure

3.3 PSR/MSSR ASR-9 Interface

3.3.1 General

The PSR/MSSR sensor is a co-mounted dual primary (ASR 9) and dual secondary MMSSR radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track and weather data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.3.2 Interface Definition

Type: Serial - synchronous  
Description: HDLC, Simplex – one way transmission  
Data Type: Radar data  
Format: ASTERIX  
Message Definition: ASTERIX message types  
001 Radar target report  
002 Radar service message  
008 Mono-radar derived weather information  
Data Rate: 9.6 kbps  
Electrical Characteristics: RS 232c V24/V28  
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)  
Reference: TBD

3.3.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communication link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.3.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.
3.3.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAG</td>
<td>ADDRESS</td>
<td>CONTROL</td>
<td>ASTERIX MESSAGE BLOCK</td>
<td>FCS</td>
</tr>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
</tr>
<tr>
<td>01111110</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3.5-1 HDLC Frame Structure

3.4 PSR/SSR LP23M + RSM 970 Thomson Interface

3.4.1 General

The 3D-PSR/MSSR sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.4.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX messages types
034 Radar target report
048 Radar service message
008 Mono-radar derived weather information
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: THALES SICD

3.4.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.4.4 Typical Interface Connection for HDLC

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.
3.4.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.4.5-1 HDLC Frame Structure

3.5 3D-PSR/MSSR TRS2230 + RSM 970 Interface

3.5.1 General

The 3D TRS2230 sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.5.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX messages types
048 Radar target report
034 Radar service message
008 Mono-radar derived weather information

Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference SICD TRS2230 from THALES

3.5.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.5.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.5.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.5.5-1 HDLC Frame Structure

3.6 2D-PSR/MSSR TRACKER 2000 + RSM 970 Interface

3.6.1 General

The 2D PSR sensor is a co-mounted primary (TRACKER 2000) and secondary radar system with plot extraction facilities and remote control and monitoring capability. These radar sites are existing radar facilities. Each site provides radar track data in a standard format to the ATCS. Information provided by the radar supports ATC Operations. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

3.6.2 Interface Definition

Type: Serial – binary-synchronous
Description: Simplex (AIRCAT500)
Data Type: Radar data
Format: PR 800
Message Definition: AIRCAT 500 messages types
Message ‘Status’ (Sector Message)
Message ‘Piste’ (Track Report)
Message ‘Correspondance Horloge’ (North Mark)
Message ‘Suppression Piste’ (Track Drop)

Data Rate: 9.6 kbps
Electrical Characteristics: RS 232
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Units
Reference AIRCAT 500 Specification

3.6.3 Special Features

These radars use a common format (AIRCAT500) for data transmission between the radar site and the existing ATC centers.

3.6.4 Interface Connection

The 3.2.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.6.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

```
SYN SYN SOH HEADER STX TEXT ETX/ETB BCC
```

Table 3.6.5-1 Binary Synchronous Frame Structure

3.7 2D-PSR/MSSR ATCR33M/S + SIR-M(S) Interface

3.7.1 General

The 2D PSR/MSSR sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.7.2 Interface Definition

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial - synchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>HDLC, Simplex – one way transmission</td>
</tr>
<tr>
<td>Data Type</td>
<td>Radar data</td>
</tr>
<tr>
<td>Format</td>
<td>ASTERIX</td>
</tr>
</tbody>
</table>
Message Definition: ASTERIX messages types
001  Radar target report
002  Radar service message
008  Mono-radar derived weather information

Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: TBD

3.7.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.7.4 Interface Connection

The 3.1.4 defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.7.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.7.5-1 HDLC Frame Structure

3.8 ATCR33DPC + SIR-S ALENIA

3.8.1 General

The 2D PSR/MSSR sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.8.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX messages types
048  Radar target report
034  Radar service message
008  Mono-radar derived weather information

Data Rate: 9.6 kbps

Electrical Characteristics: RS 232c V24/V28

Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)

Reference
E-277-01-2132SSDD - USER APPLICATION PROFILE (UAP) FOR TRANSMISSION OF MONORADAR TARGET REPORT (ASTERIX CATEGORY 34 & 48)

3.8.3 Special Features
Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.8.4 Interface Connection
The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.8.5 Interface Protocol
The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.8.5-1 HDLC Frame Structure

3.9 2D PSR + MSSR ATCR22M+ SIR-M

3.9.1 General
The 2D PSR/MSSR sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.9.2 Interface Definition
Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
### 3.9.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

