

NEW PROPOSED SENSOR FUNCTIONS

4.5 Sensor Data

4.5.1 Overview

The MGCU should be capable of gathering sensor data in the galley network group. This is accomplished via:

- Information provided by galley network members using the SENSOR_DATA messages.

The mechanism for accomplishing the sensor data gathering function is encapsulated into two separate messages. The SENSOR_DATA messages are information-delivery messages that define a sensed condition of a node. The SENSOR_CMD message is a mechanism for invocation of specific sensor commands in support of the aircraft data collection functions.

4.5.2 Commands Needed

Refer to Section XXXXXX, Message Table, for a complete message list.

Table Error! No text of specified style in document.-1 – Diagnostic Messages

Message Name	Device	
	Send	Receive
SENSOR_CMD	MGCU_SENSOR	All
SENSOR_DATA	GAIN	MGCU_SENSOR

The MGCU should be able to send the SENSOR_CMD at any time, except when the MGCU is in the 'Initialization' or 'Error' state.

The GAINs should be capable of receiving and processing the SENSOR_CMD at any time, in any state, except the 'Initialization' state.

A SENSOR_CMD could function as a broadcast message. Then every GAIN should send the sensor status when receiving a SENSOR_CMD with Device_Id set to 0. The Device_Id in the GAIN message should be set equal to the pin programming.

6.8.2 SENSOR_DATA Message

6.8.2.1 Introduction

Only GAIN may send message SENSOR_DATA to any other node; i.e., MGCU or GAIN.

6.8.2.2 Signals

Signal Name (Message "SENSOR_DATA")	Comments
SENSOR_DATA	Sensor data collected by GAIN

6.8.2.3 Data Field Format

Data Length Code (DLC) = Variable.

The content of the SENSOR_DATA message is shown in XXXXX **Error!**
Reference source not found..

Table Error! No text of specified style in document.-3 – SENSOR_DATA Message Format

Byte	Data	Designation
0	Sensor_ID MSB	Bits: 8 Coding: UCHAR Units: sensor num. Resolution: 1 Range: 1-255
	Sensor_ID	
	Sensor_ID	
	Sensor_ID	
	Sensor_ID	
	Sensor_ID	
	Sensor_ID	
	Sensor_ID LSB	
1	Sensor_Data	Sensor Data
	Sensor_Data	
	Sensor_Data	
	Sensor_Data	
	Sensor_Data	
	Sensor_Data	
	Sensor_Data	

The GAIN should be able to send the SENSOR_DATA at any time, except when the GAIN is in the 'Initialization' state.

The MGCUs should be capable of receiving and processing the SENSOR_DATA at any time, in any state, except the 'Initialization' state.

NEW PROPOSED SENSOR CONFIGURATION DATA

7.12 Sensor Data

This data block defines the needed parameters to define the sensors on a GAIN or MGCU. Each GAIN or MGCU may have a different number of sensors; therefore, a first parameter is needed to define the number of sensors contained in the GAIN or MGCU.

Table Error! No text of specified style in document.-4 – Configuration Data Block – Sensor Data (1)

Block Num.	Parameter Num.	Sub-Parameter Num.	Data	Designation
13	0	0	NUMBER_OF_SENSORS	Bits: 8 Coding: BIN Units: number of sensors Resolution: 1 Range: 0-255

Then, for each sensor, S_i , the following parameter data block should be defined (where parameter number S_i should be $1 \leq S_i \leq \text{NUMBER_OF_SENSORS}$).

$$\text{Engineering Units} = (\text{sensor_data_value} * \text{sensor_multiplier}) + \text{sensor_offset}$$


COMMENTARY

Please note that the number of different sensors (i.e., value of S_i) may be different for each GAIN or MGCU.

