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2020 BEEPMAT SURVEY REPORT
ON THE
CLEMENT PROPERTY

CLEMENT AND MACBETH TOWNSHIPS
SUDBURY MINING DIVISION, ONTARIO, CANADA

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December 28th, 2020

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EXECUTIVE SUMMARY

This is a technical report for assessment purposes on the 2020 BeepMat survey on the Clement property in Clement and MacBeth Townships. All work was performed by Randy Stewart, BSc.

The Clement property is located 130 km northeast of Sudbury, Ontario within Clement and MacBeth Townships in the Sudbury Mining Division. The property is bounded by UTM NAD83 coordinates 17U 550434E to 555243E and 5188816N to 5185595N. The property consists of 32 contiguous unpatented mining claims containing 8 boundary, 13 single cell and 11 multicell claims.

In the summer of 2020, a ground electromagnetic BeepMat survey program was completed on the Clement property. The 10-day program commenced on August 14th and was completed by August 26th, 2020.

The objective of the 2020 program was to locate magnetic and conductive outcrops for future stripping, mapping and sampling. The program utilized an electromagnetic GDD Instrumentation model BM8 BeepMat on loan from the Ministry of Energy, Northern Development and Mines, Sudbury District Geologist's office. The survey was performed over the Arcand Lake grid and all accessible logging trails.

The 2020 program was successful in outlining several conductive and magnetic anomalous areas. The most significant being the discovery of an altered and sulphide mineralized felsic volcanic rock now referred to as the Cairn Sulphide Showing.

Recommendations are presented for future work based on the 2020 program completed on the Clement Property.

1.0 INTRODUCTION

The Clement property is located 130 km northeast of Sudbury, Ontario within Clement and MacBeth townships in the Sudbury Mining Division. The property is bounded by UTM NAD83 coordinates 17U 550434E to 555243E and 5188816N to 5185595N. The property consists of 32 contiguous unpatented mining claims containing 8 boundary, 13 single cell and 11 multicell claims.

From August 14 th to August 26 th, 2020, a 10-day BeepMat survey program was completed on the Clement property. This work forms the basis of this report.

2.0 PROPERTY DETAILS

2.1 Location and Access

The property is located 130 km northeast of Sudbury, Ontario within Clement and MacBeth Townships in the Sudbury Mining Division (Figure 1). The property is bounded by UTM NAD83 coordinates 17U 550434E to 555243E and 5188816N to 5185595N.

Excellent year-round access to the property is provided by Highway 17 East from Sudbury to the town of Warren and then north onto highways 539, 539a and 805.

A full range of services and supplies are provided in the city of Sudbury located 130 km to the southwest. Local accommodations can be found at lodges located along Highway 805.

2.2 Topography and Vegetation

The local terrain is typical of the Precambrian Shield, with low rolling hills and marshy areas. Vegetation on higher ground consists of a variety of hardwoods such as poplar and birch, with coniferous trees that include spruce, balsam and pine. In the lower ground, typically more wet in character, black spruce, tamarack, alder and cedar predominate. Water for exploration purposes is available from beaver ponds, marshes, small streams and lakes. Snowfall generally begins in November and extends into late March, early April. Lakes are usually passable with adequate ice thickness from late December through to late March. Between 50 and 100

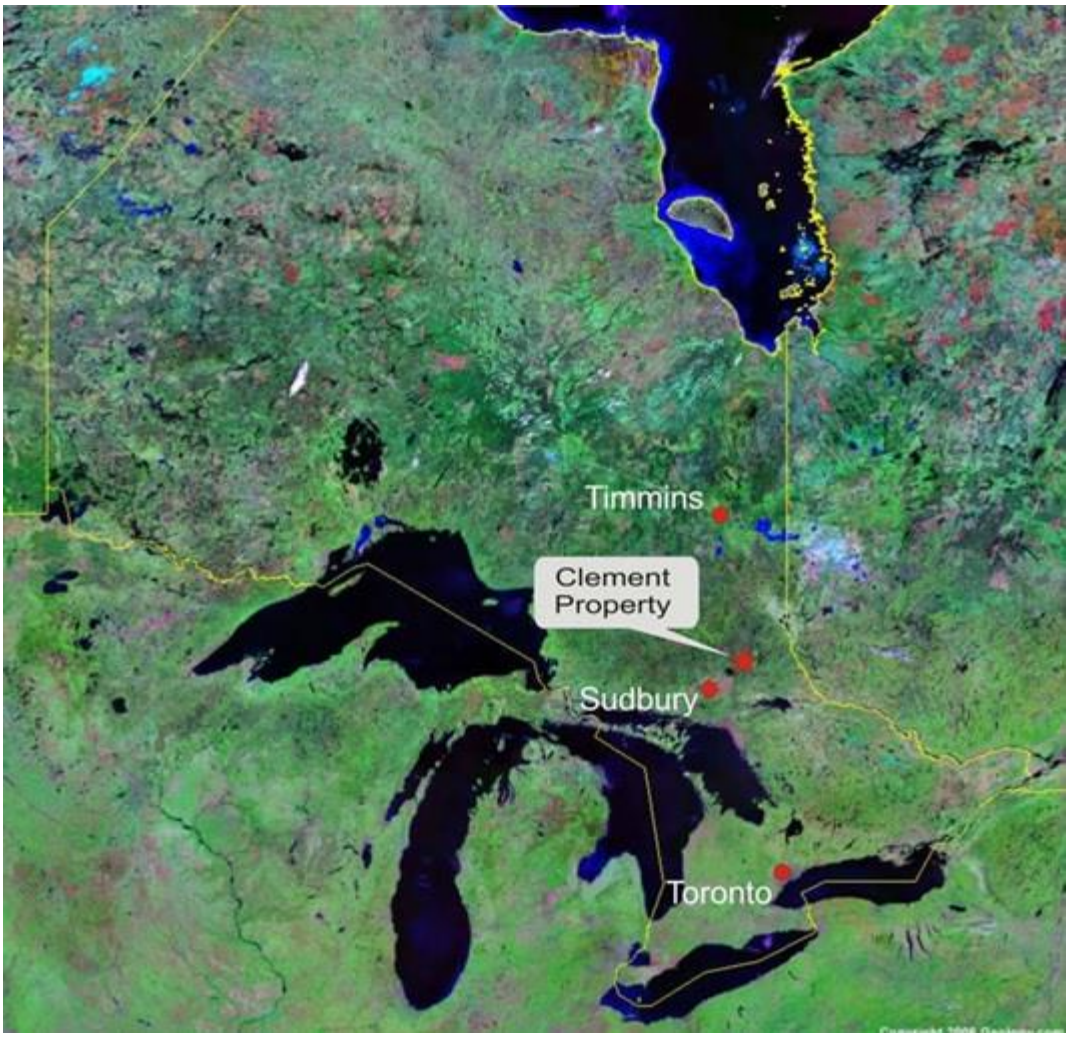

Figure 1: Location of the Clement Property in Ontario, Canada

mm of monthly rainfall is normal from April to October. The mean temperature is –13°C in January and 19°C in July.

2.3 Claims

The property is located 130 km northeast of Sudbury, Ontario within Clement and MacBeth Townships in the Sudbury Mining Division. The property is bounded by UTM NAD83 coordinates 17U 550434E to 555243E and 5188816N to 5185595N. The property consists of 32 contiguous unpatented mining claims containing 8 boundary, 13 single cell and 11 multicell claims. (Table 1, Figure 2). The claims are held by Brian James Wright, client number 210254 and Randy Irwin Stewart, client number 408174.

Table 1: Claim Summary of the Clement Property.

Claim No	Due Date	Type	Township	Required	Applied	Banked
204229	May 12/2022	1 Cell	MacBeth	172	428	0
128078	May 12/2022	1 Cell	MacBeth	200	400	0
314834	May 12/2022	1 Cell	MacBeth	200	400	0
174161	May 12/2022	1 Cell	MacBeth	200	400	0
245434	June 30/2022	1 Cell	MacBeth	200	400	0
342965	June 30/2022	1 Cell	MacBeth	200	400	0
136237	June 30/2022	Boundary	MacBeth	200	400	0
188221	June 30/2022	Boundary	MacBeth	200	400	0
107788	June 30/2022	Boundary	MacBeth	200	400	0
304207	June 30/2022	Boundary	MacBeth	200	400	0
124731	June 30/2022	1 Cell	MacBeth	200	400	0
185478	June 30/2022	Boundary	MacBeth	200	400	131
281341	June 30/2022	Boundary	MacBeth and Clement	200	400	0
122033	June 30/2022	Boundary	Clement	200	400	0
233340	June 30/2022	Boundary	Clement	200	600	0
546080	May 12/2022	3 Cell	MacBeth	1200	2400	149
546027	May 12/2022	5 Cell	MacBeth	2000	4000	0
546028	May 12/2022	6 Cell	MacBeth	2400	4800	0
546081	May 12/2022	2 Cell	MacBeth	800	1600	0
546082	June 30/2022	4 Cell	MacBeth	1600	4800	2110
546024	June 30/2022	7 Cell	MacBeth and Clement	2800	8400	0
546026	June 30/2022	12 Cell	MacBeth and Clement	4800	14400	0
545942	June 30/2022	4 Cell	Clement	1200	3600	0
545943	June 30/2022	4 Cell	Clement	1600	4800	0
546025	June 30/2022	4 Cell	MacBeth and Clement	1600	4800	0
546083	June 30/2022	2 Cell	Clement	800	2400	0
601268	July 28/2022	1 Cell	MacBeth	400	0	0
601269	July 28/2022	1 Cell	MacBeth	400	0	0
601270	July 28/2022	1 Cell	MacBeth	400	0	0
601271	July 28/2022	1 Cell	MacBeth	400	0	0
605894	Aug 08/2022	1 Cell	MacBeth	400	0	0
605895	Aug 08/2022	1 Cell	MacBeth	400	0	0
			Totals	***26172***		

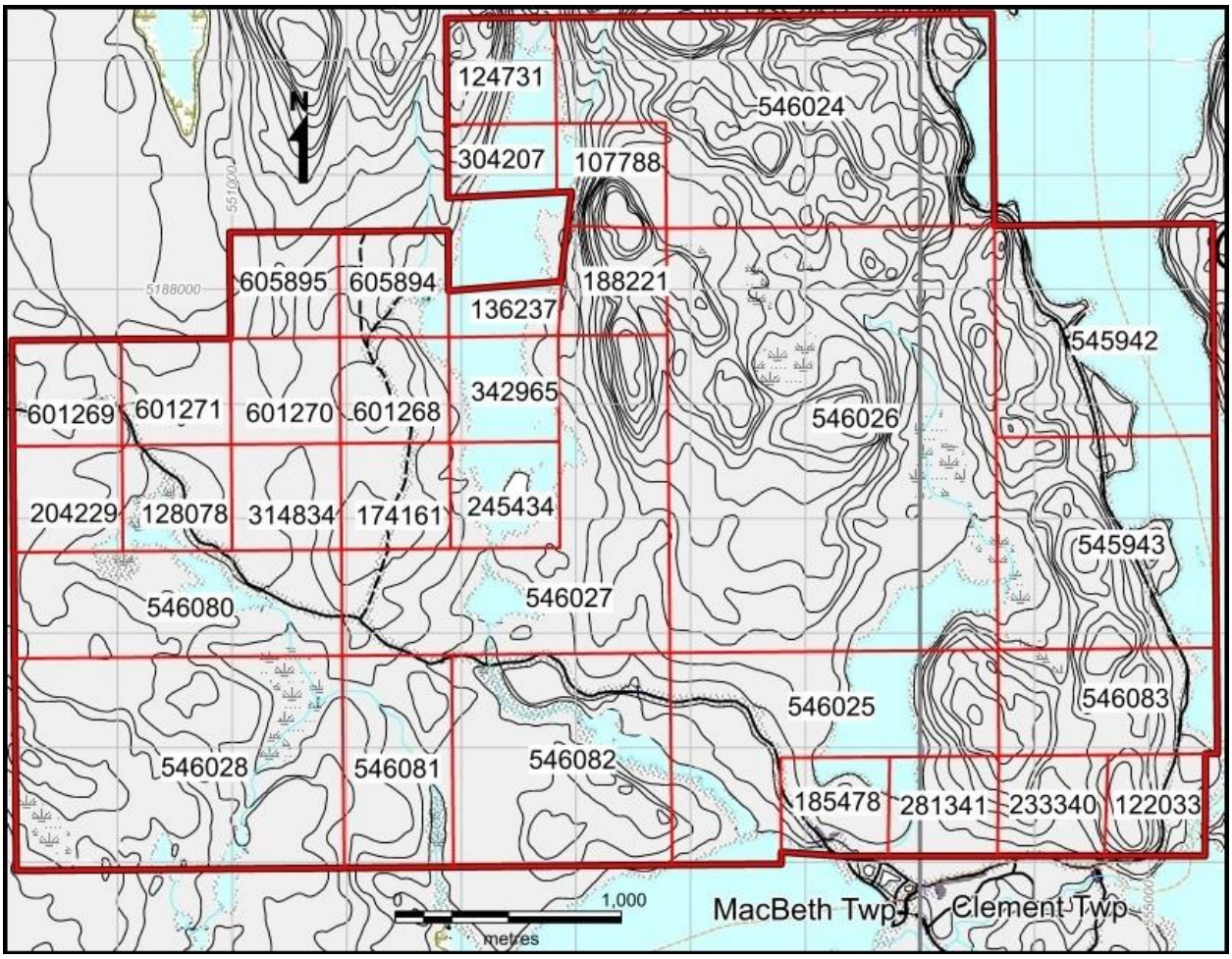

Figure 2: Tenure of the Clement Property, MacBeth and Clement Townships, Ontario.

3.0 PREVIOUS WORK

1897: Gold was first discovered in weathered iron formation on the northern-most peninsula of Emerald Lake in Afton Township.

1915-1919: The Golden Rose Mining Company built a small mine and recovered undisclosed amounts of gold on the Emerald Lake discovery.

1901: Miller visited an adit east of Arcand Lake then known as the Turcotte mine. The adit was in a 5-foot quartz vein that returned anomalous Cu values. The 2017 program located this adit at 554238E, 5186273N.

1935-1941: The Consolidated Mining and Smelting Company of Canada Limited carried out extensive surface and underground exploration and development on the Golden Rose /New Golden Rose Mine and produced a total of 45,360 ounces of gold and 8,296 ounces of silver from 144,237 tons milled for a recovery grade of 0.31 oz/ton Au. Gold is present in pyrite within quartz-carbonate veins in Archean magnetite-chert iron formation (Meyn,1977).

1958 – 1959: W.H. Nichol optioned his seventeen claims to Little Long Lac Gold Mines Ltd. The claims were located on the eastern side of Cucumber Lake, on the eastern side of Arcand Lake and on Manitou Lake just east of the northern tip of Arcand Lake. Eight trenches and five diamond drill holes (210 feet) tested a quartz vein over a 210-foot strike length (the A showing) hosted in porphyritic andesite on the shore of Cucumber Lake. One trench sample returned 1.76 oz/ton Au. This showing is now located on the present Anderson boundary claims 108367, 239481, 306805 and 345027 adjacent to the Clement property. The iron formation to the east of Arcand Lake was tested by five diamond drill holes totaling 1007 feet. An 82-foot hole, drilled south to north, also tested the iron formation but the exact location is not known. At the B showing trenching in iron formation was performed between the beaver dam at the southern tip of Cucumber Lake and the beaver pond just to the south. A sample of siliceous iron formation returned 0.28 oz/ton Au. At the C showing near the south-eastern corner of Arcand Lake a program of trenching and two diamond drill holes (W-E) totaling 750 feet was performed. Hole 2 returned a "6-inch section at depth of eighty feet; containing chalcopyrite and pyrrhotite of commercial grade" in Nipissing gabbro. Two holes were drilled close to the western shore of Lake Manitou totaling 685 feet testing the Nipissing/Gowganda contact. These holes encountered localized chalcopyrite and pyrrhotite mineralization but returned no significant values.

1968: Kennco Explorations (Canada) Ltd. performed airborne magnetic and electromagnetic surveys over the southwest corner of Clement Township and the southern third of Macbeth Township in search for copper in the Nipissing gabbro. No follow-up work was reported.

1974-1976: Pelican Mines Ltd. performed geological mapping, ground magnetics and EM surveys and four diamond drill holes totaling 1403 feet. The drilling concentrated on the main

iron formation and returned no significant values. The surveys were performed between the creek running out of the southern tip of Cucumber Lake and extending to the western edge of Arcand Lake. A grab sample from a large piece of quartz float and underlain by a large olivine diabase dike returned 0.15 oz/ton Au (located on claim 546082 at approximately 552411E, 5185922N).

1975: M. Green and Associates Ltd. (Hames, C.M.) performed a ground magnetic survey encompassing Arcand Lake to the western shore of Lake Manitou. The magnetic survey outlined the iron formation previous recognized by Nichol at the south shore in the northern bend of Arcand Lake. The magnetic survey also outlined a mafic dike in the middle of the southern portion of the claim group and corresponds to an outcrop mapped by Meyn in 1977. Also, a quartz vein and trenching were noted on the large hill just east of Arcand Lake.

1977: H.D. Meyn of the OGS mapped the townships of Afton, Scholes, Macbeth and Clement Townships.

1976 -1995: Temagami Land Caution, no work performed.

1996: Brian Wright, in the staking rush that followed the lifting of the Temagami Land Caution, staked the first claims that would become the present-day Clement property.

1998: Nipissing Exploration Services Limited cut 22.6 km of grid lines and performed a ground magnetic survey over claims that mirrored M. Green and Associates Ltd. Arcand Lake claims. The survey outlined the previously known iron formation and a NE trending mafic dike. Just south of the iron formation prospecting uncovered pits of mineralized quartz veining. Anomalous gold values were mentioned but no assays were reported.

1998: Temex Resources performed a ground magnetic and VLF-EM survey on the south western corner of the Clement property. The survey outlined two northwest trending diabase dikes.

1998-2000: Steve and Ted Anderson performed work on their claims surrounding Cucumber

Lake including the quartz veins of the Nichol (A) showing (present claim 306805). The work performed was a ground magnetic and VLF survey and sampling of the old Nichol (A) showing trenches. This sampling returned 23.45 g/t Au in quartz and anomalous values in the host metavolcanics. The magnetic survey outlined a north-west trending diabase dike.

2008: GoldTrain Resources/ GoldWright Explorations Inc. (Brian Wright option) completed 13 kms of line cutting, ground magnetic and VLF surveys, and geological mapping around the northern tip of Arcand Lake. A total of 28 samples were assayed for gold however no significant results were obtained.

2010: GoldTrain Resources contracted Geotech Ltd. to carry out a helicopter-borne VTEM and aeromagnetic survey over 2/3 of the Clement property. Several significant VTEM anomalies and magnetic signatures were identified. An EMIT Maxwell Plate Modelling of selected VTEM anomalies outlined 3 areas of interest. Between March 23 and March 26, 2010, GoldTrain undertook a bedrock stripping, sampling and geological mapping program of the C anomaly area. Huronian cover rocks impeded any explanation of the anomaly. Between May and July 2010, a 35-day reconnaissance geological mapping and sampling program was also undertaken. A total of 28 grab and 19 channel samples were collected. No significant values were returned.

2011: GoldTrain Resources completed five diamond drill holes totaling 564.5 m on several of the VTEM conductors modelled by Geotech Ltd. Holes CL11-01 and CL11-02 intersected disseminated and stringer sulphide mineralization consisting of pyrite, pyrrhotite, and chalcopyrite. Hole CL11-03 outlined a newly discovered gold zone in intermediate to felsic volcanics. The gold is contained within an alteration envelope with quartz, carbonate and albite veining and semi-massive sulphide mineralization (0.4 g/t over 9 m including 2.95 g/t over 0.5 m and 1.06 g/t over 0.5 m). Holes CL11-04 and CL11-05 outlined a sulphide mineralized alteration envelope containing massive sulphide and chert horizons with locally anomalous Cu, Zn, Au and Ag (Massive Sulphide Zone).

2014: Randy Stewart and Brian Wright completed reconnaissance geological mapping and

prospecting. The program outlined a previously unrecognized major N-S structure following the trend of Arcand Lake. Mapping concentrated on alteration, mineralization of select VTEM target locations. The most notable was a rusty 80cm wide quartz vein with 0.5% disseminated sulphides (The Quartz Vein Showing). The vein is hosted within a gossanous and siliceous intermediate to felsic metavolcanic (locally feldspar porphyritic) with 1-2% blebby, finely disseminated and fracture filling sulphides. The vein has a 345-degree strike and a vertical dip. Also, of note was sulphide mineralization in a mafic dike now known as the Ditch Sulphide Showing.

2015: Randy Stewart and Brian Wright completed a reconnaissance geological mapping and prospecting program. The 2015 program increased the understanding of the volcanic stratigraphy by the recognition of a felsic to intermediate metavolcanic breccia just to the north of claim 128078 and a felsic to intermediate lapilli/crystal ash tuff located on claim 314834. Outlined a NE-SW trending mafic dike on claims 546083, 233340 and 281341, aided by historical geophysical surveys and one outcrop on Meyn's 1977 map. Re-examined the Quartz Vein Showing of 2014 and although it is smaller in scale it bears a striking resemblance to the Anderson/ Nichol (A) showing (trench sample of 23.45 g/t Au) on the shore of Cucumber Lake.

2016: Trelawney Mining and Exploration/ IAM Gold completed a 2-day re-logging and sampling program of diamond drill hole CL11-03. This program was unsuccessful in locating any new gold zones.

2017: Randy Stewart and Brian Wright completed a program of 10.45 kms of line cutting and geological mapping. The program delineated a possible eastern surficial expression of the gold zone alteration and mineralization envelope outlined in diamond drill hole CL11-03. The outcrop (554135E and 5186939N) is an altered intermediate tuff with 1-2% disseminated and stringer pyrrhotite and pyrite. The program has also identified a historic adit at 554238E, 5186273N blasted into a large quartz vein hosted in sheared Nipissing Gabbro. The vein is 1.3m thick and strikes at 120 degrees and dips at 30 degrees.

2019: Randy Stewart and Brian Wright completed a 38-day reconnaissance geological

mapping and prospecting program. The program was successful in partially defining the aerial extent of the sulphide mineralized alteration envelope of the "Massive Sulphide Zone" and within this envelope the identification of an altered and sulphide mineralized feldspar porphyritic intrusion. The program also recognized a lamprophyre dike with implications for associated major structures and gold mineralization.

4.0 GEOLOGY

4.1 Regional Geology

The Clement property is located within the Temagami greenstone belt part of the Western Abitibi Sub province (Figure 3). The greenstone belt is an Archean window within the Cobalt embayment of the Southern Province (Jackson and Fyon, 1991). The Cobalt Group is part of the Proterozoic Huronian Supergroup.

