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Open File Report 5909

A Library of Digital Bedrock Mapping Symbols. Part 1: Figures and Descriptions

1995

Ontario

ONTARIO GEOLOGICAL SURVEY

Open File Report 5909

A Library of Digital Bedrock Mapping Symbols. Part 1: Figures and Descriptions

by

S.L. Jackson, T.L. Muir and S.W. Romkey

1995

Open File Report (OFR) 5909 was originally published in 1995 with accompanying data on a 3½-inch diskette in the back pocket.
These data are now available as Miscellaneous Release—Data (MRD) 252 “Digital Bedrock Mapping Symbols”.

All references within the text of OFR 5909 to these accompanying data are now re-directed to MRD 252.

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CONTENTS

ABSTRACT

Over 1600 symbols have been compiled into digital form as both "dxf" drawings and Autocad® "shx" shape files. Enclosed with this report are: 3.5", IBM®-compatible diskettes containing the digital files; figures of all the symbols; tables summarizing symbol acronyms; a chart depicting all of the symbols; and, a brief discussion of the symbol features .

FOREWORD

OGS-SYM is a digital library of bedrock mapping symbols developed by the Ontario Geological Survey (OGS). The symbol library is presented in two parts. Part A (this report) contains figures of the symbols (Appendix A), a chart containing all the symbols (back pocket), tables portraying construction of the symbol acronyms, and a brief discussion of some elements of the symbology (e.g. generation and displacement) and symbol classes. Part B (Muir 1995) contains a complete listing and explanation of all acronyms. The listing was designed for internal OGS referencing amongst different digital environments; however, some users may find the explanations in Part B helpful. In general, Part A should suffice to enable complete use of the symbol library.

If you, or your organization, have any comments regarding potential improvements to future releases of OGS-SYM, please forward them to one of the addresses below.

via paper mail:	via e-mail:
OGS-SYM c/o Precambrian Geoscience Section Ontario Geological Survey 933 Ramsey Lake Rd., 7th Floor Sudbury, Ontario P3E 6B5	pubsales.ndm@ontario.ca please identify mail as being related to “OFR 5909 & MRD 252 (OGS-SYM)”

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Ontario Geological Survey

Open File Report 5909

OGS-SYM

A Library of Digital Bedrock Mapping Symbols.

Part 1: Digital Files, Figures, and Description.

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S. W. Romkey[1]

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INTRODUCTION

As part of the move toward digital acquisition, compilation, and dissemination of geological information the Ontario Geological Survey (OGS) has created a library of digital bedrock mapping symbols for outcrop-scale features. The library was originally designed for internal use, however, the OGS is releasing the library in several forms so that others may take advantage of its applications. Future releases are intended to accommodate minor revisions to some symbols and the addition of new symbols not currently in the library (e.g. mineral deposit and quaternary mapping symbols). The library currently contains over 1600 symbols that represent: bedding, igneous layering, paleocurrnets, foliations (primary, tectonic, magmatic), compositional layering, cleavage (general, displacement, crenulation), fractures, faults (brittle, brittle-ductile, ductile), veins, dykes and sills, axial surfaces, and a spectrum of lineations including fold axes, crenulations, intersections, boudins, elongation, mineral, slickenside, primary, and shattercones. The aim of the library is to provide a standard set of symbols that portray the maximum amount of information and yet retain simplicity of appearance and intuitive relationships between symbol classes.

Each figure in Appendix A (A1 to A19) corresponds to a series of digital files (see Tables 16, 17, and 18). The digital files include "dxf" drawings of each of the figures in Appendix A, a "dxf" file corresponding to each symbol, and Autocad® "shx" shape files. The files are in a compressed format; to retrieve the files, follow the instructions indicated in the "readme.txt" file on each diskette. The use of "shx" shape files is discussed in Autocad® and Fieldlog® (Brodaric, 1993) manuals and is not repeated here. Note that the individual symbol "dxf" drawing files can be used to create blocks of the symbols.

SYMBOL AND ACRONYM CONSTRUCTION

Introduction

Some users of this library may find examination of the figures in Appendix A and reading of this section sufficient to enable efficient and judicious use of the symbol library. Additional comment on the symbols is provided below under "Systematic Symbol Description". The symbol library is intended to be used in much the same way as a library of books. Users are not expected to know the entire contents of the library, but they should be able to locate what they need rapidly. To this end, understanding the symbol construction and symbol acronyms is essential. In order to facilitate description of the symbols and their use, it is convenient to refer to the "strike bar" and "dip bar" of a symbol (Figure 1).

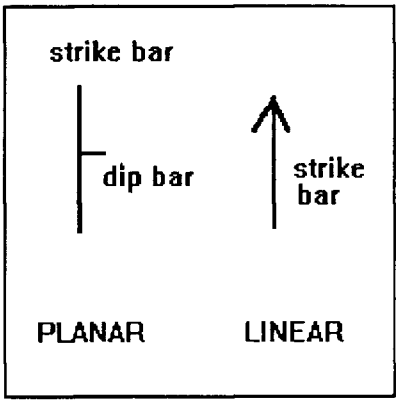

Figure 1: Definition of symbol components.

The Generation Option

The relative generation of a structure is indicated by either multiple dip bars in the place of a single dip bar (foliations, cleavages, faults, axial surfaces), or by Roman Numerals on the strike bar (compositional layering, fractures, veins). The number of dip bars (e.g. Figure 2, #1: 3rd generation mineral foliation) or the value of the Roman Numeral (e.g. Figure 2, #5: 3rd generation fracture) indicates the relative generation. For the case where the generation is uncertain, there is either a thick dip bar (Figure 2, #2: mineral foliation of uncertain generation) or a thick bar in place of the Roman Numerals. Where the dip direction is not known (i.e. only the trend is known) the strike bar is ornamented with short bars oriented at an oblique angle to the strike bar (e.g. Figure 2, #4: trend of 2nd generation mineral foliation). For veins and fractures, the generation of the "trend only" option is indicated by Roman Numerals, not oblique bars (e.g. Figure 2, #6: trend of 5th generation vein of type E). Finally, for those "trend only" cases where the generation is also uncertain, there is no oblique bar nor any numeral to indicate generation (e.g. Figure 2, #3: trend of mineral foliation, generation unknown).

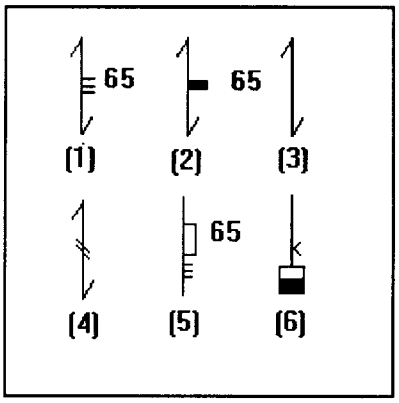

Figure 2: Indicators of generation when the dip is either known or unknown. (See text for discussion).

Although there are several ways to assign generation to a symbol, the OGS is adopting an "outcrop by outcrop" assignment. For example a cleavage might be a second generation fabric at one outcrop and the only fabric at another outcrop. In the first case the cleavage would be second generation and in the second case it would be first generation. Those interested in regional interpretations might consider the cleavages to be coeval and desire to represent both of them as second generation. This is not advised for two reasons. First the interpretation may be incorrect. Second, it is common that one can deduce the presence of two fabrics but only be able to measure the second one. In such cases, a second-generation symbol would be displayed on the map, but there would be no first-generation symbol. If "regional interpretations" are applied, then confusion would arise when confronted with a location where, for example, a second generation symbol is present without an earlier generation symbol. The confusion would result from uncertainty in whether two fabrics are actually present at the location or if only one fabric is present and assigned to "regional second generation". Figure 3 summarizes the approach to assignment by an outcrop to outcrop basis. At location "1", the second generation cleavage symbol indicates that two fabrics were observed, but only one is represented on the map. At

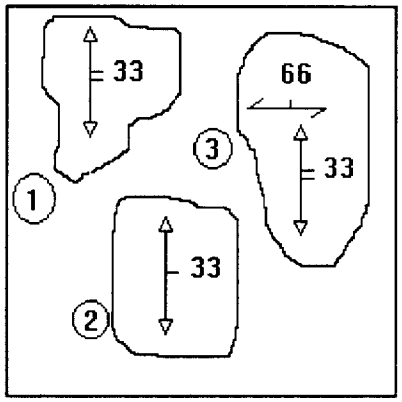

Figure 3: Examples of the use of generation. See text for details.

location "2", only one fabric was observed, a cleavage. Note that a reasonable inference might be that the cleavage is part of a set present at all 3 outcrops; however, it is still represented as 1st generation. At location 3, an early foliation (1st generation) and a later cleavage (2nd generation) is observed.

There are ways to accommodate the regional interpretation without sacrificing the "outcrop by outcrop" method of analysis. In Autocad® for example one could place all fabric elements thought to belong to the first "regional" generation on specified layers regardless of the symbol generation. Alternatively, if using Fieldlog®, one could add a "field" to the template to record the regional interpretation. That is, each structural element could have assigned to it a numeric value representing the regional interpretation. Subsequently, one could generate attribute maps containing, for example, all symbols assigned to regional generation 2, regardless of the observed generation of the structure.

Displacement

The portrayal of displacement on fracture (Figure A10, Appendix A) and displacement cleavage (Figure A9, Appendix A) symbols is broken down into strike- (horizontal) and dip-components. The horizontal component is indicated by a small "one-sided" arrow on one side of the strike bar. The arrow indicates which direction the side with the arrow moved with respect to the opposite side. The dip-direction component is indicated by one of: a small ball on the dip bar; a ball attached to the small arrow beside the strike bar; or a ball on a small bar on the opposite side of the dip bar. In all cases the ball is on the down dropped side.

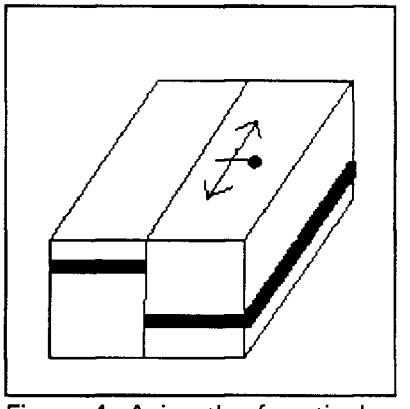

Figure 4: Azimuth of vertical plane with dip-displacement is defined as that corresponding to the down-dropped block being to right of observer.

One of several conventions could be adopted for the use of symbols portraying displacement. For example one might impose the restriction that these symbols should be used to represent only true displacements. In this case a symbol portraying dextral horizontal displacement and no dip-component of displacement would indicate that the true offset is horizontal and dextral. Alternatively one might include apparent displacements, in which case the same symbol could mean either: 1) the offset is strictly dextral; or 2) the horizontal component is dextral and the dip-component is unknown. The context in which the symbols are used should be clearly stated.

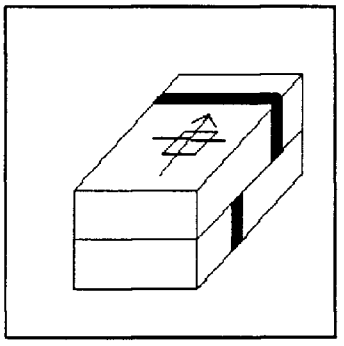

Figure 5: Azimuth of horizontal fracture with displacement is defined as direction of displacement.

Two special cases arise when the plane is either vertical (Figure 4) or horizontal (Figure 5). When the plane is vertical there is no hangingwall; consequently, "normal" and "reverse" components of displacement are not defined. In this case, use the convention "right hand side down". This defines the azimuth of a vertical plane with a dip-component of displacement as the azimuth

that corresponds to the down-dropped block being to the right of the observer. When the displacement plane under consideration is horizontal, the azimuth of the plane is undefined. However, the azimuth of displacement of the upper block is defined and can be used to define the "azimuth" of the symbol.

Dip Values

Many symbols in the library do not have dip values associated with them on a map face. It is common practice, for example, not to display "90" beside a symbol that represents a vertically dipping structure. In Fieldlog® and Autocad® there are options available to "hide" such values. The "90" should still be entered into the database for future use (e.g. stereonets), but it should not be displayed on the map. For those symbols where only the trend (strike) of a planar feature can be deduced, the user could enter "99" for the associated dip value and then "hide" this value. Numbers greater than "90" are not commonly used to portray dip values; therefore, a number such as "99" in a database signifies a feature where no dip could be determined. Note that entering "99" is preferable to entering "0" because "0" has significance (horizontal). Finally, there are those situations where the dip direction of the planar element is known, but the magnitude of the dip is uncertain. In such cases, a value like "99" should be entered into the database. However, on the map these structural symbols should be accompanied by a "DU" (magnitude of Dip Unknown). One can either hide the "99" and add the text "DU"; alternatively leave the "99" until final map preparation and replace or edit the "99's" to "DU's".

It would be desirable to have a special set of symbols to portray vertically plunging lineations since linear symbols misrepresent the fact that the strike of a vertically plunging element is not defined. The symbol library does not provide such a set; however, one can take advantage of the general (but not universal) condition wherein lineations are measured within planes. For this condition, it is suggested that vertically plunging lineations be oriented at 90 degrees to the strike of the planar symbol (e.g. Figure 6) in a fashion consistent with plunge directions determined in non-vertical planes. The plunge value of 90 should accompany the lineation on the map.

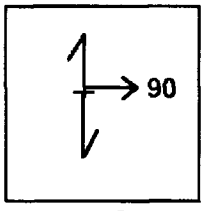

Figure 6.

Adding Descriptive Parameters to the Symbols

Just as it is possible to add a "regional generation" interpretation to a structural element using Fieldlog® (see "The Generation Option" above), it is possible to associate data or descriptive parameters with a symbol by adding "fields" to the Fieldlog® template. This enables advanced querying and manipulation of basic structural information. For example, one could add a field to record the mineral defining a lineation or to record the width of "vein type A". Although only one type of symbol would be portrayed on the map, the user could generate a variety of attribute maps; for example, maps of mineral lineations defined by hornblende or veins of type A that are greater than 10 cm wide. The association of additional data through the use of Fieldlog® is an extremely simple, yet powerful, way to construct databases and attribute maps.

Acronyms

In order to manipulate the symbols and associated data, unique acronyms are required. Rather than assigning each symbol an "arbitrary" but unique acronym, for example a number, acronyms have been devised to enable efficient manipulation of the symbols and related data. For example, when using digital maps, one might desire to use a command[1] like:

"turn on all bedding symbols".

If the acronyms were arbitrary, one might be forced to enter all names for all acronyms related to bedding. However, if the acronyms are related then the manipulation of the symbols is much easier. For example, if all bedding acronyms begin with "BED", then one might use a command like:

"turn on all BED",*

where "*" is a wildcard representing all possible alpha-numeric combinations following "BED". To carry the example one step further, one might desire to turn off all graded bedding symbols. In this case, as long as the letter following "D" in "BED" uniquely identifies all graded beds, then a command like:

"turn off all BEDG",*

where the "G" represents the graded variety of bedding, would selectively turn off all graded bedding symbols.

In general, the acronym names consist of an ordered combination of letters (see Tables 2 to 15):
1) first block: 2-3 letters identifies the general symbol class
2) second block: 1-2 letters identifies the subclass or type
3) third block: 1 letter indicates symmetry or horizontal component of separation
4) fourth block: 1 number or letter indicates relative generation
5) fifth block: 1-2 letters discriminates amongst the magnitude of dip
6) sixth block: 1 letter for dip component of separation, or azimuth of displacement
7) seventh block: 1 letter indicates no facing if appropriate

The following points should be noted:
1) Not all blocks of letters are present in all acronyms. For example bedding acronyms (Table 2) consist of blocks 1,2,5, and sometimes 7.
2) Some combinations of letters and\or numbers are not allowed. In the figures of

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[1]The "commands" are not, unless otherwise noted, in any specified computer language nor do they represent actual commands for any particular software. The actual syntax of the command would have to be consistent with the particular software being used.

Appendix A, these combinations are represented by diagonal lines in the boxes.
3) The acronyms were forced to 6 letters or less to meet OGS file-transfer restrictions.
4) Acronyms were constructed to maximize efficiency in handling of symbols and related data; careful attention to their construction will enhance data handling.

SYSTEMATIC SYMBOL DESCRIPTION

SEDIMENTARY BEDDING, VOLCANIC BEDDING, AND UNCONFORMITIES
(Figure A1, Appendix A)

Sedimentary bedding symbols are distinguished from volcanic bedding symbols by the latter having a thicker strike bar. Unconformity symbols have a wiggly strike bar. Strike-bar ornamentation distinguishes the subclasses of bedding. Note that symbols are provided for those situations where the type of bedding can be deduced but the facing cannot. Acronyms are summarized in Table 2.

IGNEOUS LAYERING (Figure A2, Appendix A)

The symbols for igneous layering differ from the analogous bedding symbols by the presence of small circles at the ends of the igneous layering strike bars (compare Figures A2 and A1 in Appendix A). Acronym combinations are summarized in Table 3.

PALEOCURRENTS (Figure A3, Appendix A)

Paleocurrents (Figure A3, Appendix A) can be determined in sedimentary rocks by a variety of methods; however, it is not common practice to emphasize this in geological mapping. Consequently only 4 basic paleocurrent symbols are provided:

i) unidirectional current in the present orientation (open arrows with plunge values);
ii) unidirectional current in the restored (solid arrows without plunge values);
iii) bidirectional current in the present orientation (double open arrow with plunge values); and,
iv) bidirectional current in the restored (solid double arrow without plunge values).