### 3.9.4 Interface Connection

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

### 3.9.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.9.5-1 HDLC Frame Structure

### 3.10 2D PSR SKYTRACKER + IRS20MPL

#### 3.10.1 General

The 2D PSR/MSSR sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

#### 3.10.2 Interface Definition

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial - synchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>HDLC, Simplex – one way transmission</td>
</tr>
<tr>
<td>Data Type</td>
<td>Radar data</td>
</tr>
<tr>
<td>Format</td>
<td>ASTERIX</td>
</tr>
</tbody>
</table>
**Message Definition:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Radar target report</td>
</tr>
<tr>
<td>002</td>
<td>Radar service message</td>
</tr>
<tr>
<td>008</td>
<td>Mono-radar derived weather information</td>
</tr>
</tbody>
</table>

**Data Rate:** 9.6 kbps

**Electrical Characteristics:** RS 232c V24/V28

**Physical Connection:** ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)

**Reference:** TBD

### 3.10.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

### 3.10.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

### 3.10.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th><strong>Table 3.10.5-1 HDLC Frame Structure</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLAG ADDRESS CONTROL ASTERIX MESSAGE BLOCK FCS FLAG</strong></td>
</tr>
<tr>
<td>01111110</td>
</tr>
</tbody>
</table>

### 3.11 3D PSR/MSSR TPS-70

#### 3.11.1 General

The 3D PSR sensor is a co-mounted primary (TPS-70) and secondary radar system with plot extraction facilities and remote control and monitoring capability. These radar sites are existing radar facilities. Each site provides radar track data in a standard format to the ATCS. Information provided by the radar supports ATC Operations. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

#### 3.11.2 Interface Definition

| **Type:** | Serial – binary-synchronous |
| **Description:** | Simplex |
| **Data Type:** | Radar data |
| **Format:** | BiSYNC |
| **Message Definition:** | CD-2 messages types |
| **Data Rate:** | 9.6 kbps |
3.11.3 Special Features

These radars use a common format (CD2) for data transmission between the radar site and the existing ATC centers. CD2 stands for Common Digitizer Protocol - enables the transmission and reception of synchronous radar data.

3.11.4 Interface Connection

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.11.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

| SYN | SYN | SOH | HEADER | STX | TEXT | ETX/ETB | BCC |

Table 3.11.5-1 Binary Synchronous Frame Structure

3.12 2D SSR STAR2000 + RSM 970

3.12.1 General

The 2D PSR STAR2000 sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.12.2 Interface Definition

| Type: Serial - synchronous |
| Description: HDLC, Simplex – one way transmission |
| Data Type: Radar data |
| Format: ASTERIX |
| Message Definition: ASTERIX messages types |
| 001 Radar target report |
| 002 Radar service message |
| 008 Mono-radar derived weather information |
| Data Rate: 9.6 kbps |
| Electrical Characteristics: RS 232c V24/V28 |
| Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU) |
| Reference: SICD STAR2000 from THALES |
3.12.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.12.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.12.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.12.5-1 HDLC Frame Structure

3.13 2D TA-10 + RSM 970

3.13.1 General

The 2D PSR TA-10 sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.13.2 Interface Definition

| Type:                | Serial - synchronous |
| Description:        | HDLC, Simplex – one way transmission |
| Data Type:          | Radar data |
| Format:             | ASTERIX |
| Message Definition: | ASTERIX messages types |
|                     | 001  Radar target report |
|                     | 002  Radar service message |
|                     | 008  Mono-radar derived weather information |
| Data Rate:          | 9.6 kbps |
| Electrical Characteristics: | RS 232c V24/V28 |
| Physical Connection: | ‘D’ type 25 pin at input to Radar Distribution Unit (RDU) |
| Reference:          | SICD TA-10 from THALES |
3.13.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.13.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.13.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.13.5-1 HDLC Frame Structure

3.14 2D TA-10 + RSM 770

3.14.1 General

The 2D PSR TA-10 sensor is a primary radar system with a co-mounted secondary radar. Each system contains plot extraction facilities and remote control and monitoring capability. Each radar site provides radar plot and track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site and does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communication between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.14.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX messages types
001 Radar target report
002 Radar service message
008 Mono-radar derived weather information
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: SICD TA-10 from THALES
3.14.3 Special Features

Radar data links are organized as Simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.14.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.14.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.14.5-1 HDLC Frame Structure

3.15 2D PSR ASR23SS + MSSR

3.15.1 General

The PSR/MSSR sensor is a co-mounted dual primary (ASR 23 SS/16) and dual secondary (Condor Mk 2) radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track and weather data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.15.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
008 Mono-radar derived weather information
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: G535530 - INTERFACE CONTROL DOCUMENT BETWEEN THE ASR23SS AND THE AUTOMATION SYSTEM
3.15.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.15.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.15.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>DATA TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAG</td>
<td>01111110</td>
</tr>
<tr>
<td>ADDRESS</td>
<td>8 bits</td>
</tr>
<tr>
<td>CONTROL</td>
<td>8 bits</td>
</tr>
<tr>
<td>ASTERIX MESSAGE</td>
<td>Variable length (bytes)</td>
</tr>
<tr>
<td>BLOCK</td>
<td>16 bits</td>
</tr>
<tr>
<td>FCS</td>
<td>16 bits</td>
</tr>
<tr>
<td>FLAG</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.15.5-1 HDLC Frame Structure