The area is underlain by a sequence of Early Precambrian metavolcanic and metasedimentary rocks locally interbedded with chert-magnetite and sulphide iron formation. The iron formation has been traced in outcrop and historical diamond drilling from the southern portion of claim 174161 to just east of Arcand Lake where it becomes covered by Nipissing gabbro. Airborne magnetic surveys suggest the iron formation continues to the east and is coincident with the iron formation in Vogt township. The metavolcanic and metasedimentary sequence has been classified as the Porcupine Assemblage (2690-2685 Ma +/- 5 Ma) from age dating by Ayer et al., 2006.

In turn, the Porcupine Assemblage is overlain unconformably by Early Proterozoic Huronian Supergroup sedimentary rocks of the Gowganda Formation. The Huronian Supergroup was deposited between 2.45 and 2.22 Ga, and reflects the initiation and development of a continental margin from an early transform margin (marked by left-lateral strike-slip activity), to a passive margin, facing a newly formed Paleoproterozoic Ocean (Long, 2009). The Gowganda Formation is characterized by a heterogeneous sequence of framework and matrix supported conglomerate (including diamictites), sandstone, siltstone and mudstone with marked vertical and lateral facies changes. Regionally, matrix-supported conglomerates and laminated

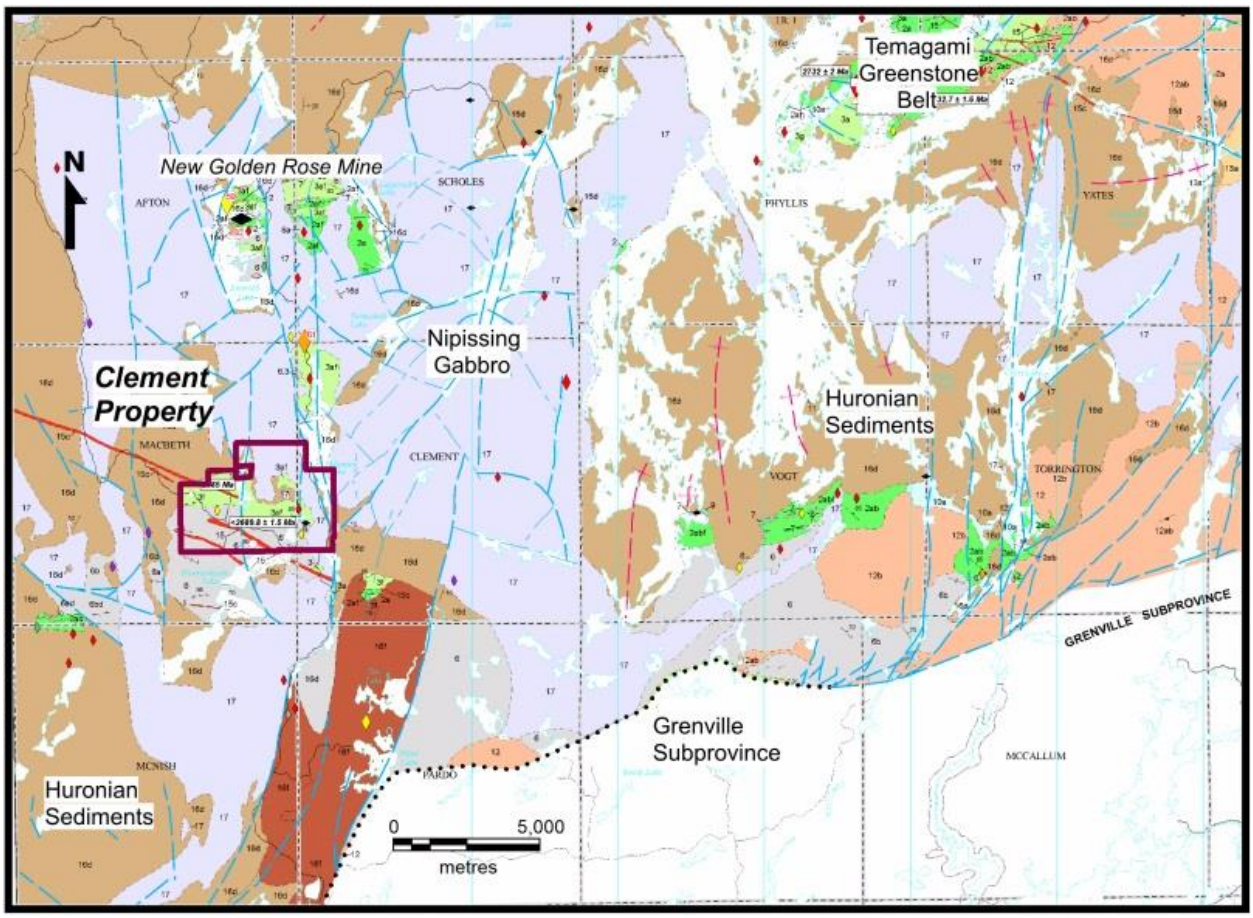

Figure 3: Regional Geology (after Ayer et al., 2006)

mudstones with drop stones are more abundant at the base of the sequence (Long, 2009). The conglomerate units have been interpreted as being glaciogenic in origin (e.g., Junnila and Young 1995, Fralick and Miall 1989), likely deposited in a marine environment adjacent to an ice shelf.

The Nipissing gabbro (after Jobin-Bevans, 2009), controlled by pre-existing structures (Choudhry, 1984), intrudes the supracrustal rocks of the Huronian Supergroup, as well as the underlying Archean granite-greenstone basement rocks. U-Pb geochronology has yielded crystallization ages of approximately 2200 Ma (2219 Ma: Corfu and Andrews, 1986; 2212 Ma: Conrod, 1989; 2210 Ma: Noble and Lightfoot, 1992). Most of the Nipissing gabbro intrusions are less than 1000 m thick and occur as horizontal sheets, as undulating sills (basins and arches), as subvertical dikes (Hriskevich, 1968; Jambor, 1971; Conrod, 1988 and 1989) and as arcuate and open-ring exposures or cone sheets (Buchan et al., 1989). The cone sheets are distinguished

by structural features in surrounding sedimentary rocks that suggest the gabbro intrusions were emplaced as shallow (< 50°), inward-dipping, cone-shaped bodies that are tens of metres to several hundred metres thick (Jambor, 1971; Lovell and Caine, 1970; Jobin-Bevans et al., 1998). Another type of intrusion, the lopolithic-like form (i.e., saucer-shaped), is rare and is interpreted to represent deeper "feeder" systems to the stratigraphically higher sill, dike and cone-sheet type of intrusions. These deeper exposures, which are fault bound on a regional scale, are thought to have been exposed through uplift along the bounding fault lines (Dressler, 1979; Innes and Colvine, 1984; Jobin-Bevans et al., 1998). The intrusions are dominantly tholeiitic and sub-alkalic, with evolved rock types and differentiated intrusions trending toward calc-alkalic affinities (Lightfoot and Naldrett, 1996). Based on geochemical characteristics and outcrop patterns, the Nipissing Gabbro represents the intrusive portion of an eroded continental flood basalt. Magmas apparently cut through Archean basement rocks and sedimentary rocks of the Huronian Supergroup as dikes, then spread laterally through the Huronian rocks as sills (Lightfoot et al., 1986 and 1987; Lightfoot and Naldrett, 1996).

The youngest rocks in the area are late olivine diabase and diabase dikes (Sudbury dike swarm 1238 +/- 4 Ma) following NW-SE structures and late mafic dikes following NE-SW structures, possibly part of the Preissac Dike Swarm (2150 Ma) (Osmani, 1991).

Several major structural trends are defined by north-south trending faults that include the Cucumber Lake Fault, Manitou Lake Faults (Meyn, 1977), Arcand Lake Faults and Brian's Fault. Also, many of the Nipissing gabbro contacts are fault bounded. Of note, the property lies on the southern edge of the Temagami (Wanapetei) magnetic anomaly that represents a mirror image of the prolific Sudbury structure (1.85 Ga) (Kawohl et. al, 2017).

4.2 Property Geology

The entire Archean metavolcanic/metasedimentary sequence of rocks on the property has an approximate trend of 275 to 280 degrees and a dip of 70 to 75 degrees northward. The rocks that have received the most attention from early workers is an E-W trending band of Archean, Algoma-type, oxide facies iron formation occurring in the centre of the property

(Figure 4). The intermittent beds of iron formation have been traced in outcrop and historical diamond drilling from the southern portion of claim 174161 to just east of Arcand Lake where it becomes covered by Nipissing gabbro. The iron formation is a banded sequence of chert and magnetite with localized pyrite, pyrrhotite and trace chalcopyrite. East of Arcand Lake the iron formation is interbedded with black aphanitic massive carbonaceous argillite that is locally sulphide mineralized (Stringer Sulphide Pits). Also, small bands of chert-magnetite-actinolite iron formation (silicate facies) with localized pyrite, pyrrhotite and trace chalcopyrite, quite recognizable in GoldTrain's airborne magnetic survey, has been mapped west of the outcrop stripping performed by GoldTrain and to the east of diamond drill hole CL11-03 on claim 546026.

The main iron formation is interbedded and bounded to the north by Archean intermediate to felsic metavolcanics. The rocks consist mostly of lapilli to fine grained laminated tuffs and possible massive flows. The rocks are locally feldspar and quartz porphyritic. Within the metavolcanics gold mineralization has been identified in diamond drill hole CL11-03 (0.4 g/t over 9 m including 2.95 g/t over 0.5 m and 1.06 g/t over 0.5 m). The gold is associated with quartz, carbonate, chlorite and albite veining with semi massive pyrite, pyrrhotite and chalcopyrite contained in altered intermediate to felsic metavolcanics. The alteration envelope consists of pervasive sericite, chlorite, epidote, carbonate and silica with disseminated and semi-massive pyrite, pyrrhotite and chalcopyrite. Also, to the north the Massive Sulphide Zone (previously recognized in diamond drill holes CL11-04 and CL11-05) is a silica, chlorite, amphibole, sericite, alteration zone with localized epidote, albite and quartz veining, areas of massive sulphides, chert horizons and locally anomalous Cu, Zn, Au and Ag and is coincident with a recognizable fault zone. Mineralization consists of massive to disseminated (up to 5%), stringer to blebby pyrite and pyrrhotite with minor amounts of chalcopyrite. Within this zone a sheared, altered and sulphide mineralized feldspar porphyritic intrusion is present.

To the west of the Massive Sulphide Zone a lamprophyre dike has been traced for over 150 m in several outcrop exposures. The dike is dense, medium grained, green black with 1-2 mm biotite crystals in a mafic groundmass.

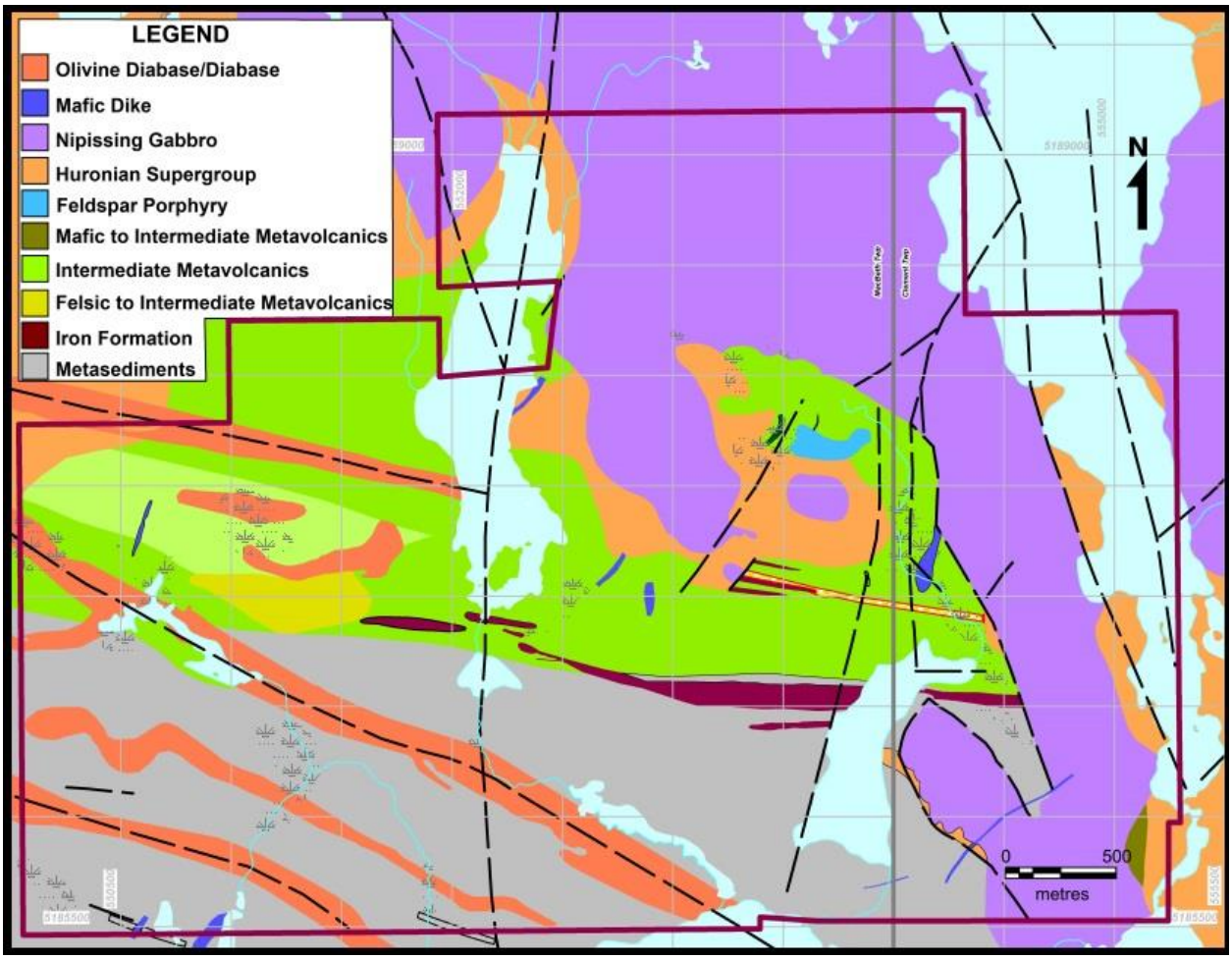

Figure 4: Property Geology

To the west the main iron formation grades into intermediate to felsic lapilli, crystal and lithic fragmental tuffs and feldspar porphyritic (locally quartz porphyritic) flows and possible intrusives (host to the Quartz Vein Showing). Occurring to the north of this is a band of intermediate to felsic metavolcanic breccia.

To the south the main iron formation is bounded by a thick sequence of Archean metasediments consisting predominately of interbedded and locally laminated greywacke, arkose, arkosic wacke and conglomerate.

The Archean rock sequence is unconformably overlain by flat lying metasedimentary rocks of the Huronian Gowganda Formation. The Formation consist of conglomerate, arkose/quartzite

and greywacke/lithic wacke. The conglomerate is matrix supported and composed of sub-rounded to angular pebbles, cobbles and minor boulders set in a fine to medium grained greywacke/lithic wacke. The clasts consist predominately of granitic rocks with lessor amounts of metasediments and metavolcanics. The greywacke/lithic wacke is feldspathic and forms interbeds in and is gradational to the conglomerate. The conglomerate and greywacke/lithic wacke can be difficult to distinguish between in limited outcrop exposure areas.

The Archean and Huronian rocks are intruded by sheet like sills of Nipissing gabbro. The Nipissing gabbro rocks are massive, medium grained, dark greenish grey, finer grained near the margins with localized pegmatitic phases. The Nipissing gabbro are in sharp contact with the Gowganda Formation rocks with a contact zone ranging from 3 to 7.5 m wide in which the two rock types are indistinguishably fine grained and black (Meyn, 1977). The gabbro follows the bedding in the Gowganda Formation and is seldom disturbed; disturbance where it occurs, extends only over a distance of l to 3 m from the contact. Recrystallization of the sedimentary rocks and contamination of the Nipissing gabbro does take place (Meyn, 1977). In field mapping a brecciated contact was observed at 554166E, 5186171N. Mapping has also outlined fault bounded contacts of the Nipissing gabbro.

The youngest rocks on the property, following NW-SE structures, are olivine diabase and diabase dikes and, following NE-SW structures, are recently mapped unclassified mafic dikes (possibly Preissic aged). The most significant one of these mafic dikes is host to the Ditch Sulphide Showing on claim 4206164. This dike was outlined by mapping, historical geophysical surveys and one outcrop on Meyn's 1977 map.

5.0 2020 PROGRAM

5.1 Methods

In the summer of 2020, a ground electromagnetic BeepMat survey was completed on the Clement property. The BeepMat (Photo 1) was a GDD Instrumentation model BM8 (Appendix II) on loan from the Ministry of Energy, Northern Development and Mines, Sudbury District Geologist's office. 10 BeepMat traverses (Figs 5 to 7) were performed

utilizing a handheld GPS, compass, grub hoe and hammer. Significant magnetic and conductive anomalies were marked on the handheld Garmin GPS as waypoints (Table 2).

The objectives of the 2020 program were to BeepMat survey the Arcand Lake grid and all accessible logging trails and to delineate, record, expose and evaluate any BeepMat anomalies for future follow-up work.

The 10-day program occurred between August 14 th and August 26 th, 2020.

6.0 RESULTS and CONCLUSIONS

Several anomalies (conductive and magnetic) were found during the survey and they are outlined in Table 2.

The anomalies of record for the 2020 program were:

- On the August 14 traverse anomalies were detected at waypoints 2020-418 to 2020-423 and 2020-440 to 2020-442 (Fig. 5 and Table 2). These can be interpreted as part of the previously mapped Banded Iron Formation and associated sulphide rich argillite (Geology Map, back pocket).
- On the August 21 traverse anomalies were detected at waypoints 2020-500 to 2020-505 (Fig. 6 and Table 2). These can be interpreted as part of the previously mapped Banded Iron Formation and associated sulphide rich argillite (Sulphide Stringer Pits) (Geology Map, back pocket).
- On the August 23 traverse anomalies were detected at waypoints 2020-521 to 2020-526 (Fig. 7 and Table 2). These anomalies correspond to a magnetic high on the airborne survey which has direct correlation with the magnetic signature of the Nipissing gabbro to the north (Geology Map, back pocket).
- On the August 25 traverse anomalies were detected at Waypoints 2020-555 to 2020-557 (Fig. 6 and Table 2), These anomalies represent the southern extension of a previously mapped magnetic mafic dike to the north. Possibly a late Preissic mafic dike (Geology Map, back pocket).

Photo 1: BeepMat on Sulphide Rich Metasediment Outcrop (552538E, 5185755N)

