

RSTRANS with imbedded frequency counter

RSTRANS is a digital communication module for high-speed cabled data transmission between remote instruments and shipboard or shore side data acquisition systems. A remote instrument uses *RSTRANS* (Remote Serial TRANSeiver) to communicate with the ship-board master computer. The master computer and the remote instrument are usually linked by an electro-mechanical cable. *RSTRANS* accepts requests for data transmitted over this communication link and returns the requested data. Its operation is completely controlled by the master computer. *RSTRANS* passes requests for data to the Serial Instrument Bus and receives a response from an Analog-to-Digital converter board, a compass, or a frequency counter (*SCOUNT*) with a datum, depending on the requested channel.

Communication between *RSTRANS* and the master computer is serial and requires only one pair of conductors. The encoding uses return-to-zero Manchester II and signals are injected into the cable with RS-485 drivers. Signals are received with RS-485 receivers for cables up to 1000 m long and by a proprietary differential receiver with cable-compensation gain for cables up to 3000 m long. A single jumper selects between these two modes of reception. *RSTRANS* is energized by a single +5V DC supply (5%). An on-board 3.3V regulator provides the supply for the Xilinx chip and this voltage is also available to peripheral devices via 3 conductors on the instrument bus. A 24 MHz, temperature compensated, crystal oscillator, accurate to 1.5ppm over the 0-50°C range, regulates the telemetry and transfers on the instrument bus. This clock signal is also available to other devices in the form of a low-voltage differential signal.

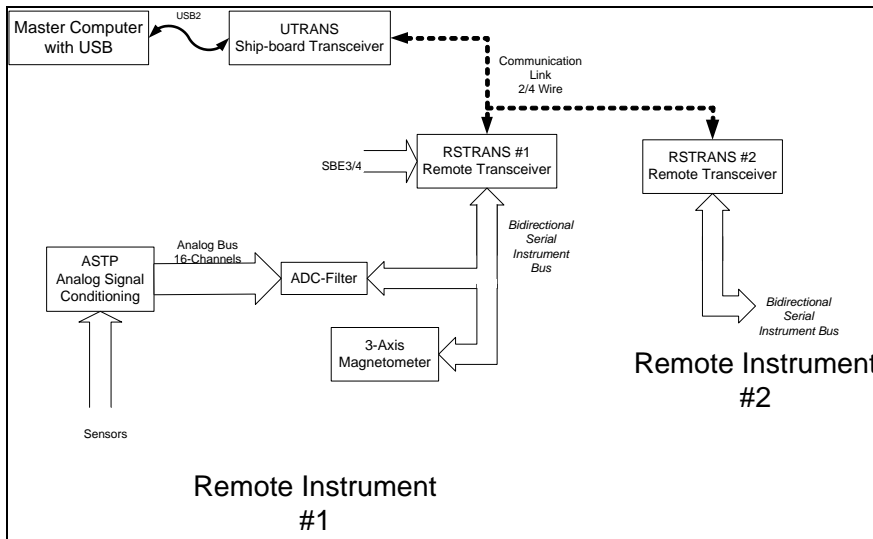


Figure 1. Overview of the ODAS system

In addition to tether communication and control of the serial instrument bus, the *RSTRANS* also supplies 2 channels of frequency counting support for a Sea-Bird SBE3 thermometer and a SBE4 conductivity sensors. The frequency estimates are 32-bit words with an absolute accuracy of 1.5 ppm or ± 1 count, whichever is larger. Typical counts are $O(10^6)$.

