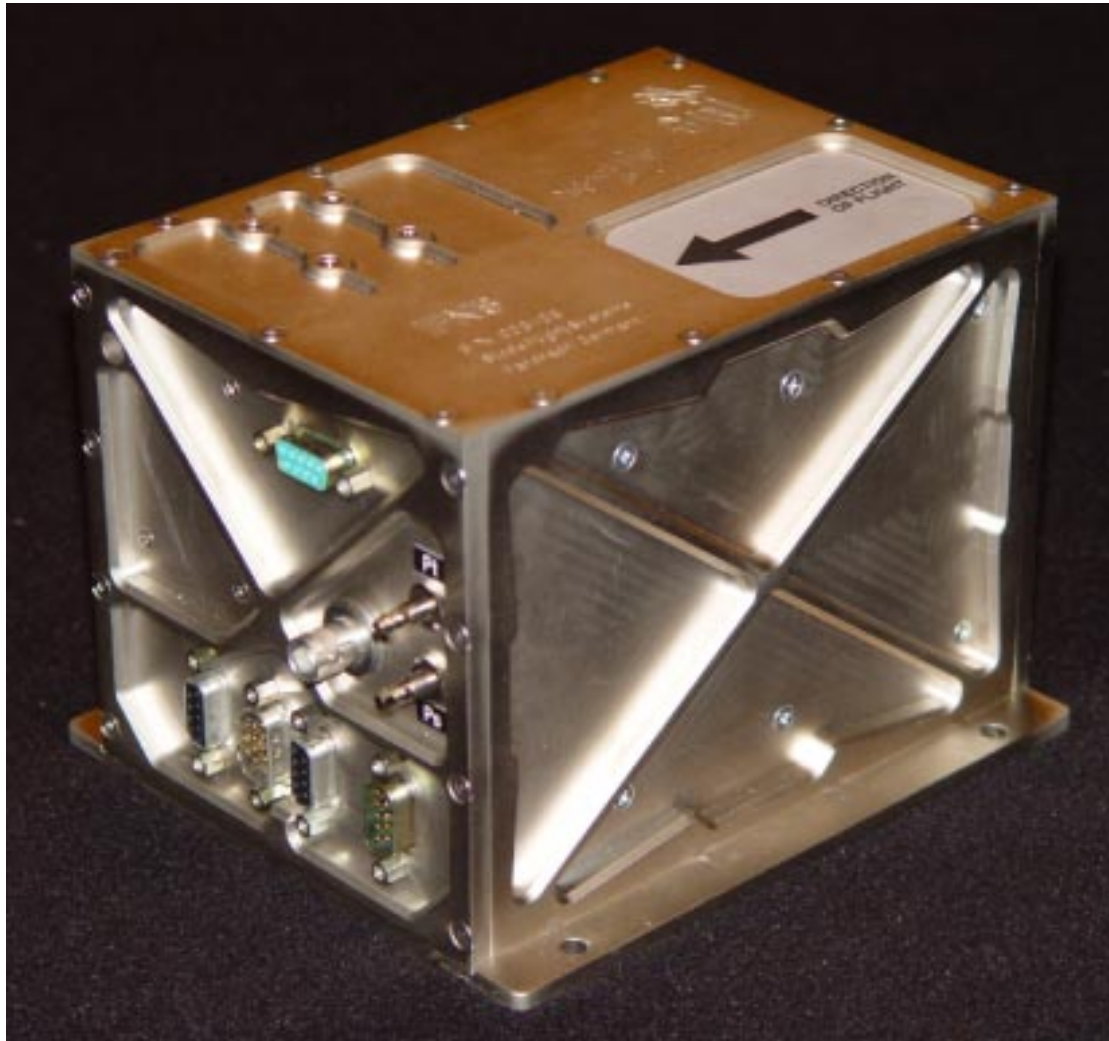


Integrated Flight State and Navigation Sensor (IFNS) CANaerospace Interface Definition