3.16 ASR12SS + MSSR

3.16.1 General

The 2D PSR sensor is a co-mounted primary and secondary radar system with plot extraction facilities and remote control and monitoring capability. These radar sites are existing radar facilities. Each site provides radar track data in a standard format to the ATCS. Information provided by the radar supports ATC Operations. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

3.16.2 Interface Definition

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Serial – binary-synchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION</td>
<td>Simplex</td>
</tr>
<tr>
<td>DATA TYPE</td>
<td>Radar data</td>
</tr>
<tr>
<td>FORMAT</td>
<td>BiSYNC</td>
</tr>
<tr>
<td>MESSAGE DEFINITION</td>
<td>CD-2 messages types</td>
</tr>
<tr>
<td>DATA RATE</td>
<td>9.6 kbps</td>
</tr>
<tr>
<td>ELECTRICAL CHARACTERISTICS</td>
<td>RS 232</td>
</tr>
<tr>
<td>PHYSICAL CONNECTION</td>
<td>‘D’ type 25 pin at input to Radar Distribution Units</td>
</tr>
<tr>
<td>REFERENCE</td>
<td>CD2 (FPS-117) Specification</td>
</tr>
</tbody>
</table>

3.16.3 Special Features

These radars use a common format (CD2) for data transmission between the radar site and the existing ATC centers. CD2 stands for Common Digitizer Protocol - enables the transmission and reception of synchronous radar data.
3.16.4 Interface Connection

The 3.2.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.16.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

| SYN | SYN | SOH | HEADER | STX | TEXT | ETX/ETB | BCC |

Table 3.16.5-1 Binary Synchronous Frame Structure

3.17 MSSR RSMA INVAP

3.17.1 General

The MSSR INVAP sensor is dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.17.2 Interface Definition

Type: Serial - synchronous
Description: ASTERIX over TCP/IP, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
  001 Radar target report
  002 Radar service message
Data Rate: 128 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: TBD

3.17.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames. The data is sent to the Center using a TCP/IP Wrapper.
3.17.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.17.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.17.5-1 HDLC Frame Structure

3.18 MSSR CARDION

3.18.1 General

The MSSR CARDION sensor is a dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.18.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: TBD

3.18.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.18.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.18.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.18.5-1 HDLC Frame Structure

3.19 MSSR SIR-7 ALENIA

3.19.1 General

The MSSR sensor is dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.19.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: TBD

3.19.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.19.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.19.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.19.5-1 HDLC Frame Structure

3.20 MSSR SIR-S SELEX

3.20.1 General

The MSSR sensor is dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.20.2 Interface Definition

| Type: | Serial - synchronous |
| Description: | HDLC, Simplex – one way transmission |
| Data Type: | Radar data |
| Format: | ASTERIX |
| Message Definition: | ASTERIX message types 001 Radar target report 002 Radar service message |
| Data Rate: | 9.6 kbps |
| Electrical Characteristics: | RS 232c V24/V28 |
| Physical Connection: | D’ type 25 pin at input to Radar Distribution Unit (RDU) |
| Reference | TBD |

3.20.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.20.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.20.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.20.5-1 HDLC Frame Structure

3.21 MSSR CONDOR MK2D

3.21.1 General

The MSSR sensor is a dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.21.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: IC808466/801 FOR THE CONDOR MK2D ASTERIX RADAR DATA OUTPUT SIVAM - FREE- STANDING INSTALLATIONS

3.21.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.21.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.21.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.21.5-1 HDLC Frame Structure

3.22 MSSR ISIR-M ALENIA

3.22.1 General

The MSSR sensor is a dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.22.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: Mensajes Radar ASTERIX con UAPs de Alenia. COCESNA

3.22.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.22.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.22.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.22.5-1 HDLC Frame Structure

3.23 MSSR IRS-20MP/L INDRA

3.23.1 General

The MSSR sensor is a dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.23.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Simplex – one way transmission
Data Type: Radar data
Format: ASTERIX
Message Definition: ASTERIX message types
001 Radar target report
002 Radar service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: Specification IRS-20MP/L INDRA COCESNA

3.23.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.23.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.23.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.23.5-1 HDLC Frame Structure

3.24 MSSR RSM 970 THALES

3.24.1 General

The MSSR sensor is a dual secondary radar system with plot extraction facilities and remote control and monitoring capability. Each site provides radar plot, track data in a standard format to the ATCS. A remote monitoring and control (M&C) terminal is located at the ATCS site but does not directly connect to the ATCS. Information provided by the radar supports ATC Operations. Communications between the ATCS and the radar site is provided by telephone channels, using satellite links and land-lines.

