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Assessment Report
Magnetic Susceptibility Logging DDH TR11-01
Danby Triangle Property, Thunder Bay Mining Division

Claim 296002
Kitchen Lake Area
Thunder Bay South District
Thunder Bay Mining Division
UTM WGS84 Zone 16U 335942 mE, 5487317 mN
Lat 49^{o} 30’ 58”N, Long 88^{o} 16’ 00”W
NTS 52H 11 (Kabitotikwia Lake)

For:
Pavey Ark Minerals Inc.
Client number 411465

Prepared by:
Richard H. Sutcliffe (Client number 225603)
130 Foxridge Drive
Ancaster, ON, L9G 5B9

March 19, 2023

Executive Summary

This assessment report documents magnetic susceptibility measurements on drill core from diamond drill hole TR11-01 on the Danby Triangle Property ("Property"), located in the Thunder Bay Mining District, Northwestern Ontario. Susceptibility measurements were taken to enhance future modelling efforts to target magmatic Ni-Cu-Pt-Pd mineralization in Archean mafic intrusive rocks overlain by a Proterozoic Nipigon diabase sill.

The Property is located 125 km north of the city of Thunder Bay, Ontario. The Property is road accessible and located on highway 527. The Property is comprised of 14 contiguous single cell claims (approximately 290 ha) in the Kitchen Lake area. The current work was done on claim 296002. The property is owned by Pavey Ark Minerals Inc., a private Ontario company.

Work for the program was carried out by the author on March 14 and 15, 2023. Total expenditures were $2,255.

Previous exploration by Canplats Resources Corp. and Colby Resources Corp. in 2001 to 2004 and Platinum Group Metals Ltd. in 2011 identified several airborne EM conductors in the vicinity of the Property. Platinum Group Metals drilled 3 holes in 2011 for a total of 1,605 m. Hole TR11-01 intersected Archean metagabbro and pyroxenite with anomalous Cu-Ni-Pt-Pd values.

The Property is underlain by Middle Proterozoic Nipigon diabase/gabbro sills related to the Nipigon Embayment of the Mid-Continent Rift. The Nipigon sills intrude and overlie Archean and intrusive rocks of the Wabigoon Suprovince. Sibley Group sediments have been intersected in several of the drill holes that have penetrated the lower contact of the diabase. Both Archean and Proterozoic rocks in the area host significant Ni-Cu-PGM mineralization. The operating Lac des Iles Pd Mine (Archean) is located 41 km southwest of the Property.

Magnetic susceptibility readings clearly discriminate between Proterozoic diabase with higher magnetic susceptibility and underlying Archean metamorphosed gabbro and pyroxenite. The metapyroxenite has lower magnetic susceptibility than the meta gabbro..

Magnetic inversion modelling combined with a follow up ground PEM-type survey is recommended to resolve the BHEM conductive target for diamond drilling.

Table of Contents

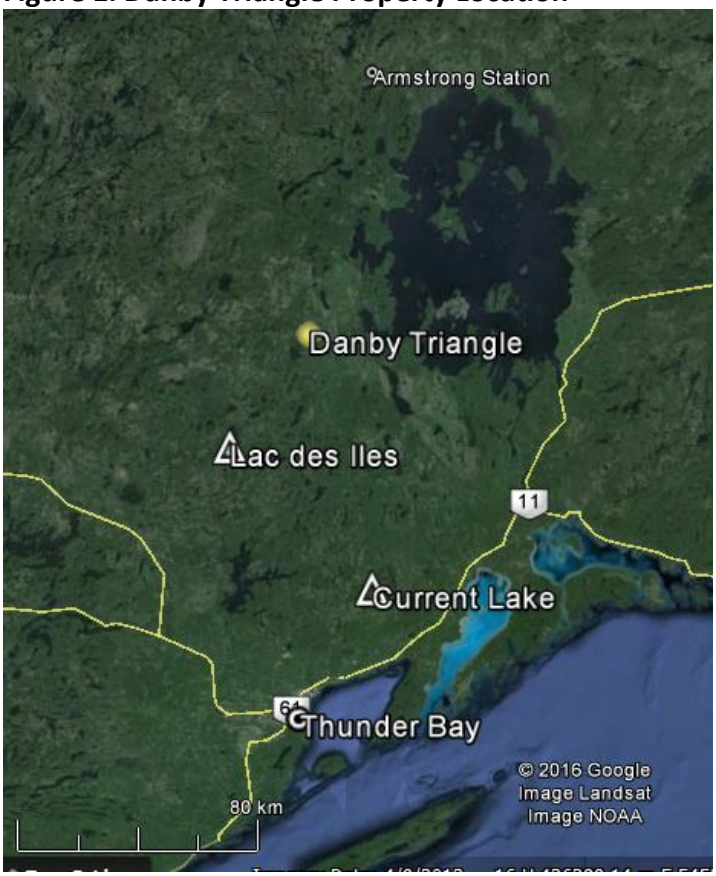
1.0 Introduction

This assessment report documents magnetic susceptibility measurements on drill core from diamond drill hole TR11-01 on the Danby Triangle Property ("Property"), located in the Thunder Bay Mining District, Northwestern Ontario. Susceptibility measurements were taken to enhance future modelling efforts to target magmatic Ni-Cu-Pt-Pd mineralization in Archean mafic intrusive rocks overlain by a Proterozoic Nipigon diabase sill. The work was done on March 14 and 15, 2023. Total expenditures were $2,255.

2.0 Location and Access

The Danby Triangle Property is located 125 km north of the city of Thunder Bay, Ontario (Figure 1). The Property is road accessible from highway 527. Recently constructed logging roads extend through the southern and central part of the property. The northern part of the property is accessible by ATV using the Geikie Road that extends west from highway 527.

Figure 1. Danby Triangle Property Location



Source: GoogleEarth, 2016

3.0 Claim holdings and property disposition

The Danby Triangle Property is comprised of 14 single cell claims (Table 1) located in the Kitchen Lake area. The Property covers approximately 290 ha. The current work covers claim 296002. Claims are held by Pavey Ark Minerals Inc., a private Ontario company.

Table 1. Property Claims

Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required
KITCHEN LAKE	296002	Single Cell Mining Claim	2023-03-21	Active	100	400
KITCHEN LAKE	154577	Single Cell Mining Claim	2023-03-21	Active	100	400
KITCHEN LAKE	756536	Single Cell Mining Claim	2024-11-13	Active	100	400
KITCHEN LAKE	756535	Single Cell Mining Claim	2024-11-13	Active	100	400
KITCHEN LAKE	744756	Single Cell Mining Claim	2024-09-06	Active	100	400
KITCHEN LAKE	744755	Single Cell Mining Claim	2024-09-06	Active	100	400
KITCHEN LAKE	744754	Single Cell Mining Claim	2024-09-06	Active	100	400
KITCHEN LAKE	744753	Single Cell Mining Claim	2024-09-06	Active	100	400
KITCHEN LAKE	685846	Single Cell Mining Claim	2023-11-15	Active	100	400
KITCHEN LAKE	685845	Single Cell Mining Claim	2023-11-15	Active	100	400
KITCHEN LAKE	685844	Single Cell Mining Claim	2023-11-15	Active	100	400
KITCHEN LAKE	684280	Single Cell Mining Claim	2023-11-10	Active	100	400
KITCHEN LAKE	684279	Single Cell Mining Claim	2023-11-10	Active	100	400
KITCHEN LAKE	684278	Single Cell Mining Claim	2023-11-10	Active	100	400

4.0 Previous Work

Lake sediments in the Cheeseman-Danby Lakes area were found to contain highly anomalous values of Au, Pd, Cu, and Pt as well as one site with the highest lake sediment Cr in the Obonga Garden Lakes area regional survey (Jackson and Dyer, 2000; OGS, 2000). The source of these anomalies has not been conclusively identified.

In 2001/2002 Canplats Resources Corp. and Colby Resources Corp. completed geological mapping, soil sampling, ground magnetic, IP surveys, and a Fugro AEM test survey on the property. The AEM survey identified several moderate northeast trending conductors east and south of Danby Lake. Canplats drilled 7 holes east of Danby and Geikie Lakes to test IP chargeability and AEM anomalies. The holes intersected anomalous Cu and Pd values in Proterozoic diabase and presumed Archean metavolcanic rocks. In 2004, Canplats drilled GK-03-08, an 859 m hole inclined at 56° to the north and located 1.5 km east of the Danby property (McNaughton 2014). This hole intersected Proterozoic diabase from surface to 313 m, Sibley Group sediments at 313 to 337 m, and then Archean gabbro. The gabbro was dated at 2,688 Ma. Both Proterozoic and Archean intrusions are reported to contain minor PGM values.

The Danby Triangle Property was covered by the Ontario Geological Survey airborne magnetic survey flown at 150 m spacing in 2003 as part of regional studies of the Lake Nipigon area (Map 81816, OGS, 2004a). The area was also covered by the Ontario Geological Survey ground gravity Bouguer anomaly survey (Map 81931, OGS 2004b). These surveys show that the Danby Triangle claim group covers the western and northern edges of a broad >2 km diameter magnetic high and coincident 4 milligal Bouguer anomaly. The broad magnetic high is associated with flanking magnetic lows to the north, east and west.

Platinum Group Metals Ltd. (PGM Ltd.) carried out 31.1 line km of reconnaissance airborne VTEM magnetic and EM surveys at 500 m spacing in 2011 over their Triangle Property, part of which is Pavey Ark's current Danby Triangle property (VanEgmond, 2013). The VTEM surveys were successful in delineating one line conductivity anomalies that were followed up with a more detailed VTEM survey at 100 m spacing flown in a NW direction. This survey identified an approximately 600 m diameter VTEM anomaly located in the southern part of claim legacy 4283459.

Four diamond drill holes for a total of 1,605 m were drilled in 2011 by PGM Ltd. on the Triangle Property. The drill holes tested the VTEM anomaly and were subsequently surveyed by Crone Geophysics with borehole EM. Hole TR-11-01 located on claim 296002 has an off-hole EM conductor.

The PGM Ltd. holes intersected presumed Archean gabbro located at depths ranging from 237 to 267 m and beneath the Proterozoic diabase and Sibley Group sediments. In addition to analysis of Ni, Cu, Cr, and PGM's, PGM Ltd. completed whole rock major and trace element geochemistry on the drill core. Hole TR-11-01 intersected anomalous Cu-Ag-Ni mineralization in the diabase (up to 4,800 ppm Cu, 3.1 ppm Ag, 411 ppm Ni) and anomalous Ni-Cr-PGE mineralization in the gabbro (up to 405 ppm Ni, 511 ppm Cr, and 165 ppb Pt+Pd+Au).

A large off-hole EM conductor beneath the Sibley Group sediments was identified in hole TR-11-01 by Crone Geophysics. This anomaly is located on the north flank of a magnetic low and has not been drill tested.

Mapping by Pavey Ark in 2013, indicated that the majority of the property is underlain by medium-grained diabase to coarse-grained, granophyric diabase that is indicative of the upper portion of a diabase sill. In 2016, Pavey Ark re-logged core drilled by Platinum Group Metals Ltd. in 2011 that intersected anomalous PGM-Cu-Ni-Cr values in Archean gabbro beneath the diabase sill. Core re-logging and petrography characterized the mafic rocks beneath the diabase sill as medium-grained gabbroic amphibole gabbro and meta-pyroxenite. The rocks are composed of dominantly amphibole (actinolite/hornblende) and altered plagioclase with minor amounts of biotite and opaques. Some samples have preserved larger poikilitic amphibole grains with relict clinopyroxene that encloses plagioclase and represents a remnant ophitic igneous texture. Petrography and microprobe work by Pavey Ark in 2017 confirmed the presence of magmatic pyrrhotite+chalcopyrite+pentlandite sulphide assemblages in the

gabbroic rocks. Ilmenite has been identified as the principal oxide phase and high Cr values are associated with hornblende.

5.0 Regional Geology

The Property is underlain by Middle Proterozoic Nipigon diabase/gabbro sills related to the Nipigon Embayment of the Mid-Continent Rift. The Nipigon sills intrude and overlie Archean metavolcanic and intrusive rocks of the Wabigoon Suprovince. Sibley Group sediments have been intersected by several but not all of the drill holes that have penetrated the lower contact of the diabase. The area has been mapped by Hart (2006) for the OGS.

Both Archean and Proterozoic rocks in the area host significant Ni-Cu-PGM mineralization. The operating Lac des Iles Pd Mine (Archean) is located 41 km southwest, and the Middle Proterozoic Current Lake PGM deposit is located 85 km south-southwest of Danby Lake.

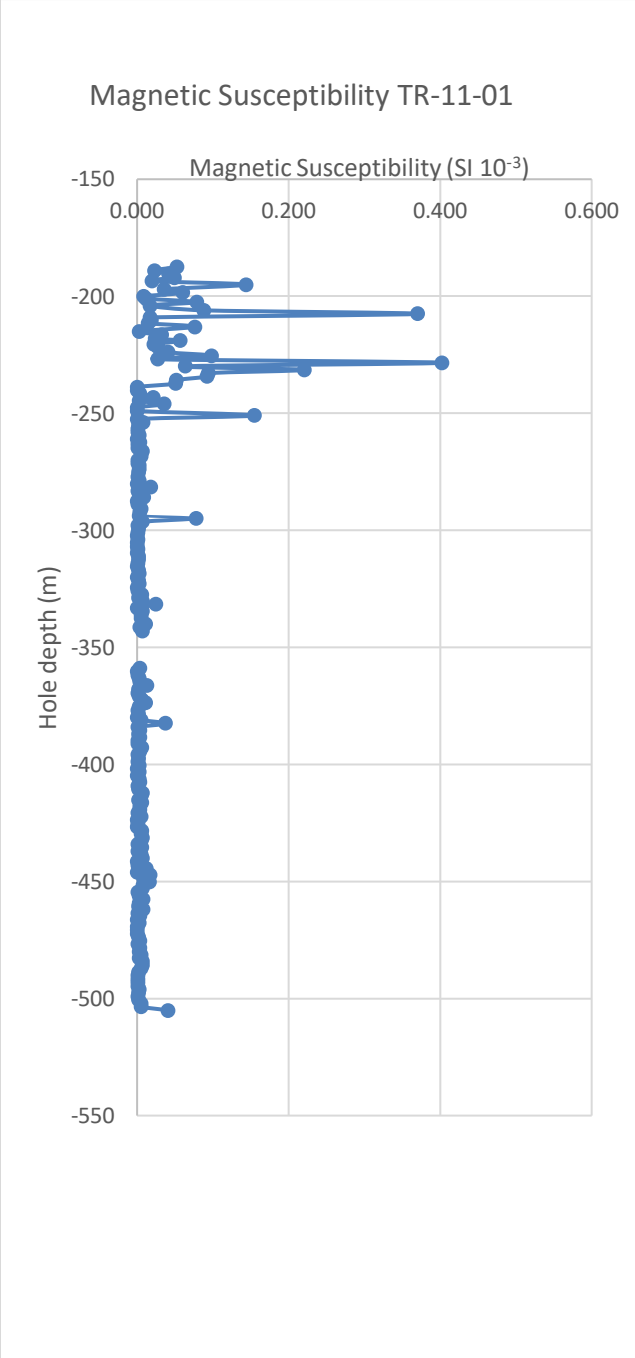
6.0 Magnetic Susceptibility Measurements

Magnetic susceptibility readings were carried out by the author on March 14 and 15, 2023 using a TerraPlus KT-10 Magnetic Susceptibility Meter (Serial Number #9197). The measurements were taken on diamond drill core from hole TR11-01 drilled by PGM Ltd. in 2011. This hole is a vertical NQ hole drilled to a total depth of 506 m. The hole is collared in diabase at an elevation of 410 m and is located at UTM 16 NAD 83 335942mE, 5487317mN. The core is stored at Pavey Ark's core yard located at 660 Squier Street, Thunder Bay, Ontario.

Results are plotted in Figure 2. A summary of measurements is provided in Appendix 1. The KT-10 meter was used in a manual mode and measurements were recorded manually. The instrument manual is provided in Appendix 2.

The Proterozoic diabase is clearly differentiated by higher magnetic susceptibility. 34 measurements of Proterozoic diabase had an average susceptibility of 0.071 x 10^{-3} SI units. The Archean mafic/ultramafic rocks had consistently lower magnetic susceptibility. 58 measurements of gabbro had an average susceptibility of 0.007 x 10^{-3} SI units. Pyroxenite had the lowest magnetic susceptibility with 114 measurements having an average of 0.004 x 10^{-3} SI units.

Figure 2. Magnetic susceptibility measurements plotted against depth in hole TR11-01.



10.0 Conclusion and Recommendations

The Danby Triangle property is underlain by outcrops exposing the upper part of an approximately 260 m thick sub-horizontal Proterozoic Nipigon diabase sill. Drilling by previous operators to investigate a prominent VTEM anomaly has identified an Archean amphibole gabbro/meta-pyroxenite intrusion that underlies the diabase in central part of the Property. Drilling has intersected anomalous Cr, base and precious metal contents but has not identified the source of the anomaly. In drill core, the gabbro intrusion is associated with fine-grained mafic amphibolite.

Magnetic susceptibility readings clearly discriminate between Proterozoic diabase with higher magnetic susceptibility and underlying Archean metamorphosed gabbro and pyroxenite. The metapyroxenite has lower magnetic susceptibility than the meta gabbro..

Magnetic inversion modelling combined with a follow up ground PEM-type survey is recommended to resolve the BHEM conductive target for diamond drilling.

11.0 References

Hart, T.R. 2006. Precambrian geology of the southwest portion of the Nipigon Embayment, northwestern Ontario; Ontario Geological Survey, Preliminary Map P.3580, scale 1:100 000.

Jackson, J.E. and Dyer, R.D. 2000. Garden–Obonga Lake area high density lake sediment and water geochemical survey, northwestern Ontario; Ontario Geological Survey, Open File Report 6009, 95p.

Ontario Geological Survey 2000. Garden–Obonga Lake area lake sediment survey: gold and PGE data; Open File Report 6028, 76p.

Ontario Geological Survey 2004a. Airborne magnetic and gamma-ray spectrometric surveys, residual magnetic field and Keating coefficients, Lake Nipigon Embayment, Map 81816, 1:50000.

Ontario Geological Survey 2004b. Ground gravity survey, terrain-corrected Bouguer anomaly, northern part, Lake Nipigon Embayment area, Map 81931, scale 1:100000.

Van Egmond, R., 2013, Assessment Report on the Triangle Property, Kitchen And Cheeseman Lake Areas, Thunder Bay Mining District, Ontario, for Platinum Group Metals Ltd.

10.0 Statement of Qualifications

I, Richard H. Sutcliffe, of 130 Foxridge Drive, Ancaster, Ontario, do hereby certify that:
I am a graduate of University of Toronto (B.Sc. Geology, 1977, M.Sc Geology 1980), and a graduate of University of Western Ontario (Ph.D. Geology, 1986) and I have been practising my profession as a geologist since.
I am a member with the Association of Professional Geoscientists of Ontario (#852).
I have direct knowledge of the exploration work performed for this assessment and I am indirectly the owner of the claims on which the work was performed.

Signed

"R.H. Sutcliffe"

Richard H. Sutcliffe, Ph.D., P.Geo.
March 19, 2023
Ancaster, Ontario

Danby TR-11-01 Magnetic Susceptibility Log
March 15, 2023, Squier Street, Thunder Bay core storage
Core stored at Wabassi core storage yard, Squier Street, Thunder Bay
TerraPlus KT-10 Magnetic Susceptibility Meter, Serial Number #9197

Core box	Depth (m)	Mag Suscep (10^{-3}SI units)	Major Lithology
44	187.5	0.053	Diabase
	189.0	0.023	Diabase
	190.5	0.042	Diabase
45	192.0	0.049	Diabase
	193.5	0.020	Diabase
	195.0	0.144	Diabase
46	197.0	0.036	Diabase
	198.5	0.060	Diabase
	200.0	0.009	Diabase
47	201.0	0.012	Diabase
	202.5	0.079	Diabase
	204.0	0.017	Diabase
48	206.0	0.088	Diabase
	207.5	0.370	Diabase
	209.0	0.017	Diabase
49	210.0	0.019	Diabase
	211.5	0.015	Diabase
	213.0	0.076	Diabase
50	215.0	0.003	Diabase
	216.5	0.032	Diabase
	218.0	0.024	Diabase
51	219.0	0.057	Diabase
	220.5	0.022	Diabase
	222.0	0.028	Diabase
52	223.9	0.041	Diabase
	225.4	0.098	Diabase
	226.9	0.027	Diabase
53	228.4	0.402	Diabase
	229.9	0.064	Diabase
	231.4	0.221	Diabase
54	232.8	0.094	Diabase
	234.3	0.092	Diabase
	235.8	0.052	Diabase
55	237.3	0.051	Diabase
	238.8	0.000	Hb Gabbro, mg
	240.3	0.000	Hb Gabbro, mg
56	241.7	0.004	Hb Gabbro, mg
	243.2	0.021	Hb Gabbro, mg
	244.7	0.003	Hb Gabbro, mg

57	246.0	0.036	Hb Gabbro, mg
	247.5	0.000	Hb Gabbro, mg
	249.0	0.000	Hb Gabbro, mg
58	250.9	0.155	Hb Gabbro, mg
	252.4	0.000	Hb Gabbro, mg
	253.9	0.008	Hb Gabbro, mg
59	255.0	0.002	Hb Gabbro, mg
	256.5	0.001	Hb Gabbro, mg
	258.0	0.001	Hb Gabbro, mg
60	259.4	0.003	Hb Gabbro, mg
	260.9	0.000	Hb Gabbro, mg
	262.4	0.004	Hb Gabbro, mg
61	263.3	0.001	Hb Gabbro, mg
	264.8	0.001	Hb Gabbro, mg
	266.3	0.007	Hb Gabbro, mg
62	268.4	0.005	Hb Gabbro, mg
	269.9	0.001	Hb Gabbro, mg
	271.4	0.001	Hb Gabbro, mg
63	272.3	0.003	Hb Gabbro, mg
	273.8	0.003	Hb Gabbro, mg
	275.3	0.002	Hb Gabbro, mg
64	277.2	0.001	Hb Gabbro, mg
	278.7	0.003	Hb Gabbro, mg
	280.2	0.000	Hb Gabbro, mg
65	281.5	0.018	Hb Gabbro, mg
	283.0	0.001	Hb Gabbro, mg
	284.5	0.003	Hb Gabbro, mg
66	285.9	0.009	Hb Gabbro, mg
	287.4	0.000	Hb Gabbro, mg
	288.9	0.001	Hb Gabbro, mg
67	290.7	0.005	Hb Gabbro, mg
	292.2	0.004	Hb Gabbro, mg
	293.7	0.003	Hb Gabbro, mg
68	294.8	0.078	Hb Gabbro, mg
	296.3	0.007	Hb Gabbro, mg
	297.8	0.001	Hb Gabbro, mg
69	299.3	0.002	Hb Gabbro, mg
	300.8	0.001	Hb Gabbro, mg
	302.3	0.000	Hb Gabbro, mg
70	303.8	0.001	Hb Gabbro, mg
	305.3	0.000	Hb Gabbro, mg
	306.8	0.000	Hb Gabbro, mg
71	308.1	0.001	Hb Gabbro, mg
	309.6	0.000	Hb Gabbro, mg
	311.1	0.002	Hb Gabbro, mg
72	312.4	0.002	Hb Gabbro, mg
	313.9	0.001	Hb Gabbro, mg

	315.4	0.000	Hb Gabbro, mg
73	316.9	0.002	Hb Gabbro, mg
	318.4	0.003	Hb Gabbro, mg
	319.9	0.000	Hb Gabbro, mg
74	321.3	0.002	Hb Gabbro, mg
	322.8	0.003	Hb Gabbro, mg
	324.3	0.000	Pyroxenite
75	325.8	0.001	Pyroxenite
	327.3	0.006	Pyroxenite
	328.8	0.002	Pyroxenite
76	330.1	0.007	Pyroxenite
	331.6	0.025	Pyroxenite
	333.1	0.000	Pyroxenite
77	334.6	0.007	Pyroxenite
	336.1	0.005	Pyroxenite
	337.6	0.005	Pyroxenite
78	339.9	0.011	Pyroxenite
	341.4	0.004	Pyroxenite
	342.9	0.007	Pyroxenite
83	358.8	0.004	Pyroxenite
	360.3	0.000	Pyroxenite
	361.8	0.001	Pyroxenite
84	363.2	0.003	Pyroxenite
	364.7	0.004	Pyroxenite
	366.2	0.013	Pyroxenite
85	367.9	0.002	Pyroxenite
	369.4	0.001	Pyroxenite
	370.9	0.003	Pyroxenite
86	372.2	0.006	Pyroxenite
	373.7	0.011	Pyroxenite
	375.2	0.003	Pyroxenite
87	377.0	0.001	Pyroxenite
	378.5	0.002	Pyroxenite
	380.0	0.000	Pyroxenite
88	381.0	0.005	Pyroxenite
	382.5	0.037	Pyroxenite
	384.0	0.001	Pyroxenite
89	385.5	0.004	Pyroxenite
	387.0	0.002	Pyroxenite
	388.5	0.004	Pyroxenite
90	389.7	0.001	Pyroxenite
	391.2	0.001	Pyroxenite
	392.7	0.006	Pyroxenite
91	394.4	0.004	Pyroxenite
	395.9	0.001	Pyroxenite

	397.4	0.002	Pyroxenite
92	398.8	0.001	Pyroxenite
	400.3	0.003	Pyroxenite
	401.8	0.000	Pyroxenite
93	403.2	0.003	Pyroxenite
	404.7	0.000	Pyroxenite
	406.2	0.003	Pyroxenite
94	407.6	0.004	Pyroxenite
	409.1	0.001	Pyroxenite
	410.6	0.002	Pyroxenite
95	412.1	0.007	Pyroxenite
	413.6	0.005	Pyroxenite
	415.1	0.002	Pyroxenite
96	416.4	0.006	Pyroxenite
	417.9	0.004	Pyroxenite
	419.4	0.004	Pyroxenite
97	420.7	0.001	Pyroxenite
	422.2	0.005	Pyroxenite
	423.7	0.000	Pyroxenite
98	425.2	0.001	Pyroxenite
	426.7	0.000	Pyroxenite
	428.2	0.006	Pyroxenite
99	429.7	0.005	Pyroxenite
	431.2	0.007	Pyroxenite
	432.7	0.005	Pyroxenite
100	434.0	0.001	Pyroxenite
	435.5	0.006	Pyroxenite
	437.0	0.001	Pyroxenite
101	438.5	0.005	Pyroxenite
	440.0	0.007	Pyroxenite
	441.5	0.000	Pyroxenite
102	443.0	0.001	Pyroxenite
	444.5	0.012	Pyroxenite
	446.0	0.000	Pyroxenite
103	447.2	0.017	Pyroxenite
	448.7	0.009	Pyroxenite
	450.2	0.016	Pyroxenite
104	451.5	0.008	Pyroxenite
	453.0	0.007	Pyroxenite
	454.5	0.001	Pyroxenite
105	456.1	0.003	Pyroxenite
	457.6	0.008	Pyroxenite
	459.1	0.003	Pyroxenite
106	460.5	0.002	Pyroxenite
	462.0	0.008	Pyroxenite
	463.5	0.001	Pyroxenite
107	464.7	0.004	Pyroxenite

	466.2	0.000	Pyroxenite
	467.7	0.003	Pyroxenite
108	469.3	0.000	Pyroxenite
	470.8	0.000	Pyroxenite
	472.3	0.000	Pyroxenite
109	473.8	0.002	Pyroxenite
	475.3	0.004	Pyroxenite
	476.8	0.001	Pyroxenite
110	478.4	0.004	Pyroxenite
	479.9	0.003	Pyroxenite
	481.4	0.005	Pyroxenite
111	482.7	0.003	Pyroxenite
	484.2	0.007	Pyroxenite
	485.7	0.007	Pyroxenite
112	487.2	0.005	Pyroxenite
	488.7	0.002	Pyroxenite
	490.2	0.001	Pyroxenite
113	491.7	0.001	Pyroxenite
	493.2	0.001	Pyroxenite
	494.7	0.001	Pyroxenite
114	496.0	0.003	Pyroxenite
	497.5	0.002	Pyroxenite
	499.0	0.001	Pyroxenite
115	500.5	0.002	Pyroxenite
	502.0	0.005	Pyroxenite
	503.5	0.005	Pyroxenite
116	505.0	0.041	Pyroxenite

KT-10 v2

Magnetic Susceptibility, Conductivity

and Combined Magnetic Susceptibility / Conductivity Meter

with GEOVIEW

User's Guide

Ver. 2.1

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Fax: (905) 764-8093
Web: http://www.terraplus.ca

KT-10 v2

Congratulations on your purchase of a KT-10 v2 (version 2) meter! Please read through this manual to familiarize yourself with your new instrument.