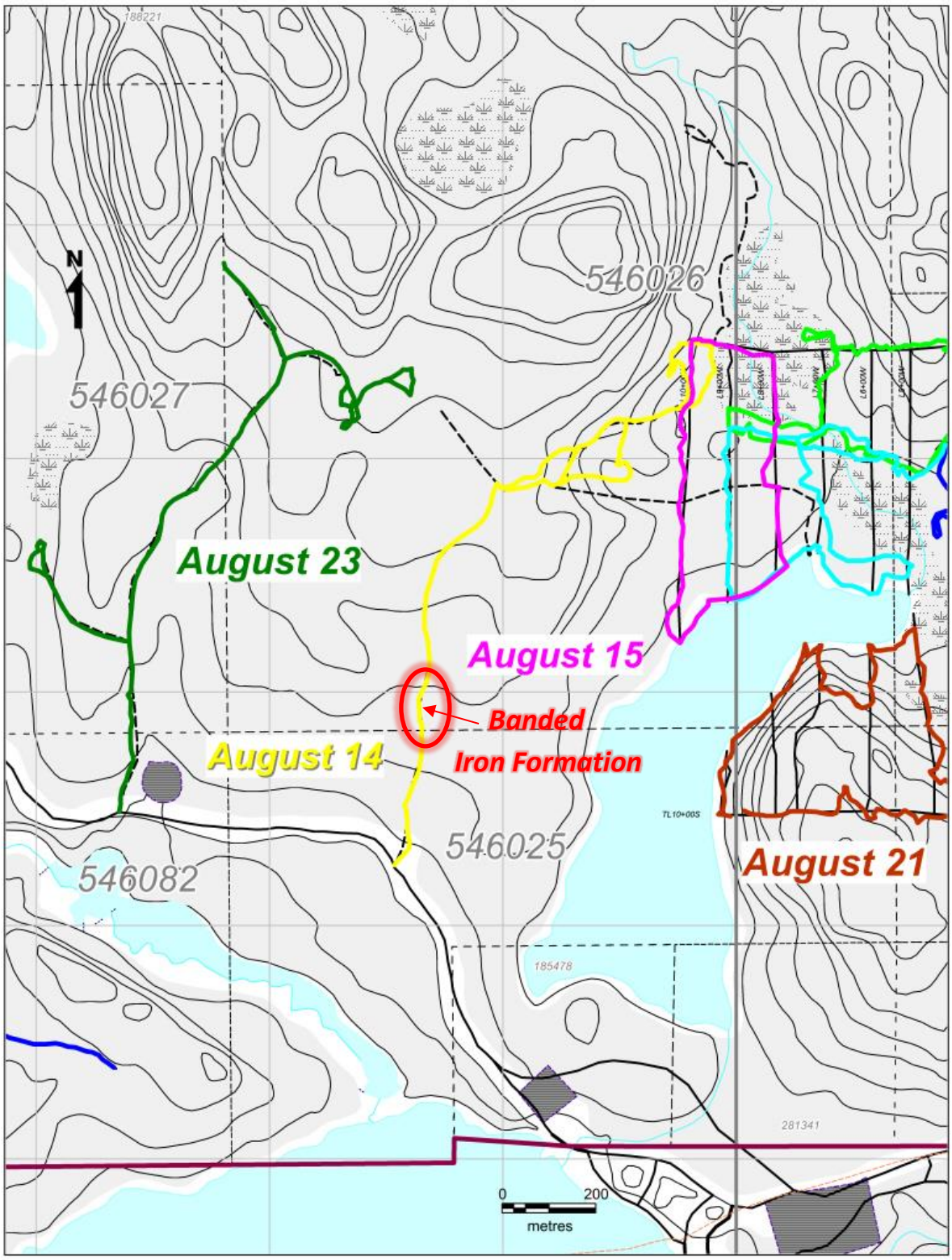

Figure 5: BeepMat Traverses and Anomaly Areas

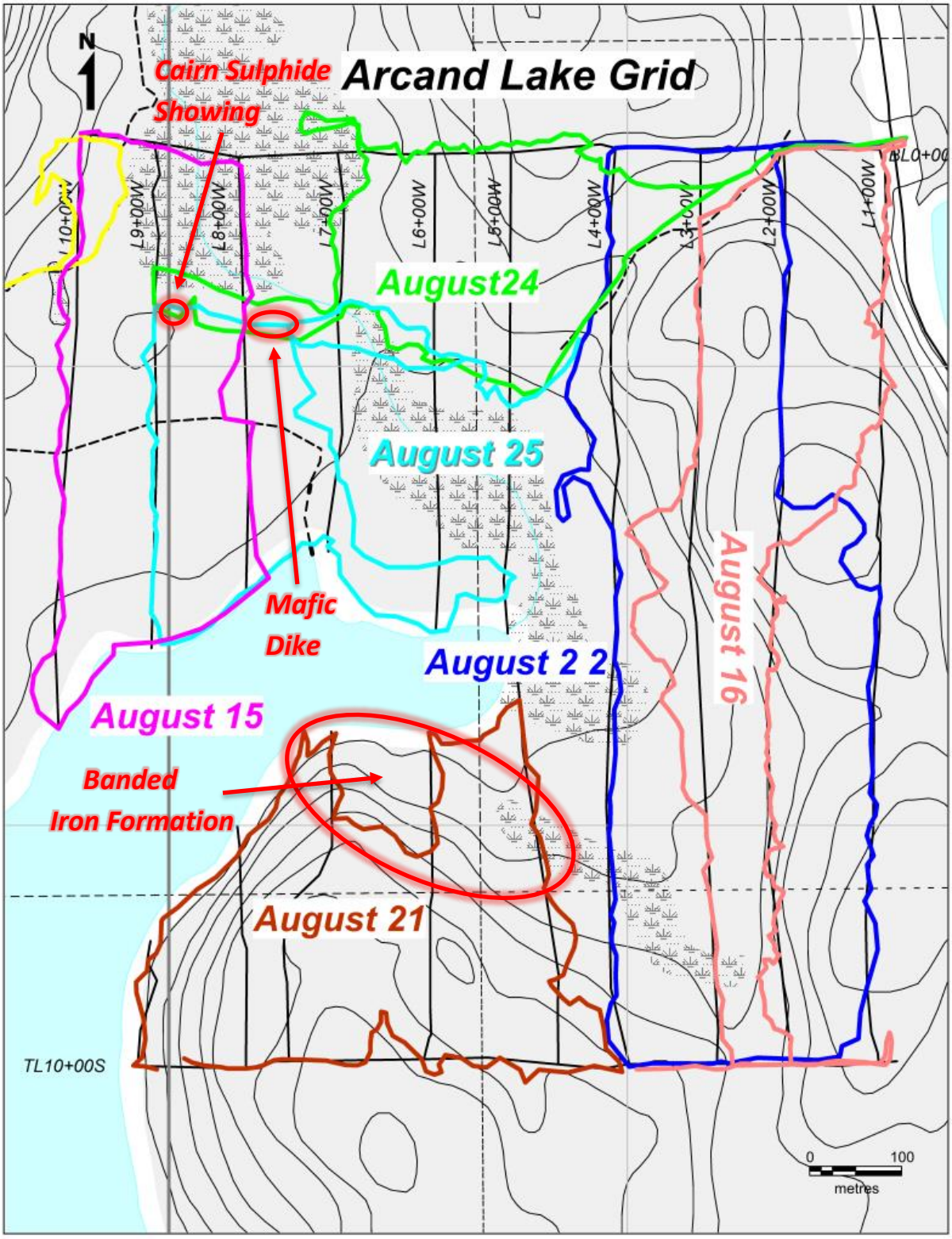

Figure 6: BeepMat Traverses and Anomaly Areas

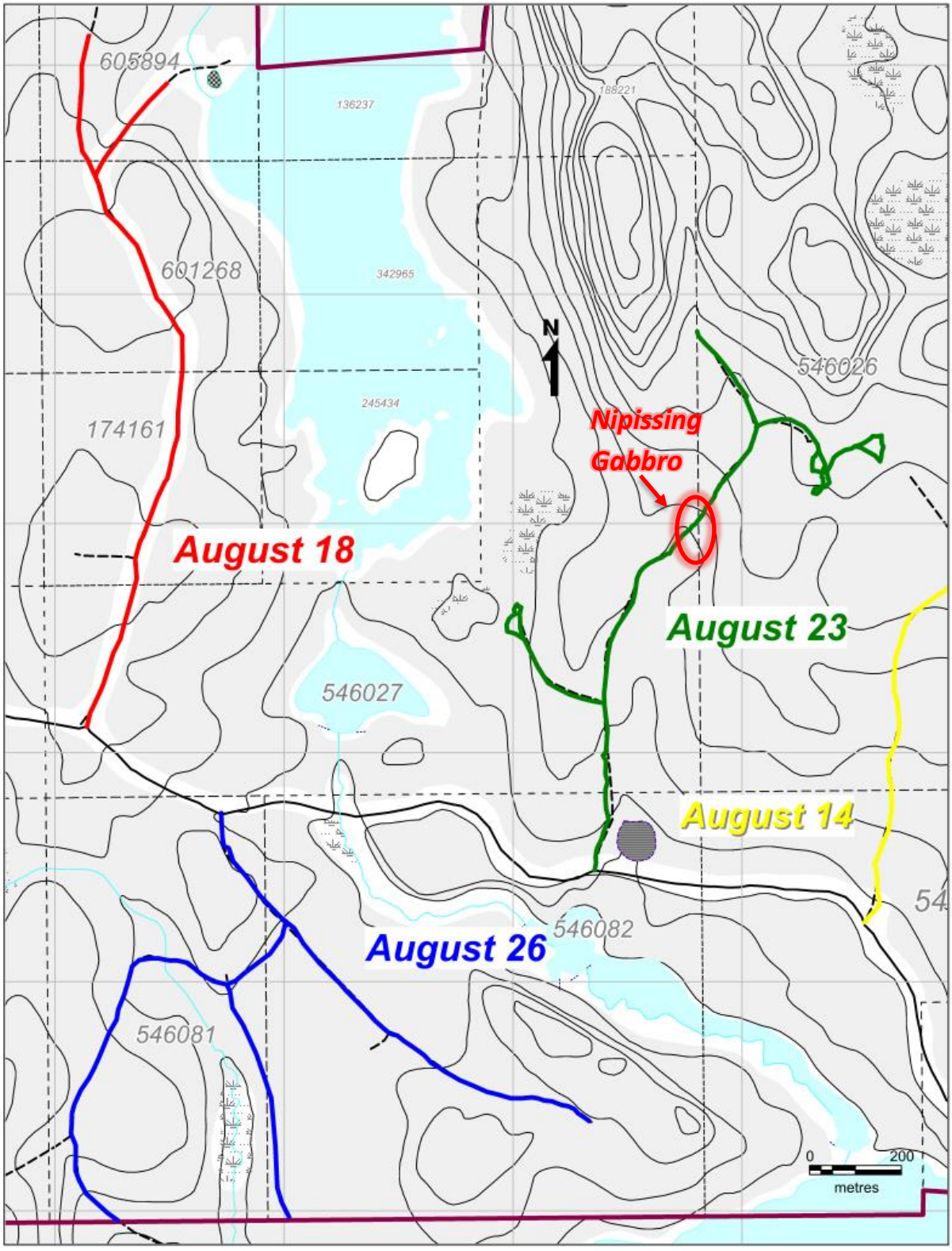

Figure 7: BeepMat Traverses and Anomaly Areas

Table 2: BeepMap Survey Anomalies

Rock Type	***Traverse Date***	***Way Point***	***Easting***	***Northing***	***Description***
Mafic Sulphide Boulder	Aug 14/2020	2020-415	553289	5186258	Conductor on trail, boulder with sulphides
Mafic Sulphide Boulder	Aug 14/2020	2020-416	553294	5186270	Conductor on trail, boulder with sulphides
Sulphide Boulder	Aug 14/2020	2020-417	553321	5186342	Conductor on trail, boulder with sulphides
n/a	Aug 14/2020	2020-418	553326	5186397	Mag on trail
n/a	Aug 14/2020	2020-419	553325	5186405	Mag on trail
n/a	Aug 14/2020	2020-420	553326	5186413	Mag on trail, possible dike
n/a	Aug 14/2020	2020-421	553321	5186439	Mag on trail
Rusty Mafic Boulder	Aug 14/2020	2020-422	553321	5186460	Conductor on trail, rusty boulder
Rusty Mafic Boulder	Aug 14/2020	2020-423	553319	5186485	Mag on trail, rusty mafic boulder
Intermediate Tuff	Aug 14/2020	2020-426	553751	5187007	Rusty weathering, buff purple grey, fine grained, siliceous/cherty, veinlets of quartz + amphibole + 0.5% pyrrhotite + albite, locally bedded, hornblende + chlorite + albite alteration
Intermediate Tuff	Aug 14/2020	2020-427	553748	5187002	Rusty weathering, buff purple grey, fine grained, siliceous /cherty, veinlets of quartz+amphibole+0.5% pyrrhotite + albite, 1-2% diss pyrrhotite, locally bedded, hornblende + chlorite + albite alteration
Intermediate Volcanic	Aug 14/2020	2020-428	553772	5186962	Possible Au Zone float, altered intermediate volcanic, looks mafic, massive, quartz + sulphide patches
Intermediate Volcanic	Aug 14/2020	2020-429	553765	5186990	Possible Au Zone float, altered intermediate volcanic, looks mafic, massive, quartz + sulphide patches
n/a	Aug 14/2020	2020-430	553750	5187014	Northern limit of Au Zone, picket
n/a	Aug 14/2020	2020-431	553755	5186954	VTEM target, approximate location
n/a	Aug 14/2020	2020-440	553325	5186392	Start of discontinuous mag
n/a	Aug 14/2020	2020-441	553321	5186483	Strongest mag
n/a	Aug 14/2020	2020-442	553335	5186521	Conductor and end of mag zone
Magnetic Mafic Boulder	Aug 14/2020	2020-443	553339	5186610	Magnetic boulder
Magnetic Mafic Boulder	Aug 14/2020	2020-444	553486	5186948	Magnetic boulder at parking spot
Magnetic Mafic Boulder	Aug 14/2020	2020-445	553566	5186957	Magnetic boulder on trail
Magnetic Mafic Boulder	Aug 14/2020	2020-446	553585	5186957	Magnetic boulder on trail
n/a	Aug 14/2020	2020-447	553607	5186940	Intense mag on downward slope of trail just before turn
Intermediate Lapilli Tuff	Aug 14/2020	2020-448	553745	5187086	Lap tuff, previously mapped, sub-crop, foliation 280/?
n/a	Aug 14/2020	2020-449	553817	5187085	Conductor on trail as 450 at 330 deg
n/a	Aug 14/2020	2020-450	553820	5187085	Conductor on trail as 449 at 330 deg
Magnetic Mafic Boulder	Aug 14/2020	2020-451	553893	5187169	Fine grained conductive dike boulder on side of hill on line
Gowganda Conglomerate	Aug 14/2020	2020-452	553866	5187215	Start of o/c
Gowganda Conglomerate	Aug 14/2020	2020-453	553901	5187186	o/c

Rock Type	*Traverse Date*	*Way Point*	*Easting*	*Northing*	*Description*
Gowganda Conglomerate	Aug 14/2020	2020-454	553855	5187177	End of 452
n/a	Aug 15/2020	2020-455	553903	5187252	Line and BL
n/a	Aug 15/2020	2020-456	553982	5187240	Possible conductor on BL in swamp?
n/a	Aug 15/2020	2020-457	554089	5187084	Out of swamp all readings B/O. No more swamps
Intermediate Lapilli Tuff	Aug 15/2020	2020-458	554063	5186970	Possible sub crop, Intermediate lapilli tuff
n/a	Aug 15/2020	2020-459	554110	5186761	Lakeshore, lost the line
Intermediate to Felsic Volcanic	Aug 15/2020	2020-460	553883	5186759	Intermediate-felsic volcanic, locally feldspar porphyritic, localized sulphide burns, chlorite + hornblende alteration and veinlets making look mafic, possible lapilli, previously mapped as mafic
Intermediate to Felsic Volcanic	Aug 15/2020	2020-461	553891	5186965	Close to VTEM anomaly, intermediate-felsic volcanic, feldspar porphyritic, localized lapilli, siliceous, purplish dark grey, quartz + 2-3% pyrite + chalcopyrite veinlets, foliated, fabric, chlorite + amphibole alteration rims, locally cherty/siliceous, possibly bedded, possible sub crop, foliation 50/85
n/a	Aug 16/2020	2020-464	554690	5186816	Test looking for line
n/a	Aug 16/2020	2020-466	554667	5186359	Now on L2
n/a	Aug 16/2020	2020-467	554679	5186244	L2 and TL
n/a	Aug 16/2020	2020-468	554781	5186244	TL
n/a	Aug 16/2020	2020-469	554787	5186237	Tl and L1
Arkose/Greywacke/ Argillite	Aug 16/2020	2020-470	554612	5186235	Siliceous arkosic greywacke with layers of argillite, dark to medium grey to black, bedding at 296/78
n/a	Aug 16/2020	2020-471	554601	5186236	Tl and 3
n/a	Aug 16/2020	2020-472	554510	5186234	Mag close L4
Magnetic Gabbro Boulder	Aug 16/2020	2020-473	554593	5186471	Mag, small gabbro boulder
Magnetic Gabbro Boulder	Aug 16/2020	2020-474	554590	5186481	Mag, small gabbro boulder
Nipissing Gabbro	Aug 16/2020	2020-475	554555	5186612	Edge of gabbro looking for line
Magnetic Gabbro Scree	Aug 16/2020	2020-476	554566	5186888	Magnetic Gabbro scree
n/a	Aug 16/2020	2020-477	554573	5186899	Back on Line
Magnetic Rusty Boulder	Aug 18/2020	2020-481	551608	5186660	Magnetic rusty boulder on Cucumber Lake Road
n/a	Aug 18/2020	2020-482	551625	5186710	Magnetic boulders
n/a	Aug 18/2020	2020-483	551633	5186724	Magnetic boulders
n/a	Aug 18/2020	2020-484	551643	5186763	Magnetic boulders
n/a	Aug 18/2020	2020-485	551685	5186960	Magnetic boulders
n/a	Aug 18/2020	2020-486	551702	5186999	Magnetic boulders
n/a	Aug 18/2020	2020-487	551769	5187245	Magnetic boulders
Intermediate Volcanic	Aug 18/2020	2020-488	551772	5187419	Possible o/c, turn around
n/a	Aug 18/2020	2020-489	551769	5187245	Mag/Conductor on road
n/a	Aug 18/2020	2020-490	551693	5186975	Mag/Conductor on road
n/a	Aug 18/2020	2020-491	551679	5186884	Mag on road part of BIFF
n/a	Aug 18/2020	2020-492	551648	5186780	Mag on road

Rock Type	*Traverse Date*	*Way Point*	*Easting*	*Northing*	*Description*
n/a	Aug 18/2020	2020-493	551636	5186727	Mag on road
n/a	Aug 18/2020	2020-494	551622	5186709	Mag on road
n/a	Aug 18/2020	2020-495	551584	5186602	Mag boulder on road
n/a	Aug 21/2020	2020-497	554502	5186237	Mag on TL
n/a	Aug 21/2020	2020-498	553987	5186234	Mag scree
n/a	Aug 21/2020	2020-499	554087	5186489	Small rusty mag boulder
Argillite/Banded Iron Formation	Aug 21/2020	2020-500	554142	5186576	Sulphide pit, conductive and mag, lit up like a Christmas tree
n/a	Aug 21/2020	2020-501	554188	5186540	Big BIFF
n/a	Aug 21/2020	2020-502	554230	5186496	Mag
n/a	Aug 21/2020	2020-503	554285	5186519	BIFF Mag
n/a	Aug 21/2020	2020-504	554403	5186553	Big Mag
n/a	Aug 21/2020	2020-505	554414	5186452	Mag
Greywacke/Argillite	Aug 21/2020	2020-506	554439	5186367	Small o/c, Dark grey to black, aphanitic, GW /Arg
n/a	Aug 22/2020	2020-507	554482	5186306	On the line
n/a	Aug 22/2020	2020-508	554488	5186358	Mag
Greywacke/Argillite /Siliceous Sediment	Aug 22/2020	2020-509	554485	5186396	Photos, New o/c under fallen tree, Interbed, Dark grey fine grained gw/arg and fine-grained siliceous sediment with sulphides possible chalcopyrite, bed 270/80
Greywacke	Aug 22/2020	2020-510	554481	5186481	Bedded Greywacke, bedding at 282/80
n/a	Aug 22/2020	2020-511	554484	5186614	Lost my battery, survey done
Gowganda Conglomerate	Aug 22/2020	2020-512	554433	5186837	Photos, Huronian conglomerate, large chunks of coarse grained tonalite/ feldspar rich granite
n/a	Aug 23/2020	2020-513	552682	5186285	Mag boulder on trail, black fine grained
n/a	Aug 23/2020	2020-514	552697	5186327	Conductor /Mag on road
n/a	Aug 23/2020	2020-515	552703	5186377	Conductor /Mag on road
n/a	Aug 23/2020	2020-516	552706	5186390	Conductor /Mag on road
n/a	Aug 23/2020	2020-517	552702	5186394	Conductor /Mag on road
n/a	Aug 23/2020	2020-518	552696	5186494	Continuous to intermittent mag/conductor up to here, BIFF or chunks of dike, chunk of black aphanitic BIFF mag, possible magnetite, looks schistose
n/a	Aug 23/2020	2020-519	552508	5186822	Dry river bed/ boulder pile end of trail
n/a	Aug 23/2020	2020-520	552842	5186935	Black mag rich road boulder
n/a	Aug 23/2020	2020-521	552869	5186974	Mag/conductor road boulder
n/a	Aug 23/2020	2020-522	552888	5186989	Mag/conductor road boulder
n/a	Aug 23/2020	2020-523	552890	5186994	Mag/conductor road boulder
n/a	Aug 23/2020	2020-524	552897	5186998	Continuous mag/conductor to 525
n/a	Aug 23/2020	2020-526	552930	5187045	525-526 Continuous mag/conductor
n/a	Aug 23/2020	2020-527	552939	5187058	Mag/conductor road boulder
n/a	Aug 23/2020	2020-528	552942	5187068	Mag/conductor road boulder
n/a	Aug 23/2020	2020-529	552942	5187068	Mag/conductor road boulder
n/a	Aug 23/2020	2020-530	552941	5187371	Mag/conductor road boulder
n/a	Aug 23/2020	2020-531	553010	5187278	Conductor too deep need shovel, near EM
Greywacke	Aug 23/2020	2020-532	553177	5187098	Huronian GW
Greywacke	Aug 23/2020	2020-533	553156	5187068	Huronian GW, bedded, large o/c, bedding at ?/25
n/a	Aug 23/2020	2020-534	553305	5187191	Edge of trench
n/a	Aug 23/2020	2020-535	553301	5187143	End of trench
n/a	Aug 23/2020	2020-536	553298	5187137	Hole 1 and 2

Rock Type	*Traverse Date*	*Way Point*	*Easting*	*Northing*	*Description*
n/a	Aug 23/2020	2020-537	553245	5187168	Visible trail ends
n/a	Aug 23/2020	2020-538	553208	5187151	Mag/conductor on trail
n/a	Aug 23/2020	2020-539	552821	5186925	Mag/conductor on trail
n/a	Aug 23/2020	2020-540	552800	5186916	Mag/conductor on trail
n/a	Aug 23/2020	2020-541	552770	5186879	Mag/conductor on trail
n/a	Aug 23/2020	2020-542	552706	5186437	No mag/conductor on BL trail
n/a	Aug 23/2020	2020-543	552707	5186362	Mag gabbro boulder on trail
n/a	Aug 24/2020	2020-544	554180	5187149	On line mag gabbro boulder
Intermediate to Felsic Volcanic	Aug 24/2020	2020-545	554184	5187080	Int to felsic volcanic "ridge", siliceous grey, on line, washed out looks alt, loc cross-cutting quartz veins with amphibole/chlorite rims, lite purplish grey, fine grained, possible fabric
n/a	Aug 24/2020	2020-546	554179	5187050	Leaving line heading west
n/a	Aug 24/2020	2020-547	554030	5187098	Mag boulder
n/a	Aug 24/2020	2020-548	553983	5187108	On the line
n/a	Aug 24/2020	2020-549	55987	5187062	Lost battery at 9:30 (2hrs)
n/a	Aug 24/2020	2020-550	554028	5187075	Photo of Twp cairn
Felsic to Intermediate Volcanic	Aug 24/2020	2020-551	554012	5187053	Photos, felsic-intermediate volcanic, very siliceous, fine grained, mm-cm scale veinlets of quartz + chlorite + amphibole + sulphide, loc 0.5% disseminated fine grained sulphides, locally larger clots of quartz + amphibole + chlorite + cubic pyrite crystals. *Cairn Showing*
n/a	Aug 24/2020	2020-552	554460	5187063	The trail out
n/a	Aug 24/2020	2020-553	554435	5187006	The trail out, Beep mat on at 7:48 am
Felsic to Intermediate Volcanic	Aug 25/2020	2020-554	554283	5187035	Faulty reading, felsic to intermediate volcanic, very siliceous, chlorite alteration, same bump as rest
n/a	Aug 25/2020	2020-555	554131	5187044	Beep on boulder hill
n/a	Aug 25/2020	2020-556	554106	5187045	Continuous signal from 555
Intermediate Volcanic	Aug 25/2020	2020-557	554099	5187046	Int volcanic chunks, beep intermit to going crazy
n/a	Aug 25/2020	2020-558	553992	5186697	Lakeshore and Line
n/a	Aug 25/2020	2020-559	554091	5186747	Picket L8, 4+75mS
n/a	Aug 25/2020	2020-560	554159	5186806	Pump road, conductive boulders here
n/a	Aug 25/2020	2020-561	554179	5186810	Line
Mafic Dike/ Intermediate Volcanic	Aug 25/2020	2020-562	554173	5186804	Gabbro dike, stung on the elbow
n/a	Aug 25/2020	2020-563	554177	5186930	Mag/conductive
Intermediate to Felsic Volcanic	Aug 25/2020	2020-564	554136	5186953	Showing Photos
n/a	Aug 25/2020	2020-565	554343	5187004	End of survey, BeepMat off at 10:15a, 75% bat
n/a	Aug 26/2020	2020-566	551862	5186368	New survey, 74% bat at 11:00 am
Arkose	Aug 26/2020	2020-567	551947	5186187	Conductive arkosic sediment on trail with sulphide burns.
Arkose	Aug 26/2020	2020-568	552031	5186137	Sediment highly conductive
n/a	Aug 26/2020	2020-569	552022	5186117	Conductor on trail
n/a	Aug 26/2020	2020-570	552137	5185979	Entire beaver dam is conductive, culvert?

