EUROCONTROL Specification for Surveillance Data Exchange ASTERIX Part 06 Category 018 Mode S Datalink Function Messages

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Abstract
This document specifies the contents of ASTERIX Category 018 messages used for the transmission of Mode S Datalink Function Messages.

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DOCUMENT APPROVAL

This document has been approved by the ASTERIX Maintenance Group (AMG).

For management approval of the complete set of ASTERIX documentation refer to Part 1.

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.2	September 1998	Creation of the document, based on POEMS Document: "Radar Data Exchange, Part 4: Transmission of Mode S Related Data" Doc.ref: SUR.ET1.ST05.2000-STD-04-01	ALL
1.1	December 1998	Changes made as a result of meeting with RSL	ALL
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1.7	November 2015	Layout EUROCONTROL Specification Numbering in I018/001 "DIAG" corrected	All 5.2.2

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1.   SCOPE

1.1   This document describes the message structure for the transmission of Mode S Datalink Function messages between POEMS ground interrogator and GDLP or Local User.

1.2   Datalink Function messages are exchanged using ASTERIX Data Category 018.

2.   REFERENCES

2.1   General

At the time of publication of this POEMS Document, the editions indicated for the referenced documents and standards were valid.

In the case of a conflict between the requirements of this POEMS Document and the contents of the other referenced documents, this POEMS Document shall take precedence for POEMS stations.

2.2   Reference Documents

1.   EUROCONTROL Standard 000-1-92. Directives for the Uniform Drafting and Presentation of EUROCONTROL Standard Documents. 1992.

2.   EUROCONTROL Standard SUR.ET1.ST05.2000-STD-01-01. All Purpose Structured EUROCONTROL Radar Information Exchange - ASTERIX.

3.   EATCHIP GDLP/Local User ICD for POEMS SUR-ET2-ST03.3112-SPC-02-00, Edition 1.7, March 1999

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3.   DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1   Definitions

For the purposes of this POEMS Document, the following definitions shall apply:

3.1.1   **Calculated Item:**   A piece of information (e.g. the position of a target) derived from the raw radar information through an intermediate processing such as transformation of co-ordinates, tracking, code conversion, etc.

3.1.2   **Catalogue of Data Items:**   List of all the possible Data Items of each Data Category describing the Data Items by their reference, structure, size and units (where applicable).

3.1.3   **Data Block:**   Unit of information seen by the application as a discrete entity by its contents. A Data Block contains one or more Record(s) containing data of the same category.

3.1.4   **Data Category:**   Classification of the data in order to permit inter alia an easy identification.

3.1.5   **Data Field:**   Physical implementation for the purpose of communication of a Data Item, it is associated with a unique Field Reference Number and is the smallest unit of transmitted information.

3.1.6   **Data Item:**   The smallest unit of information in each Data Category.

3.1.7   **Measured Item:**   A piece of information (e.g. the position of a target) directly derived from the radar information and transmitted without any intermediate processing.

3.1.8   **Mode S:**   An enhanced mode of secondary surveillance radar (SSR) which permits the interrogation of all SSR equipped aircraft and the addressed interrogation of suitably equipped aircraft and two-way exchange of digital data between such aircraft and the interrogator.

3.1.9   **Record:**   A collection of transmitted Data Fields of the same category preceded by a Field Specification field, signalling the presence/absence of the various Data Fields

3.1.10   **User Application Profile:**   The mechanism for assigning Data Items to Data Fields, and containing all necessary information which needs to be standardised for the successful encoding and decoding of the messages.

3.2 Acronyms and Abbreviations

For the purposes of this POEMS Document the following shall apply:

°	Degree (angle)
ACAS	Airborne Collision Avoidance System
ADLP	Airborne Data Link Processor
AMG	ASTERIX Maintenance Group
ASTERIX	**A**ll Purpose **St**ructured **E**UROCONTROL Su**R**veillance **I**nformation E**x**change
ATC	Air Traffic Control
BDS	Comm-B Data Selector
CAT	Data Category
CC	Cluster Controller
CQF	Coverage Quality Factor
dBm	The dBm is the unit of absolute power related to 1 milliwatt.
DLF	Data Link Function of the Mode-S station
ELM	Extended Length Message
EWPD	EATCHIP Work Programme Document
f	Scaling factor
FL	Flight Level, unit of altitude (expressed in 100's of feet)
FRN	Field Reference Number
FRUIT	False Replies Unsynchronised In Time
FSPEC	Field Specification
FX	Field Extension Indicator
GICB	Ground Initiated Comm B
GDLP	Ground Data Link Processor
ICAO	International Civil Aviation Organization
II	Interrogator Identifier
kt	knot = NM/hour, unit of speed
LEN	Length Indicator
LSB	Least Significant Bit
MA	Message, Comm A
MD	Message, Comm D
MSSR	Monopulse Secondary Surveillance Radar
MTD	Moving Target Detection
MTI	Moving Target Indicator

NM	Nautical Mile, unit of distance (1852 meters)	
PSR	Primary Surveillance Radar	
RA	Resolution Advisory	
RDP	Radar Data Processing (system)	
REP	Field Repetition Indicator	
RFS	Random Field Sequencing (organization of the Data Fields in a Record)	
RS	Random Sequence Indicator	
RSSP	Radar Systems Specialist Panel	
s	second, unit of time	
SAC	System Area Code	
SCN	Surveillance Co-ordination Network	
SGN	Surveillance Ground Network	
SIC	System Identification Code	
SP	Special Purpose Indicator	
SPI	Special Position Identification	
SSR	Secondary Surveillance Radar	
SURT	Surveillance Team (EATCHIP)	
UAP	User Application Profile (see Definitions)	
UTC	Co-ordinated Universal Time	

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4.   GENERAL PRINCIPLES

4.1   General

The Data Link Function (DLF) provides the functionality to support the air/ground data link.The DLF messages shall be exchanged between the Ground Data Link Processor (GDLP) and the DLF and shall be used to:

- manage the GDLP-DLF interface;
- manage the broadcast service;
- manage the GICB service;
- manage SVC/MSP downlink data flow;
- manage SVC/MSP uplink data flow.

The Mode-S sensors shall use the following co-ordinate system for category 18:

- Between the DLF function of the Mode-S sensors and the GDLP/Local User, local polar and Cartesian co-ordinates shall be used. The co-ordinates shall be a direct translation of the measured or coasted position of the track. The time stamp shall represent the time the aircraft has been (measured) or should have been (coasted) on that position.

- The speed will be expressed as groundspeed and heading, the heading will be with respect to geographical north at the position of the aircraft as valid at the moment of the time stamp.

4.1   User Application Profile and Data Blocks

4.2.1 A single User Application Profile (UAP) is defined and shall be used for Data Link Function messages.

4.2.2 Data Blocks containing Data Link Function messages shall have the following layout.

CAT = 018	LEN		Items of the first record		FSPEC	Items of the last record

where:

- Data Category (CAT) = 018, is a one-octet field indicating that the Data Block contains Data Link Function messages;

- Length Indicator (LEN) is a two-octet field indicating the total length in octets of the Data Block, including the CAT and LEN fields;

- FSPEC is the Field Specification.

4.3 Composition of Messages

4.3.1 Messages shall be composed of Data Items assembled in the order defined by the Field Reference Number (FRN) in the associated UAP.

4.3.2 Data Items shall be either compulsory or optional.

4.3.2.1 Compulsory items represent commonly used data required by any application, they shall be implemented;

4.3.2.2 Optional items represent more specific data and their implementation shall be negotiated between users.

4.3.2.3 When Data Items are optional, they shall be either always transmitted or conditionally transmitted. When conditionally transmitted, they shall be present in a Record only if certain conditions are met (e.g. availability of the data).

4.3.2.4 When transmitted, they shall always be in a Record with the corresponding FSPEC bits set to one;

5.   LAYOUT OF DATA LINK FUNCTION MESSAGES

5.1   Standard Data Items

The standardised Data Items which shall be used for the transmission of data link function messages between a GDLP and the DLF are defined in Table 8 and described in the following pages.