The KT-10 v2 (version 2) is available in a variety of different model configurations: KT-10 v2, KT-10 v2 Plus, KT-10 v2 C, KT-10 v2 Cx, KT-10 v2 S/C, KT-10 v2 Plus S/C, or KT-10 v2 Plus S/Cx. All of these models are available with either a circular or rectangular coil. The basic KT-10 v2 can also be upgraded to include extended magnetic susceptibility, conductivity and/or extended conductivity measurements. All upgrades can be performed via the internet. Please contact **Terraplus'** Sales Department at sales@terraplus.ca for further information.

This User's guide describes the operation of the meter as a combined magnetic susceptibility/conductivity meter, a magnetic susceptibility meter, or a conductivity meter.

The illustrations contained within this manual are of the KT-10 S/C – a combined Magnetic Susceptibility/Conductivity Meter.

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Chapter 5: Bluetooth Connections

Chapter 6: Troubleshooting

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Chapter 1

Introduction

1.1 General Information

The KT-10 v2 is an advanced hand-held magnetic susceptibility meter. The KT-10 v2 was developed as a joint venture between Terraplus Inc., a geophysical instrument supplier located in Richmond Hill, Ontario (Canada), and Georadis S.R.O., a Czech Republic based design and manufacturing company.

The KT-10 v2 is best utilized for obtaining accurate and precise measurements from outcrops, drill cores and rock samples. The KT-10 v2 is capable of measuring uneven rock surfaces and is well suited for automated drill-core logging with a digitally recorded scanning mode.

With its leading edge technology, the KT-10 v2 offers high sensitivity, higher operational comfort and excellent communication capabilities.

IMPORTANT: Your KT-10 v2 meter is calibrated at the factory and a periodic calibration is not required.

1.2 Operating Principle and Theory

1.2.1 Theory

Magnetic susceptibility is defined as the degree to which a substance can be magnetized. In mathematical terms, it is the ratio ***k*** of the intensity of the magnetization ***I*** to the magnetic field ***H*** that is responsible for the magnetization, i.e.

$$kH = I$$

From Ampere's law, it is known that a current (i.e. a moving electrical charge) generates a magnetic field. The inverse corollary to this is that a magnetic field can also influence a moving electrical charge. Thus, an oscillating EM field will be influenced to varying degrees by a magnetically susceptible material.

Conductivity is an intrinsic property of a microscopic volume of material. Apparent conductivity is a volume average of a heterogeneous half-space except that the averaging is not mathematical but dependent on each instrument. Only when the earth is a homogenous half-space is the apparent conductivity the same as the true conductivity. The main advantage of the electromagnetic conductivity method is that contact with the sample is not required. If the conductive material is moved near to the measurement coil, new elementary electric circuits are created. The sample will then behave like small secondary coils and influence the magnetic flux through the measurement coil caused by mutual inductance. Naturally, this leads to a change in the frequency. In general, the amplitude of the voltage signal decreases if the conductivity increases and vice versa. Our method is based on the analysis of this change.

1.2.2 Operating principle

The KT-10 v2 utilizes a 10 kHz LC oscillator with an inductive coil to measure the magnetic susceptibility and conductivity. Magnetic susceptibility is calculated from the frequency difference between the sample and free air measurements, while conductivity is calculated from the difference in amplitude between the two. It also takes into account geometric corrections to determine the true susceptibility. The frequency of the oscillator is extremely sensitive to temperature deviations. Any temperature instability is propagated in frequency deviations and has a direct impact on maximum sensitivity. To minimize these effects, the KT-10 v2 takes multiple measurements in free air before measuring the sample, and then multiple free air measurements are taken afterwards. Then using a sophisticated algorithm, the negative impact of temperature shift is minimized.

The sequence required to obtain a measurement is:

Step 1: The frequency and amplitude of the oscillator is determined in free air.

Step 2: The oscillator frequency and amplitude is then measured when the coil is placed on a rock sample, drill core, or outcrop.

Step 3: The frequency and amplitude of the oscillator is then measured again, in free air, and then the results are displayed.

Chapter 2

The KT-10 v2 S/C

2.1 Specifications

Susceptibility Sensitivity:	$1x10^{-6}$ SI Units
Conductivity Sensitivity (optional):	1 S/m
Susceptibility Range:	0.001×10^{-3} to 1999.99×10^{-3} SI
Conductivity Range (optional):	1 - 100,000 S/m Units Auto-Ranging
Operating frequency:	10 kHz
Measurement Frequency	20 times per second in Scanner Mode (5 readings are averaged together and 4 readings per second are stored)
Display:	High Contrast LCD Graphic Display with 104 x 88 pixels
Memory:	Up to 4000 measurements with voice notes.
Control:	One button with up and down functionality. A PIN mode is available for rough surfaces.
Communication:	USB, Bluetooth and GPS link via Bluetooth
Battery:	Two AA batteries - Rechargeable or Non-rechargeable
Battery life:	Up to 3000 readings without voice recorder, using alkaline batteries
Operating temperature:	-20 °C to 60 °C
Dimensions:	200mm x 57mm X 30mm
Coil Diameter:	65 mm
Weight:	0.30 kg

2.2 Features

The KT-10 v2 has many features that make it stand out in the crowd of available hand held magnetic susceptibility & conductivity meters, and they are as follows:

Multiple Configuration Capability (optional)*

The KT-10 v2 can be upgraded to include conductivity measurements. With this upgrade it can be configured as a simultaneous magnetic susceptibility/conductivity meter, a magnetic susceptibility meter, or a conductivity meter.

Android Application for Real Time Profiling (optional)*

The optional GeoVision software can be used to display real time scanner profile on Android platform operated smart phones. The large display of the smart phone will show real time graphical output while scanning and can be used as a data browser to display field measurements/records in the KT-10 v2 memory. The keypad of the smart phone can be used to enter additional text notes to the current data or any previously stored data on the KT-10 v2.

True Susceptibility and Conductivity

The KT-10 v2 uses automated correcting routines to display true susceptibility and volume conductivity.

Uneven Samples

The KT-10 v2 is offered with a **PIN** for rough surface measurements. When measuring field samples or outcrops with the **PIN**, and when the meter is kept parallel to the surface, it provides a reading with increased accuracy. It also automatically corrects and displays the true magnetic susceptibility and conductivity.

Fast Scanning

The KT-10 v2 scans up to 20 readings per second; increasing the amount of information that user can obtain per location or sample.

Please note: 4 readings per second are stored on the KT-10 v2; 5 readings are averaged together for each of the 4 readings per second.

Depth Correlation

Before starting the measurement routine, the user can now enter information such as borehole ID, box ID and the number of rows in a box, along with the start depth, end depth and depth interval. The user will have the option to choose between imperial or metric as their desired unit of measurement. In the Scanner mode, depth intervals can be recorded with the push of a button while scanning a core. All readings between depth intervals are interpolated.

Variable Audio

When used in the **Scanner Mode**, the KT-10 v2 meter's loudspeaker allows the operator to monitor the variation in the Magnetic Susceptibility and Conductivity measurements with a variable audio tone, which reflects the relative intensity of the reading. In the combined mode, Susceptibility & Conductivity, the variable audio is active for the primary reading. For example, in Cond+Sucs mode the audio will reflect the intensity of the Conductivity measurements. The voice recorder allows the recording and replaying of voice messages through the loudspeaker as well.

Data Storage

The KT-10 v2 can store up to 4000 measurements with two minutes of comments per reading, to its internal non-volatile memory. Average readings and standard deviation are also stored. The operator can record comments associated to specific readings through the KT-10 v2 digital voice recorder.

Data Averaging

Stored results of the measurement are automatically added in an averaging buffer. The average value is displayed on the LCD along with standard deviation. The operator can erase the buffer and control how many results will be averaged together.

USB Data Transfer

The KT-10 v2 uses USB communication standards as the default mode of communication. It allows fast data transfer of measured values and digital voice streams from the unit to any Windows PC. The USB connection can be also used for firmware upgrades and device parameter settings.

Bluetooth Connectivity

The KT-10 v2 comes standard with Bluetooth capabilities. When the KT-10 v2 is paired to an external Bluetooth enabled GPS, the user can store the GPS coordinates in the KT-10 v2's memory along with the readings. Bluetooth can also be used to download readings from the unit along with the voice streams to a computer. Alternately, one can also pair the KT-10 v2 to an Android running smart phone to obtain Real Time Scanner Profile.

Rain and Dust Proof

The KT-10 v2 meets IP65 standards; therefore it is protected against dust and provides additional protection in rainy or high humidity conditions.

Large LCD Display

A high contrast LCD is utilized for the display of both the magnetic susceptibility and conductivity readings and serves as the interface for operating the instrument. Together with two buttons and graphical menus, operators can interactively navigate between the different functions. On screen notification icons allows the operator to monitor the battery status, Bluetooth connectivity, GPS support and more.

Power

Power saving techniques and use of low consumption components allow for the use of high speed communication standards (USB, Bluetooth) and supports the large LCD display. The meter is powered by 2 AA type batteries. The user can use any brand of rechargeable or non-rechargeable battery. The unit does not contain an internal battery charger. Therefore, rechargeable batteries must be charged outside the KT-10 v2 in a suitable battery charger provided or similar.

Storage / Transportation

The KT-10 v2 is delivered in small pouch/case with a foam insert. The pouch can be mounted on a belt and comfortably carried on the waist. A set of spare batteries and **PINs** can be also placed in the pouch for storage. Even though the KT-10 v2 has been designed to be a rugged instrument, it still can be damaged by severe impacts. Also, please note that the KT-10 v2 is only water resistant, not water proof. Consequently, total immersion in water or long exposure in heavy rain is not advisable for this instrument.

2.3 KT-10 v2 Layout

Figure 1: KT-10 v2 Layout (KT-10 S/C shown)

2.4 Controls

To control the KT-10 v2, there is one button with associated UP/DOWN functions. There are five different options to use this button and they are as follows:

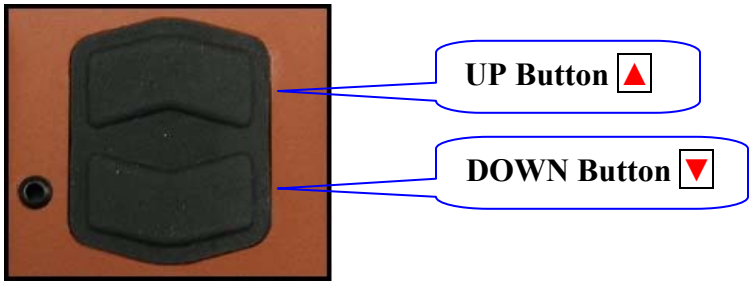


Figure 2: Control Button

SBP▲ Short Button Press UP – is a single short push of the button, pointing to screen, in its upper half. This symbol will be used throughout this document to represent this button press **SBP▲**

LBP▲ Long Button Press UP – hold the button in its upper half for more than one second or until a reaction appears on display. This symbol will be used throughout this document to represent this button press **LBP▲**

SBP▼ Short Button Press DOWN – is a single short push on the button, pointing away from screen, in its lower half. This symbol will be used throughout this document to represent this button press **SBP▼**

LBP▼ Long Button Press DOWN – hold the button in its lower half for more than one second or until a reaction appears on the display. This symbol will be used through out this document to represent this button press **LBP▼**

SBP▲ **SBP▼** Both buttons pressed together will turn the unit off at any time during operation. This symbol will be used throughout this document to represent this button press **SBP▼** **SBP▲**

2.5 Menus

The first screen you will see when you power on the meter will be a start up screen (shown in **Figure 3).**

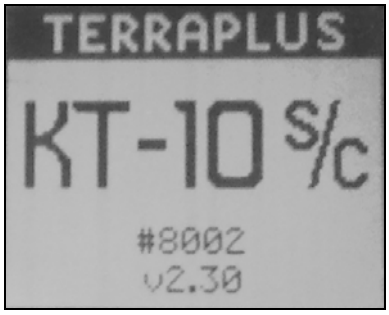


Figure 3: Start-up Screen

The information displayed on the start-up screen will be the unit's serial number and firmware revision, which is currently v2.70, at the time of this writing. The start-up screen will be displayed for about 2 seconds and then the main menu will appear (shown in **Figure 4**).

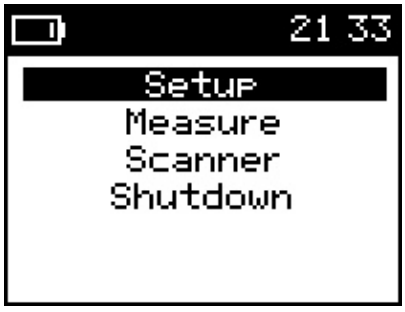


Figure 4: Main Menu

Measure and **Scanner** are the two modes of operation for the KT-10 v2. Selecting one of these options will activate the measurement routine for that mode. **Setup** is used to configure mode, date & time, core size selection, connection of Bluetooth GPS unit, and battery type selection along with calibration information. **Shutdown** will turn the unit off.

For detailed information on each measurement selection and the settings menu please refer to **Chapter 3** for Operation of the KT-10 v2 (starting on Page 17).

2.6 Notification Icons

There are several icons used on the KT-10 v2, which are displayed in the top bar of the instrument, known as the notification area. The time and battery indicator are displayed in this location and are displayed permanently during operation of the instrument. Below you will find a list of the other icons you will see used on the meter and the meaning for each of them.

Pin used for measurement

Readings have been saved

Button used for measurement

USB is connected

Core diameter selected

Bluetooth is connected

GPS is connecting

GPS is connected

Voice Note

Chapter 3

Operating the KT-10 v2

3.1 Battery Installation

Figure 5: Battery Installation

To install batteries follow this procedure:

1. Bend the rubber protection cover on the rear of the instrument to gain access to the battery housing lid.
2. Use any flathead screw driver, or suitable coin, to open the lid.
3. Insert two rechargeable AA cell batteries provided. The positive side goes in first.
4. Close the battery housing by screwing the lid back onto it.
5. Attach the rubber protective cover back in position.

Note: If you are going to store your KT-10 v2 for long a period of time, please remove the batteries from the unit to prevent damage from electrolyte leakage. It is also recommended that you visually inspect the batteries after any long storage interval.

3.2 Power

3.2.1 Power ON

To power the unit ON, use **SBP▲.** An introductory screen (seen below in **Figure 6**) accompanied by a melody will be presented.

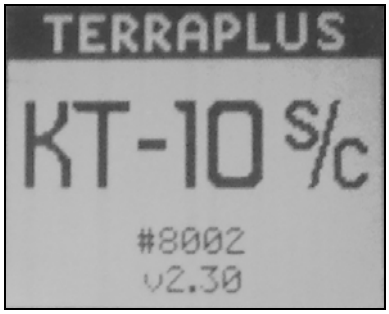


Figure 6: Power On

3.2.2 Power OFF

To power the unit off, use **LBP▲** or **LBP▼** on the Shutdown option from the main menu. You will be presented with the following screen…

Figure 7: Power Off

Alternatively

Press **SBP▲** and **SBP▼** together, to turn the meter off at any time during operation. The shut down screen will not appear. Instead the unit will immediately turn off

TIP: Place your finger or thumb tip between the two buttons to simplify this task.

3.3 Setup Menu

The Setup menu contains several different parameters to configure the KT-10 v2's operation. The selections in this menu are: **Mode, Core Diameter, Measure Units, Date/Time, Accessories, Advanced**, and **Main Menu**. To navigate to the desired parameter use the **SBP▼** or **SBP▲**, then when the parameter is highlighted use **LBP▼** or **LBP▲** to activate it.

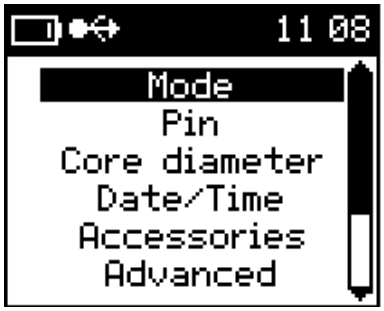


Figure 8: Setup Menu

Mode: (Optional for KT-10 v2)

KT-10 v2 can be operated in 3 different configurations: measure Magnetic Susceptibility and Conductivity simultaneously, measure only Magnetic Susceptibility, or measure Conductivity only.

For ease of operation, the user can select from 4 modes; Susceptibility, Conductivity, Susceptibility & Conductivity, or Conductivity & Susceptibility.

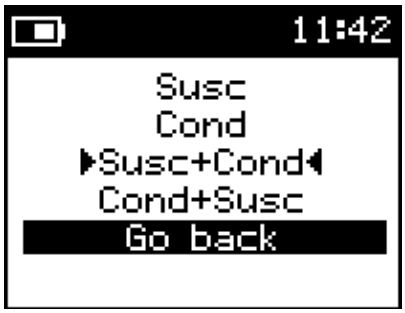


Figure 9: Mode menu

Sucs:

Enables the meter for susceptibility measurements. Along with susceptibility results, user can obtain data average and standard deviation values in the measure mode and data average and maximum values in the scanner mode
(Seen in **Figure 10**).

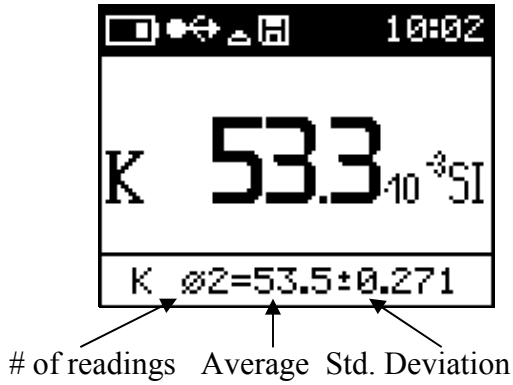


Figure 10 : (a) Measure Mode

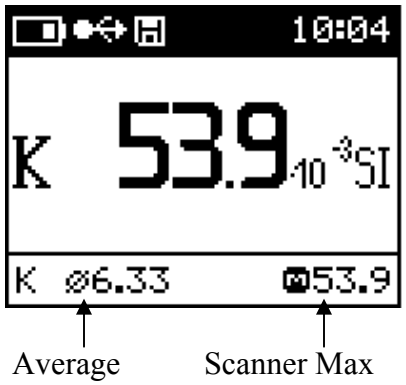


Figure 10 : (b) Scanner Mode

Cond:

Enables the meter for conductivity measurements. Along with conductivity results, user can obtain data average and standard deviation values in the measure mode and data average and maximum values in the scanner mode
(seen in **Figure 11**).

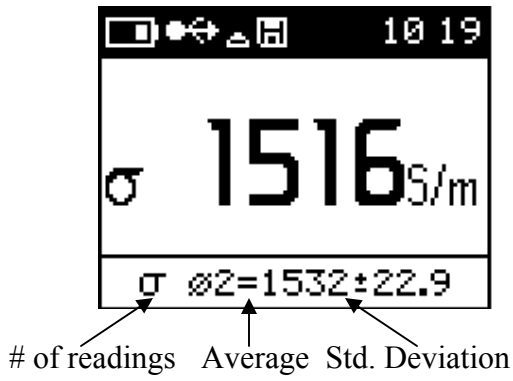


Figure 11 : (a) Measure Mode

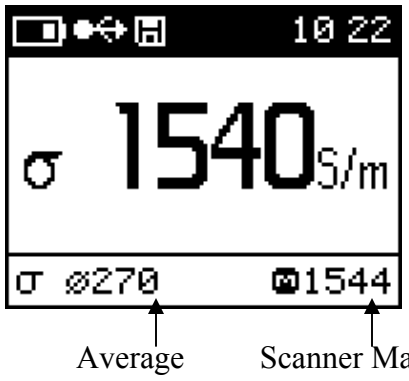
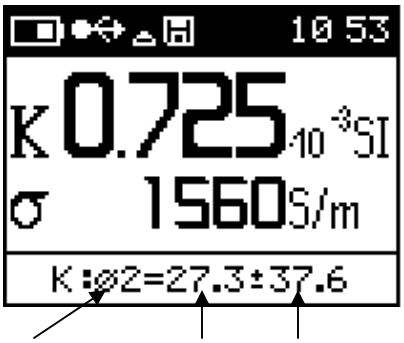


Figure 11 : (b) Scanner Mode

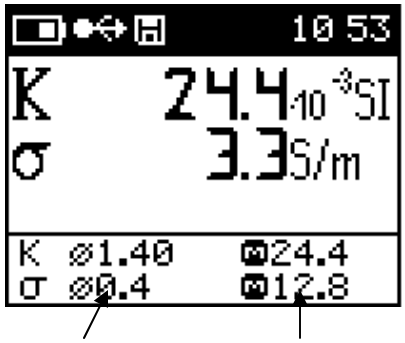
Susc+Cond:

This mode will enable the meter to read both susceptibility and conductivity simultaneously. In this mode, measurement of magnetic susceptibility is considered primary reading and the results of the primary readings are displayed in large text. User can obtain data average and standard deviation values in the measure mode and data average and maximum values in the scanner mode. (shown in **Figure 12**).



# of readings Average Std. Deviation

Figure 12 (a): Measure Mode

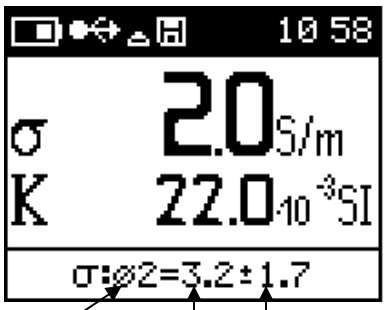


Average Scanner Max

Figure 12 (b): Scanner Mode

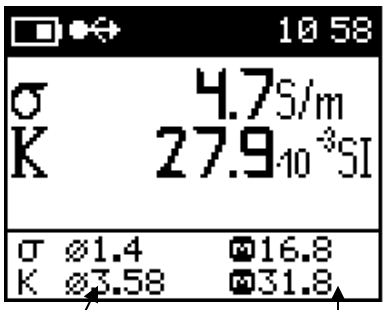
Cond+Susc:

This mode will enable the meter to read both conductivity and susceptibility simultaneously. In this mode, measurement of conductivity is considered primary and the results of the primary are displayed in large text. User can obtain data average and standard deviation values in the measure mode and data average and maximum values in the scanner mode. (shown in **Figure 13**).



# of readings Average Std. Deviation

Figure 13 (a) : Measure Mode



Average Scanner Max

Figure 13 (b) : Scanner Mode

Pin

The KT-10 v2 is equipped with a PIN for rough surface measurements. To enable the meter in the PIN mode, PIN must be selected.

Figure 14: PIN mode

Core Diameter

Contains a list of the different core diameter sizes that can be selected; both standard North American and non-standard diameters are available. When a diameter is selected, for either full cylindrical or split cores, the diameter correction is automatically applied to magnetic susceptibility and conductivity measurements.

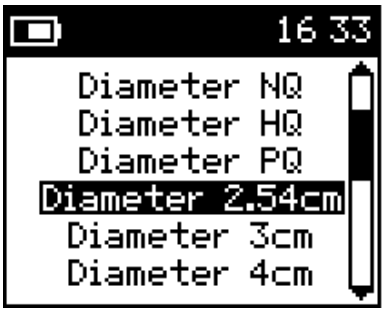


Figure 15: Core diameter

Concentration (Conc.) Tables (for Plus model only * see page 106)

The user can choose to obtain readings in either basic SI or CGS units, or as a grade estimate in a percentage (%) for any installed calibration table.

Figure 16: Measure units

Date/Time:

To set date and time on the KT-10 v2, in a 24 hour format.

Figure 17: Date/Time

Accessories

Allows for configuration of the GPS and Battery type.

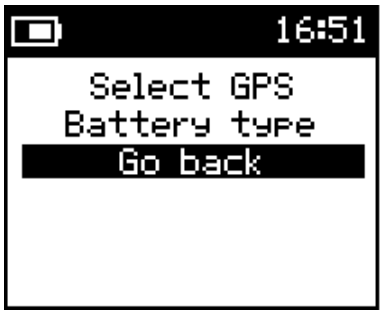


Figure 18: Accessories

Select GPS: Entering this option will start a search for Bluetooth capable GPS units. A search screen will be presented and when all the Bluetooth enabled devices have been detected, a list of all named Bluetooth devices will be displayed. Please consult the GPS user's manual for detailed information on settings for the Bluetooth GPS and any name it may use for its discovery.

Please note: Some Bluetooth GPS units require a "PIN" for secure pairing. To facilitate this, the KT-10 v2 allows entry of a "PIN" via GeoView software.

Battery Type: there are two choices for battery type selection, rechargeable and non-rechargeable.

