

ELLIOTT

9000

Volume 2: PROGRAMMING INFORMATION

Part 2: PROGRAM DESCRIPTIONS

Section 6: QOUT1

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Chapter 1: DESCRIPTION

1.1 Introduction

1.1.1 Purpose

QOUT1 is used to output the contents of the accumulator as an integer or a fraction.

1.1.2 Summary

The program outputs an integer or a fraction, the format being specified by a parameter word. The number may be scaled before output to give a mixed number format.

1.1.3 Form of Distribution

The program is distributed as a mnemonic code tape for input by Elliott SIR.

1.1.4 Method of Use

QOUT1 is assembled as a block of the user's program and entered as a subroutine. It may be run at any program-level and in and store module. QCHOP and QERROR must be assembled in the same store module (see Volume 2.5.5).

1.1.5 Accuracy

Fractions are output with a maximum error of $\pm 2^{-17}$, i. e. approximately 7.6×10^{-6} .

1.2 Functions

1.2.1 Format

The format is specified by a parameter word placed in the location immediately following the entry to QOUT1. The word should be in pseudo-instruction form:

B F N (/F N or F N)

where B, the modifier bit, is 1 if the number is to be preceded by

<newline> (/F N)

or 0 if the number is to be preceded by

<space> (F N)

F, the function bits, control the size of number output.
The number of digits output (including leading zeros output as spaces) is $6-F$.
A complete integer thus occupies $(7-F)$ character positions, and a mixed number $8-F$ positions, including sign and decimal point.
N, the address bits, hold the scaling factor, this must be in the range $0 \leq N \leq 5$ (see below).

Negative numbers are preceded by <minus> and positive numbers by <space>. (Positive numbers may be preceded by <plus> if the location labelled PLUS in QOUT1 is changed from +0 to +11).

1.2.1.1 Integers

Leading zeros are suppressed (output as spaces).

The number output is equal to the integer in the accumulator $\times 10^{-N}$

1.2.1.2 Fractions

The number output is equal to the fraction in the accumulator $\times 10^{+N}$

1.2.2 Entry and Exit

Entry. The number to be output must be in the accumulator.

Place link in QOUT1

Jump to QOUT1+1 to output integer
or QOUT1+2 to output a fraction

The location after the jump must contain the parameter word (see Para. 2.1).

Exit. Control is returned to the location after the parameter word.

The contents of the accumulator are not preserved by QOUT1.

Example: The following section of program causes output as shown overleaf:

```

4      -123456
11     QOUT1
8      QOUT1+1
/0     0
4      +.00357
11     QOUT1
8      QOUT1+2
2      3

-123456  3.570

```

1.3 Store Used

Approximately 140 locations and the appropriate B-register. QCHOP and QERROR must also be in store (130 locations approximately).

1.4 Time Taken

QOUT1 operates at the speed of the tape punch.

1.5 Examples of Format

L and S represent newline sequence and space characters respectively.

Accumulator	Entry Point	Parameter Word	Output
-3706	QOUT1+1	/0 0	L S S -3706
-3706	QOUT1+1	/0 2	L S S -37.06
+65536	QOUT1+1	/1 0	L S 65536
+65536 (=0.5)	QOUT1+2	/0 0	L S .500000
-0.517682	QOUT1+2	/0 0	L - .517682
-0.517682	QOUT1+2	/2 3	L -517.6

1.6 Errors

If the number to be output, after scaling, cannot be expressed in the specified format, * is output on the specified device and QERROR is used to output in the form:

```
* QO1 00000 00620
```

where 620 represents the address of the entry to QOUT1.

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2.2.6

1.7 Output Devices

The output device is controlled by the value of QDOUT, within QCHOP (see Volume 2.5.5). This is normally set to +1 for paper tape output.