Table 8 - Standard Data Items of Category 018

DATA ITEM REF. No.	DESCRIPTION	SYSTEM UNITS
I018/000	Message Type	N.A.
I018/001	Result	N.A.
I018/002	Time of Day	1/128 s
I018/004	II Code	N.A.
I018/005	Mode S Address	N.A.
I018/006	Mode S Address List	N.A.
I018/007	Aircraft Data Link Command	N.A.
I018/008	Aircraft Data Link Status	N.A.
I018/009	Aircraft Data Link Report Request	N.A.
I018/010	Transponder Communications Capability	N.A.
I018/011	Capability Report	N.A.
I018/012	Aircraft Coverage Quality Factor (CQF)	N.A.
I018/013	Aircraft CQF Calculation Method	N.A.
I018/014	Aircraft Position in polar coordinates	RHO: 1/256 NM THETA: $360°/(2^{16})$
I018/015	Aircraft Position in cartesian coordinates	X, Y: 1/128 NM
I018/016	Packet Number	N.A.
I018/017	Packet Number List	N.A.
I018/018	Mode S Packet Properties	N.A.
I018/019	Mode S Packet	N.A.
I018/020	Broadcast Number	N.A.
I018/021	Broadcast Properties	N.A.

I018/022	Broadcast Prefix	N.A.
I018/023	Uplink or Downlink Broadcast	N.A.
I018/025	GICB Number	N.A.
I018/027	BDS Code	N.A.
I018/028	GICB Extraction Periodicity	seconds
I018/029	GICB Extracted	N.A.
I018/030	GICB Properties	N.A.
I018/031	Aircraft Identity	N.A.
I018/032	Aircraft Mode A Code in octal representation	N.A.
I018/033	Aircraft Height	1/4 FL
I018/034	Aircraft Speed	(2^{-14}) NM/s
I018/035	Aircraft Heading	$360° / (2^{16})$
IO18/036	Data Source Identifier	N.A
IO18/037	Data Destination Identifier	N.A

5.2   Description of Standard Data Items

5.2.1   Data Item I018/000, Message Type (D_message_type)

Definition: Allows identification of the message type.
Format: One-octet fixed length Data Item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
Type							
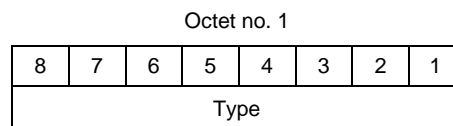
bits-8/1   Message type

The following set of Message Types are standardised for category 018 records:

Message	Message Type	Message Purpose
Associate_req	00h	Connection establishment
Associate_resp	01h	Connection establishment
Release_req	02h	Connection disabling
Release_resp	03h	Connection disabling
Abort_req	04h	Connection disabling
Keep_alive	05h	Keep alive procedure
Aircraft_report	10h	Routing information
Aircraft_command	11h	Routing information
II_code_change	12h	Routing information
Uplink_packet	20h	Manage uplink data flow
Cancel_uplink_packet	21h	Manage uplink data flow
Uplink_packet_ack	22h	Manage uplink data flow
Downlink_packet	23h	Manage downlink data flow
Data_XON	26h	Flow control
Data_XOFF	27h	Flow control
Uplink_broadcast	30h	Manage broadcast service
Cancel_uplink_broadcast	31h	Manage broadcast service
Uplink_broadcast_ack	32h	Manage broadcast service
Downlink_broadcast	34h	Manage broadcast service

Message	Message Type	Message Purpose
GICB_extraction	40h	Manage GICB service
Cancel_GICB_extraction	41h	Manage GICB service
GICB_extraction_ack	42h	Manage GICB service
GICB_response	43h	Manage GICB service

5.2.2 Data Item I018/001, Result (D_Result)

Definition: Indicates the status of a particular message together with additional information.

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
CAUSE				DIAG			

bits-8/5 (CAUSE) Cause
- = 0   "Accepted", the request is accepted and is under processing
- = 1   "Rejected", the request has not been accepted
- = 2   "Cancelled", the request has been cancelled
- = 3   "Finished", the request has been accepted and successfully processed
- = 4   "Delayed", the request processing is temporarily delayed but the request is still valid
- = 5   "In Progress", the request is being successfully processed
- = 6   "Invalid Result"

bits-4/1 (DIAG) Diagnostic
- = 0   "No diagnostic available"
- = 1   "Aircraft Exit"
- = 2   "Incorrect aircraft address"
- = 3   "Impossibility to process the message"
- = 4   "Insufficient or change in data link capability"
- = 5   "Invalid LV field"
- = 6   "Duplicate request number"
- = 7   "Unknown request number"
- = 8   Timer T3 expiry
- = 9   Expiry of I/R delivery timer
- = 10   Uplink flow disabled by UC

Encoding Rules:

Data Item I018/001 (D_Result) is compulsory as indicated in section 5.3.2.
This Data Item is optionally transmitted in;
1. the Downlink_packet to indicate the presence of an invalid LV field.
2. the Abort_req to indicate expiry of Timer T3.

Recommendation: *D_result contains two fields (CAUSE and DIAG). The DIAG field is used to indicate the reason which have led to CAUSE. It is therefore recommended to set the appropriate DIAG code whenever possible.*

5.2.3   Data Item I018/002, Time of Day (D_Time)

Definition: Absolute time stamping expressed as Co-ordinated Universal Time (UTC) time.

Format: Three-octets fixed length Data Item.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17

Octet no. 2   Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
															LSB
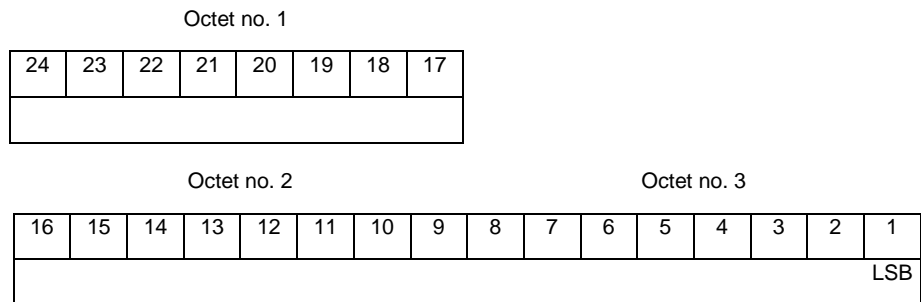
bits-24/1   (Time-of-Day)   Acceptable Range of Values
                                           $0 <= \text{Time-of-Day} < 24\text{hrs}$

bit-1   (LSB)   = (2^{-7}) s = 1/128 s

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2.
2. This data item is compulsory in the following messages : Downlink_broadcast, and, GICB_response. This data item provides the time at which the GICB/Broadcast extraction was carried out. This time information, coded in three bytes, is expressed as UTC time. It refers to a time derived from a national radio clock or a GNSS system clock.
3. This data item is optional in GICB_extraction. It allows the user to specify the request's end time (time is expressed as UTC time), as opposed to its use in other messages for timestamping. If not specified the request lifetime will be until the GDLP/LU-Interrogator link is disconnected, the aircraft leaves coverage or the request is cancelled.

NOTES

1) The time of day value is reset to zero each day at midnight.
2) For time management in radar transmission applications, refer to Part 1, paragraph 5.4

5.2.4 Data Item I018/004, II Code (D_II_Code)

Definition: Indicates the interrogator's current and previous II Code.
Format: One-octet fixed length Data Item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
Previous II				Current II			

bits-8/5   Former II code

bits-4/1   Current II code

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the following messages : Associate_req, Associate_resp, II_code_change. It shall be sent only by the DLF (in Associate_req and Associate_resp) as it is a station parameter.

NOTE: *The Previous II code shall be set to the Current II code value when there is no Previous II code available.*

5.2.5 Data Item I018/005, Mode S Address (D_Mode_S_address)

Definition: Technical Mode S address used for identification of an aircraft, as defined in ICAO Annex 10.

Format: Three-octets fixed length Data Item.
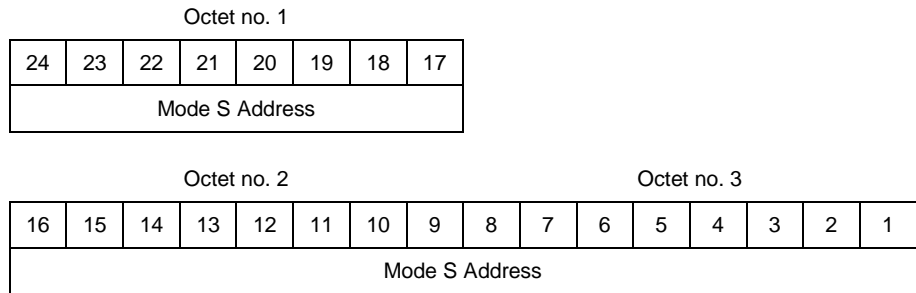
Structure:

Octet no. 1

24	23	22	21	20	19	18	17
Mode S Address							

Octet no. 2   Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mode S Address															

bits-24/1   24-bits Mode S address, A23 to A0

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the following messages: Aircraft_report, Aircraft_command, Downlink_broadcast, GICB_extraction, GICB_extraction_ack, Cancel_GICB _ extraction, GICB_response, Downlink_packet, , Uplink_packet, Uplink_packet_ack, Cancel_Uplink_packet.