Rock Type	*Traverse Date*	*Way Point*	*Easting*	*Northing*	*Description*
Arkose	Aug 26/2020	2020-571	552224	5185879	Sulphide burns conductor
n/a	Aug 26/2020	2020-574	552666	5185696	End of trail going standby
Olivine Diabase Dike	Aug 26/2020	2020-575	551608	5185886	Dike o/c
n/a	Aug 26/2020	2020-576	551541	5185593	Rust ditch
Olivine Diabase Dike	Aug 26/2020	2020-582	551555	5185564	Dike on trail

The high light anomaly of the 2020 program was:

- On the August 24 traverse (Waypoint 2020-551) an outcrop of sulphide rich felsic rock now known as the Cairn Sulphide Showing (Fig. 6, Table 2 and Photo 2) was identified. The outcrop consists of a very siliceous, fine grained felsic to intermediate volcanic with millimetre to centimetre scale veinlets of quartz, chlorite, amphibole and sulphide, localized 0.5% disseminated fine grained sulphides, locally larger clots of quartz, chlorite, amphibole and cubic pyrite crystals.

7.0 RECOMMENDATIONS

The following recommendations can be made based on the 2020 program completed on the Clement Property:

1) Hand bedrock stripping, detailed mapping and sampling of the Cairn Sulphide Showing.

Photo 2: Cairn Sulphide Showing (554012E, 5187053N)

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www.gddinstrumentation.com/beep-mat

Appendix I

Instructional Manual

BeepMat Model BM8

Instruction Manual

BEEP MAT

Model BM8

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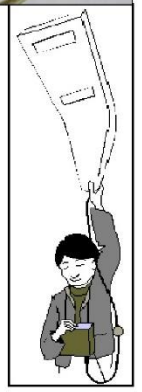
QUICK USER'S GUIDE

Beep Mat : Steps to follow

1) Connect the BM probe to the back of the reading unit. Do not forget to tie the safety strap (as shown on picture).

   Press [ON] until the first sound signal stops, then release it. "Standby" will then appear on the display indicating that the probe is connected and warming up. If possible, it is recommended to warm up the instrument at least half an hour before beginning the survey. It is also suggested to keep the BM probe at the external temperature.



2) To begin the survey, place the probe away from any conductive material by lifting it vertically above your head so as to avoid ground effects. Initialize the reading unit by pressing rapidly [ON]. You then have 5 seconds to take the probe above your head. There will be a "beep" for each second then two "beep" close together at the end; the system is initializing at that moment. If the Beep Mat probe is connected, the [No readings BM Probe] message will appear momentarily and the module automatically turns off the Beep Mat probe [BM SYSTEM : OFF]. When the probe is connected to the reading module, this function will automatically run [BM SYSTEM : ON].

3) The instrument will signal every 15 minutes, by a repetitive beep, that it needs to be reinitialized. The following message will appear on the display: "*Please Initialize*". The reinitialization procedure is done in order to achieve maximum efficiency. Repeat step B before continuing the survey. It is necessary to initialize the Beep Mat periodically. By default, the device asks to reset every 15 minutes.

4) To shut off the instrument, press and hold [ON] until the end of the two beeps (about 5 sec.). The display will show "OFF", then release. If the instrument is not used during two hours, it will automatically turn itself off.

5) The instrument should be recharged every night. Full charge takes between 4 to 6 hours. When it is not used for a long period of time, keep the instrument on charging.

6) If the batteries are too low, the reading unit will emit an alarm signal and will display the message "Low battery". Shortly afterwards, the readings become meaningless. Put batteries on charge the same day.

Using the Mag Sensor

Connect the Mag sensor to the back of the reading unit using the DB9 connector and press [ON]. The display will show *Initialization*, there will have 5 beeps. If the Beep Mat probe is not connected the message *No reading BM Probe* will be displayed and the reading unit will automatically turn off BM detection (*BM SYSTEM OFF*). If the Beep Mat probe is connected to the reading unit, BM detection will be automatically actuated (*BM SYSTEM ON*). The Mag sensor is not activated automatically (*MAG SYSTEM : OFF*). To activate it, press the

[MENU] key until the (*MAG SYSTEM*) appears on the display. Use the arrow keys [↑] or [↓], to select the MAG SYSTEM and the arrow keys [←] or [→] to activate the MAG SYSTEM. The (*MAG Initialization*) will be displayed. To visualize the MAG values press the arrow keys [←] or [→], the display will show the azimuth and the magnetic total field.

Using the GPS

The GPS cannot be used alone, it has to be use with the Beep Mat probe or the Mag Sensor connected to the reading unit. Connect the GPS to the back of the reading unit using its external connector (furnished with the GPS) and press the [ON]. The unit will search for the Beep Mat probe and if the BM probe is not connected, the reading unit will automatically turn off BM detection (*BM SYSTEM OFF*). The GPS is not activated (*GPS SYSTEM : OFF*). Press the [MENU] key until (*GPS SYSTEM*) appears on the display. To activate the GPS use the arrow keys [←] or [→]. To visualize the GPS coordinates press the arrow keys [←] or [→], the display will show the X and Y coordinates in degrees-minutes. To indicate them in UTM, press the [MENU] key until the (*GPS POSITION*) appears. Use the arrow keys [←] or [→] to select the UTM. Afterwards, select the DAT option using the arrow keys [↑] or [↓], then select the localization system: WGS 84 (Nad 83), Airy, Austral Nation, Bessel 1841, etc. with the arrow keys [←] or [→]. The serial data format in the GPS must be adjusted to NMEA and bauds to 4800 to allow the data transfer (see section 3.8). The optimize satellite detection; attach the GPS antenna under your hat (strongly recommended).

Note: Surveying, arrow keys [←] or [→] allow to visualize once at a time Beep Mat, Mag or GPS display, if they are activated.

Using the unit with an ATV or snowmobile

While riding an ATV or a snowmobile, it is difficult to hear the conductor or magnetite beeper of the Beep Mat. The module allows connecting an external alarm which is clipped to the operator and sounds louder. A cable of 4-6 meters allows pulling the BM probe behind the vehicle up to 20-30 km/h.

It is also difficult to visualize numeric readings. A GRAPH mode allows the operator to visualize the anomalies. To activate the GRAPH mode, press the key [MENU] until the (*GRAPH*) option appears. Select (*ON*) with the arrow keys [←] or [→]. The module returns to the normal operating mode. Use the arrow keys [←] or [→] to change the display. In graphic mode, a conductive anomaly is shown by a peak on the first line (up) and a magnetic anomaly by a peak on the second line (down). The operator can also adjust the speed of the scrolling with the (*GRAPH TIME*) option. Press the key [MENU] until the function (*GRAPH TIME*) appears on the screen and select the scrolling time with the arrow keys [←] or [→].

It is sometimes difficult to proceed at the initialization of the probe because of the snow or because the probe is at the back of the snowmobile. The user can set the initialization time at 30 minutes with the (*INIT TIME*) option. In this mode there will have 20 beeps instead of 5. This extra time allows the operator to go from the vehicle to the probe and hold it over the ground. The probe is initialized at the last two consecutive beeps.

The probe must be pulled in a wholly plastic or wooden sleigh far for the vehicle. (See section 8.4)

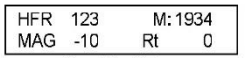
Basic keyboard

[ON] – To turn ON the BM or to change its state (see 2.3)
◁] – To increase or decrease the volume of the beepers (see 2.4)
▮▮ – To increase or decrease the display brightness (see 2.5)
[MENU] – To navigate in the menu (see 2.6)

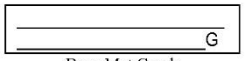
[←] [→] – To select items in the menu (see 2.6)
[↑] [↓] – To select items in the menu (see 2.6)
[MEM] – To store the data (see 2.11) or to reset the memory (see 4)

Display

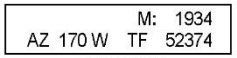
There are five types of display according to the operation mode. The following are: Beep Mat values or graphic, Mag, GPS or Date-Time-Battery. To change the type of display press the arrow keys [←] and [→] while the unit is in normal operating mode.



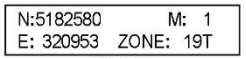
Beep Mat Values



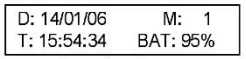
Beep Mat Graph



Mag Values



GPS UTM



Date-Time-Battery

Signal interpretation

- **HFR and LFR** are respectively the High frequency (HFR) and Low frequency (LFR) response (relative conductivity). They increase near a conductor. The concentration of the sulfite will be proportional to the HFR/LFR response. We generally pick up a sample where the outcrop has the higher response. The High frequency (HFR) is always displayed. The Low frequency (LFR) is displayed as long as no magnetite is present; otherwise the unit displays *MAG* instead of *LFR*.
- **MAG** is the magnetic value (relative susceptibility) and increases in presence of magnetite, its value is indicated by a negative sign (magnetic content). A reading of -1000 corresponds aproximatively to 1% of magnetite.
- **Rt** is unaffected by the amount of conductive material (intrinsic conductivity). The Rt qualifies the conductor from 0 %, poor conductor to 100 %, excellent conductor (conductor quality). The Rt is calculated only if no magnetite is present. For HFR below 10 Hz, the Rt value is not precise enough and *Rt = 0 %* will be displayed.

Threshold values

The default threshold values for the BM when you first turn it on are LFR: 2 Hz, HFR: 4 Hz and MAG: -400 Hz. To change those settings, press the [MENU] key until the desired parameters appears, then press the arrows key [↑], [↓], [←] and [→] to increase and decrease the value of each parameters. If at any time you become confused with those values, just turn the instrument off, then on again to reset all default values. These parameters should not be changed, unless you are very experimented. Be aware that a small change of these threshold values reduces dramatically the depth of detection of the Beep Mat.

The operating parameters of the BM as well as their thresholds (bold character) are:

Parameters	Threshold
LFR (conductivity):	1-**2**-4-8-15-20-40-80-150-200-400..... 30000 Hz
HFR (conductivity):	1-2-**4**-8-15-20-40-80-150-200-400..... 30000 Hz
MAG (magnetic):	- (1-2-4-8-15-20-40-80-150-200-**400**..... 30000 Hz)

Memory

The maximum storage capacity is the memory size divided by 32. One reading takes 32 bytes of memory. The readings are recorded on a flash card. The size of the card is displayed at the initialization of the unit. For a flash card of 256 Mbytes, a time interval of 0.1 second will take 9 days to fill the memory in continuous operation. The memory address is permanently indicated on the display.

Clearing memory

To clear or reset the memory of the BM while in the field, press and hold [ON], wait until *OFF* appears on the display then press [MEM] the message *Reset Memory?* will appear on the display, press again [MEM] and the message *Clear Memory?* will appear. Release the [ON] key and the unit will either reset or clear the memory according to the selection. The unit will automatically turn itself off after the execution of the operation and the memory address will be zero. To abort Memory clearing, press on [MEM] (see section 4).

Reading marker

A marker can be used to memorize a Beep Mat or Mag reading with their GPS localization on the field. These readings will be identified at the time of the data transfer into the computer. For example, the name of the Outcrop 1 could be associated with the readings 1 to 100. Outcrop 2 from 101 to 200, etc. To do that, press the [MENU] key until *NAME* appears on the display. Modify the characters by using the arrows key [↑], [↓], [←] and [→].

Date and time

The date (DD/MM/AA) and the time can be adjusted by pressing [MENU] until *Date/Time* appears on the display. The unit keeps in memory the date and the time even if the unit is off.

Warnings

Connect the probe to the reading unit and initialize it far away from any conductive material. If the display indicates *NO HI FREQ.*(No High Frequency) or *NO LO FREQ.* (No Low Frequency), refer to section 6 of this manual (Troubleshooting).

If the batteries are too low, the reading unit will send an alarm signal and will display the message *LOW BATTERY*. Shortly afterwards, the readings become meaningless. Recharge the device the same day.

Beep Mat malfunction

The unit uses special fuse. The fuse is chemical and as the property to build back itself. The unit is then protected against static discharge and short circuit but not against breakdowns. If the unit is not working, disconnect the cable for 30 seconds, connect it back and turn on the unit. If the module displays *No readings BM Probe*, verify if the cable is well connected. If the problem persists, change the cable and refer to section 6 (Troubleshooting).

If the instrument does not display anything and does not send any sound, but the status lights light up at the initialization, first check the display brightness with the key ▬ and the volume with the key ◁) (section 2.4 and 2.5).

EXAMPLE ON WHAT TO RECORD IN THE FIELD:
Record to photocopy for field work

http://www.gdd.ca

 # Échantillon - *Sample #* : _____

Projet - *Project* : _____ **Date - *Date* :** _____

Opérateur(s) - *Operator(s)* : _____

LOCALISATION AVEC GPS - *LOCALIZATION BY GPS*

NAD 83 ❑ 27 ❑ **EST - *EAST* :** __ __ __ __ __ __ m.

NORD - *NORTH* : __ __ __ __ __ __ m.

Zone __ __ __

LECTURES DU BM - *BM READINGS*

	HFR / LFR	MAG	% RATIO
• Sur la neige : • *On top of snow :*	_____	_____	_____
• Sol original : • *On the surface :*	_____	_____	_____
• Sur le roc : • *On the conductor :*	_____	_____	_____

Profondeur conducteur : **m. terre +** **m. neige**
Depth cond. buried : _____ ***m. soil +*** _____ ***m. snow***

Dimension conducteur : **m. long X** **m. large**
Size of conductor : _____ ***m. long X*** _____ ***m. wide***

Site échantillonné : **Erratique** ❑ **Affleurement** ❑
Site sampled : ***Boulder*** ***Outcrop***

Si foré : # de trous **Longueur totale** **m.**
If drilled : # of holes __ __ __ ***Total length*** __ __ __ ***m.***

Comment échantillonné (cliquez sur la case appropriée) :
Type of sample (tick one appropriate square) :

1) au marteau : **aléatoire** ❑ **choisi** ❑
hammered : ***random*** ***grab***

2) dynamite : **aléatoire** ❑ **choisi** ❑
blasted : ***random*** ***grab***

3) poussières de forages ***drill cuttings*** ❑

Si affleurement lité : **Azimut** **Plongée**
If outcrop layered : ***Azimuth :*** __ __ __ ϒ ***Dip :*** __ __ ϒ

Description du site et de la géologie - *Site and geology description :*

_____

_____

_____

Preface

With the Beep Mat, you can drastically reduce the cost of sampling and assaying the numerous near-surface conductors detected by airborne surveys in the many areas where the overburden is shallow. The Beep Mat has also been very successful in discovering new floats of ore and in the follow-up of conductive floats of ore to their source. Finally, the Beep Mat has discovered rich showings of gold and base metals that had not responded to airborne EM and even to any geophysical methods, as it can detect even small veinlets in an otherwise non-conductive body.

Under the moss, the Beep Mat also detects conductive and magnetic boulders. It is therefore possible to map the scattering of a trail of floats and find its source.

Moreover, the Beep Mat is the only instrument capable of detecting sulfide veinlets in sub outcropping ores that would otherwise respond weakly or not at all to geophysics. For example, the Beep Mat detected small chalcopyrite and pyrite veinlets in sub outcropping ores of Silidor and New Pascalis mines. Similar mines could be inexpensively discovered by a prospector dragging a Beep Mat in the woods and sampling every conductive vein detected.

Not only is the Beep Mat a new tool for prospecting, but it is also a whole new way of looking at prospecting!

GDD is convinced that the large-scale use of Beep Mats will bring new life to exploration of base and precious metals, just as the large-scale use of the scintillometer did for uranium exploration in Saskatchewan, Canada.

1. INTRODUCTION

This manual is intented for geologists and prospectors. It concerns the Beep Mat, model BM8. However, the general theory of the Beep Mat can be used to better understand any previous model.

1.1 Brief description of the Beep Mat

The Beep Mat is a simple and efficient electromagnetic prospecting instrument adapted to the search of outcrops and/or boulders containing conductive and/or magnetic minerals. It basically consists of a sleigh-shaped short probe and a reading unit. For prospecting, you pull the probe on the ground to be explored. The Beep Mat takes continuous readings while you walk and sends out a distinctive audible signal when detecting a conductive or a magnetic object in a radius of up to 3 meters. The Beep Mat directly detects and signals the presence of ores, even slightly conductive, containing chalcopyrite, galena, pentlandite, bornite and chalcocine. It also detects native metals (copper, silver, gold) as well as generally barren conductive bodies (pyrite, graphite and pyrrhotite), but which may contain precious ores such as gold or zinc (sphalerite), which are themselves non-conductive. Besides detecting conductors, the Beep Mat measures their intrinsic conductivity and their magnetic susceptibility (magnetite content). This helps geologists and geophysicists better interpret others geophysical and geological surveys.

The BM8 allows the use of a Mag sensor and the connection of an external GPS. This combination allows to survey large areas, to detect rapidly conductors, to find their localization and to record their values 10 times a second. A map of conductivity, magnetic susceptibility and magnetic total field can be done from these results. A second field operation to recognize the nature of conductors could be scheduled.

1.2 Beep Mat components

When you receive your Beep Mat, make sure that it contains all components shown on illustration 1. If not, please contact Instrumentation GDD Inc. Pay special attention to the terminology used on illustration 1 since it will be used throughout this manual.

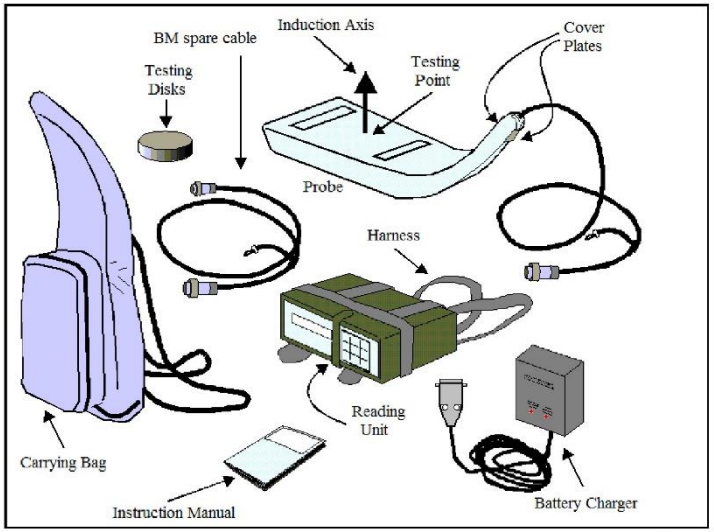


Illustration 1: Beep Mat components

Also included: RS232 and USB data transfer cables
Optional components:

- Mag sensor
- Loud sound alarm
- Protective shield under the probe
- A 4 -6 meters BM cable

1.3 Specifications

Power source:	Rechargeable batteries
Daily autonomy:	Up to 10 hours
Memory capacity:	8,093,750 readings
Weight:	Reading unit: 1.9 kg Probe: 3.8 kg
Size:	Reading unit: 18 x 20 x 6.4 cm Probe: 30 x 91 x 7.6 cm
Operating temperature:	From -20 °C to 40 °C
Humidity :	Operate on rainy, snowy and foggy days

2. READING UNIT

This chapter describes the various physical and functional components of the reading unit as well as instructions on how to use them.

2.1 Reading unit components

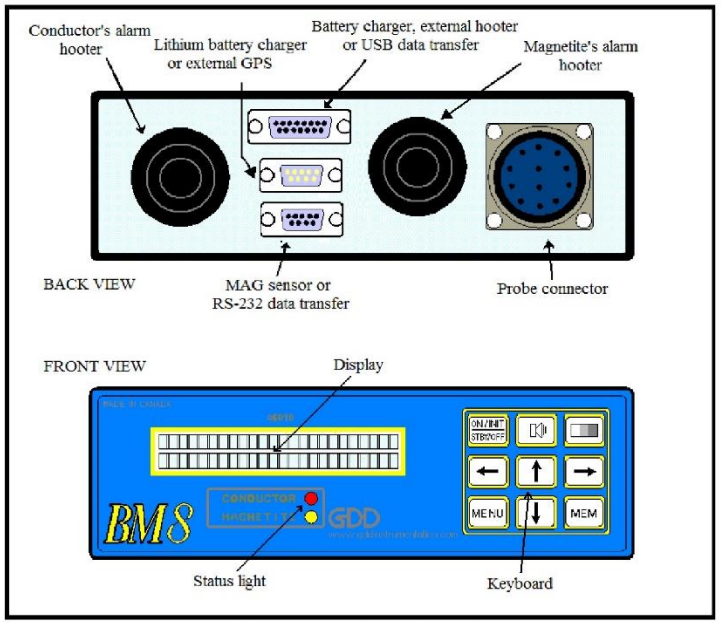


Illustration 2: Reading unit

The illustration 2 shows the various visible parts of the reading unit. Here is a short description of the function of each one.

- The **display** has two lines of 24 characters. Values, parameters or messages generated by the Beep Mat can be read on it.
- The **conductor status light** lights up when any key is pressed or when the **LFR** or **HFR** values exceed a specified threshold due to the presence of a conductor.

- The **magnetic status light (yellow)** lights up when a reading is stored in the unit or is sent to a remote unit. It also lights up when the **MAG** value exceeds a specified threshold due to the presence of a magnetic material.
- The **conductor's alarm hooter** (low-pitched sound) is activated when any key is pressed or when the **LFR** or **HFR** values exceed a specified threshold.
- The **magnetite's alarm hooter** (high-pitched sound) is activated when a reading is stored or sent or when the **MAG** value exceeds a specified threshold.
- The **probe connector** (round jack 10 pins connector) links the reading unit to the probe.
- The **DB15 jack** is used for hardware control. It allows charging the batteries, connecting an external sound alarm or data transfer with USB cable.
- The **DB9 jack (center)** links the reading unit to an external GPS.
- The **DB9 jack (below)** links the reading unit to the Mag sensor or to a RS232 data transfer cable.
- The **keys** on the **keyboard** are used to access the various functions of the Beep Mat, each key being identified at its center. In this manual, a word or a symbol in square brackets represents the key:

[ON] = To turn the unit on or to change its state (2.3)
◁] = To increase or decrease the volume of the beepers (2.4)
▬ = To increase or decrease the display brightness (2.5)
[MENU] = To navigate in the menu (2.6)
[→] [←] = To select items in the menu (2.6)
[↑] [↓] = To select items in the menu (2.6)
[MEM] = To store the data (2.11), to reset or clear the memory (4)

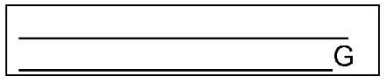
2.2 Displays of the Beep Mat

The BM8 unit has five types of display in normal operation mode: Beep Mat values, Beep Mat graph, Mag values GPS values (UTM and degree-minute) and Date-Time-Battery. It is possible to change the display by using keys [→] et [←] . Take note that each display is associated with a particular reading mode. If this mode is not activated then the display will not be displayed. For example if the *MAG SYSTEM* is *OFF* or if the mode *GRAPH* is *OFF*, their related info will not be displayed.