3.24.2 Interface Definition

- Type: Serial - synchronous
- Description: HDLC, Simplex – one way transmission
- Data Type: Radar data
- Format: ASTERIX
- Message Definition: ASTERIX message types
  - 001 Radar target report
  - 002 Radar service message
- Data Rate: 9.6 kbps
- Electrical Characteristics: RS 232c V24/V28
- Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
- Reference: TBD

3.24.3 Special Features

Radar data links are organized as simplex transmission from Radar to ATCS. The serial data stream is synchronous with the clock provided by the source (radar site). Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.24.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.24.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.24.5-1 HDLC Frame Structure

3.25 AMS (Alenia Marconi Systems ) Interface (Intercenter System Radar Track)

3.25.1 General

This interface allows to send and receive system track data, resulting of the fusion of the information from several PSR/MSSR and MSSR sensors, the coordinate are sent in latitude, longitude. The track is sent with the flight Plan information associated to the track. The cycle update is generated by the center, usually 4, 5 or 10 sec. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

3.25.2 Interface Definition

Type: Serial - synchronous
Description: HDLC, Full-duplex
Data Type: System Track data
Format: ASTERIX
Message Definition: ASTERIX message types
    062 Radar target report
    063 Sensor status service message
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
Reference: EUROCONTROL Surveillance Data Exchange

3.25.3 Special Features

System Track Radar data links are organized as full-duplex transmission from ATCS to an adjacent ATCS. The serial data stream is synchronous with the clock provided by the source ATCS. Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.
3.25.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

3.25.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.25.5-1 HDLC Frame Structure

3.26 Inter-CINDACTA (Intercenter System Radar Track)

3.26.1 General

This interface allows to send and receive system track data, resulting of the fusion of the information from several PSR/MSSR and MSSR sensors, the coordinate are sent in stereographical projection referenced to the Center. The track is sent with the CALLSIGN associated to the track. The cycle update is generated by the center, usually 4, 5 or 10 sec. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

3.26.2 Interface Definition

Type: Serial – binary-synchronous
Description: Full-duplex (TVT2)
Data Type: Radar data
Format: System Radar Data
Message Definition: TVT2 messages types – Ref. ‘Procedure de Transmission TVT2’

- Message ‘Status’ (Sector Message)
- Message ‘Piste’ (Track Report)
- Message ‘Correspondance Horloge’ (North Mark)
- Message ‘Suppression Piste’ (Track Drop)

Data Rate: 9.6 kbps
Electrical Characteristics: RS 232
Physical Connection: ‘D’ type 25 pin at input to Radar Distribution Units
Reference: SICD ACC-BS

3.26.3 Special Features

These interface use a common format (TVT2) for data transmission between the ATCS Site from/to an adjacent ATCS center.
3.26.4 Typical Interface Connection for BI-SYNC Protocol

The following diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.

SATCOM Equipment
Connector 25 pin ‘D’ type (F) DCE
Pin Configuration
1  Protective Ground (Frame)
2  Transmit data
3  Receive data
7  Signal Ground (Common Return)
17 Receive Clock
24 Transmit Clock

ATC Equipment
Connector 25 pin ‘D’ type (F) DTE
Pin Configuration
1  Protective Ground (Frame)
2  Transmit data
3  Receive data
7  Signal Ground (Common Return)
17 Receive Clock
24 Transmit Clock
3.26.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

| SYN | SYN | SOH | HEADER | STX | TEXT | ETX/ETB | BCC |

Table 3.26.5-1 Binary Synchronous Frame Structure

3.27 INDRA Interface (Intercenter System Radar Track)

3.27.1 General

This interface allows to send and receive system track data, resulting of the fusion of the information from several PSR/MSSR and MSSR sensors, the coordinate are sent in latitude, longitude. The track is sent with the flight Plan information associated to the track. The cycle update is generated by the center, usually 4, 5 or 10 sec. Communications is provided between the ATCS and the radar site by telephone channels, using landline and microwave links.

3.27.2 Interface Definition

- **Type:** Serial - synchronous
- **Description:** HDLC, Full-duplex
- **Data Type:** System Track data
- **Format:** ASTERIX
- **Message Definition:**
  - ASTERIX message types
  - 062 Radar target report
  - 063 Sensor status service message
- **Data Rate:** 9.6 kbps
- **Electrical Characteristics:** RS 232c V24/V28
- **Physical Connection:** ‘D’ type 25 pin at input to Radar Distribution Unit (RDU)
- **Reference:** EUROCONTROL Surveillance Data Exchange

3.27.3 Special Features

System Track Radar data links are organized as full-duplex transmission from ATCS to ATCS. The serial data stream is synchronous with the clock provided by the source ATCS. Each physical communications link consists of two signals, data and clock, from the radar site. The HDLC procedure is defined in accordance with ISO 3309 for one way transmission with no acknowledgement of received frames.