Driven by
CAN
Aerospace

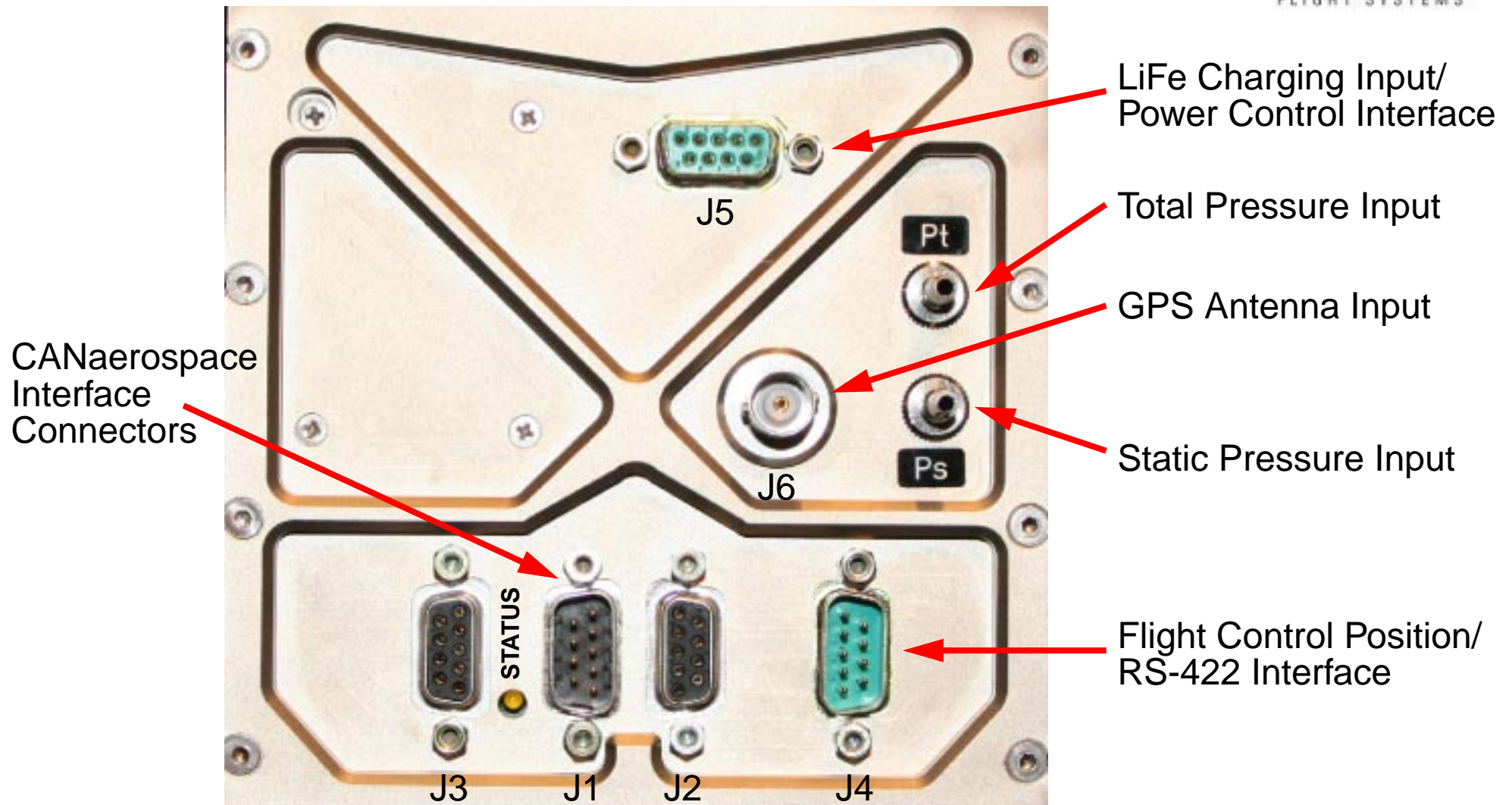


IFNS Overview



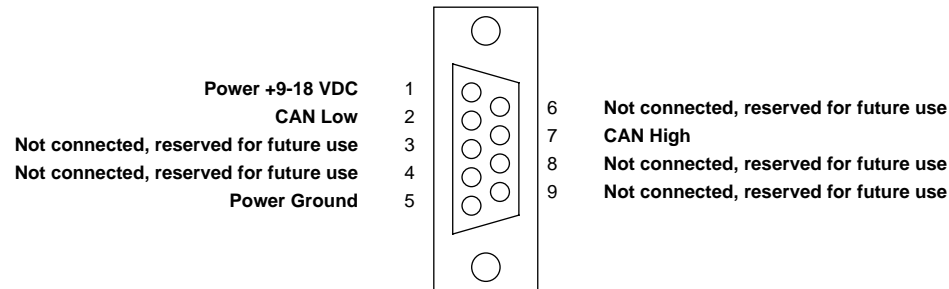
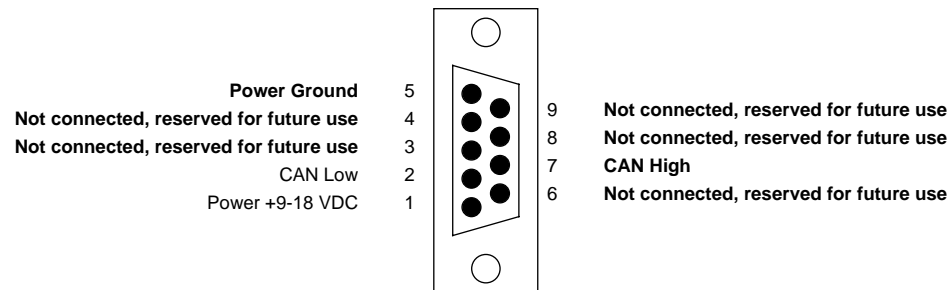
- Provides 3-axis angular rates, linear accelerations, magnetic course, pitch/roll angle and GPS data at 50Hz
- 12-channel GPS receiver
- Optional 3-axis control position pickoff input
- 9-18VDC power supply according to EN2282
- CANaerospace interface
- Internal LiFe power pack for 5 hr. autonomous operation
- EMC-sealed aluminum housing
- Mechanical dimensions: 165x120x124mm
- Weight: 1.7kg

