

CONTENTS

PREFACE	viii
1 INTRODUCTION	1
THE CONCEPT ~ OF A "PROGRAM"	2
ILLUSTRATION ~ OF A FORTRAN PROGRAM	4
PREPARATION ~ IN A FORM THE COMPUTER CAN READ	6
EXECUTION ~ WHAT THE COMPUTER HAS TO DO	8
OPERATING SYSTEMS ~ TELLING THE COMPUTER WHAT TO DO	9
EXERCISES	10
2 STRUCTURE	11
PUNCHED CARDS ~ THEIR INFLUENCE ON TERMINOLOGY	12
LINE ~ THE CONTENT OF A SINGLE PUNCHED CARD OR ITS EQUIVALENT	14
LABEL ~ FOR EXECUTABLE STATEMENTS AND FORMAT STATEMENTS	15
PROGRAM UNIT ~ MAIN PROGRAM AND SUBPROGRAMS	16
ORDER ~ OF STATEMENTS IN A PROGRAM UNIT	17
EXERCISES	18
3 ELEMENTS OF FORTRAN	19
CHARACTERS ~ LETTERS, DIGITS AND SYMBOLS	20
SYMBOLIC NAMES ~ DEvised BY THE PROGRAMMER	21
TYPES OF VARIABLE ~ REAL, INTEGER, DOUBLE PRECISION, LOGICAL, COMPLEX	22
TYPES OF CONSTANT ~ REAL, INTEGER, DOUBLE PRECISION, LOGICAL, HOLLERITH, COMPLEX	24
ARITHMETIC EXPRESSIONS ~ REAL, INTEGER, DOUBLE PRECISION, COMPLEX	26
LOGICAL EXPRESSIONS ~ TRUE OR FALSE	28
ASSIGNMENT ~ ALL ASSIGNMENTS ARE EXECUTABLE STATEMENTS	30
LOANS ~ AN EXAMPLE TO ILLUSTRATE ASSIGNMENTS	31
EXERCISES	32
4 CONTROL WITHIN A PROGRAM UNIT	33
SIMPLE LOOPS ~ INTRODUCING THE GO TO AND LOGICAL IF	34
SHAPES (OR STRUCTURES) ~ FOR STRUCTURED PROGRAMMING	35
LOGICAL IF ~ THE MOST USEFUL CONTROL STATEMENT	36
UNCONDITIONAL TRANSFER ~ GO TO, STOP, PAUSE	38
COMPUTED GO TO ~ "CASE C OF ..."	39
CONTINUE ~ A LABELLED, EXECUTABLE "DO NOTHING" STATEMENT	39
THE DO LOOP ~ "REPEAT UNTIL"	40
ARITHMETIC IF ~ SUPERSEDED BY LOGICAL IF	42
ASSIGNED GO TO ~ BEST NOT TO USE IT	43
AREAS OF SHAPES ~ AN EXAMPLE TO ILLUSTRATE CONTROL	44
EXERCISES	46
5 ARRAYS	47
TYPES OF ARRAY ~ INTEGER, REAL, DOUBLE PRECISION, LOGICAL, COMPLEX	48
SUBSCRIPTS ~ ONLY SEVEN FORMS PERMITTED	50
RIppLE SORT ~ AN EXAMPLE TO ILLUSTRATE SUBSCRIPTED VARIABLES	52
EXERCISES	54
6 SIMPLE FUNCTIONS	55
INTRINSIC FUNCTIONS ~ "BUILT IN" TO FORTRAN	56
BASIC EXTERNAL FUNCTIONS ~ "OFFERED" BY FORTRAN	58
STATEMENT FUNCTIONS ~ DEVISED BY THE PROGRAMMER	60
TRIANGLE ~ AN EXAMPLE TO ILLUSTRATE SIMPLE FUNCTIONS	62
ROUGH COMPARISON ~ ILLUSTRATING A LOGICAL STATEMENT FUNCTION	63
EXERCISES	64