-1 The Beep Mat display in values mode is the most used. It is used to indicate the parameters measured by the Beep Mat probe.

```
HFR      0          M:  1
LFR      0      RT      0
```

-2 The Beep Mat displays in graph mode are very useful for surveys done with ATV's or snowmobiles. The parameters of the Beep Mat probe are indicated on two lines. The first line indicates the conductor signal intensity and the second line indicates the magnetic signal intensity.



-3 The Mag display indicates the azimuth and the magnetic total field. The magnetic north is indicated by azimuth 0 E. The Mag sensor can be used as a compass. The total field is indicated in gamma and the sensor can measure a total field as high as 120,000 gammas.

```
                   M:    1
AZ:      30 E      TF:  58645
```

-4 The GPS display indicates latitude and longitude in degree minute or in UTM according of the reference system used. To modify the reference system, select DAT by pressing [MENU] and with arrow keys choose your preference, for example WGS-84 (NAD83).

```
Y:   46°46.37              M:  1
X:  -71°20.71  180603 1424
```

GPS degree-minute

```
N:   5182580               M:  1
E:    320953   ZONE:  19T
```

GPS UTM

-5 The Date-Time-Battery display.

```
D: 14/01/06              M:    1
T: 15:54:34          BAT: 95%
```

2.3 Beep Mat Status

The [ON] key is not only used to turn the unit on; it is also used to put the unit in one of the following four states: ***On, Initialization, Standby or Off***.

To turn on the unit, connect the Beep Mat probe and press the [ON] key. The unit is initializing and measures the reaction of the probe. The values are displayed every second and measured every 1/10 second. The unit goes in the two following states:

Initialization :	*(sends 5 long sounds and 2 short.)*
On :	*(measures 0.1 sec., displays 1 sec.)*

If the [ON] key is kept pressed, the display indicates the two following states:

Standby :	*(first sound, 3 seconds)*
Off :	*(second sound, 5 seconds)*

The unit will put itself in the displayed state if you release [ON] at the precise moment the state is displayed.

Initialization, it is important to place the probe away from any conductive material by lifting it vertically above your head to avoid ground effects. Initialize the reading unit by pressing rapidly [ON]. At this time you have 5 seconds to hold the probe above your head. There is one beep every second then at the end two consecutive beeps are heard, at this moment the unit is initializing. In fact, the 5 seconds delay allows to the user to hold the probe with his two hands. The unit adjusts the signal to display values close to zero then it goes in reading mode.

In initialization mode, there are three cases: The Beep Mat probe alone, the Mag sensor alone and the Beep Mat probe with the Mag sensor connected.

-1 Beep Mat probe alone, the reading unit searches the Beep Mat initializes it and display the Beep Mat values.

-2 Mag sensor alone, the reading unit searches the Beep Mat, as the Beep Mat in not connected, the message *No readings BM Probe* is shown shortly, then the BM8 displays the date, time and percentage of battery. To activate the Mag sensor, press the [MENU] key until the (*MAG SYSTEM*) appears on the display. Use the arrow keys [↑] or [↓], to select the MAG

SYSTEM and the arrow keys [←] or [→] to select [MODEL GDDX]. To visualize the MAG values press the arrow key [←] or [→].

-3 Beep mat probe with the Mag sensor, the reading unit searches the Beep Mat probe initializes it and display the Beep Mat values. You must activate the Mag sensor by using the menu. To visualize the MAG or Beep Mat values press the arrow key [←] or [→].

On, to turn on the instrument, connect the probe and press the [ON] key. The BM8 measures the probe reactions and displays values every second. However, measurements are taken every 1/10 of a second. The beepers reacts instantly, then the beepers can signal a conductor even if the value is no yet displayed. In this mode, a message is displayed and a sound signals the operator to reinitialize the Beep Mat probe every 15 or 30 minutes.

Standby, press [ON] until the first sound signal stops, then release it. (S*TANDBY)* will then appear on the display. The BM warms up to stabilize its frequencies. The minimal preheating period suggested before beginning a survey is 30 minutes. If possible, the warm up could be done at the same temperature conditions that the one the survey will be done. The Mag sensor has not to be warm up.

Off, To turn off the instrument. Press and hold [ON] until (*OFF*) is shown on the display, then release it. The unit stops all functions and turns off. If the instrument is not used during two hours, it will automatically turn itself off.

2.4 Volume Control

It is possible to increase and decrease the volume of the Beepers. To change the volume of the sound, hold down the key ◁. The volume will slowly increase or decrease. Release the key at the appropriate volume. The next time you hold down the key ◁, the volume will go in the opposite way of the last action.

2.5 Brightness Control

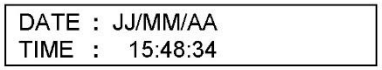
It is possible to increase and decrease the brightness of the display. To change the brightness of the display, hold down the key ▭. The brightness will slowly increase or decrease. Release the key at the appropriate brightness. The next time you hold down the key ▭, the brightness will go in the opposite way of the last action.

2.6 Selection of Menus

The BM8 has ten menus. To obtain a menu press [MENU]. The following menus are:

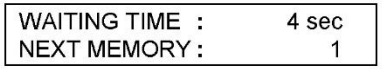
Identification:

Date-Time-Battery:

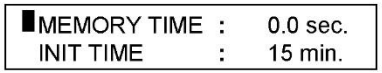


Threshold values:

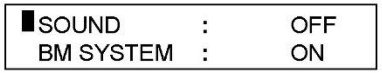
Waiting Time and Memory address:



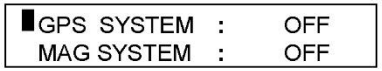
Memory Time and Init Time:



Sound and BM System:

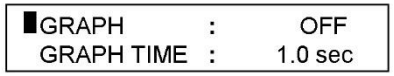


GPS and MAG System:

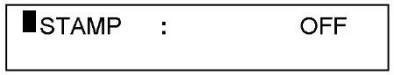


GPS reference system:

Graphic Option and tracing time:



Stamp events:



The menu has two lines. The black square indicates the selected line. By pressing the key [↑] or [↓], the black square will move from one line to the other. When a menu is selected, the keys [←], [→], [↑] or [↓] are used to select the items. There is no [ENTER] key. This key is replaced by a *WAITING TIME*.

2.7 Identification

To enter your identification, press [MENU] until that the menu NAME is displayed. The first character flashes. By pressing [→], the next character will flash and by pressing [←], the previous character will flash. To modify a character, use the keys [↑] and [↓]. If no keys are pressed for a time more than the waiting time, the BM8 will go back in reading mode.

2.8 Date and Time

You can set up the date and the time by pressing the key [MENU] until the option *Date/Time* is displayed. The keys [←], [→], [↑] and [↓] are used to adjust the date and the time. The module keeps the date and the time in memory even if the unit is off. The date and time has the following format: DD/MM/YY.

2.9 Configuration of the GPS

A special configuration is needed to transfer data from the GPS to the Beep Mat's reading unit:

To permit the data transfer from the GPS to the Beep Mat reading unit, a modification of the GPS parameters should be done. First connect the GPS to the Beep Mat reading unit with a RS-232 cable and follow these steps if you have a GPS model Garmin 60 or 76, on the GPS:

- Press on ''MENU'' button
- Press a second time on ''MENU'' button to reach the Main Menu
- Select ''Set Up'' and press ''Enter'' button
- Select ''Interface'' tab and change the serial data format to NMEA and bauds to 4800
- Press two times on ''QUIT'' button to return to the standard display.

2.10 Threshold Values

The operating parameters of the Beep Mat and their threshold values are the following:

Parameters	Threshold	
LFR (conductivity):	2 Hz	1-**2**-4-8-15-20-40-80-150-200-...30000 Hz
HFR (conductivity):	4 Hz	1-2-**4**-8-15-20-40-80-150-200-...30000 Hz
MAG (magnetite):	-400 Hz	-(1-2-40-80-150-200-**400**-800-.. 30000 Hz)

To display the threshold parameters, press on [MENU] until the desired menu appears. The parameters are displayed. These parameters are shown for a few seconds. By pressing [←] or [→] the threshold value selected will appear under its name. To modify the displayed value use the [↑] or [↓] keys. If no key is pressed during a few seconds, the BM8 will return to the normal operating mode.

It is important to remind that when a reading exceeds its threshold, an alarm (sound signal) will go on. By reducing the threshold of a value, the sensitivity of the Beep Mat will increase and can send false alarms. On the other hand, by increasing the threshold of a value, the sensitivity of the Beep Mat will diminish and so will the number of false alarms. It is not recommended to increase the thresholds, since fewer conductors will be found during the day.

The following table shows Beep Mat readings versus the depth of a conductive ore underneath the probe. Thank to this table, you are now able to evaluate the consequences of the modification of the threshold.

Depth in cm	**HFR value (conductor)**	**MAG value (magnetite)**
30	68	0
25	124	0
20	240	0
15	530	0
10	1329	0
5	3312	0
0	9233	0

HFR versus the depth of a pyrrhotite boulder of 15 cm.

Keep in mind that if you modify the threshold and at any time you can become confused with the values. Just turn the instrument off, then on again to reset all default values. These parameters should never be changed, unless you are very familiar with the instrument. Be aware that a small change of these threshold values reduces dramatically the depth of detection of the Beep Mat.

2.11 Waiting Time and Next Memory Location

Waiting time:

The keyboard of the unit has no [ENTER] key. The [ENTER] key is replaced by a waiting time.

While a menu is selected, if no key is pressed, the menu will be displayed for a few seconds (waiting time).

To select the waiting time press [MENU] until this menu is displayed. A digit will be flashing, by pressing [→], the next line will be flashing and by pressing [←], the previous one will be flashing. To modify the digit selected use [↑] to increase the value and [↓] to decrease the value. If no key is pressed for a time greater than the waiting time, the unit will return to its normal operating mode.

The waiting time selection is from 1 to 9 seconds. The default waiting time value is 4 seconds.

Next memory address:

The BM8 allows beginning recording values at any memory address. It gives a corresponding memory address to the values stored. Every time the unit stores a reading, the memory address increases by one. The maximum memory address is the size of the memory divided by 32. The size of the memory is shown at the top right corner of the BM screen when initializing.

To select the next memory address, press [MENU] until NEXT MEMORY is displayed. The first digit is flashing. By pressing [→], the next digit will be flashing and by pressing [←], the previous one will be flashing. To modify the digit, use [↑] to increase the value and [↓] to decrease the value. If no key is pressed for a time greater than the waiting time, the unit will return to its normal operating mode.

> **Note:** The memory address begins at 1 after a clear or a reset memory. However, if no clear or reset has been done before you initialize the probe, the memory address should not have changed since the last use. If the memory address has been accidentally reset, enter a new address memory greater than the numbers of readings of the last survey. This will avoid overwriting previous readings.

2.12 Memory Time

This menu is presented on two lines. A black square indicates the line selected. By pressing [↑] or [↓] the black square will move from one line to the other.

The size of memory is shown during initialization at the top right of the display in Mbytes. The number of readings that can be stored in the BM is the size of the memory divided by 32. A time interval of 0.1 seconds will take 9 days to fill the memory in continuous operation for a memory card of 256 Mbytes.

With the BM8, it is possible to store the values shown on the display. The Memory Time determines the interval that the BM8 will record data. This time can be set from 0 to 240 seconds. A Memory Time sets to 0 second is used for Manual-recording while any other values allow the Auto-recording. Those values can be stored either manually (**Manual recording**) or automatically (**Auto-recording**). The BM8 gives a corresponding memory number to the values stored. The memory number appears at the top right of the display. Every time the BM8 stores a reading, the memory number increases by one.

Manual recording (*memory time : 0.0 sec.*)

The manual recording allows storing data by pressing [MEM]. Press the key [MEM] each time you want to store a current displayed values in memory.

Auto-recording (*memory time : X sec*)

The time selected at *memory time* determines the time interval at which the BM8 will record data automatically. To access to the Memory Time, press [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. By pressing [→] or [←], the time can be modify to the value wanted. If no key is pressed during a few seconds, the BM8 will return to the normal operating mode.

To activate the Auto-recording, press on [MEM]. The # symbol will thus appear at the top right of the display to indicate that the BM8 is actually storing values automatically at every X sec. To stop the Auto-recording, simply press on [MEM] again and the # symbol will disappear.

Every time a reading is stored in memory, the number of corresponding memory is displayed. In your note book, record this number thus the nature of the reading. For example, the localization, the depth, etc. (see section 8.5). Later on, you can transfer the data to a computer to map the anomalies (see section 3)

2.13 Init Time

Init Time

It is necessary to reinitialize the BM8 periodically. The default reinitialization time is 15 minutes. However, in some special conditions, it may be more practical to increase the reinitialization time (in snowmobile or ATV). It is possible, but generally not recommended to do so.

To increase the reinitialization time to 30 minutes, press [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. Change the Init Time by pressing [→] or [←], the time will change from 15 to 30 and vice versa. When the Init Time is at 30 minutes, the initialization of the reading unit will automatically increase to 20 seconds. This extra time allows the operator to go behind the ATV or the snowmobile to lift the probe during initialization time.

2.14 Sound Control

This menu is presented on two lines. A black square indicates the line selected. By pressing [↑] or [↓] the black square will move from one line to the other.

Sound

When the thresholds for LFR/HFR or MAG are reached by the BM8, an alarm goes on. Sometimes, when you investigate the same conductor longer, the alarm may become bothersome. It is possible to neutralize the alarm.

To do so, press [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. By pressing [→] or [←], the sound will change from ON to OFF and vice versa. If you forgot to reactivate the alarm, it will automatically go on after a lapse of 5 minutes.

2.15 Beep Mat System

BM8 System

The BM8 unit allows connecting more than one system. It is also possible to connect a GPS System, a MAG sensor or any type of probe communicating in RS232.

It is possible to activate or deactivate the Beep Mat probe. Select the option *BM SYSTEM*, by pressing [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. By pressing [→] or [←], the activation will change from ON to OFF and vice versa.

When the Beep Mat probe is not connected or if there is a malfunction of the probe, a message *No readings BM Probe* is displayed momentarily. The reading unit disengages automatically the Beep Mat probe, *BM SYSTEM :OFF*.

2.16 GPS and Mag System

This menu is presented on two lines. A black square indicates the line selected. By pressing [↑] or [↓] the black square will move from one line to the other.

The default system of the BM is the Beep Mat probe. The GPS and the MAG are not activated. The *GPS SYSTEM* and *MAG SYSTEM* are *OFF*.

GPS SYSTEM:

To activate or deactivate the GPS System, press [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. By pressing [→] or [←], the activation of the selected item will change from OFF to NMEA (GPRMC) and NMEA (GPGGA). Some GPS will use RMC and others GGA. The cable of the external GPS should be plugged in the middle connector of the reading unit. Don't forget to fix the GPS antenna under your hat. (See 3.8, special configuration of the GPS)

MAG SYSTEM:

To activate or deactivate the Mag System, press [MENU] until this menu is displayed. Move the black square at the line selected by pressing [↑] or [↓]. By pressing [→] or [←], the activation of the selected item will change from OFF, GDD1 and GDD2 according to the sensor used. When the Mag sensor is not connected or if there is a malfunction of the sensor, a message *No readings Mag Probe* is displayed. The reading unit disengages automatically the Mag probe, MAG *SYSTEM :OFF*.

2.17 Reference System of the GPS

By default, the reference system of the GPS represents the latitude and the longitude in degrees-minutes. The X,Y values are at 0 and the date and hour are not inscribed until the GPS has not found its localization. To put the reference system in UTM, press the [MENU] several times up to the *GPS POSITION* page. Then, use the keys [←] or [→] to change the reference system from *degrees-minutes* to *UTM*. Don't forget to choose the good localization system. To do so, choose the DAT option, just below by using the keys [↑] or [↓], and determine the localization you are looking for: WGS 84 (NAD 83), Airy, Austral Nation, Bessel 1841, etc. Use the keys [←] or [→] in order to modify it.

2.18 Graph Option and Scrolling Speed

It is possible to visualize the readings in graphic mode. This mode is very useful when one does a survey with an ATV or a snowmobile because it is difficult to look at the reading unit while driving at the same time. The graphic mode has the advantage to keep on the screen the last 23 readings that were taken. In graphic mode, a conductive anomaly is shown by a peak on the first line (up) and a magnetic anomaly by a peak on the second line (down). Please note that when the operator first initializes the Beep Mat, the graphic mode is not activated. In order to activate it, press the [MENU] key several times until the *GRAPH* option appears. Use the [←] or [→] keys to put this option *ON*.

The operator can also adjust the speed of the scrolling with the *GRAPH TIME* option. Press the key [MENU] until the function *GRAPH TIME* appears on the screen and select the scrolling time with the arrow keys [←] or [→]. By default, the scrolling speed is 1.0 second.

2.19 Events Stamp

Events Stamp:

The BM8 allows taking readings in continuous mode at chosen intervals. The BM8 allows the user to record data with pre-determined intervals with the option *MEMORY TIME*. It is sometimes difficult to identify the readings of a particular spot. The stamp option therefore allows you to mark precisely the spot of the reading while recording. To activate the stamp option, press [MENU] until *STAMP* option appears to the screen. Then select ON with the arrows [←] or [→]. The Beep Mat then returns automatically to its reading.

In order to mark a position, press [↑] or [↓]. *STATION1* will appear to your screen. The readings will be recorded under the file name *STATION1*. When transferring data, it will be easy to find this recording. If more than one spot is recorded, the file name number will automatically increase: *STATION2, STATION3*, etc.

3. BM LINK TO A COMPUTER

This section will explain how to transfer the data from the BM8 reading module to your computer.

First, connect the reading module to a computer as shown in illustration 3.

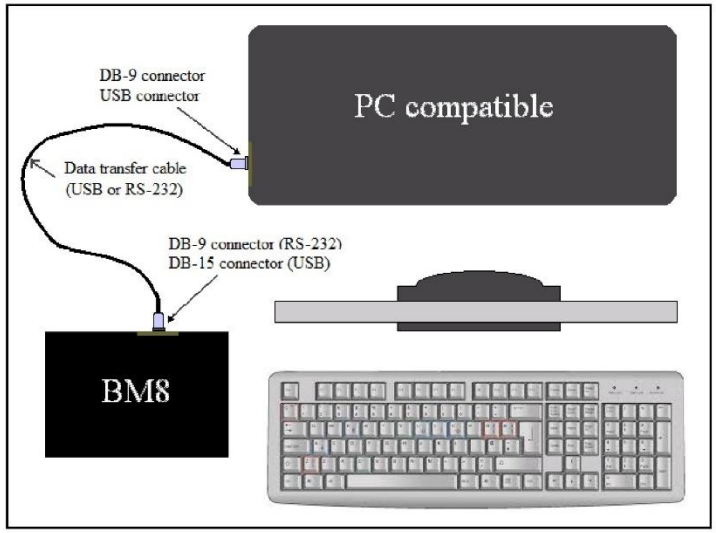


Illustration 3: Data transfer

If your computer does not have a Serial Com Port, connect the BM8 module to your computer with the RS-232 / USB cable supplied and see section 13.1 How to install the USB drivers on your computer.

Turn your communication software on and press [ON] on the reading unit, the following message will appear on the display of the BM8.

```
COMM:  57600,8,N,1 15934
INTERVAL:   5.0 seconds
```

3.1 Data transfer to a computer with HyperTerminal

A- How to create an icon on your desktop for data transfer using a RS232 or a USB cable with Windows XP

1. Start → Programs → Accessories → Communications → HyperTerminal (or C:\Program Files\Windows NT\hypertrm.exe)
2. Double-click on **Hypertrm.exe**
3. Name: type **BM**→ Select any icon → OK
4. Phone number: do not type anything here and pass to "Connect using"
5. Connect using: select **Direct to Com1 or Com 2** → OK
   (To know which port to choose, check the place where the RS232 cable is plugged behind your computer. For data transfer with USB cable, see **How to install the USB drive on your computer** in appendix, step 10)
6. Com X Properties → Bits per second: **57600**
   Data bits: **8**
   Parity: **None**
   Stop bits: **1**
   Flow control: **Hardware** → OK

   Bits per second number appear in left corner of BM8 display just next to **C:** when the reading unit is connected to a data transfer cable.
7. BM HyperTerminal:
   File → Properties → Settings → ASCII Setup…
8. ASCII Setup:
   ASCII Receiving: select **"Append line feeds to incoming line ends"**
   Note: Never select **"Force incoming data to 7-bit ASCII"**. It does not matter whether "Wrap lines that exceed terminal width" is selected or not.
9. OK → OK
10. File → Save as → Save in: Desktop → Save
11. Close the window entitled ''**BM-HyperTerminal''**→ Yes.
12. If someone needs the icon, you may copy it to his computer instead of following the previous steps.

B- How to transfer the data stored in the reading unit to your computer

1. Connect the reading unit to your computer and turn it on. You need the cable for data transfer (USB or RS232) provided with the Beep Mat.
2. Double-click on the icon previously created on your desktop.
3. In the tool bar, select Transfer → Capture Text → File: give a name to your file → Start
4. Press ENTER on your computer keyboard and you will see a menu appearing on your computer screen (*If the keyboard freezes, reinitialize the reading unit by pressing init button on the BM8 reading unit):*

```
BM8 1.7 by Instrumentation GDD Inc.
MENU -> DUMP (memory_start,memory_end,bypass)
        Set your software in capture, and then send the DUMPcommand.

        CLEAR
        Clear or reset the memory of the BM.

        INIT [also MENU key]
        Initialize the probe.

        INTERVAL(seconds) [also RIGHT and LEFT key]
        Set the interval reading (Min.: 0.1, Max.: 240).

        START [also MEM key]
        Activate the BM readings.

        The ESC key (character ASCII 27) [also MEM key]
        Deactivates the BM readings.

        GPS(system)
        Choose the system of GPS output
        Default value - GPS(24) ("WGS - 84")

        SYSTEM
        List of GPS systems

GDD >
```

Illustration 4: Messages displayed on the computer

This menu presents eight commands. The first two commands are specially used to transfer and clear the data stored in the BM. The next four commands are specially used when the Beep Mat is controlled b a computer. These four commands are used to monitor the ore grade on a conveyor. The last two commands are used to modify the GPS coordinates.