Acronyms distinguish the type of paleocurrent determination (e.g., ripples, crossbeds, other, unsubdivided, and flow direction in volcanic rocks), however, the symbology does not. The distinct acronyms enable separation of symbols and related data according to the method of determination should this be important to the user. Note that paleocurrent symbols in the "observed" orientation should have a plunge value associated with them. Restored paleocurrents are horizontal and by definition have a plunge value of zero. Acronyms are summarized in Table 4.

FOLIATIONS (Figure A4 Appendix A)

Foliation symbols include: shape foliations of primary, uncertain, and

tectonic origin; igneous foliation (planar magmatic alignment of minerals); and, tectonic foliation. Shape foliations all have an ellipsoid centred on the strike bar and are further distinguished by different arrowheads. Igneous foliation, mineral foliation, and schistosity are distinguished by the style of arrowhead and the absence of the ellipsoid. Schistosity is included with the foliation symbols. Acronym combinations are summarized in Table 5. Note that "generations" are not permitted for shape foliations of primary or uncertain origin.

COMPOSITIONAL LAYERING (Figures A5 and A6, Appendix A)

Symbols representing secondary compositional layering, with or without an accompanying mineral foliation, are displayed in Figures A5 and A6 of Appendix A. Corresponding acronyms are summarized in Table 6. There are more types and possible combinations of compositional layering than can be accounted for in the symbol library. Consequently, the symbol library provides symbols for 4 "types" of compositional layering which are distinguished on the basis of the type of fill in the triangle serving as the dip bar. The type is "user defined" and will vary from user to user and map to map. Legends should clearly identify what type of layering a symbol represents.

Commonly a mineral foliation accompanies secondary compositional layering. The symbol that represents this combination (Figure A6, Appendix A) is a combination of the mineral foliation symbol (Figure A4, Appendix A) and the compositional layering symbol (Figure A5, Appendix A). The "Generation" for this class of symbol refers to relative generations of secondary compositional layering.

CLEAVAGE (Figures A7, A8, and A9, Appendix A)

Three types of cleavage are currently represented in the symbol library. The three types of cleavage are distinguished by the style of arrowhead located at the ends of the strike bar (Figure A7, A8, A9). The symbols represent:

i) general cleavage (Figure A7, Appendix A),
ii) crenulation cleavage (Figure A8, Appendix A),
iii) displacement cleavage (Figure A9, Appendix A).

General cleavage symbols should be used for cleavage that cannot be classified as either crenulation or displacement cleavage. Crenulation cleavage refers to cleavage that crenulates a pre-existing fabric. Displacement cleavage refers to cleavage that displays separation along the cleavage plane due to slip, not to apparent separation such as that which can arise from pressure solution. For discussion on relative generation and displacement see "The Generation Option" and "Displacement" sections above.

Included with the displacement cleavage symbols are those which refer to "unknown" horizontal displacement and "unknown" vertical displacement. These symbols allow for the condition where a cleavage is inferred to be part of a set of displacement cleavages but has either unknown, uncertain, or indeterminate displacement sense.

Included with the crenulation and displacement cleavages are symbols that represent the relatively uncommon scenario where the cleavage plane is horizontal. If the symmetry of the crenulations are known, an apparent "sense of vergence" may be defined. The large open-headed arrows for this type of symbol (e.g.,

CCXHT, Figure A8, Appendix A) refers to the apparent relative displacement of the upper block to the lower block. Similarly for displacement cleavage planes that are horizontal (e.g. CD2HT, Figure A9b, Appendix A) the large openheaded arrow refers to the displacement direction of material above the plane.

The symbol library does not currently have a symbol to represent "differentiation banding" (also referred to as "differentiation cleavage"). It is suggested that one of the compositional layering symbols be used to represent this type of fabric.

The generation of cleavage refers to its relative chronology with respect to other fabrics. See "The Generation Option" above. Note that crenulation cleavage must, by definition, be at least the second fabric observed and consequently 1st generation crenulation cleavage symbols are not present in the library. Acronyms are summarized in Tables 7, 8, and 9.

FRACTURES (Figure A10, Appendix A)

Symbols for fractures are identified by the open rectangle that serves as the dip bar (Figure A10, Appendix A). Up to 5 generations of fractures are allowed. The "generation" of a fracture should be considered in relation to other fractures and not all fabrics. Note that the generation of a fracture is indicated by Roman Numerals, not multiple dip bars. Therefore, the case where the trend and generation are known, but the dip is unknown, is represented by Roman Numerals (to indicate generation) and a single, short bar oriented diagonally to the strike bar to indicate "trend only". Furthermore, the degenerate case where neither dip nor generation is known is represented by an unornamented symbol consisting of the strike bar and the rectangle. Fracture symbols can also indicate displacement (see the section above entitled "Displacement". For the special case where the fracture plane is horizontal and the displacement direction is known, a single large arrow is located at one end of the strike bar and defines the relative sense of displacement of material above the plane with respect to material below the plane. Acronym construction for fractures is summarized in Table 10.

FAULTS (Figures A11, A12, and A13, Appendix A)

A double strike bar serves to distinguish fault symbols from all other symbols. Symbol classes for faults include:

i) brittle faults;
ii) brittle-ductile faults;
iii) and ductile faults.

Solid and/or open arrowheads on the strike bars serve to identify the type of faults: brittle fault symbols have open arrowheads; brittle-ductile fault symbols have half the arrowheads open and half solid; and, ductile fault symbols have solid arrowheads. The fault symbols are further distinguished on the basis of the horizontal component of displacement. If the horizontal component of displacement is unknown, then the symbol is symmetric with four arrowheads. Where the horizontal component of displacement is known, the symbols have only two arrowheads which indicate the sense of displacement (dextral or sinistral). For the special case where the fault plane is horizontal and the displacement direction is known, a single large arrow is located at one end of the double strike bars and

defines the relative sense of displacement of material above the fault plane with respect to material below the fault plane (e.g., FTXHT, Figure A11a, Appendix A). The dip-component of displacement is indicated by either a ball on one of the dip bars (normal component of displacement), or by a ball on the opposite side of the dip bar (reverse component of displacement). In both cases, the ball represents the down-dropped side. Further discussion on displacement can be found above under "Displacement". Generations of faults are indicated by the number of dip bar (see "The Generation Option" above). Acronym construction is summarized in Table 11.

VEINS (Figure A14, Appendix A)

Up to 6 types of user-defined veins are present in the symbol library. The symbols are distinguished by a unique box pattern located at one end of the strike bar (Figure A14, Appendix A). Vein types and relative timing of veins can be complex, therefore, 5 generations of each vein type are included (Figure A14, Appendix A). The "type" of vein should be identified by the user in a legend. Vein types will vary from user to user and map to map. The generation of vein is indicated by either a short fat bar (generation unknown) or Roman Numerals between I and V (generations 1 through 5 respectively). The "generation" of a vein should be considered in relation to other veins. For the case where the trend and generation are of a vein are known (but not the dip), the symbols do not have a dip bar. The degenerate case where only the trend is known (dip and generation unknown) is represented by an unornamented symbol consisting of the strike bar and the appropriate rectangle (e.g., VNEXT, Figure A14, Appendix A). Acronyms for veins are summarized in Table 12.

DYKES AND SILLS (Figure A15, Appendix A)

Symbols for tabular, or sheet-like, igneous intrusions are represented by symbols within the class "Igneous Contacts". Six different types of dyke/sill symbol are present and are distinguished by different patterns in the narrow rectangle that serves as the strike bar. Each type is further subdivided according to its orientation at the time of emplacement: unknown, dyke, or sill. The types are user defined and should be clearly identified in map legends. Generations are not assigned to the symbols, but could be accounted for through placement of the symbol on an appropriate layer in AutoCAD® or through defining appropriate "fields" in a Fieldlog® template. Acronyms are summarized in Table 13.

AXIAL SURFACES OF FOLDS AND KINKS (Figures A16 and A17, Appendix A)

Symbols for axial surfaces of folds and kinks (special class of fold) display fold asymmetry and relative generation. Included in this set of symbols are those which portray the condition where the dip of the plane is unknown (the "trend" option of Figures A16 and A17, Appendix A) Asymmetry is indicated by an S, Z, M, u, or n on the strike bar, and generation is indicated by the number or style of dip bars (see "The Generation Option" above). Note that "u" symmetry refers to a synformal fold and "n" symmetry refers to an antiformal fold. Acronyms are summarized in Table 14.

LINEAR FEATURES (Figure A18)

Symbols for linear elements include: fold axes, kink fold axes, crenulation axes, intersections, boudins, elongation (stretch), mineral, slickenside, shattercone, primary sedimentary, primary volcanic, and primary plutonic. The lineations are distinguished on the basis of their arrowhead or ornamentation that takes the place of the arrowhead (e.g. boudin neck lineation, LINBX of Figure A18, Appendix A). The asymmetry of folds, kinks and crenulations is indicated by an S, Z, M, n or u. Note that "u" symmetry refers to a synformal fold and "n" symmetry refers to an antiformal fold. The generation of lineation is defined by the number of ticks orthogonal to the strike bar. For intersection lineations, the intersecting planes that define the lineation are indicated by paired combinations of "o", "I", "II", "III" and "x", which indicate planes "So", "S1", "S2", "S3", and "Sx", respectively. "Sx" indicates plane of uncertain generation. Acronyms are summarized in Table 15.

MISCELLANEOUS (Figure A19 Appendix A)

Symbols in this subset represent widely differing features including: drill holes, outcrop location, glacial striae, varieties of grading, joints, breccias, regional paleocurrent, regional younging, and structural facing. Most of these symbols are self explanatory however some comment is necessary for the "grading" symbols. "Colour" grading refers to either systematic changes in intensity or tone of colour (e.g. light to dark, red to green). "Mineral" grading refers to metamorphic minerals and represents a systematic change in abundance of one or more minerals. "Size" grading refers to any systematic change in the size of a collection of clasts and or fragments. For all grading types the user should clearly define in the legend what the symbol is representing.

ACKNOWLEDGEMENTS

Many individuals contributed to the construction of this symbol library through earlier OGS compilations, discussion, and advice. In particular, we would like to thank G. Beakhouse, G. Stott, M. Easton, and B. Brodaric (now at the Geological Survey of Canada). I. Henderson is thanked for patiently creating early drafts of the digital drawings.

FORMAT	EXAMPLES OF USES
drawings Figures in Appendix A Chart in back pocket	-traditional pen and ink -reference when using digital files
symbol acronyms (see Tables 2 to 15 and the listing in Muir, 1994)	Fieldlog®, dBASE® (i.e. as a text string to distinguish observations in databases)
"DXF" files	"DXF" is a standard file format that can be accepted by many CAD and graphics utilities
"SHX" files	AutoCAD®
"CDR" files not yet released	CorelDRAW!®

Table 1: Formats of the Symbol Library

BEDDING

BED

```
(U,G,C,O,S,F,P,V,N) (T,F,M,I,V,O,OM,H,HU,HD) (N)
      |                      |
      |                      V                    N = no facing
      |
      |            T = trend known, dip & facing direction unknown
      |            F = facing  known, dip direction unknown
      |            M = magnitude and direction of dip unknown
      |            I = inclined
      |            V = vertical
      |            O = overturned, dip known
      |            OM = overturned, magnitude of dip unknown
      |            H = horizontal dip, no younging
      V            HU = horizontal, upward younging
                   HD = horizontal, downward younging
```

U = unsubdivided
G = graded, sedimentary
C = crossbedded, sedimentary
O = other sedimentary structures and or bedforms
S = stromatolitic bedding
F = flow, volcanic
P = pillowed unit
V = other volcanic structure and or bedform
N = unconformity

Example: "**BEDCI**" = **BED**ding, **C**ross bedded, sedimentary **I**nclined

Table 2: Acronym construction for bedding and unconformities.

IGNEOUS LAYERING

IGL

(U,G,C,O) (T,F,M,I,V,O,OM,H,HU,HD) (N)

V

N = no facing

T = trend only
F = strike and facing direction only
M = inclined, dip magnitude uncertain
I = inclined
V = vertical
O = overturned, dip magnitude uncertain
H = horizontal, no facing
HU = horizontal, upward facing
HD = horizontal,downward facing

V

U = unsubdivided layering, no tops
G = grading
C = cross bedded
O = other form of bedding

Example: "**IGLCV**" = **IG**neous **L**ayering that is **C**ross bedded and **V**ertical

Table 3: Acronym construction for igneous layering symbols.

PALEOCURRENTS

PC

(U,R,C,V,O) (UO,UR,BO,BR)

```
     |          UO = unidirectional, observed orientation
     |          UR = unidirectional, restored to horizontal
     |          BO = bidirectional, observed orientation
     V          BR =bidirectional, restored to horizontal
```

U = unsubdivided criteria for paleocurrent
R = ripples determining paleocurrent
C = cross beds determining paleocurrent
V = volcanic rock with paleocurrent
O = other form of paleocurrent

Example: "**PCRBO**" = **P**aleo**C**urrent determined by **R**ipples and constrained to one of two directions (**B**idirectional), displayed in **O**bserved orientation

Table 4: Acronym construction for paleocurrent symbols.

SHAPE FOLIATIONS

SHP

```
(P,U,T ) (X,1,2,3) (T,M,I,V,H)
      |      |            T = trend only
      |      |            M = magnitude of dip uncertain
      |      |            I = inclined
      |      V            V = vertical
      |                   H = horizontal
      |
      |      1 = 1st generation
      |      2 = 2nd generation
      V      3 = 3rd generation
             X = generation uncertain
```

P = primary foliation
U = uncertain origin of foliation
T = tectonic foliation

NOTE THAT IF "P" OR "U" SELECTED THEN CANNOT SELECT GENERATION X,1,2,OR 3.

MINERAL FOLIATIONS

FOL

(X,1,2,3) (T,M,I,V,H)

```
      |            T = trend only
      |            M = magnitude of dip uncertain
      |            I = inclined
      V            V = vertical
                   H = horizontal
```

X = generation uncertain
1 = 1st generation
2 = 2nd generation
3 = 3rd generation

SCHISTOSITY

SCH

(T,M,I,V,H)

T = trend only
M = magnitude uncertain
I = inclined
V = vertical
H = horizontal

IGNEOUS FOLIATION

IGF

(T,M,I,V,H)

Table 5: Acronym construction for foliations and schistosity.

COMPOSITIONAL LAYERING

CL

(F) (A,B,C,D) (X,1,2) (T,M,I,V,H)

```
  |       |          |      T = trend only
  |       |          |      M = magnitude of dip uncertain
  |       |          |      I = inclined
  |       |          |      V = vertical
  |       |          V      H = horizontal
  |       |
  |       |        x = unknown generation
  |       |        1 = 1st generation
  |       V        2 = 2nd generation
  |
  |  A = Type A
  |  B = Type B
  |  C = Type C
  |  D = Type D
  |
  V
```

F = mineral Foliation Present
(note that this letter is omitted to obtain compositional layering acronyms/symbols without foliation)

Example: "**CLFCXM**" = **C**ompositional **L**ayering (with **F**oliation) of type **C** where the generation is unknown or uncertain (**X**) and dip direction is known but dip **M**agnitude is uncertain

Table 6: Acronym construction for compositional layering.

GENERAL CLEAVAGE

CG

(X,1,2,3) **(T,M,I,V,H)**

```
     |        T = trend only
     |        M = dip magnitude unknown
     |        I = inclined
     |        V = vertical
    V         H = horizontal
```

x = unknown or uncertain generation
1 = 1st generation
2 = 2nd generation
3 = 3rd generation

Example: **CGXI** = **C**leavage, **G**eneral, of unknown generation (**X**), dip **I**nclined

Table 7: Acronym construction for general cleavage.

CRENULATION CLEAVAGE

CC

(U,S,Z,M) (X,2,3) (T,M,I,V,H)

```
     |          |      T = trend
     |          |      M = magnitude of dip uncertain
     |          |      I = inclined
     |          |      V = vertical
     |        V        H = horizontal
     |
     |       X = generation unknown or uncertain
     |       2 = 2nd generation
   V         3 = 3rd generation
```

U = uncertain asymmetry
S = "s" asymmetry
Z = "z" asymmetry
M = symmetric

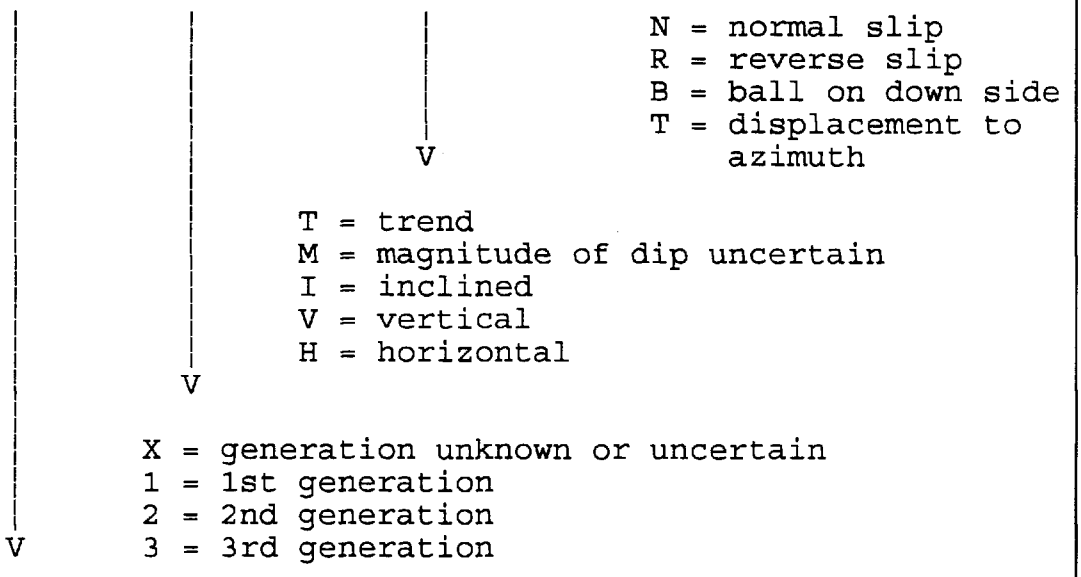
Example: **CCS2T** = **C**renulation **C**leavage plane of with crenulations of "**S**" asymmetry, **2**nd generation, **T**rend only

Table 8: Acronym construction for crenulation cleavage symbols.