5.2.6 Data Item I018/006, Mode S Address List (D_Mode_S_address_list)

Definition: List of technical Mode S addresses.
Format: Repetitive Data Item starting with a one-octet Repetition Factor
             followed by at least one Mode S Address of 3-octets length.
Structure:

Octet no. 1   Octet no. 2

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
REP								Mode S Address							

Octet no. 3   Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mode S Address															
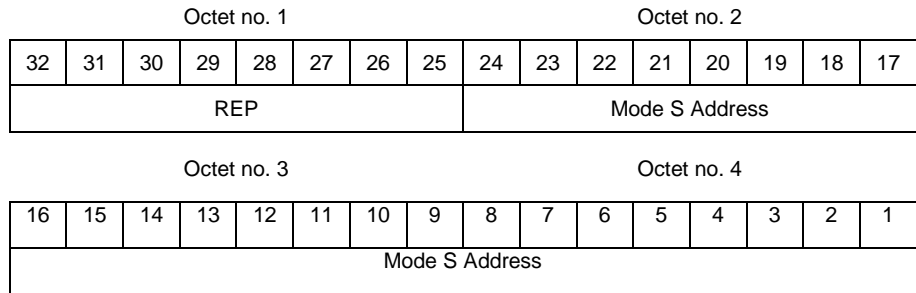
bits-32/25   (REP)   Repetition factor

bits-24/1   24-bits Mode S address, A23 to A0

Encoding Rules:
This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the
Data_XON and Data_XOFF messages.

5.2.7   Data Item I018/007, Aircraft Data Link Command (D_Data_link_command)

Definition: Command for the aircraft data link communications. It allows the GDLP to enable or disable the uplink & downlink data flows for a specified aircraft.

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
UM	DM	UC	DC	0	0	0	0

bit-8   (UM)   Uplink mask
                         = 0   UC shall be ignored
                         = 1   UC shall be taken into account

bit-7   (DM)   Downlink mask
                         = 0   DC shall be ignored
                         = 1   DC shall be taken into account

bit-6   (UC)   Uplink command
                         = 0   the uplink flow shall be enabled
                         = 1   the uplink flow shall be stopped

bit-5   (DC)   Downlink command
                         = 0   the downlink flow shall be enabled
                         = 1   the downlink flow shall be stopped

bits-4/1   Spare bits set to 0

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the Aircraft_command message.

NOTE - This command applies to the interrogator´s Current status (UCS/DCS) and does not affect the interrogator's Default Status (see UDS/DDS in Data Item I018/008).

5.2.8 Data Item I018/008, Aircraft Data Link Status (D_Data_link_status)

Definition: Status for the aircraft data link communications.
Format: Variable length Data Item comprising a first part of one octet followed by one-octet extent as necessary.

**Structure
of first part:**

Octet no. 1

8	7	6	5	4	3	2	1
UDS	DDS	UCS	DCS	Spare	Spare	EI	FX

bit-8   (UDS)   Uplink Default status
              = 0   The interrogator is enabled to uplink frames
              = 1   The interrogator is disabled to uplink frames

bit-7   (DDS)   Downlink Default status
              = 0   The interrogator is enabled to extract frames
              = 1   The interrogator is disabled to extract frames

bit-6   (UCS)   Uplink Current status
              = 0   The interrogator is enabled to uplink frames
              = 1   The interrogator is disabled to uplink frames

bit-5   (DCS)   Downlink Current status
               = 0   The interrogator is enabled to extract frames
              = 1   The interrogator is disabled to extract frames

bit-4   (Spare)   =0

bit-3   (Spare)   =0

bit-2   (EI)   Exit Indication
             = 0   The aircraft is in the Datalink coverage map of the interrogator
             = 1   The aircraft is not in the Datalink coverage map of the interrogator

bit-1   (FX)   = 0   End of Data Item
             = 1   Extension into first extent

**Structure
of extension:**

Octet no. 1

8	7	6	5	4	3	2	1
IC	0	0	0	0	0	0	FX

bit-8   (IC)   Interrogator Control

= 0   The interrogators current ability to uplink/downlink frames (UCS/DCS) and the content of the Aircraft_report could be changed using D_Data_link_command.

= 1   The interrogators current ability to uplink/downlink frames (UCS/DCS) and the content of the Aircraft_report cannot be changed using D_Data_link_command.

bits-7/2   Spare bits set to 0

bit-1   (FX)   = 0   End of Data Item
                    = 1   Extension into next extent

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the Aircraft_report message.
2. When FX = 0, it is assumed that the entire extension octet is set to all 0.
3. This item is sent in the Aircraft_report message regardless of the value of the SR flag set in an Aircraft_command message.
4. Set IC=0 when sent to authorised equipment.
5. Set IC=1 when sent to non-authorised equipment.

NOTES:

1. The current status should never be more restrictive than the default status.
2. IC is usually set 1when the interrogator is a member of a cluster with a decentralised data link responsibility protocol.
   IC is usually set to 0 when the interrogator is connected to a GDLP. IC settings shall comply with the rules defined in Ref.3.

5.2.9   Data Item I018/009, Aircraft Data Link Report Request (D_Report_request)

Definition: Request for an Aircraft_report message.
Format: Variable length Data Item comprising a first part of one octet followed
                  by one-octet extent as necessary.

**Structure
of first part:**

Octet no. 1

8	7	6	5	4	3	2	1
SR	AR	ER	FR	MR	PR	CR	FX

bit-8   (SR)   = 0   The next Aircraft_report may not include
                          D_Data_link_status
              = 1   The next Aircraft_report shall include
                          D_Data_link_status

bit-7   (AR)   = 0   The next Aircraft_report may not include D_COM
              = 1   The next Aircraft_report shall include D_COM

bit-6   (ER)   = 0   The next Aircraft_report may not include D_ECA
              = 1   The next Aircraft_report shall include D_ECA

bit-5   (FR)   = 0   The next Aircraft_report may not include D_CQF
              = 1   The next Aircraft_report shall include D_CQF

bit-4   (MR)   = 0   The next Aircraft_report may not include
                          D_CQF_method
              = 1   The next Aircraft_report shall include D_CQF_method

bit-3   (PR)   = 0   The next Aircraft_report may not include
                          D_Polar_position
              = 1   The next Aircraft_report shall include D_Polar_position

bit-2   (CR)   = 0   The next Aircraft_report may not include
                          D_Cartesian_position
              = 1   The next Aircraft_report shall include
                          D_Cartesian_position

bit-1   (FX)   = 0   End of Data Item
              = 1   Extension into first extent

**Structure
of extension:**

Octet no. 1

8	7	6	5	4	3	2	1
ID	MA	SP	HG	HD	0	0	FX

bit-8   (ID)   = 0   The next Aircraft_report may not include Aircraft_ID
                = 1   The next Aircraft_report shall include Aircraft_ID

bit-7   (MA)   = 0   The next Aircraft_report may not include Mode_A
                = 1   The next Aircraft_report shall include Mode_A

bit-6   (SP)   = 0   The next Aircraft_report may not include Speed
                = 1   The next Aircraft_report shall include Speed

bit-5   (HG)   = 0   The next Aircraft_report may not include Height
                = 1   The next Aircraft_report shall include Height

bit-4   (HD)   = 0   The next Aircraft_report may not include Heading
                = 1   The next Aircraft_report shall include Heading

bits-3/2 Spare   Spare bits set to 0

bit-1   (FX)

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the
Aircraft_command message

NOTE : This item indicates to the DLF which items to send in the next Aircraft_report
messages (for a specified aircraft) through the use of flags. These flags
concern D_Data_link_status, D_COM, D_ECA, D_CQF, D_CQF_method,
D_Polar_position, D_Cartesian_position, D_Aircraft_ID, D_Mode_A,
D_Speed, D_Height, D_Heading.

