Format 4

This is a new format under the NORSTAR description, device code 5, with the introduction of Trinav 2.4 into the field. There are at present three formats under the NORSTAR heading, of which number 1 is obsolete. The new format, format 4, will be identical to format 3 except that the Hewlett-Packard 4- and 8-byte floating-point representations will be replaced by the standard IEEE representations.

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WORD #  FORMAT      CONTENT
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WORD #	FORMAT	CONTENT
1	Integer*2	Identity. Gives format code of data block.
2	Integer*2	Length of data block in bytes.
3	Integer*4	Shotpoint. Binary. Range 0 - 999999.
5	Real*8	Shot time. Seconds since 1. january 1988.
9	Integer*2	Shot Increment/Decrement factor. 1 or -1.
10	Integer*2	Shot flag. Internal flag, 1 or 0.
11	Integer*2	Relay mode. 1 = OFF, 2 = START, 3 = ON.
12	Integer*2	Line mode. 0 = Off, 1 = Run-in, 2 = On
13	Integer*2	Year. Binary value.
14	Integer*2	Julian Day. Binary value, range 1 - 366.
15	Integer*2	Hour. GMT time, range 0 - 23.
16	Integer*2	Minutes. GMT time, range 0 - 59.
17	Integer*2	Seconds. GMT time, range 0 - 59.
18	Integer*2	Fraction. GMT 1/100th second.
19	ASCII*16	Client name.
27	ASCII*16	Line name.
35	ASCII*16	Job name.
43	ASCII*16	Area name.
51	ASCII*16	Vessel name.
59	Real*4	Central meridian. Radians. Range -pi - +pi
61	Real*8	Inverse flattening. Range 250 - 350.
65	Real*8	Major axis of spheroid, Meters.
69	Integer*2	Number of positions. 2 for format 2.

Position 1:

WORD #	FORMAT	CONTENT
70	Real*8	System latitude. Radians. -pi/2 - +pi/2.
74	Real*8	System longitude. Radians. -pi - +pi.
78	Real*4	System heading. Radians. Range 0 - 2pi.
80	Real*4	Gyro 1 heading. Radians. Range 0 - 2pi.
82	Real*4	CST line heading. Radians. Range 0 - 2pi.
84	Real*4	Water speed. Meters/second.
86	Real*4	Speed along track. Meters/second.
88	Real*4	Speed across track. Meters/second.
90	Real*4	Water depth from echosounder. Meters.

Position 2:

WORD #	FORMAT	CONTENT
92	Real*8	System latitude. Radians. -pi/2 - +pi/2.
96	Real*8	System longitude. Radians. -pi - +pi.
100	Real*4	System heading. Radians. Range 0 - 2pi.
102	Real*4	Gyro 1 heading. Radians. Range 0 - 2pi.
104	Real*4	Gyro 2 heading. Radians. Range 0 - 2pi.
106	Real*4	Water speed. Meters/second.

108   Real*4   Speed along track. Meters/second.
110   Real*4   Speed across track. Meters/second.
112   Real*4   Water depth from echosounder. Meters.
114   Integer*2Checksum. 16 bit XOR of all previous data.

IEEE representations are shown below.

Table 1: IEEE 4 byte floating point repersentation

byte number	msb							lsb
1	sign	exponent	exponent	exponent	exponent	exponent	exponent	exponent
2	exponent	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
3	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
4	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa

The real value represented is defined as:

$$(-1)^s * 2^{(eeeeeeee - 127)} * 1.mmmmmmmmmmmmmmmmmmmmmmm$$

where s is the sign bit, eeeeeeee is the set of exponent bits and
mmmmmmmmmmmmmmmmmmmmmmm is the set of mantissa bits, all in the order given
above. The ^ indicates exponentiation., the * indicates multiplication.

Table 2: IEEE 8 byte floating point repersentation

byte number	msb							lsb
1	sign	exponent	exponent	exponent	exponent	exponent	exponent	exponent
2	exponent	exponent	exponent	exponent	mantissa	mantissa	mantissa	mantissa
3	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
4	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
5	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
6	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
7	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa
8	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa	mantissa

The real value represented is defined as:

$(-1)^s$ * $2^{(eeeeeeeeee - 1023)}$ *
1.mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm
mmm

where s is the sign bit, eeeeeeeeee is the set of exponent bits and
mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm
mm is the set of mantissa bits, all in the order given above. The ^ indicates exponentiation., the *
indicates multiplication.

Example:

If the 8 bytes are, in decimal representation, 64, 9, 33, 251, 77, 18, 216, 74 the real number is
3.1415926000