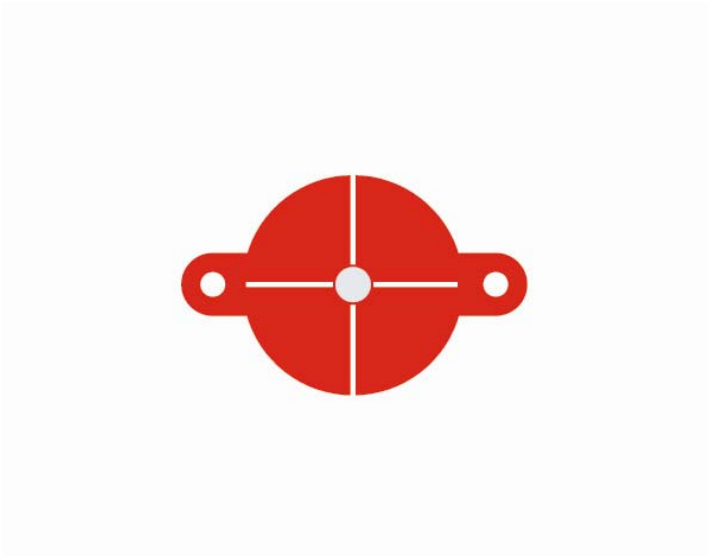
FLUXGATE WORLD
subsystems

A4030 COMPASS PICK-UP USER MANUAL



November 2007
A4030 manual 00-03.doc
Hardware version 1
Software version 0.2

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1. Introduction and description of fluxgate compass.

1.1 Description of compass.

The Autonnic A4030 is a complete sensing and processing sub-system for a compass indicating system which derives its heading information from a main or 'master' compass. It derives its output from the position of the powerful permanent magnet inside the main compass.

The A4030 contains a dual-axis fluxgate magnetometer surrounded by high-precision interface circuits which, together with the special clockwise/anticlockwise and a sequence to null offsets allow a microprocessor to acquire a binary value from the two orthogonal sensors of the direction of the field created by the main compass. The processor calculates the vector from these values and then presents the data in a manner which has been requested. Such requests alter the frequency of the data, the degree of filtering and the offset value. Calibration sequences can also be commanded.

The application software can be directly loaded by commands so that special versions or updated releases can be placed into the A4030 from data sent to the user by Autonnic using email or downloaded from our website.

1.2 Connections

Wires

1	Brown	Supply + 8 to 15v
2	Black	Supply – and signal ground
3	Blue	Serial digital input
4	Green	Serial digital output
5	Grey	Analogue output (not used)

1.2 Power supply.

The compass is compatible with any DC power supply of between 8 and 15 Vdc. Typical supply current during operation is approx. 25mA. The compass is protected against reversed polarity.

Care should be taken to make sure the compass is not situated too close to the power supply, as it's accuracy may be affected by either the iron in the mains transformer, or by magnetic field 'noise' from a switching power supply. It is not possible to cover all possible scenarios here, and it remains up to the user to determine the suitability of a possible location for the compass.

Note that the output from the A4030 takes several seconds to stabilize after a power is applied; the time taken depends on the damping settings. There is a command - see section 5 – which can be used to suppress the output after power-up.

2 Connecting the compass to your application.

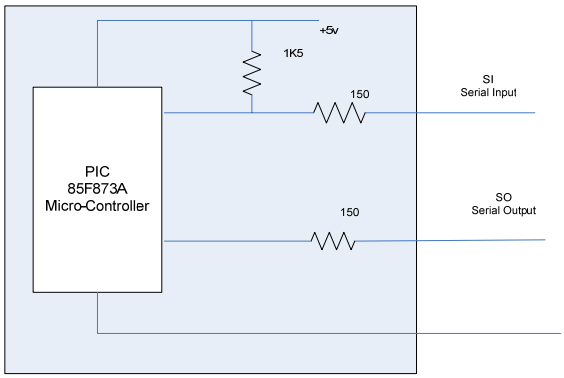

Fig 1

The figure above shows what is inside the A4030. To connect the serial data to a PC would need a TTL to RS232 interface. Autonnic make a suitable interface called the A3035 and it would be used as shown in Fig 2.

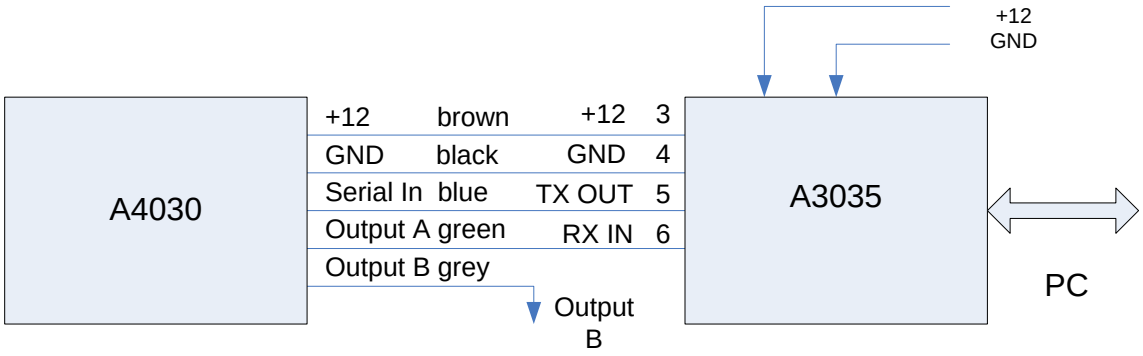

Fig 2

3 Serial data

3.1 NMEA-0183

The serial output format is: 4800 Baud, 8 data bits, 1 stop bit, no parity but note that it is not NMEA-0183 at the physical level – solely in the meaning of the data.