5.2.10 Data Item I018/010, Transponder Communications Capability (D_COM)

Definition: Transponder Communications Capability
Format: One-octet fixed length Data Item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
0	0	0	0	0	COM		

bits-8/4   Spare bits set to 0

bits3/1   (COM)   Communications capability of the transponder
= 0   No communications capability (surveillance only)
= 1   Comm. A and Comm. B capability
= 2   Comm. A, Comm. B and Uplink ELM
= 3   Comm. A, Comm. B and Uplink ELM and Downlink ELM
= 4   Level 5 Transponder capability
5 to 7   Not assigned

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_Report message. It shall be present in any Aircraft_report messages concerning an aircraft entry, irrespective of the AR/ER values.
2. If the AR flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_COM data item.

5.2.11 Data Item I018/011, Capability Report (D_ECA)

Definition: Capability report as described in the Mode S subnetwork SARPs.

Format: Seven-octets fixed length Data Item.

Structure:

Octet no. 1

56	55	54	53	52	51	50	49

Octet no. 2   Octet no. 3

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33

Octet no. 4   Octet no. 5

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Octet no. 6   Octet no. 7

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

bits-56/1   Capability report

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_report message. It shall be present in any Aircraft_report messages concerning an aircraft entry, irrespective of the AR/ER values.

2. If the ER flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_ECA data item.

5.2.12 Data Item I018/012 Aircraft Coverage Quality Factor (D_CQF)

Definition: Coverage Quality Factor (CQF) of an aircraft (for a given interrogator).
Format: One-octet fixed length Data Item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
FS	CQF						

bit-8 (FS)   Flight Status
 = 0   Aircraft is airborne
 = 1   Aircraft is on the ground

bits-7/1 (CQF)   Aircraft CQF
 = 0   The CQF calculation method is not
            supported
 = 1   The CQF is minimum
 = 126   The CQF is maximum
 = 127   The CQF is undefined according to the
            calculation method

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_report message.
2. If the FR flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_CQF data item. It contains the flight status and the coverage quality factor of the aircraft (for a given interrogator).

5.2.13 Data Item I018/013 Aircraft CQF Calculation Method (D_CQF_method)

Definition: Indicates which criteria to take into account when computing the CQF of an aircraft for an interrogator.

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
CQF method							

bits-8/1   (CQF method)   Calculation method

Encoding Rules:
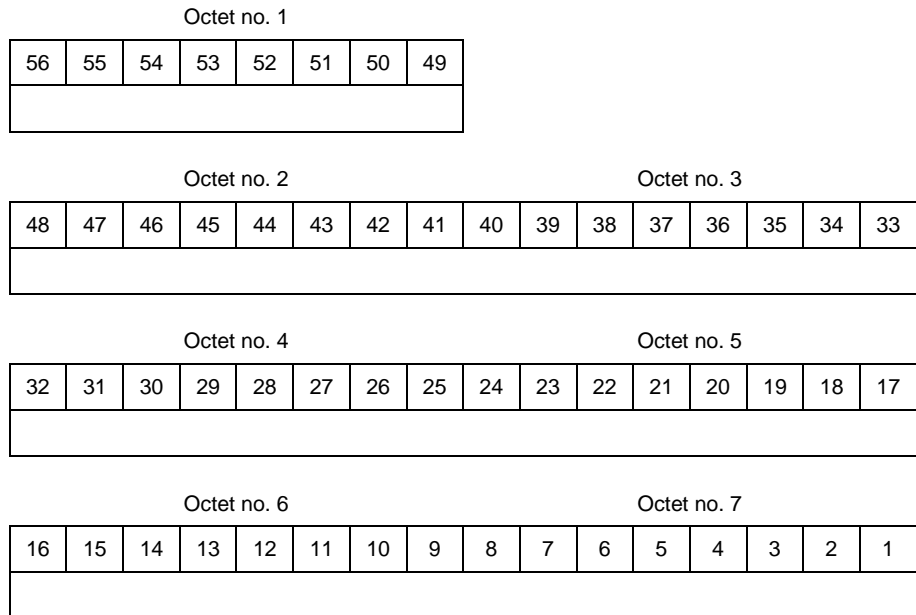
1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_report and Aircraft_command messages.
2. If used in the Aircraft_report message this data-item indicates which method has been used to calculate CQF. If used in the Aircraft_command message the data-item shall be used to select the indicated CQF method.
3. If the MR flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_CQF_method data item. It indicates which criteria to take into account when computing the CQF of an aircraft for an interrogator (it may not be considered as a local issue and is subject to a formal agreement between National Administrations and the Agency).

5.2.14 Data Item I018/014, Aircraft Position in Polar Co-ordinates (D_Polar_position)

Definition: Measured position of an aircraft in local polar co-ordinates.
Format: Four-octets fixed length Data Item.
Structure:

Octet no. 1   Octet no. 2

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
RHO															LSB

Octet no. 3   Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
THETA															LSB

bit-17 Least   =   1/256 NM.
        Significant Bit   Max. range = 256 NM
        (LSB)

bit-1   (LSB)   = $360°/(2^{16}) = 0.005\ 5°$

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_report message.
2. If the PR flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_Polar_position data item.

NOTE - When expressed in 16 bits, signed or unsigned azimuths have the same value.

5.2.15 Data Item I018/015, Aircraft Position in Cartesian Co-ordinates (D_Cartesian_position)

Definition: Calculated position of an aircraft in Cartesian co-ordinates.
Format: Four-octets fixed length Data Item.
Structure:

Octet no. 1								Octet no. 2							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
X - Component															LSB

Octet no. 3								Octet no. 4							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Y - Component															LSB

bit-17   (LSB)   =   1/128 NM
                                Max. range = +/-256 NM

bit-1   (LSB)   =   1/128 NM
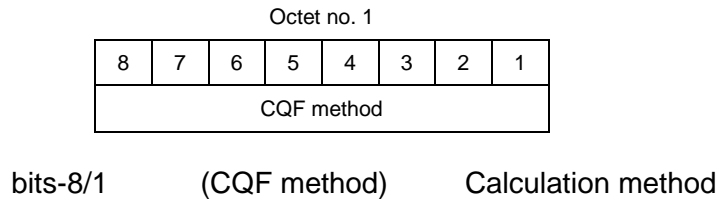   Max. range = +/-256 NM

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft_report message.
2. If the CR flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_Cartesian_position data item.

NOTE: Negative values are expressed in 2's complement form, bit-32 and bit-16 shall be set to 0 for positive values and 1 for negative values.

5.2.16 Data Item I018/016, Packet Number (D_Packet_number)

Definition: Number used to correlate an uplink packet request and its associated acknowledgement.

Format: Four-octets fixed length Data Item.

Structure:

	Octet no. 1									Octet no. 2					
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

	Octet no. 3									Octet no. 4					
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

bits32/1   Packet number
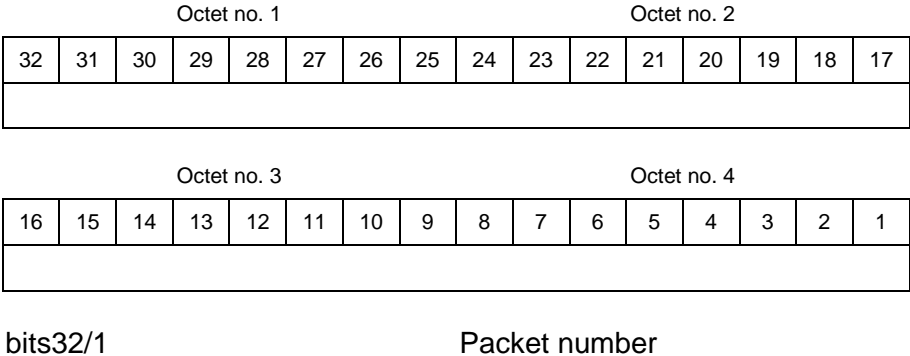
Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the message : Uplink_packet.
2. In the Cancel_uplink_packet message, this item is optional. If present, this means that the cancellation refers to a specific request (identified by item I018/016). If absent, all Mode S uplink packets for the aircraft identified by D_Mode_S_address are concerned by the cancellation.

5.2.17 Data Item I018/017, Packet Number List (D_Packet_number_list)

Definition: List of numbers used to correlate an uplink packet request and their associated acknowledgements

Format: Repetitive Data Item starting with a one-octet Repetition Factor followed by at least one packet number of four-octets length.