5. Type **dump(1,___)**. Note that there is no spacing between the typed characters. In the space at the right of the **1,** (___), you must type the number of readings stored in the memory of the reading unit. To know the number of readings stored, look on the reading unit display, top right.

6. Press ENTER on your computer keyboard and it will start downloading the data line by line.

   A message similar to the one shown on illustration 5 should appear on the screen. In the example presented on illustration 5, the first line is the name of the survey, then the date and the time. The second line is the header of the columns.

GDD > **DUMP(1,12)**

TEST1 15/06/03 13:36:25

Memory	HFR	LFR/MAG	Ratio	N	E	Zone	Date	Time	MTF	Azim
2	337	217	10	0	166021	31N	DATE	TIME	0	0
3	338	218	11	0	166021	31N	DATE	TIME	0	0
4	337	217	11	0	166021	31N	DATE	TIME	0	0
5	37	-218	0	0	166021	31N	DATE	TIME	0	0
6	239	219	2	0	166021	31N	DATE	TIME	0	0
7	239	-220	0	0	166021	31N	DATE	TIME	0	0
8	140	180	0	0	166021	31N	DATE	TIME	0	0
9	140	-221	0	0	166021	31N	DATE	TIME	0	0
10	341	221	5	0	166021	31N	DATE	TIME	0	0
11	340	222	5	0	166021	31N	DATE	TIME	0	0
12	142	-223	0	0	166021	31N	DATE	TIME	0	0

DUMP MEMORY COMPLETED...

GDD >

Illustration 5: Typical display following a data dump

Note the following points: The RT in the filed is 0 when LFR/MAG value is negative (presence of a magnetic body). Note that when HFR is under 10, RT value is 0%. The default GPS coordinates are transferred in UTM (WGS-84) system. The GPS was not activated since the latitude and longitude are 0°0'0", indicated by 0, 166021, 31N in UTM. Date and

time given by the GPS wasn't measured on this example. In latest version, the date and time of the reading unit (RTC) are displayed. The Mag sensor was not connected, the total field (MTF) and azimuth are zero.

7. Once the transfer is over, go in the tool bar and select Transfer → Capture Text → Stop

8. Close the window → Yes

9. You can now unplug the connectors from the BM8 reading unit.

10. You are now ready to work on your file ***.TXT** (ASCII format).

It is possible to transfer your data to a Microsoft Excel file see (*How to import a text file in Microsoft Excel*) in appendix.

3.2 Bypass function

The bypass is used to exceed the pointer of the last reading stored in memory. **DUMP(1,1200,BYPASS)** will transfer 1200 readings even if the last reading stored is at the memory location 200.

3.3 Clear memory

After the data transfer, you will eventually want to leave space for other readings. In order to do so, type **CLEAR** to see the display shown on illustration 6.

GDD > **CLEAR**

TO CLEAR MEMORY WITH ALL ZERO
ALL DATA WILL BE LOST
CONFIRM WITH (0000)

TO RESET MEMORY NUMBER TO ZERO
DATA WILL NOT BE LOST
CONFIRM WITH (9999)

Illustration 6: Memory clearing of the BM8

The confirmation **0000** feeds all the memory space with zero. The memory address is shown on the BM8 display and it will increase up to 8 093 750 then it will be reset to zero. This operation takes 15 minutes to be executed. The data will be lost. A message similar to the one shown on illustration 7 should appear on the screen.

```
0000

PLEASE WAIT, 15 MINUTES…
(To abort, press the ESC key on computer or MEM key on BM)

CLEAR MEMORY COMPLETED…

GDD >
```

Illustration 7: Confirmation with 0000

The confirmation **9999** does not really clear the memory, but reset the memory address to zero. The data will not be lost until next readings are stored. The next readings stored will overwrite the previous readings. A message similar to the one shown on illustration 8 should appear on the screen.

```
9999

RESET MEMORY DONE...

GDD >
```

Illustration 8: Confirmation with 9999

If you are not using a computer, press and hold the [ON] and [MEM] keys simultaneously on the BM8 reading unit. This will have the same effect of the **9999** confirmation (see section 4).

NOTE: It is recommended to confirm with **9999**. The data are not lost until next readings are stored and data can be downloaded to a computer with the **bypass** command.

3.4 Init Command

The initialization command is used to initialize the probe when the BM8 is monitoring a conveyor. To do so, lift the probe and type the **INIT** command then **ENTER**. Five beeps will be sent follow by two consecutive sounds. The probe will be initialized. The same command can be achieve by pressing the [MENU] key on the BM8.

3.5 Interval Command

This command set the time interval between each reading sent to the computer. The default value is 5.0 seconds. To do so, type **INTERVAL (0.2)** and the interval between each reading sent to the computer will be 0.2 seconds. The time interval can be increase or decrease by pressing [→] or [←] keys on the BM8 unit.

3.6 Start and Escape Commands

The start command starts sending readings at every time interval selected previously. To start the BM8 sending readings to the computer type **START** and to stop use the escape key on the computer keyboard. The same command can be achieve by pressing [MEM] key, which starts and stops sending data. If the probe was not initialized, an error message will appear on the screen of the computer: *ERROR 2: probe not initialized (INIT)…*

The data sent to the computer are the Memory Address, HFR relative conductivity, LFR/Mag relative susceptibility and Ratio. The illustration 9 shows an example of data transfer.

101	7	-5	0
102	25	-49	0
103	28	-54	0
104	54	-28	0

Illustration 9: Example of data transfer

3.7 GPS reference System

The default GPS coordinates are sent in UTM WGS-84. It is possible to choose among 24 systems. The available systems are listed by the command *SYSTEM*. Type on the computer the command **SYSTEM** the table in illustration 10 will be displayed.

```
SYSTEM

 1 - "ddd mm.mm"
 2 - "Airy"
 3 - "Austral Nation"
 4 - "Bessel 1841"
 5 - "Bessel 1841 (Nam)"
 6 - "Clarke 1866"
 7 - "Clarke 1880"
 8 - "Everest"
 9 - "Fis 1960 (Mercury)"
10 - "Fis 1968"
11 - "GRS 1967"
12 - "GRS 1980"
13 - "Helmert 1906"
14 - "Hough"
15 - "International"
16 - "Krassovsky"
17 - "Modified Airy"
18 - "Modified Everest"
19 - "Modified Fis 1960"
20 - "South Amer 1969"
21 - "WGS - 60"
22 - "WGS - 66"
23 - "WGS - 72"
24 - "WGS - 84"

GDD >
```

Illustration 10: List of GPS reference systems

To select the reference system, type the command **GPS(X)** or X corresponds to the number of system selected. This is an example for the selection of a reference system in degrees minutes. Type **GPS(1)** on your computer and the GPS position will transfer in degrees minutes.

4. CLEAR OR RESET MEMORY (FIELD)

To clear or reset the memory of the BM8 while on the field, press and hold [ON], wait until "OFF" appears on the display then press [MEM] the message "Reset Memory?" will appear on the display, press again and the message "Clear Memory?" will appear. Release the [ON] key and the unit will either reset or clear the memory according to the selection. The unit will automatically turn itself off after the execution of the operation and the memory address will be zero.

The Reset Operation does not really clear the memory, but reset the memory address to zero. The data will not be lost until next readings are stored. The next readings stored will overwrite the previous readings. The data can still be transferred to a computer by adding **BYPASS.**

The Clear Operation feeds all the memory space with zero. All data will be lost. The memory address is shown on the BM8 display and it will increase up to 8 093 750 then it will be reset to zero. This operation takes 15 minutes to be executed. To stop the execution, press the [MEM] key.

If one of the following messages appears on the display: *Memory full* or *Memory corrupted*, you must clear or reset the memory.

5. UNIT AND BATTERY TEST

Upon the delivery of the Beep Mat, always check if the batteries are charged. Some BM8 are powered by lithium batteries or Gel Cell and the chargers are not compatible. The lithium batteries are indicated by the addition of letters **LI** on the front panel at the end of the name BM8. If the letters **LI** are not present, the BM8 is powered by Gel Cell batteries.

5.1 Lithium Battery charger

The BM8 powered by lithium batteries connects with the DB-9 jack behind the reading unit (see illustration 11A); the BM8 turns on by itself. The BM8 display shows the time left to charge the lithium batteries, the capacity left (Ah) in the battery, the rate charge (A), the voltage of the battery(V) and the icon ⏚ at the bottom right side of the screen . If the charger is connected and the icon ⏚ is not present, the power source or the supply cable might be defective. The display is ON for five minutes. When the batteries are completely charged, the BM8 will display 'Charge complete'. Press the ON key to activate the display. Disconnect the charger and the Beep Mat will shut off by itself within five minutes. The Beep Mat is now ready to be use.

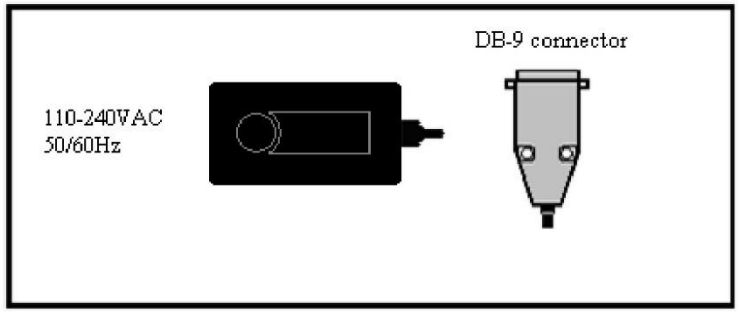


Illustration 11A: Lithium battery charger

When the BM8 is in operational mode, the status of the battery is shown by pressing key [←] or [→]. If the battery is weak, the reading unit will send a signal and will display *Low battery*. The readings might be obsolete if the batteries are low. We recommend to fully charging the BM8 batteries for accurate readings. It is also recommended to charge the battery to 40% (1.3 AH) before a long period of storage. When storing the BM8 for several months, check the charge level every six months and recharge the batteries to 50% (1.6 AH) if they have less than 30% (1.0 AH) of their load.

Never store lithium batteries fully charged or discharged for an extended period. Lithium batteries have no memory effect. They have low self-discharge, 10% (0.3 AH) per month and even less than a few percent per year. They require no maintenance.

Battery status:

Charger connected

Charger disconnected

5.2 Gel cell Battery charger

It is recommended to keep the instrument on charge when it is not in use for a long period. The charger is voltage and current limited. To keep the batteries charged, connect the DB-15 jack at the back of the reading unit (see illustration 11B).

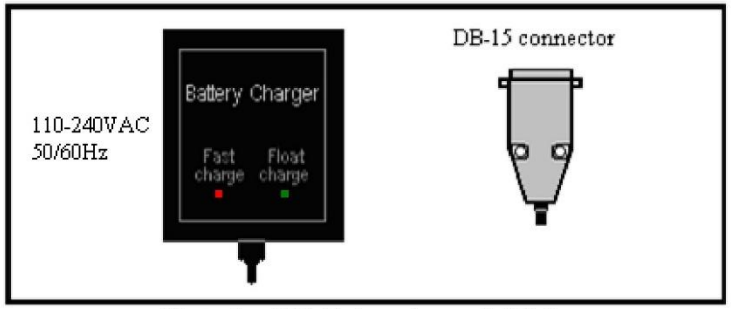


Illustration 11B: Battery charger Gel Cell

If the batteries are weak, the reading unit will send a signal and will display *Low battery*. The readings will be meaningless. Connect the 110VAC plug to a socket outlet.

If the light does not come on, the power source might be defective or the supply cable might have been cut. The Fast charge light indicates that the batteries are charging. When the batteries are completely charged, the Fast charge light goes out. Disconnect the charger and the Beep Mat is ready to use in the field.

5.3 Battery testing

When the batteries are fully charged, it is possible to verify their capacity. Connect the probe to the BM8; reset the memory as mentioned on section 4. Press and hold the [ON] key until OFF appears on the screen, then press the key [↓]. The message *Battery Test* should appear on the display. Release the [ON] key, the BM8 will start to store readings every minute. Let the instrument go on. When the batteries are weak, a *low battery* will appear on the display and the BM8 will shut off by itself. Turn on the unit and check the address of the memory. This number will give you the operating time of the BM8 in minutes. This time must be greater than eight hours (480 minutes) for good batteries.

5.4 Detecting functions and Testing

Connect the probe cable to the round jack at the back of the reading unit. Put the probe in a metal-free environment; for example, place the probe on a **wooden** table or a cardboard box. Ideally, avoid any kind of metal in a radius of 3 meters. On the reading unit, press the [ON] key. An initialization message will be displayed, and then the following display will appear:

HFR	0	M: 1
MAG	0	RT 0

The display shows four values. The HFR, the memory M**:**, the MAG or LFR and the RT. The High Frequency Response HFR can be negative or positive and is always displayed. The MAG is the magnetic value and increases negatively, if magnetite is present, its value is always negative. If there is no magnetite, the module displays Low Frequency Response LFR insted of MAG. The LFR is always positive and it is displayed as long as no magnetite is present. The HFR and LFR increase near of a conductor. The sulfite contents will be proportional to the HFR/LFR ratio. On a conductive horizon, the sample will be taken where this ratio HFR/LFR is the highest. The M**:** value is the number of readings recorded in memory. The RT is the Ratio value. This value is independant of the quantity of present material and indicates the quality of the conductor (intrinsic conductivity). The RT varies from 0 % (poor conductor) to 100 % (excellent conductor). The RT value is calculated only if a magnetic body is not present and if the HFR is greater than 10 counts, otherwise the RT will show 0%.

At the initialization, the HFR value must be lower than 4, the LFR lower than 2 and the MAG on the side of -8. You could hear one or two sounds from the beepers.

Bring a metal piece close to the probe (ex.: keys or a can). The HFR value should be positive, and the CONDUCTOR status light (see illustration 2) should light up and you should hear a low-pitched sound. The ratio value should be near 100 %, indicating an excellent conductor.

Take note that with the old Beep Mat model, two verification disks (blue and red) were provided with the unit. But now, you just need one disk (green) to do the verification of the Beep Mat.

Blue and red disks

Take away the metal piece from the probe, then place the red testing disk "C" (conductor) in the middle of the testing point (the first "D" of GDD on the probe). The HFR and LFR values should rise. The Rt value should indicate a value around 40 %. You should hear the high-pitched sound and the red CONDUCTOR status light should light up.

Then take away the red disk "C" and place the blue testing disk "M" (magnetic) in the middle of the testing point. The HFR value should be negative and the MAG value should increase negatively. The Rt value should indicate 0 (due to the presence of magnetite). You should hear a high-pitched sound and the yellow MAGNETITE status light should light up. For example a MAG reading of -1000 corresponds approximately at 1 % of magnetite.

Now, place the red disk on the blue disk in the middle of the testing point. The HFR value should be positive and the MAG value should be negative.The Rt value should be 0. You should also hear the high-pitched and low-pitched sounds and the red CONDUCTOR and yellow MAGNETITE status light should light up.

The displayed values should correspond, by 20 %, to the values marked on the red disk "C" and the blue disk "M".

Green disk

The green disk simulates the presence of a conductor and a magnetic material at the same time. The way to proceed is the same as the red and blue disk but the values should be these one. The HFR value should be around 2000 and the LFR value should be approximately 1650. For the RT, it supposes to be 83%.

If the Beep Mat reacts as described previously, it means that it works well. Otherwise, refer to section 6.0 (Troubleshooting). Repeat that test when you are not sure if the instrument is working well.

Those 3 tests are basic examples of the Beep Mat response in the field, so try to becoming familiar with them.

The reaction to the red disk is the typical reaction of the Beep Mat when you pass over a conductor in a non-magnetic environment.

The reaction to the blue disk is the typical reaction of the Beep Mat when you pass over a magnetic body or a magnetic environment.

The reaction to the red and blues disks is the typical reaction of the Beep Mat when you pass over a conductor in a magnetic environment.

6. TROUBLESHOOTING

If the instrument does not display anything and does not send any sound, but the status lights light up at the initialization, first check the display brightness with the key and the volume with the key .

If the Beep Mat is incoherent or if the reading unit indicates a problem such as *Low Battery*, *NO HI FREQ.* (No High Frequency) or *NO LO FREQ.* (No Low Frequency), one of the following components might be defective:

- probe cable
- battery charger
- reading unit
- batteries
- probe

In order to try to fix one of these parts, first check if the probe cable is correctly screwed to the reading unit. Then check if the batteries are fully charged by using either the other cylindrical connector of the charger or another charger (see 5.1 Battery charger). If the instrument is still not working, try to clear its memory (see 4. CLEAR OR RESET MEMORY). If the problem persists, replace the probe cable, it may be damaged. To replace it, unscrew the screws of the cover plates (see illustration 1). Then, unscrew the connector located there with a pair of pliers and cut the tie wraps if necessary. Connect the spare cable to the same hole where the defective cable was and test it. If it works, put the tie wraps back (it is essential), then put the cover plates back in place. The Beep Mat may also display the presence of a problem such as a low battery or non-working elements.

If you are not sure what the problem is, repeat the test described at section 5.3. If the Beep Mat still does not work, call Instrumentation GDD Inc. so that arrangements can be taken to ship you another unit as soon as possible while the instrument is under repair. Always return the complete instrument with all its components in its carrying bag to GDD.

6. TROUBLESHOOTING

If the instrument does not display anything and does not send any sound, but the status lights light up at the initialization, first check the display brightness with the key ▭ and the volume with the key ◁.

If the Beep Mat is incoherent or if the reading unit indicates a problem such as *Low Battery*, *NO HI FREQ.* (No High Frequency) or *NO LO FREQ.* (No Low Frequency), one of the following components might be defective:

- probe cable
- batteries
- battery charger
- probe
- reading unit

In order to try to fix one of these parts, first check if the probe cable is correctly screwed to the reading unit. Then check if the batteries are fully charged by using either the other cylindrical connector of the charger or another charger (see 5.1 Battery charger). If the instrument is still not working, try to clear its memory (see 4. CLEAR OR RESET MEMORY). If the problem persists, replace the probe cable, it may be damaged. To replace it, unscrew the screws of the cover plates (see illustration 1). Then, unscrew the connector located there with a pair of pliers and cut the tie wraps if necessary. Connect the spare cable to the same hole where the defective cable was and test it. If it works, put the tie wraps back (it is essential), then put the cover plates back in place. The Beep Mat may also display the presence of a problem such as a low battery or non-working elements.

If you are not sure what the problem is, repeat the test described at section 5.3. If the Beep Mat still does not work, call Instrumentation GDD Inc. so that arrangements can be taken to ship you another unit as soon as possible while the instrument is under repair. Always return the complete instrument with all its components in its carrying bag to GDD.

7. OPERATING PRINCIPLE

The probe contains an inductive coil within its shell. When the probe is in normal position on the ground, as shown on illustration 12, the induction axis sent by the coil is in vertical position.

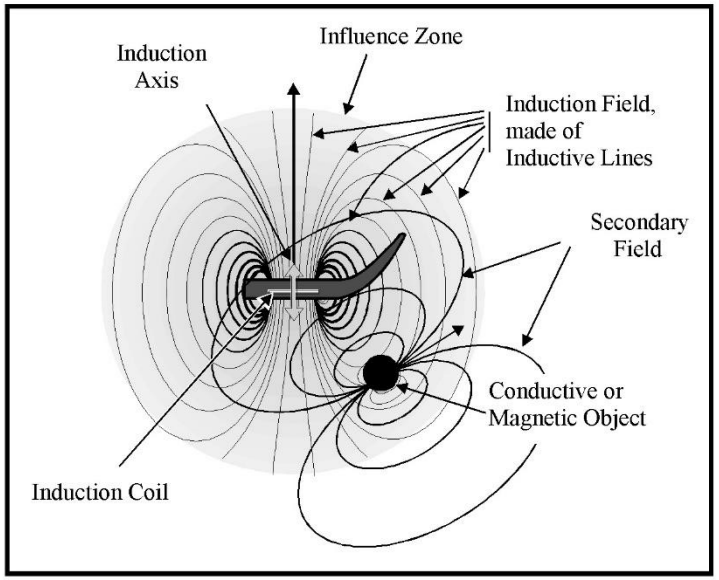


Illustration 12: Operating principle

The influence zone of its induction field has an average radius (called "range") of about 3 meters. This field is similar to the field of a magnet. Any conductive or magnetic object within the zone reacts by sending out again a secondary field (or "induced field") which is weaker and has distinctive features. The probe reacts on the part of this field that goes through its inductive coil. This reaction is then displayed on the reading unit in terms of LFR, HFR, MAG and Rt values.

Picture the inductive field as being composed of several induction lines crossing the inductive coil and which density increases towards the center of the coil. To illustrate that, only a few induction lines are presented on illustration 12. Therefore, the greater the number of lines that cross the conductive or magnetic object, the higher the displayed values will be. For further details, refer to chapter 9.

Following is the meaning of LFR, HFR, MAG and Rt values.

- The **LFR** value (Low Frequency Response) represents a specific reaction of the low frequency, in hertz, to the presence of a conductor near the probe.
- The **HFR** value (High Frequency Response) represents a specific reaction of the high frequency, in hertz, to the presence of a conductor near the probe.
- The **MAG** value (Magnetite) represents a specific reaction of the probe, in hertz, to the presence of a magnetic body, in particular one containing magnetite (relative susceptibility).
- The **Rt** value (Ratio) indicates the quality of the conductor (intrinsic conductivity) and is independent of the quantity of present material. For the ratio value to be calculated by the unit, there are two conditions:
  - the HFR must be at least 10 Hz
  - no magnetite must be present (MAG=0)

In presence of magnetite, the Rt value is altered and *Rt = 0* will be displayed. When HFR is below 10 Hz, the Rt value is not precise enough and Rt = 0% will be displayed.

To help you better interpret those values, a practical example is given on illustration 17 (section 9.2).

8. USE IN THE FIELD

This chapter describes a typical sequence for a Beep Mat survey.

8.1 Getting ready

Prepare all the necessary field gear : Beep Mat, a and a VLF (EM-16) electro magnetometer to localize airborne conductors, radio, field books, sample bags, small shovel, hammer, flag tape, maps, photos, dynamiting kit, marker, compass, etc.

Make sure that the batteries are charged. If possible, at least 30 minutes before beginning a Beep Mat survey, connect the probe cable to the round jack on the reading unit, then put the instrument in ***standby*** by keeping [ON] pressed until the end of the first sound signal (3 seconds). The message STANDBY will appear. You can carry the instrument while in ***standby***, but it is better to keep the probe at least 6 inches away from any large metallic surfaces (i.e., the floor of a truck). In such a situation, it is recommended to put the probe upside down.

