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Appendix A - Native Output of the Instruments

1. GPS

The native representation of the GPS is of NMEA output format with the following NMEA messages available:

$GPGGA - Global Positioning System Fix Data

$GPGLL - Geographic Position, Latitude/Longitude

$GPGSA – GNSS (Global Navigation Satellite System) DOP and Active Satellites

$GPGST - GNSS Pseudorange Error Statistics

$GPGSV - GNSS Satellites in View

$GPRMC - Recommended Minimum Specific GNSS Data

$GPRRE – Range Residual Message

$GPVTG – Course over ground and Ground Speed

$GPZDA - UTC Date / Time and Local Time Zone Offset

The GPGGA message contains detailed GPS position information, and is the most frequently used NMEA message, this message takes the following form:

$GPGGA,hhmmss.ss,ddmm.mmm,a,dddmm.mmm,b,q,xx,p.p,a.b,M,c.d,M,x.x,nnnn

hhmmss.ss = UTC of position

ddmm.mmm = latitude of position

a = N or S, latitude hemisphere

dddmm.mmm = longitude of position

b = E or W, longitude hemisphere

q = GPS Quality indicator (0=No fix, 1=Non-differential GPS fix, 2=Differential GPS fix, 6=Estimated fix)

xx = number of satellites in use

p.p = horizontal dilution of precision

a.b = Antenna altitude above mean-sea-level

M = units of antenna altitude, meters

c.d = Geoidal height

M = units of geoidal height, meters

x.x = Age of Differential GPS data (seconds since last valid RTCM transmission)

nnnn = Differential reference station ID, 0000 to 1023

2. COMPASS

The TCM2 standard output format is of NMEA format:

$C<compass>P<pitch>R<roll>

Appendix B   Setup and Acquisition of the ADCP

THE SERIAL BREAK
The serial break which is used to wake up the ADCP is sent by changing the 6^{th} bit (sets break enable) of the Line Control Register (LCR) that controls the data going on the Transmit Data (TD) and Receive Data (RD) lines. When active, the TD line goes into "Spacing" state which causes a break in the receiving UART. Setting this bit to '0' disables the Break.

Table 18 RS232 Registers

Base Address	DLAB	Read/Write	Abr.	Register Name
+ 0	=0	Write	-	Transmitter Holding Buffer
	=0	Read	-	Receiver Buffer
	=1	Read/Write	-	Divisor Latch Low Byte
+ 1	=0	Read/Write	IER	Interrupt Enable Register
	=1	Read/Write	-	Divisor Latch High Byte
+ 2	-	Read	IIR	Interrupt Identification Register
	-	Write	FCR	FIFO Control Register
+ 3	-	Read/Write	**LCR**	Line Control Register
+ 4	-	Read/Write	MCR	Modem Control Register
+ 5	-	Read	LSR	Line Status Register
+ 6	-	Read	MSR	Modem Status Register
+ 7	-	Read/Write	-	Scratch Register

DOWNLOAD THE ADCP DATA

The data, preceded by the ID code 7F7F, contains header data. The fixed and variable leader data is preceded by ID codes 0000 and 8000.

Table 19 PD0 standard output data buffer format

Always Output	Header: 6 Bytes + [2*Number of Data Types]
	Fixed Leader Data: 53 Bytes
	Variable Leader Data: 65 Bytes
WP – Command WD - Command	Velocity: 2 Bytes + 8 Bytes per Depth Cell
	Correlation Magnitude: 2 Bytes + 4 Bytes per Depth Cell
	Echo Intensity: 2 Bytes + 4 Bytes per Depth Cell
	Percent Good: 2 Bytes + 4 Bytes per Depth Cell
BP - Command	Bottom Track Data: 85 Bytes
Always Output	Reserved: 2 Bytes
	Checksum: 2 Bytes

Knowing the necessary binary address offsets, it is possible to directly access to the desired data, which are pitch, roll and heading information, as well as, the four velocities (each beam) for each one of the 16 depth cell.