IFNS Frontpanel Connectors

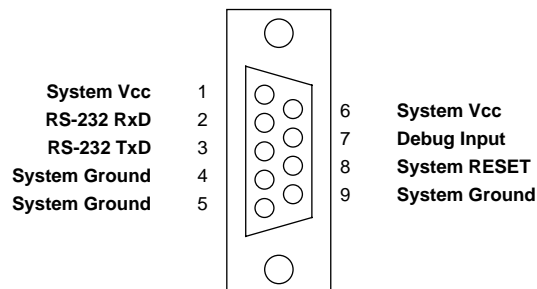


IFNS CANaerospace Interface Connector Pinout

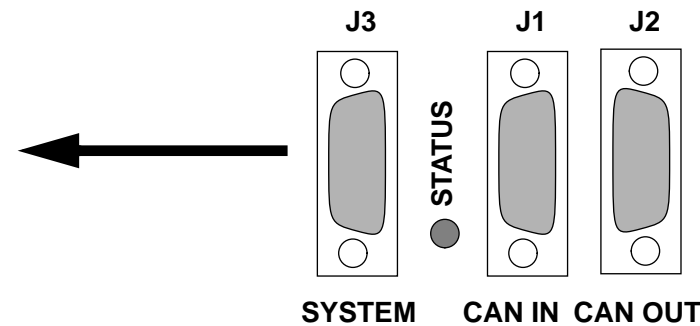
CAN IN/OUT



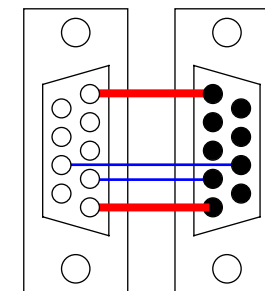
SYSTEM



During normal operation, the STATUS LED flashes at 0.5 Hz



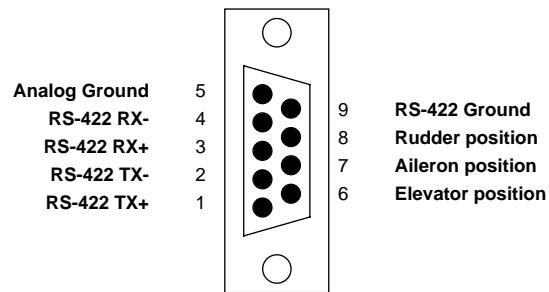
SYSTEM connector used for factory test only (do not connect)



Internal CAN IN/OUT connections

J4/J5 Connector Pinout

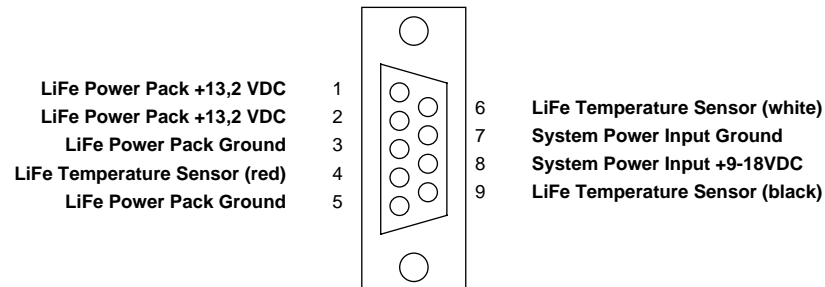
J4



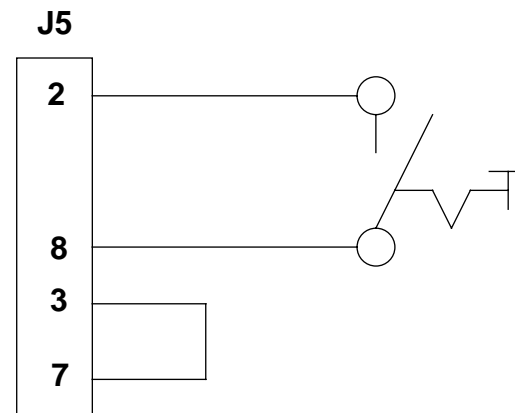
RS-422 connection
MicroINS Port C

Flight control position inputs
5V max. against pin #5 (no overvoltage protection)