3.27.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the radar serial interface. See also Figure 3.1-1 for details of the Radar Distribution Unit.
3.27.5 Interface Protocol

The data provided by the radar site is formatted into an HDLC frame structure as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>ADDRESS</th>
<th>CONTROL</th>
<th>ASTERIX MESSAGE BLOCK</th>
<th>FCS</th>
<th>FLAG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01111110</td>
<td>8 bits</td>
<td>8 bits</td>
<td>Variable length (bytes)</td>
<td>16 bits</td>
<td>01111110</td>
</tr>
</tbody>
</table>

Table 3.27.5-1 HDLC Frame Structure

3.28 Flight Plan interface with Hand-off Coordination ICAO

3.28.1 General

The Aeronautical Fixed Telecommunications Network (AFTN) is a Worldwide network specifically for the transmission of Flight Plans and related information (aeronautical and meteorological) between Airports, ATC Centers, Meteorological centers and Air Traffic Services. The network is essentially a low speed data network designed for use over low-grade telephone lines. Data rates can be as low as 75 baud (telex rates) or may be as high as 9.6 kbps as output from modern Automatic Message Switch System (AMSS). These AMSS usually form a hub at many centers to provide local distribution and also allow direct access to the network. Communications between the ATCS and the AMSS is provided by point-to-point serial digital links. The AMSS is also referred to as a AFTN Server in this document.

3.28.2 Interface Definition

Type: Serial - asynchronous
Description: FULL DUBLEX
Data Type: AFTN messages
Format: ICAO
Message Identity: FPL, CHG, CNL, DLA, DEP, CPL, EST, ARR, including also CDN, LAM and ACP for Hand-off
Message Definition: Refer to ICAO Annex 10 and Doc 4444
Data Rate: 2.4 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to Flight Data Processors
Reference: ICAO Doc 4444

3.28.3 Special Features

A line-sharing unit is employed at the input to the FDPs to allow for un-interrupted connection should one of the FDPs fail and a switch over occurs.
3.28.4 Interface Connection

The following diagram defines the interface connection point for the AFTN serial interface. See also Figure 3.1-4 for details of the connection to the FDP processors.

![Diagram of AFTN and ATCS connection]

| Connector 25 pin ‘D’ type (F) DCE | ATC Equipment  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin Configuration</td>
<td>Pin Configuration</td>
</tr>
<tr>
<td>1 Protective Ground (Frame)</td>
<td>1 Protective Ground (Frame)</td>
</tr>
<tr>
<td>2 Transmit data</td>
<td>2 Transmit data</td>
</tr>
<tr>
<td>3 Receive data</td>
<td>3 Receive data</td>
</tr>
<tr>
<td>4 Request to Send</td>
<td>4 Request to Send</td>
</tr>
<tr>
<td>5 Clear to Send</td>
<td>5 Clear to Send</td>
</tr>
<tr>
<td>7 Signal Ground (Common Return)</td>
<td>7 Signal Ground (Common Return)</td>
</tr>
</tbody>
</table>
3.29 Flight Plan interface without Hand-off Coordination ICAO

3.29.1 General

The Aeronautical Fixed Telecommunications Network (AFTN) is a Worldwide network specifically for the transmission of Flight Plans and related information (aeronautical and meteorological) between Airports, ATC Centers, Meteorological centers and Air Traffic Services. The network is essentially a low speed data network designed for use over low-grade telephone lines. Data rates can be as low as 75 baud (telex rates) or may be as high as 9.6 kbps as output from modern Automatic Message Switch System (AMSS). These AMSS usually form a hub at many centers to provide local distribution and also allow direct access to the network. Communications between the ATCS and the AMSS is provided by point-to-point serial digital links. The AMSS is also referred to as a AFTN Server in this document.

3.29.2 Interface Definition

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial - asynchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>FULL DUPLEX</td>
</tr>
<tr>
<td>Data Type:</td>
<td>AFTN messages</td>
</tr>
<tr>
<td>Format:</td>
<td>ICAO</td>
</tr>
<tr>
<td>Message Identity:</td>
<td>FPL, CHG, CNL, DLA, DEP, CPL, EST, ARR</td>
</tr>
<tr>
<td>Message Definition:</td>
<td>Refer to ICAO Annex 10 and Doc 4444</td>
</tr>
<tr>
<td>Data Rate:</td>
<td>2.4 kbps</td>
</tr>
<tr>
<td>Electrical Characteristics:</td>
<td>RS 232c V24/V28</td>
</tr>
<tr>
<td>Physical Connection:</td>
<td>‘D’ type 25 pin at input to Flight Data Processors</td>
</tr>
<tr>
<td>Reference:</td>
<td>ICAO Doc 4444</td>
</tr>
</tbody>
</table>

3.29.3 Special Features

A line-sharing unit is employed at the input to the FDPs to allow for un-interrupted connection should one of the FDPs fail and a switch over occurs.