Structure:

Octet no. 1

40	39	38	37	36	35	34	33
REP							

Octet no. 2   Octet no. 3

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Octet no. 4   Octet no. 5

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

bits-40/33 (REP)   Repetition Factor

bits-32/1   Packet Number

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2.
2. Data Item I018/017 (D_Packet_number_list) is optional in the Uplink_packet_ack message and is not included for the case when no D_Packet_number was included in the Cancel_uplink_packet request and no pending packets exist.

Recommendation : *It should be used to optimise the throughput (a single acknowledgement message is used to acknowledge several uplink requests).*

5.2.18 Data Item I018/018 Mode S Packet Properties (D_Packet_properties)

Definition: Properties of an uplink Mode S packet, i.e. its internal priority and its capability to be multiplexed or not, and its type (SVC, MSP or ROUTE).

Format: One-octet fixed length Data Item.

Structure:

Octet no. 1

8	7	6	5	4	3	2	1
0	PR					PT	

bit-8   spare   spare bit set to 0

bits-7/3   (PR)   Mode S packet internal priority
                       0 is the lowest priority, 31 is the highest priority

bits-2/1   (PT)   Packet type
                       = 0   SVC packets
                       = 1   MSP packets
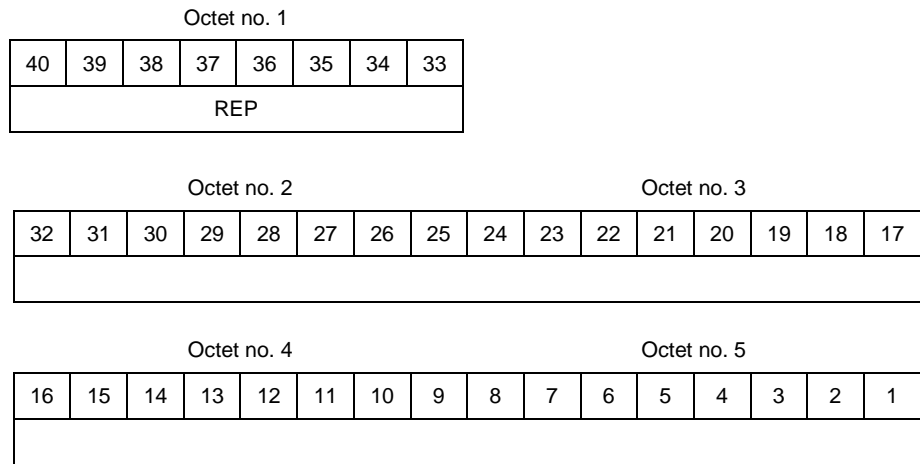   = 2   Route packets

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the Uplink_packet message
2. This item gives the properties of an uplink Mode S packet (SVC/MSP/Route), i.e. its Mode S subnet priority and therefore its capability to be multiplexed or not, and its type (SVC, MSP or Route).

NOTE :

The PT field is used to identify the ROUTE packets which have a higher priority than SVCs. The PR field is used to describe the priority of SVCs as follows:

        0 = low
        1 = high

For ROUTE and MSP packets the value of PR has no significance. However, for the purpose of standardisation, it is recommended that for ROUTE packets, PR is set to 15 and for MSPs the PR should be set to 31.

5.2.19 Data Item I018/019, Mode S Packet (D_Mode_S_packet)

Definition: A Mode S packet as defined in the Mode S subnetwork SARPs.

Format: Explicit length Data Item starting with a one-octet length indicator followed by a Mode S packet of 2 to 160-octets length.

Structure:

Octet no. 1

24	23	22	21	20	19	18	17
LENGTH							

Octet no. 2   Octet no. 3

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mode S Packet															
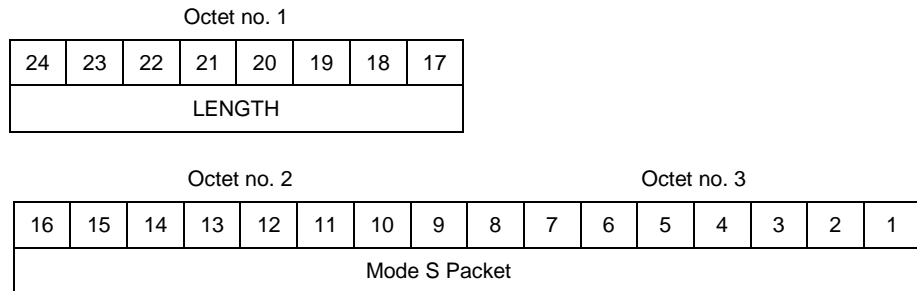
bits-24/17   (LENGTH)   Length indicator

bits-16/1   Mode S packet

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the following messages : Downlink_packet, Uplink_packet. It contains two fields : the first one gives the total length of the data item; the content of the second one is a Mode S packet (as defined in the Mode S SARPs) whose length is in the range [2..160].

5.2.20 Data Item I018/020, Broadcast Number (D_Broadcast_number)

Definition: Number used to correlate an uplink broadcast request and its associated acknowledgement.

Format: Four-octets fixed length Data Item.

Structure:

	Octet no. 1										Octet no. 2				
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

	Octet no. 3										Octet no. 4				
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

bits32/1   Broadcast number
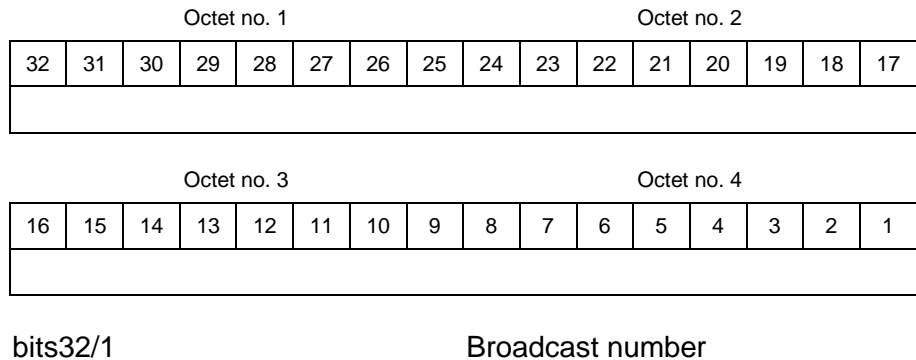
Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. This data item is compulsory in the Uplink_broadcast message
2. This Data Item is optional in the Uplink_broadcast_ack, for the case where there is no valid broadcast request to cancel.
3. In the Cancel_uplink_broadcast message, D_Broadcast_number is optional. If it is present, it means that the cancellation refers to a specific uplink broadcast request (identified by item I018/020). If not, all the *uplink* broadcast subscriptions are concerned by the cancellation

5.2.21 Data Item I018/021, Broadcast Properties (D_Broadcast_properties)

Definition: Properties of an uplink broadcast request (power, duration, coverage).
Format: Six-octets fixed length Data Item.
Structure:

Octet no. 1								Octet no. 2							
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Priority				Power				Duration							

Octet no. 3								Octet no. 4							
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Coverage															

Octet no. 5								Octet no. 6							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Coverage (cont.)															

bits-48/45   Priority
0 is the lowest, 15 is the highest priority.

bits-44/41   Power
0 is the lowest, 15 is the highest power.

bits-40/33   Duration expressed in seconds

bits-32/1   Coverage
bit-i = 0   The broadcast is not to be sent on sector i
bit-i = 1   The broadcast is to be sent on sector i

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is optional in the Uplink_broadcast message. If present all the fields are compulsory. It describes the properties of an uplink broadcast request (i.e. its power, duration and coverage).

NOTES
1) A broadcast with a higher priority will temporarily delay a lower priority broadcast if necessary. The delayed broadcast will be resumed as soon as possible for its remaining time.
2) The sectors are numbered from 1 to 32 clockwise, sector 1 being the first sector after the North.