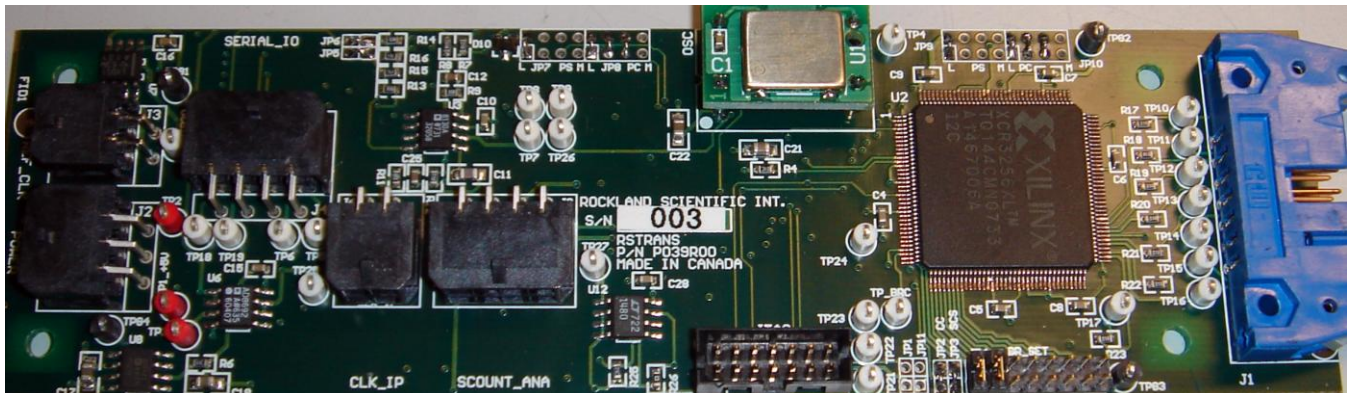


Figure 2. The *RSTRANS* board

Serial Communication Modes	Simplex (2-wire) and duplex (4-wire)
Serial Line Drivers	RS-485 centered on 2.5V
Serial Line Receivers	RS-485 centered on 2.5V and cable compensation differential receiver. User selectable.
Maximum Bit Rate times cable length	Less than 1.5×10^9 meter-bits/s
Encoding	Manchester II, 2-phase, return-to-zero
Conductors	2 for simplex bi-direction communication, 4 for full duplex communication, user selectable.
Clock	24 MHz, ± 1.5 ppm, 0-50°C, also available as low-voltage differential signal to other instruments.
Frequency Counting	2 channels, AC coupled waveforms larger than 0.1 V peak-to-peak. Absolute accuracy, ± 1.5 ppm or ± 1 count. Input range 10 Hz to 100 kHz. Typical counts are 5×10^5 and 1×10^6 at 6 and 3 kHz, respectively.
Power	+5VDC $\pm 5\%$, 12V DC is passed directly to Sea-Bird connector, J8.
Current	55 mA typical at 5VDC, depending on duty cycle of communication.
Power for other devices on the Instrument bus	3.3VDC, 250 mA max
Dimensions	15.24 cm x 4.44 cm

Connector List

J1 Serial Instrument Bus, IDC 0.1"	
1	Ground
2	Seq_Clk +
3	Seq_Clk -
4	Ground
5	Add_Clk
6	Add_En
7	Add
8	Data_Rdy
9	Data_En
10	Data
11	Data_Clk
12	Ground
13	+3.3V DC
14	+3.3V DC

J2 Power 6-pin Molex	
1	+5V DC in
2	+12V DC in
3	Ground
4	Ground
5	+3V DC out
6	Ground

J3 TXCO Reference Clock, 3pin DIN	
1	- REF_CLK
2	+ REF_CLK
3	Ground
4	Ground

J4 Com 8-pin Molex	
1	TX-
2	TX+
3	RX-
4	RX+
5	Driver_Enable
6	5V DC
7	Ground
8	Ground

J5 JTAG	
1	TDO
2	TCK
3	TMS
4	TDI
5	3.3V
6	Ground

J6 External Reference Clock Input	
1	Clk +
2	Clk -
3	Ground
4	Ground

J8 SeaBird I/O Connector	
1	+12V DC out
2	F_0 in
3	Ground
4	F_1 in (Ground)