A Tri-Axial Accelerometer Interface For The Transmission Of Impact Measurements

Figure 1 [1]

Figure 2 [2]

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General Athletic Accelerometer Applications

Figure 3 [3]: Rowing Application

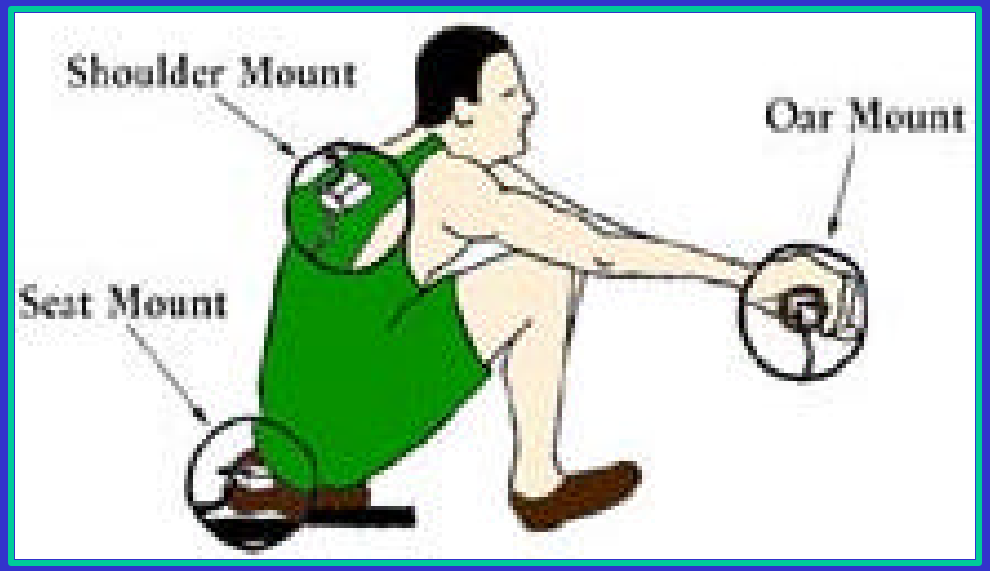


Figure 4 [4]: Hockey Application

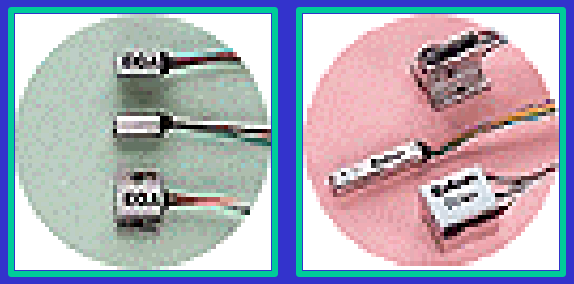
The Accelerometer

- What is an accelerometer?
- Defining Characteristics
  - ‘g’-rating
  - sensitivity
  - axes
- Choosing the proper accelerometer

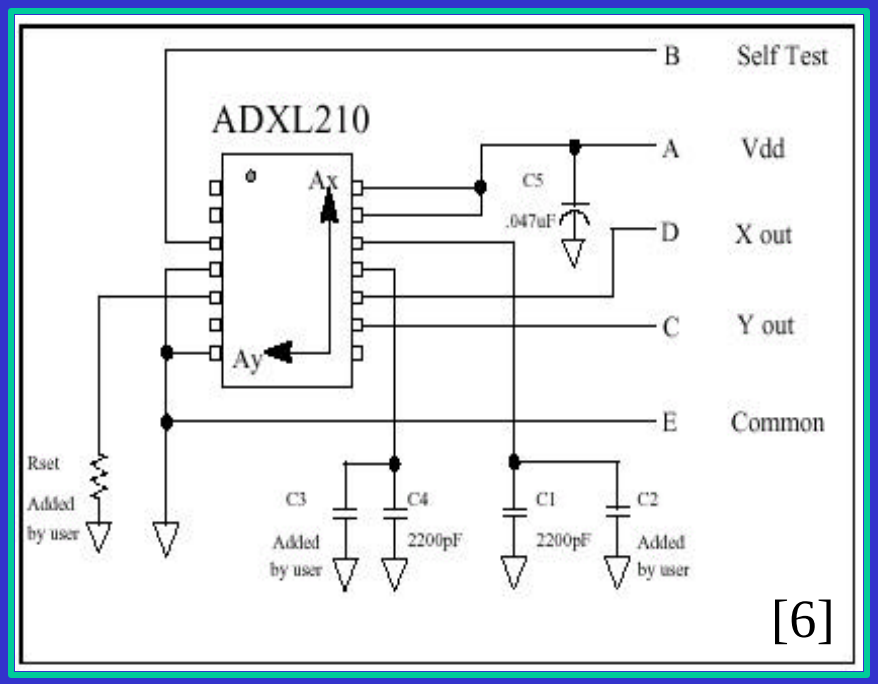
Entran Devices [5]