DISPLACEMENT CLEAVAGE

CD

(U,D,S) (X,1,2,3) (T,M,I,V,H) (N,R,B,T)



U = uncertain horizontal displacement
D = dextral horizontal displacement
S = sinistral horizontal displacement

Example: **CDS1VB** = **C**leavage **D**isplacement plane with **S**inistral horizontal displacement, **1**st generation, **V**ertical dip with the down side indicated by the **B**all.

Table 9: Acronym construction for displacement cleavage symbols.

FRACTURES

FR

(U,D,S) (X,1,2,3,4,5) (T,M,I,V,H) (N,R,B,T)

N = normal dip slip
R = reverse dip slip
B = ball on down side
T = displacement to azimuth

T = trend
M = magnitude of dip uncertain
I = inclined
V = vertical
H = horizontal

X = generation unknown or uncertain
1 = 1st generation
2 = 2nd generation
3 = 3rd generation
4 = 4th generation
5 = 5th generation

U = uncertain horizontal displacement
D = dextral horizontal displacement
S = sinistral horizontal displacement

Example: **FRD5IN** = **FR**acture plane with **D**extral horizontal displacement, **5**th generation, **I**nclined with a **N**ormal component of displacement.

Table 10: Acronym construction for fracture symbols.

FAULTS

BR = **BR**ittle
BD = **B**rittle - **D**uctile
SH = ductile **SH**ear

(U,D,S) (X,1,2,3) (T,M,I,V,H,H) (N,R,B,T)

N = normal dip slip
R = reverse dip slip
B = ball on down side
T = displacement to azimuth

T = trend
M = magnitude of dip uncertain
I = inclined
V = vertical
H = horizontal

X = generation unknown or uncertain
1 = 1st generation
2 = 2nd generation
3 = 3rd generation

U = uncertain horizontal displacement
D = dextral horizontal displacement
S = sinistral horizontal displacement

Example: **SHD3IN** = Ductile **SH**ear plane with **D**extral horizontal displacement, **3**rd generation, **I**nclined with a **N**ormal component of displacement.

Table 11: Acronym construction for fault symbols.

VEINS

VN

(A,B,C,D,E) (X,1,2,3,4,5) (T,M,I,V,H)

```
    |             |          T = trend only
    |             |          M = magnitude of dip uncertain
    |             |          I = inclined
    |             |          V = vertical
    |            V          H = horizontal
    |
    |       x = unknown generation
    |       1 = 1st generation
    |       2 = 2nd generation
    |       3 = 3rd generation
    |       4 = 4th generation
   V        5 = 5th generation
```

A = type A
B = type B
C = type C
D = type D

Example: "**VNE5I**" = **Vei**N of type **E** and **5**th generation
that is **I**nclined

Table 12: Acronym construction for vein symbols.

IGNEOUS CONTACTS (DYKES AND SILLS)

IGC

(A,B,C,D,E,F) (U,D,S) (T,M,I,V,H)

```
    |             |          T = trend only
    |             |          M = magnitude of dip uncertain
    |             |          I = inclined
    |             |          V = vertical
    |            V          H = horizontal
    |
    |
    |       U = unknown emplacement orientation
    |       D = dyke
   V        S = sill
```

A = type A
B = type B
C = type C
D = type D
E = type E
F = type F

Example: "**IGCFSV**" = **IG**neous **C**ontact for type **F** which is a **S**ill now in a **V**ertical orientation.
(note that if one did not know body was a sill when emplaced, then **U** instead of **S** would be used)

Table 13: Acronym construction for dykes and sills (igneous contacts).

AXIAL SURFACES

AX

(F,K) (S,Z,U,N,M) (X,1,2,3) (T,M,I,V,N)

```
|             |         |          T = trend of surface only
|             |         |          M = magnitude of dip unknown
|             |         |          I = inclined
|             |         |          V = vertical
|             |         |          N = inclined, no plunge
|             |       V |               (asymmetry defined when dip is
|             |         |                 to right of observer)
|             |         |
|             |         |
|             |         |       X = unknown generation
|             |         |       1 = 1st generation
|           V |       V |       2 = 2nd generation
|             |         |       3 = 3rd generation
|             |
|     S = S asymmetry
|     Z = Z asymmetry
|     U = u asymmetry (synform)
|     N = n asymmetry (antiform)
V     M = M asymmetry

F = fold axial surface
K = K axial surface
```

Example: "**AXFM2M**" = **AX**ial surface of a **F**old where the dip direction is known, but the **M**agnitude of dip is uncertain and the fold is a **2**nd generation fold of **M** asymmetry

Table 14: Acronym construction for axial surface symbols.

LINEATIONS

LINF Fold Axis Lineation

(S,Z,u,n,M) (X,1,2,3)
X = unknown generation
1 = 1st generation
2 = 2nd generation
3 = 3rd generation
S = S asymmetry
Z = z asymmery
u = symmetric (synform)
n = symmetric (antiform)
M = symmetric

LINK Kink Axis Lineation

(S,Z,M) (X,1,2,3)
X = unknown generation
1 = 1st generation
2 = 2nd generation
3 = 3rd generation
S = S asymmetry
Z = z asymmery
M = symmetric

LINC Crenulation Lineation

(S,Z,M) (X,2,3)
X = unknown generation
2 = 2nd generation
3 = 3rd generation
S = S asymmetry
Z = z asymmery
M = symmetric

LINP Primary Lineation

(S,V,P)
S = sedimentary
V = volcanic
P = plutonic

LINI Intersection Lineations

(XX,X0,X1,X2,X3,01,02,03,12,13,23)

The letters and/or numbers indicate what planes are intersecting to define lineation.

X = unknown generation
1 = 1st generation
2 = 2nd generation
3 = 3rd generation

LIN Miscellaneous Lineations

(U,B,E,M,SL,SH) (X,1,2,3)
U = undefined
B = boudin neck
E = elongation
M = mineral
SL = slickenside
SH = shattercone
X = unknown generation
1 = 1st generation
2 = 2nd generation
3 = 3rd generation

Table 15: Acronym construction for lineation symbols.

exe FILE	dxf file	FIGURES
symbols.exe	bed_sdvl.dxf	A1
symbols.exe	cvg_cren.dxf	A8
symbols.exe	cvg_dis1.dxf	A9 a
symbols.exe	cvg_dis2.dxf	A9 b
symbols.exe	cvg_genr.dxf	A7
symbols.exe	flt_bri1.dxf	A11 a
symbols.exe	flt_bri2.dxf	A11b
symbols.exe	flt_brd1.dxf	A12 a
symbols.exe	flt_brd2.dxf	A12 b
symbols.exe	flt_duc1.dxf	A13 a
symbols.exe	flt_duc2.dxf	A13 b
symbols.exe	fld_axpf.dxf	A16
symbols.exe	fld_axpk.dxf	A17
symbols.exe	foln_all.dxf	A4
symbols.exe	fractur1.dxf	A10 a
symbols.exe	fractur2.dxf	A10 b
symbols.exe	fractur3.dxf	A10 c
symbols.exe	ignscont.dxf	A15
symbols.exe	lay_comp.dxf	A5
symbols.exe	lay_comf.dxf	A6
symbols.exe	lay_igns.dxf	A2
symbols.exe	linn_all.dxf	A18
symbols.exe	misc.dxf	A19
symbols.exe	paleocur.dxf	A3
symbols.exe	vein.dxf	A14

Table 16: DXF files containing drawings of the symbols as in Figures A1 to A19. See "readme.txt" file on Disk for instructions on retrieving the files from the self-extracting executable file "symbols.exe".

exe FILE	DIRECTORY	FILES
sym_dxf.exe	\bd_ly_cn (bedding_layering _contacts)	bed*.dxf igl*.dxf cl*.dxf igc*.dxf
sym_dxf.exe	\cleavage	cg*.dxf cc*.dxf cd*.dxf
sym_dxf.exe	\faults	ft*.dxf bd*.dxf sh*.dxf
sym_dxf.exe	\ax_surf	axf*.dxf axk*.dxf
sym_dxf.exe	\foln	shp*.dxf igf*.dxf sch*.dxf fol*.dxf
sym_dxf.exe	\fracture	fr*.dxf
sym_dxf.exe	\veins	vn*.dxf
sym_dxf.exe	\linear	lin*.dxf
sym_dxf.exe	\others	br*.dxf dh*.dxf g*.dxf yn*.dxf sf*.dxf st*.dxf jnt*.dxf pc*.dxf outcrp.dxf

Table 17: File locations of DXF drawings of individual symbols. Note that the names of the DXF drawings correspond to the symbol acronyms. See "readme.txt" on the diskette for information on retrieving the files from the self-extracting executable file "sym_dxf.exe".

exe FILE	shx FILE	FIGURES
sym_shx.exe	bed_sdvl.shx	A1
sym_shx.exe	cvg_cren.shx	A8
sym_shx.exe	cvg_disp.shx	A9 a,b
sym_shx.exe	cvg_genr.shx	A7
sym_shx.exe	flt_brit.shx	A11 a,b
sym_shx.exe	flt_brdu.shx	A12 a,b
sym_shx.exe	flt_duct.shx	A13 a,b
sym_shx.exe	fld_axpf.shx	A16
sym_shx.exe	fld_axpk.shx	A17
sym_shx.exe	foln_all.shx	A4
sym_shx.exe	fracture.shx	A10 a,b,c
sym_shx.exe	ignscont.shx	A15
sym_shx.exe	lay_comp.shx	A5
sym_shx.exe	lay_comf.shx	A6
sym_shx.exe	lay_igns.shx	A2
sym_shx.exe	linn_all.shx	A18
sym_shx.exe	misc.shx	A19
sym_shx.exe	paleocur.shx	A3
sym_shx.exe	vein.shx	A14

Table 18: Shape files (SHX) for use in Autocad® with or without Fieldlog®. Note that each file contains the symbols of one of the figures in Appendix A. See "readme.txt" on the diskette for information on how to retrieve the files from the self-extracting executable file "sym_shx.exe".

References

Brodaric, B., (1993) Fieldlog® v2.83b. Geological Survey of Canada, unpublished manuscript. 601 Booth Street, Ottawa, Ontario, K1A 0E8.

Muir, T. (1995) OGS-SYM, A Library of Bedrock Mapping Symbols. Part 2: Appendix B (Listing and explanation of symbol acronyms). Ontario Geological Survey, Open File Report, 5910.

APPENDIX A

Figures A1-A19

Organization of Symbol Figures

In general, the columns of the figures represent a subdivisions based on dip value and the rows represent subdivisions based on one of "type", symmetry, or dip-component of separation. More than one matrix chart is present for symbol classes where there are more than two subdividing parameters. Perhaps the most complex set of symbol charts is that for faults. Faults are subdivided according into 1 of 3 types (brittle, brittle-ductile, or ductile) which are in turn subdivided into 1 of 3 horizontal components of separation (unknown, dextral, or sinistral) and 1 of 4 generations (unknown, 1st, 2nd, or 3rd). Consequently there are 3 x 3 x 4 = 36 matrices for faults, each of which is subdivided into rows according to dip value and columns according to dip-component of separation.

FIGURE A1: BEDDING -- SEDIMENTARY AND VOLCANIC (BED)

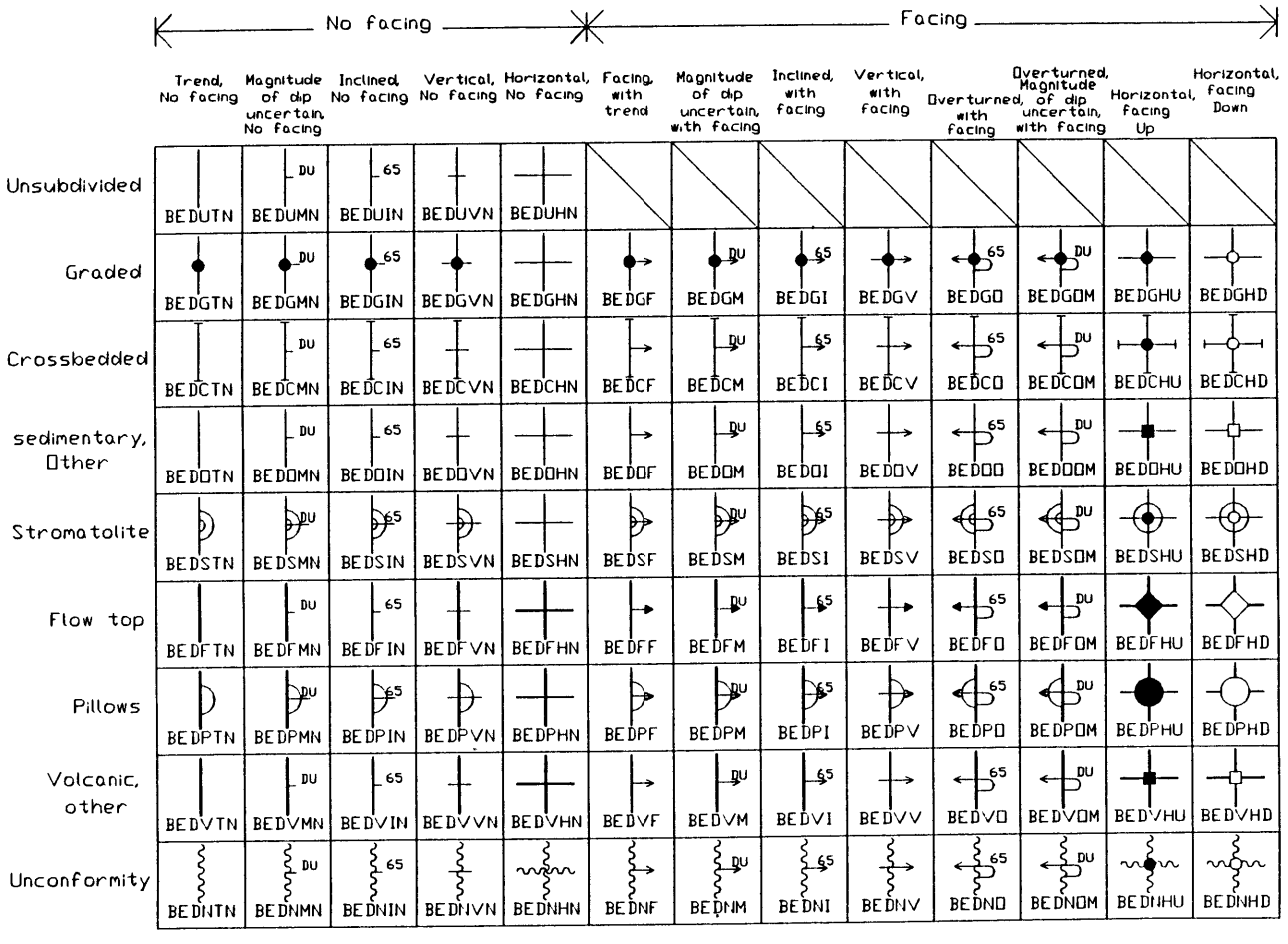


FIGURE A2: IGNEOUS LAYERING (IGL)

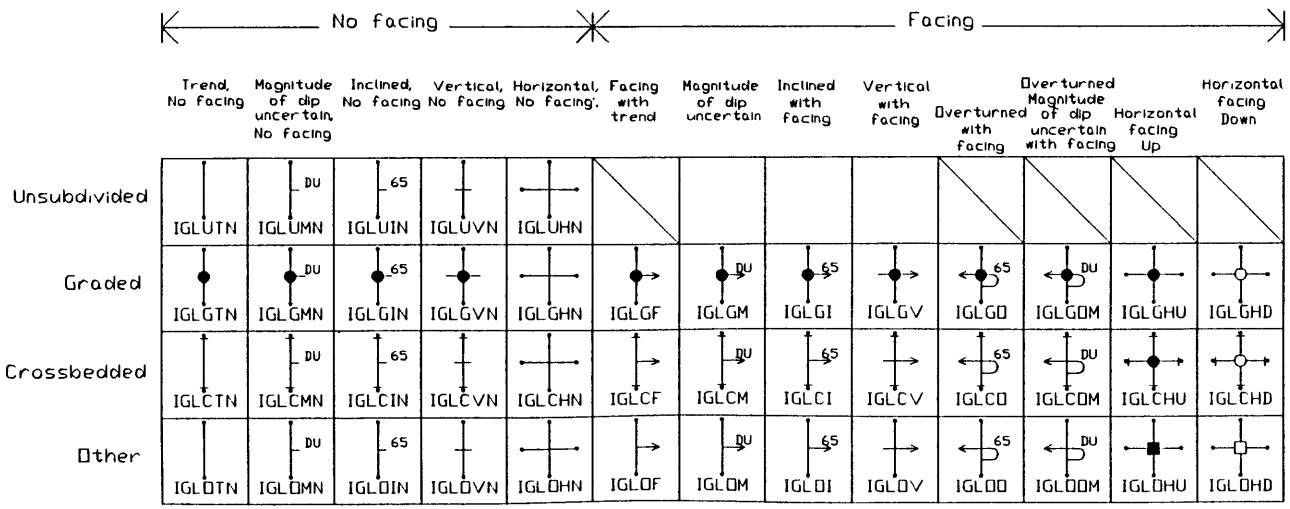


FIGURE A3: PALEOCURRENT (PC)