J5



External Power Switch Connection



IFNS CANaerospace Data (1)

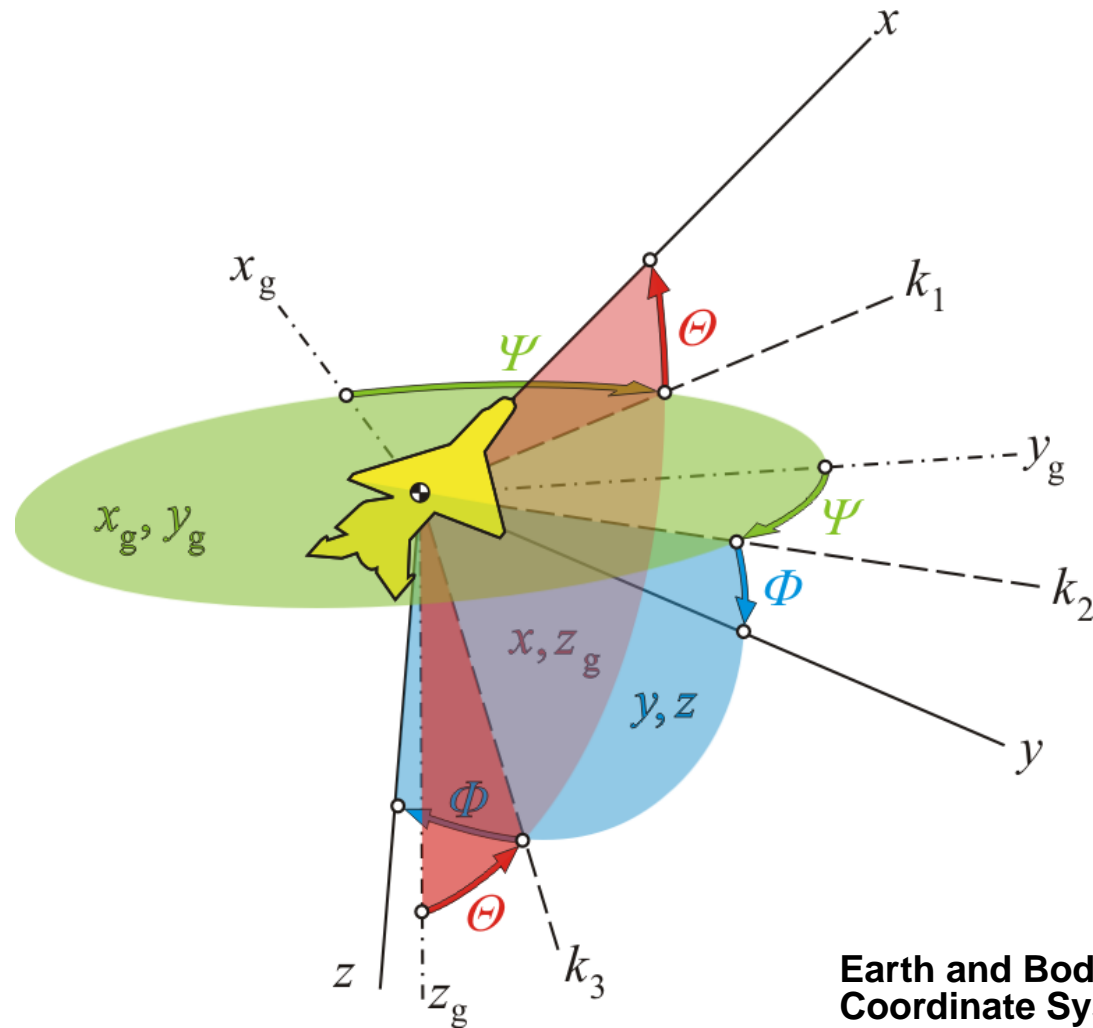
Message Node-ID	CANaerospace Identifier	Unit/Range	Data Type	Description	Service Code
2	300	+/- 98.0665 m/s ²	AS_FLOAT	Body Longitudinal Acceleration	SSTAT
2	301	+/- 98.0665 m/s ²	AS_FLOAT	Body Lateral Acceleration	SSTAT
2	302	+/- 98.0665 m/s ²	AS_FLOAT	Body Normal Acceleration	SSTAT
2	303	+/- 3.4907 rad/s	AS_FLOAT	Body Pitch Rate (+/- 200 deg/s)	SSTAT
2	304	+/- 3.4907 rad/s	AS_FLOAT	Body Roll Rate (+/- 200 deg/s)	SSTAT
2	305	+/- 3.4907 rad/s	AS_FLOAT	Body Yaw Rate (+/- 200 deg/s)	SSTAT
2	306	0 to 100%	AS_FLOAT	Rudder Position (flight control pickoff option only)	0
2	308	0 to 100%	AS_FLOAT	Elevator Position (flight control pickoff option only)	0
2	309	0 to 100%	AS_FLOAT	Left Aileron Position (flight control pickoff option only)	0
2	310	0 to 100%	AS_FLOAT	Right Aileron Position (flight control pickoff option only)	0