It is better that the probe be preheated before beginning a survey. However, even if the probe has not been sufficiently preheated, you can start the survey anyway, but once in the field, you will probably have to reinitialize the Beep Mat more often during the first hour of use. Put the probe on the ground, strap the reading unit to yourself and attach the strain relief ribbon to the leather case as shown on illustration 13. You can then initialize the Beep Mat (see section 2.3).

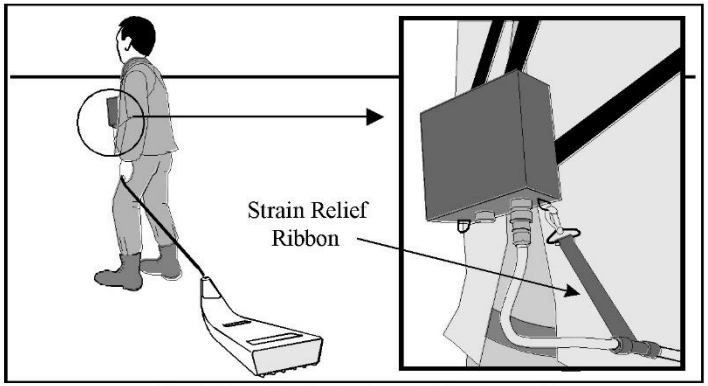


Illustration 13: Typical use of the Beep Mat

8.2 Initialization

First, make sure you are not wearing a metal helmet. Lift the probe vertically above your head, as shown on illustration 14, so that it is not affected by the ground, and initialize the Beep Mat by pressing the [ON] key. Wait until the initialization is over (about 5 sec.), and then put the probe on the ground. You can now pull it again. Remember that every 15 minutes; the Beep Mat will signal to the operator that it needs to be initialized again. It is possible to initialize the Beep Mat anytime by lifting the probe vertically in the air (see illustration 14).

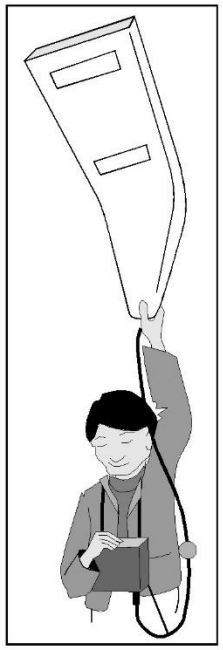


Illustration 14: Beep Mat initialization

8.3 Exploration

Cover all grounds that you think may offer an interesting potential of discovery. A distinctive signal will indicate that you just passed near a conductor or a magnetite concentration. Stop and confirm the signal position. Mark that position immediately with flag tape, posts or branches. Before digging, reinitialize the probe in the air, then use the Beep Mat to

delimit the nearby surface giving abnormal readings. Dig at the place where the readings are the highest, that is where there seem to be the most sulfides in the rock. Make sure that it is not caused by scrap metal, such as cans or metal casing (near a former drilling site for example). Dig with a shovel and examine the samples. Try to find the geological cause. You can also use the Beep Mat to delimit a conductive or magnetic outcrop.

Such exploration helps making discoveries, but in order to increase chances of success, it is recommended to elaborate a strategy and use different tactics. This aspect will be treated further in this manual.

8.4 Using an ATV or a snowmobile

The reading unit allows to connect an external alarm (see illustration below) which is clipped to the operator. This way, it is easier for the operator to take an immediate action. An optional 4-6 meters cable allows to pull the Beep Mat probe by using a connector interface (see illustration below).

While using a snowmobile or ATV, it is difficult to visualize numeric readings when an alarm occurs. A graphic mode (see section 2.6 and 2.18) allows the operator to visualize the conductive and magnetic anomalies. The graphic mode has the advantage to show on the display the last 23 readings and with a default one second scrolling speed you can visualize the last 23 seconds. A conductive anomaly is shown by a peak on the first line up and a magnetic anomaly is shown by a peak on the second line down (see illustration below). The modes can be selected by pressing the keys [←] or [→].

The operator can adjust the speed of the scrolling allowing the ATV or snowmobile driver to look at the display less frequently. The graphic mode can also be used to map a showing to determinate if it is a large conductor or small veinlets.

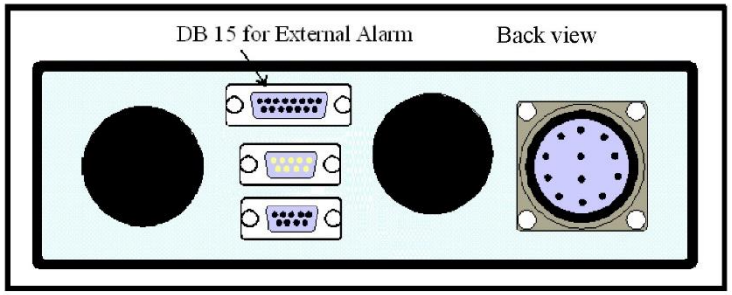
Make sure that the Beep Mat probe is far from a metallic material, as the ATV, the snowmobile or some sleighs. To do it, you must put the probe in a wholly plastic or wooden sleigh or pull the probe far from the vehicle. The maximum suggested speed is 20 to 30 km/h.

It is sometime difficult to proceed at the initialization of the probe because of a large amount of snow or because the probe is at the back of the snowmobile. The user can set the initialization time at 30 minutes with the *INIT TIME* option (see section 2.6 and 2.13). With this mode there will be 20 beeps instead of 5. This extra time allows the operator to go from the

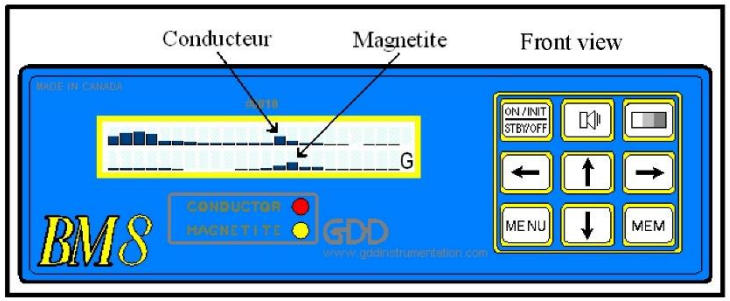
vehicle to the probe and hold it over the ground. The probe is initialized at the last two consecutive beeps.

Optional External Alarm

Optional Connector Interface



DB-15 Connector for the external alarm



Graphic mode

8.5 *Example of notebook*

8.5 *Example of Notebook*

With the Beep Mat, you will find a lot of conductors. For a good evaluation of each conductor found, it is important to take proper notes in your notebook. Here is an example of a typical notebook :

																Assays (when obtained)				
A	B	C	D	E	F	G	H	I	J	K	L									
#	prosp	B/O	HFR before	HFR after	MAG	Rt %	Area	Orient.	UTM m.N.	UTM m.E.	Comments					Au ppb	Cu ppm	Ni ppm		
201	LG	B	9500	45000	3000 3 %	***	0.5m, round	-	4 986452	717 540	about 30 % of pyrrhotine					> 5	34	13		
202	EG	O	2000	4000	0	55	30 m x 1.5 m	90 N	4 987022	717 870	lots of small parallel veinlets. Cpy 10 %					8980	5340	450		
203	GD	B	1200	3000	2000 2 %	***	0.6 m x 0.4 m	-	4 986110	716 983	look like quartz with dark impurities.					> 5	14	12		
301	EG	B	70	1500	2500 2.5 %	***	0.3 m, round	-	4 984440	718 393	5 % Po and 2 % Cu					67	2300	45		
302	EG	O	80	6000	0	54	25 m x 1 m	60 N	4 984350	718 408	many stripes of conductors about 1 m apart, over 2.5 m.					550	670	350		

A : Sample number
B : kinds of the person who found the sample, for further reference
C : The conductor's a boulder (B) or an outcrop (O)
D : Maximum value (**HFR**) obtained from the Beep Mat before digging
E : Maximum value (**HFR**) obtained from the Beep Mat after digging
F : **MAG** value
G : Ratio read over the conductor
H : Area over which the Beep Mat responds (beeps)
I : Conductor orientation, useful for geological interpretation
J-K : Localisation of the discovery (here from a GPS in UTM)
L : Other useful info, if possible, ore content

9. INTERPRETATION OF READINGS

This chapter explains how to interpret the values on a target and the profiles of these values.

9.1 Data on a target

The HFR, LFR and MAG values are influenced by the conductivity of an object and its magnetite content. A LFR value indicates that the object is more conductive than magnetic, while a MAG value indicates the opposite. A conductive and magnetic rock could give a LFR or MAG value according to the proportion of those elements. The bigger the object is or the closer it is to the probe, the higher the value. The presence of humidity in the ground causes the addition of an offset of 0 to -100 to the MAG value (see illustration 15). For that reason, in the absence of conductors, the readings are generally MAG.

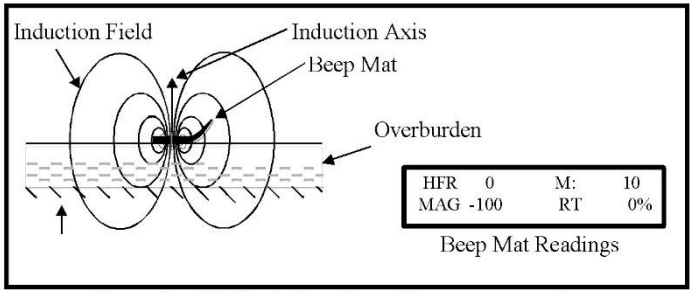


Illustration 15: Typical reading without any anomaly.

The HFR corresponds to the variation of the high frequency and the LFR or MAG corresponds to the reaction of the low frequency. When approaching a magnetite rich sample (for example, a vein), the low frequency reacts more than the high frequency, so the MAG value should appear a little more negative than HFR value. The MAG value increases in negative value (see illustration 16, case "b"). When approaching a conductive sulfide sample, the HFR reacts more than the LFR. Therefore, the HFR value should appear and increase while the LFR value should remain low (see illustration 16, case "a"). If the HFR value is high and the LFR is almost equivalent, it means that the conductivity of the sample is high and that the body could turn out to be metal.

Note the similarity of these reactions with those observed during the instrument testing (chapter 5.3). The weaker the block conductivity is, the weaker the HFR value will be. By approaching a conductive block that also

contains magnetite, the HFR will increase and the MAG will diminish in negative value (see illustration 16, case "c").

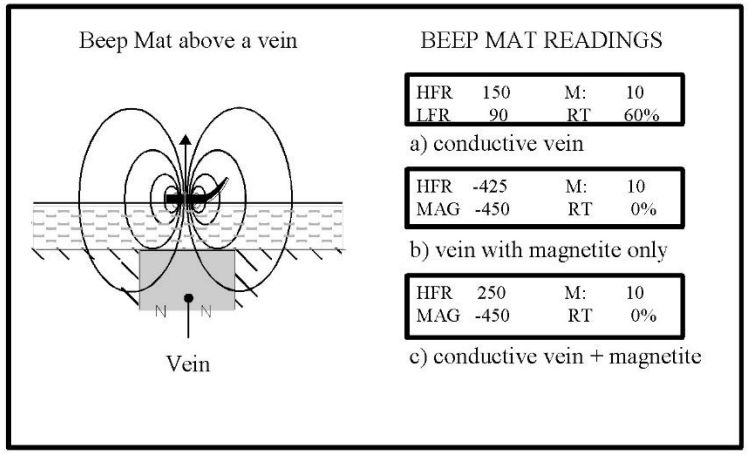
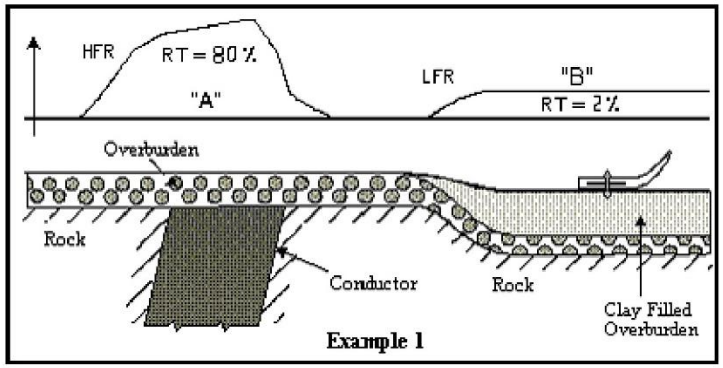


Illustration 16: Examples of Beep Mat readings in presence of: a) a conductor, b) magnetite, c) a conductive body containing magnetite.

9.2 Profiles on target

It is possible to draw a profile of the values displayed by the Beep Mat along a traverse, but it is rather suggested to just make an image of it in your mind. The two following illustrations show simplified but typical examples.



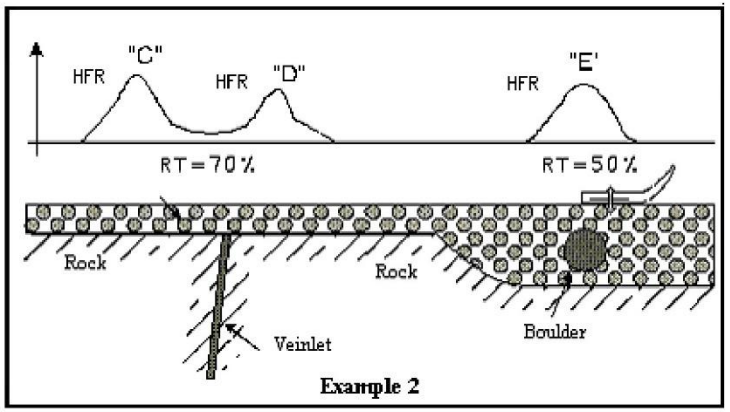


Illustration 17: Examples of typical profiles of the Beep Mat

Here is how to interpret illustration 17.

- Anomaly "A" is strong and wide, and the ratio (Rt) is high. It indicates the presence of a good wide conductor.
- Anomaly "B", however, is weak and uniform, and the ratio (Rt) is low; it is a typical sign of the effect of a clayey ground.
- Anomalies "C" and "D" of example 2 above. These two anomalies forming a doublet are both caused by the effect of an almost vertical veinlet. There are no anomalies above the veinlet because the induction lines do not cross it (see chapter 7).
- Anomaly "E" is rather narrow and reacts mostly in HFR. In this example, it is due to the presence of a boulder in the till.

Do not attach too much importance to the exact shape of these profiles. When you will pull the Beep Mat again, the profile should change a little. This is due to one or several of the following factors:

- the probe has not been pulled exactly on the same line;
- the surface is bumpy;
- the surface condition has changed (for example, after rain).

The Beep Mat is adapted for quick jobs. Experience will enable you to visualize these profiles by memory while delimiting an interesting target. It is faster and more efficient to pass the Beep Mat again and delimit the target with flag tape, then dig and sample, than to draw a survey profile on paper once back at the office.

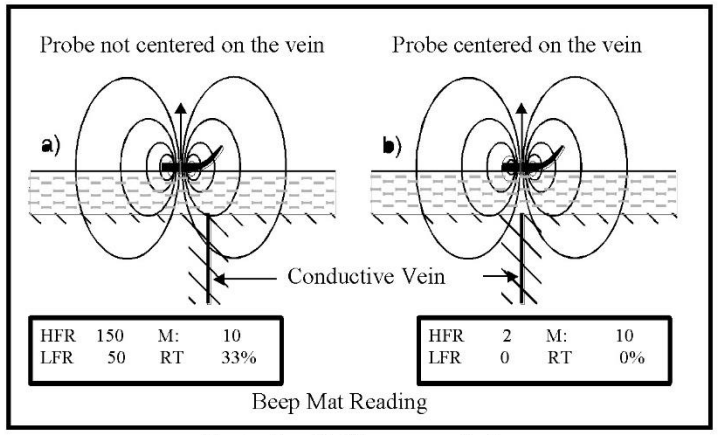


Illustration 18: Narrow conductor

The illustration 18 is a good example of the Beep Mat responds over a narrow conductor.

10. PRATICAL APPLICATIONS

As mentioned previously, it is essential, before doing a Beep Mat survey, to elaborate a strategy in order to maximize the chances of making a discovery. When a Beep Mat anomaly appears in the field, you must then use appropriate tactics.

10.1 Strategy

Look for a favorable ground for a Beep Mat survey, such as an area where the overburden is not very deep (less than 2 meters) and contains, if possible, electromagnetic anomalies. Use cards according to your prospection area. Examples:

- Overburden maps (M.R.N. in Quebec)
- Quaternary geology maps (Geological Survey of Canada)
- Geology maps for outcrops
- Electromagnetic and magnetic airborne survey maps
- Topographic maps (at 1:20 000 or 1:50 000)
- Aerial photos
- Compilations of previous works

Prepare a strategic map for your survey, similar to the one shown on illustration 19. You can use the overburden map as a starting point. Report all pertinent information on that strategic map. Mark all outcrops, boulders, conductors (electromagnetic anomalies) and/or magnetite concentrations (not very deep magnetic anomalies), known geological directions, areas where the overburden is less than two meters thick, areas covered with till rather than with river deposits (sand, clay), etc. Make sure that the elements coordinates are as precise as possible. Finally, delimit target areas to be explored and estimate the direction of the survey lines.

Former prospectors have taught us that lake shores and swamp edges (former lakes) very often represent favorable areas for prospecting because waves have washed the till and bare rocks are often hidden just under a thin layer of moss.

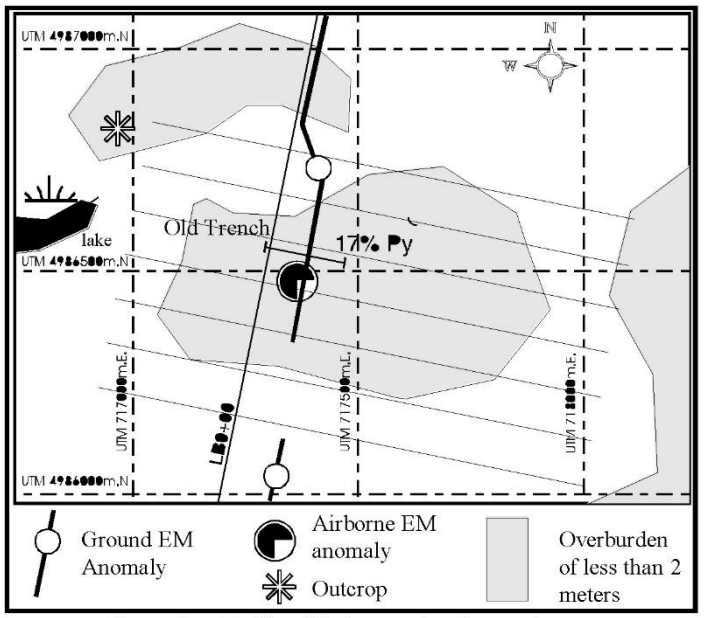


Illustration 19: Simplified example of strategic map

Once in the field, at the beginning of the survey, try to evaluate the operating parameters of the Beep Mat. Modify them if you find it appropriate. You may also want to modify these parameters in order to reduce the alarms frequency. Cover target areas according to your strategic map. Use the Beep Mat to localize known conductors, discover new conductors or detect mineralized boulders.

10.2 Advanced tactics

If you detect an anomaly, reinitialize the Beep Mat and pass it again on this anomaly, it should beep again. With a post, flag tape, etc.; mark the spot where the highest value was obtained. Keep that value in mind. Zigzag around the spot taking into account the conductor's direction or the geological direction (see illustration 20). With colored flag tape, delimit the anomaly contour, its size and other spots having high values. Check if this anomaly appears again farther in the same geological direction. If you do not find the conductor, you can use a Mag VLF to localize its axis, and then zigzag with the Beep Mat over the known Beep Mat axis to find where the conductor comes closer to the surface. But remember that any conductor that a Beep Mat detects may lead to the discovery of a mine, even if the

VLF had not reacted to it! So maximize your time by pulling the Beep Mat instead of running a VLF survey.

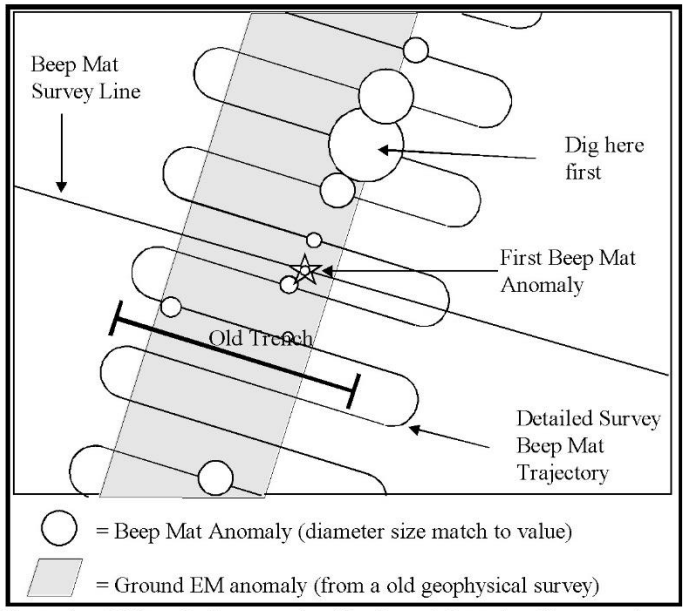


Illustration 20 Practical approach with a Beep Mat to localize a conductor

By concentrating your efforts on the areas which give the highest values, you will not have to dig too much since a high value means that the conductor is closer to the surface. Dig until you can identify the source of the anomaly (graphite, sulfite or even native metal). If the conductor seems to be deep, dig and check if the readings increase when you insert the probe into the hole. If the readings increase, it means that you are really getting closer to the conductor. Take samples containing sulfides for assays (Cu, Zn, Pb, Au, Ag, Ni, etc.).

Repeat these steps for each conductor discovered with the Beep Mat.

10.3 Case of Anomalies Forming a Doublet

If you find two Beep Mat anomalies along your route and they are in a doublet (about 1 meter apart), it is possible that you may be dealing with only one veinlet located in the middle rather than with two (see illustration 17, anomalies "**C**" and "**D**"). Determine the conductor axis, then grab the probe and hold it on its side as shown on illustration 21. Its induction axis should therefore be horizontal and perpendicular to the geological orientation. Cross the anomalies with the probe thus oriented. You might find only one anomaly in the middle. That is where you must dig. If both anomalies persist, dig at both places.