Advanced

Provides access to the meter Calibration and QA parameters.

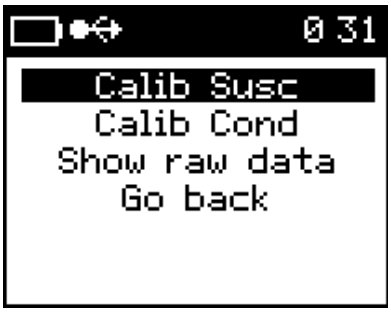
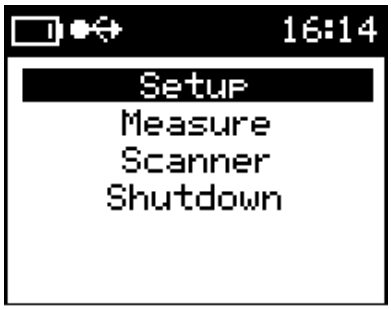


Figure 19: Advanced

Show raw data: A debug tool that monitors the frequency & amplitude of the measuring coil; this feature is primarily used at the factory.

Borehole mode

The Borehole mode allows user to integrate depth information to the data being collected in both the Measure and the Scanner mode. In the Setup menu, the Borehole mode option can be OFF or ON. When the Borehole mode is ON, the main menu will list Borehole as a method of measurement.



Borehole Mode OFF

Borehole Mode ON

Main Menu

Units

Users can obtain magnetic susceptibility measurements in either SI or CGS units; while conductivity measurements can be in either S/m or Ω.m units

* When Borehole Mode is enabled, unit of measure for distance can be selected

Main Menu:

This selection will take you back to the Main Menu.

3.4 Measure

Selecting Measure from the main menu will initialize the KT-10 v2 for a single measurement. In this mode, measurements can be obtained with (measurement of a core) or without geometric corrections to the readings. Measurements without geometric corrections to the readings are best utilized for quick recognisance of rock samples or outcrops with no specific geometry.

3.4.1 Take a reading

If **Measure** has not already been selected, use **SBP▼** or **SBP▲** to highlight this mode and select it with the use of **LBP▼** or **LBP▲**.

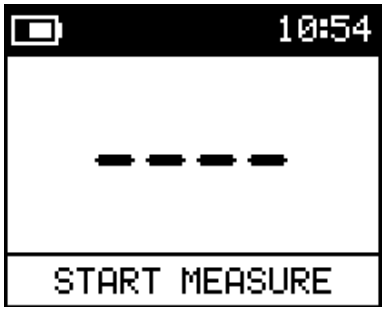


Figure 21: Start Measure

When you enter the measurement mode, the screen above will be displayed and indicate that the meter is ready to start the measurement process.

There are three steps involved in the measurement sequence: the first step is a free air measurement; the second is the sample measurement; and the final step is another free air measurement.

Note: The duration for the measurement sequence is 7 seconds long. Soon after the measurement is initiated, a new screen with 4 dashes and a progress bar will appear. It takes 7 seconds for the progress bar to complete. It is important that you do not wait for the bar to build up in between each of the 3 steps or else you will be presented with "Error" on the screen.

TIP: **Figure 26** on page 30 contains a flow chart for the measurement process. The chart shows all of the functions that are associated with the measurement routine and how to access them. **Figure 26** references **Figure 27** for the measurement sequence as shown on page 31.

To start the measurement process, follow the steps below:

1. Select Measurement Mode & Core Diameter Size

a. From the main menu (**Figure 4**), enter into the Setup menu.

b. Select Mode and select the preferred mode of measurement.

c. Select Core diameter then choose the core diameter size. Select "None" if you wish to measure rock samples.

d. Select "Back to menu" to go back to main menu

2. Select Measure

Ensure the meter is on the start measure screen that is displayed in **Figure 21.** Before proceeding with the measurements, ensure that the meter is position in a free air space void of all metallic objects.

Step 1: With the KT-10 v2 in free air, use **SBP▲** to start the measurement process. After about 1 second you will hear a short sound indicating the free air measurements are complete.

Step 2: Immediately place the KT-10 v2 on the sample's surface then use **SBP▲**. When the reading on the sample is complete you will hear a sound; this sound is different then the one heard during the free air measurements.

Step 3: Then immediately position the KT-10 v2 in free air once again for the final free air measurements. Wait for the final sound, which will be the same as the first tone heard in **Step 1**. This sound will indicate the final free air measurements are complete and the reading(s) will be displayed on screen.

Note: A button icon will appear in the notification area confirming a button press.

Tip: To repeat the measurement process without saving the results, position the unit in free air and go directly to **Step 1**.

With PIN

PIN Installation:

Remove the thread protection screw from head of the KT-10 v2. Install the PIN in the place of the thread protection screw. Ensure that the PIN is threaded all the way into the housing. **Remember to enable the PIN mode in the Setup menu.**

Step 1: With the KT-10 v2 in Free Air, use **SBP▲** to start the measurement process. After about 1 second you will hear a short sound indicating the free air measurements are complete.

Step 2: Immediately place the KT-10 v2 on the sample's surface keeping the coil parallel to the sample then use **SBP▲**. When the reading on the sample is complete you will hear a sound; this sound is different then the one heard during the free air measurements.

Step 3: Then immediately position the KT-10 v2 in free air once again for the final free air measurements. Wait for the final sound, which will be the same as the first tone heard in **Step 1**. This sound will indicate the final free air measurements are complete and the reading(s) will be displayed on screen.

3.4.2 Store a reading

To store the reading, there are two different options available; quick save and save with a voice note.

Quick Save: With the results displayed on screen, you can quickly store the reading by using **LBP▲**.

Save with voice note: To store the reading with an optional voice record use **LBP▼**. This will invoke the voice recorder and the screen shown in **Figure 22** will be displayed. Position the KT-10 v2 about 10 cm from your mouth and speak at a normal volume. You can end the voice record by using either **SBP▼** or **SBP▲** or, by allowing the time to elapse (45 seconds).

Figure 22: Voice Record

Once the recording has ended, it will be replayed if the KT-10 v2 has been enabled to do so; this will allow its contents to be confirmed. User can then store or discard the voice note.

Figure 23: Store voice record

When a reading is stored, by either method, a confirmation will be displayed. It will show the record number, date and time along with any GPS positions available (if the optional Bluetooth GPS is enabled).

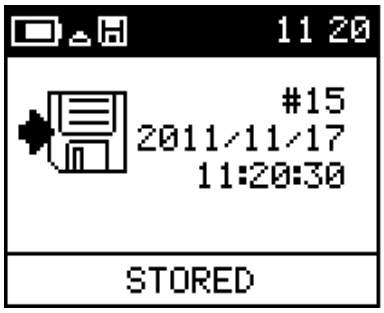


Figure 24: Record Saved

3.4.3 Measurement Sub Menu

The measurement menu can be accessed with **SBP▼** only when the results are displayed on the screen (shown in **Figure 25)**. This menu allows for storing of the reading, storing of the reading with a voice record, returning to the measure routine, disabling the GPS positions when GPS is enabled, clearing of the average buffer or returning to the main menu.

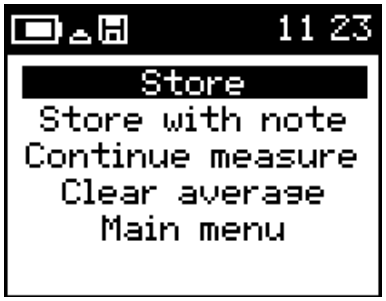


Figure 25: Measure Menu

To store the reading, navigate to the **Store** option with the use of **SBP▼** or **SBP▲** and select it by using **LBP▼** or **LBP▲** when it is highlighted.

To store the reading with a voice record, navigate to the **Store with note** option with the use of **SBP▼** or **SBP▲** and select it by using **LBP▼** or **LBP▲** when it is highlighted.

Selecting **Continue measure** will return the display to the results page. This is accomplished with the use of **SBP▼** or **SBP▲** to highlight the selection and use **LBP▼** or **LBP▲** to select it.

Disable GPS will remove the GPS positions from the data set. However, the meter will remain paired to the Bluetooth GPS. Highlight this option by moving the cursor with **SBP▼** or **SBP▲** and once highlighted select it with **LBP▼** or **LBP▲**. When you return to the measurement menu after you **Disable GPS,** the menu will show **Enable GPS.** Selecting Enable GPS will enable the GPS positions in the data again.

Clear average is selected to clear the averaging buffer. Each reading that has been saved is used to calculate the average and standard deviation of the stored readings. The averaged values and standard deviations are stored along with the readings for later retrieval. Clearing the average will enable the user to select which set of readings will be averaged together.

3.4.4 Measure Flow Chart

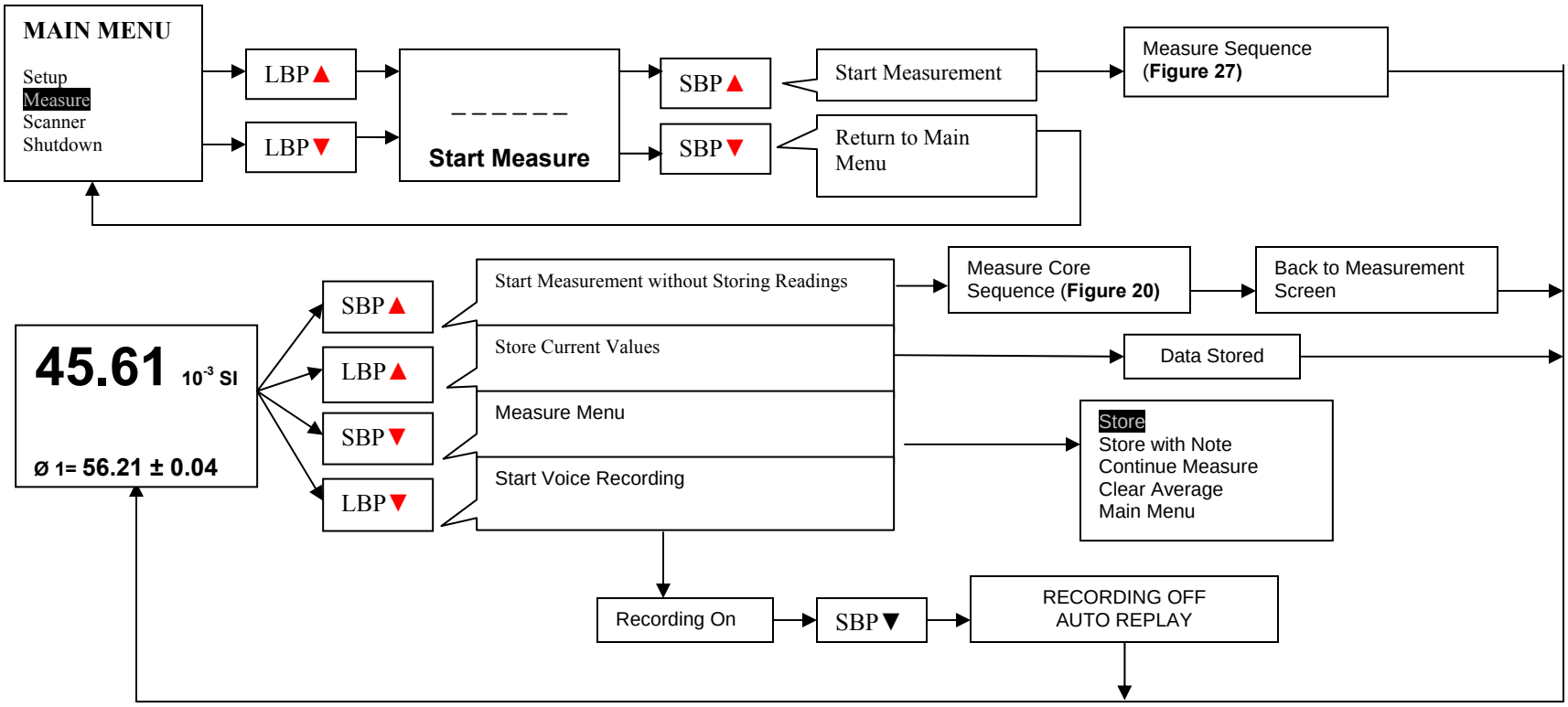
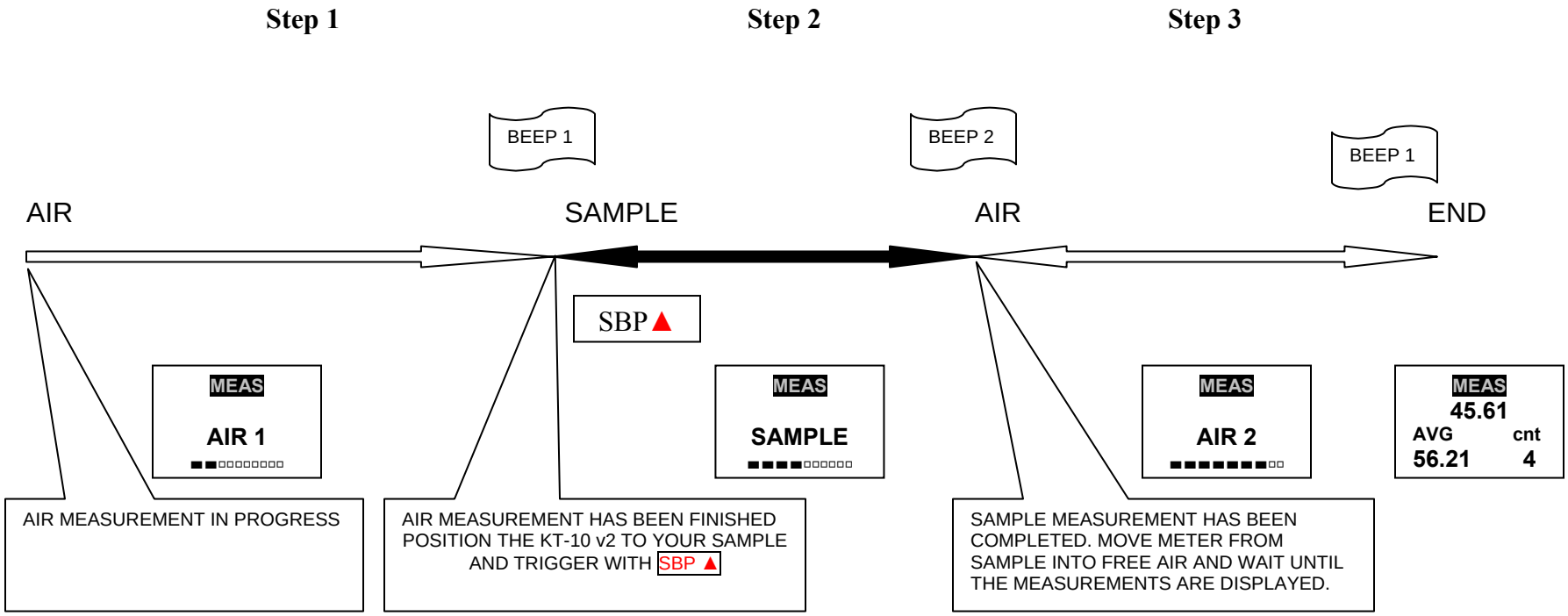


Figure 26: Measurement Flow

3.4.5 Measure Sequence



Please note: MAXIMUM OF 7 SECONDS BEFORE TIMEOUT ERROR WILL BE SEEN ON SCREEN.
Measurement sample must be started before this time has elapsed

Figure 27: Measurement Sequence

3.5 Scanner

The **Scanner** option will initialize the KT-10 v2 for continuous measurement. Geometric corrections can be applied to the magnetic susceptibility readings to display true susceptibility values. This mode is best utilized for logging drill cores or prospecting. In Scanner mode, the **SBP▲** is used to activate the **Scanner** measurement sequence and to add markers to the data set. **SBP▼** is used to end the scanner process.

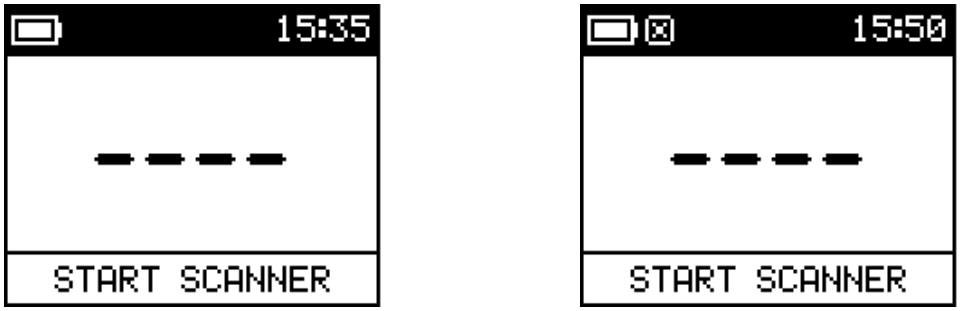
3.5.1 Take a reading in the Scanner mode

1. Set Measure Mode & Core Diameter Size

a. From the main menu (**Figure 4**), enter into the Setup menu.
b. Select Mode and select the preferred mode of measurement.
c. Select Core diameter then choose a core diameter size. Select "None" if you are measuring rock samples.
d. Select "Back to menu" to return to the main menu

2. Select Scanner

Ensure the meter is on the start scanner screen that is displayed in **Figure 28.** Before proceeding with the measurements, ensure that the meter is positioned in free air, void of all metallic objects.



No Core Correction with Core Correction

Figure 28: Start Scanner

This icon in the notification area indicates that a core diameter has been selected for susceptibility measurements. Conductivity measurements are not corrected for core size.

The KT-10 v2 is now ready to start the measurement process in **Scanner** mode.

TIP: **Figure 33** on page 36 contains a flow chart for the **Scanner** mode; it shows the functions associated with the **Scanner** routine and how to access them. **Figure 33** references **Figure 34** for the **Scanner** sequence and can be seen on the page 37.

There are two steps involved in the **Scanner** process. The first step is a free air measurement; the second is the sample measurement which will last for 120 seconds unless stopped with the use of **SBP▼**.

To start the measurement process follow the steps listed below. Ensure your KT-10 v2 is on the screen presented in **Figure 28** and is positioned in free space void of all metallic objects first.

Step 1: With the KT-10 v2 in free air, use **SBP▲** to start the **Scanner** process. Soon after you will hear a short sound indicating the free air measurements are complete and that the meter can be positioned on the sample.

Step 2: Begin to move the KT-10 v2 along the surface you wish to measure. The meter's loud speaker will indicate the relative intensity of the reading by the pitch of the audio. Place a marker in the data set with **SBP▲**. Use **SBP▼** at any time during the scanning process to end scanning.

Markers are special symbols that are added to the scanner data stream while scanned values are being stored to the memory. These can be used for correlation of the recorded samples which may help to synchronize measured values with important positions of anomalies in your samples. Markers can be used as often or as sparingly as needed.

To repeat the **Scanner** process without saving the results, position the unit in free air and go directly to **Step 1**.

3.5.2 Store a reading

There are two different options available to store the readings.

Quick save: With the results displayed on screen, you can quickly store the reading by using **LBP▲**.

Save with voice note: To store the reading with an optional voice record use **LBP▼**. This will invoke the voice recorder and the screen shown in **Figure 29** will be displayed. Position the KT-10 v2 about 10 cm from your mouth and speak at a normal volume. You can end the voice record by using either **SBP▼** or **SBP▲** or, by allowing the time to elapse (45 seconds).

Figure 29: Voice Record

Once the recording has ended, it will automatically be replayed; this will allow its contents to be confirmed. User can then store or discard the voice note.

Figure 30: Store voice record

When a reading is stored, by either method, a confirmation will be displayed. It will show the record number, date and time along with any GPS positions available (if the optional Bluetooth GPS is enabled).

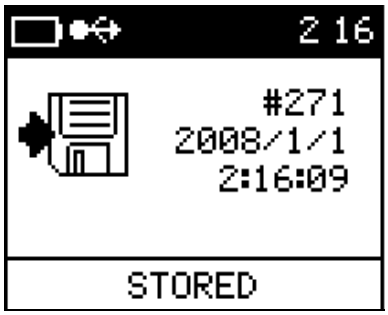


Figure 31: Saved Record

3.5.3 Measurement Sub Menu

The measurement menu can be accessed only when the results are displayed on the screen; this is accomplished by a **SBP▼** as shown in **Figure 32**. This menu allows for the storing of the reading, storing of the reading with a voice note, returning to the measure routine, disabling the GPS (if GPS connected), clearing the average or returning to the main menu.

Figure 32: Scanner Measure Menu

To store the reading, navigate to the **Store** option with the use of **SBP▼** or **SBP▲** and select it by using **LBP▼** or **LBP▲** once it is highlighted.

To store the reading with a voice record, navigate to the **Store with note** option with the use of **SBP▼** or **SBP▲** and select it by using **LBP▼** or **LBP▲** once it is highlighted.

Selecting **Continue scan** will return the display to the results page. This is accomplished with the use of **SBP▼** or **SBP▲** to highlight the selection and a **LBP▼** or **LBP▲** to select it.

Disable GPS will remove the GPS positions from the data set. However, the meter will remain paired to the Bluetooth GPS. Highlight this option by moving the cursor with **SBP▼** or **SBP▲** and once highlighted select it with **LBP▼** or **LBP▲**. When you return to the measurement menu after you **Disable GPS,** the menu will show **Enable GPS.** Selecting Enable GPS will enable the GPS positions in the data again.

3.5.4 Scanner Flow Chart

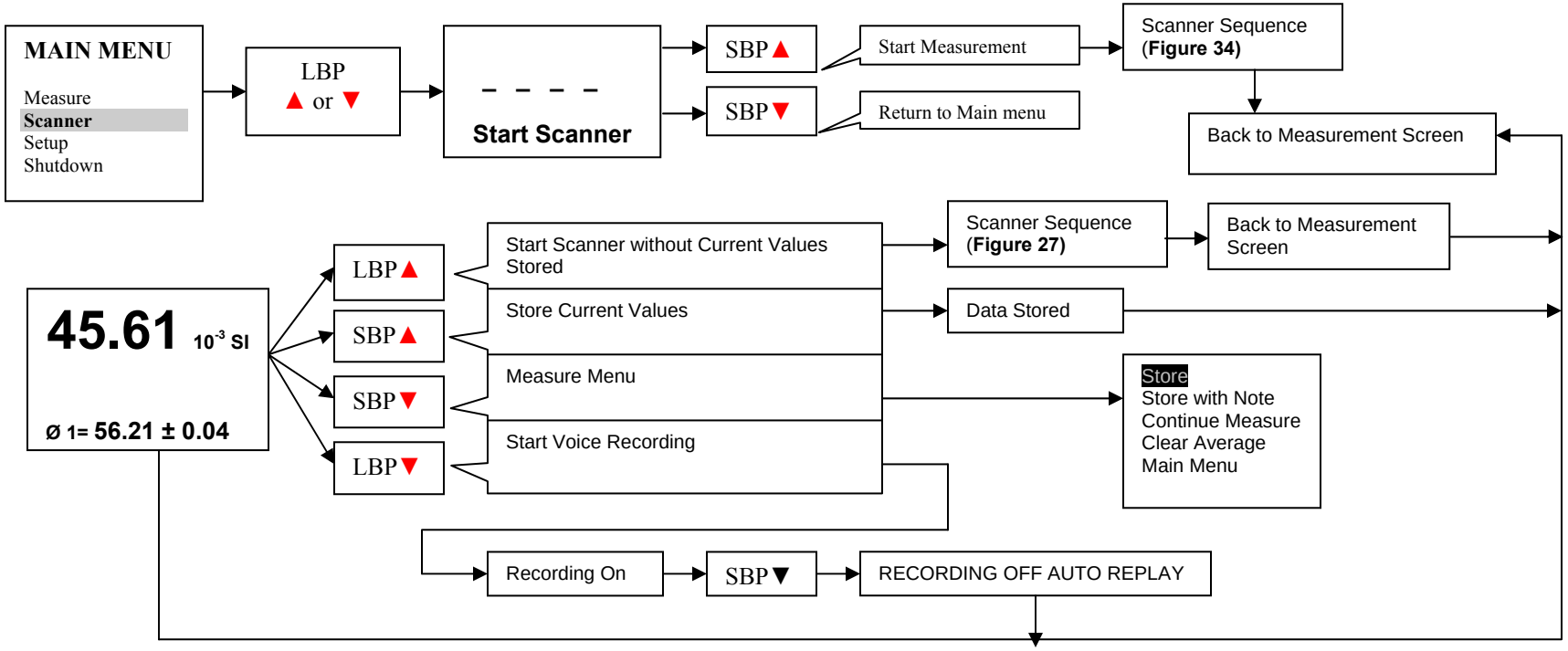


Figure 33: Scanner Measurement Flow

3.5.5 Scanner Sequence

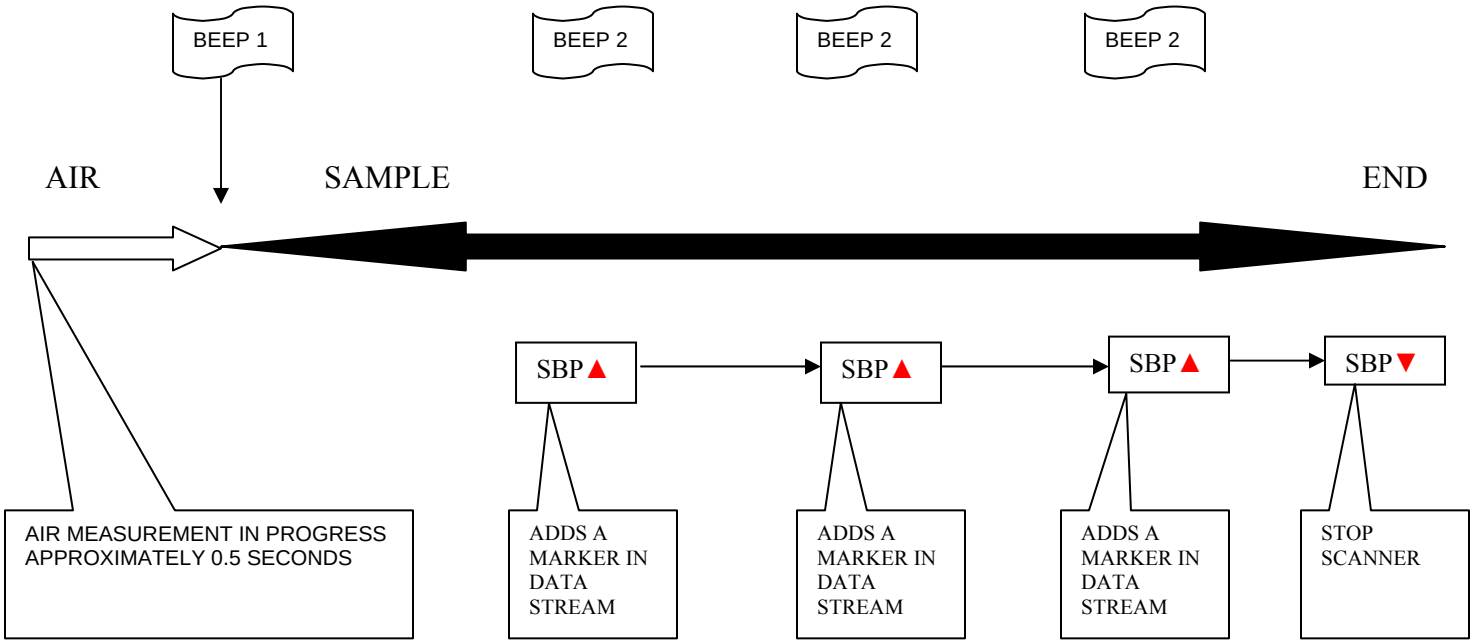


Figure 34: Scanner Measurement Sequence

3.6 Borehole mode

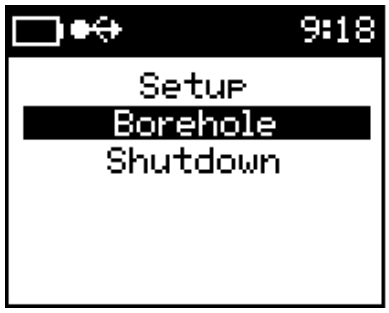
The **Borehole mode** option will initialize the KT-10 v2 for measurements on drill cores along with borehole parameter such as the Borehole ID, Start depth, End depth, Core length, # of Cores per box, and Depth interval. Geometric corrections applied to the magnetic susceptibility and conductivity readings to display true measurement values. In the Borehole mode, the **SBP▲** is used to activate the **Scanner** measurement sequence and to add depth interval to the data set. Depth intervals can be recorded with the push of a button while scanning cores. All readings between depth intervals are interpolated.