IFNS CANaerospace Data (2)

Message Node-ID	CANaerospace Identifier	Unit/Range	Data Type	Description	Service Code
2	311	+/- 1.5708 rad	AS_FLOAT	Body Pitch Angle	SSTAT
2	312	+/- 1.5708 rad	AS_FLOAT	Body Roll Angle	SSTAT
2	315	0 to 102.89 m/s	AS_FLOAT	Indicated Airspeed (0-200kts)	SSTAT
2	320	-305 to +18.288 m	AS_FLOAT	Baro-Inertial Altitude	SSTAT
2	321	0.0000 to 6.2832 rad	AS_FLOAT	Body heading angle (0-360 deg)	SSTAT
2	1036	+/- 90.0 deg	AS_FLOAT	GPS latitude	SSTAT
2	1037	+/- 180.0 deg	AS_FLOAT	GPS longitude	SSTAT
2	1038	-305 to +18.288 m	AS_FLOAT	GPS height above ellipsoid	SSTAT
2	1208	0 to 4294967295 s	AS_ULONG	GPS Time-of-Week	SSTAT
2	1130	-514 to +514 m/s	AS_FLOAT	East Velocity	SSTAT
2	1131	-514 to +514 m/s	AS_FLOAT	North Velocity	SSTAT
2	1132	-514 to +514 m/s	AS_FLOAT	Vertical Velocity	SSTAT

IFNS Axis Convention according to ISO 1151 (1)

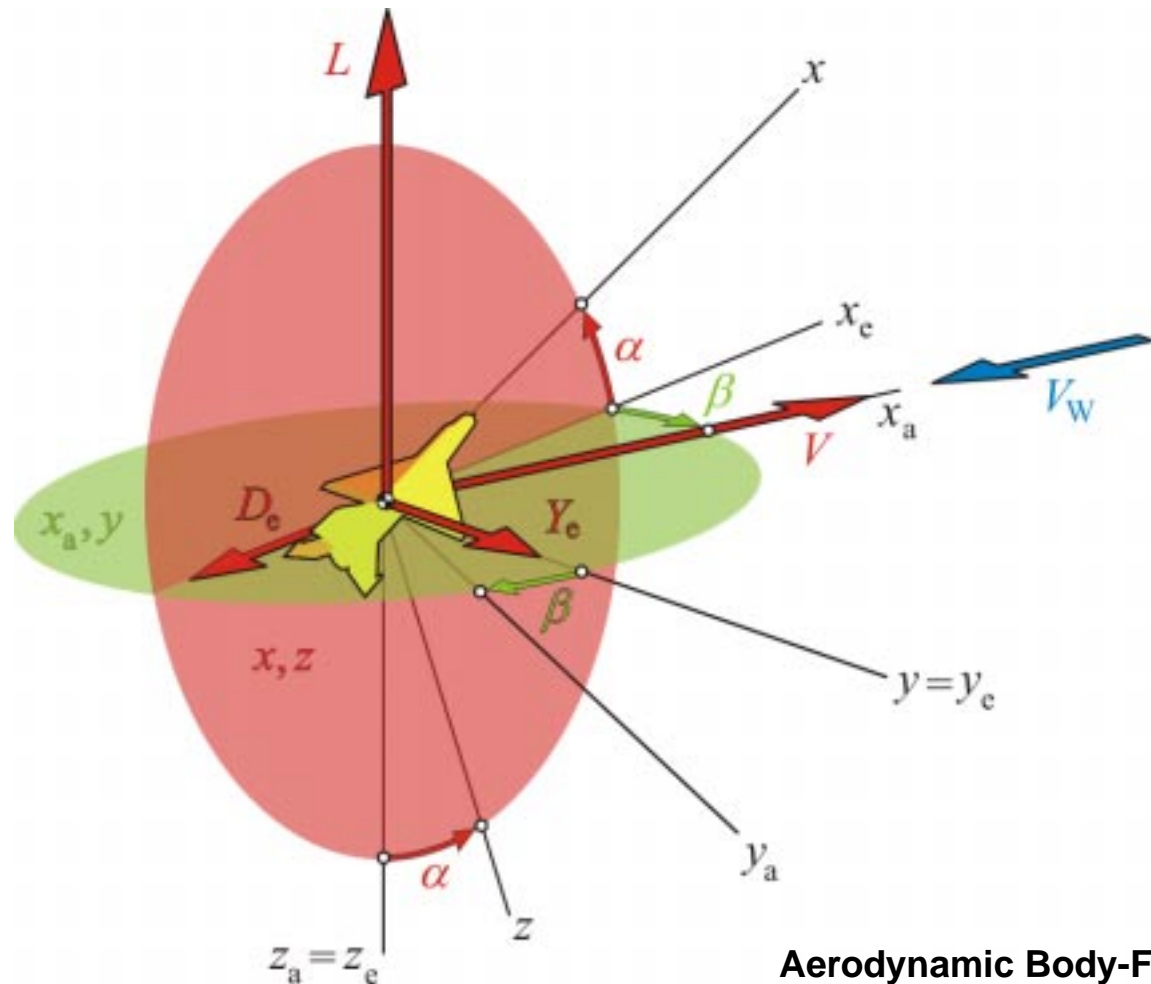
Symbol	Definition
x, y, z	Body axis system
x_a, y_a, z_a	Airpath axis system
k_1, k_2, k_3	Flightpath axis system
Θ	Pitch angle
Φ	Roll angle
Ψ	Heading angle