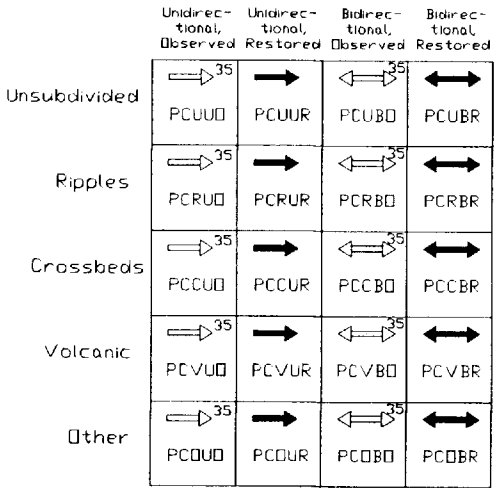
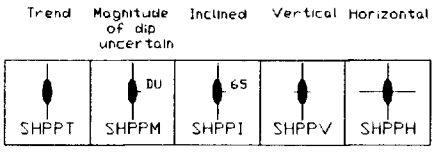
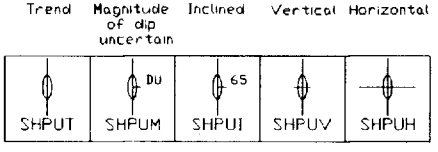


FIGURE A4: FOLIATIONS (FOL; IGF; SCH; SHP)

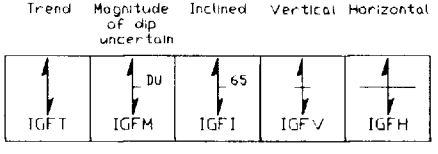
PRIMARY SHAPE FOLIATION



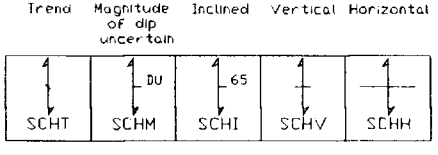
UNCERTAIN ORIGIN SHAPE FOLIATION



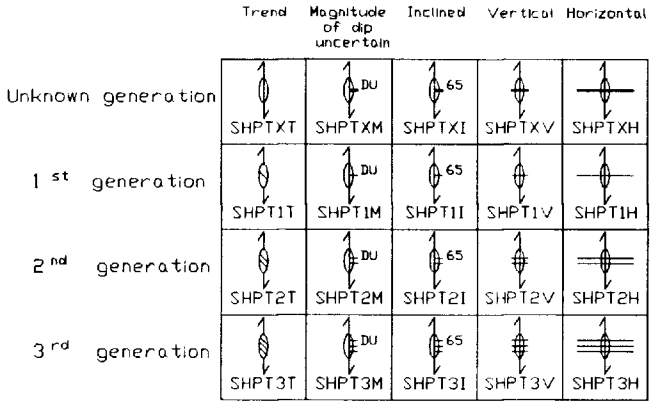
PRIMARY IGNEOUS FOLIATION



SCHISTOSITY



TECTONIC SHAPE FOLIATION



MINERAL FOLIATION

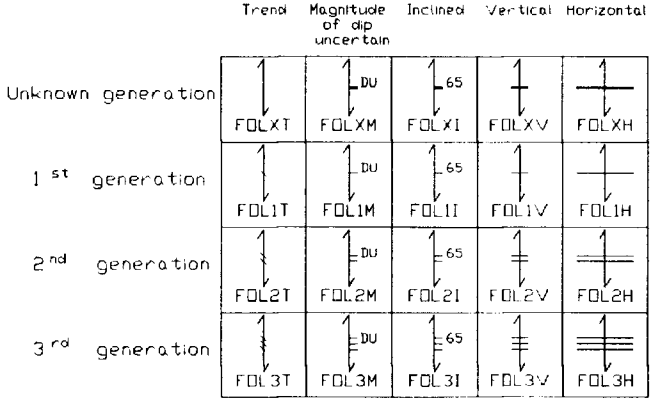
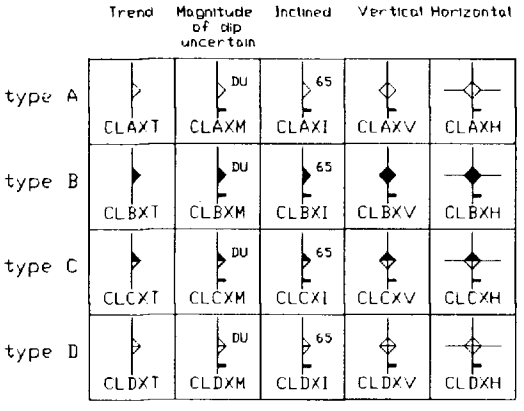
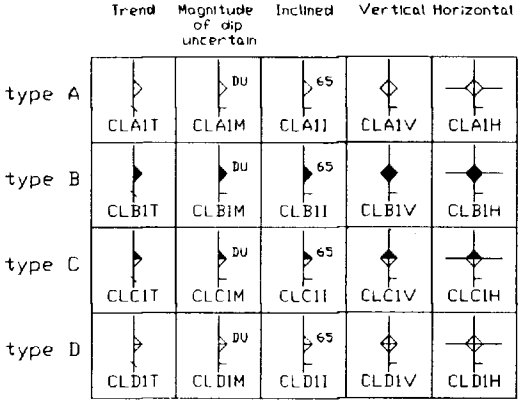


FIGURE A5: COMPOSITIONAL LAYERING (CL)

Unknown generation



1st generation



2nd generation

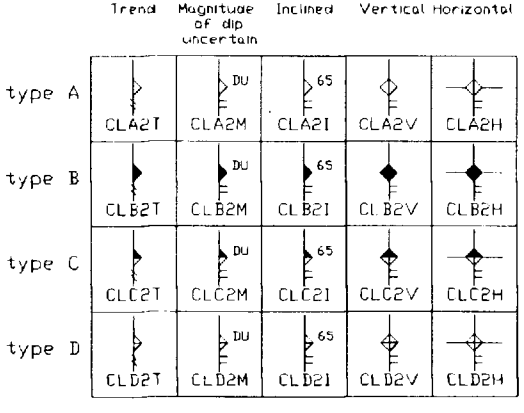
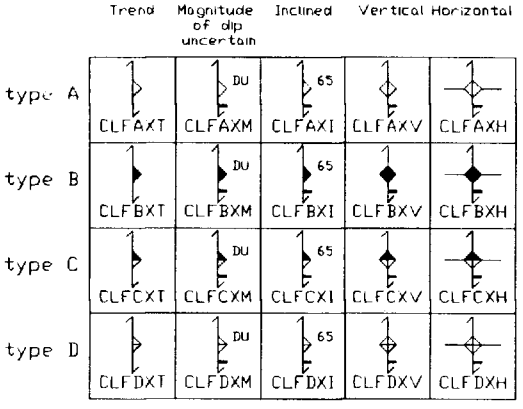
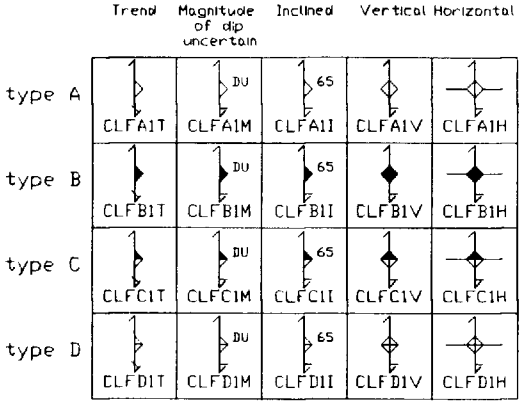


FIGURE A6: COMPOSITIONAL LAYERING AND PARALLEL TECTONIC FOLIATION (CLF)

Unknown generation



1st generation



2nd generation

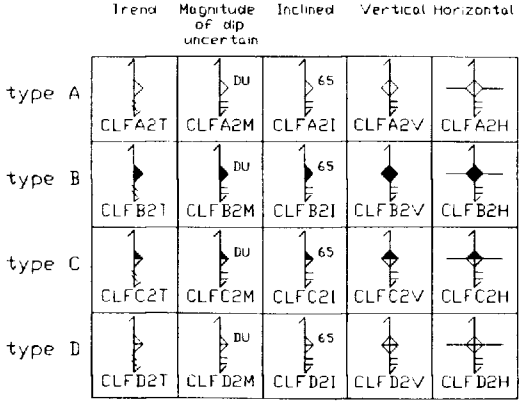


FIGURE A7: GENERAL CLEAVAGE (CG)

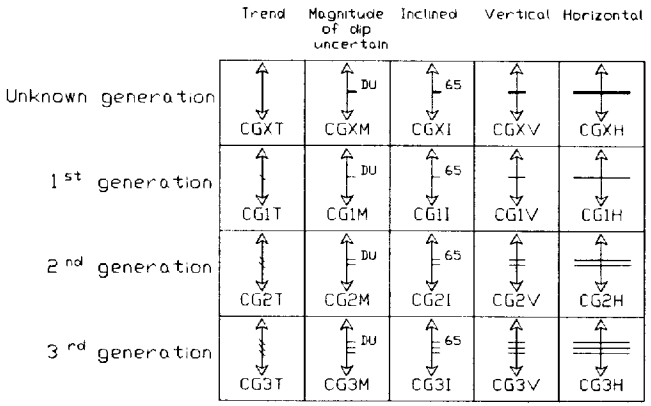
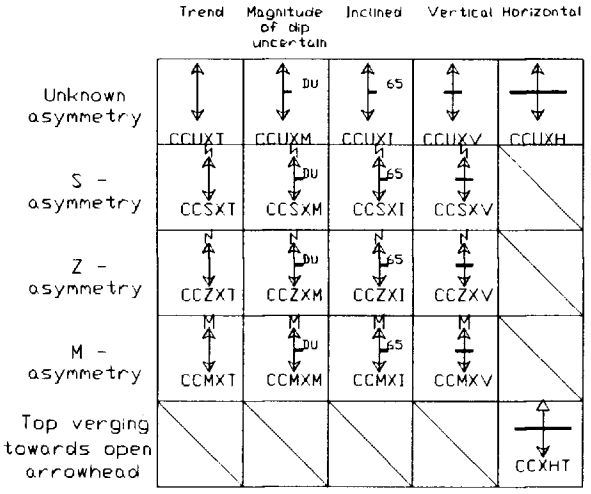
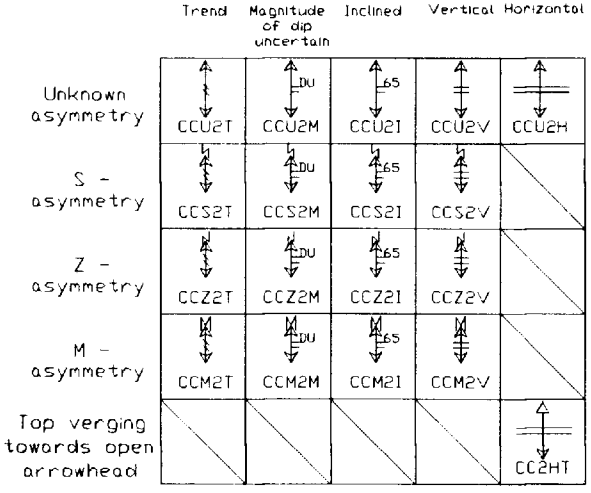


FIGURE A8: CRENULATION CLEAVAGE (CC)

Unknown generation



2nd generation



3rd generation

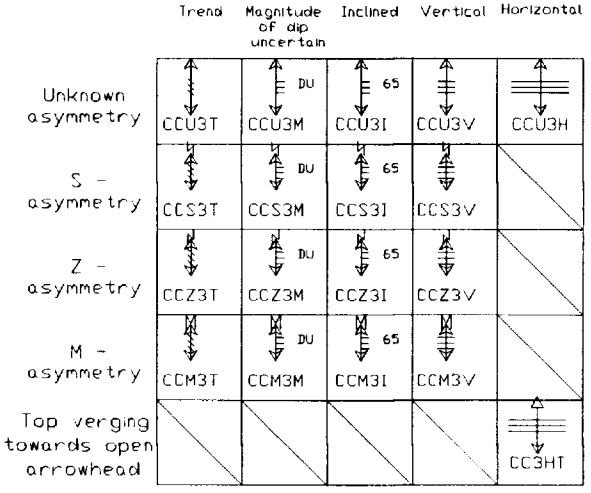


FIGURE A9a: DISPLACEMENT CLEAVAGE (CD) (1 of 2)

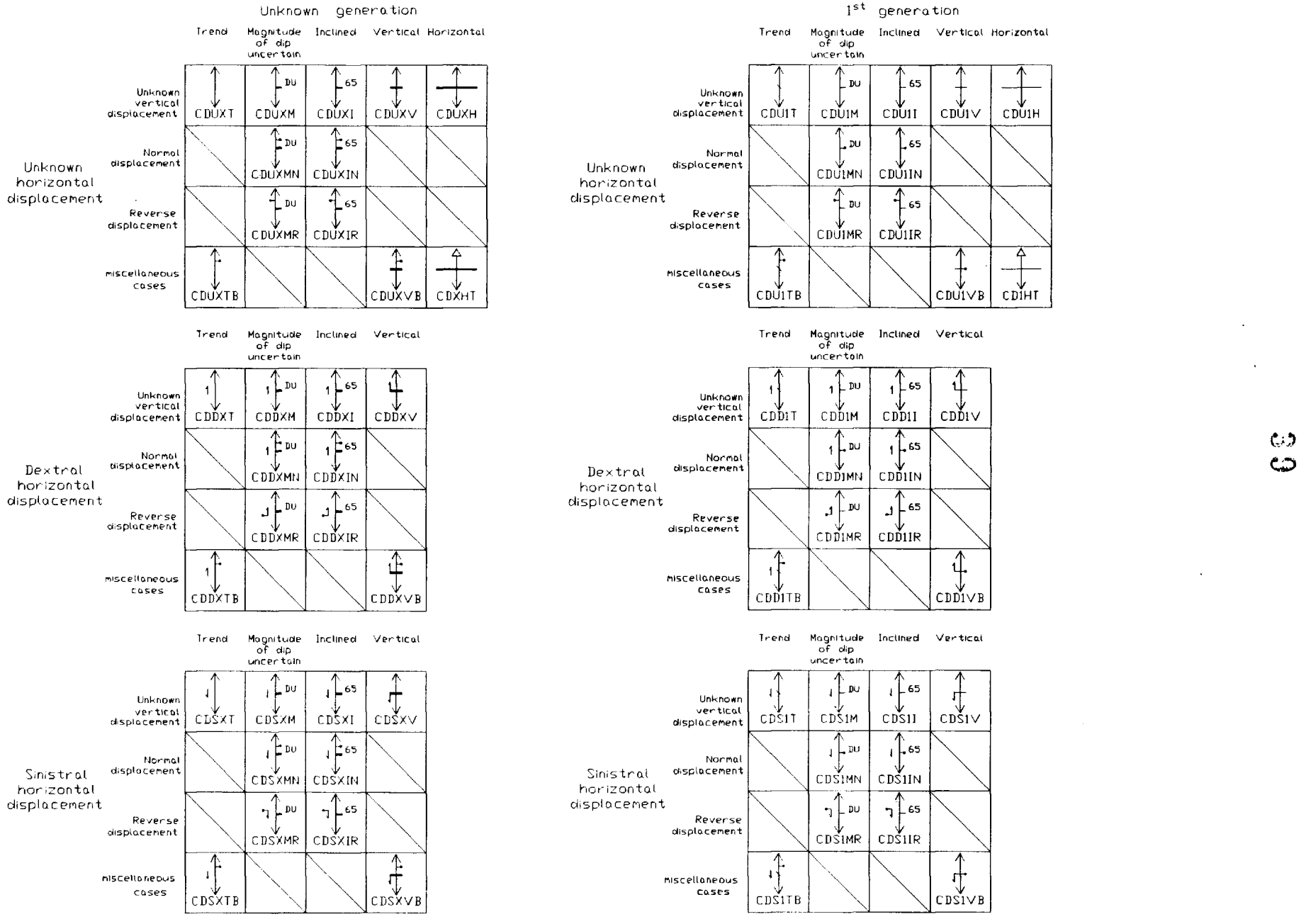


FIGURE A9b: DISPLACEMENT CLEAVAGE (CD) (2 of 2)