3.6.1 Borehole mode configuration

1) Enable Borehole mode

a. From the main menu, select Setup options.
b. Select Borehole mode and then enable it by selecting "On".
c. Select "Back to menu" to return to the main menu

2) Select Borehole from the main menu



Borehole mode enabled

The options in the Borehole menu are as shown on the following page.

Borehole type

3) Borehole type

New borehole: - used to create a new borehole options

Last borehole: - uses last borehole options; this option is only active when a previously created borehole is not fully completed. For any event the new borehole is not finished, the last borehole is used to resume measurements.

4) New Borehole

Selecting new borehole will start the Borehole creation wizard. Up to six alphas-numerical characters can be used to enter the Borehole options. Use the SBP▼ or **SBP▲** to scroll through the characters and **LBP▼** or **LBP▲** to make selection a selection. The symbol "↵ " is used to proceeded to next in the setup wizard and the symbol " * " is used to exit the setup wizard. Use the " – " for a space or to make corrections.

5) Select measurement type

Borehole measurement type

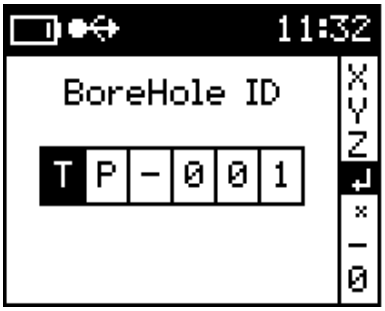
The two measurement modes are the Scanner and Discrete (Measure mode).

3.6.2 Scanner mode setup wizard

Use the **LBP▲** to select the Scanner mode. The Scanner setup wizard will be activated as shown below.

1) BoreHole ID

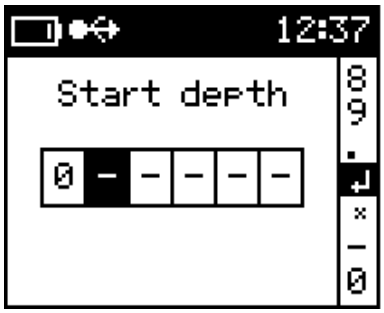
Use the alpha-numeric to enter identification for the borehole



BoreHole ID

2) Start Depth

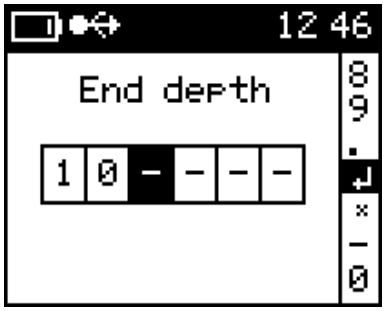
Enter the starting depth of the core



Start Depth

3) End Depth

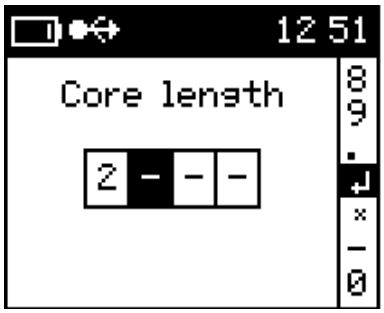
Enter the End depth of the core



End Depth

4) Core Length

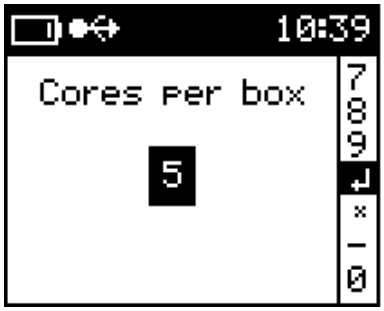
Enter the length of core



Core Length

5) Cores per Box

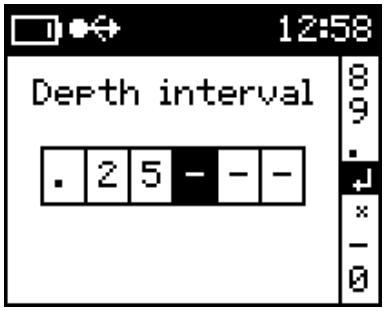
Enter the number of cores that are in a core box



# of Cores in a Box

6) Depth Interval

Enter depth interval for the core



Depth Interval

The Borehole setup wizard is now completed; there will be a brief message on the screen indicating that the new borehole is loaded and does not have any readings recorded for this borehole.

Borehole loaded

The meter is now ready for scanner measurements.

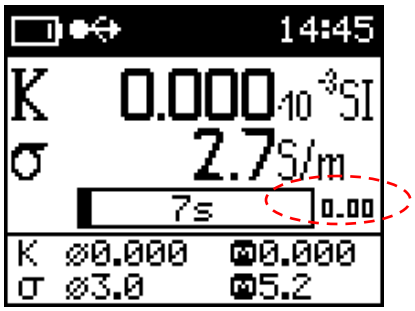
3.6.3 Taking a measurement in the Scanner mode

There are two steps involved in the **Scanner** process. The first step is a free air measurement. The second is the sample measurement which will last for 120 seconds unless stopped with the use of **SBP▼**.

To start the measurement process follow the steps listed below. Ensure your KT-10 v2 is positioned in free air space void of all metallic objects before proceeding with measurement.

Step 1: With the KT-10 v2 in free air, use **SBP▲** to start the **Scanner** process. Soon after you will hear a short sound indicating the free air measurements are complete and that the meter can be positioned on the sample.

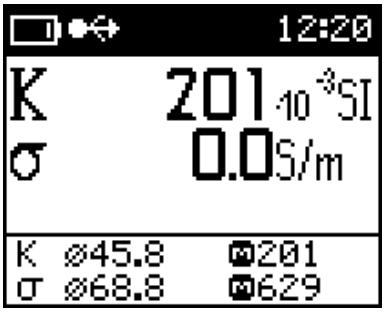
Step 2: When positioned on the sample, press the **SBP▲** to mark the beginning of the Start Depth on the core. This button press will trigger a new display, as shown below in red circle, showing the relative depth on the core. This number will increment with each depth intervals.



Relative Depth display

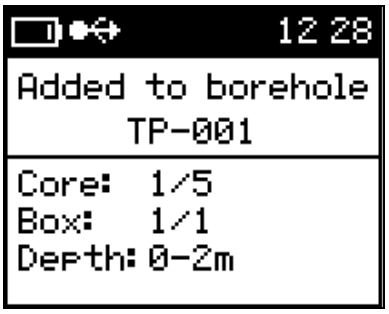
Note: **It is important to have the starting depth marked with the use of the SBP▲ or else the data will not correspond to the depth properly.**

Step 3: Begin to move the KT-10 v2 along the surface you wish to measure. The meter's loud speaker will indicate the relative intensity of the reading by the loudness of the audio. To insert a depth interval in the data set, use **SBP▲**. The scanner will automatically come to a stop when all depth intervals are accounted for given core length as seen below.



Scanner mode stopped

Step 4: Use the **LBP▲** to store the completed measurement for the 1st core. The meter will show the current core status briefly as shown below.



Borehole Status

The borehole status window provides the current status of the borehole measurement. As entered in the Borehole setup wizard, the Borehole ID is TP-00, Start Depth is 0m, End Depth is 10m, Core Length is 2m, # of cores in Box is 5 and Depth interval of 0.25. The status window above shows that 1 of 5 cores are logged for the depth of 0 to 2m as specified in the Borehole setup. This status window will be updated each time a new measurement is saved.

In case of more than one Core box, the after completion of the first core box, the meter will automatically will be configured for the next core box with the appropriate start depth without any intervention from the user.

Step 5: Use the **SBP▲** to continue scanning rest of the cores. When all of the cores have been scanned and saved, a message showing borehole complete will be displayed as shown on the next page.

Borehole completed

It is important to remember that it is not possible to store new reading for a borehole that is already completed and saved. The message shown below will appear when attempting to save new readings for a completed borehole.

Borehole completed – cannot save new record

3.6.4 Discrete mode setup wizard

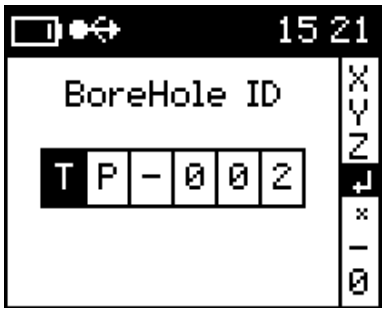
This mode is useful to those how only wishes to obtain single measurement at fixed depth on borehole cores. The sequence for the discrete mode remains the same as described in the **section 3.4.1** for the Measure mode. What is new for the discrete mode is the added benefit of collecting depth information to each stored readings. The operator will be able to associate the Borehole ID and the Depth interval to each new reading collected. In this mode, the depth interval is used as constant for incrementing depth for each successive reading.

If a **New borehole** is not already been selected, use **SBP▼** or **SBP▲** to highlight this mode in the borehole options and select it with the use of **LBP▼** or **LBP▲**.

Use **SBP▼** or **SBP▲** to highlight the **Discrete** mode and then use **LBP▼** or **LBP▲** to select it. A new borehole setup wizard will be activated as shown below.

1) Borehole ID

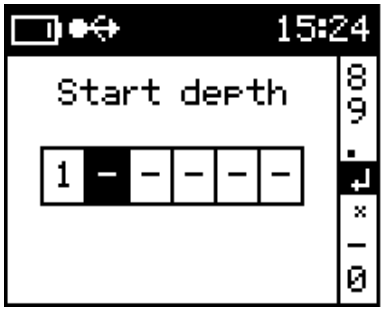
Enter the borehole identification



Borehole ID – Discrete mode

2) Start Depth

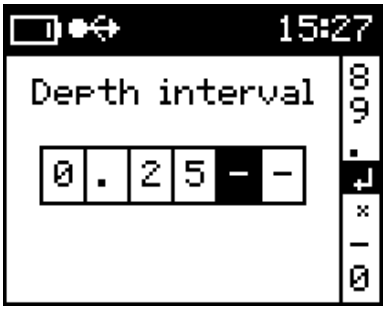
Enter the start depth of the core



Start measure

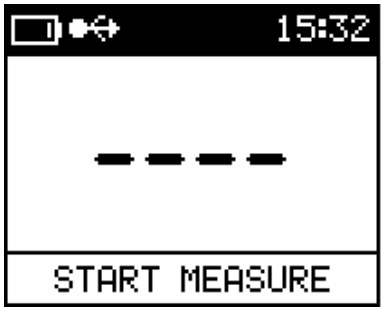
3) Depth Interval

Enter the depth interval as desired



Depth Interval

3.6.5 Taking a measurement in Discrete mode



Start Measure – Discrete mode

After completion of the borehole setup wizard, the screen above will be displayed indicating that the meter is ready to start the measurement process.

As described in the **Section 3.4.1,** there are three steps involved in the measurement sequence: the first step is a free air measurement; the second is the sample measurement; and the final step is another free air measurement.

Note: The duration for the measurement sequence is 7 seconds long. Soon after the measurement is initiated, a new screen with 4 dashes and a progress bar will appear. It takes 7 seconds for the progress bar to complete. It is important that you do not wait for the bar to build up in between each of the 3 steps or else you will be presented with "Error" on the screen.

To start the measurement process, follow the steps below:

Before proceeding with the measurements, ensure that the meter is positioned in a free air space void of all metallic objects.

Step 1: With the KT-10 v2 in free air, use **SBP▲** to start the measurement process. After about 1 second you will hear a short sound indicating the free air measurements are complete.

Step 2: Immediately place the KT-10 v2 on the sample's surface then use **SBP▲**. When the reading on the sample is complete you will hear a sound; this sound is different than the one heard during the free air measurements.

Step 3: Immediately position the KT-10 v2 in free air once again for the final free air measurements. Wait for the final sound that will be the same as the first tone heard in **Step 1**. This sound will indicate the final free air measurements are complete and the reading(s) will be displayed on screen.

Step 4: To quickly store the reading, use the **LBP▲**. Alternately press the **LBP▼** to bring up the measurement sub menu. The current measurement will be stored with the Start depth.

Note: The depth will increment automatically for the interval depth specified when the measurement is stored.

3.7 Voice Recorder

The voice recorder can be accessed after a measurement has been completed from any mode. To access this option, you must use the **SBP▼** which will bring you into the measurement menu (**Figure 25** on **page 29)**. Select **Store with note** and the voice recorder will begin immediately. For best recording, the KT-10 v2 should be positioned approximately 10 centimetres from the operator's mouth, and a normal speaking volume should be used. Speaking loudly will only cause distortion in the recording, which may make it difficult to understand when the file is played back. Using **SBP▼** will end the voice recording.

Note: voice notes are currently limited to 45 seconds per recording.

The voice recorder can add complimentary information to a set of core measurements or field measurements. For example, the voice recorder will allow an operator to indicate which borehole a reading came from as well as any other location information (if the optional GPS is not connected). Information such as the physical characteristics of a rock, sample interval on a drill core and the number of boxes to complete the borehole could also be added here.

All voice records are saved and transferred to a personal computer in wave format and can be replayed in the GeoView via audio program such as Windows Media Player.

3.8 PIN

The KT-10 v2 is equipped with a **PIN** for rough surface measurements.

There will be a single PIN located in the carrying case at the time of purchase, located near the back left as seen below (**Figure 35)**.

Figure 35: KT-10 v2 Pouch PIN Storage

Note: A spare PIN can be purchased and carried in the KT-10 v2 Pouch as shown in **Figure 35**.

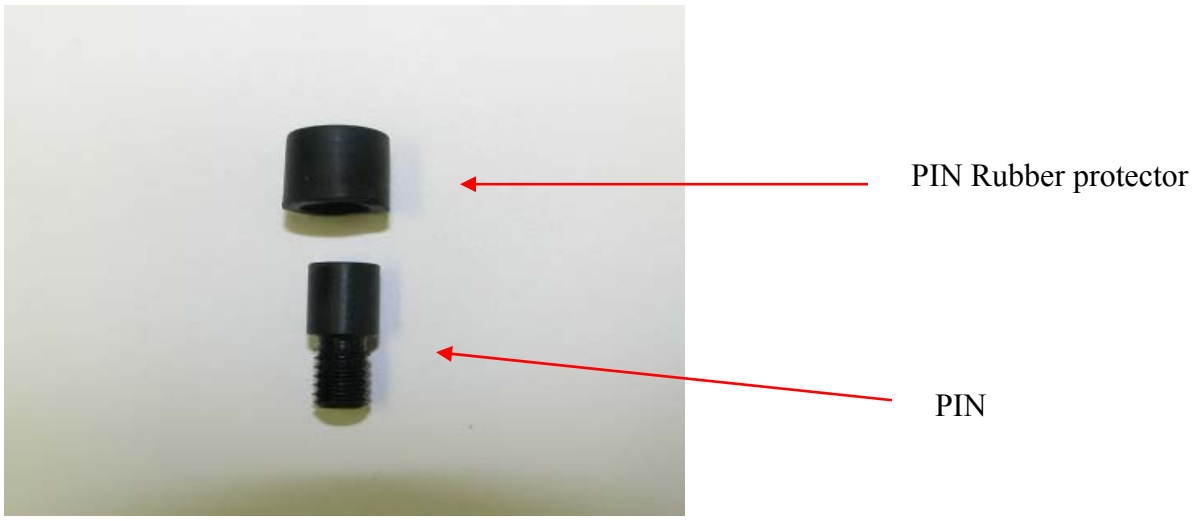


Figure 36: PIN

Remove the thread protector screw from the head of the KT-10 v2.

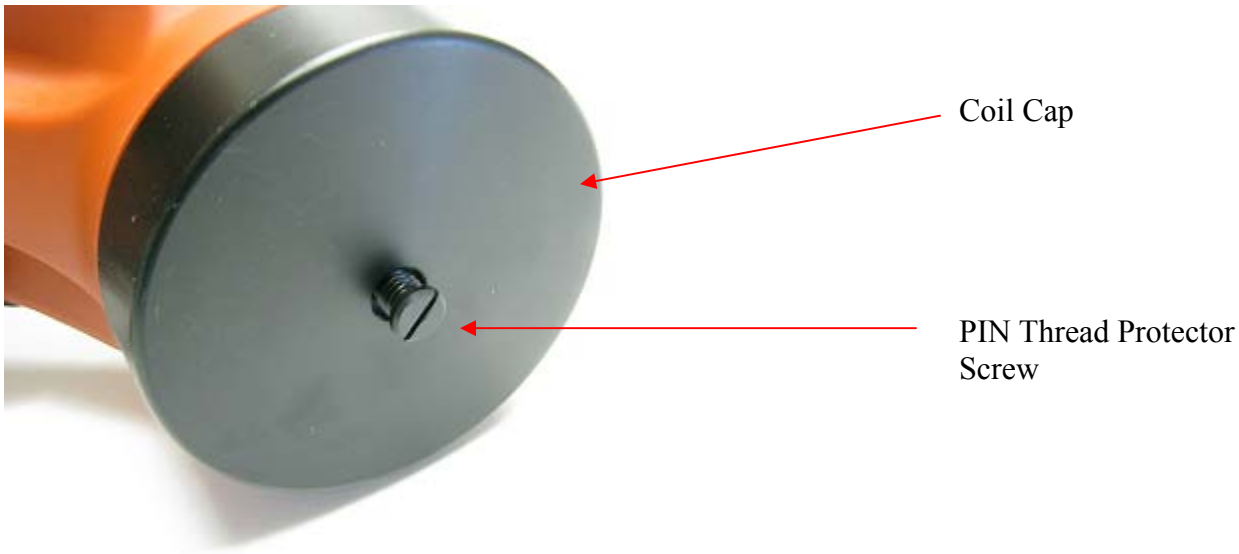


Figure 37: Coil Cap & Thread Protector

Coil Cap and PIN installed

When the thread protector have been removed, insert the KT-10 v2 PIN into the center hole where the thread protector came from, seen in the image on the left.

Chapter 4

Software

4.1 GeoView

GeoView is an easy to use Windows ™ based GUI (Graphical User Interface) which allows for data on a KT-10 v2 to be downloaded, stored and viewed on a Windows PC. It also supports data export functionality which allows the KT-10 v2 data to be converted into an ASCII file format that can then be easily imported into database or spreadsheet software. All data retrieved from the KT-10 v2 are stored in a firebird database, which is an integral part of the Geoview software. The Geoview database can be a local or a networked database, with the added possibility to have several databases existing for separating projects. Voice notes that are recorded and stored on the KT-10 v2's internal memory can be replayed from with-in the software interface. This allows for the voice notes and visual observations that have been recorded from the field to be added and stored along side the readings from the KT-10 v2 for a complete picture.

4.1.1 Installation

To install GeoView locate the install package provided to you on the KT-10 v2 software CD. Please locate GeoView_setup.exe file in the Software\Geoview folder. It will be approximately 21,613 Kilo Bytes in size as seen in **Figure 38**. Double click the icon to run the installation package.

Please note: **You must be an administrator to install the software and you will be prompted for this information if your Windows user account does not have administrator credentials.** **(Seen in Figure 39)**

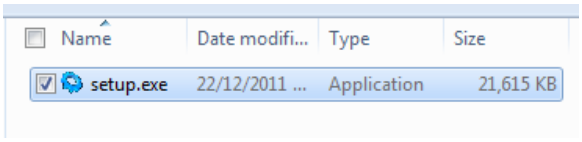


Figure 38: Setup.exe

Figure 39: Administrator credentials

The setup file contains installation packages for the GeoView Software, the firebird database, and the USB drivers for the KT-10 v2. If this is the first time connecting your KT-10 v2 to your PC it is recommended to install the drivers first, and then install GeoView software. To begin installation, select the appropriate option from the menu shown below (**Figure 40**).

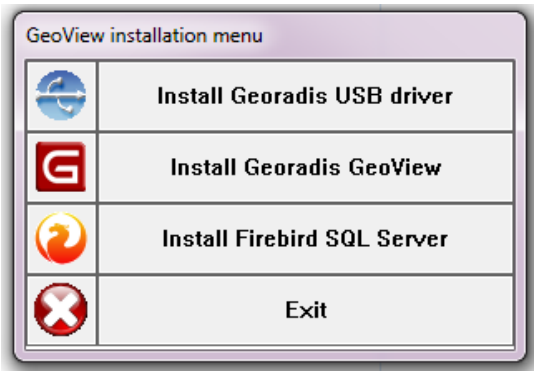


Figure 40: Install Splash Screen

USB Driver Installation

Please ensure that the meter is not connected to the PC via USB prior to driver installation.

When selecting ***Install Georadis USB driver*****,** you will be presented with the following screen seen in **Figure 41**, select ***Next>*** to continue the installation or ***Cancel*** to exit.

Figure 41: Start Driver Installation

When the driver install has been completed, you will be presented with screen as seen in **Figure 42**.

Figure 42: Complete Driver Installation

At this time, plug the KT-10 v2's USB cable into the computer to have windows recognize the drivers and copy the files to the appropriate location. Windows will respond by showing you that a new USB device has been recognized. The new hardware wizard will start.

Note: You should be logged in as an administrator to complete this part of the install.

Figure 43: Windows New Hardware Wizard

You will not need to go to the internet, as the previous step has copied the files to your PC already, so select **No, not at this time** and then press **Next** button.

Figure 44: Install Automatically

Select **Install software automatically** and then press **Next>** button.

The drivers will start to be copied to the windows/system32/drivers folder but you may be warned that the drivers have not passed Windows Verification.

Figure 45: Start File Copy

Select **Continue Anyways**

Figure 46: Continue Anyways

The files will then be copied to your PC and you will be able to establish communication between your PC and the KT-10 v2.

Figure 47: Driver Files Copied

GeoView Installation

When selecting ***Install Georadis GeoView*****,** you will be presented with the screen as seen in **Figure 48**, select ***Next>*** to continue the installation or ***Cancel*** to exit.

Figure 48: Begin GeoView Installation

You will then be prompted for the location of the installation directory. You may either leave this as default (C:\Program Files\Geoview) or use the browse button to find a new directory to install the GeoView software too. Select ***Next>*** when the correct path has been chosen.

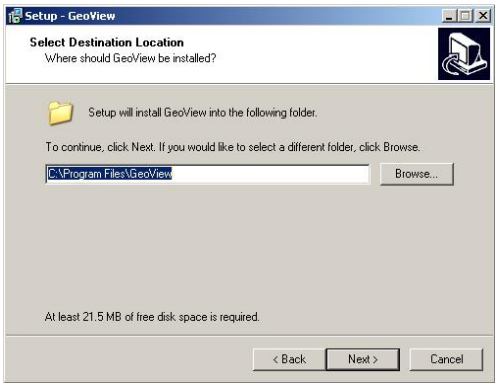


Figure 49: Folder Location

You will then confirm the destination folder by selecting ***Install*** or if you wish to change this location use the ***<Back*** button to make the necessary changes.

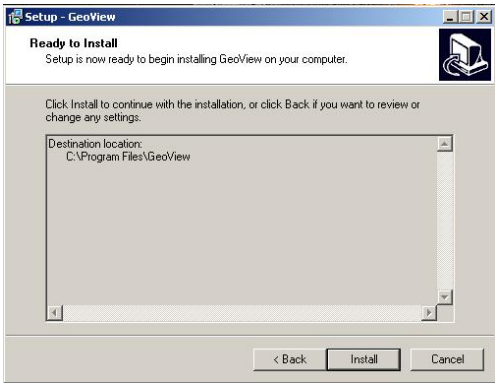


Figure 50: Folder and Installation Confirmation

An installation progress window, seen in **Figure 51**, will then be presented which is followed by a confirmation dialogue, seen in **Figure 52**. Selecting ***Finish*** completes the installation process.

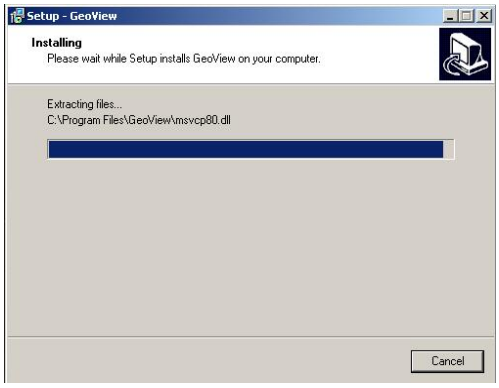


Figure 51: Install progress window

Figure 52: GeoView Installation Complete

4.1.2 GeoView Calendar Interface

To start using GeoView, double click on the software's icon which can be seen in **Figure 53**. When GeoView is first opened, a calendar is presented to the user, seen in **Figure 54**. This allows for the KT-10 v2 data to be organized by the date it was collected on, which allows for the quick retrieval of data from previous recordings.

