(13) Symbols for the lattice complexes of each space group (given as separate tables in Part 14).

(14) Euclidean and affine normalizers of plane and space groups are listed in Part 15.

The volume falls into two parts which differ in content and, in particular, in the level of approach:

The first part, Parts 1–7, comprises the plane- and space-group tables themselves (Parts 6 and 7) and those parts of the volume which are directly useful in connection with their use (Parts 1–5). These include definitions of symbols and terms, a guide to the use of the tables, the determination of space groups, axes transformations, and synoptic tables of plane- and space-group symbols. Here, the emphasis is on the *practical* side. It is hoped that these parts with their many examples may be of help to a student or beginner of crystallography when they encounter problems during the investigation of a crystal.

In contrast, Parts 8–15 are of a much higher *theoretical* level and in some places correspond to an advanced textbook of crystallography. They should appeal to those readers who desire a deeper theoretical background to space-group symmetry. Part 8 describes an algebraic approach to crystallographic symmetry, followed by treatments of lattices (Part 9) and point groups (Part 10). The following three parts deal with more specialized topics which are important for the understanding of space-group symmetry: symmetry operations (Part 11), space-group symbols (Part 12) and isomorphic subgroups (Part 13). Parts 14 and 15 discuss lattice complexes and normalizers of space groups, respectively.

At the end of each part, references are given for further studies.

## Contributors to the space-group tables

The crystallographic calculations and the computer typesetting procedures for the First Edition (1983) were performed by D. S. Fokkema. For the Fifth Edition, the space-group data were reprogrammed and converted to an electronic form by M. I. Aroyo and P. B. Konstantinov. Details are given in the following article *Computer Production of Volume A*.

The following authors supplied lists of data for the space-group tables in Parts 6 and 7:

Headline and Patterson symmetry: Th. Hahn & A. Vos.
Origin: J. D. H. Donnay, Th. Hahn & A. Vos.
Asymmetric unit: H. Arnold.
Names of symmetry operations: W. Fischer & E. Koch.
Generators: H. Wondratschek.
Oriented site-symmetry symbols: J. D. H. Donnay.
Maximal non-isomorphic subgroups: H. Wondratschek.
Maximal isomorphic subgroups of lowest index: E. F. Bertaut & Y. Billiet; W. Fischer & E. Koch.
Minimal non-isomorphic supergroups: H. Wondratschek, E. F. Bertaut & H. Arnold.

The *space-group diagrams* for the First Edition were prepared as follows:

Plane groups: Taken from *IT* (1952).

Triclinic, monoclinic & orthorhombic space groups: M. J. Buerger; amendments and diagrams for 'synoptic' descriptions of monoclinic space groups by H. Arnold. The diagrams for the space groups Nos. 47–74 (crystal class *mmm*) were taken, with some modifications, from the book: M. J. Buerger (1971), *Introduction to Crystal Geometry* (New York: McGraw-Hill) by kind permission of the publisher.

Tetragonal, trigonal & hexagonal space groups: Taken from *IT* (1952); amendments and diagrams for 'origin choice 2' by H. Arnold.

Cubic space groups, diagrams of symmetry elements: M. J. Buerger; amendments by H. Arnold & W. Fischer. The diagrams were taken from the book: M. J. Buerger (1956), *Elementary Crystallography* (New York: Wiley) by kind permission of the publisher.

Cubic space groups, stereodiagrams of general positions: G. A. Langlet.

New diagrams for all 17 plane groups and all 230 space groups were incorporated in stages in the Second, Third and Fourth Editions of this volume. This project was carried out at Aachen by R. A. Becker. All data and diagrams were checked by at least two further members of the editorial team until no more discrepancies were found.

At the conclusion of this *Preface*, it should be mentioned that during the preparation of this volume several problems led to long and sometimes controversial discussions. One such topic was the subdivision of the hexagonal crystal family into either hexagonal and trigonal or hexagonal and rhombohedral systems. This was resolved in favour of the hexagonal–trigonal treatment, in order to preserve continuity with *IT* (1952); the alternatives are laid out in Sections 2.1.2 and 8.2.8.

An even greater controversy evolved over the treatment of the monoclinic space groups and in particular over the question whether the *b* axis, the *c* axis, or both should be permitted as the 'unique' axis. This was resolved by the Union's Executive Committee in 1977 by taking recourse to the decision of the 1951 General Assembly at Stockholm [*cf. Acta Cryst.* (1951). **4**, 569]. It is hoped that the treatment of monoclinic space groups in this volume (*cf.* Section 2.2.16) represents a compromise acceptable to all parties concerned.