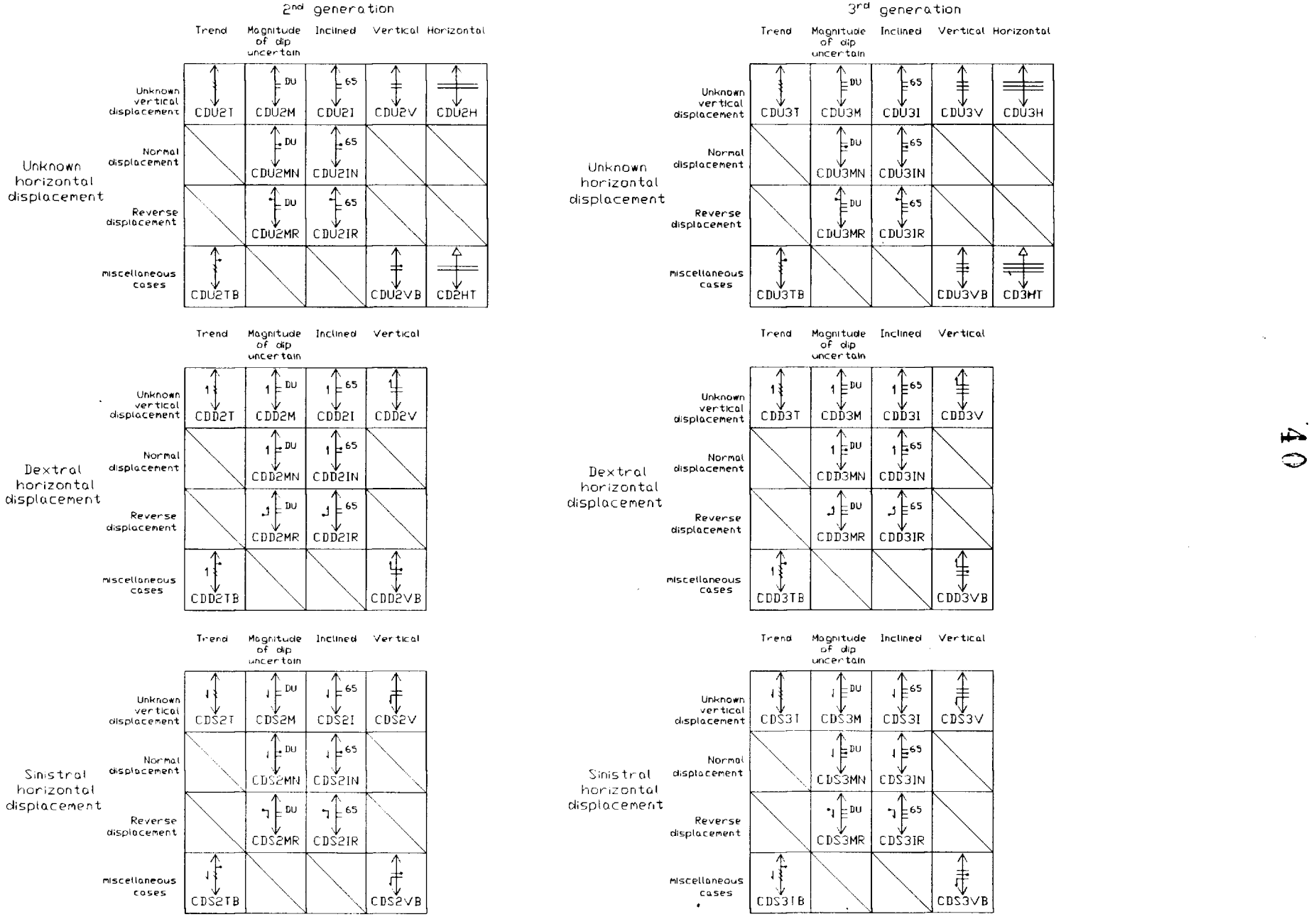


FIGURE A10a: FRACTURES (FR) (1 of 3)

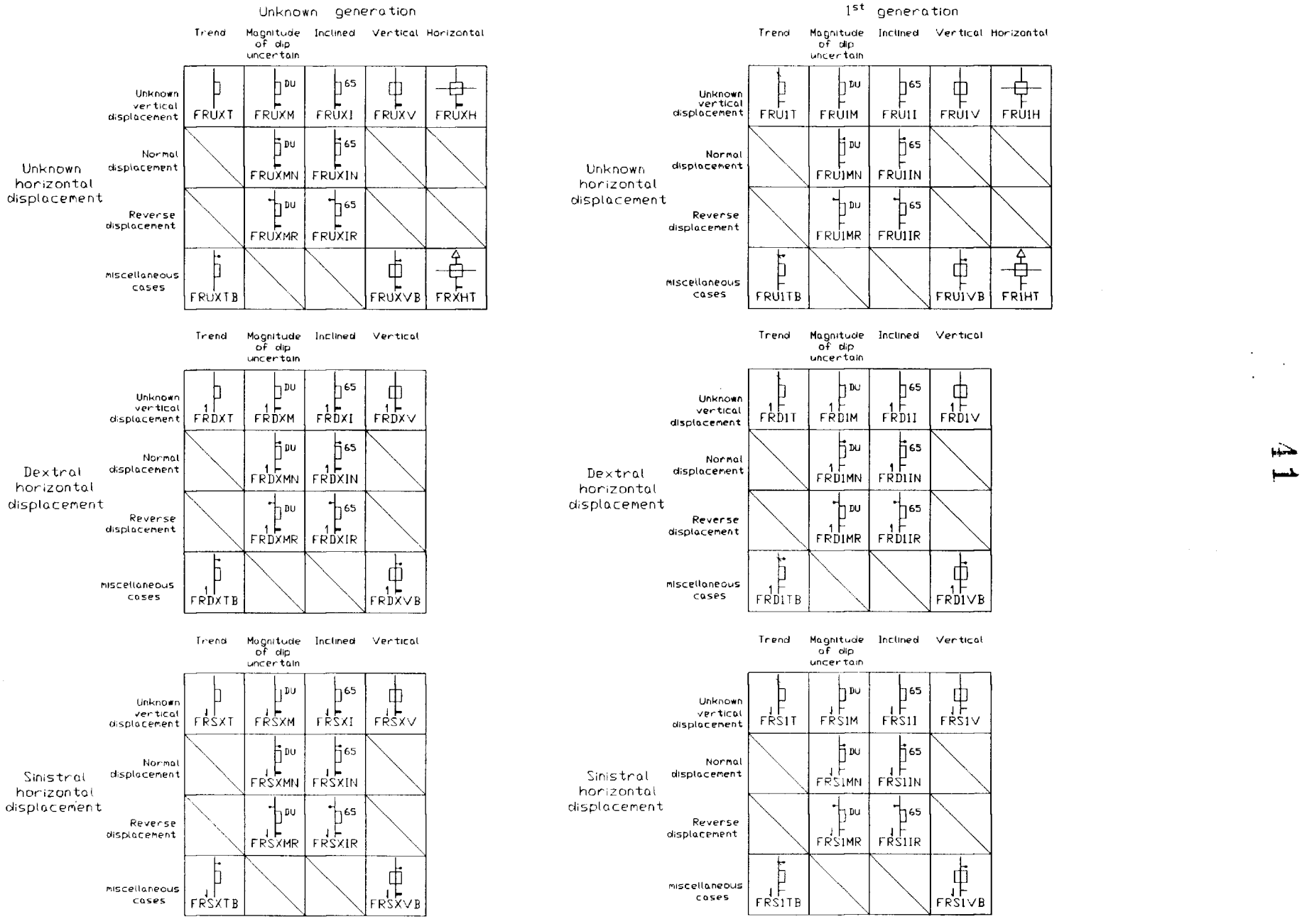


FIGURE A10b: FRACTURES (FR) (2 of 3)

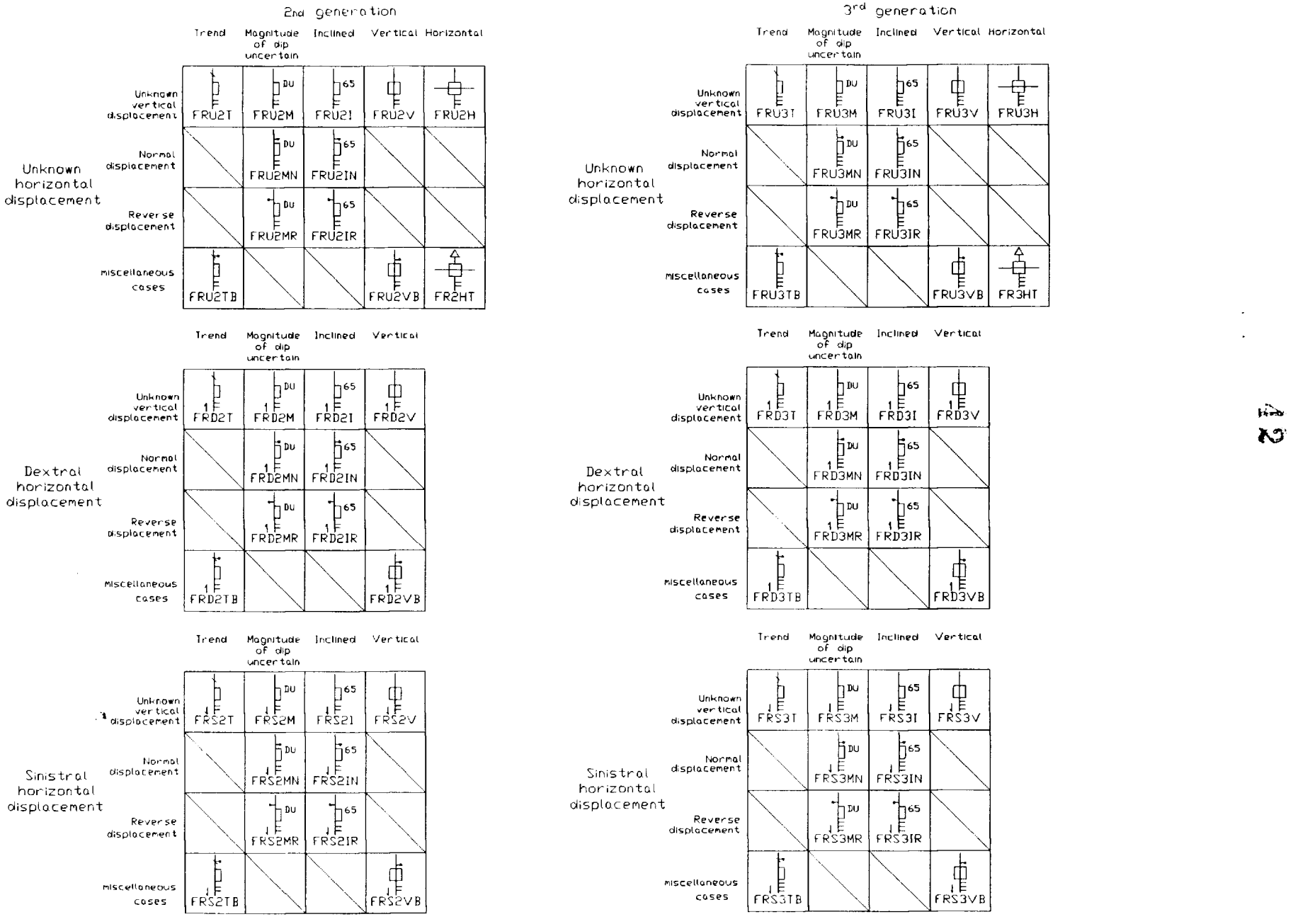


FIGURE A10c: FRACTURES (FR) (3 of 3)

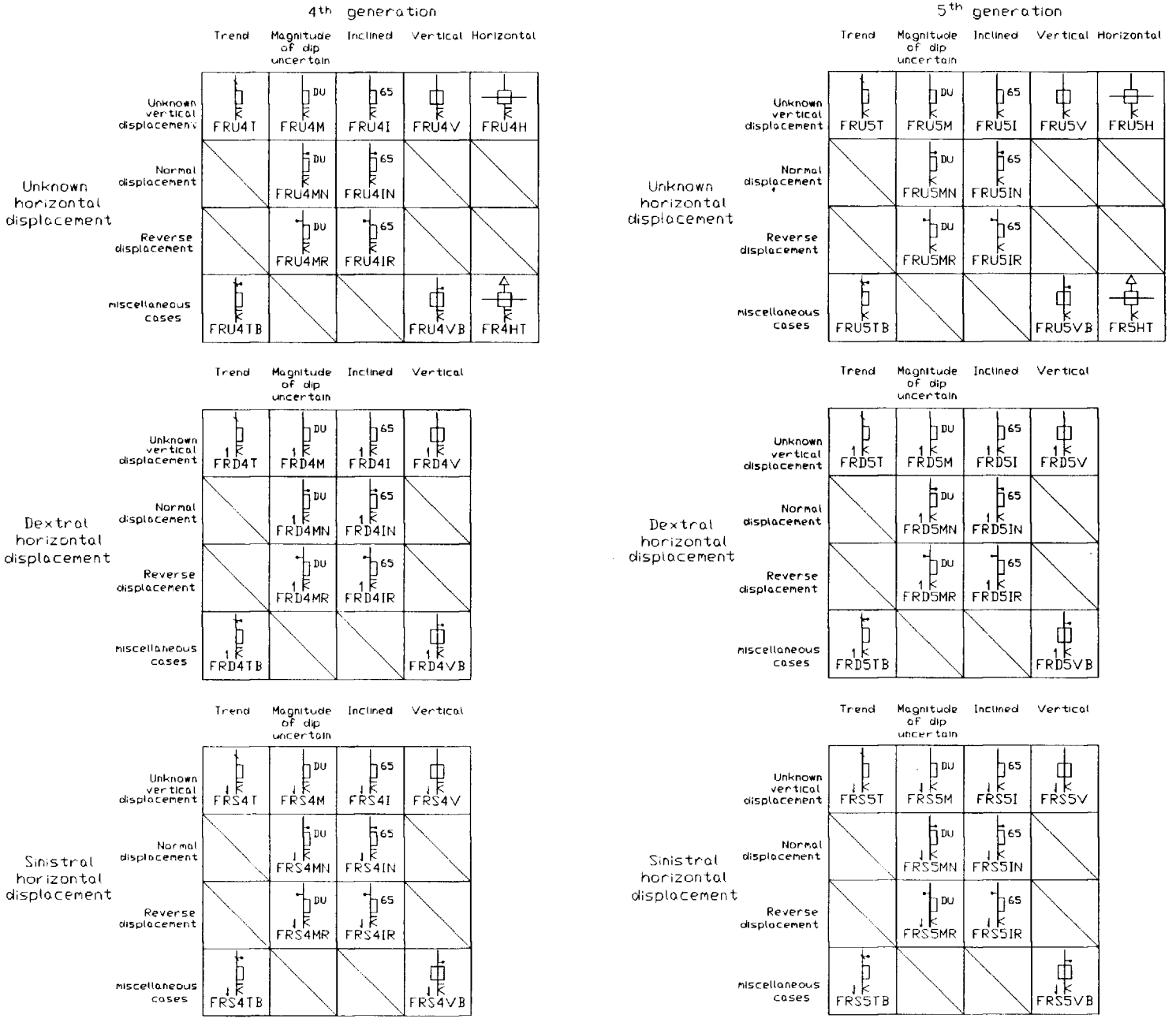


FIGURE A11a: BRITTLE FAULTS (FT) (1 of 2)

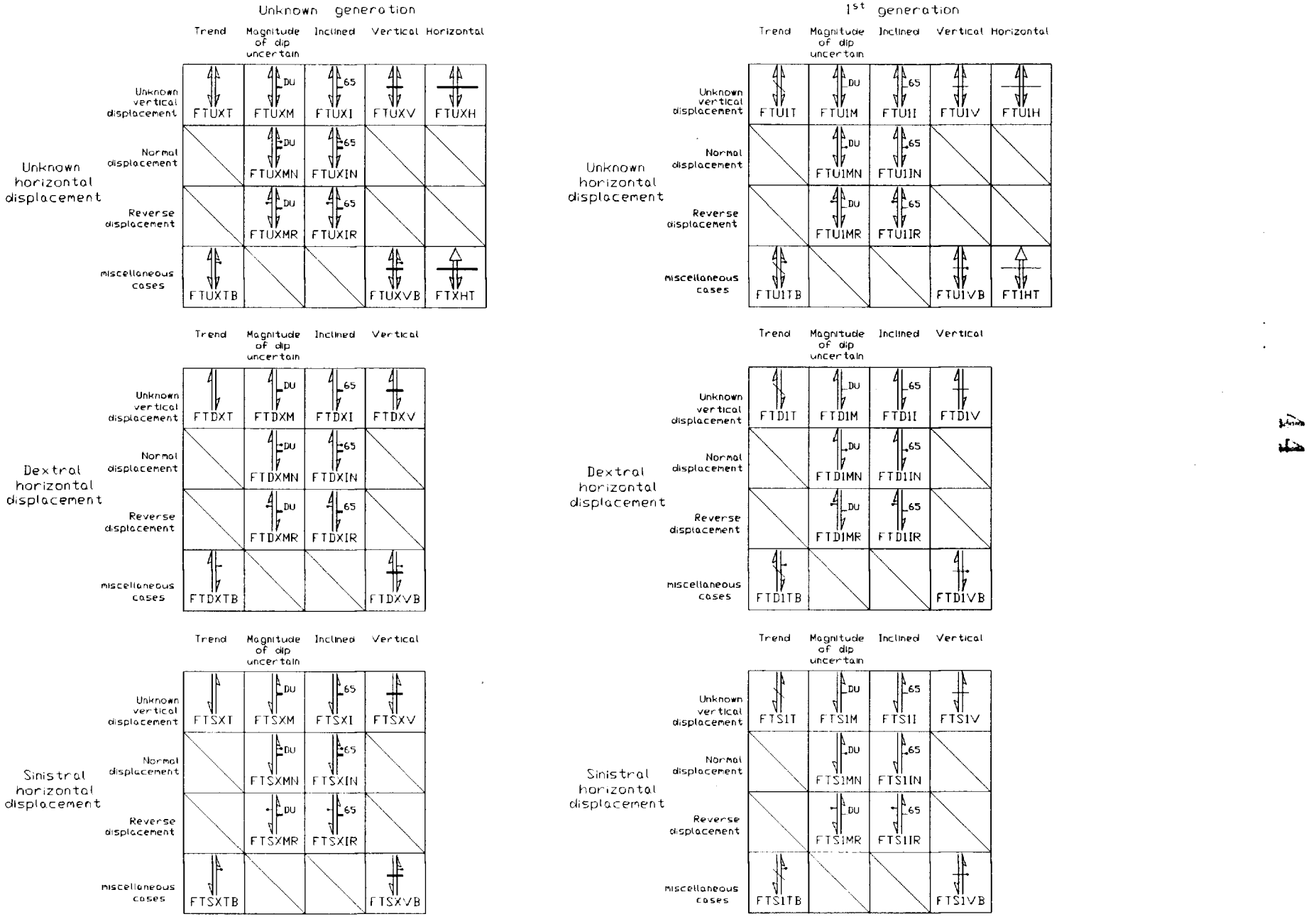


FIGURE A11b: BRITTLE FAULTS (FT) (2 of 2)