Table Error! No text of specified style in document.-5 – Configuration Data Block – Sensor Data (2)

Block Num.	Parameter Num.	Sub-Parameter Num.	Data	Designation
13	S_i	0	SENSOR_NUMBER	Bits: 8 Coding: BIN Units: sensor num. Resolution: 1 Range: 1-255 0: Not applicable

Block Num.	Parameter Num.	Sub-Parameter Num.	Data	Designation																																	
13	S _i	1	SENSOR_TYPE	Bits: 8 Coding: Signed BIN Units and Resolution vary by Physical Unit as shown below. <table border="1" data-bbox="914 359 1417 747"> <thead> <tr> <th>Value</th> <th>Physic Unit</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Reserved</td> <td>Reserved</td> </tr> <tr> <td>1</td> <td>Temperature</td> <td>°C</td> </tr> <tr> <td>2</td> <td>Pressure</td> <td>psi</td> </tr> <tr> <td>3</td> <td>Rotational Speed</td> <td>RPM</td> </tr> <tr> <td>4</td> <td>Current</td> <td>Amps</td> </tr> <tr> <td>5</td> <td>Voltage</td> <td>Volts</td> </tr> <tr> <td>6</td> <td>Time</td> <td>Seconds</td> </tr> <tr> <td>7</td> <td>Percent</td> <td>Percent</td> </tr> <tr> <td>8</td> <td>Percent Open</td> <td>Percent</td> </tr> <tr> <td>7-255</td> <td>Reserved</td> <td>Reserved</td> </tr> </tbody> </table>	Value	Physic Unit	Unit	0	Reserved	Reserved	1	Temperature	°C	2	Pressure	psi	3	Rotational Speed	RPM	4	Current	Amps	5	Voltage	Volts	6	Time	Seconds	7	Percent	Percent	8	Percent Open	Percent	7-255	Reserved	Reserved
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13	S _i	2	SENSOR_LOCATION	Bits: 8 Coding: BIN <table border="1" data-bbox="768 825 1279 1373"> <thead> <tr> <th colspan="2">SENSOR_LOCATION Coding</th> </tr> <tr> <th>Code</th> <th>Device standard</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Valve</td> </tr> <tr> <td>1</td> <td>Pump</td> </tr> <tr> <td>2</td> <td>Cavity</td> </tr> <tr> <td>3</td> <td>Compressor</td> </tr> <tr> <td>4</td> <td>Fan</td> </tr> <tr> <td>5</td> <td>Air inlet</td> </tr> <tr> <td>6</td> <td>Air Exhaust</td> </tr> <tr> <td>7</td> <td>Fan Stator</td> </tr> <tr> <td>8</td> <td>Controller</td> </tr> <tr> <td>9</td> <td>Refrigerant</td> </tr> <tr> <td>10</td> <td>Tank</td> </tr> <tr> <td>11</td> <td>Water</td> </tr> <tr> <td>12-255</td> <td>Reserved</td> </tr> </tbody> </table>	SENSOR_LOCATION Coding		Code	Device standard	0	Valve	1	Pump	2	Cavity	3	Compressor	4	Fan	5	Air inlet	6	Air Exhaust	7	Fan Stator	8	Controller	9	Refrigerant	10	Tank	11	Water	12-255	Reserved			
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Block Num.	Parameter Num.	Sub-Parameter Num.	Data	Designation
13	S _i	3	SENSOR_REPORTING_RATE	Bits: 32 Coding: Unsigned FLOAT Units: Multiplication Factor  Resolution: 1 Range: $(2^{-1}/2^{22})2^{-126} \dots +127$ 0: Not applicable
13	S _i	3	SENSOR_MULTIPLIER	Bits: 32 Coding: Signed FLOAT Units: Multiplication Factor Resolution: 1 Range: $\pm(2^{-1}/2^{22})2^{-126} \dots +127$ 0: Not applicable
13	S _i	4	SENSOR_OFFSET	Bits: 32 Coding: Signed FLOAT Units: Multiplication Factor Resolution: 1 Range: $\pm(2^{-1}/2^{22})2^{-126} \dots +127$ 0: Not applicable