Figure 53: GeoView Icon

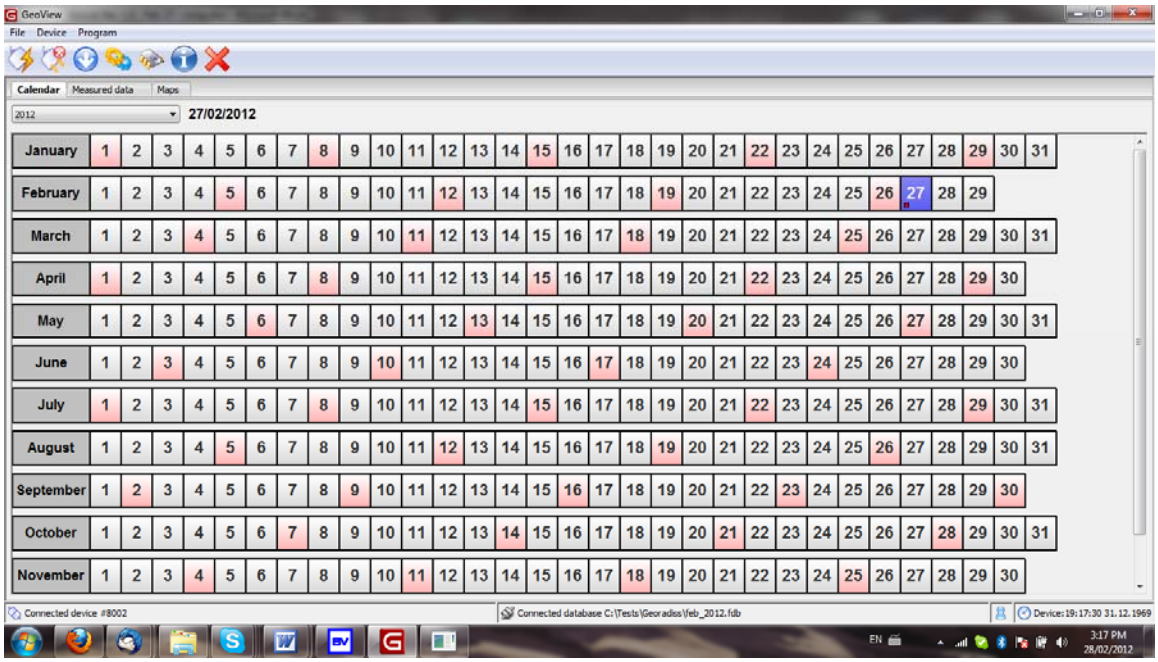


Figure 54: Calendar Interface

Let us get acquainted with the GeoView calendar interface. As is the case with most Windows software programs, there are menus located at the top row of the main window. On GeoView these are labelled ***File***, ***Device*** and ***Program***. Under each menu are several selections, which are outlined below in detail. Some of these selections that are used most often also have icons for quick access to the function. These are located directly below the menus and the associated icons are included below with the description of the selection.

Under the ***File menu*** you will find the following selections: ***Create local database, Open local database, Create remote database, Open remote database*** and ***Exit.*** The function of each selection is listed below.

Create local database: - This allows for the creation of a local database to store KT-10 v2 data into. The location and the name of the database are user definable but must be a location on your personal computer. One can use the default database name (.FBD) or choose a name for the database. Seen in **Figure 55** is the dialog for this task. Enter the desired name and then press the **Save** button when complete.

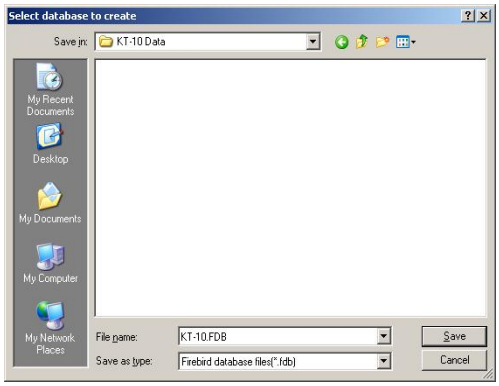


Figure 55: Create Local Database

Open local database: - This will open an already created local database which contains data from one or many KT-10 v2 units. Select the database file that you wish to work with and then select open.

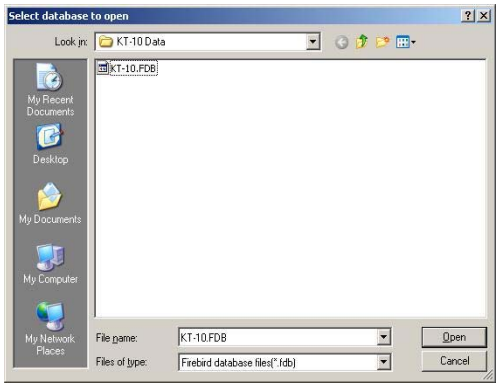


Figure 56: Open Local Database

Create remote database: - This allows for the creation of a remote database to store KT-10 v2 data into. The location and the name of the database are user definable and the

location can be on a server or networked PC. Enter the path and server name into the following box as seen in **Figure 57** and then press create when complete.

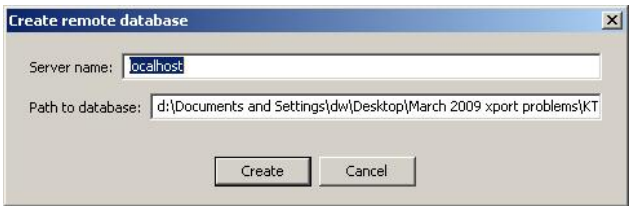


Figure 57: Create Remote database

Please note: The Firebird Super Server will have to be installed and setup correctly on the Server or networked PC which will hold the remote database. This must be completed for remote database option to work correctly, for further details please contact Terraplus Technical Support for assistance. Contact information can be found on the last page of this manual.

Open remote database: - This will open an already created remote database which contains data from one or many KT-10 v2 units. Fill in the server name, path to the database file and then press the open button to connect to the database.

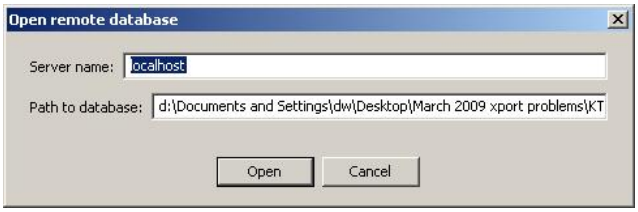


Figure 58: Open Remote Database

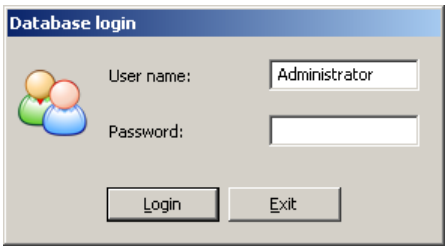


Figure 59: Remote Database Login

Exit: - Will exit the program. You will be prompted to confirm this selection seen in **Figure 60.**

Figure 60: Exit Dialog

Under the **Device** menu you will find: ***Connect device***, ***Disconnect device***, ***Download data***, and ***Device settings***. Each of the functions is listed below.

Connect device: **-** Connect your Personal Computer to a KT-10 v2 with a USB cable or via Bluetooth connection. There is also an icon for quick access to this function and it can be seen below

Connect to Device Icon

Disconnect device: **-** Disconnect your Personal Computer from a KT-10 v2's USB or Bluetooth connection, icon seen below.

Disconnect from Device Icon

Download data: **-** Begin the process to download data from a connected KT-10 v2, icon seen below. Further details on this can be found in section **4.1.4 Data download** on **Page 67**.

Download data Icon

Device settings: - Open the device settings window to make changes to KT-10 v2 operations, icon seen below. More details on device settings can be found in **Section 4.1.7** on **Page 76**.

Device Settings Icon

Under the **Program** menu you will find ***Options*** and ***About***, details for each selection can be found below.

Options: - This selection allows for additional fields to be added to the database. These new fields will be stored along with your KT-10 v2 readings. More details on this option are further explained starting on **page 71**. There is an icon on the main window for quick access to this function and it can be seen below.

Program Options Icon

About: - This shows program version, database version and is the location for performing a GeoView software upgrade. There is also a quick link icon to this feature and it can be seen below.

About Geoview Icon

Directly below the quick link icons you will see a pull down menu with a date beside it. This can be seen below in **Figure 60**. This allows you to switch between different years in the database. You will also notice two tabs, one labelled **Calendar** and the other labelled **Measured data** which are directly above the year. This will change the interface between the calendar view and the data view.

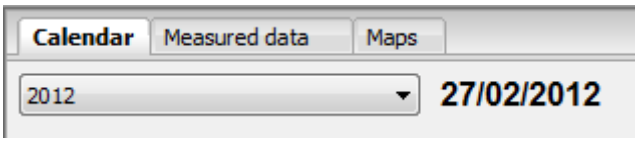


Figure 60: View Selection

Down at the bottom of the window you will also notice additional information being presented. This shows details on device and database connections along with system or device date and time and user credentials for database login. **Figure 61** shows an example of this portion of the screen.

Figure 61: Connections Status

To start adding data to the Geoview software, a database must be created for the storage of the KT-10 v2 data. This is accomplished by navigating to the file menu seen in **Figure 62** and then selecting either ***Create local database*** or ***Create remote database*****. (Most users will want to use the local database option)**

Figure 62: File Menu

A Windows file browser window will open, seen in **Figure 63**. Select the location and file name for the database file. Select **Save** when finished.

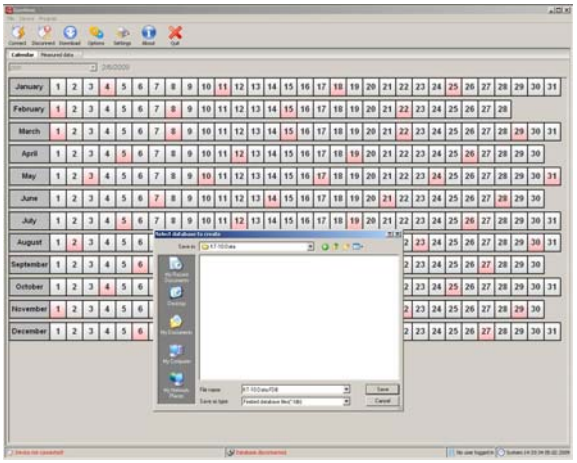


Figure 63: Database Creation Dialogue

You will notice at the bottom of the main window that a database connection is now shown.

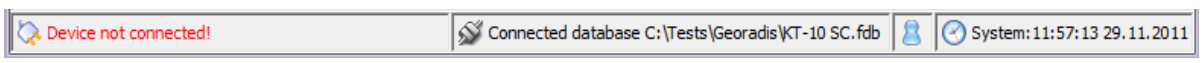


Figure 64: Database Connection Updated

4.1.3 GeoView Data Interface

Switching to data view changes the bottom three quarters of the screen only, with all icons and menus still available while in the data view or calendar view. To switch back to the calendar view, select the **calendar** tab directly above the displayed date. Below this you will see the data view window and we will now get familiar with this part of the interface.

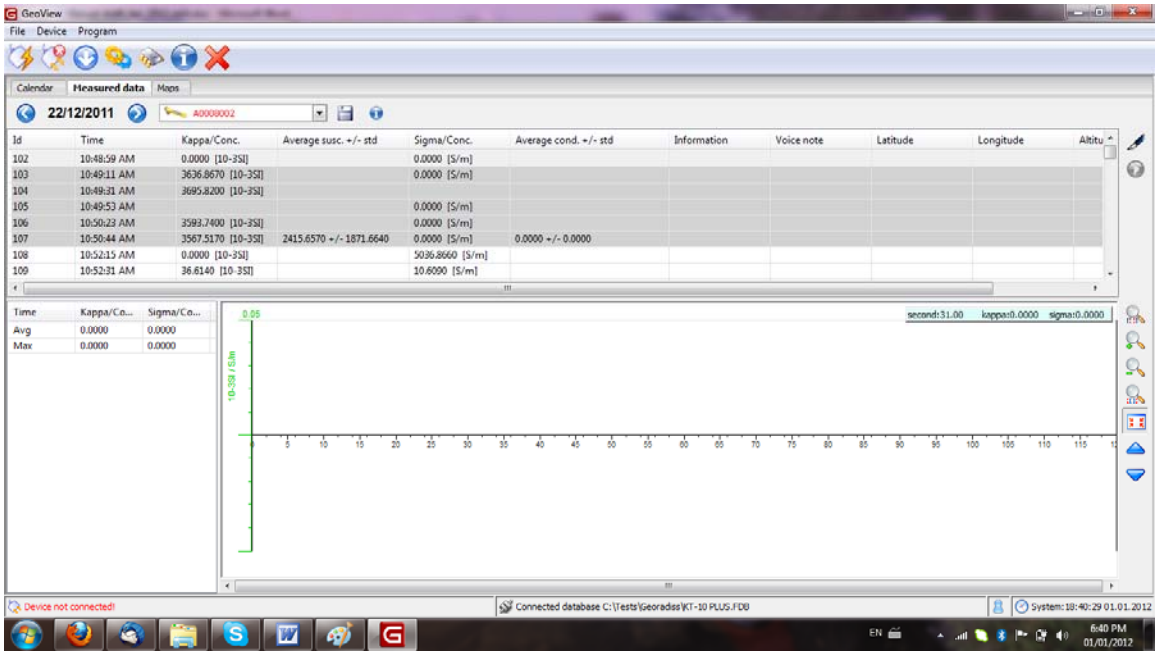


Figure 65: GeoView Data View

Directly below the **Measure data** and **Calendar** tabs is where you will start to notice the changes to the interface. The displayed date has two buttons on either side of it. These two buttons allow for you to move forwards and backwards through the calendar while remaining in the data view display. **Please note:** Only days that contain data for the serial number shown will be viewable. To the right of the date you will see a pull down menu which contains a serial number list of unit's with data being displayed. If you have data from other units on the same day this is where you would change between the different units. Pull the menu down with a left click of the mouse and all serial numbers that contain data for that day will be displayed. Select the serial number you wish to view the data for, with a left click of the mouse.

Following the unit serial numbers drop down box is an icon which is used to export data from GeoView to an ASCII format for use in another database system or spread sheet program.

4.1.4 Data Download

Once you have the database created and connected, you can then download data from your KT-10 v2 and store it on your PC. To accomplish this, connect your KT-10 v2 to your PC via the USB cable provided or by performing a Bluetooth pairing between your PC and KT-10 v2 unit. Use the Device menu and select **Connect device** or press the icon to connect the KT-10 v2 to the GeoView software. A window will open prompting you to select the method and serial number for the unit you are connecting to.

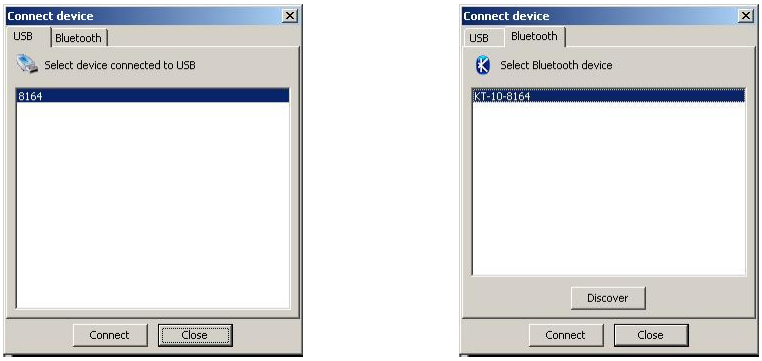


Figure 66: Connection dialog - USB & Bluetooth

The tabs at the top of the window are used to select either a USB connection or Bluetooth connection. The unit you have connected to your Personal Computer will show up in the list. In the case of a Bluetooth connection, you may have to use the discover button to bring the serial number up. Select a serial number from the list with a left click of the mouse, which will cause the listing to be highlighted, then press the connect button at the bottom of the window.

Once the KT-10 v2 is connected you will notice the bottom of the screen will be updated with the KT-10 v2 unit's serial number, as seen in **Figure 67**.

Figure 67: KT-10 v2 connection Updated

You may then proceed by pressing the download button icon  or use the **Device** menu and select **Download data**. When the download process starts the following window shown in **Figure 68** will be presented.

Figure 68: Synchronising with Device

GeoView will synchronize with the KT-10 v2 to determine how much data is on the device that is also not currently in the GeoView database. At this point the data will be downloaded and the dialogue box display will show the details of the operation. The display will change depending on which type of readings is being downloaded. The **record # / total # of records** will be presented when data is being downloaded and **Downloading note** # will be displayed when downloading a voice record. The Unique record ID will be used for referencing voice notes to the recorded readings.

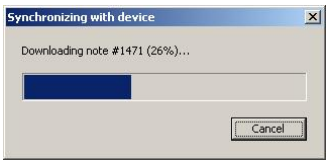


Figure 57: Downloading voice note

Figure 58: Downloading Records

When all the data has been downloaded from your unit you will be presented with a small window confirming data transfer is complete.

Figure 69: Download Complete

When data is loaded into the GeoView database, the day in which data is stored on will change its color to indicate that data is present for that day. When the cursor is over that day an icon  will be shown for the instrument and the serial number will also be present. If multiple instruments are used on the same day these are also separated and a list of serial numbers will be presented on that day.

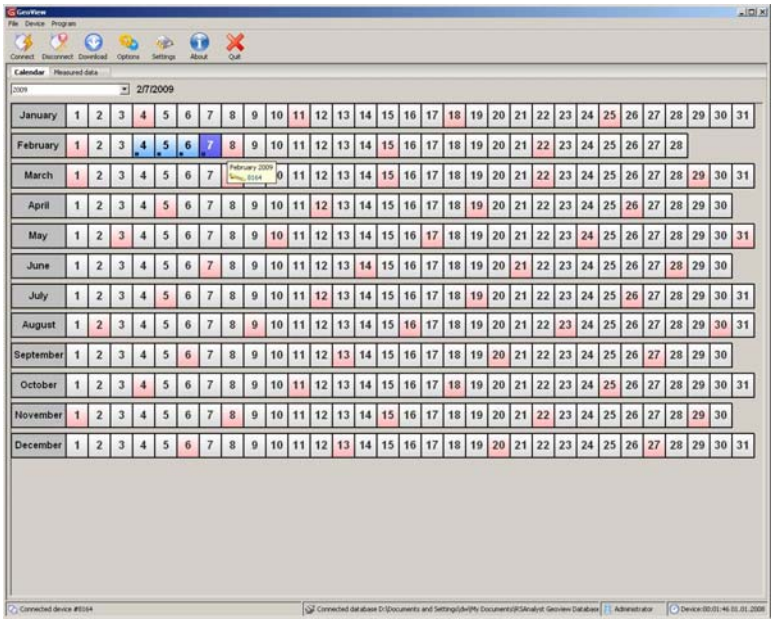


Figure 70: Calendar with Data Populated

To view the data on any of the days, double click on the day or click once on the day and select the M**easure data** tab.

4.1.5 Data Export

When the  icon is pressed, the window of **Figure 71** will open. This dialogue is used to select the data that is to be exported over a definable period of time and to which location.

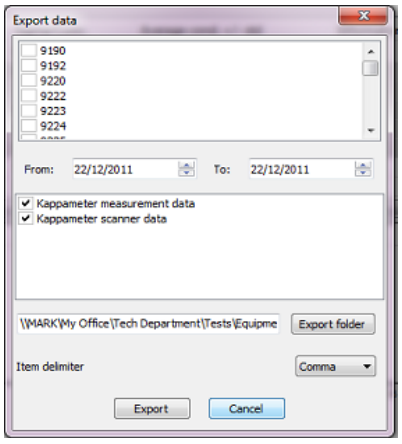


Figure 71: Data Export

A list of units in the database will be presented with a check box beside each unit serial number, populate the box for each unit the data is to be exported from. Then select a date range, if desired, and choose the folder location for the data to be exported too. Make sure to select your preferred delimiter. When selecting the export folder button a windows explorer window will open to choose the location, seen in **Figure 72**. Select a location and then press **OK** then the **Export** button to complete the task.

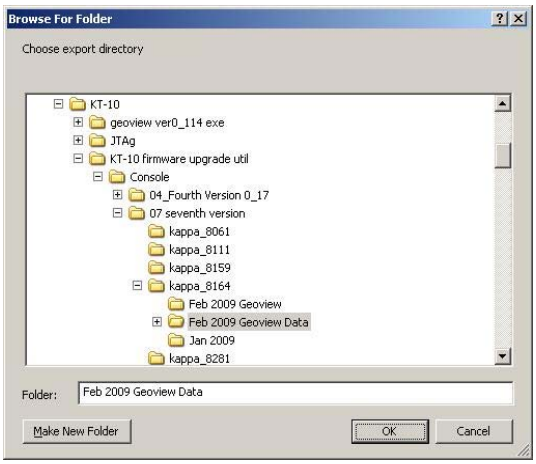


Figure 72: Data Export Location Window

The final icon on this row is used to add notes or information to the day. These will be displayed directly to the right of this icon when populated.

Over on the right hand side of the window you will notice two more icons. This icon is used to edit the custom fields in the database for the record that has been highlighted in the display. This icon is used to play the voice notes associated with a data record.

Please note: This  icon my not appear until a record with a voice note is available in the database and will remain " greyed out " until voice records are available in the database.

The upper portion of the data view window shows the data in numerical format which contains column headers to define what each value represents. **Measure** and Scanner data will be displayed in this manner and will have the following fields by default.

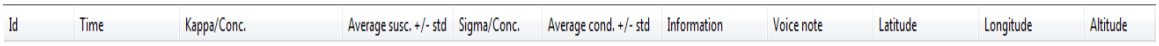


Figure 73: Default Database Field Names

Custom fields can be added to the database which will be appended to the end of each reading this information will also be exported along with the stored KT-10 v2 data. There are three types of data that can be added to the database and these are: Integer numbers, Real numbers and String data. Each data type has a name and a description associated with it and the user must define these when setting up the custom fields. With the numerical data you also have the ability to add a range of acceptable values, with values outside this range being rejected at entry. To add custom fields to the database select the **options** under program menu or select the  icon. This will bring up a dialog box for adding fields to the database, which can be seen below.

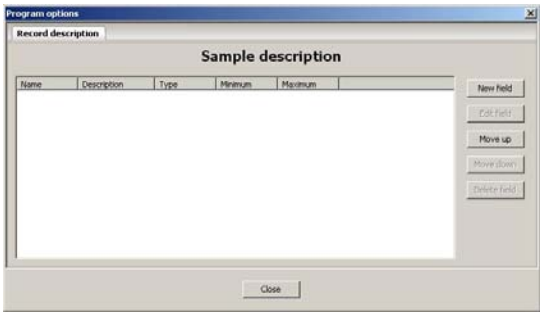


Figure 74: Enter New Field into Database

This dialog will list all fields that have been added to the database. To enter a new field select the New field button on the right of the window. This will open another window to select the type and particulars to the field, seen in **Figure 75.**

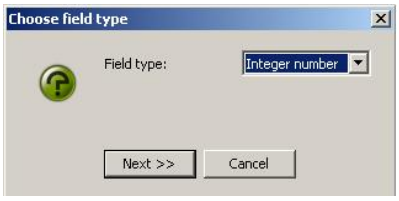


Figure 75: Field type Selection

Select the field type from the pull down list and select next. The next dialogue window will allow for you to enter the particulars for the field depending on the type selection. The different windows can be seen in **Figures 76, 77, and 78**.

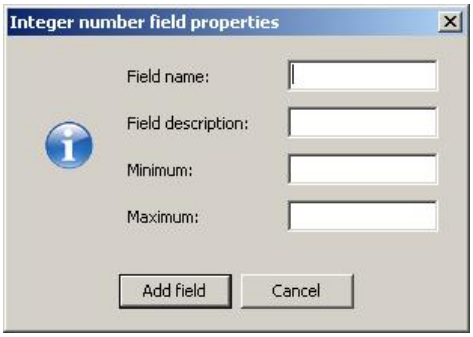


Figure 76: Integer field setup

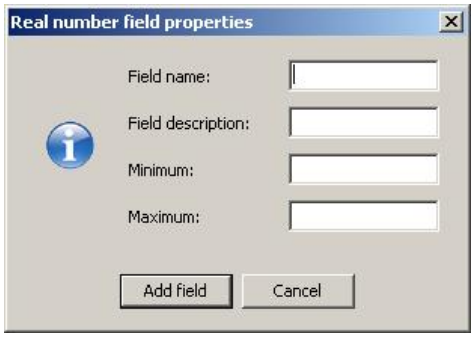


Figure 77: Real number field setup

Figure 78: String Setup

Give the field a name and brief description, for numerical values provide the range of valid entries. When complete, select the **Add field** button at the bottom to complete the task. Repeat these steps for each new field that is to be added to the database.

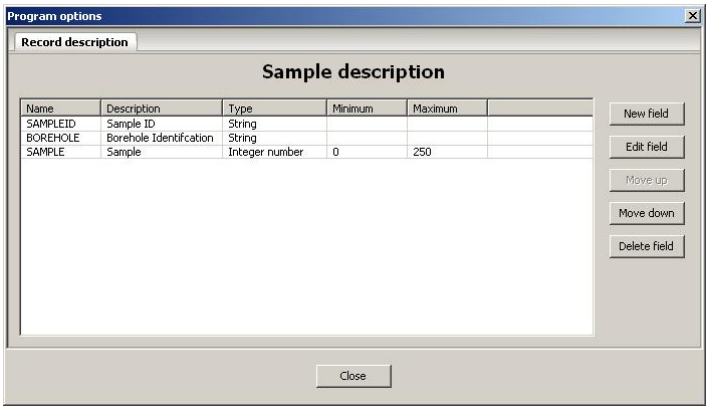


Figure 79: Custom Fields added to GeoView Databae

Once you have added the fields into the **Program options** window, press the close button at the bottom and the database will be updated with the new fields. The new fields will be appended to the end of the default columns. This can be seen in **Figure 80.**

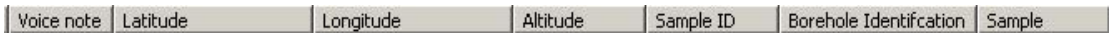


Figure 80: New fields added to the end of the columns

The custom fields can also have their location in the database listing moved but they will always be at the end of the default columns. Use the **Move up** and **Move down** to change the location of the fields in the database. **Edit field** will allow you to change the description and number range for a field. The field name cannot be changed when stored. To remove fields use **Delete field**, a confirmation window will be presented to confirm the deletion of the field.

Scanner records will also be listed in the upper numerical display and are blue in color. The values are given in the bottom left hand corner of the screen, only when a scanner record has been highlighted. When selected, the scanner record will also be plotted in the graph window directly to the right of the numerical display. This can be seen on the following page, **Figure 81**.