5.2.22 Data Item I018/022, Broadcast Prefix (D_Broadcast_prefix)

Definition: Contents of the 32 first bits of an uplink broadcast interrogation.
Format: Four-octets fixed length Data Item.
Structure:

Octet no. 1 | Octet no. 2

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
0	0	0	0	0	Prefix Field										

Octet no. 3 | Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Prefix Field (cont.)															
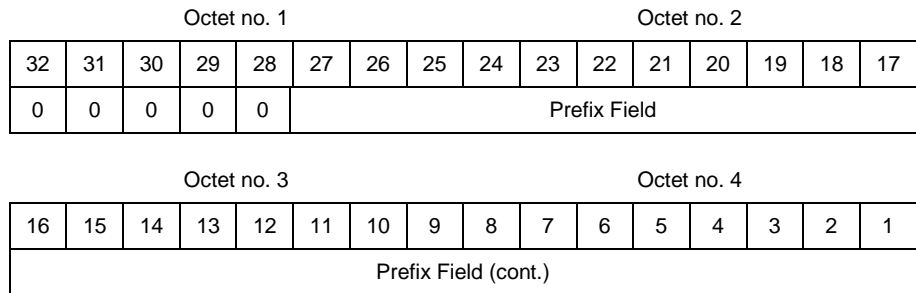
bits-32/28   Spare bits set to 0

bits-27/1   Prefix Field

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the Uplink_broadcast message. It is the content of the 32 first bits of an uplink broadcast interrogation.

NOTE - The Mode S uplink broadcast interrogation will be made up of this D_Broadcast_prefix field followed by the D_Broadcast field and then by the Address/Parity field (in this order), as defined in ICAO Annex 10. In the interrogator, the 5 first bits of D_Broadcast_prefix will be replaced by ICAO UF field, as defined in Annex 10.

5.2.23 Data Item I018/023, Uplink or Downlink Broadcast (D_Broadcast)

Definition: Broadcast message sent (MA field of the Comm-A frame) or received (MB field of the Comm-B frame), conformant with the ICAO Manual on Mode S Specific Services.

Format: Seven-octets fixed length Data Item.

Structure:

Octet no. 1

56	55	54	53	52	51	50	49
Broadcast							

Octet no. 2   Octet no. 3

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
Broadcast (cont.)															

Octet no. 4   Octet no. 5

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Broadcast (cont.)															

Octet no. 6   Octet no. 7

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Broadcast (cont.)															
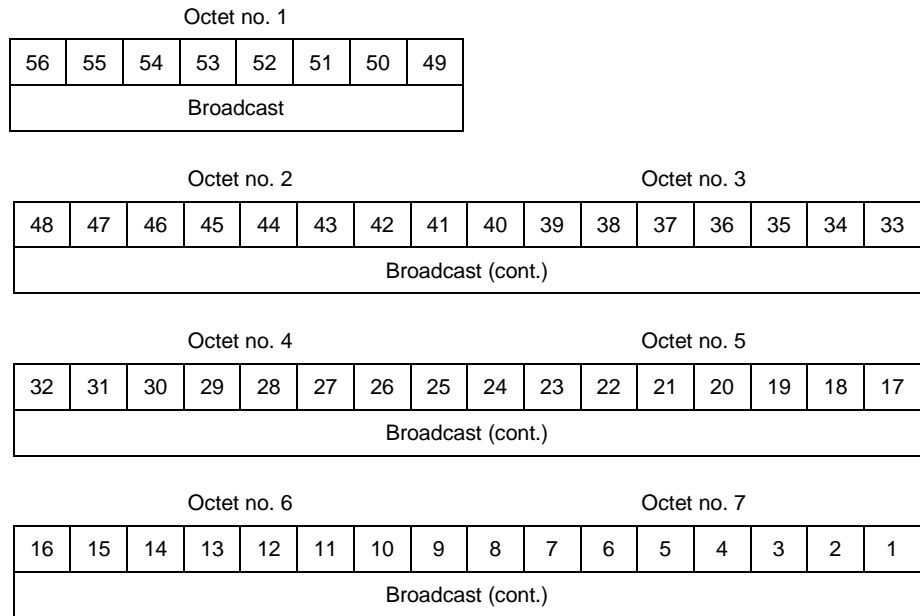
bits-56/1   Broadcast

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the following messages : Uplink_broadcast and Downlink_broadcast.

5.2.24 Data Item I018/025, GICB Number (D_GICB_number)

Definition: Number used to correlate subsequent GICB messages (i.e. responses and acknowledgements) with the original GICB request.

Format: Four-octets fixed length Data Item.

Structure:

Octet no. 1   Octet no. 2

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
GICB Number

Octet no. 3   Octet no. 4

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
GICB Number (cont.)

bits-32/1   GICB Number

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the message GICB_extraction.
2. It is used to correlate a request with a future response (BDS register content or request acknowledgement).
3. In the Cancel_GICB_extraction message, D_GICB_number item is optional. If it is present, this means that the cancellation refers to a specific GICB extraction request (identified by item I018/025). If it is absent, all the GICB extractions for the aircraft identified by D_Mode_S_address are concerned by the cancellation.
4. D_GICB_number is optional in GICB_extraction_ack for the case when a Cancel_GICB_extraction message is received without any D_GICB_number field.

5.2.25 Data Item I018/027, BDS Code (D_BDS_code)

Definition: BDS code of the GICB to be extracted.
Format: One octet fixed length data item.
Structure:

Octet no. 1

8	7	6	5	4	3	2	1
BDS Code							
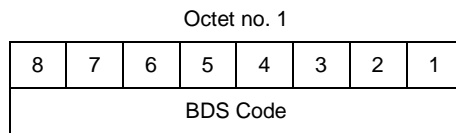
bits-8/1   BDS Code

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory in the following messages : GICB_extraction and GICB_response. It identifies a particular BDS register of the Mode S transponder.

5.2.26 Data Item I018/028, GICB Extraction Periodicity (D_GICB_periodicity)

Definition: Periodicity of the GICB extractions.
Format: Two-octets fixed length Data Item.
Structure:

Octet no. 1   Octet no. 2

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
GICB Extraction Periodicity															
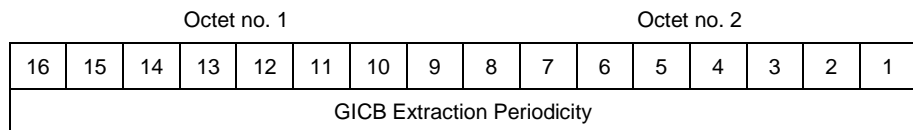
bits-16/1   GICB Extraction Periodicity
                                       expressed in second

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the GICB_extraction message. It expresses the periodicity of the GICB extraction requested by the user.
2. A GICB Extraction Periodicity equal to zero indicates the smallest available GICB extraction periodicity at the ground station.
3. If this data-item is not present, the DLF will only try to perform a single extraction i.e. the request will end after the first successful extraction.

5.2.27 Data Item I018/029, GICB Extracted (D_GICB_extracted)

Definition: GICB extracted message (MB field of the Comm-B frame). i.e., the contents of a BDS register, conformant with the ICAO Manual on Mode S Specific Services.
Format: Seven-octets fixed length Data Item.
Structure:

Octet no. 1

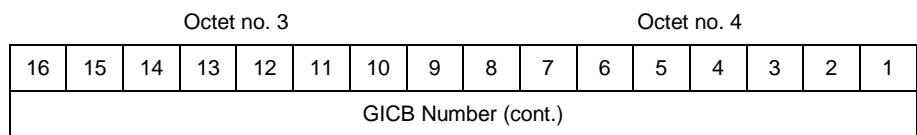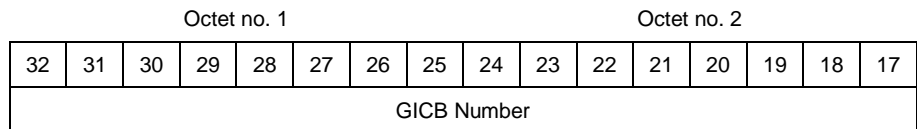| 56	55	54	53	52	51	50	49
GICB

Octet no. 2   Octet no. 3

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
GICB (cont.)

Octet no. 4   Octet no. 5

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
GICB (cont.)

Octet no. 6   Octet no. 7

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
GICB (cont.)

bits-56/1   GICB extracted

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2.
2. Data Item I018/029 (D_GICB_extracted) is optional in the GICB_response message. It is the content of an MB field. It should be present in the case of a successful extraction but not in the case of an extraction failure.