EGA Miniature Accelerometers

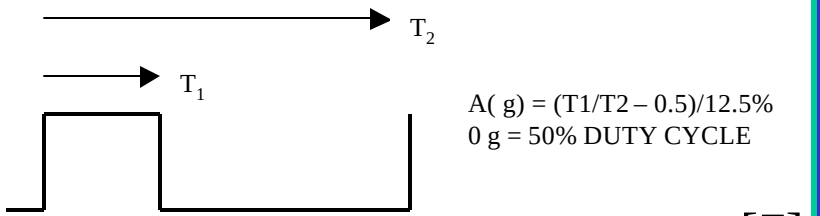
(3.56 x 3.56mm to12.7 x 12.7mm)



The Evaluation Board



[6]



[7]

[8]

$$\text{Period} = \frac{\text{Rset}(\Omega)}{125\text{M}\Omega}$$

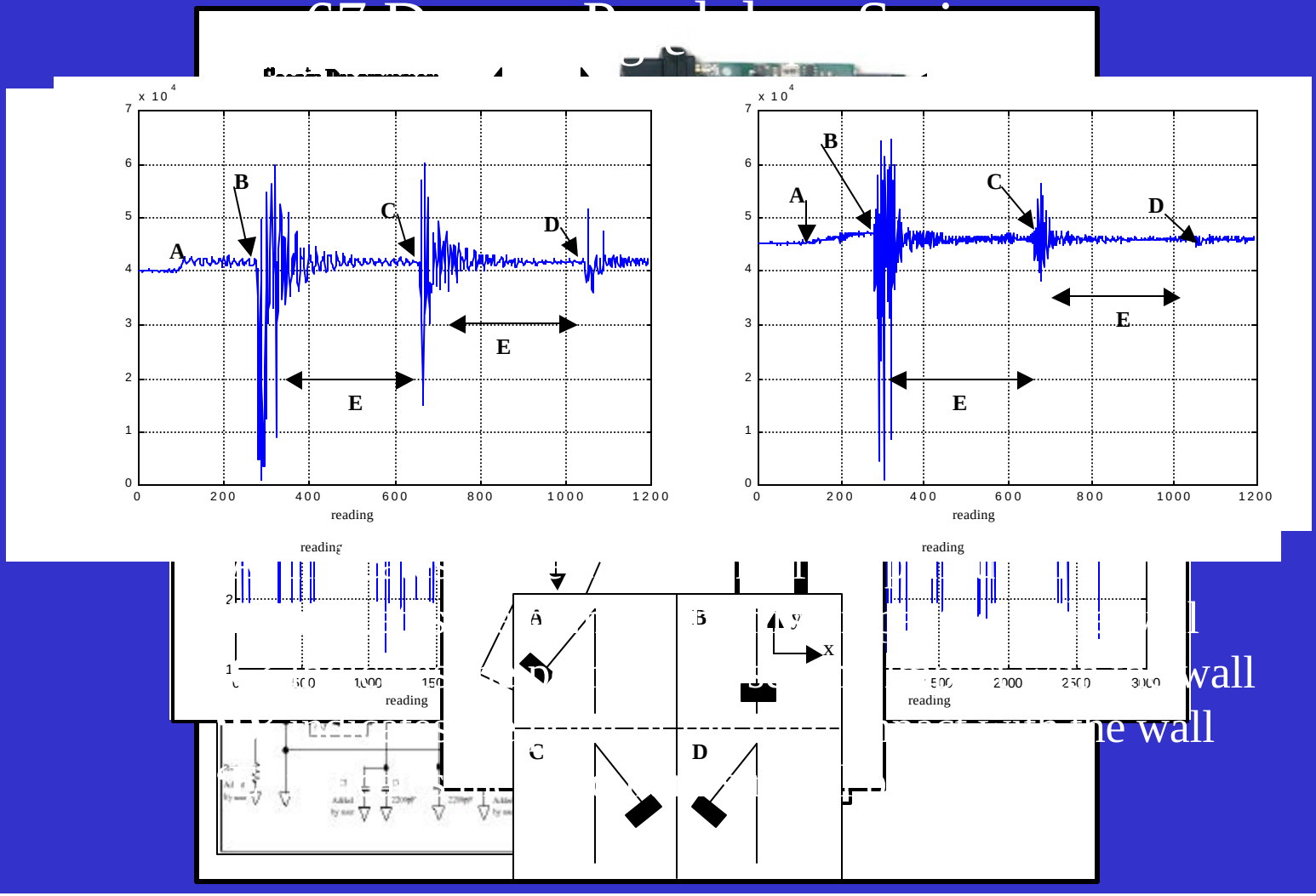
[9]