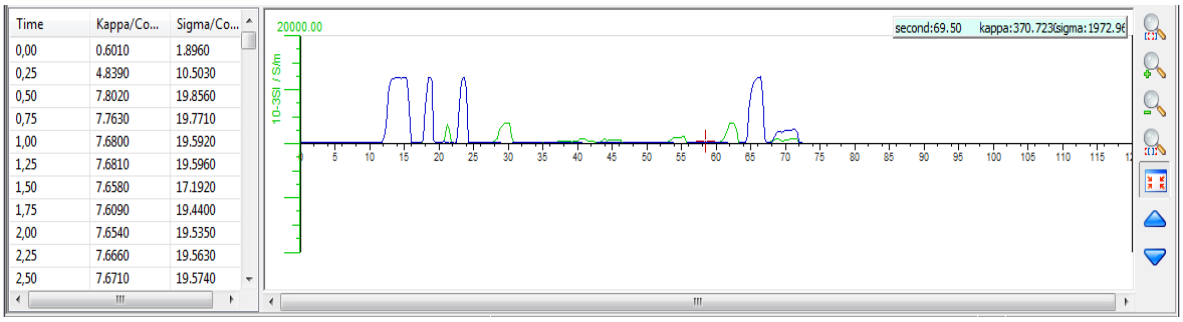


Figure 81: Scanner Data Plotted & Charted

To control the scanner graph use the icons to the right of the graph window, seen in **Figure 81** and **82**. There are four zoom function buttons, and three scale buttons.

The first of the zoom buttons, which is located at the top of the graph control pane, is used to zoom on a selected section. To use this feature click on the icon then navigate your mouse pointer to the section of the graph you wish to zoom in on, left click and hold the button down while dragging the mouse to the end of the section you wish to zoom to. When you release the mouse button the section highlighted will be seen as the entire graph plot. An example of this can be seen below in **Figure 82.**

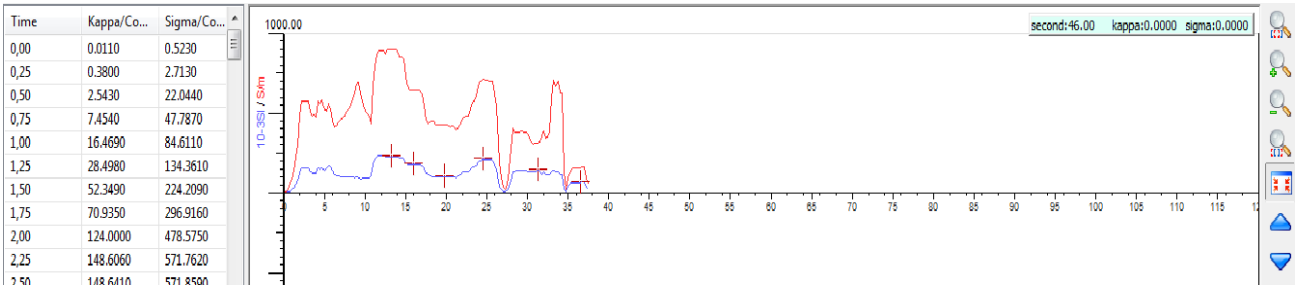


Figure 82: Zooming on Scanner Graph

The next two buttons are for zooming in and out. Left click on the button to increase the zoom level and left click on the button to decrease the zoom level.

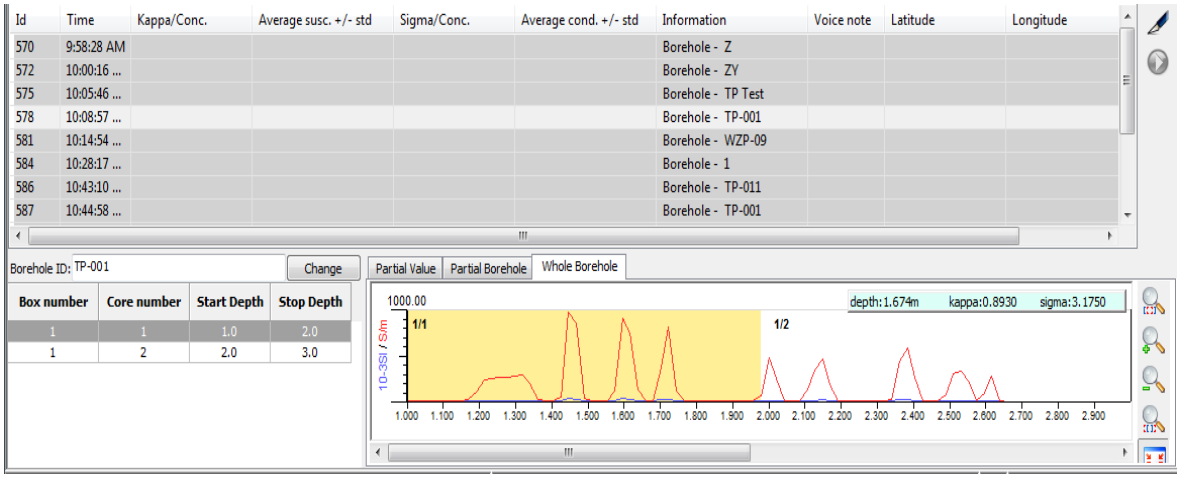
To reset the zoom level to default and look at the entire scan record, use the button.

To apply an auto-scale to the plot, which is the default view, use the button. To increase the scale use the button and to decrease the scale use the button.

Markers entered while scanning samples are presented in the plotted data and are visible in the numerical data as well. The numbers that are in red are denoted as a marker and in the plotted data the graphical representation of the marker is seen here as a cross.

4.1.6 Borehole data display

Scanner Data: The screen capture below shows example data set collected using the Borehole mode.



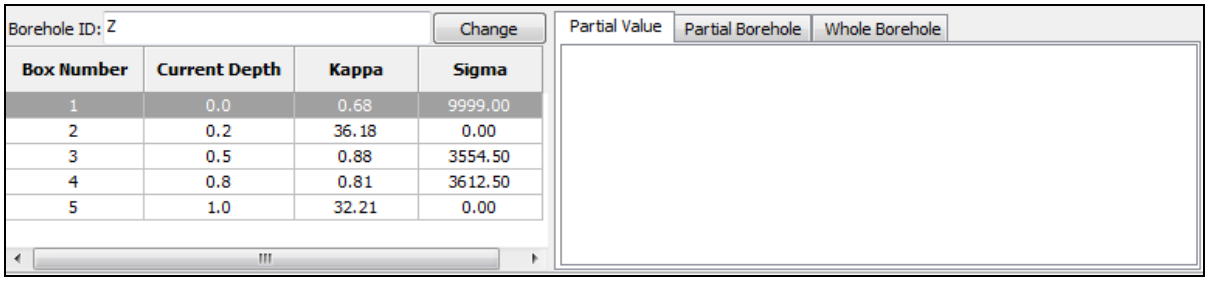
Along with the scanner graph, the GoeView shows the Borehole parameters such as the Borehole ID , Box Number, Core Number, Start & End depth of each scanned cores. The Borehole ID can be edited by clicking on the "Change" button.

Partial Value: Shows numerical value of a scanned core in time

Partial Borehole: Shows graphical view of a single scanned core in time

Whole Borehole: Shows graphical view of the entire cores or records collected for a given borehole. The graph is plotted with depth information.

Discrete mode (Measure mode)



For the discrete mode, the displayed data parameters are the core box number, depth, and the reading values for susceptibility and conductivity. The borehole ID and the data filed are editable. Clicking on the data field will unlock the field for editing. Please note that changes made into the GeoView database are not updated in the KT-10 v2.

4.1.7 Device Settings

Entering the Device options, allows for settings on your KT-10 v2 to be changed or saved. The KT-10 v2 will have to be connected to the PC for this menu to be accessible. Settings that can be changed with this menu are as follows: Sound, PC Authorization, GPS Pin, GPS, Shutoff timer, Automatic voice note replay, Battery selection and Time synchronization. Below you will see the window that is used to make these changes. This also allows for this information to be saved to a file for later use or loaded from a file to be sent to the KT-10 v2. With the exception of the GPS PIN setting each will only have two options available. The GPS PIN setting should be used when a Bluetooth GPS is to be used with the KT-10 v2 and has a documented PIN (Pairing Identification Number) or (Personal Identification Number). Consult with the documentation for your GPS to find this PIN and enter the number in the box provided. When all settings are changed to your preferences use the **Write to Device** at the bottom of the window to update the KT-10 v2.

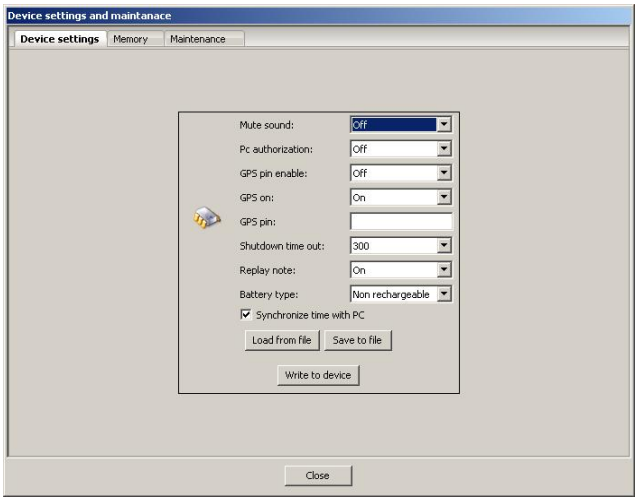


Figure 83: Device Settings

The Memory window will show the readings currently stored on your KT-10 v2 and allows for individual readings to be deleted.

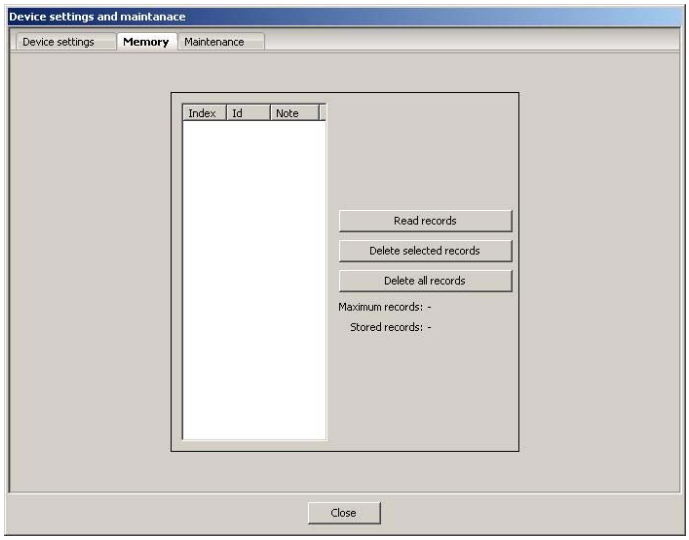


Figure 84: Memory Functions

Select the read records button to have GeoView list all readings currently stored on your KT-10 v2. Highlighting a record and pressing the delete record, will remove it from the meters's memory. Delete all records will format the complete memory on the KT-10 v2 and all data will be lost.

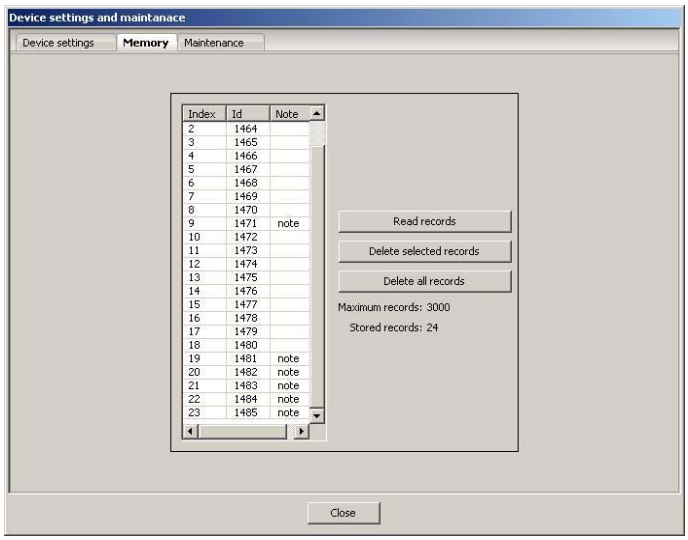


Figure 85: Memory Read

The Maintenance window has a firmware upgrade process and an additional assistance method which can be used to assist persons in the field to correct issues that may be un-foreseen. Session to maintainer is used for just this purpose. This will send the parameters file from the KT-10 v2 unit to the manufacturer for further analysis and possible

correction. This file can then be sent back to the end user to correct issues that maybe present.

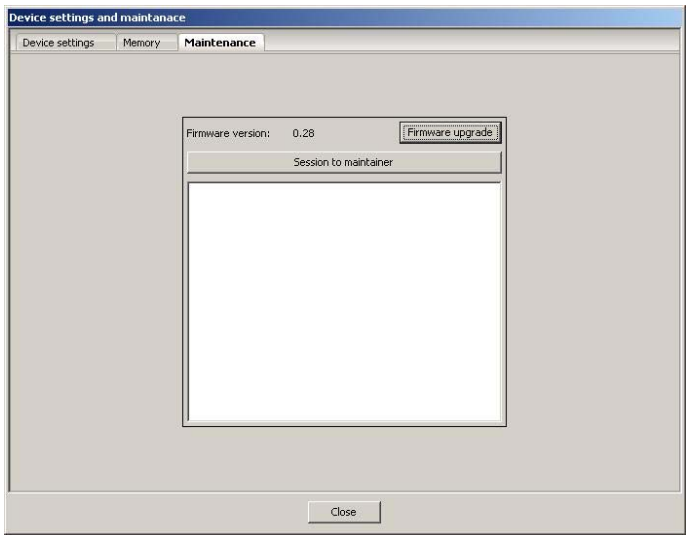


Figure 86: Maintenance

4.1.8 Firmware Upgrade

Firmware upgrade utility permits the user to install new firmware on their KT-10 v2 Firmware update allows the end user to enjoy new software features and/or correct any bug in the current firmware.

CAUTION: Failure to follow the upgrade instructions exactly could render the unit inoperative, requiring an RMA and a return to repair. Please follow the upgrade instructions explicitly.

When selecting ***Firmware Upgrade, as seen in figure 86,*** you will be presented with the following screen seen in **Figure 87**, select ***Next>*** to continue the installation or ***Cancel*** to exit.

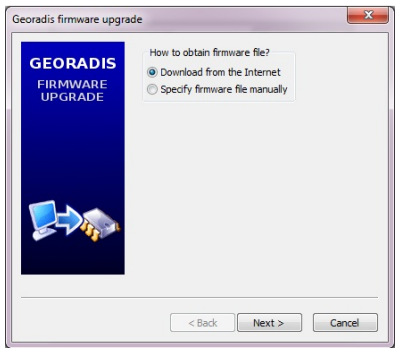


Figure 87: Firmware Upgrade Wizard

You may select Download from the Internet, and then press **Next >.**

The wizard will automatically query the Georaids' web site. If it finds a firmware that is newer than what is currently on your KT-10 v2, it will be downloaded.

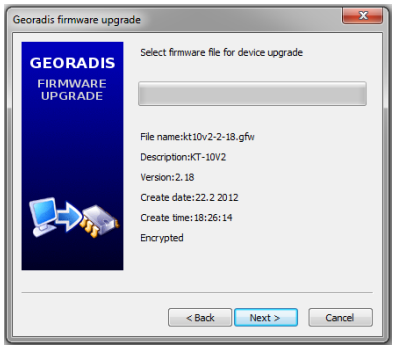


Figure 88: New Firmware Downloaded

Press **Next>** to continue

The utility will erase the current firmware and upload the new firmware on to the unit.

Figure 89: Firmware Uploaded to KT-10 v2

Press **Next >** to continue

You should see FW UPGRADE displayed on the KT-10 v2's display as seen in the Figure 90. It is very IMPORTANT not to disturb the unit during the upgrade process.

Figure 90: FW Upgrade screen

Upon successful upgrade, the KT-10 v2 will re-start.
You may then press the press **Finish** button to exit the firmware upgrade wizard.

Figure 91: Firmware Update Complete

4.2 KT-10 v2 Console – Geomon (not supplied)

The console program is called Geomon and is available for changing advanced parameter setting in the KT-10 v2. Some of the advanced parameter setting includes set or enable KT-10 v2 for re-calibration, read current calibration parameters, download measurement logs in text format, as well as it is used in advanced troubleshooting of the KT-10 v2.

Caution: Making changes without complete understanding or guidance from Terraplus Technical Support may result in incorrect operation of the KT-10 v2.

IMPORTANT: The KT-10 v2 console program cannot be executed directly from a CD-ROM. Please copy the console files(s) to local hard-drive of your laptop or desktop.

To install the console program run geomon.exe by double clicking on it. When the installation wizard starts the following security warning screen will be presented as seen in **Figure 92**.

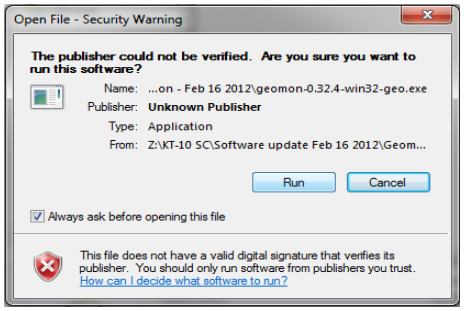


Figure 92: Console Installation Wizard

Select, **Run** to continue…

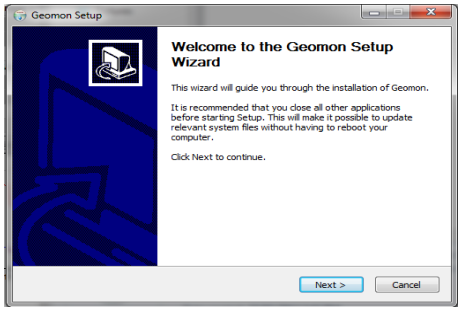


Figure 93: Geomon Setup

Select, **Next >** to continue…

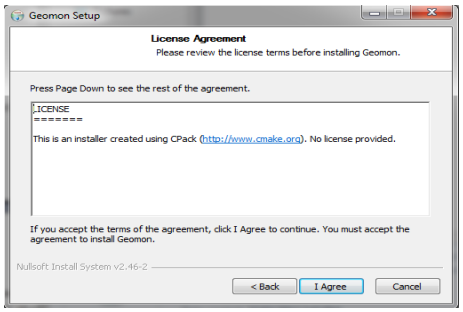


Figure 94: Licence Agreement

Select, **I Agree** to continue…

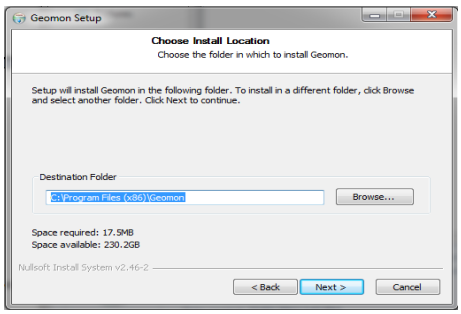


Figure 95: Destination folder

Select different destination folder if desired or click **Next >** to continue…

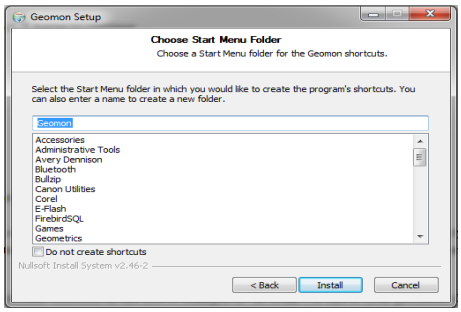


Figure 96: Start Manu folder

Select Start Menu Folder and then select "**Install**"…

To launch the Geomon, double click on the Geomon short-cut icon placed on the desktop or run it from the programs menu. **Figure 97** shows the Geomon software running.

Figure 97: Geomon

The buttons in the menu bar are as follow:

Figure 98: Connect device

Figure 99: Disconnect device

Figure 100: About

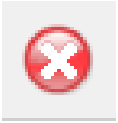


Figure 101: Quit application

To connect KT-10 v2 to Geomon;

1. Connect KT-10 v2 via the USB cable. Ensure that the GeoView software is not presently running.
2. Click on the Connect Device button as seen in **figure 98**.
3. Select device window will open up as seen in the figure below.

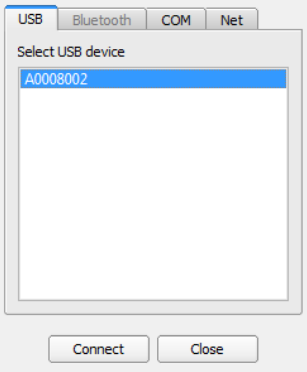


Figure 102: Select USB device

4. Highlight the serial number of your device in the box and then click on Connect. The following screen will appear as seen in the figure below. If the USB connection is successful, the status window, at the bottom of the window, will show device connected.

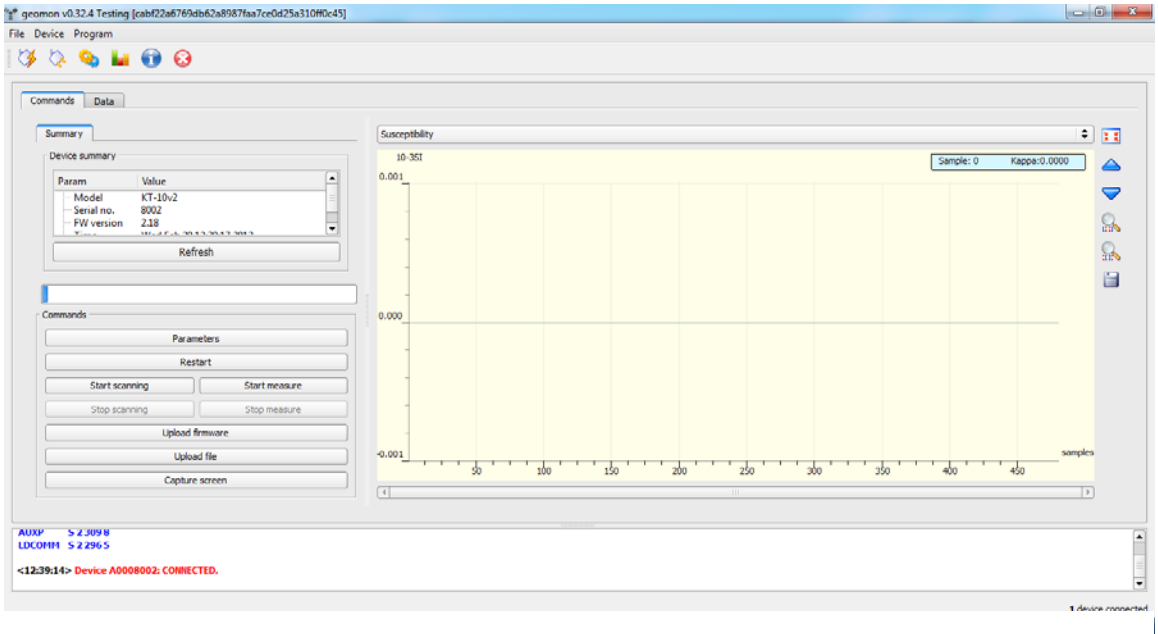


Figure 103: KT-10 v2 connected

Once the meter is connected, then the user can select between Commands or Data tab, as shown in figure below.

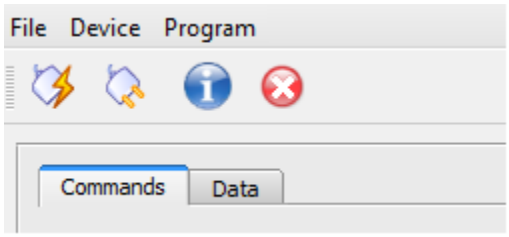
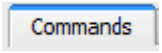
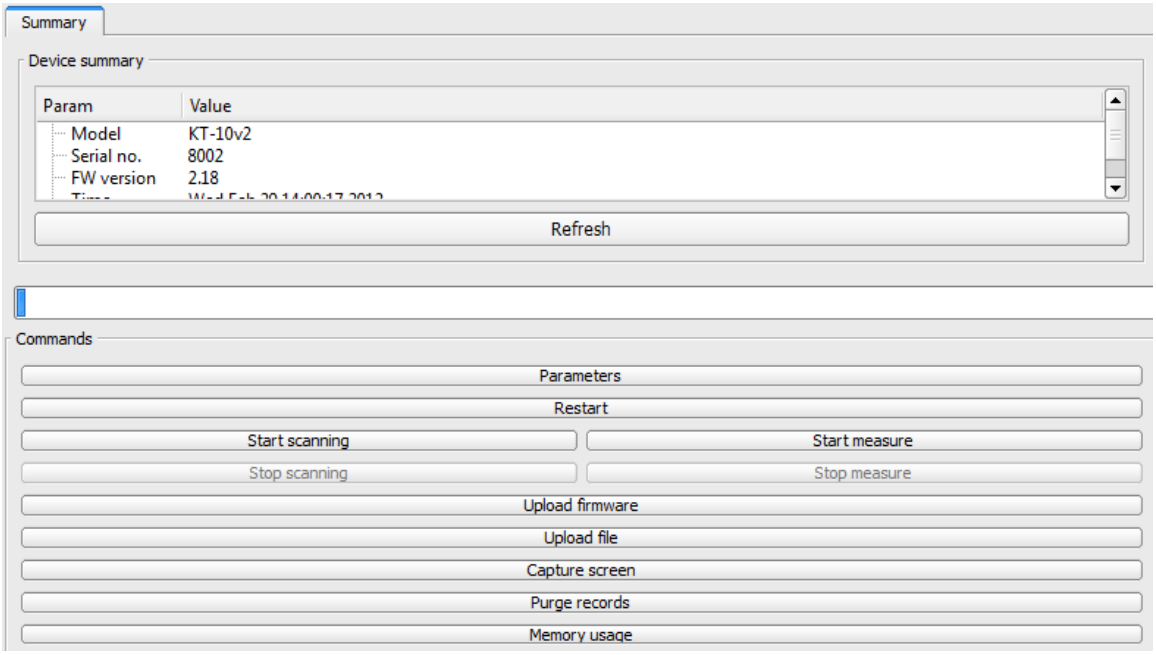


Figure 104: Geomon tab

The  tab offers the following:



Device Summary: lists information such as serial number, firmware version and model type of the meter that is connected.