3.29.4 Interface Connection

The 3.26.4 diagram defines the interface connection point for the AFTN serial interface. See also Figure 3.1-4 for details of the connection to the FDP processors.

3.30 OLDI Interface

3.30.1 General

This interface is used to coordinate Flight Plans (Hand-Off) between Adjacent ATC Centers. This protocol is used for Entry Coordination and Exit Coordination, using a specific set of messages to transfer a flight Plan from/to a Adjacent Center, with specific signalization on the Human-Machine Interface to the Controller.
3.30.2 Interface Definition

- **Type:** Serial - synchronous
- **Description:** X.25, HDLC, FULL DUPLEX
- **Data Type:** Flight Plan Coordination
- **Format:** OLDI
- **Message Identity:** ABI, ACT, REV, PAC, MAC e LAM
- **Message Definition:** Refer to OLDI EUROCONTROL doc
- **Data Rate:** 9.6 kbps
- **Electrical Characteristics:** RS 232c V24/V28
- **Physical Connection:** ‘D’ type 25 pin at input to Flight Data Processors
- **Reference:** Estándar de Eurocontrol de intercambio de datos en línea (OLDI, On-Line Interchange) Eurocontrol Edición 2.3 diciembre de 2001

3.30.3 Special Features

A line-sharing unit is employed at the input to the FDPs to allow for un-interrupted connection should one of the FDPs fail and a switch over occurs.

3.30.4 Interface Connection

The 3.1.4 diagram defines the interface connection point for the OLDI serial interface.

3.30.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>SYN</th>
<th>SYN</th>
<th>SOH</th>
<th>HEADER</th>
<th>STX</th>
<th>TEXT</th>
<th>ETX/ETB</th>
<th>BCC</th>
</tr>
</thead>
</table>

Table 3.30.5-1 Binary Synchronous Frame Structure

3.31 AIDC interface

3.31.1 General

This interface is used to coordinate Flight Plans (Hand-Off) between Adjacent ATC Centers. This protocol is used for Entry Coordination and Exit Coordination, using a specific set of messages to transfer a flight Plan from/to a Adjacent Center, with specific signalization on the Human-Machine Interface to the Controller.

3.31.2 Interface Definition

- **Type:** Serial - synchronous
- **Description:** X.25, HDLC, FULL DUPLEX (and future ATN)
- **Data Type:** AIDC messages
- **Format:** ICAO
- **Message Identity:** ABI, CPL, EST, PAC, ACP, MAC, LAM, LRM, TOC, AOC
- **Message Definition:** Refer to ICAO Doc
3.31.3 Special Features

A line-sharing unit is employed at the input to the FDPs to allow for un-interrupted connection should one of the FDPs fail and a switch over occurs.

3.31.4 Interface Connection

The 3.26.4 diagram defines the interface connection point for the HDLC (X.25) serial interface. See also Figure 3.1-4 for details of the connection to the FDP processors.

3.31.5 Interface Protocol

The data provided by the radar site is formatted into a BISYNC data block as shown below. Order of transmission is LSB sent first.

```
| SYN | SYN | SOH | HEADER | STX | TEXT | ETX/ETB | BCC |
```

Table 3.31.5-1 Binary Synchronous Frame Structure

3.32 ATCS to ATCS (CINDACTA) Interface Flight Plan Data Message

3.32.1 General

Flight plan data will be exchanged between the ATCS and adjacent ATCS (CINDACTA). The primary communication path for this exchange is via the digital comms infrastructure. Digital comms nodes are available at the major sites and are interconnected using digital data links. The links are supported by landline, microwave or satellite links. The information that is provided by these links supports ATC Operations. The communication path between the SCO and a CINDACTA is a point to point data circuit.

3.32.2 Interface Definition

```
Type: Serial – binary-synchronous
Description: FULL DUPLEX (TVT2)
Data Type: Flight Plan Data
Format: ICAO in TVT2 wrapper
Message Identity: CDN, LAM, ACP
Message Definition: Refer to Doc 4444
Data Rate: 9.6 kbps
Electrical Characteristics: RS 232c V24/V28
Physical Connection: ‘D’ type 25 pin at input to FDPS
Reference SICD ACC-BS
```
3.32.3 Special Features

The Line Sharing Units allow connection between the active Flight Plan Data Processor of the ATCS and the equivalent units in the adjacent CINDACTA. The active FDP will exchange messages for flights in a defined region on each side of the FIR boundary, controlled by the respective ATC centers. Messages will be received and transmitted using NOS to implement the network communications function.

3.32.4 Interface Connections

The following diagram defines the interface connection point for the SCO to CINDACTA serial interface. See also Figure 3.1-4 for details of the connection to the FDP processors.