Earth and Body-Fixed
Coordinate System

IFNS Axis Convention according to ISO 1151 (2)

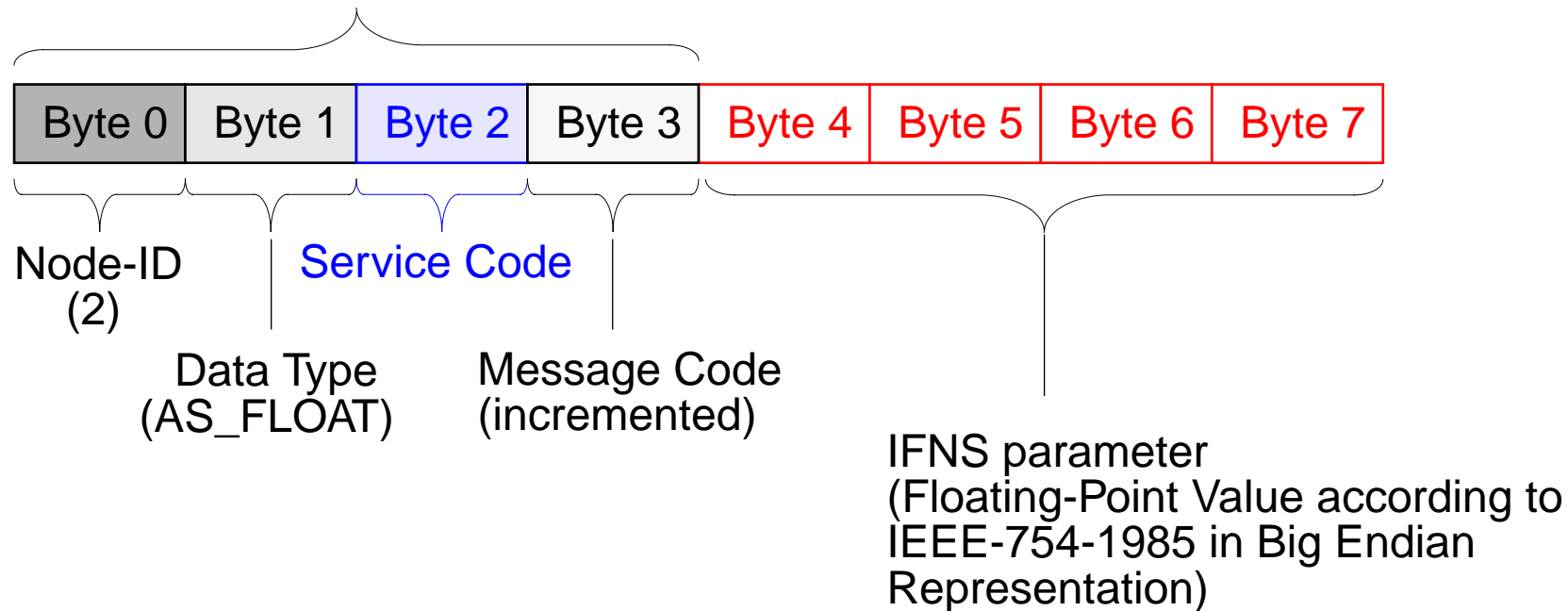
Symbol	Definition
x, y, z	Body axis system
x_a, y_a, z_a	Airpath axis system
k_1, k_2, k_3	Flightpath axis system
x_e, y_e, z_e	Intermediate axis system
V	Velocity vector
L	Lift vector
Y_e	Transverse force vector
D_e	Drag vector
α	Angle of attack
β	Angle of sideslip
Θ	Pitch angle
Φ	Roll angle
Ψ	Heading angle



