

ELLIOTT

9000

Volume 2: PROGRAMMING INFORMATION

Part 2: PROGRAM DESCRIPTIONS

Section 5: QIN1

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Chapter 1: DESCRIPTION

1.1 Introduction

1.1.1 Purpose

To input an integer or mixed number and place the integer or scaled mixed number in the accumulator.

1.1.2 Summary

QIN1 will input integers in the range -131071 to +131071, and fractions and mixed numbers for single-length working. Mixed numbers are scaled by a Factor supplied by the user (a power of ten) so that they can be stored as fractions.

1.1.3 Form of Distribution

QIN1 is distributed as a mnemonic tape for input by the SIR assembler.

1.1.4 Method of Use

QIN1 is assembled as a block of the user's program and entered as a subroutine. It may be run in any program-level and in any store-module. The subroutines QCHIN and QERROR (from 2.5.5; SSYS1) must be assembled in the same module.

1.1.5 Accuracy

An integer is held with absolute accuracy. Mixed numbers are scaled by division by a power of ten and stored as fractions with a maximum error of 0.000015 and a mean error of 0.000004.

1.1.6 Compatibility

QIN1 (Issue 3) will input any number output by QOUT1 and input any number capable of input by QIN1 (Issue 2).

1.2 Functions

1.2.1 Entry and Exit

Entry. The scaling factor (see 1.2.2) is placed in QIN1+2, if required, the link is placed in QIN1 and entry is made to QIN1+1, e.g.

```
4 +1
5 QIN1+2
11 QIN1
8 QIN1+1
```

On exit the number read is held in the accumulator and control is returned to the location following the entry. On exit QIN1+125 contains +0 if an integer has been input and +1 if a fraction has been input.

1.2.2 Format

On commencing input, any separator is ignored. <minus> and <decimal point> are also ignored provided another separator (not <minus>) occurs before the number commences. Once a digit has been input any separator or <minus> indicates the end of the number. <plus> is treated as any other separator.

(<separator> is any character except <blank>, <erase>, <halt>, <carriage return>, <decimal point>, <minus> or <digit>.)

<space> is a permissible separator but is ignored between <minus> and <digit>.

If <halt> is input the program halts. Continuation is by entry at 9. <halt> may occur anywhere in the input sequence and is ignored on re-entry. However, it is recommended that <halt> should always follow a new line sequence.

Mixed numbers may be input, so the decimal point may occur anywhere in the number. If a complete number does not contain a decimal point it is treated as an integer. If a number does contain a decimal point it is treated as a mixed number, N, and stored in the accumulator on exit as $N \times 10^{-m}$. The scaling factor m is held in QIN1+2 and set by the user of the subroutine.

If a mixed number is read whose fractional part represents an integer greater than 131071, e.g. 0.131072, 0.000135002., the number will be truncated and the excess digits ignored, e.g. the numbers given above will be treated as 0.13107 and 0.00013 respectively.

1.2.3 Range of Numbers

The range of a number, N, that may be input by QIN1 is:

- i) Integers. $-131071 \leq N \leq 131071$
- ii) Mixed number input with scaling factor m

$$0 \leq m \leq 5$$

$$|N| < 131072 \text{ and}$$

$$|N| < 10^m \text{ must all be true.}$$

1.2.4 Ignorable Characters

<blank>, <carriage return>, <erase> are ignored wherever they occur.

1.3 Error Indications

1.3.1 Illegal Characters

All illegal characters to QCHIN cause error indication *CHN <OCTAL GROUP> <ADDRESS> (see QCHIN specification). A wait occurs and the character is ignored on re-entry at 9.

1.3.2 Errors in Number Input

The following errors are output by QIN1 via QERROR in the form: *QIN <error> <address of entry to QIN1>.

- Error 1 Format error. e.g. 54.327.02
or ETC...
(Consecutive decimal points not separated by a permissible separator give error 1).
- Error 2 Integer or mixed number overflow.
e.g. Integer or integral part of mixed number is outside the range $-131071 \leq N \leq 131071$.
- Error 3 Scale error. The mixed number read is outside the range $|N| < 10^m$. i.e. the scaled number cannot be held as a fraction.
- Error 4 Negative scaling factor supplied, in location QIN1+2. On continuation, QIN1 exits with the A-register undefined.

Errors 3 and 4 cannot be detected when reading integers. After errors 1, 2 and 3, on re-entry at 9 all digits and decimal points are ignored up to the next separator. QIN1 is then re-entered and another number is read, e.g. if a tape containing 28.73.21., 19.3 is read by QIN1, error 1 will be detected when the second decimal point is read. 21. is skipped on re-entry and 19.3 is read.

1.4 Store Used

QIN1 occupies approximately 220 locations.

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2.2.5.

QCHIN and QERROR must also be in store (160 locations approximately).

1.5 Time Taken

QIN1 operates at the speed of the 250 ch/sec. tape reader.

1.6 Input Devices

The standard input device is the paper tape reader. The teleprinter may be used for input by changing the location labelled DEVICE from +1 to +3. Other input devices may be used by supplying special versions of QCHIN (see Volume 2.5.5).