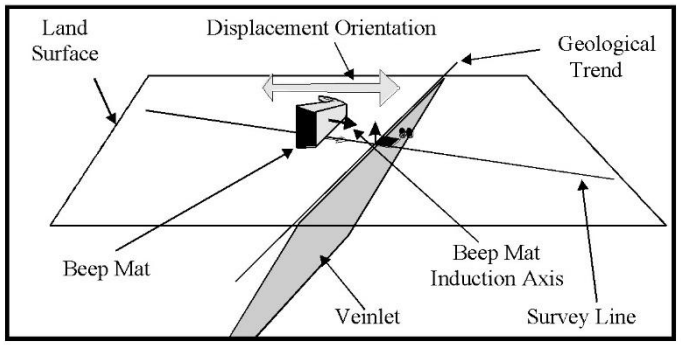


Illustration 21: Confirming double anomalies

10.4 Sampling

On a given long conductor, it is suggested to take a sample at every 300 or 400 meters (and send them for assays) since even a barren pyrrhotite horizon can turn out to be, for example, a rich ore (ex.: Thompson Mine in Manitoba). However, on parallel horizons, it is suggested to sample whenever the conductor's nature changes (graphite to pyrite) and wherever the geological environment is favorable (fine pyrite in quartz veinlets). By cleverly choosing their sampling sites, Beep Mat users will make more discoveries. Thanks to the Beep Mat, a massive sphalerite horizon was once discovered about 10 meters from a sterile pyrite trench.

10.5 Clayey ground

On a target, if you suspect that the ground is particularly conductive (clayey ground); dig a 30-cm deep trench that is big enough to insert the probe in it. Put the probe into the hole and rotate it to find out from what direction the strongest signal is coming. If the displayed values do not vary much, it is due to the clayey nature of the ground. But if the values increase, it means that the conductive rock is hidden deeper. If the values keep increasing while the probe is in the hole, keep digging up to one and a half meter. Usually, clayey grounds are uniformly flat and give a relatively uniform LFR value (between +25 and +80) on a large surface. The ratio (Rt) value should be very low on clayey ground, indicating a poor conductor.

11. TRUE AND FALSE SIGNALS

Here are a few examples of true and false signals that you will learn to recognize by experience.

11.1 Probe and frequency drift

When the probe frequency drifts, as during the preheating period, the HFR value may well increase and the alarm will go on. Before digging, reinitialize the probe in the air to correct the drift. It the alarm stops once the probe is back on the ground, continue your survey, it was a false alarm caused by the drift of the probe. But if the Beep Mat still beeps, it means that it is a true signal and you can dig.

11.2 Drifting and ground proximity

If the probe has started to drift and is on humid ground, the water effect may prevent it from beeping. However, as soon as the probe moves away from the ground (ex: when passing over a log), the reading unit will beep. Lift the probe in the air and if it still beeps, reinitialize it. In both cases, pass the probe again at the place where it beeped to check if there really was a conductor at that place.

11.3 How to Interpret Signals in Clayey Areas

Clay layers deposited in brackish waters during one of the ice-age periods are sometimes somewhat conductive. On these clay layers charged with water, the HFR value displayed by the probe laid on the ground will be close to zero, the effect of clay conductivity being cancelled by the effect of water, and the reading unit will probably not beep. However, if you pass over a log lying on the ground while walking with the probe, the probe will leave the ground. The effect of water will rapidly diminish, but the clay conductivity, which slowly diminishes with distance, will make the LFR value rise to 80, and the Beep Mat will signal a conductor. Remember that on clayey ground, the conductor value LFR does not vary because this type of ground is not very conductive.

11.4 Salt in the Ground

Salt water is highly conductive. You might detect conductors caused by salt next to roads on which salt has been spread during winter.

12. INTERPRETATION OF VALUES

The Beep Mat gives a quantitative measure of the apparent conductivity and/or the average magnetite content of the underlying rock. It also gives an estimate of the intrinsic conductivity thanks to the ratio value (Rt).

12.1 Magnetite content

The magnetite content is measured on a 1-meter^3 volume under the probe. Our testing indicates that a MAG value of -1,000 corresponds to 1 % magnetite under the probe, which is equivalent to about -1,000 gammas for a volume of a few meters^3. This equivalence exists up to a magnetic value of -20,000, which is equivalent to 20,000 gammas, or 20 % magnetite.

12.2 Apparent conductivity

Up to now, the apparent conductivity has been calibrated only in the absence of magnetite. The graph presented on illustration 22 (curve "a") shows the apparent conductivity according to the HFR value and in the absence of magnetite. Caution! A veinlet or a coin will suggest a bad conductivity, because the instrument measures the average conductivity of the area surrounding the probe. However, the instrument gives a real measure of the conductivity of a clay layer. The closeness of water creates negative signals. The estimate of the conductivity of a clay layer full of water is slightly more real if one lifts the probe 10 cm above the ground because the influence of water, just as the influence of magnetite, diminishes more rapidly than the effect of the conductor (see curves "b" and "c" of illustration 22).

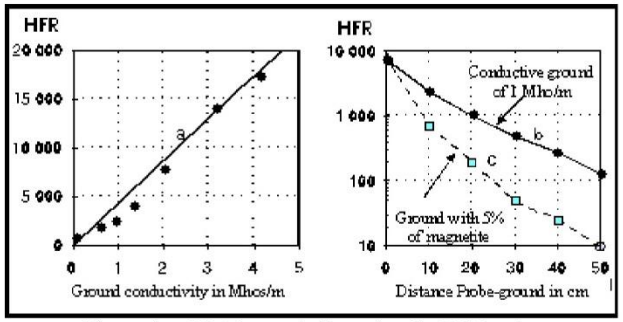
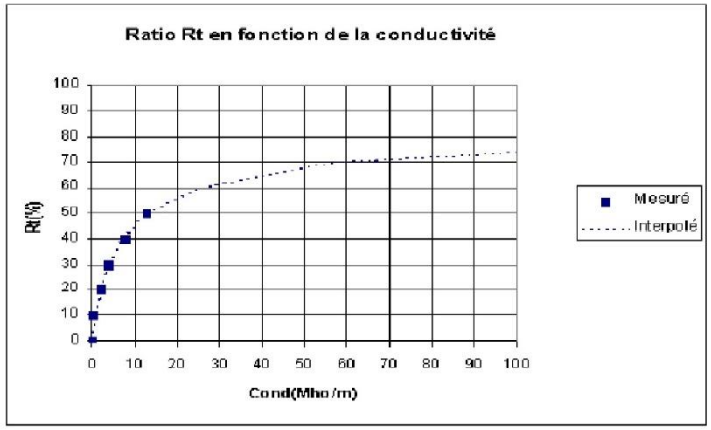


Illustration 22: Factors influencing the HFR value

12.3 Intrinsic conductivity

In the absence of a magnetic body (verify with a magnet), the Rt (ratio) gives a measure of the intrinsic conductivity of the conductor and this ratio is not influenced by the size of the conductor. Therefore, a coin placed on the testing point (the first "D" of "GDD") will give HFR values ranging from +70 to +80 with a ratio close to 84%, while a typical Abitibi clay layer will also give a HFR value of +80, and therefore a Rt close to 0 % (clayey grounds offer poor conductivity). Remember that the ratio will be calculated only if the HFR is at least 10 and if no magnetite is present (MAG = 0).



Ratio RT in function of the conductivity

Ratio (%)	Conductivity (Mhos/m)
0	0.00
10	0.40
20	2.00
30	4.00
40	8.00
50	13.00
60	**25.64**
70	**57.79**
80	**174.02**
90	**1105.38**
95	**6951.18**
100	ω

The values in bold character are interpolated

Please take note that the measure of the conductivity is good only if there isn't any magnetite, like in a MaxMin survey.

12.4 Variation of Sulfides Conductivity

As mentioned before, galena and compact massive pyrite are not always conductive. One does not know why these variations exist, but since these sulfides are semiconductors, it could depend on the impurities incorporated in the crystals structure just as for transistors! Fortunately for the Beep Mat and prospectors, pyrite veinlets, which are often present in gold-bearing quartz veins, are generally good conductors. This has been noticed in particular in gold-bearing quartz veins that do not react to any other geophysical instrument and that can be discovered under moss only by the Beep Mat or a trench.

13. Appendix

13.1 How to install the USB drivers on your computer

1. Insert the "Drivers USB" disk furnished with the Beep Mat in the computer.
2. Plug the BM8 reading unit and the computer together using USB cable.
3. Put the BM8 reading unit on by pressing [ON] key.
4. Typical information showed on the BM8 display (Numbers may differed):

COMM: 38400,8,N,1 15934
INTERVAL: 5.0 seconds

5. On your computer, a window entitled Found **New Hardware Wizard** appears. Select '' **Yes, this time only**'' → Next
6. Choose '' **Install from a list or specific location (advanced)**''→ Next
7. Select '' **Search for the best driver in these location** '' and tick '' **Include this location in the search**''. Do not tick '' **Search removable media (floppy, CD-ROM…)** ''
8. Browse → Desktop → My Computer → CD Drive (D:) → Drivers USB → OK
9. Next → The computer will install all the necessary drives. Click on ''Finish'' when download process is completed.
10. Then, to know on which port is connected the USB cable, click on **My Computer** with the right button of your mouse and select **Properties**.
11. Choose **Hardware** tab → **Device Manager**
12. Click on the + sign next to **Ports (COM & LPT)** to see which number is associated to the USB connexion (COM 1,2,3…). The connexion number will be useful to know in following directives.
13. Close both windows by pressing red X on the upper right corner.

13.2 Configuration of Hyperterminal

The Hyperterminal application does not exist for Windows 7. Copy the files: hypertrm.dll and hypertrm.exe in your working directory. These files are copied from Windows NT and you will find it in your BM8 CD revision 2.

1. For Windows 7, copy the following files: hypertrm.exe and hypertrm.dll.
2. Plug the BM8 reading unit and the computer together using USB cable.
3. Power the BM8 reading unit by pressing [ON] key.
   Start the hypertrm.exe application.
4. For Windows NT, Start → Programs → Accessories → Communication → HyperTerminal.
5. Name: BM8USB → click OK.
6. Connect using: COMx, x is the number associated to the USB port as mentioned on step 12 previously.
7. COMx properties → Bits per second: **57600**
   Data bits: **8**
   Parity: **None**
   Stop bits: **1**
   Flow control: **None** → OK
8. BM8USB – HyperTerminal:
   File → Properties →Settings → ASCII Setup
9. ASCII Setup:
   ASCII Receiving: Select **Append line feeds to incoming line ends**
   OK → OK
10. Close the window → Yes. Save USB named ''BM8USB''? → Yes.
11. For Windows 7, Go to Start → Search Programs and Files → BM8USB.ht and copy this file in your working directory.
12. For Windows NT, Go to Start → Programs → Accessories → Communication→HyperTerminal.
    Drag the BM8USB.ht to your desktop.

13.3 Use Hyperterminal for Data Transfer

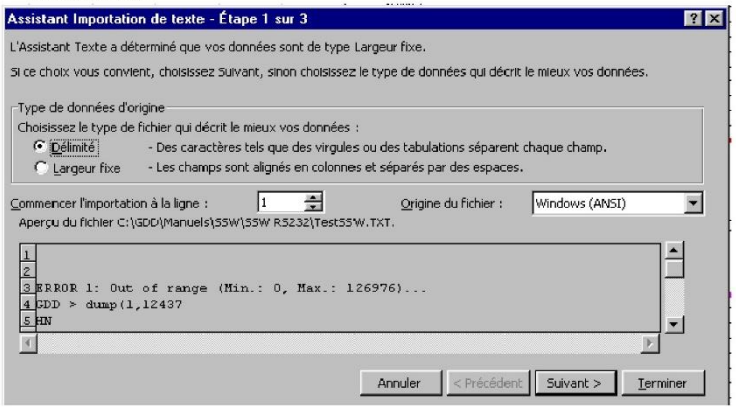
1. Plug the BM8 reading unit and the computer together using USB cable.
2. Power the BM8 reading unit by pressing [ON] key.
3. Typical information showed on the BM8 display (Numbers may differ):

   COMM: 57600, 8, N, 1 15934
   INTERVAL: 5.0 seconds

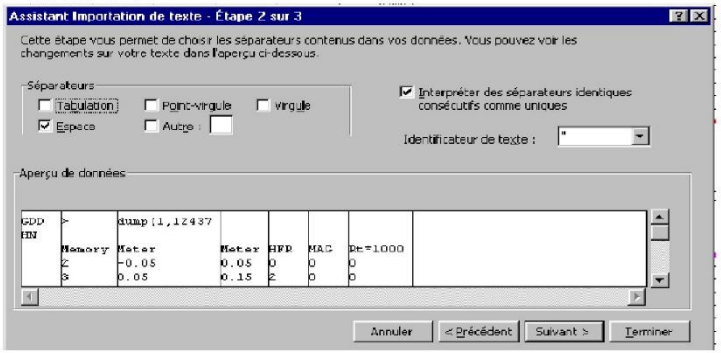
4. On your computer, double-click on the icon BM8USB.ht previously created.
5. For Windows 7, a window will open, Impossible to read…. → OK.
6. File → Properties → Connexions.
7. Connect using: COMx, x is the number associated to the USB port in **Device Manager**.
8. COMx properties → Bits per second: **57600**
   Data bits: **8**
   Parity: **None**
   Stop bits: **1**
   Flow control: **None** → OK
9. File → Properties →Settings → ASCII Setup
   ASCII Receiving: Select **Append line feeds to incoming line ends**
   OK → OK Press → ENTER on your computer keyboard, a menu will appear on your computer screen.
10. On the toolbar, select Transfer → Capture Text → File: give a name to your file → Start.
11. Type **dump (1, ____)** in the space next to the **1, ____**, you must type the number of readings stored on the memory of the reading unit. To find out the number of readings stored, look on the top right of the BM8 display.
12. Press ENTER on your computer keyboard and it will start downloading the data.
13. Once the transfer is completed, go in the toolbar and select Transfer → Capture Text → Stop
14. Close the window → Yes
15. You can now unplug the BM8. You are ready to work on your file (ASCII format).

13.4 How to import a text file in Microsoft Excel

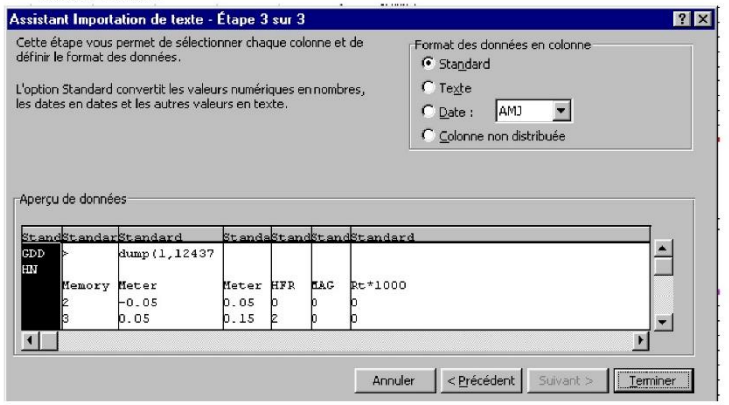
1. Open the Microsoft Excel software.
2. In the tool bar, select **File → Open**
3. At *Files of type*, select **All Files (*.*)**. At *Look in*, you have to localize your file. This is very important in order to find the file you need. The file extension is **.txt**. Then select the file you want to open → **Open**
4. You now have *Text Import Wizard - Step 1 of 3*.
   Select *Delimited*.
   Select **Next**



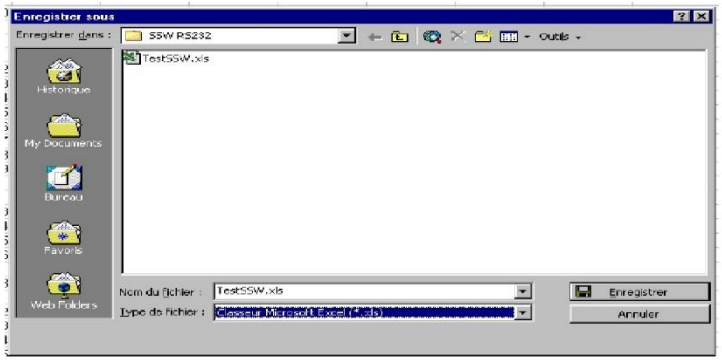
5. You now have *Text Import Wizard - Step 2 of 3*.
   Select only *Space*
   Select **Next**



6. You now have *Text Import Wizard - Step 3 of 3*.
   At *Column Data Format*, select **General**
   Select **Finish**



7. It is very important that you save your file now. To do so, go to the tool bar and select: **File → Save as**:
   Save in: choose the folder in which you want to save it
   Save as type: **Microsoft Excel Workbook (*.xls)**
   File name: choose the name you want to save and do not forget to put the extension **.xls** at the end of the name.
   Select **Save**



14. WARRANTY AND REPAIRS

14.1 Copyrights

Considering GDD's interest in promoting the Beep Mat, any person interested in duplicating this manual is authorized to do so.

14.2 Warranty

The BM is covered by a one-year warranty on parts and labor. The warranty is void if the instrument has been the object of an abusive use, has been opened or modified without authorization, or if the serial number on the instrument has been altered, erased or removed.

Instrumentation GDD Inc. is not responsible for any eventual damages and/or losses that may occur during transportation or use of the Beep Mat.

14.3 Service

Should the BM require repairs, please contact Instrumentation GDD Inc. at the numbers below in order to receive proper instructions for shipping. When the instrument is under warranty, all repairs are done free of charge at our office in Quebec (taxes, transportation and customs fees are extra). If any instrument manufactured by GDD breaks down while under warranty, a spare one will be provided free (taxes, transportation and customs fees are extra) while the instrument is under repair (upon request and subject to instruments availability).

Instrumentation GDD Inc.
860, boul. de la Chaudière
Quebec (Quebec) G1X 4B7
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Fax: 1-418-877-4054
E-Mail: gdd@gddinstrumentation.com

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Appendix II

Statement of Qualifications

I, Randy I. Stewart, B.Sc. of 213 Kingsmount Boulevard, Sudbury, Ontario, P3E 1L1, do hereby certify that:

I graduated from the Mining Engineering Technician program at Cambrian College of Applied Arts and Technology, Sudbury, Ontario, in 2002.

I graduated with a Bachelor of Science Degree (Honours) in Geology in 1991 from the University of Waterloo, Waterloo, Ontario.

I have been actively involved in Mining and Exploration since 1986.

Randy Irwin Stewart

December 28, 2020
Sudbury, Ontario

MAPS

CLEMENT LEGEND

- Olivine Diabase (Sudbury Dike Swarm 1238+/- 4 Ma)
- Mafic Dike (Preissac Dike Swarm 2150 Ma)
- Nipissing Gabbro (2200 Ma)

Huronian Supergroup (2450-2220 Ma)

Cobalt Group

Gowganda Formation

- Greywacke/Lithic Wacke
- Arkose/Quartzite
- Conglomerate

Archean

- Lamprophyre Dike
- Feldspar Porphyry

Porcupine Assemblage (2690-2685 Ma +/- 5 Ma)

Metasediments

- Iron Formation
- Greywacke, Arkosic Wacke
- Arkose, Quartzite
- Conglomerate
- Argillite

Metavolcanics

- Felsic to Intermediate
- Intermediate to Felsic Volcanic Breccia
- Intermediate
- Mafic to Intermediate

0 200 metres

- Age Dates (Ayer 2006) (approximate locations)
- 2011 Diamond Drill Hole (Goldtrain Resources)
- Foliation
- Jointing
- Bedding
- Historical Pits
- Previous Sample Location
- Outcrop Stripping (GoldTrain Resources)
- HELITEM Anomaly

Geological Compilation Map
Clement Property
MacBeth and Clement Townships, Ontario
Sudbury Mining Division
Drawn By: Randy Stewart (updated:2020)
Scale 1:5,000
UTM Zone 17, NAD 83
NTS 41 I/9W

Abbreviations

no o/c = no outcrop alt = alteration qtz = quartz
sil = silicified/siliceous qv = quartz vein chl = chlorite
sulph = sulphides ser = sericite py = pyrite
amph = amphibole po = pyrrhotite hbld = hornblende
cpy = chalcopyrite epi = epidote mntite = magnetite
bio = biotite mag = magnetitc ves = vesicular
fp = feldspar porphyritic qp = feldspar porphyritic
qfp = quartz feldspar porphyritic lap = lapilli tuff
frag = fragmental lam = laminated bed = bedded
SZ = shear zone shrd= sheared fol = foliated
gn = gneissic tr = trace

Lake Manitou
Lake Manitou Fault
Cucumber Lake
Cucumber Lake Fault
Brians Fault
Arcand Lake
Arcand Lake Fault
Grassy Lake
Anderson/Nichol Quartz Vein Au Showing
Quartz Vein Showing
Nichol B Showing
Pelican Mines Au Showing
Massive Sulphide Zone
Clement Gold Zone
Stringer Sulphide Pits
Adit Quartz Vein
Ditch Sulphide Showing
2017 Arcand Lake Grid
2685 Ma
<2689.8+/-1.5 Ma

Clement Transportation Log

	2020	Description	km's	$0.55/km ($)
1	14-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
2	15-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
3	16-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
4	18-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
5	21-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
6	22-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
7	23-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
8	24-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
9	25-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
10	26-Aug	From 213 Kingsmount Blvd, Sudbury, ON to the Clement Property and Return	260	143.00
	Totals		**2600**	**1430.00**

2020 Clement Daily Log

	2020	Personnel	Task/Objective	Claims (Days)
1	14-Aug	Randy Stewart	Main Logging Trail	546025 (0.25), 546026 (0.75)
2	15-Aug	Randy Stewart	Arcand Lake Grid : L8+00W, L10+00W	546026
3	16-Aug	Randy Stewart	Arcand Lake Grid : L1+00W, L2+00W, L3+00W, TL10+00S	545943 (0.75), 546083 (0.25)
4	18-Aug	Randy Stewart	Cucumber Lake Road	546027 (0.20), 174161 (0.26), 601268 (0.26), 605894 (0.28)
5	21-Aug	Randy Stewart	TL10+00S, L9+00W, L7+00W, L6+00W, L5+00W	546083 (0.22), 546025 (0.32), 546026 (0.31), 545943 (0.15)
6	22-Aug	Randy Stewart	L1+00W, L2+00W, L4+00W, TL10+00S, BL0+00	545943 (0.78), 546083 (0.22)
7	23-Aug	Randy Stewart	Culvert Logging Trail	546082 (0.10), 546027 (0.42), 546026 (0.48)
8	24-Aug	Randy Stewart	Game Trail, L7+00W, L9+00W, LBL0+00	545943 (0.40), 546026 (0.60)
9	25-Aug	Randy Stewart	Game Trail,L5+00W, L6+00W, L7+00W, L9+00W	545943 (0.14), 546026 (0.86)
10	26-Aug	Randy Stewart	South Sediment Logging Trail	546081 (0.55), 546082 (0.45)
11	18-Nov	Randy Stewart	Report Writing and Map Making	All
12	28-Dec	Randy Stewart	Report Writing and Map Making	All