**Aerodynamic Body-Fixed
Coordinate System**

IFNS Analog CANaerospace Message Encoding

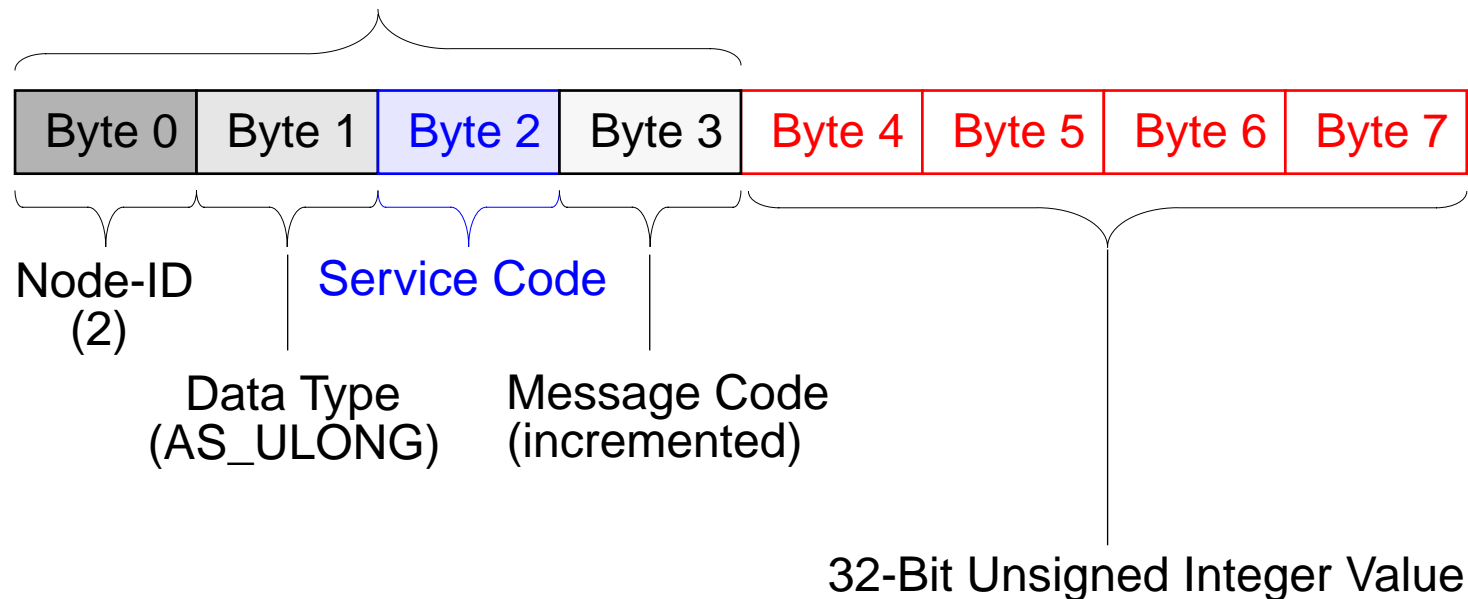
CANaerospace message header



- All IFNS parameters (except time-of-week) are transmitted in AS_FLOAT format.