Refresh: updates the summary window

Parameters: allows user to set device parameters, enter calibration value and so on…

Restart: re-starts the meter

Start scanning: starts scanner measurement

Stop scanning: stops scanner measurement

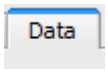
Start measure: activates measurement sequence

Stop measure: stops measurement sequence

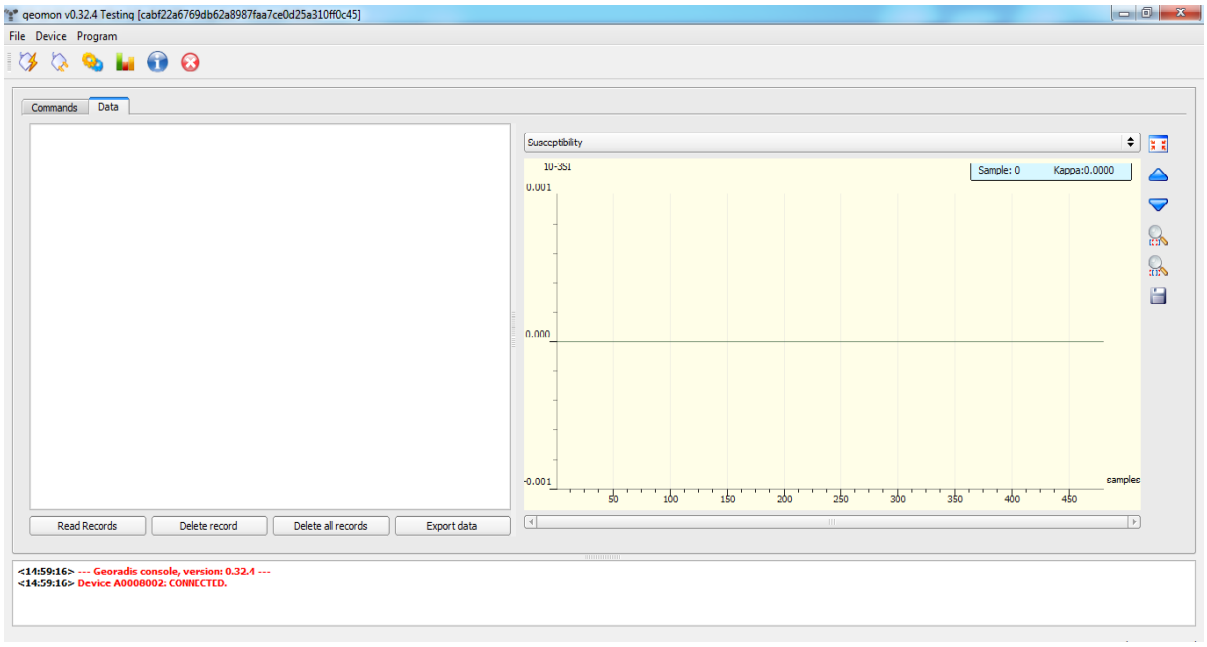
Upload firmware: permits user to upload firmware on the KT-10 v2 as described in the section **4.1.8** on **page 78**.

Upload file: to upload .tar files on the internal memory of the KT-10 v2

Purge Records: permanently deletes records from the unit

The 

tab:



Read Records: reads all records on the device

Delete record: deletes individual record that is selected by the user

Delete all records: deletes all records on the device

Export data: Exports data set in text format

Chapter 5

KT-10 v2 – Bluetooth Connections

5.l PC Connections

The KT-10 v2 also has the ability to connect to the PC via Bluetooth, if your PC is Bluetooth capable. If you have the Bluetooth icon in the system tray of your PC you will have Bluetooth connectivity.

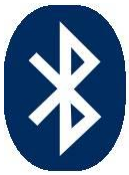


Figure 104: Bluetooth Icon

By right clicking on the icon you will receive the menu below

Figure 105. Add a Device

Select **Add Bluetooth Device** and the following window will be seen.

Figure 106. Bluetooth Wizard

Check the box **My device is set up and ready to be found**, and then select **Next**

Figure 107: Search for Device

Allow the Bluetooth search to finish, seen above. When it has completed the following screen will be presented. Select the KT-10 v2 with the correct serial number and choose N**ext>**

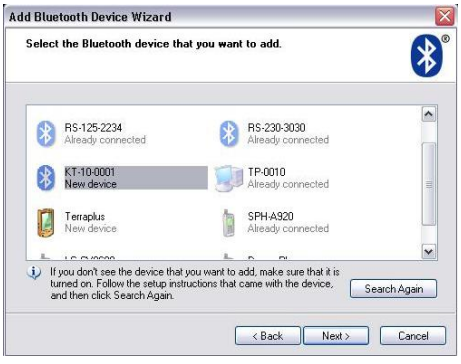
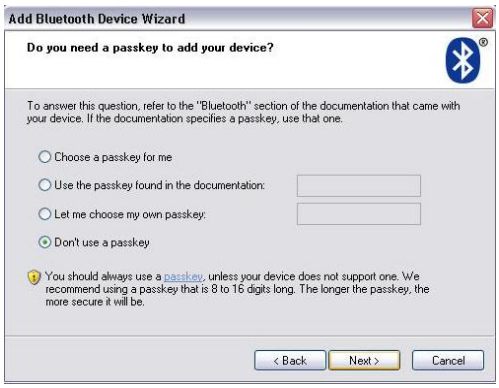


Figure 108: Select Device

No passkey is needed for the KT-10 v2 communications.



Bluetooth Passkey

The KT-10 v2 will then be connected to your PC.

Installing Bluetooth Device

When completed, you will be presented with a list of the ports associated with the KT-10 v2 Bluetooth connection.

Figure 109: Installation Complete

Finally, if you right click on the Bluetooth icon in the system tray and select show devices, the KT-10 v2 will now be listed.

Figure 110: Confirm Bluetooth Device

Further details on connecting the KT-10 v2 via Bluetooth to the GeoView software for Data Download is found in section 4.1.4 on Page 67.

5.2 GeoVision – Real Time Profile for Android Smartphone

(Standard with KT-10 S/C)

The GeoVision app can be paired with the KT-10 v2 to display real time scanner profiles on Android operated smart phones and tablets. Real time animated graphical outputs are displayed on the smart phone's screen when scanning. The GeoVision can also be used as a KT-10 v2 memory data browser to display field measurements/records, allowing the user to pan and zoom on the scanner graph. Additional text notes can be added to the current or previously stored data with an Android smart phone or tablet.

5.2.1 GeoVision - Installation

Important: The software requires Android OS 2.3.3 or higher

The GeoVision installation file, geovision.apk, is located on the KT-10 v2 Utility CD - inside of the Android folder.

Downloading the software onto your Smartphone;

1) Connect your phone to computer via the USB in Mass Storage mode

2) Once connected to computer, your phone's memory will appear as Removable Disk(s) - phone's internal memory or external SD card;

3) Copy the geovision.apk installation file into 1 of the 2 memory space available on your phone.

4) Once copied, disconnect the phone from the computer

Installing the software on your Smartphone;

1) Select Applications from the main menu 

2) Select My Files or any suitable file browser utility installed on your phone to browse to the geovision.apk file copied earlier.

Figure 111: GeoView Install file

3) Tap on the geovision.apk to being installation.

4) You will be then asked to confirm if you wish to install the application, confirm it by selecting the "Install" button.

Figure 112: Confirm Installation

5) After the successful installation of the application, you may either select Open or Done. Selecting "Open" will launch the GeoVision application on your device.

Figure 113: GeoVision installed

5.2.2 GeoVision – main menu

Figure 114: GeoVision menu

The main menu lists 3 selections and they are:

Scanner — Initiates real time scanner profile measurement on the KT-10 v2 if the meter is paired with GeoVision.

Browse — Allows an operator to review data stored in the KT-10 v2's memory. Operator can then view any records or attach text note using the keypad of the mobile phone.

Connect — Connects GeoVision to the KT-10 v2 via Bluetooth.

5.2.2.1 Connect / Disconnect

To connect GeoVision to the KT-10 v2:

1. Tap on the Connect button.
2. If your phone is not currently paired with any Bluetooth device, you will be provided with selection to Scan for Bluetooth device as seen in the figure below.

Figure 115: Scan for device

3. Tap on Scan for devices button.
4. When the scan is completed, a list of Bluetooth device will be populated as seen in **Figure 116**.

Figure 116: Device selection

5. Find and select your KT-10 v2 from the list by taping on the device's name.

6. When the GeoView is successfully connected to your KT-10 v2, the following screen can be seen momentarily – indicating that the device is connected.

Figure 117: Device connected

Please note that the Connect button is now replaced with Disconnect. Also, the Scanner button is now active.

To disconnect your KT-10 v2 from the GeoVision / mobile device;

Simply tap on the Disconnect button. When disconnected, the following screen will be displayed momentarily and the Disconnect button will be then replaced with Connect.

Figure 118: Device disconnected

5.2.2.2 Browse

To browse previously stored data on the KT-10 v2, tap on the Browse button. It takes a few seconds for the GeoVision to read all of the data from the KT-10 v2. When the reading of data is completed, a device log will be populated as seen in the figure below.

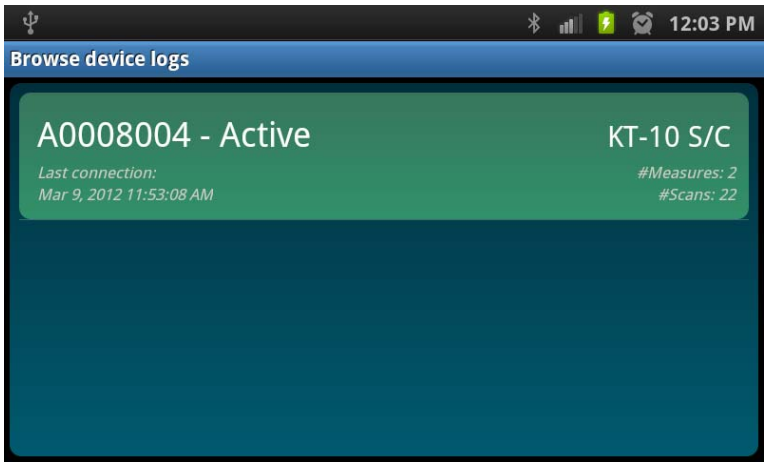


Figure 119: Device Log

Note: Phone

In the figure 119, the serial number of the paired KT-10 v2 as well the number of stored records for Measure and Scanner is displayed.

To browse stored data, tap on the serial number of the KT-10 v2. A new screen, as seen in Figure 120, will be displayed listing records under Scanner and Measure tab.

Figure 120: Data preview

To view Scanner records, select Scanner in the main header and then scroll up or down to browse different scanner record.

As seen in **Figure 121**, the scanner record is consist of Average and Max value of Susceptibility & Conductivity, Duration in # samples recorded, and the time when the measurement was saved on the meter.

Figure 121: Scanner record explained

Note: In the scanner mode 20 samples per seconds are collected. Of the 20 samples, 5 are averaged together, total of 4 samples are stored per second. The maximum number of samples for full scanner duration is 120 seconds x 4 = 480.

To preview a scanner graph, tap on the record of your choice. The scanner graph will be previewed as seen in the **Figure 122** below.

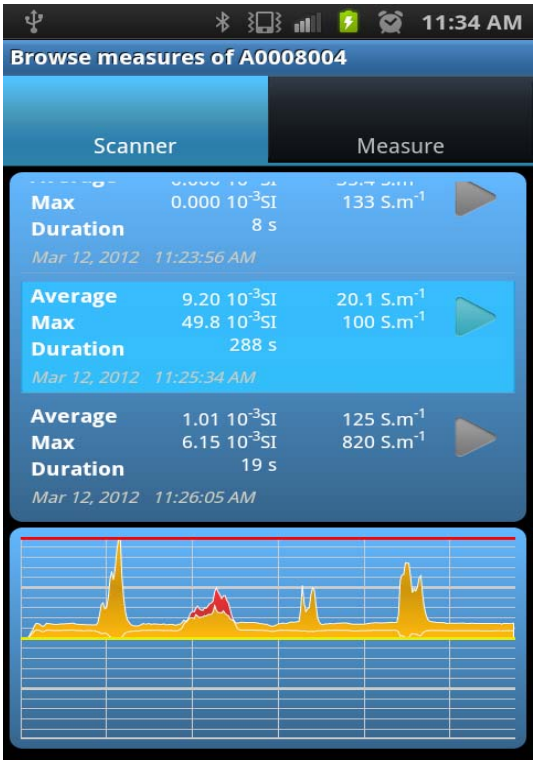


Figure 122: Scanner data preview

Tap on the scanner graph preview area to see the record in full size.

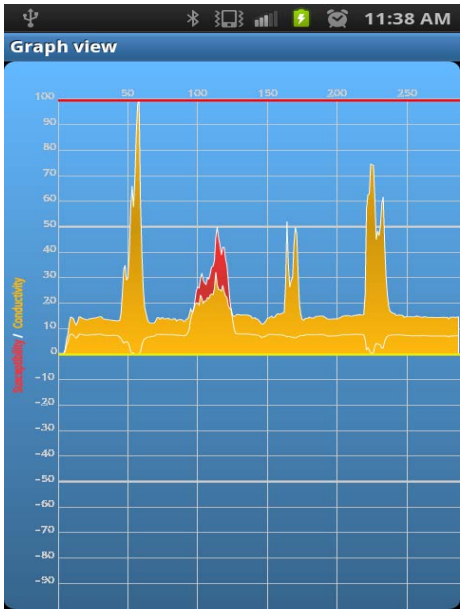


Figure 123: Scanner record full size (Portrait view)

Figure 124: Scanner record full size (Landscape view)

5.2.3 Graph Scale

To set/change graph scale, tap on the menu button  of your mobile phone. A new menu with scale options will be open up as seen in the figure 125 seen below.

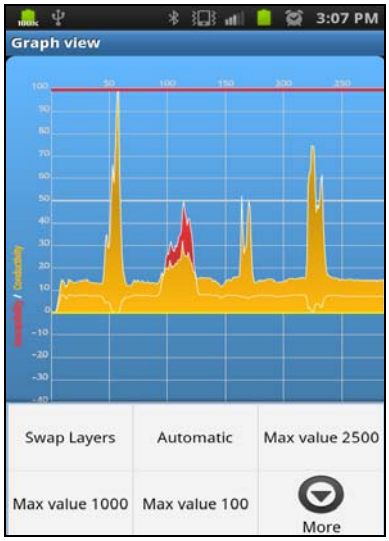


Figure 125: Adjust scale – pull menu

Swap Layers:

Changes the way the graph is displayed. Normally, the graph of the Conductivity is displayed in the foreground and susceptibility is displayed in the background. By swapping layers, the graph of susceptibility is now placed in the foreground and conductivity is moved to the background.

Automatic:

Sets automatic scale for the graph (Y axis) to ensure displayed graph is easier to read.

Max value 2500:

Sets the maximum scale value of the Y axis to 2500. Scanner record with readings over 2500 will be clipped.

Max value 1000:

Sets the maximum scale value of the Y axis to 1000. Scanner record with readings over 1000 will be clipped.

Max value 100:

Sets the maximum scale value of the Y axis to 100. Scanner record with readings over 100 will be clipped.

Tapping on the More button will show more options to set the Y axis scale.

Max value 10:

Sets the maximum scale value of the Y axis to 10. Scanner record with readings over 10 will be clipped.

Max value 1:

Sets the maximum scale value of the Y axis to 1. Scanner record with readings over 1 will be clipped.

Max value 0.1:

Sets the maximum scale value of the Y axis to 100. Scanner record with readings over 0.1 will be clipped.

In the Figure 126, the function “Swap Layers” is used on the display to show the same graph as shown in Figure 125.

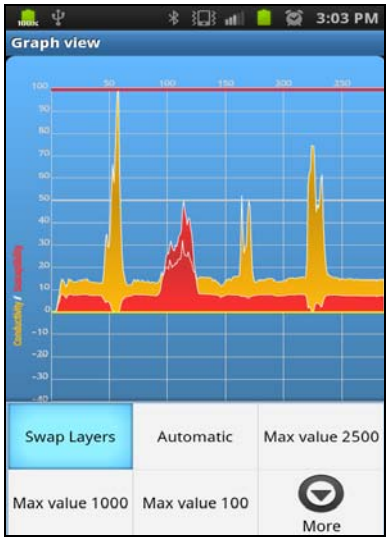


Figure 126: Swap Layers

5.2.4 Zoom / Pan

To **Zoom** into the graph, simply place your two fingers on the area you would like to zoom into and then separate the two fingers away on the screen. This pinching out of the two fingers for zoom can be done on both the Y and X axis.

To **Pan** into the graph, simply place your two fingers on the area you would like to Pan into and then bring the two fingers closer on the screen. This pinching in of the two fingers for Pan can be done on both the Y and X axis.

5.2.5 Delete data

If you highlight and hold on a measurement record (both scanner/measure) you will see a menu pop up for deleting record. By tapping on Delete record will delete the selected record from phone's memory as well the meter if there is an active Bluetooth connection between the meter and the GeoVision.

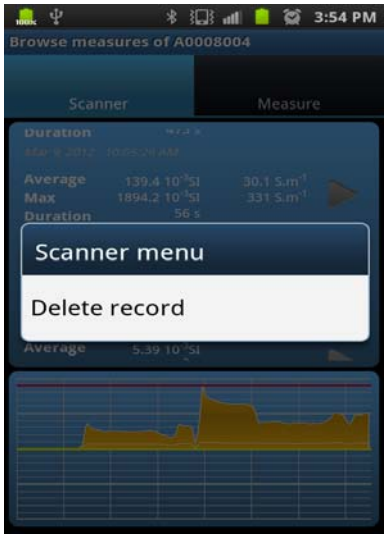


Figure 127: Delete record

Chapter 6

Troubleshooting

6.1 Notes about Switching OFF.

Like other instruments that are based on a microcomputer core, the KT-10 v2 meter may be sensitive, in some specific circumstances, on external distortion (strong electromagnetic field, discharge) and may show improper operational behaviour. The most common symptom is no reaction on any of the button presses. To bring the unit back in operational condition it is necessary to switch OFF and then switch ON the unit. To simplify the OFF/ON process, press and hold the Up & Down button together. This way, the user can switch OFF the unit in situation when there is no software switch accessible the way of contemporary push of button up and down; every time regardless of any working status of the unit.

6.2 KT-10 v2 Powers OFF during measurement

Battery:

Confirm that the 2 AA batteries are at proper voltage level. Replace if necessary.

Button:

It may be possible that both the UP and DOWN buttons are accidently being pressed at the same-time instead of a single UP or DOWN button. **Re-position your finger on the button so that only the intended button gets pressed.**

Battery Cap:

It may be possible that the spring tension of the battery cap has become weak, causing intermittent contact with the batteries when the KT-10 v2 is moved around during a measurement. A battery cap replacement will be required.

6.3 “Error” on the Display

An “Error” message is displayed on the KT-10 v2’s screen when it fails to compute a result as seen in the figure 128.

Figure 128: Measurement Error

The main reason for this error message may be that a measurement sequence is not being followed properly.

To ensure that a correct measurement sequence is being followed, please try do the following:

1. Set the KT-10 v2 in the Measure mode.
2. With the KT-10 v2 at arm's length, in the free air, press the UP button. Meter beeps, and the "progress bar" starts to run.
3. Immediately after the first beep, quickly move the KT-10 v2 to the sample’s surface and press the UP button again.
4. Hold the KT-10 v2 on the sample until it beeps a second time, with a different tone. After the second beep, quickly move the instrument back to arm's length. Do not push the button again.
5. The KT-10 v2 beeps a third time on it's own; displaying result on the screen.

TIP: Alternately, the Scanner mode can be used to confirm the operation of the meter.

6.4 Maintenance

Switch Cover: The rubber cover on the buttons can degrade over time with the regular usage. A worn-out rubber cover will allow dust particles to enter inside of the meter. Any dust particles inside of the meter could make the buttons unresponsive to the presses. It is important to replace a damaged switch cover to avoid any internal damages.

Spare rubber cover for the switch can be purchased through Terraplus Inc. and replaced in the field.

Coil Cap: The black coil cap on the head of the KT-10 v2 can wear and tear with regular usage. Spare Coil caps can be purchased through Terraplus Inc.

6.5 Contact Technical Support

If you are experiencing problem(s) with your KT-10 v2 or the application software, please contact Terraplus Technical Support for assistance. Our contact information is below; please try to contact Terraplus' Technical Support between the hours of 9 am and 5:30 pm E.S.T., otherwise please leave a voice message or send an email and someone will be in touch with you shortly.

Terraplus Inc.
52 West Beaver Creek Unit 12
Richmond Hill, Ontario
L4B 1L9 (Canada)
Phone: (905) 764-5505
Fax: (905) 764-8093
E-mail: support@terraplus.ca
Website: http://www.terraplus.ca/

Appendix A: KT-10 v2 Plus Feature

This document is in addition to the KT-10 v2 manual. It is intended to provide information specific to the operation of the Plus feature for the KT-10 v2. The procedures outlined in this section are also applicable for conductivity measurements and calibration. Please consult the KT-10 v2's operations manual for general operating instructions.

The KT-10 v2 Plus has an increased range of up to 10 SI units for magnetic susceptibility measurements. Direct iron ore concentration estimates can be obtained from the meter's display with the use of a magnetite calibration curve already loaded into the unit.

The KT-10 v2 Plus meter has been developed to allow users to calibrate the meter to specific ore types for quick recognition in the field. It can be used for sample selection, core analysis and grade control. With the ability to use three different calibration curves, one of which is the pre-installed magnetite curve, users have a flexible, user friendly instrument suitable for several different applications. If the samples or cores have a different composition or structure than those used to create the pre-installed calibration curve included in the KT-10 v2 Plus, the user can program up to two additional calibration curves that are specific to the samples and cores they are measuring.

At the end of this guide you will find recommendations for preparing samples for site specific calibration procedures.

The KT-10 v2 Plus has an increased range of operation (10 SI). Users can select different units (SI units or %) to receive measurement results in; this option is located in the Setup menu. From the main menu select the Setup option and the following menu will be presented.

Figure 129: Setup menu

When the option **Conc. tables** has been selected, the user will be presented with an option to select a list of calibration tables for susceptibility or conductivity **(Figure 130)**.

Figure 130: Conc. Tables Sub menu

Select the appropriate measurement mode (**Figure 130**) to reveal the installed calibration tables for that mode.

Figure 131: Susceptibility - Calibration tables

The first unit of measurement, Basic [SI], is used to obtain magnetic susceptibility measurements in SI units. Under this selection, measurements are displayed and stored in SI units.

Selecting Magnetite [%] will enable the unit to read iron ore concentration estimates as a percentage. This calibration table is based on magnetite with different concentrations.

The next two selections, User1 [%] & User2 [%], remain open to be populated by the end user. Please note that these two tables are currently populated with the same table used for magnetite.

The process to load a calibration curve is outlined on page 109. To begin using the preloaded calibration table, select it from the list and return to the main menu. The KT-10 v2 will remember the last table selection made upon restart.

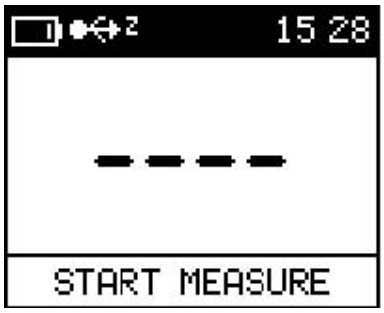


Figure 132: Table type notified

On the measurement screen (**Figure 132**), a number in the upper left hand corner of the display is used to indicate which calibration table is currently being used.

Legend used to notify current calibration table in use:

1 = Magnetite [%]

2 = User1 [%]

3 = User2 [%]

There will be no number shown in the notification area when the Basic SI is selected as the unit of measurement.

The procedure to take a reading is described in the in this user's manual and the quick user guide.

When a calibration table is used, the measurements are presented to the user as percentage with average and standard deviation displayed on the bottom line (**Figure 133**).

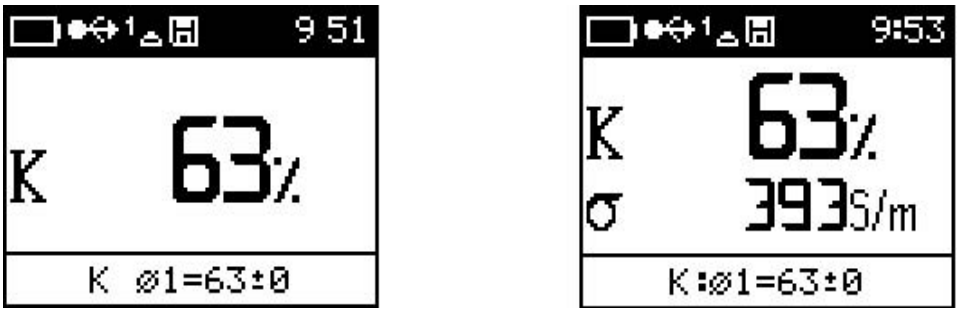


Figure 133: Calibrated Percentage Display

The data stored on the KT-10 v2 will be in a percentage with average and standard deviation values for each group of readings.

GeoView Software Interface

GeoView is used to access the data stored on the KT-10 meters. It also provides access to the settings and calibration tables used in the meter.

Connect your KT-10 Plus v2 to a PC and launch the GeoView software to load, view, delete, or save a calibration table. Click on the  button to access the Device Parameters settings. In this menu, you will see a "Concentration" tab. If there is no Concentration tab, then the instrument connected to Geoview is not a Plus meter.

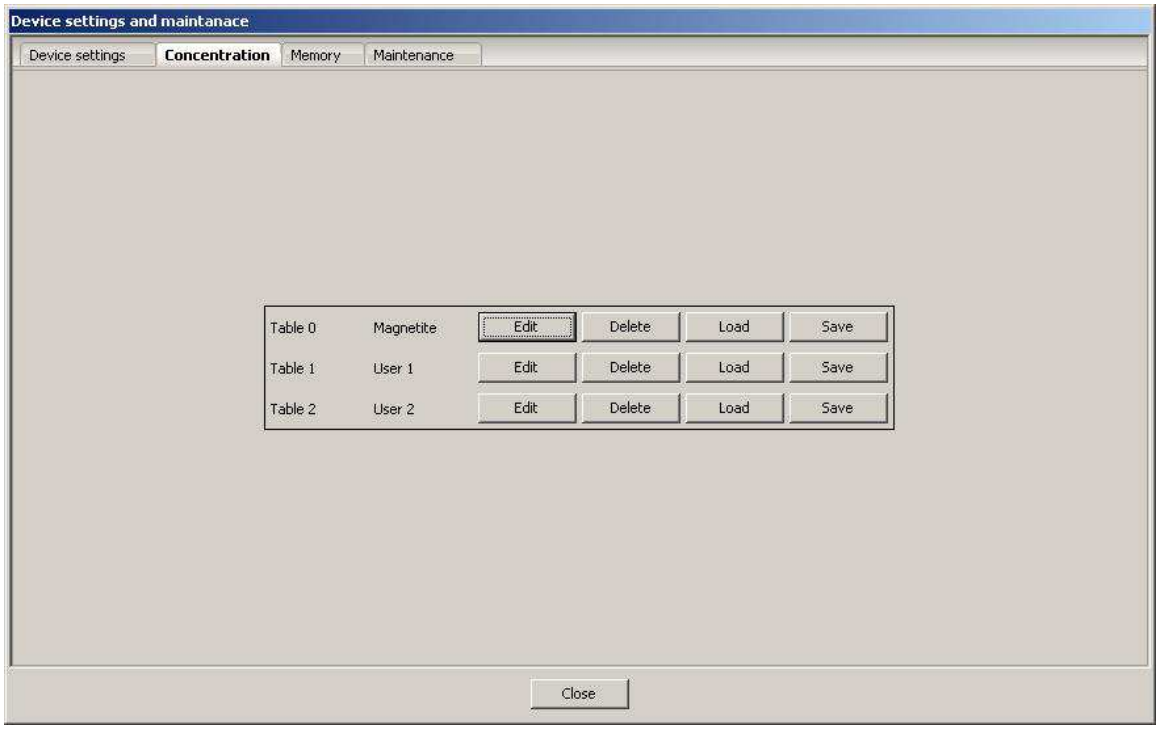


Figure 134: Concentration tab

In the Concentration tab, you will find the three tables that are loaded on the KT-10 Plus.