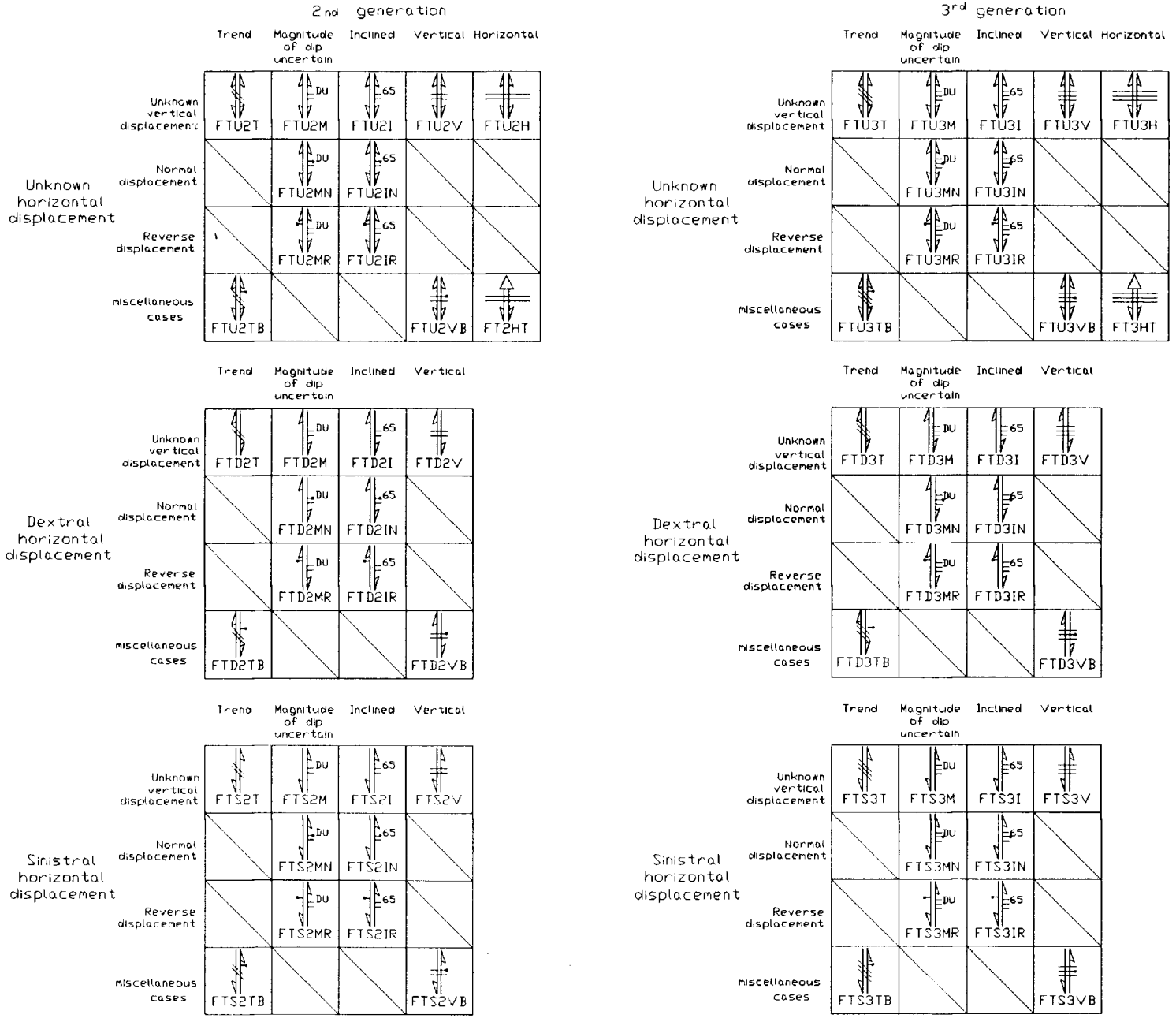


FIGURE A12a: BRITTLE-DUCTILE FAULTS (BD) (1 of 2)

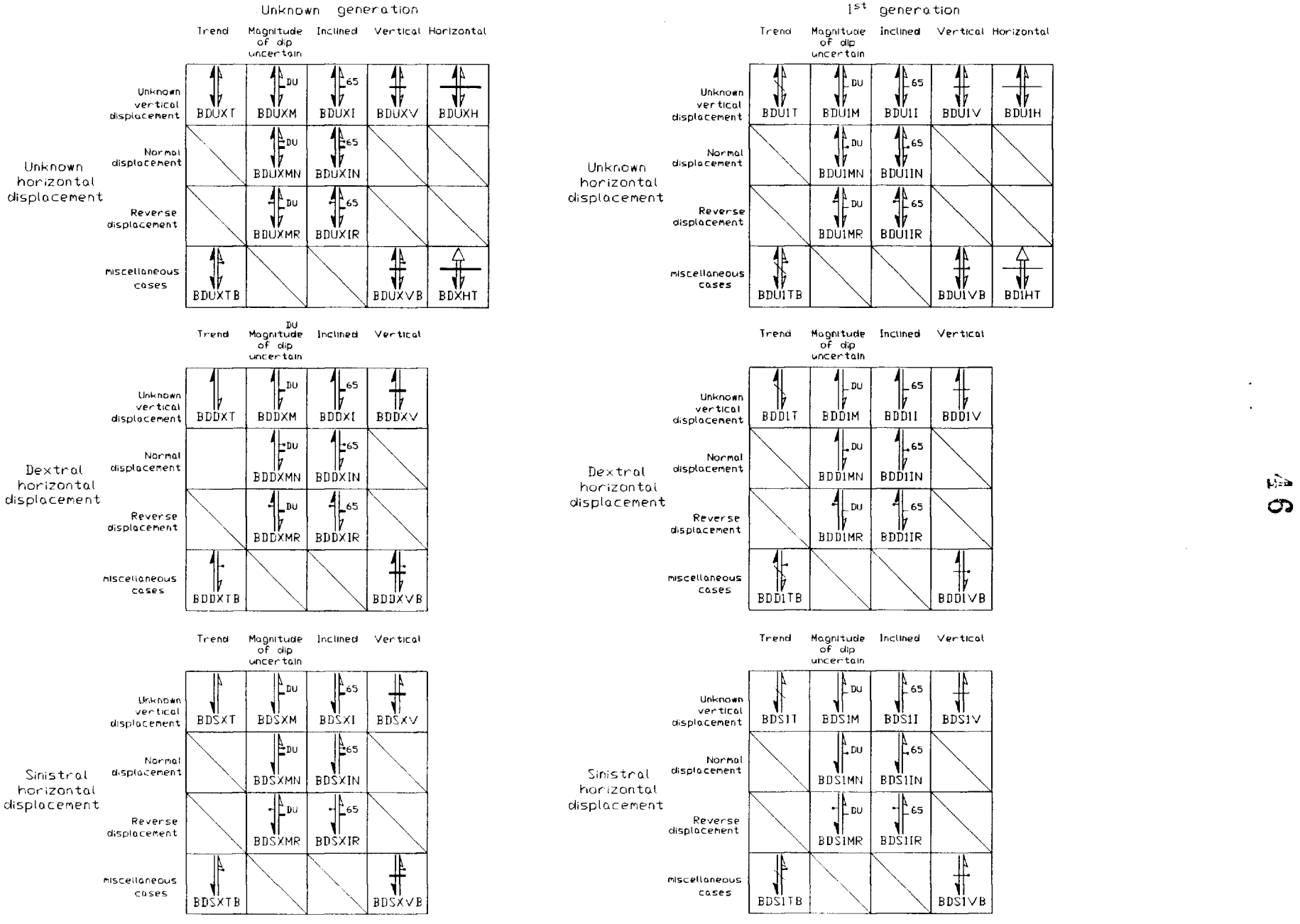


FIGURE A12b: BRITTLE-DUCTILE FAULTS (BD) (2 of 2)

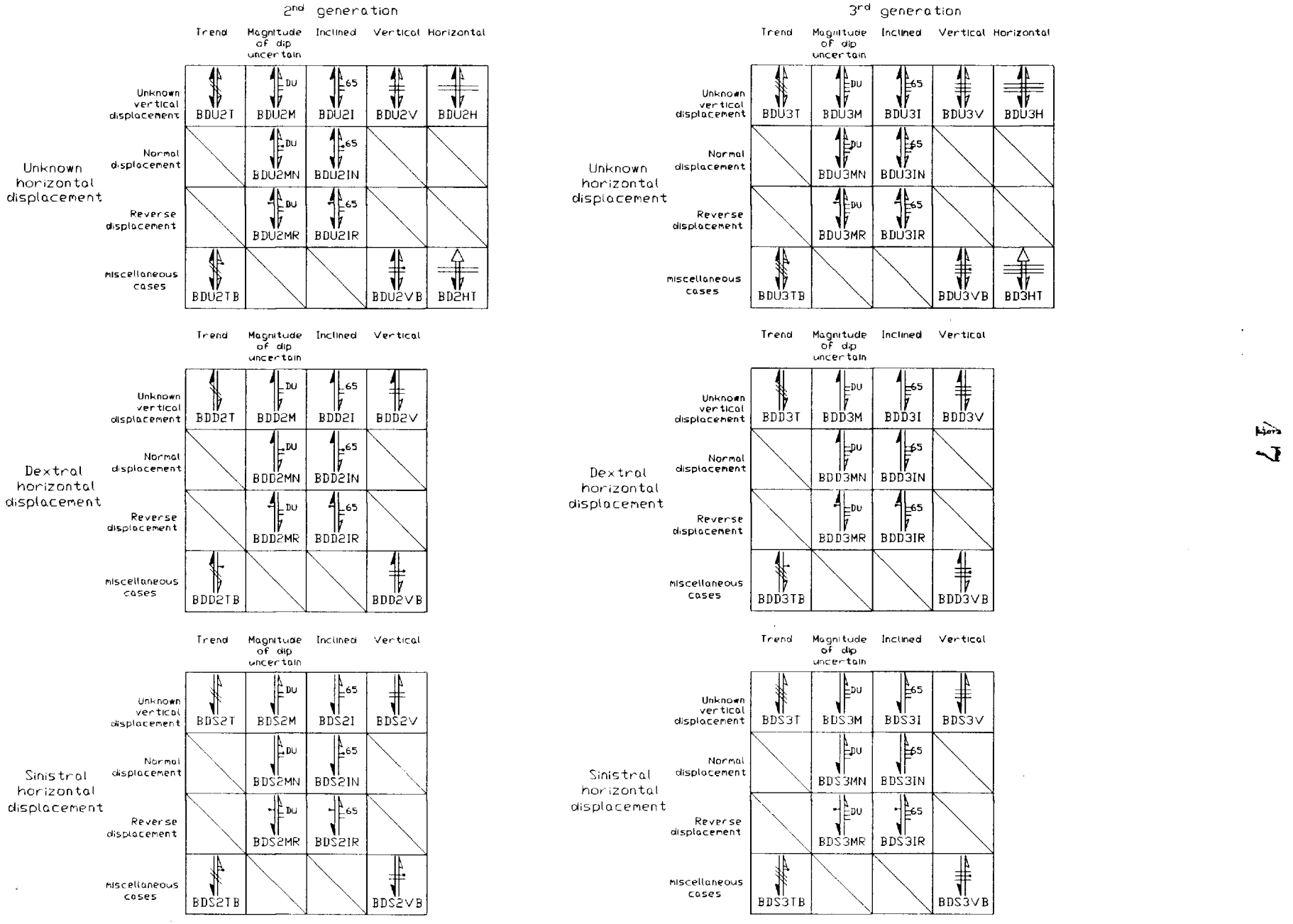


FIGURE A13a: DUCTILE FAULTS -- SHEARS (SH) (1 of 2)

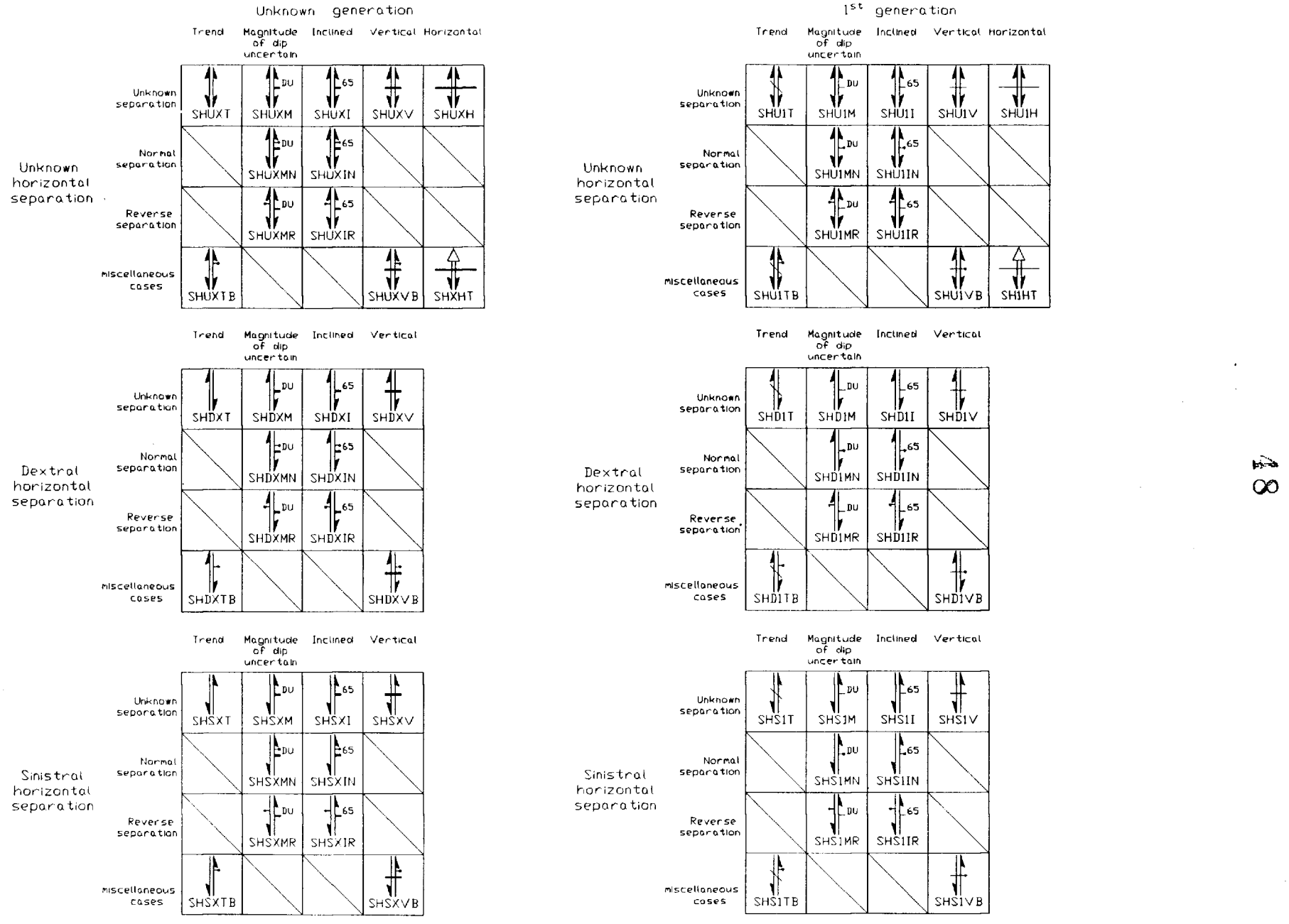


FIGURE A13b: DUCTILE FAULTS -- SHEARS (SH) (2 of 2)