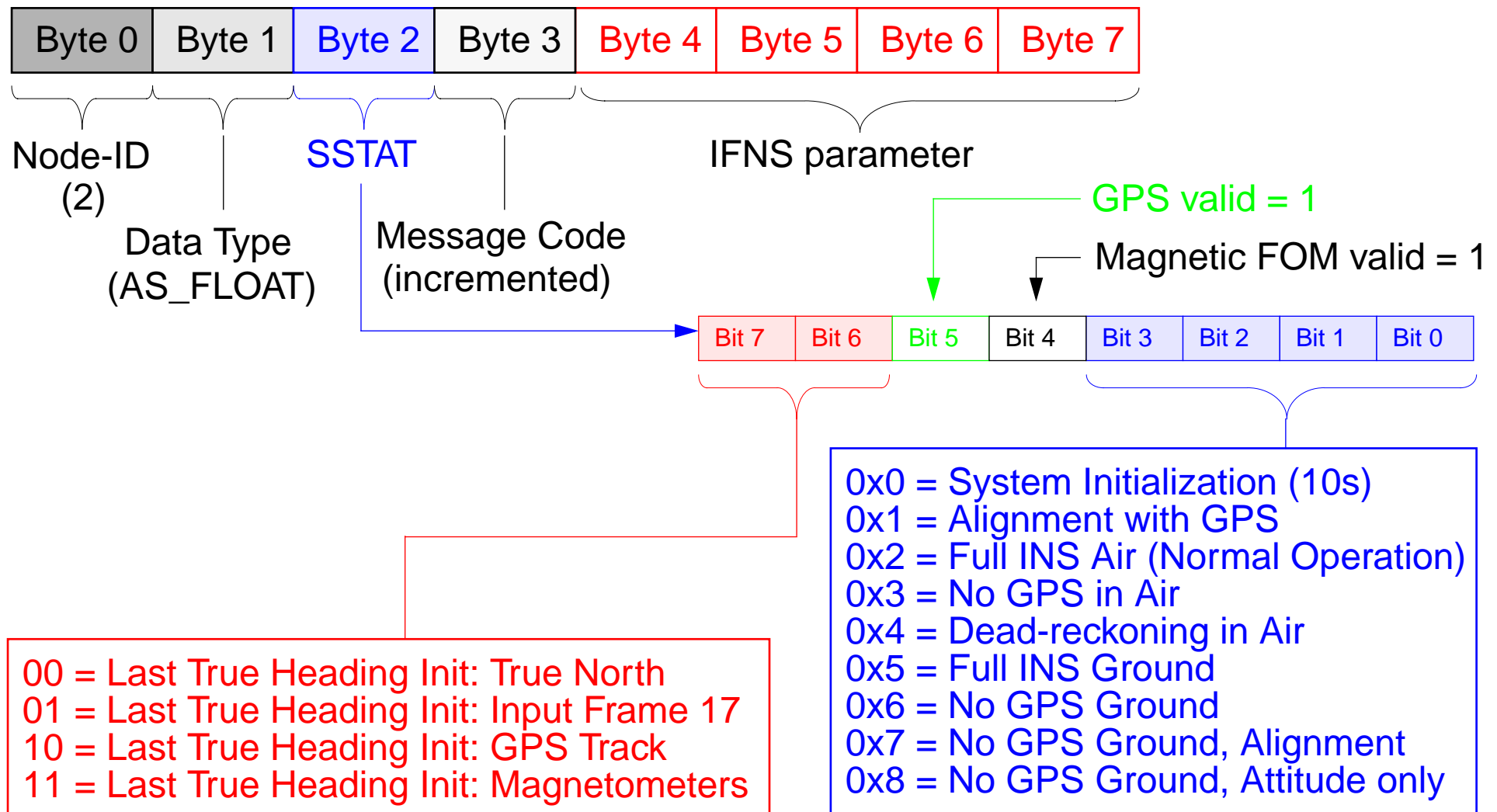
IFNS Time-of-Week CANaerospace Message Encoding

CANaerospace message header



- The IFNS Time-of-Week parameter is transmitted in AS_ULONG format.

IFNS CANaerospace Message Service Code Encoding (SSTAT)



IFNS Node Service Request Interface (1)

- Identification Service (IDS):

CANAerospace Data Field Description	Node Service Request	Node Service Response	Remarks
Node-ID	2	2	IFNS Node-ID = 2
Data Type	AS_NODATA (0)	AS_UCHAR_4 (16)	See CANaerospace specification for data type description
Service Code	IDS (0)	IDS (0)	Identification Service code = 0
Message Code	Standard Information Request (0)	NS_OK (0) or NS_INVALID_MODE (-3)	NS_INVALID_MODE is returned if request type is not Standard Information
Data Bytes	n.a.	Byte 0= H/W Rev. Byte 1= S/W Rev. Byte 2= 0 Byte 3 = 0	Hardware Revision (i.e. \$12 = V1.2) Software Revision (i.e. \$3B = V3.11) Identifier Distribution (0 = Default) Header Type (0 = Standard)

- Node Service Channel: 0 (Request CAN-ID = 128, Response CAN-ID = 129)

IFNS Node Service Request Interface (2)

- Control Position Send Service (CPS):

CANaerospace Data Field Description	Node Service Request	Node Service Response	Remarks
Node-ID	2	n.a.	IFNS Node-ID = 2
Data Type	AS_NODATA (0)	n.a.	See CANaerospace specification for data type description
Service Code	CPS (105)	n.a.	Control position send service code = 105
Message Code	0	n.a.	Connectionless service
Data Bytes	n.a.	n.a.	Connectionless service

- Node Service Channel: 0 (Request CAN-ID = 128, Response CAN-ID = 129)
- This service starts transmission of the optional control surface position CANaerospace identifiers 306-310.