ARINC 429 Arduino Shield

Description
This shield is an ARINC 429 interface for Arduino. The circuit features two ARINC 429 inputs and one ARINC 429 output along with additional multi-purpose inputs / outputs.

The shield may be plugged onto Arduino Uno or Nucleo boards and provides a 26 pins HE-10 connector to the external world. The HE-10 connector enables the use of a SUB-D25 plug if wanted.

A Gaïa MGD-02 28V -> 5V DC-DC power converter may be soldered by the user if necessary. The converter is then able to power the shield and the Arduino board. Otherwise, the shield is powered by Arduino.

The board may be used as a protocol converter, bridge (2xA429 -> A429, RS422 <-> A429 etc...), test bench, PC interface with aeronautical equipment etc.

Features
The shield uses an ARINC 429 transceiver chip (HI-3593 from Holt, product page here) clocked at 16 Mhz. The communication with the Arduino board is done by SPI.

ARINC 429
2 inputs: high speed or low speed
1 output: high speed or low speed

RS422
One full duplex RS422 line interface (MAX488)

Multipurpose I/O
4 analog inputs - 2 digital inputs - 1 digital output

Board Connections
The pinout of the HE-10 connector (26 pins) is as following:

<table>
<thead>
<tr>
<th>HE10</th>
<th>SUB25</th>
<th>SUB25</th>
<th>HE10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>A429 RX1 H</td>
<td>A429 RX1 GND</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>A429 RX1 L</td>
<td>A429 RX2 H</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>A429 RX2 GND</td>
<td>A429 RX2 L</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>A429 TX H</td>
<td>A429 TX GND</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>A429 TX L</td>
<td>RS422 TX H</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>RS422 TX GND</td>
<td>RS422 TX L</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>RS422 RX H</td>
<td>RS422 RX GND</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>RS422 RX L</td>
<td>AIN1</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>AIN2</td>
<td>AIN3</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>AIN4</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>0V/OPEN OUT</td>
<td>0V/OPEN IN1</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>0V/OPEN IN2</td>
<td>28V (+)</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>28V (-)</td>
<td>GND</td>
</tr>
</tbody>
</table>

Notes:
- A429 RX : ARINC 429 receive port
- A429 TX : ARINC 429 transmit port
- RS422 RX : RS422 receive port
- RS422 TX : RS422 transmit port
- H : hot point
- C : cold point
- AIN: analog input port (10 bits, 0V to 5V)
- 0V/OPEN IN: digital input (0 to 28V)
- 0V/OPEN OUT: digital output, open drain (28V)
- 28V (+) and 28V (-): main power supply
- GND : ground
**NAVEOL Nav429 1.0 Arduino Shield interface**

**Notes:**
- The output « 0V/OPEN Out » is connected to a MOSFET open drain. The associated gate is “DOUT0” (with inverted logics).
- The 2 digital inputs DIN1 and DIN2 are tied to IOREF through 2.2k resistors and schottky diodes.
- The RS-485 RX (0) pin is “ORed” with the bootloader UART RX of the Arduino.

**References and documentation:**
- The pinout of the Arduino Uno board can be found [here](#).
- The datasheet of the Holt HI-3593 can be found [here](#).
- The Gaïa DC-DC converter can be found [here](#).
- Free software for Arduino Uno and Nucleo board is available, please contact NAVEOL.
  - Library (*.cpp, *.h)
  - Autotest firmware