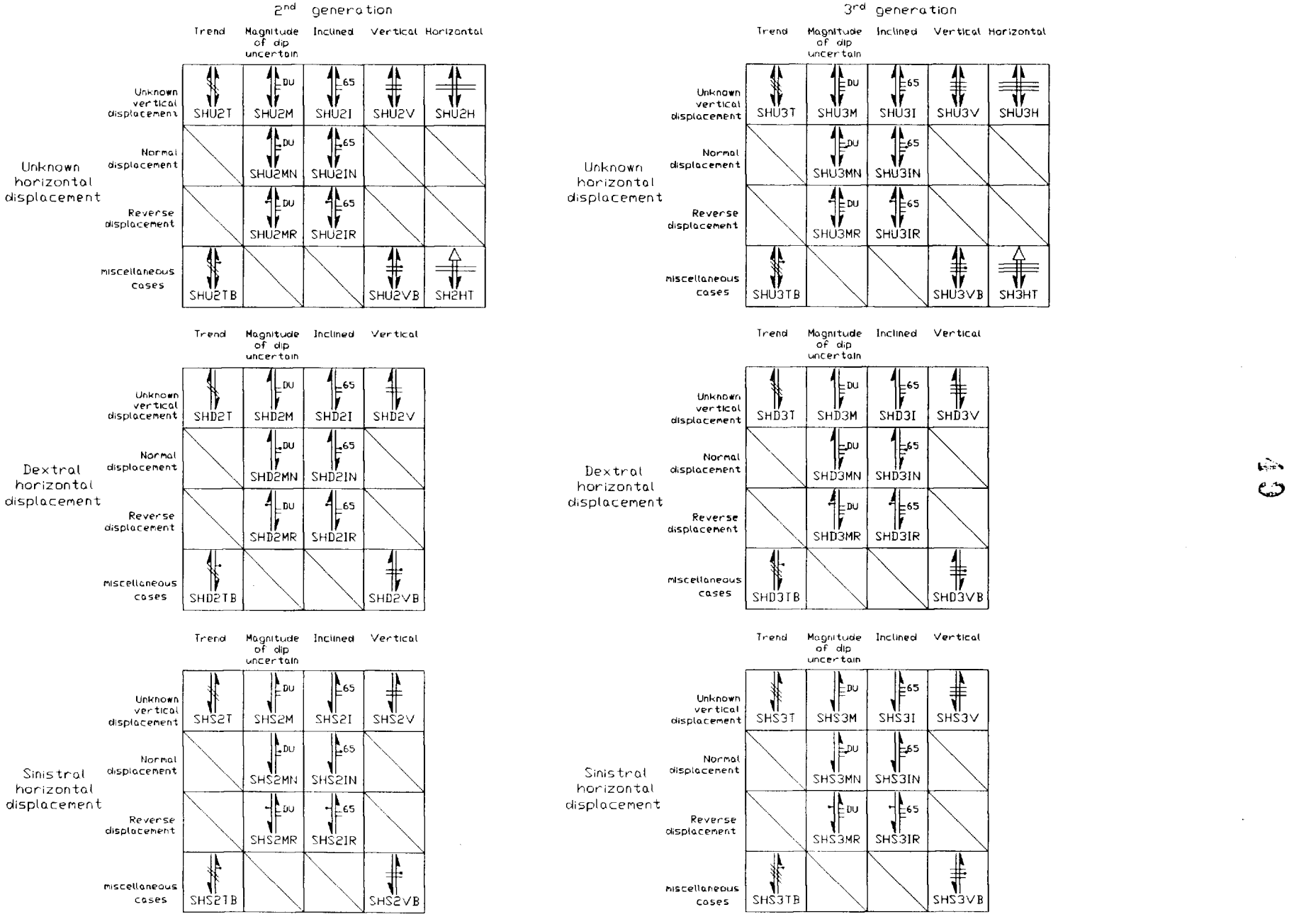


FIGURE A14: VEINS (VN)

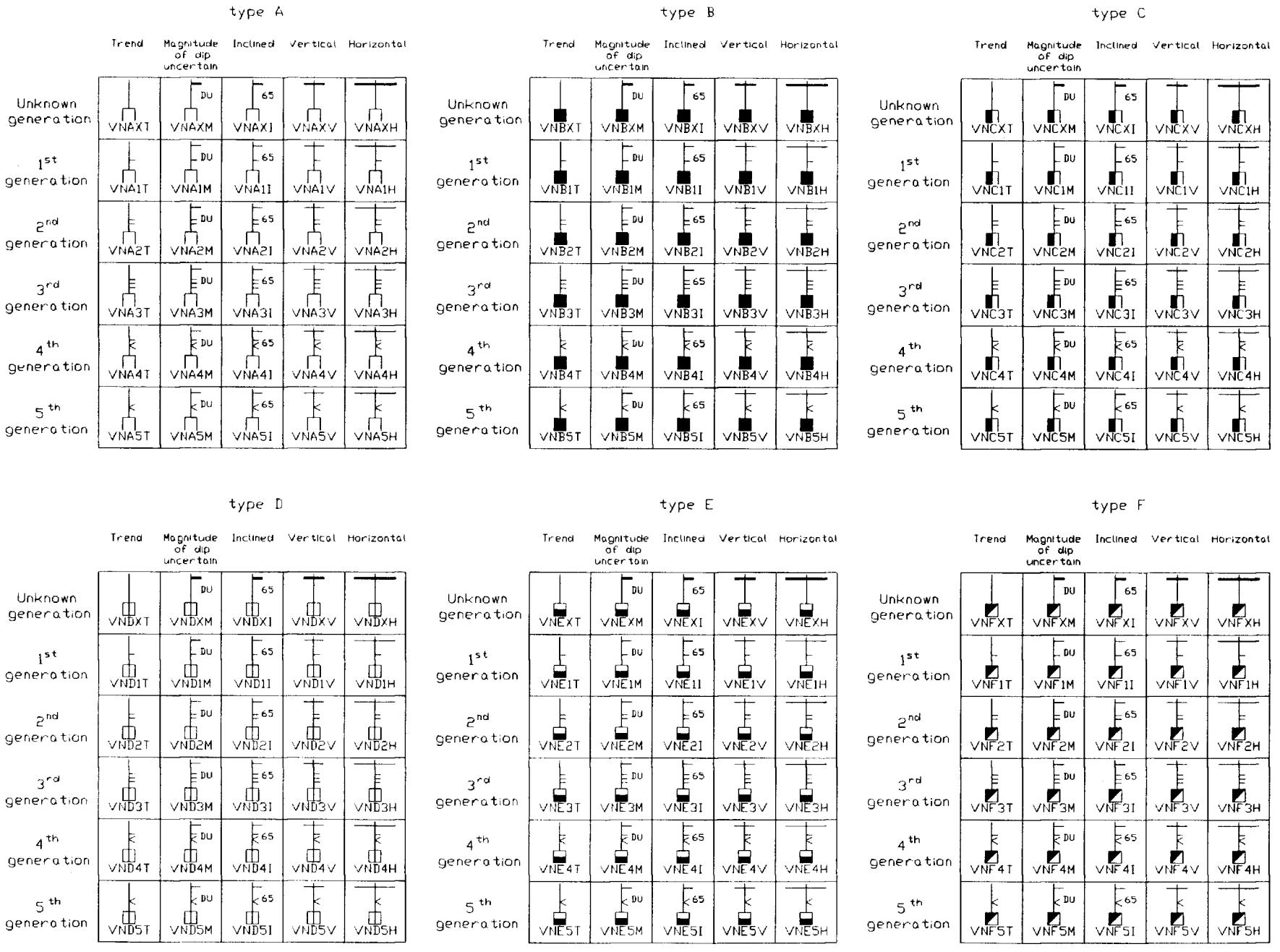
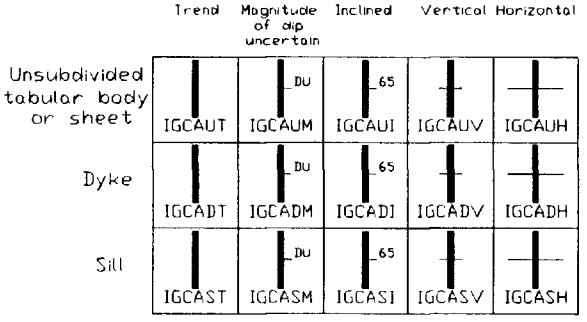
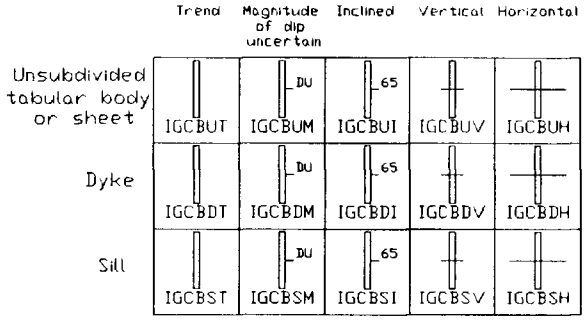


FIGURE A15: IGNEOUS CONTACTS (IGC)

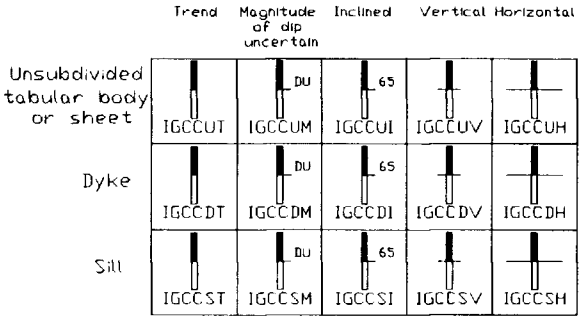
type A



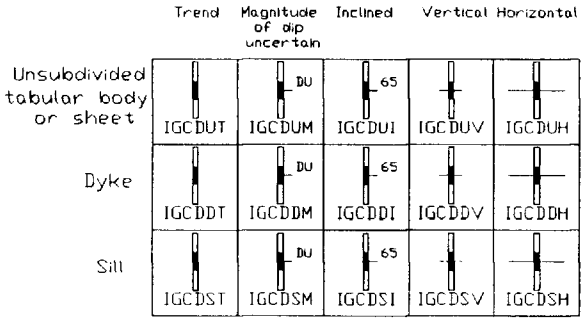
type B



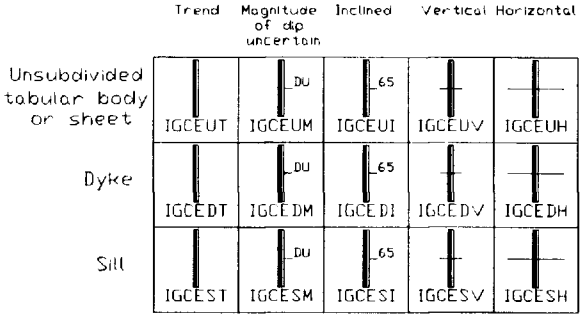
type C



type D



type E



type F

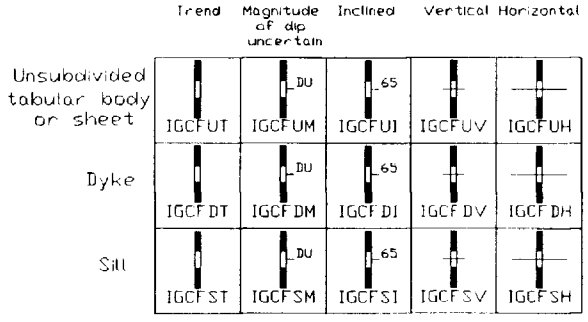


FIGURE A16: AXIAL PLANES of FOLDS (AXF)

Unknown generation

	Trend	Magnitude of dip uncertain	Inclined	Vertical	No plunge, inclined
S - asymmetry	AXFSXT	AXFSXM	AXFSXI	AXFSXV	AXFSXN
Z - asymmetry	AXFZXT	AXFZXM	AXFZXI	AXFZXV	AXFZXN
U - asymmetry	AXFUXT	AXFUXM	AXFUXI	AXFUXV	AXFUXN
N - asymmetry	AXFNXT	AXFNXM	AXFNXI	AXFNXV	AXFNXN
M - asymmetry	AXFMXT	AXFMXM	AXFMXI	AXFMXV	AXFMXN

1st generation

	Trend	Magnitude of dip uncertain	Inclined	Vertical	No plunge, inclined
S - asymmetry	AXFS1T	AXFS1M	AXFS1I	AXFS1V	AXFS1N
Z - asymmetry	AXFZ1T	AXFZ1M	AXFZ1I	AXFZ1V	AXFZ1N
U - asymmetry	AXFU1T	AXFU1M	AXFU1I	AXFU1V	AXFU1N
N - asymmetry	AXFN1T	AXFN1M	AXFN1I	AXFN1V	AXFN1N
M - asymmetry	AXFM1T	AXFM1M	AXFM1I	AXFM1V	AXFM1N

2nd generation

	Trend	Magnitude of dip uncertain	Inclined	Vertical	No plunge, inclined
S - asymmetry	AXFS2T	AXFS2M	AXFS2I	AXFS2V	AXFS2N
Z - asymmetry	AXFZ2T	AXFZ2M	AXFZ2I	AXFZ2V	AXFZ2N
U - asymmetry	AXFU2T	AXFU2M	AXFU2I	AXFU2V	AXFU2N
N - asymmetry	AXFN2T	AXFN2M	AXFN2I	AXFN2V	AXFN2N
M - asymmetry	AXFM2T	AXFM2M	AXFM2I	AXFM2V	AXFM2N

3rd generation

	Trend	Magnitude of dip uncertain	Inclined	Vertical	No plunge, inclined
S - asymmetry	AXFS3T	AXFS3M	AXFS3I	AXFS3V	AXFS3N
Z - asymmetry	AXFZ3T	AXFZ3M	AXFZ3I	AXFZ3V	AXFZ3N
U - asymmetry	AXFU3T	AXFU3M	AXFU3I	AXFU3V	AXFU3N
N - asymmetry	AXFN3T	AXFN3M	AXFN3I	AXFN3V	AXFN3N
M - asymmetry	AXFM3T	AXFM3M	AXFM3I	AXFM3V	AXFM3N

FIGURE A17: AXIAL PLANES of KINK FOLDS (AXK)

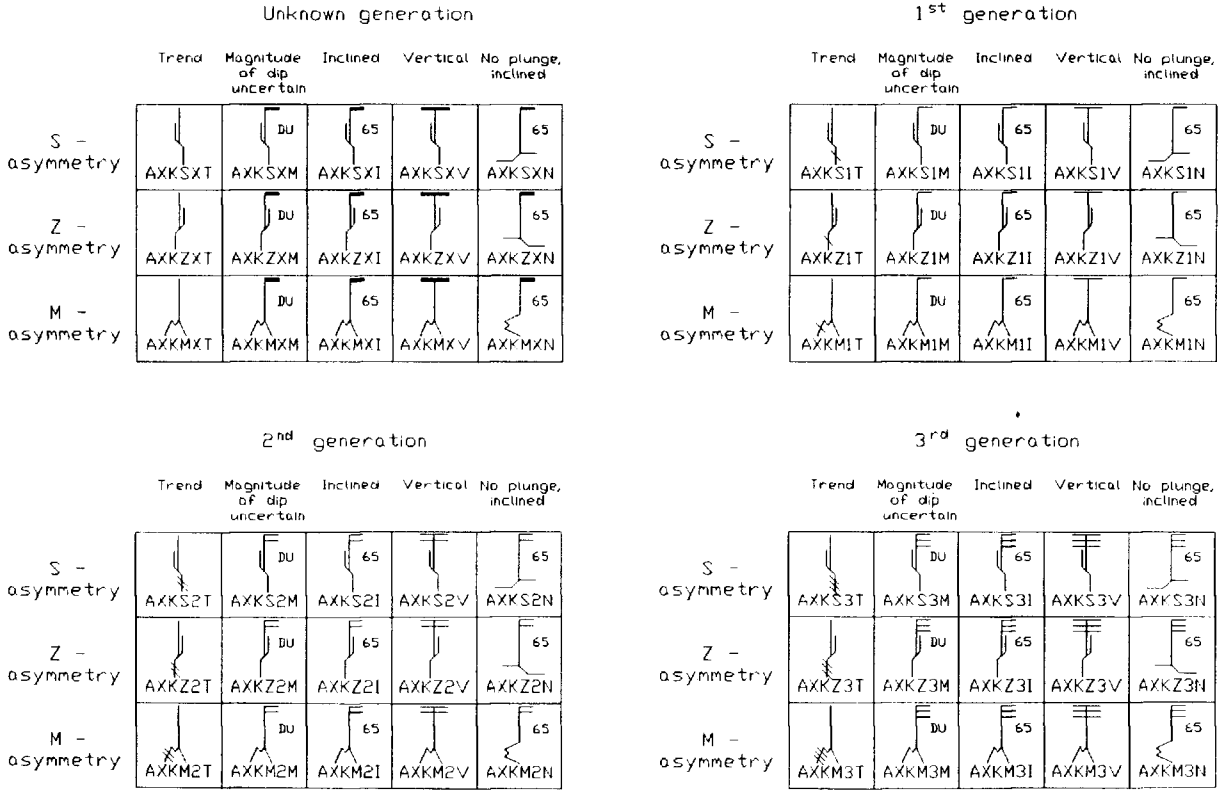
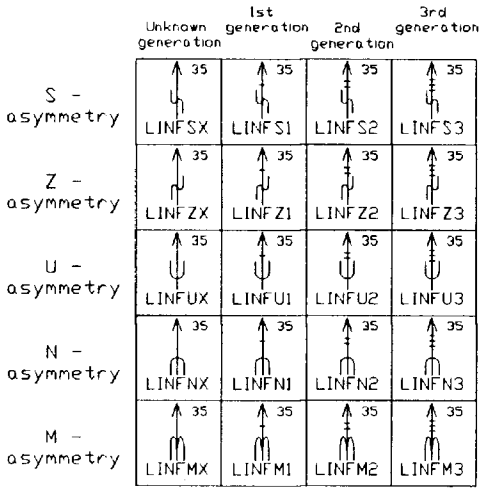
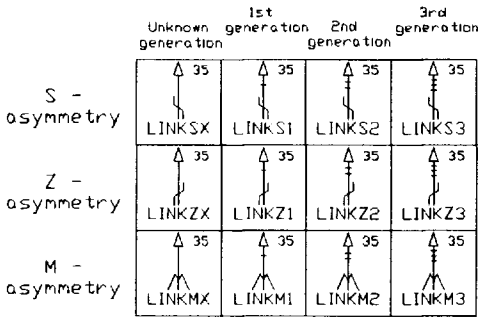


