

(51) International Patent Classification:  
*G01V 3/40* (2006.01)(21) International Application Number:  
PCT/US2012/021875(22) International Filing Date:  
19 January 2012 (19.01.2012)

(25) Filing Language: English

(26) Publication Language: English

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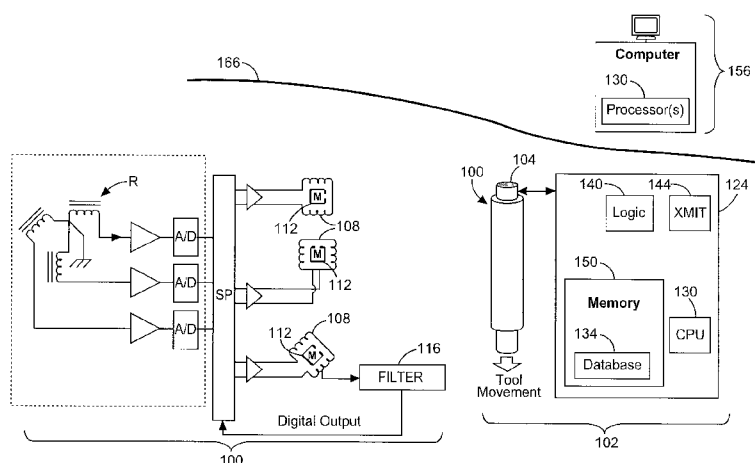
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nesota 55402 (US).(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,  
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,  
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,  
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,  
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,  
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,  
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,  
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,  
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU,  
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,  
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,  
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,  
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, ML, MR, NE, SN, TD, TG).**Declarations under Rule 4.17:**

— of inventorship (Rule 4.17(iv))

**Published:**

— with international search report (Art. 21(3))

(54) Title: MAGNETIC SENSING APPARATUS, SYSTEMS, AND METHODS

**Fig. 1**

(57) **Abstract:** In some embodiments, an apparatus and a system, as well as a method and an article, may operate to acquire a first signal from a first magnetometer at least partially disposed within a Helmholtz coil, to acquire a second signal from a second magnetometer having a sensitivity at least one thousand times less than the first magnetometer, to process the second signal to determine a drive signal, to drive the Helmholtz coil using the drive signal so as to null an ambient Earth magnetic field surrounding the first magnetometer, and to process the first signal as one of a down hole location signal or a down hole telemetry signal, the location signal to determine a range to a sub-surface object, and the telemetry signal to provide data from down hole drilling operations. Additional apparatus, systems, and methods are disclosed.