5.2.28 Data Item I018/030, GICB Properties (D_GICB_properties)

Definition: Properties of the GICB extractions.
Format: Two-octets fixed length Data Item.
Structure:

	Octet no. 1										Octet no. 2				
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Priority					0	0	0	PC	AU	NE	RD		0	0	0

bits-16/12 (Priority) GICB priority
0 is the lowest, 31 is the highest priority

bits-11/9 Spare bits set to 0

bit-8 (PC) Periodicity Constraint
= 0 The periodicity may not be strictly respected
= 1 The periodicity shall be strictly respected

bit-7 (AU) Asynchronous Update
= 0 GICB extractions should be sent only when required by the periodicity
= 1 If a GICB extraction is done due to external conditions, an update will also be sent, even if it does not match the expected periodicity

bit-6 (NE) Non Extraction
= 0 The GICB extraction is attempted according to the periodicity
= 1 There will no GICB attempts

bits-5/4 (RD) Reply Destination
= 0 The extracted GICB must be sent only on the Data Link line
= 1 The extracted GICB must be sent only on the Surveillance line
= 2 The extracted GICB must be sent both on the Data Link and on the Surveillance lines

bits-3/1 Spare bits set to 0

Encoding Rules:
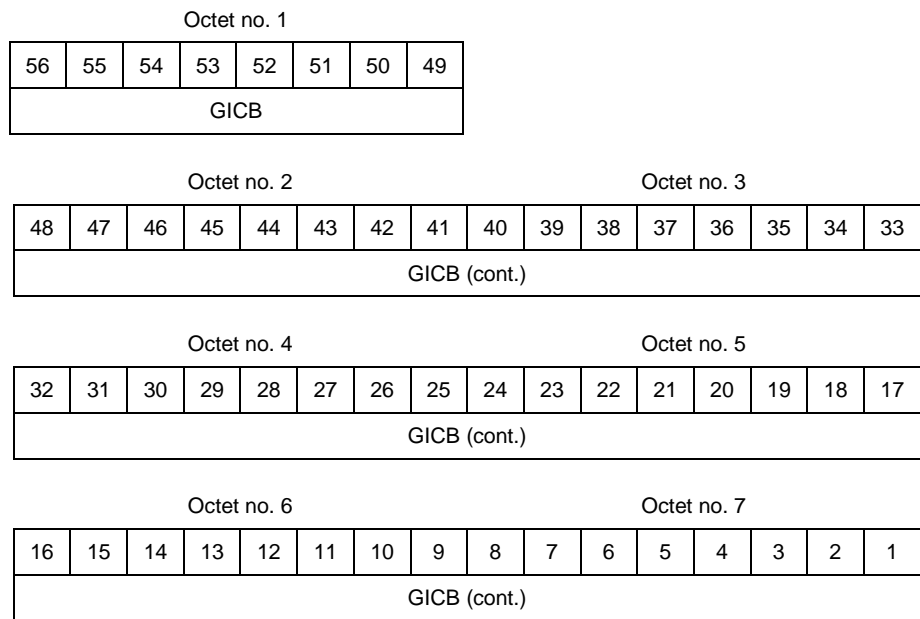
1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the GICB_extraction message. It gives the properties of a GICB extraction : priority, periodicity constraint and some flags (Asynchronous Update, Non Extraction, Reply Destination)
2. If it is absent, the properties parameters will be set as follows :
   - no periodicity constraint (PC = 0)
   - no asynchronous update (AU = 0, NE = 0)
   - reply destination will be only the GDLP (RD = 0)
   - request priority will be set to 8 (medium value)

NOTE : *The Non Extraction flag (NE) should be used only if the Asynchronous Update flag (AU) is set to true. It is specially reserved to the ACAS' RA extraction (asynchronous update without periodic extraction request).*

5.2.29 Data Item I018/031, Aircraft Identity (D_Identity)

Definition: Identity of the aircraft extracted by a BDS 20 as described in ICAO Annex 10.

Format: Six-octets fixed length Data Item.
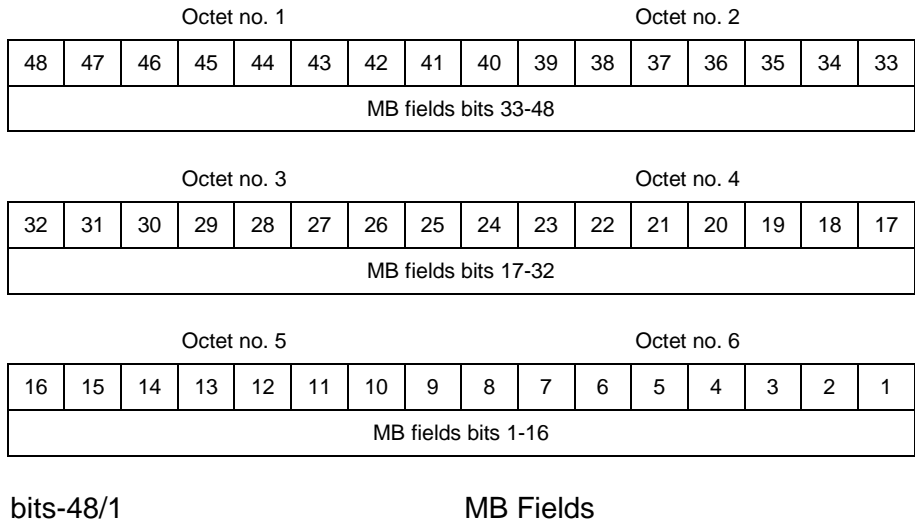
Structure:

Octet no. 1   Octet no. 2

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33

MB fields bits 33-48

Octet no. 3   Octet no. 4

32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

MB fields bits 17-32

Octet no. 5   Octet no. 6

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

MB fields bits 1-16

     bits-48/1   MB Fields

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft report message. It shall only be sent if the GDLP has requested it for the aircraft specified in the last Aircraft_command message. It is a sequence of 8 alpha-numeric characters which in fact is the item 7 of the ICAO flight plan.

5.2.30 Data Item I018/032, Aircraft Mode A (D_Mode_A)

Definition: Mode-3/A code converted into octal representation.
Format: Two-octet fixed length Data Item.
Structure:

	Octet no. 1									Octet no. 2					
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
V	G	L	0	A4	A2	A1	B4	B2	B1	C4	C2	C1	D4	D2	D1

| bit-16 | (V) | = 0 | Code validated |
| | | = 1 | Code not validated |

| bit-15 | (G) | = 0 | Default |
| | | = 1 | Garbled code |

| bit-14 | (L) | = 0 | Mode-3/A code derived from the reply of the transponder |
| | | = 1 | Mode-3/A code not extracted during the last scan |

bit-13   Spare bit set to 0

bits-12/1   Mode-3/A reply in octal representation

Encoding Rules:

1. This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft report message. If the MA flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_Mode_A data item. This is the mode 3/A identification code in an octal representation. It represents the mode-A information associated to a particular aircraft.
2. When Mode A code is absent and local tracking is performed, it shall be sent with the bit-14 (L) set to one.

NOTE: Bit 15 has no meaning in the case of a smoothed Mode-3/A code and is set to 0 for a calculated track. For Mode S, it is set to one when an error correction has been attempted.

5.2.31 Data Item I018/033, Aircraft Height (D_Height)

Definition: Flight Level converted into binary representation.
Format: Two-octet fixed length Data Item.
Structure:

	Octet no. 1								Octet no. 2						
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
V	G	Flight Level													LSB

bit-16   (V)   = 0   Code validated
                             = 1   Code not validated

bit-15   (G)   = 0   Default
                             = 1   Garbled code
bits 14-1   (FL)   =   Flight Level, where

bit-1   (LSB)   =   1/4 FL = 25 ft.

Encoding rule :

      This data item shall be sent as indicated in section 5.3.2, when Mode C code or Mode S altitude code is present and decodable. It represents the flight level of the plot, even if associated with a track.

Notes :

1. The value shall be within the range described by ICAO Annex 10
2. For Mode S, bit 15 (G) is set to one when an error correction has been attempted.
3. If Altitude is not extracted on the last scan, it is an implementation issue as to whether Altitude is output from track file, if at all.

5.2.32 Data Item I018/034, Aircraft Speed (D_Speed)

Definition: Tracker calculated Ground Speed of an aircraft.
Format: Two-octets fixed length Data Item.
Structure:

Octet no. 1									Octet no. 2						
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CALCULATED GROUNDSPEED (max. 2 NM/s)															LSB

$$\text{bit-1} \quad \text{(LSB)} \quad = \quad (2^{-14}) \, \text{NM/s} \; = \; 0.22 \, \text{kt}$$

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft report message. If the SP flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_Speed data item. This represents the tracker estimated ground speed of the aircraft.