![Diagram](image)

### Pin Configuration

**COMM PANEL**
- Connector 25 pin ‘D’ type (F) DCE
- Pin Configuration:
  - 1: Protective Ground (Frame)
  - 2: Transmit data
  - 3: Receive data
  - 7: Signal Ground (Common Return)
  - 17: Receive Clock
  - 24: Transmit Clock

**ATC Equipment**
- Connector 25 pin ‘D’ type (F) DTE
- Pin Configuration:
  - 1: Protective Ground (Frame)
  - 2: Transmit data
  - 3: Receive data
  - 7: Signal Ground (Common Return)
  - 17: Receive Clock
  - 24: Transmit Clock

3.32.5 Interface Protocol

The data provided by the SCO is formatted into a BISYNC data block as shown in below. Order of transmission is LSB sent first.

<table>
<thead>
<tr>
<th>SYN</th>
<th>SYN</th>
<th>SOH</th>
<th>HEADER</th>
<th>STX</th>
<th>TEXT</th>
<th>ETX/ETB</th>
<th>BCC</th>
</tr>
</thead>
</table>

Table 3.32.5-1 Binary Synchronous Frame Structure
3.33 RCMS (Radar Sensors) Interface

3.33.1 General

For each of the PSR/MSSR sensors, MSSR sensors and the 3-D radars, Remote Control and Monitoring facilities are provided. The Remote monitoring and control (M&C) terminals which can be situated both at the radar head (site) and in the ATCS are used to control (configure) and monitor the status of the radars. The data links used with the remote monitoring and control (M&C) terminals are the same type as used for the radar data except the links are full-duplex in operation. These remote monitoring and control (M&C) terminals which are situated in the ATCS do not directly connect to the ATCS. Communications between the ATCS and the radar site is provided by telephone channels, satellite links and land-lines.

3.33.2 Interface Definition

Part of the Radar system. Refer to the specific Radar ICD such as: G630621, G628715 and IC808136/802

3.33.3 Special Features

One remote terminal will be provided for each radar site.

3.34 AFTN AMSS (to/from AIS) Interface

3.34.1 General

The Aeronautical Fixed Telecommunications Network (AFTN) is a Worldwide network specifically for the transmission of Flight Plans and related information (aeronautical and meteorological) between Airports, ATC Centers, Meteorological centers and Air Traffic Services. The network is essentially a low speed data network designed for use over low-grade telephone lines. Data rates can be as low as 75 baud (telex rates) or may be as high as 9.6 kbps as output from modern Automatic Message Switch System (AMSS). These AMSS usually form a hub at many centers to provide local distribution and also allow direct access to the network. Communications between the ATCS and the AMSS is provided by point-to-point serial digital links. The AMSS is also referred to as a Text Server in this document.

3.34.2 Interface Definition

<table>
<thead>
<tr>
<th>Type:</th>
<th>Serial - asynchronous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>FULL DUPLEX</td>
</tr>
<tr>
<td>Data Type:</td>
<td>AFTN messages</td>
</tr>
<tr>
<td>Format:</td>
<td>ICAO</td>
</tr>
<tr>
<td>Message Identity:</td>
<td>AFTN Messages</td>
</tr>
<tr>
<td>Message Definition:</td>
<td>Refer to ICAO Annex 10</td>
</tr>
<tr>
<td></td>
<td>Wind Data</td>
</tr>
<tr>
<td></td>
<td>ICAO_Meteorological Data</td>
</tr>
<tr>
<td>Data Rate:</td>
<td>2.4 kbps</td>
</tr>
<tr>
<td>Electrical Characteristics:</td>
<td>RS 232c V24/V28</td>
</tr>
<tr>
<td>Physical Connection:</td>
<td>‘D’ type 25 pin at input to AIS Processors</td>
</tr>
</tbody>
</table>
3.34.3 Special Features

A line sharing unit is employed at the input to the AIS servers to allow for un-interrupted connection should one of the AIS fail and a switch over occurs.

3.34.5 Interface Connection

The following diagram defines the interface connection point for the AFTN serial interface. See also Figure 3.1-4 for details of the connections to the FDP and AIS processors.

![Diagram showing interface connection](image)

Text Server
Connector 25 pin ‘D’ type (F) DTE
Pin Configuration
1 Protective Ground (Frame)
2 Transmit data
3 Receive data
4 Request to Send
5 Clear to Send
7 Signal Ground (Common Return)

ATC Equipment
Connector 25 pin ‘D’ type (F) DTE
Pin Configuration
1 Protective Ground (Frame)
2 Transmit data
3 Receive data
4 Request to Send
5 Clear to Send
7 Signal Ground (Common Return)
3.35  Time Server to ATCS Interface (Time Synchronization Message)

3.35.1 General

The Time server sent Time synchronization Messages to the ATCS dual LAN, using nntp service in the RDP to synchronize all the workstations. This will provide the System Time.