The compass sends information using the standard NMEA-0183 sentence 'HDG': Magnetic Heading, Deviation, and Variation. But note that the information of Deviation and Variation is not sent and so blank fields are defined by consecutive commas. In the A4030 the sentence may have one of several forms typically of the general form:

$HCHDG,hhh.h,,,,*ssss<CR><LF>

3.2 Input and Output data

Input and Output s

$HCHDG,hhh.h,,,,*ssss<CR> <LF>
or $HCHDT,hhh.h,T*ssss<CR><LF>
or $HCHDM,hhh.h,M*ssss<CR><LF>
or $HCHCC,hhh.h*ssss<CR><LF>
or $HEHDT,hhh.h,T*ssss<CR><LF>
where hhh.h represents the magnetic heading with one decimal place of precision, i.e: 0.0 to 359.9 degrees.
*ssss may be omitted or as two digits checksum or 4 digits unit serial number.

The compass may be configured via several proprietary input sentences, and will reply with an 'Acknowledge' output sentence, except mentioned otherwise, **$PATC,HCHDG,ACK <CR> <LF>** when any of the sentences listed below are received:

Proprietary Input Sentences

$PATC,IIHDG,AHD,x.x<CR><LF>
Set reference heading (0 to 359.9 degrees)
Where x.x is the wanted reference angle, 0 to 359.9 degrees.

$PATC,IIHDG,TXP,x.x<CR><LF>
Set NMEA-0183 output repetition rate in milliseconds. (Where x.x is in range 100 to 3000 mSec- default is 100 mSec)

$PATC,IIMWV,CFG,ab<CR><LF>
Configure unit's output sentences' structure.
If b=0, heading sentence will NOT include checksum nor unit's serial number.
If b=1, heading sentence will include 2 digits checksum.
If b=2, heading sentence will include 4 digits serial number instead of checksum.
If a=0 the output is the form $HCHDG,hhh.h,,,,*ssss<CR><LF>
If a=1 the output is the form $HCHDT,hhh.h,T*ssss<CR><LF>
If a=2 the output is the form $HCHDM,hhh.h,M*ssss<CR><LF>
If a=3 the output is the form $HCHCC,hhh.h*ssss<CR><LF>
If a=4 the output is the form $HEHDT,hhh.h,T*ssss<CR><LF>
Where *ssss is defined by the value of b.
If a=7 the output is the form #kkkk<CR><LF> where kkkk is MA in 15 bits Brad (for calibration use). This setting is volatile.

$PATC,IIMWV,RID<CR><LF>
Get unit's serial number.
A special proprietary reply sentence as below :
$PATC,WIMWV,RID,ssss<CR><LF>, where ssss is the serial number in ASCII decimal.

Below are the input sentences for internal use :

$PATC,IIMWV,SID,ssss<CR><LF>
Set serial number (I.D.) to unit, where ssss is the serial number in ASCII decimal.

$SR<CR><LF>

Get unit's application software release number.
A special proprietary reply sentence as below :
$SRA4030.a.b<CR><LF> where a= major number & b=minor number
e.g. $SRA4030.2.3 means product A4030 application software release number is 2.3.

$Naabbbbccccddddeeeess<CR><LF>
Program calibration table
Reply #M<CR><LF> if data been accepted.
where :aa - start address (in hexadecimal) (0x00, 0x04, 0x08, 0x0C, 0x10, 0x14, 0x18, 0x1C or 0x20)
bbbb; cccc; dddd; eeee 14 bits data (in hexadecimal) for 4 memory locations
ss - 2-character hexadecimal checksum (XOR between $ and ss)

$K<CR><LF>
Query calibration table checksum
Reply #Khh<CR><LF> (where hh is checksum in ASCIIHEX)
XOR of memory content of calibration table

$L<CR><LF>
Get calibration table
reply #Laabbbbccccddddeeee<CR><LF>
aa - start address (in hexadecimal) (0x00, 0x04, 0x08, 0x0C, 0x10, 0x14, 0x18, 0x1C or 0x20)
(i.e. total 9 reply sentenses in the ascending order)
bbbb; cccc; dddd; eeee 14 bits data (in hexadecimal) for 4 memory locations

$UPLOAD<CR><LF>
Enter application software upload mode
Reply #M<CR><LF> if enter software upload mode successfully.

4 References

1 A4030 data sheet
2 NMEA-0183 specification

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