

## CONTENTS

### CHAPTER I—STATISTICAL CONTROL

	PAGES
INTRODUCTION. Three steps in quality control. Three senses of statistical control.....	1
SOME IMPORTANT HISTORICAL STAGES IN THE CONTROL OF QUALITY. § Developments since 1870. § A requirement regarding control. § A probable inference regarding control.....	1-8
THE STATE OF STATISTICAL CONTROL. § The physical state of statistical control. The ideal bowl experiment. § The mathematical state of statistical control. § An attempt at defining random order for infinite sequences. § An attempt at defining random order for finite sequences. § There is no unique description of a state of control. § How to build a model of a state of statistical control. Postulate I.....	8-23
STATISTICAL CONTROL AS AN OPERATION. § The operation of statistical control. § Some comments on the first step in the operation of control. The importance of order. § Some comments on the second step in the operation of control. § Some comments on the third and fourth steps in the operation of control. Practical requirements imposed on the criterion of control. Criterion I. § Some comments on the fifth step in the operation of control. § The operation of statistical control as a whole. § Example of what can be done in practice. § Two kinds of errors in the operation of control.....	23-40
THE JUDGMENT OF STATISTICAL CONTROL. § Postulate II.....	41-43
THE SIGNIFICANCE OF STATISTICAL CONTROL.....	43-46
THE FUTURE OF STATISTICS IN MASS PRODUCTION.....	46-49

### CHAPTER II—HOW ESTABLISH LIMITS OF VARIABILITY?

WHAT IS INVOLVED IN THE PROBLEM? § Note on the meaning of tolerance limits. Probabilities involved. § Three typical tolerance ranges.....	50-52
THE PROBLEM FROM THE VIEWPOINT OF STATISTICAL THEORY. § A practical example.....	52-56
HOW ESTABLISH TOLERANCE LIMITS IN THE SIMPLEST CASE? § A tolerance range for the bowl universe. § Student's theory inadequate for tolerance limits. § A study of three types of ranges.....	56-63

HOW ESTABLISH TOLERANCE LIMITS IN THE PRACTICAL CASE? § The necessity for control. § Engineering and "research" data are not to be regarded differently with respect to the assumption of statistical control. § Where does the statistician's work begin? .63-71	63-71
FURTHER CONSIDERATIONS REGARDING TOLERANCE LIMITS. § Standard methods of measuring. § Setting tolerance limits when control is lacking.....	71-79

### CHAPTER III—THE PRESENTATION OF THE RESULTS OF MEASUREMENTS OF PHYSICAL PROPERTIES AND CONSTANTS

THE NATURE OF THE PROBLEM. § Increased knowledge of quality necessary. § Some considerations of summaries of the density of iron. § The importance of the problem of presenting data. § The presentation of data from the viewpoint of language. There is scientific language and emotive language.....	80-85
THREE COMPONENTS OF KNOWLEDGE—EVIDENCE, PREDICTION, DEGREE OF BELIEF .....	85-86
THE RESULTS OF MEASUREMENT PRESENTED AS ORIGINAL DATA. § Presenting data as facts; can it be done? § Original data must be considered as evidence for inferences of various kinds. Rule 1. § Two different problems of presentation—data may or may not arise from statistical control. § Four important characteristics of original data. § Summarizing original data; by symmetric functions; by Tchebycheff's theorem. Rule 2 .....	86-92
THE RESULTS OF MEASUREMENT PRESENTED AS MEANINGFUL PREDICTIONS. § Every interpretation involves a prediction. Criterion of meaning. § Prediction involved in estimation—type $P_3$ . "Best" estimates. § Prediction involved in the use of the Student range—type $P_1$ . § Practical need for clarification of predictive meaning. § Prediction involved in the use of the tolerance range—type $P_2$ . § Common characteristics of the predictions.....	92-101
THE RESULTS OF MEASUREMENT PRESENTED AS KNOWLEDGE—IDEAL CONDITIONS. § To every prediction there corresponds a certain degree of rational belief. § Nonstatic character of knowledge. § Limits to knowing. Predictions based on the bowl universe have maximum validity. § The object of a scientific investigation and the presentation of its results. § The presentation of results from the normal bowl. § The presentation of results from a bowl when its distribution is known but is not normal. § The presentation of results from a bowl when its distribution is unknown ..	101-110

THE RESULTS OF MEASUREMENT PRESENTED AS KNOWLEDGE—CUSTOMARY CONDITIONS. § Complications in real measurements not in a state of statistical control. § Consistency between different methods more important than consistency in repetition. § A word on the detection of constant errors by "tests of significance." § Need for the attainment of statistical control. § Distinction between summarizing data for evidence of statistical control, and for setting tolerance limits after it has been attained. § Tolerance limits when statistical control has not been attempted. § Need for evidence of consistency—constant errors. § Kinds of information needed for setting limits in uncontrolled conditions.....	110-118
CONCLUDING COMMENTS.....	118-119

#### CHAPTER IV—THE SPECIFICATION OF ACCURACY AND PRECISION

VARIOUS ASPECTS OF THE PROBLEM. § Applied science more exacting than pure science regarding accuracy and precision. § Fivefold objective. § Broad interest in the problem.....	120-124
THE MEANING OF ACCURACY AND PRECISION—PRELIMINARY COMMENTS. § Why statements about accuracy and precision are often indefinite. § Accuracy and precision in the theory of errors. Customary assumptions. § Some difficulties with the usual theory.....	124-130
OPERATIONAL MEANING. § Operation or method of measurement; two aspects. § Consistency and reproducibility. § A requirement concerning a verifiable statement about precision. § Practical and theoretical verifiability. § The operational meaning of a quality characteristic. § Physical and logical aspects of theoretical verifiability. Examples.....	130-137
THE OPERATIONAL MEANING OF ACCURACY AND PRECISION. § Some fundamental difficulties. § Practically verifiable meaning of accuracy and precision. § The meaning of these concepts in use. § Practically verifiable procedures for realizing $p'$ , $X'$ , $\bar{X}'$ , $p'_b$ , and randomness. Distinction between the meanings of concepts and operationally verifiable procedures. § Need for specifying the minimum quantity of evidence for forming a judgment regarding accuracy and precision. § The meaning of abstract concepts is not unique.....	138-144
CONCLUSIONS.....	144-148
EPILOGUE.....	149-151
SOME COMMENTS ON SYMBOLS AND NOMENCLATURE.....	152-155