FIGURE A18: LINEATIONS (LIN)

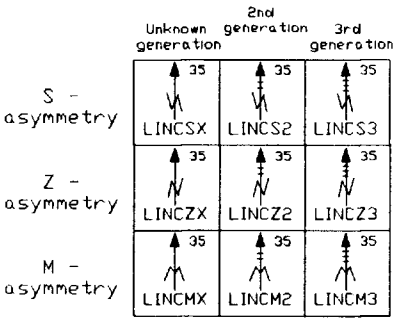
FOLD AXIS -



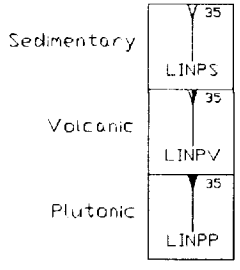
KINK FOLD AXIS



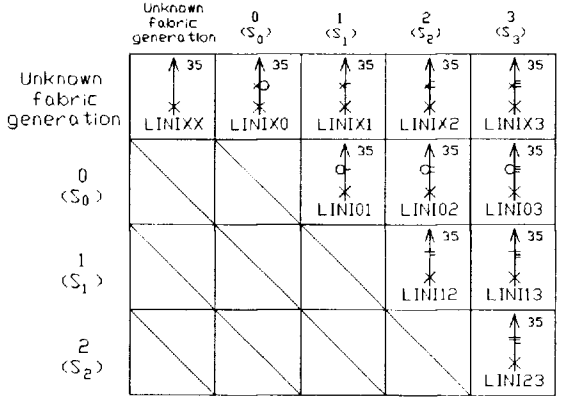
CRENULATION



PRIMARY



INTERSECTION



OTHER

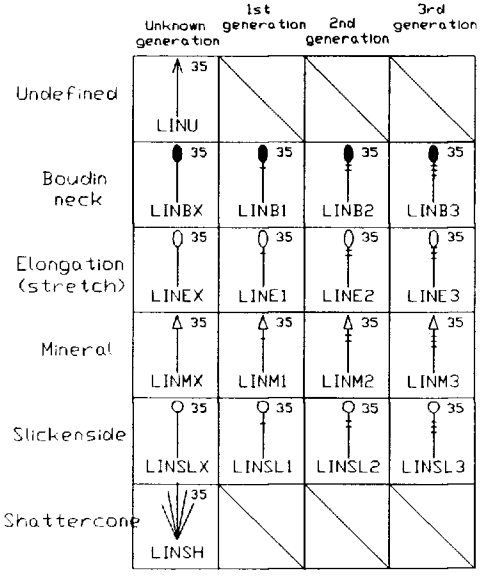
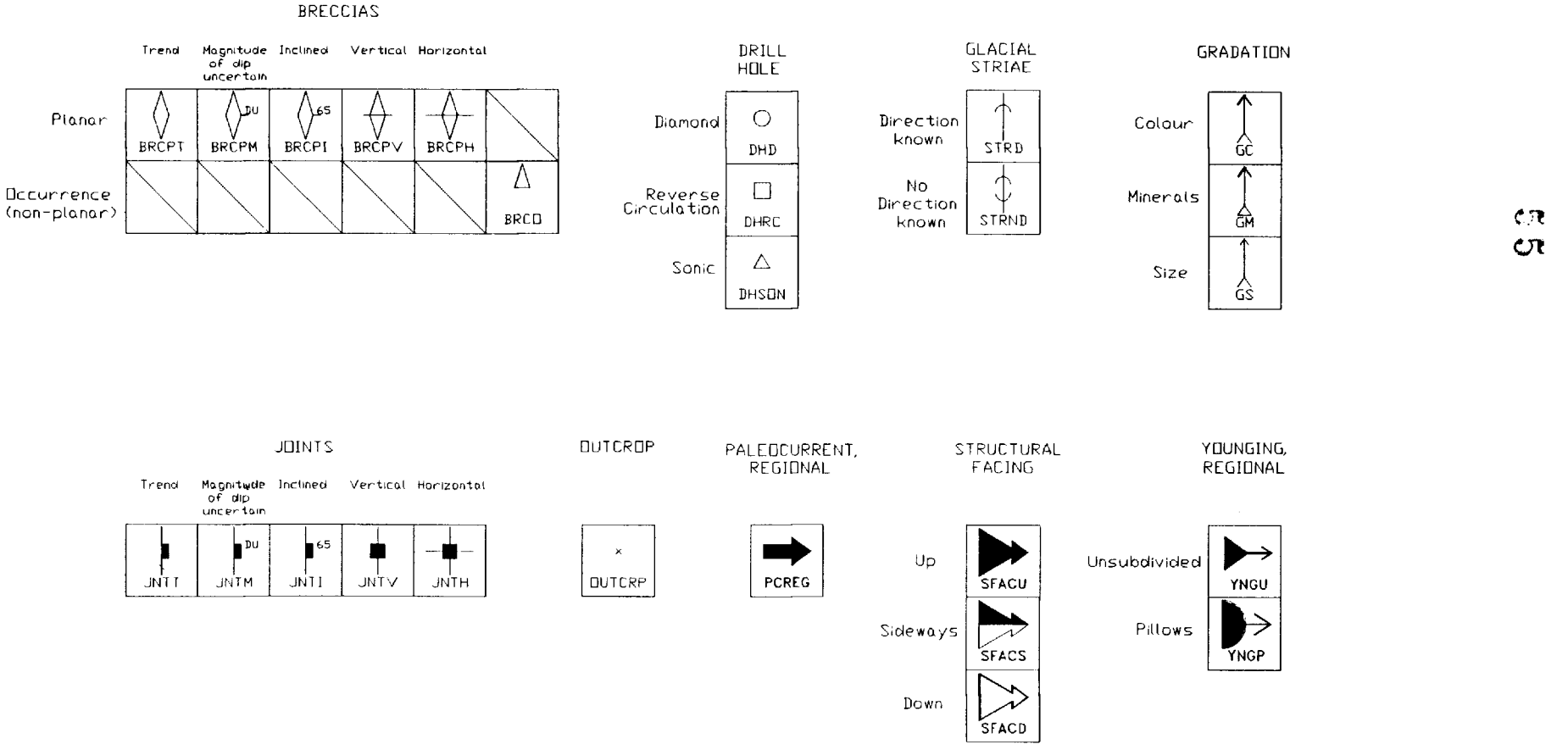


FIGURE A19: MISCELLANEOUS FEATURES



CONVERSION FACTORS FOR MEASUREMENTS IN ONTARIO GEOLOGICAL SURVEY PUBLICATIONS

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
			LENGTH		
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709 7	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
			AREA		
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
			VOLUME		
1 cm^3	0.061 02	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.308 0	cubic yards	1 cubic yard	0.764 555	m^3
			CAPACITY		
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
			MASS		
1 g	0.035 273 96	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 75	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 62	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 908 8**	t
			CONCENTRATION		
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

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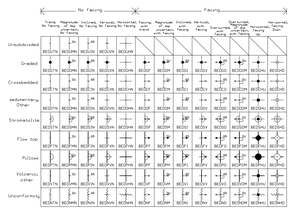
OGS LIBRARY OF DIGITAL BEDROCK MAPPING SYMBOLS

BEDDING

SEDIMENTARY; VOLCANIC

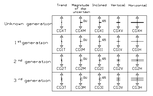
FIGURE A1: BEDDING -- SEDIMENTARY AND VOLCANIC (BED)



CLEAVAGE

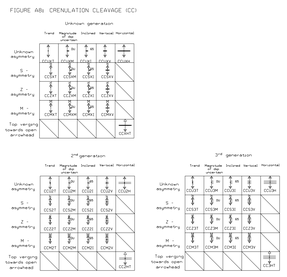
GENERAL

FIGURE A7: GENERAL CLEAVAGE (CG)



CRENULATION

FIGURE A8: CRENULATION CLEAVAGE (CC)



DISPLACEMENT

FIGURE A9a: DISPLACEMENT CLEAVAGE (CD) (1 of 2)

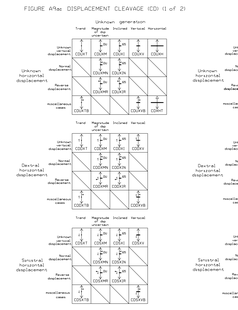
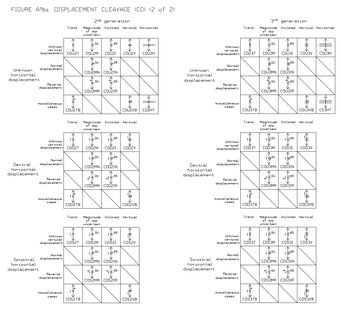


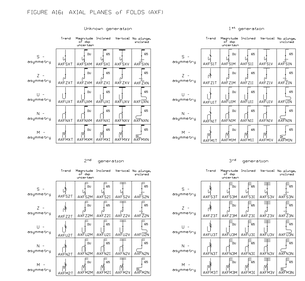
FIGURE A9b: DISPLACEMENT CLEAVAGE (CD) (2 of 2)



FOLD AXIAL PLANES

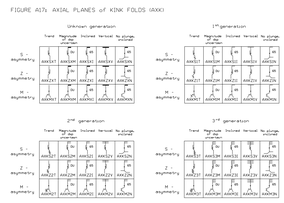
FOLDS

FIGURE A16: AXIAL PLANES of FOLDS (AXF)



KINKS

FIGURE A17: AXIAL PLANES of KINK FOLDS (AKK)



FAULTS

BRITTLE

FIGURE A11a: BRITTLE FAULTS (FT) (1 of 2)

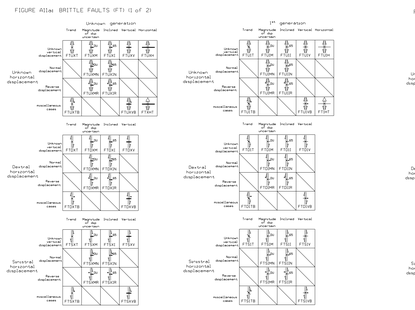
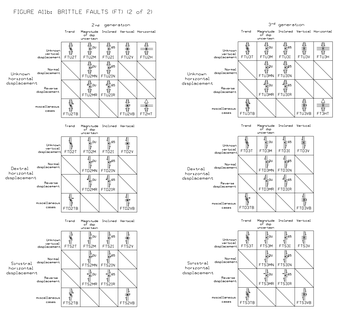


FIGURE A11b: BRITTLE FAULTS (FT) (2 of 2)



BRITTLE-DUCTILE

FIGURE A12a: BRITTLE-DUCTILE FAULTS (BD) (1 of 2)

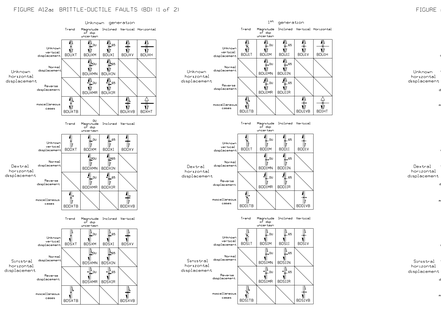
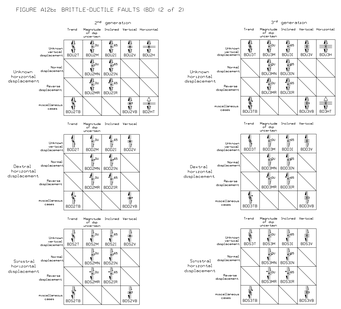


FIGURE A12b: BRITTLE-DUCTILE FAULTS (BD) (2 of 2)



DUCTILE SHEARS

FIGURE A13a: DUCTILE FAULTS -- SHEARS (SH) (1 of 2)

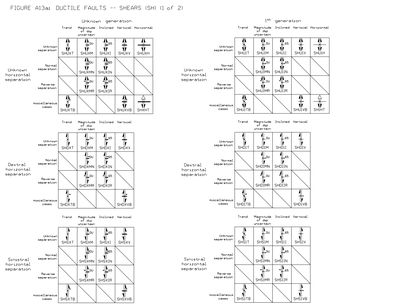
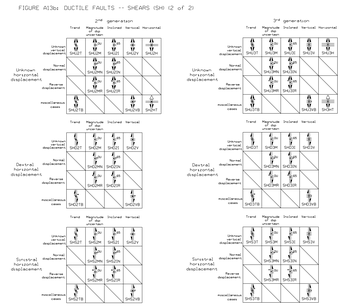


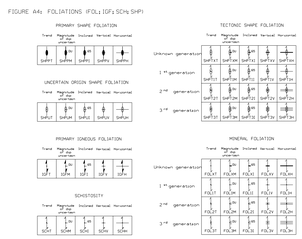
FIGURE A13b: DUCTILE FAULTS -- SHEARS (SH) (2 of 2)



FOLIATIONS

PRIMARY: IGNEOUS, SHAPE; MINERAL; SCHISTOSITY

FIGURE A4: FOLIATIONS (FOL; IGF; SCH; SHP)



FRACTURES

FIGURE A10a: FRACTURES (FR) (1 of 3)

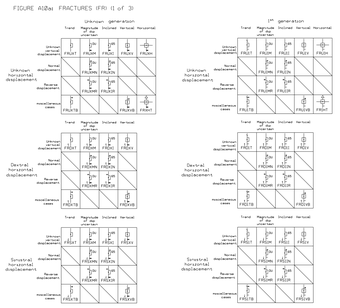


FIGURE A10b: FRACTURES (FR) (2 of 3)

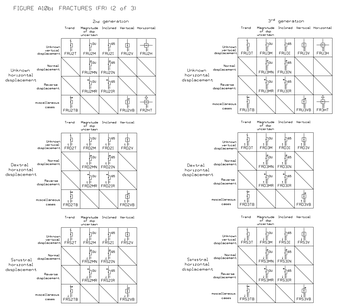
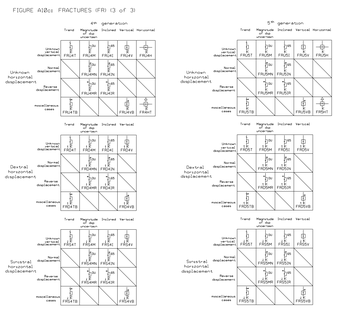
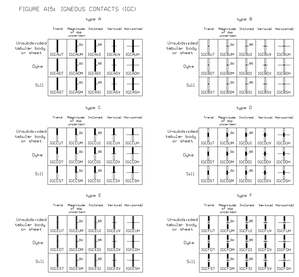


FIGURE A10c: FRACTURES (FR) (3 of 3)



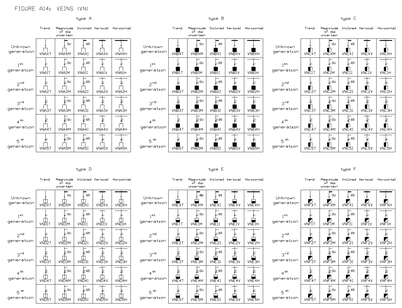
IGNEOUS CONTACTS

FIGURE A15: IGNEOUS CONTACTS (IGC)



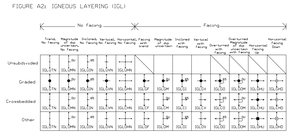
VEINS

FIGURE A14: VEINS (VN)



IGNEOUS LAYERING

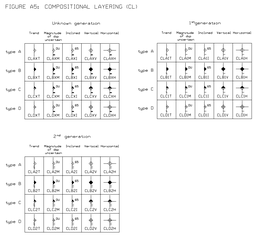
FIGURE A2: IGNEOUS LAYERING (IGL)



COMPOSITIONAL LAYERING

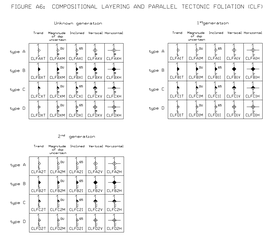
COMPOSITIONAL ONLY

FIGURE A5: COMPOSITIONAL LAYERING (CL)



COMP'NAL & || FOLIATION

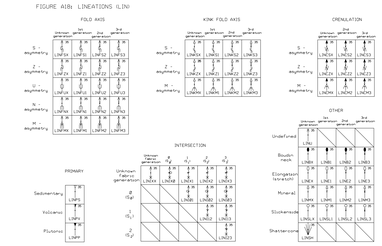
FIGURE A6: COMPOSITIONAL LAYERING AND PARALLEL TECTONIC FOLIATION (CLF)



LINEATIONS

PRIMARY; FOLD & KINK AXES; CRENULATION; INTERSECTION; OTHER

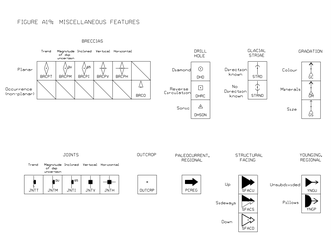
FIGURE A18: LINEATIONS (LIN)



MISCELLANEOUS

BRECCIAS; JOINTS; DRILL HOLES; OTHERS

FIGURE A19: MISCELLANEOUS FEATURES



PALEOCURRENTS

FIGURE A3: PALEOCURRENT (PC)

FUTURE RELEASES OF SYMBOLS

- -QUATERNARY
- -MINERAL DEPOSITS
- -COMMODITIES
- -MINING
- -MAPSCALE LINES & LINE ORNAMENTATION

OFR 5909