$$\text{Noise(rms)} = \left(500\,\frac{\mu g}{\sqrt{\text{Hz}}}\right) \times \sqrt{\text{BWx1.5}}$$

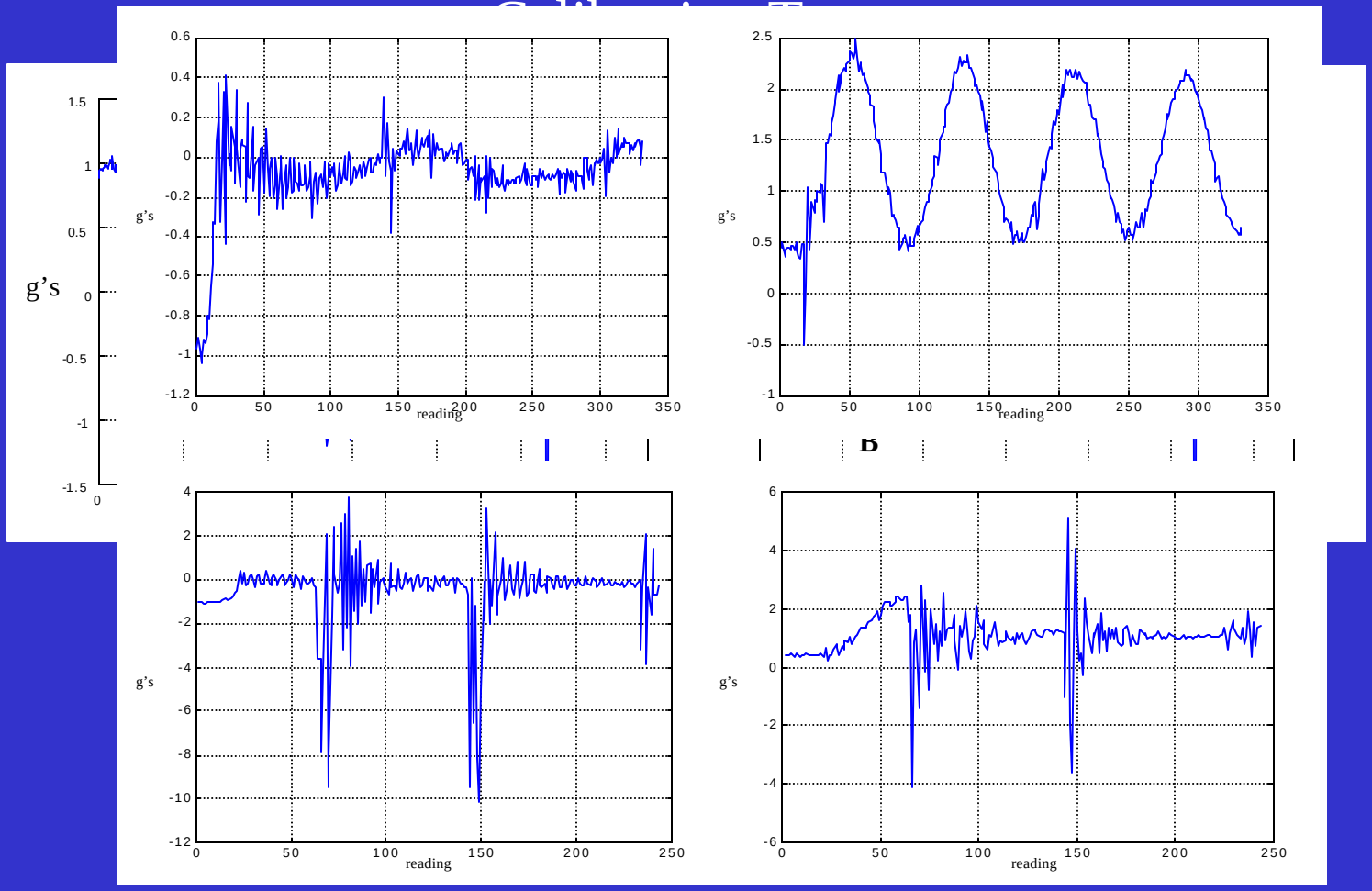
[10]