3.35.2 Interface Definition

Type: LAN
Description: Ethernet
Data Type: Time synchronization Message
Format: TCP/IP, Internal LAN Message structure
Message Identity: ATCS TimeSynchronization
Message Definition: LAN Message Time synchronization
Source Mail Box: (TBD)
Source IP Address: (TBD)
Destination Mail Box: (TBD)
Destination IP Address: (TBD)
Data Rate: 100 Mbps
Electrical Characteristics: ISO3309 and ISO7776
Physical Connection: RJ45

3.35.3 Special Features

A time synchronization message will be generated at regular intervals (every 10 seconds) to ensure that the ATCS has the same time, which is synchronized to the GPS Universal Time Coordinated (UTC). The message will be sent to a unique node address in the ATCS using a Mail box number scheme.

3.35.4 Interface Protocol

The data provided by the Time server is formatted into a Message data block. Order of transmission is LSB sent first.
Figure 3.1-1  Typical Radar Data Interface – dual links from each radar (A+B)

Provision for Radar Data Interfaces
Types are:
1. PSR/MSSR
2. MSSR
3. 3D-PSR/MSSR
4. MSSR
Figure 3.1-2 Typical Interface to the AGP for Future ADS Data Reception
Figure 3.1-3 Typical ATCS Configuration

[Diagram showing typical ATCS configuration with labels for RDP 1, FDP 1, AIS 1, CMD 1, ROUTER 1, DUAL ATC LAN, CS 1, CF 1, CA 1, ESD, SDD, FDD, AIS, Images < SCC, CONTROLLER WORKSTATION]
Figure 3.1-4 Interface to ATC Centers and AFTN for Flight data exchange
4.0 Recommended interfaces

The recommend interfaces are:

- Surveillance: as defined in the Item 3.25 – Intercenter ASTERIX Radar Data category 62 and 63.
- Flight Plan: as defined in the item 3.31 – AIDC Messages over ATN.

5.0 Notes

5.1 Glossary

This section contains a list of abbreviation used in this document.

AFTN Aeronautical Fixed Telecommunications Network
AGDLIC Air/Ground Data Link Interface Controller
AIS Aeronautical Information Services
AMS Alenia Marconi Systems
AMSS Automatic Message Switch System
APP Approach Control
ASTERIX All purpose structure Eurocontrol radar information exchange
ATC Air Traffic Control
ATCS Air Traffic Control System
CFE Customer Furnished Equipment
CINDACTA Centro Integrado de Defesa Aerea e Controle de Trafego Aereo
DCE Data Circuit-Terminating Equipment
DTE Data Terminal Equipment
EMA Altitude Weather Station
EMS Surface Meteorological Station
FCS Frame Check Sequence
FDDI Fibre (optic) Distributed Data Interface
FDP Flight Data Processor
FIR Flight Information Region
FP Flight Plan
GPS Global Positioning Satellite
HDLC High-level data link control
HF High Frequency
HTTP Hyper-text Transfer Protocol
ICAO International Civil Aviation Organization
ICD Interface Control Document
IDD Interface Design Document
IRS Interface Requirements Specification
LAB Laboratory
LAN Local Area Network
M&C Monitor and Control
MSSR Monopulse Secondary Surveillance Radar
NOTAM Notice to Airmen
OUE User Organization Equipment
PSR Primary Surveillance Radar
RDP Radar Data Processor
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>RDSS</td>
<td>Radio Determination Sub-system</td>
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<tr>
<td>RDU</td>
<td>Radar Distribution Unit</td>
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<tr>
<td>RES</td>
<td>Raytheon Electronic Systems</td>
</tr>
<tr>
<td>RF</td>
<td>Radio Frequency (normally rf)</td>
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<tr>
<td>RM</td>
<td>Regional Monitoring</td>
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<tr>
<td>RPL</td>
<td>Repetitive Flight Plan</td>
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<tr>
<td>RS</td>
<td>Remote Sensing</td>
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<tr>
<td>SCD</td>
<td>Brazilian low Earth orbiting satellite</td>
</tr>
<tr>
<td>SCO</td>
<td>Operations Sub-center</td>
</tr>
<tr>
<td>SICD</td>
<td>System Interface Control Document</td>
</tr>
<tr>
<td>SIVAM</td>
<td>System for the Vigilance of the Amazon</td>
</tr>
<tr>
<td>STV</td>
<td>Data Treatment and Visualization Center</td>
</tr>
<tr>
<td>TBD</td>
<td>To be determined</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Transmission Control Protocol/Internet Protocol</td>
</tr>
<tr>
<td>TEL</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>TIROS</td>
<td>Television and infra-red observation satellite</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
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<tr>
<td>UTC</td>
<td>Universal Time Coordinated</td>
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<tr>
<td>VCCS</td>
<td>Voice Communications Control System</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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