5.2.33 Data Item I018/035, Aircraft Heading (D_Heading)

Definition: Tracker calculated heading of an aircraft. . The heading is the heading with respect to the geographical north at the aircraft position.
Format: Two-octets fixed length Data Item.
Structure:

Octet no. 1									Octet no. 2						
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Calculated Heading															LSB

bit-16/1   Heading expressed in degrees measured clockwise from North

$$\text{bit-1} \quad \text{(LSB)} \quad = \quad 360°/(2^{16}) \quad = 0.005\,5°$$

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is optional in the Aircraft report message. If the HD flag is set to 1 in a Aircraft_command message, the next Aircraft_report message concerning the aircraft (its Mode-S address is embedded in the D_Mode_S_address Data Item of any Aircraft_report message) shall contain the D_Heading data item. This represents tracker estimated heading of the aircraft expressed in degrees measured clockwise from North.
Note : Further information can be found in the POEMS document for Asterix Category 017.

5.2.34 Data Item I018/036, Data Source Identifier (D_Source)

Definition: Identification of the source node for the GDLP/LU data
Format: Two-octets fixed length Data Item.
Structure:

Octet no. 1	Octet no. 2

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SAC								SIC							

bits-16/9   (SAC)   System Area Code

bits-8/1   (SIC)   System Identity Code

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory and shall always be transmitted for each type of DLF-GDLP/LU message.

NOTE:
The up-to-date list of SACs is published on the EUROCONTROL Web Site (http://www.EUROCONTROL.int/asterix).

5.2.35 Data Item I018/037, Data Destination Identifier (D_Destination)

Definition: Identification of the destination node for the GDLP/LU data.
Format: Two-octets fixed length Data Item.
Structure:

Octet no. 1	Octet no. 2

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SAC								SIC							

bits-16/9   (SAC)   System Area Code

Bits--8/1   (SIC)   System Identity Code

Encoding Rules:

This Data Item shall be used as indicated in section 5.3.2. It is compulsory and shall always be transmitted for each type of DLF-GDLP/LU message.

NOTE:
The up-to-date list of SACs is published on the EUROCONTROL Web Site (http://www.EUROCONTROL.int/asterix).

5.3   Transmission of Data Link Function Messages

5.3.1   Standard User Application Profile

The following standard User Application Profile shown in Table 9 shall be used for the transmission of Data Link Function Messages.

Table 9 - Standard UAP for Data Link Function Messages

FRN	Data item	Information	Length in bytes
1	I018/036	D_Source	2
2	I018/037	D_Destination	2
3	I018/000	D_Message_type	1
4	I018/001	D_Result	1
5	I018/005	D_Mode_S_address	3
6	I018/016	D_Packet_number	4
7	I018/017	D_Packet_number_list	(1+4*N)
FX	-	Field extension indicator	-
8	I018/018	D_Packet_properties	1
9	I018/019	D_Mode_S_packet	3+
10	I018/028	D_GICB_periodicity	2
11	I018/030	D_GICB_properties	2
12	I018/025	D_GICB_number	4
13	I018/027	D_BDS_code	1
14	I018/029	D_GICB_extracted	7
FX	-	Field extension indicator	-
15	I018/002	D_Time	3
16	I018/006	D_Mode_S_address_list	1+3*N
17	I018/007	D_Data_link_command	1
18	I018/008	D_Data_link_status	1+
19	I018/009	D_Report_request	1+
20	I018/010	D_COM	1
21	I018/011	D_ECA	7
FX	-	Field extension indicator	-
22	I018/014	D_Polar_position	4
23	I018/015	D_Cartesian_position	4
24	I018/020	D_Broadcast_number	4
25	I018/021	D_Broadcast_properties	6
26	I018/022	D_Broadcast_prefix	4
27	I018/023	D_Broadcast	7
28	I018/004	D_II_code	1
FX	-	Field extension indicator	-
29	I018/031	D_Identity	6
30	I018/032	D_Mode_A	2
31	I018/033	D_Height	2

FRN	Data item	Information	Length in bytes
32	I018/034	D_Speed	2
33	I018/035	D_Heading	2
34	I018/012	D_CQF	1
35	I018/013	D_CQF_method	1
FX	-	Field extension indicator set to 0	-

In the above table

- the first column indicates the Field Reference Number (FRN) associated to each Data Item used in the UAP,
- the fourth column gives the format and the length of each item, a stand-alone figure indicates the octet-count of a fixed-length Data Item, 1+ indicates a variable-length Data Item comprising a first part of 1 octet followed by N-octets extents as necessary.

5.3.2 Encoding rules

The following coding is used for the table;

C = Compulsory;
S = Selectable, through data-item I018/009;
O = Optional, for the exact meaning see the data-item encoding rules.

Data item	Connection Establishment		Connection Termination			Keep Alive
	Associate _req	Associate _resp	Release _req	Release _resp	Abort_ req	Keep_ alive
I018/036	C	C	C	C	C	C
I018/037	C	C	C	C	C	C
I018/000	=00h	=01h	=02h	=03h	=04h	=05h
I018/001		C		C	O	
I018/005						
I018/016						
I018/017						
I018/018						
I018/019						
I018/028						
I018/030						
I018/025						
I018/027						
I018/029						
I018/002						
I018/006						
I018/007						
I018/008						
I018/009						
I018/010						
I018/011						
I018/014						
I018/015						
I018/020						
I018/021						
I018/022						
I018/023						
I018/004	O	O				
I018/031						
I018/032						
I018/033						
I018/034						

	Connection Establishment		Connection Termination			Keep Alive
Data item	Associate _req	Associate _resp	Release _req	Release _resp	Abort_ req	Keep_ alive
I018/035						
I018/012						
I018/013						

Data item	Routing Information			uplink data flow			downlink data flow
	Aircraft_ report	Aircraft_ command	II_code_ change	Uplink_ packet	Cancel_ uplink_ packet	Uplink_ packet_ ack	Downlink_ packet
I018/036	C	C	C	C	C	C	C
I018/037	C	C	C	C	C	C	C
I018/000	=10h	=11h	=12h	=20h	=21h	=22h	=23h
I018/001						C	O
I018/005	C	C		C	C	C	C
I018/016				C	O		
I018/017						O	
I018/018				C			
I018/019				C			C
I018/028							
I018/030							
I018/025							
I018/027							
I018/029							
I018/002							
I018/006							
I018/007		C					
I018/008	C						
I018/009		C					
I018/010	S						
I018/011	S						
I018/014	S						
I018/015	S						
I018/020							
I018/021							
I018/022							
I018/023							
I018/004			C				
I018/031	S						
I018/032	S						
I018/033	S						
I018/034	S						
I018/035	S						
I018/012	S						
I018/013	S	O					

Data item	Flow control		broadcast service			
	Data_ XON	Data_ XOFF	Uplink_ broadcast	Cancel_ uplink_ broadcast	Uplink_ broadcast_ ack	Downlink_ broadcast
I018/036	C	C	C	C	C	C
I018/037	C	C	C	C	C	C
I018/000	=26h	=27h	=30h	=31h	=32h	34h
I018/001					C	
I018/005						C
I018/016						
I018/017						
I018/018						
I018/019						
I018/028						
I018/030						
I018/025						
I018/027						
I018/029						
I018/002						C
I018/006	C	C				
I018/007						
I018/008						
I018/009						
I018/010						
I018/011						
I018/014						
I018/015						
I018/020			C	O	O	
I018/021			O			
I018/022			C			
I018/023			C			C
I018/004						
I018/031						
I018/032						
I018/033						
I018/034						
I018/035						
I018/012						
I018/013						

Data item	GICB Service			
	GICB_ extraction	Cancel_ GICB_ extraction	GICB_ extraction_ ack	GICB_ response
I018/036	C	C	C	C
I018/037	C	C	C	C
I018/000	=40h	=41h	=42h	=43h
I018/001			C	C
I018/005	C	C	C	C
I018/016				
I018/017				
I018/018				
I018/019				
I018/028	O			
I018/030	O			
I018/025	C	O	O	C
I018/027	C			C
I018/029				O
I018/002	O			C
I018/006				
I018/007				
I018/008				
I018/009				
I018/010				
I018/011				
I018/014				
I018/015				
I018/020				
I018/021				
I018/022				
I018/023				
I018/004				
I018/031				
I018/032				
I018/033				
I018/034				
I018/035				
I018/012				
I018/013				