$$\text{F(3dB)} = \frac{1}{(2\pi(32\text{k}\Omega)\times C(2,3))} = \frac{5\,\text{pF}}{C(2,3)}$$

Accelerometer Data Evaluation



Accelerometer Data Evaluation (cont.)



Display Mechanism

Acceleration Display Mechanism	
Display	**Acceleration Range (g's)**
0	0 to .25
0*	.25 to .75
0**	.75 to 1.25
"	"
0**********	9.75 to 10.25
Overload	> 10.25

Transmission & Reception

Linx Technologies LC Series Wireless Data Modules

315 Hz Transmitter: 

[11]

315 Hz Receiver: 

[11]

Benefits:

- low cost
- low power consumption
- very compact


[11]

Other Transmission Considerations

- Choosing an Antenna

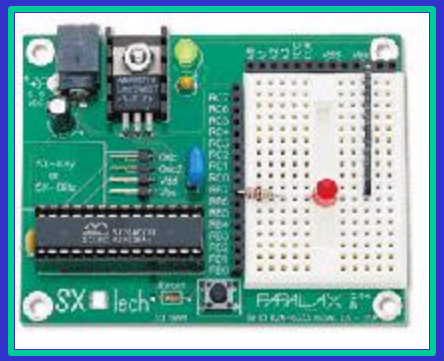
  The “Splatch”

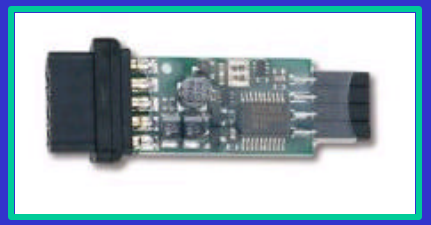
[12]

0.062” thick
(easily concealed)

