**LAND AND MARINE GRAVITY DATA REDUCTION**

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Data reduction of large amounts of land or marine gravity data can easily be accomplished with Digitech’s new suite of programs especially designed for Canadian survey conditions. All forms of location, evaluation or water depth data can be input, as well as tables of meter constants to reduce the manual computation of these items. Meter drift, loop and line tie differences and running average filters can be applied. Results of free air and Bouguer corrections are output to a master tape file, which can be updated, or used as input to computer contouring or profile routines.

The mathematical formula used for the corrections are as published by Grant and West in “Interpretation Theory in Applied Geophysics” published by McGraw-Hill, Toronto 1956.

For land gravity, these are:

1. G = 978049.0 \* (1 + 0.005 288 4 \* Sin2Ø – 0.000 005 9 Sin2Ø)

2 . E = 0.09416 – 0.00090 \* Cos 2Ø – 0.068 \* 10-7 \* H

3. B = -0.01276 \* DENS\* H

4. T = 0.005 \* Ts \* DENS

Where:

G = Theoretical gravity at latitude Ø

E = Elevation correction at latitude Ø for elevation H

B = Bouguer correction for replacement density DENS

T = Terrain correction for T value of Ts at 2.00 g/cc for replacement   
 density DENS

The Bouguer Anomaly is:

5. BG = Observed Gravity + E + B + T – G

For Marine Gravity (moving platform), the equations are:

6. G = As above

7. B = 0.01276 \* (DENS – DENSW) \* W

8. E = 7.5074 \* V \* CosØ Sin A – 0.004 16 \* V^2

Where:

B = Bouguer correction for replacement density DENS and water density  
 DENSW for water depth W

E = Eotvos correction for ship speed V at latitude Ø with course direction A

The Bouguer Anomaly is:

9. BG = Observed Gravity + B + E – G

The units of measurement used in the equations are as follows:

G = milligals

Ø i= degrees from Equator

H = feet

DENS = grams per cubic centimeter

DENSW = grams per cubic centimeter

Ts = gravity units (0.10 milligal)

W = feet

V = Knots

A = degrees from North

The virtues of the forthcoming conversion to the metric system are clearly evident.