ELLIOTT 903

Volume 2: PROGRAMMING INFORMATION

Part 2: PROGRAM DESCRIPTIONS

Section 11: QEXP (B. 2)

Contents

Chapter 1: DESCRIPTION

1. 1 INTRODUCTION

1. 1. 1 Purpose.

To calculate exp $(2^p x)$

where

$$-1 \leq x < 0$$
$$p \geq 0, \text{ and } p \text{ is integral.}$$

1. 1. 2 Forms of Distribution.

The program is distributed as a machine code tape for input by T2 or SIR.

1. 1. 3 Method of Use.

The routine is assembled as a block of the user's program and used as a sub-routine. It may be run at any program level and in any store-module.

1. 1. 4 Accuracy.

The maximum error is 2^{-16} ($\triangleq .000015$).

1. 2 FUNCTIONS

1. 2. 1 Number Type.

x is treated as a pure fraction;
p is treated as an integer.

The result is a pure fraction.

1. 2. 2 Exit and Entry.

On entry

x must be placed in the accumulator

and p must be placed in QEXP + 53 (53;N)
p is not preserved by QEXP

On exit

the result is in the accumulator

and in QEXP + 54 (54;N)
x is in QEXP + 52 (52;N)

Entry is made by

(for assembly by SIR.)	(for translation by T2, where N is the number of the block).
11 QEXP	11 0;N
8 QEXP + 1	8 1;N

1. 2. 3 Identifiers.

QEXP must be declared as a global identifier in all blocks of the user's program which refer to it.

On the library tape, a mnemonic label and identifier list are separated from the coding by several inches of blank tape: the mnemonics must not be loaded into the tape reader if the tape is to be translated by T2.

1. 3 ERROR INDICATIONS.

If $x \geq 0$ or $p < 0$ tape is output continuously.

1. 4 METHOD USED.

The program first calculates exp (x) by a Chebyshev series.

$$\exp(x) = \sum_{n=0}^{6} a_n x^n$$

The final result is calculated by repeated squaring of e^x.

1. 5 STORE USED.

55 locations and the appropriate B register.

1. 6 TIME TAKEN.

(3. 7 + 0. 26 p) milliseconds approx.