- Data Encoding

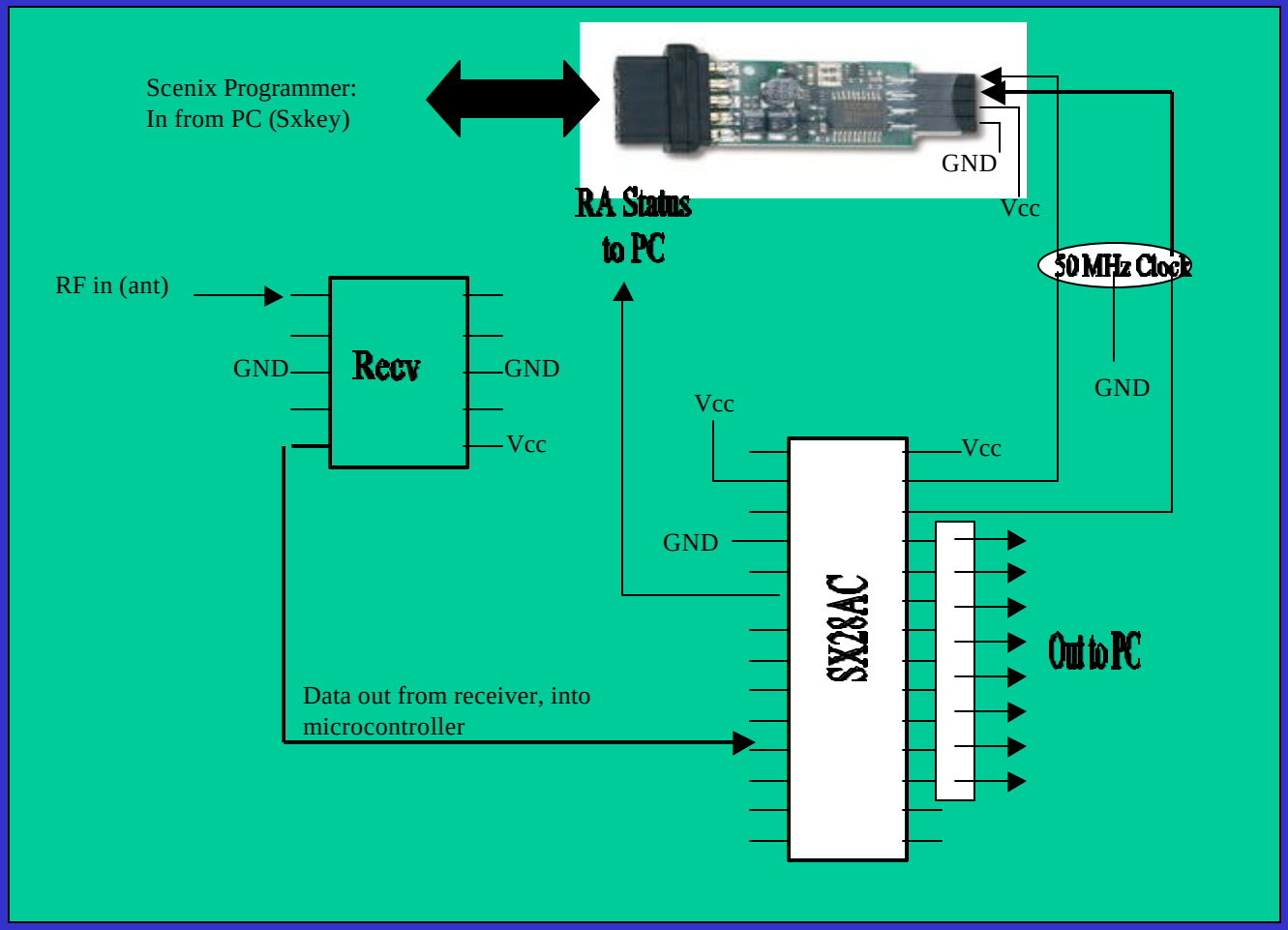
  The Scenix
  Microcontroller





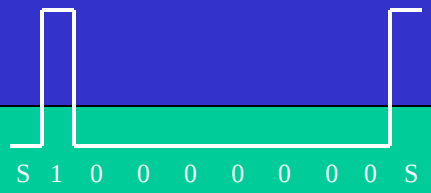
[13]