The ***Edit*** button will open the table for editing of the name and the calibration data points. The ***Delete*** button will erase the table from the meter's memory. The ***Load*** button will allow the user to load a new table in the meter's memory. The ***Save*** button will allow the user to save the table on the computer. The saved table then can be loaded onto another meter.

The name of the table can be edited so that it is easier to distinguish from other tables. The table's name cannot be longer than 11 characters. You can also edit the percentage and SI reading columns in the table. In the example below, ***Point 1*** is for 1 percent and has the assigned value of 26.0 X 10^3 SI units.

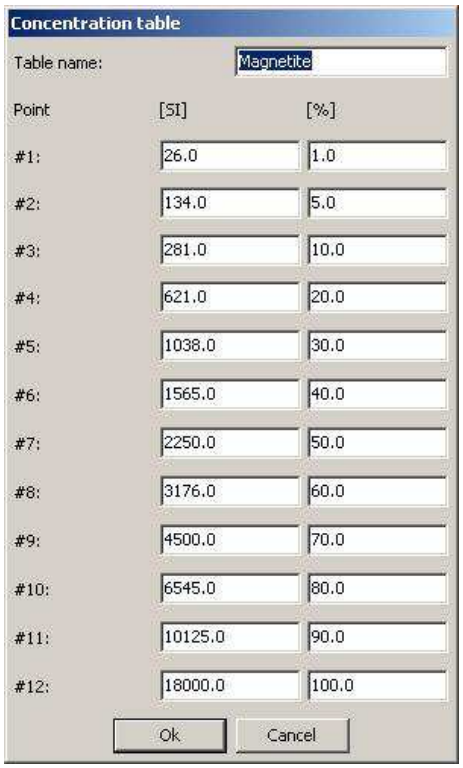


Figure 135: Concentration Table

When creating a table, you do not need to have all of the 12 data points entered for reference. Smaller tables, with a minimum of 4 data points, can be used, but they must follow a specific format.

In order to use a smaller table, the concentration table must be padded with zeroes where there are unpopulated data points. The absolute position of the table is not important, but it cannot contain zeroes between the start and end data points as this will result in the meter neglecting the higher concentration data points **(Figure 136)**.

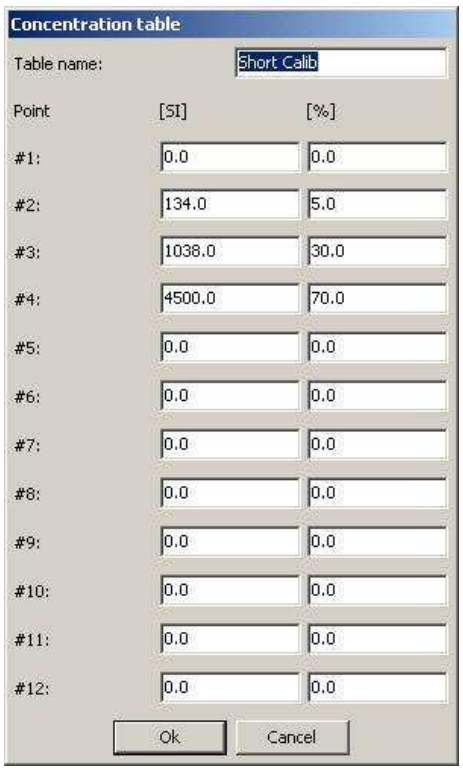


Figure 136: Short Calibration table

In **Figure 136**, the range from 5 % to 70 % has been included in only three data points. Please note that any values above and below this table will produce questionable a output. After the data has been collected and transferred into Geoview, you will see the additional information showing when the calibration curves have been used. In the information column, the calibration curve number is provided for each reading and is populated for any mode used with a calibration curve. **Figure 137** shows the results from scanner and measure modes where calibration curve 1 (magnetite) was used.

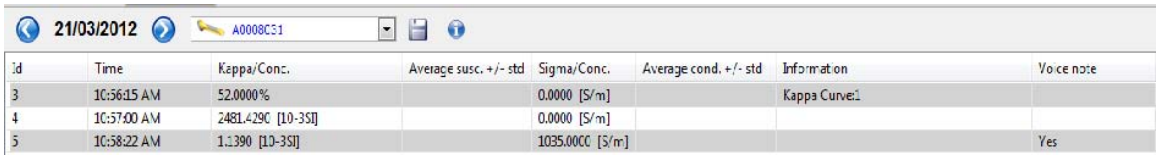


Figure 137: KT-10 Plus Data view

Recommendations for KT-10 Plus Calibrations

The calibration curves are based on the relation between the measured susceptibility and the real concentration of a specific type of mineral. The calibration consists of creating a numerical table or function that will cover all of the different concentrations found in an ideal sample. The KT-10 Plus comes with calibration for ideal magnetite.

Recommended Materials for the Calibration Process

1. KT-10 Plus v2
2. Five plastic bags approx size 8" x 8" or bigger
3. Five samples of a specific local mineral or rock at varying concentrations.
4. A PC with a text editor and the GeoView software.

Sample Preparation

The user must prepare the samples in a consistent geometry to eliminate the deviations caused by geometric factors or unsuitable shapes. The shape of the samples must conform to the expected or common shape of real samples that will be measured in future production. The closer the calibration sample compares to the real samples, the more precise the measurements will be.

If there is a scenario where the common samples are rocks and the user does want to crush them prior to taking measurements, then it is recommended to have samples with a minimum size of 4" x 4" and a thickness of 1.5". In places where the most common mineral is in a fine gravel or sand, it is recommended that it be poured into a plastic 8" x 8" bag and formed into the shape of a pillow, with a thickness of approximately 2".

Calibration Samples Selection

The calibration method expects to cover a wide range of local concentration profiles. For better interpolation, we recommend samples be taken from the mine or pit and contain both low and high concentrations. The user can define five points of conversion for the table and a suitable selection of calibration points can increase precision within a focused range. For example, if a site has an iron concentration of approximately 30% and this concentration is found in approximately three quarters of the reserves, while the remaining reserves have concentrations close to the local maximum (45%, in this case), the calibration can be configured as presented in the following table **(Figure 138)**.

Concentration	Sample Concentration
<5%	Below average
25%	
30%	Local average
40%	
45%	Local Maximum

Figure 138: Calibration Selection table

Calibration Table

To create the calibration table, the user will require calibration samples with known concentrations; the concentrations should be determined by another method, such as chemical assay, XRF, etc. The calibration samples must also be in a suitable form and geometry similar to the local samples found on site. Once the user obtains the appropriate calibration samples, they must perform five susceptibility measurements for calibration and the creation of the relation table. The following table is to be used only as an example.

Concentration	**Susceptibility**
<5	98.21 x 10^{-3} SI
25	405.66 x 10^{-3} SI
30	630.10 x 10^{-3} SI
40	867.72 x 10^{-3} SI
45	1139.23 x 10^{-3} SI

It is recommended that multiple measurements be taken on each sample; use the average value to populate the concentration table. Next, the user must transfer the concentration table to the KT-10 Plus v2; this can be done with Geoview following the steps beginning on page 109.

Format is:

Susceptibility in SI * 10^{-3} & Concentration in % (percent)

98.21 5
405.66 25
630.10 30
867.72 40
1139.23 45

Finally, the user must access the setup menu to select the output in concentration. Once this final step is complete, the measurements on production samples can begin.

Appendix B: Advice and Recommendations

Measurements of bulk susceptibility or conductivity using a new handheld meter can be used in a wide range of applications in various geological fields, making the instrument useful for both geologists and geophysicists. But there are some considerations that must be followed in order to obtain good results and protect the instrument against damage. These are as follows:

• Do not take measurements with weak batteries (exchange batteries after the low battery signal appears at your earliest convenience).

• Do not take measurements in the rain when the surfaces of rocks are very wet.

• The first and third steps in a measurement (measuring with coil in the air, otherwise known as free air measurements) should not be executed near earrings, necklaces or any other metallic objects. When taking free air measurements, maintain distance of at least 50 cm from anything metallic.

• When taking readings on drill cores, avoid measuring near the nails of the wooden core box. Never measure cores placed in metallic boxes. For best results, it is recommended that cores be removed from the boxes during measurements.

• When measuring on outcrops, care must be taken to find convenient surfaces in order to eliminate the influence of weathering. Weathering results in a decrease of susceptibility, which is intensified the more the sample is weathered. It is important to remember that the coil is most strongly influenced by the rock nearest to the coil's surface, even if one measures using the pin. Magnetic anisotropy exists and measure parallel and perpendicular to the foliation in metamorphic rocks. Make corrections for the unevenness of the rock surfaces. Susceptibility distribution in any outcrop is found relatively reliably if more than 12 measurements are made; one, two or three measurements are insufficient. Take care not to measure near the geological hammer you may have with you.

• When placing the meter on a rock's surface, do so gently. Beware that shocks and rough handling of the meter on rocks can damage the measuring coil.

• To verify magnetic anomalies, it is recommended that users measure all kinds of rocks available in the region of interest, even small rocks and soil debris. They may not cover the entire surface of the coil and may be very thin; but, it is important to remember that the value you obtain is informative only. From a collection you gathered you can take the characteristic pieces for the lab measurement, sufficiently big and suitable for cutting the lab specimens. Susceptibility measurements help you to take representative samples for lab measurement of anisotropy and/or remnant magnetization measurement.

Warranty:

All KT-10 v2 models come with a one-year warranty from Terraplus Inc from the date of shipment. Warranty for the KT-10 v2 models covers defective components and workmanship for the repair at Terraplus' office in Richmond Hill, Ontario, Canada. Shipment costs to and from Terraplus' facility are not covered under warranty and are the responsibility of the customer. Malfunctions or damages due to negligence or improper use are not covered under this warranty. Users who need to send their meter to Terraplus for repair should complete the RMA request form on our website. The RMA request form can also be found at: http://www.terraplus.ca/misc/support.aspx

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52 West Beaver Creek Unit 12
Richmond Hill, Ontario
L4B 1L9 (Canada)
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E-mail :support@terraplus.ca
Website: http://www.terraplus.ca

Appendix 1 – TR-11-01 Drill Log (2016)

Pavey Ark Minerals Inc.				
Property	**Danby Triangle**, Thunder Bay Mining Division			
Claim Number	Claim 296002/Legacy claim 4283459			
Drill Hole Number	**TR11-01** (drilled by Platinum Group Metals Ltd.)			
Hole Length and core size	506 m, NQ			
Location	UTM 16 NAD 83 335942mE, 5487317mN (Garmin 76Csx) (re-confirmed by Garmin Etrex 20)			
Collar Elevation	410 m (Google Earth)			
Hole dip and azimuth	Vertical			
Target	VTEM conductor			
Date started/Date completed	April 12, 2011/April 21, 2011			
Drilling company	Cobra Drilling			
Logged by:	Originally logged by James Seals (April 30, 2011), relogged and sampled for petrography by Richard Sutcliffe (September 21, 22, 2016)			
Core Storage	Storage yard at 660 Squier Street, Thunder Bay			
Downhole survey instrument	Reflex			
	Depth	Dip	Azimuth	Mag
Downhole Measurements	17	-89.8	285.7	57540
	350	-89.4	314.8	57080

From	To	Code	Description	Samples				Photo
				From	To	Length	Thin sect	
0.00	0.60		Overburden					
0.60	38.00	DB cg	Coarse grained (cg) to pegmatitic diabase (DB) with red hematite alteration, grades into medium grained diabase					3096, 3097
38.00	61.90	DB mg	Medium grained (mg) diabase					
61.90	62.35		Chlorite-sulphide veinlet with cpy					3094, 95
62.35	117.80	DB mg	Medium grained diabase, coarse magnetite in upper part, feldspar foliated at 90^{o} TCA					
117.80	118.50	vn	Coarse grained pegmatitic vein (vn)					3098
118.50	197.90	DB mg	Uniform medium grained diabase					
197.90	198.50		Coarse grained, sulphide rich vein, at low angle to core axis (TCA)					3099,3100
198.50	236.5	DB mg	Medium grained diabase, 2 to 3 mm amphibole filled fracture at 225 m is first sign of bottom of sill approaching					

236.50	237.50	DB fg	Medium grained diabase grades into fine grained (fg) aphanitic diabase with cooling fractures,					
237.50	237.80	DB ap	Aphanitic (ap) chilled diabase with polygonal fractures, sharp contact at 237.80					3102, 3103
237.80	247.50		Chaotic zone, looks like mixture of chilled diabase mixed with underlying rocks, no obvious Sibley group seds, granitic inclusion at 243.6					3105
247.50	248.00	FT	Mylonitic or flow banded zone,90° TCA					3104
248.00	252.40	GB mg	Medium grained hornblende gabbro (GB), foliated					
252.40	252.50		Another mylonite or flow banded zone					
252.50	265.50	GB mg	Medium grained hornblende gabbro, foliated, more uniform in this interval	256.9	257.0	0.1	TS	
265.50	266.1	GR	Granitic (GR) xenolith, upper contact sharp, lower contact has flow banded, mylonite texture, 80° TCA					3106, 3108, 3109
266.1	283.2	GB mg	Medium grained hornblende gabbro, relatively homogenous, foliated at 30° TCA	271.9	272.0	0.1	TS	
				280.9	281.0	0.1		
283.2	283.6	vn	Felsic veins(?) at 30° TCA associated with shearing					3110, 3111
283.6	317.3	Hb GB	Medium grained hornblende gabbro, non-magnetic, foliated, 30° TCA, relatively homogenous	294.9	295.0	0.1		
				310.35	310.50	0.15	TS	
317.3	317.4	vn	Quartz vein, sheared margins, 45° TCA					
317.4	324.9	GB mg	Medium grained gabbro, becomes more mafic toward base					
324.9	325.0		Pyrite carb vein					3113
325.0	329.0	PX	Meta pyroxenite, medium grained, locally minor chalcopyrite	328.0	328.1	0.1	TS	
329.0	329.2	sh	Shear zone (sh) with silica alteration at 30° TCA					
329.2		PX	Meta pyroxenite (PX), medium grained, missing boxes 79 to 82					
358.9	365.6	GB mg	Medium grained meta gabbro					
365.6	366.3		Feldspar porphyry dike, purplish colour, 1 to 3 mm fsp phenos and 1 to 2 mm amph phenos, sharp contact 60° TCA	365.75	365.85	0.1		
366.3	377.4	GB mg	Medium grained hornblende gabbro					
377.4	377.6	sh	Strong shear, 30° TCA					
377.6	378.2	FP	Feldspar porphyry (FP) dike, sharp contact					
378.2	385.5	PX	Medium grained mela gabbro/pyroxenite, foliation 45° TCA					
385.5	386.5	GR	Leuco granitic dike, contact at 80° TCA					
386.5	415.7	PX	Very uniform, competent, medium grained metapyroxenite, with	402.1	402.2	0.1		

			characteristic 4-5 mm poikilitic grains (relict cpx?)					
415.7	415.8	sh	Narrow sheared zone with quartz veins, 30° TCA					
415.8	447.0	PX	medium grained metapyroxenite, foliated at 30° TCA	415.9	416.0	0.1		
				446.35	446.50	0.15		
447.0	447.2	sh	Shear with quartz vein					
447.2	491.6	PX	Competent, medium grained gabbro to metapyroxenite, latter with characteristic 4-8 mm poikilitic grains (relict cpx?), first sample gabbro, others pyroxenite	449.0	449.2	0.2	TS	
				481.3	481.4	0.1	TS	
				488.8	488.9	0.1	TS	
491.6	492.0	GR	Leuco granitic dike, 80° TCA					
492.0	496.0	PX	Medium grained, meta pyroxenite					
496.0	496.2	sh	Strong shear, 25° TCA					
496.2	506.0	PX	Medium grained, meta pyroxenite					
EOH								

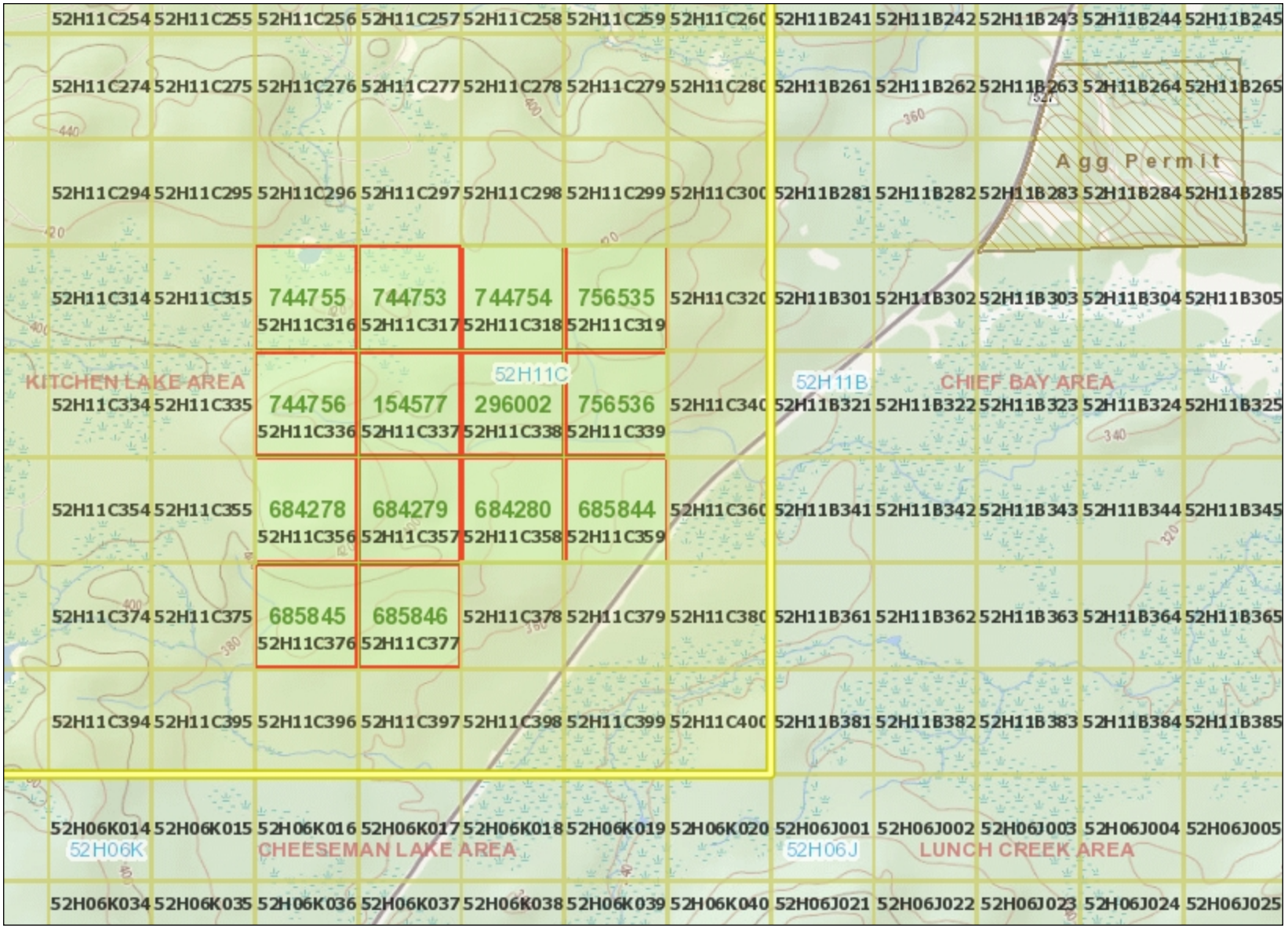
Ontario

Ministry of Mines (MINES)

MLAS Map Viewer

MLAS Map

Notes:
Danby Triangle Property March 19 2023



Legend

Provincial Grid Cell
- Available
- Pending
- Unavailable

Mining Claim
- Mining Claim
- Boundary Claim

Alienation
- Withdrawal
- Notice

MINES Administrative Boundaries
- MINES Townships and Areas
- Geographic Lot Fabirc
- UTM Grid 1K
- UTM Grid 10K
- Mining Division
- Mineral Exploration and Development Region
- CLUPA Protected Area - Far North
- Resident Geologist District
- Federal Land Other
- Native Reserves
- AMIS Sites
- AMIS Features
- Drill Hole
- Mineral Occurrences

MLAS Mining History
- Withdrawal - History
- Notice - History
- Mining Claim - History
- Mining Land Tenure - History
- Legacy Claim

Provincial Grid
- Provincial Grid 250K
- Provincial Grid 50K
- Provincial Grid Group

Land Tenure
- Surface Rights
- Mining Rights
- Mining and Surface Rights
- Order-in-Council

Those wishing to register mining claims should consult with the Provincial Mining Recorders' Office of the Ministry of Mines (MINES) for additional information on the status of the lands shown hereon. This map is not intended for navigational, survey, or land title determination purposes as the information shown on this map is compiled from various sources. Completeness and accuracy are not guaranteed. Additional information may also be obtained through the local Land Titles or Registry Office, or the Ministry of Natural Resources and Forestry. The information shown is derived from digital data available in the Provincial Mining Recorders' Office at the time of downloading from the Ministry of Mines (MINES) web site.

0 1.32 km

N

Projection: Web Mercator

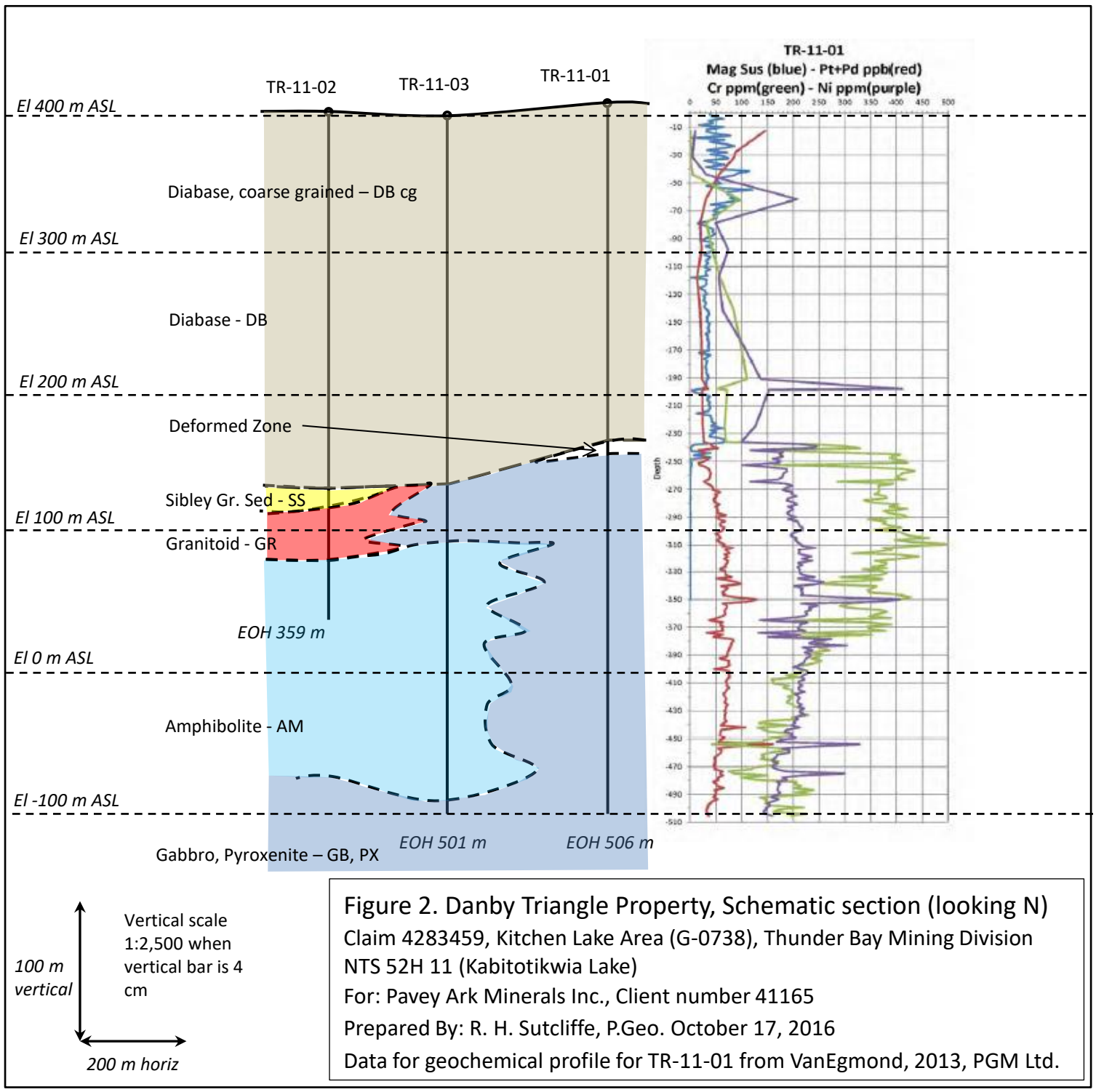


Figure 2. Danby Triangle Property, Schematic section (looking N)

Claim 4283459, Kitchen Lake Area (G-0738), Thunder Bay Mining Division

NTS 52H 11 (Kabitotikwia Lake)

For: Pavey Ark Minerals Inc., Client number 41165

Prepared By: R. H. Sutcliffe, P.Geo. October 17, 2016

Data for geochemical profile for TR-11-01 from VanEgmond, 2013, PGM Ltd.