

# Contents

<b>Chapter 1</b>	<b>Motivation and Setting for the Results</b>	
§1.1	Introduction .....	1
§1.2	The classical groups .....	2
§1.3	The alternating, sporadic and exceptional groups .....	6
<b>Chapter 2</b>	<b>Basic Properties of the Classical Groups</b>	
§2.1	Introduction .....	9
§2.2	The linear groups .....	20
§2.3	The unitary groups .....	22
§2.4	The symplectic groups .....	24
§2.5	The orthogonal groups .....	26
§2.6	Orthogonal groups in odd dimension .....	34
§2.7	Orthogonal groups with Witt defect 0 .....	35
§2.8	Orthogonal groups with Witt defect 1 .....	39
§2.9	Structure and isomorphisms .....	43
§2.10	Classical groups acting on their associated geometries .....	47
<b>Chapter 3</b>	<b>The Statement of the Main Theorem</b>	
§3.1	Introduction .....	57
§3.2	How to determine the conjugacy amongst members of $\mathcal{C}$ .....	61
§3.3	How to determine the structure of members of $\mathcal{C}$ .....	64
§3.4	How to determine the overgroups of members of $\mathcal{C}$ .....	65
§3.5	The tables .....	69
<b>Chapter 4</b>	<b>The Structure and Conjugacy of the Members of <math>\mathcal{C}</math></b>	
§4.0	Introduction .....	80
§4.1	The reducible subgroups $\mathcal{C}_1$ .....	83
§4.2	The imprimitive subgroups $\mathcal{C}_2$ .....	99
§4.3	The field extension subgroups $\mathcal{C}_3$ .....	111
§4.4	The tensor product subgroups $\mathcal{C}_4$ .....	126
§4.5	The subfield subgroups $\mathcal{C}_5$ .....	139
§4.6	The symplectic-type subgroups $\mathcal{C}_6$ .....	148
§4.7	The tensor product subgroups $\mathcal{C}_7$ .....	155
§4.8	The classical subgroups $\mathcal{C}_8$ .....	165
<b>Chapter 5</b>	<b>Properties of the Finite Simple Groups</b>	
§5.1	Basic properties of the simple groups .....	169

§5.2 Subgroups of the simple groups .....	174
§5.3 Representations of the simple groups .....	183
§5.4 Groups of Lie type: representations in the natural characteristic .....	189
§5.5 Further results on representations .....	203

## Chapter 6 Non-maximal Subgroups in $\mathcal{C}$ : the Examples

§6.1 The case $H \in \mathcal{C}_1$ .....	209
§6.2 The case $H \in \mathcal{C}_2$ .....	211
§6.3 The case $H \in \mathcal{C}_4$ .....	219

## Chapter 7 Determining the Maximality of Members of $\mathcal{C}$ , Part I

§7.1 The case $H \in \mathcal{C}_1$ .....	223
§7.2 The case $H \in \mathcal{C}_2$ .....	225
§7.3 The case $H \in \mathcal{C}_3$ .....	233
§7.4 The case $H \in \mathcal{C}_4$ .....	237
§7.5 The case $H \in \mathcal{C}_5$ .....	240
§7.6 The case $H \in \mathcal{C}_6$ .....	241
§7.7 The case $H \in \mathcal{C}_7$ .....	242
§7.8 The case $H \in \mathcal{C}_8$ .....	245

## Chapter 8 Determining the Maximality of Members $\mathcal{C}$ , Part II

§8.1 Introduction .....	247
§8.2 The case $H \in \mathcal{C}_2$ .....	251
§8.3 The case $H \in \mathcal{C}_3$ .....	258
§8.4 The case $H \in \mathcal{C}_4$ .....	261
§8.5 The case $H \in \mathcal{C}_6$ .....	267
§8.6 The case $H \in \mathcal{C}_7$ .....	269

References .....	289
Index of notation .....	296
Index .....	299