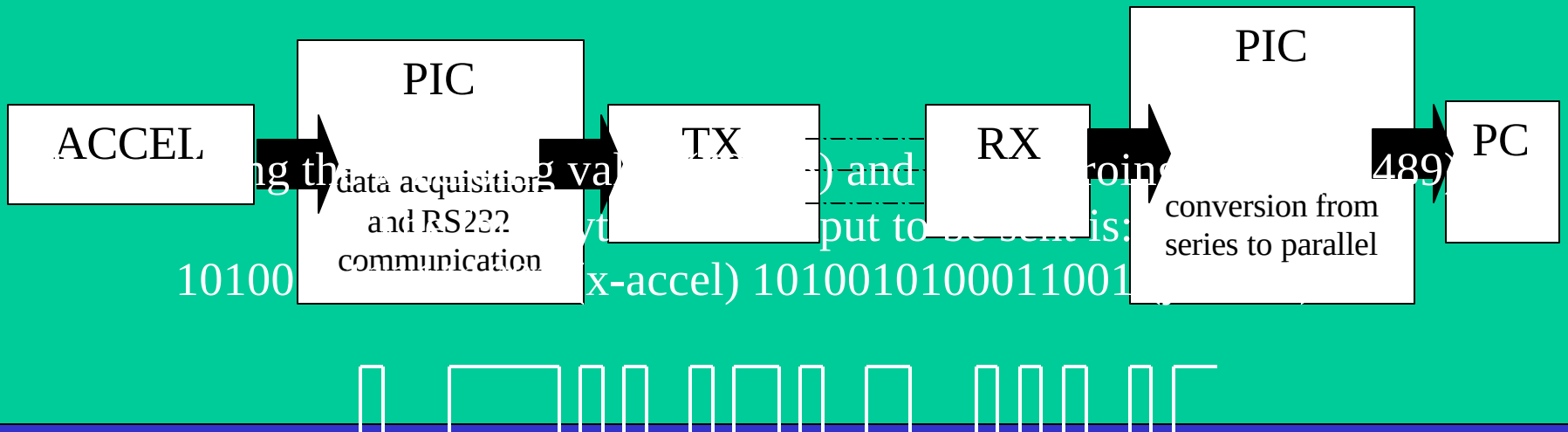
Transmission/Reception Eval Boards



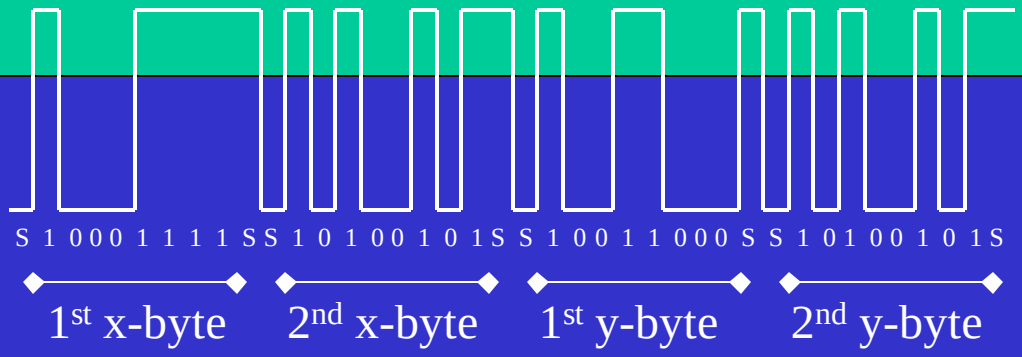
RS232 Communication

Transmitting the #1:





10100 (x-accel) 1010010100011001



Conclusions

- Preliminary filtering, scaling, & display mechanisms completed
- LC Series transmitter and receiver of sufficient caliber
- Transmission board capable of sending RS232 data across RF link
- Reception board capable of converting series to parallel
- Link must be established between the transmitter and receiver

The Future

Accelerometer applications within impact monitoring systems are numerous. I believe the future of this device lies in the development of wireless interface system compatible with each of the applicable environments - a universal accelerometer interface requiring only minor alterations when switching from one application to the next.

References

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