7	FUNCTION AND SUBROUTINE SUBPROGRAMS	65
	FUNCTION SUBPROGRAMS ≈ DEVISED BY THE PROGRAMMER	66
	SUBROUTINE SUBPROGRAMS ≈ PROGRAM UNITS WHICH YOU CALL	68
	EXTERNAL ≈ SUBPROGRAMS WHOSE NAMES ARE USED AS ARGUMENTS	70
	HORRORS ≈ USE AND ABUSE OF LOCAL VARIABLES AND ARGUMENTS	71
	AREAS OF POLYGONS ≈ AN EXAMPLE ILLUSTRATING A FUNCTION SUBPROGRAM	72
	EXERCISES	74
8	COMMON STORAGE	75
	COMMON ≈ A MEANS OF COMMUNICATION VIA SHARED VARIABLES	76
	COMMON (CONTINUED) ≈ RULES FOR ENSURING PORTABILITY	78
	STACKS ≈ AN EXAMPLE TO ILLUSTRATE A COMMON BLOCK	79
	EQUIVALENCE ≈ A MEANS OF SHARING STORAGE SPACE	80
	CHAINS ≈ AN EXAMPLE TO ILLUSTRATE LIST PROCESSING	82
	EXERCISES	84
9	INITIALIZATION	85
	DATA ≈ A STATEMENT FOR INITIALIZING VARIABLES AND ARRAYS	86
	BLOCK DATA ≈ A SUBPROGRAM TO INITIALIZE COMMON STORAGE	87
	CHARACTERS ≈ INTRODUCING FREE-FORMAT INPUT	88
	STATE TABLES ≈ INPUT OF ROMAN NUMERALS TO ILLUSTRATE INITIALIZATION	90
	EXERCISES	92
10	INPUT OUTPUT	93
	READ ≈ INPUT IN READABLE OR BINARY FORM	94
	WRITE ≈ OUTPUT IN READABLE OR BINARY FORM	95
	GENERAL ≈ CONCERNING READ AND WRITE STATEMENTS	95
	I/O LIST ≈ DENOTING A STREAM OF ITEMS	96
	FORMAT ≈ DESCRIBING LAYOUT IN READABLE FORM	98
	FORMAT (CONTINUED) ≈ BLANK RECORDS, MISMATCHING, LINE PRINTERS	100
	RUN-TIME FORMAT ≈ ASSEMBLY VIA DATA OR READ STATEMENTS	102
	GRAPH ≈ AN EXAMPLE TO ILLUSTRATE FORMATS	103
	DESCRIPTORS ≈ RECAPITULATION AND SUMMARY	104
	NUMBERS IN DATA	105
	FRUSTRATED OUTPUT	105
	DESCRIPTOR <i>Fw.d</i>	106
	DESCRIPTOR <i>Ew.d</i>	107
	DESCRIPTOR <i>Dw.d</i>	108
	DESCRIPTOR <i>Gw.d</i>	109
	SCALE FACTOR <i>nP</i>	110
	DESCRIPTOR <i>Iw</i>	111
	DESCRIPTOR <i>Lw</i>	111
	DESCRIPTOR <i>Aw</i>	112
	HOLLERITH LITERAL <i>whhh...h</i>	113
	BLANKS (SPACES) <i>wX</i>	
	FREE-FORMAT INPUT ≈ AN EXAMPLE AVOIDING DESCRIPTORS	114
	EXERCISES	116
11	FILES	117
	FORMATTED FILES ≈ SOME CONCEPTS AND TERMINOLOGY	118
	UNFORMATTED FILES ≈ MORE CONCEPTS AND TERMINOLOGY	119
	ENDFILE, REWIND, BACKSPACE ≈ AUXILIARY I/O STATEMENTS	120
	EXERCISES	122
12	MORE WORKED EXAMPLES	123
	LINEAR SIMULTANEOUS EQUATIONS	124
	SHORTEST ROUTE THROUGH A NETWORK	126
	REVERSE POLISH NOTATION	128
	EXERCISES	130
	BIBLIOGRAPHY	131
	INDEX	132