

**Burroughs Corporation**



COMPUTER SYSTEMS GROUP  
SANTA BARBARA PLANT

P.S. 2212 5538  
B1800/B1700 INPLACE SORT

**PRODUCT SPECIFICATION**

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| C          | 6-11-79                | <i>Hale</i> | Changes for Mark 9.0 Release<br><br>3-2 Added FILLER and SORT.PURGE.INPUT.FILE to<br>TABLE 3.2.<br>Changed BIT(24) to BIT(8) of SORT.MEDIA.NUMBER. |

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### GENERAL

This product specification describes the sort and interface requirements of the B1800/B1700 INPLACE SORT which is accomplished by a program named QSORT. The options, input and output, memory requirements and sort communicate, are discussed. This specification does not present the sort language constructs necessary for a particular language. The user must see the language manual of the respective source language for that information.

The QSORT program allows the user to sort a designated file using head-per-track (HPT) disk, disk cartridge, or disk pack storage for work files. QSORT, rather than DISK SORT, is used when limited amounts of disk are available for sorting. QSORT is defined for implementation with RPG, SDL/UPL, and COBOL languages for the B1800/B1700 systems and may also be called using the SORT program.

QSORT arranges the records of a designated file in ascending or descending sequence according to the specified keys. Signed keys are sorted algebraically, i.e., negative numbers are less than any positive number.

### RELATED DOCUMENTATION

|  |                |
|--|----------------|
| SDL S-Language                         | P.S. 2201 2389 |
| COBOL S-Language                       | P.S. 2201 6729 |
| B1800/B1700 SORT LANGUAGE              | P.S. 2201 6752 |
| B1800/B1700 DISK SORT                  | P.S. 2201 5264 |
| B1800/B1700 SDL Manuel (BNF Version)   | 5000847        |
| B1899/B1700 Software Operational Guide | 1068731        |

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## OPERATING REQUIREMENTS AND RESTRICTIONS

### MAIN MEMORY REQUIREMENTS

QSORT operates in a minimum of 8K bytes of main memory and dynamically allocates additional main memory at run time if:

1. Additional main memory is available from the roll-out of the calling program; or
2. The memory specified is insufficient for the specified sort. (Additional memory will be allocated in increments of 1K bytes, up to a maximum of 18.5K bytes, until sufficient memory exists to perform a minimal sort.)

The minimum main memory requirement is larger for those files specifying record or block sizes approaching the defined maximum size.

### DISK REQUIREMENTS

QSORT uses only the space containing the file to perform the sort. No additional disk space is required. However, if the input and output file names are not the same, a copy of the input file with the output file name is created before the sort begins. If a record size is specified, it must be the same for both files.

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INPUT

INPUT MEDIA

The input medium to the QSORT can only be one of the following:

- A. 80-Col. Cards
- B. 96-Col. Cards
- C. 7-Track Magnetic Tape(s)
- D. 9-Track Magnetic Tape(s)
- E. 81800/81700 Disk Pack(s), Disk Cartridge(s) or  
Head-Per-Track (HPT) Disk.

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### INPUT RESTRICTIONS

Any input file must be wholly contained on a single hardware type. The mixture of hardware types (such as 7-Track and 9-Track magnetic tapes, or HPT disk and disk pack) is not permitted for an input file.

### INPUT ASSUMPTIONS

Magnetic tape input is defaulted to EBCDIC coding if 9-Track and BCL coding if 7-Track. The user may specify "ANY TAPE" in which case it is his responsibility to make certain that the format is acceptable to the hardware type he has selected.

### INPUT LIMITATIONS

The maximum record length for sorting is 65,535 bits. Input records that are larger than output records (from sorts) are truncated on the right to match the smaller size. Truncation occurs if a second file, with shorter record length, is created before the sort begins, i.e., a true inplace sort is not performed.

The maximum block size for sorting is a function of the available memory space.

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### INPUT PARAMETERS

The parameters required by the QSORT are described in the sort interface tables. The number of records to be sorted should be passed from the calling program to the QSORT for non-disk files. If zero or no records are specified, 20,000 will be used by default. The program uses this integer to perform an optimum sort memory allocation.

For HPT disk, disk cartridge, or disk pack input files, the number of records is obtained from the header information.

Additionally, the program requires information about the disposition of input/output files (e.g. type of close) and the sort keys. (See Sort Key Tables).

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## OUTPUT

The output medium from the program can only be one of the following:

- A. 80-Col. Cards
- B. 96-Col. Cards
- C. 7-Track Magnetic Tape(s)
- D. 9-Track Magnetic Tape(s)
- E. B1800/B1700 Disk Pack(s), Disk Cartridge(s), or Head-Per-Track (HPT) Disk
- F. Line Printer

### OUTPUT: FIXED-LENGTH DEVICES

Output records to a line printer that are smaller than a printer line appear left-justified with space fill on the right. On other devices where the output records have been defined to be larger than the input records, the records will be left-justified with nulls on the right.

### OUTPUT RESTRICTIONS

Output records that are shorter than input records are truncated from the right. Truncation occurs if a second file, with shorter record length, is created before the sort begins, i.e., a true inplace sort is not performed. If the output medium is not disk, the file is copied to the medium after the sort is done.

The relationship of records in an output file within a given group of contiguous, equal-key records to the relative ordering of those same records in an input file is unspecified.



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DUPLICATE-CHECKING

The duplicate checking option will create a file containing pointers to the duplicate records. Each record will contain a pair of pointers, the record being 8 BYTE with two 4 BYTE pointers. The first pointer points to the relative position of the duplicate record in the output file and the second pointer to the record it duplicates. The file will be labeled SD.<job number>.

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SOFTWARE IMPLEMENTATION

The inplace sort is invoked by a MCP communicate from QSORT or any other sort program. For language constructs that apply to a particular source language, the user should see the appropriate source language manual.

SORT INTERFACE

The following tables (3.1-3.3) are required as input to the sort interface to invoke the inplace sort intrinsic.

```

*****
*
* CT.VERB      = 29
* CT.OBJECT   = BASE RELATIVE ADDRESS OF SORT
*              INFORMATION TABLE
* CT.ADVERB   = NOT USED
* CT.1        = BASE RELATIVE ADDRESS OF SORT KEY TABLE
* CT.2        = INPUT FILE NUMBER
* CT.3        = OUTPUT FILE NUMBER
*
*****

```

TABLE 3.1 SORT COMMUNICATE

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```

*****
*
*  SORT.TYPE                BIT(2)    00 = RECORD SORT
*                               01 = QSORT
*  SORT.MEDIA.TYPE         BIT(6)    MAY BE DISK, DISK PACK,
*                               DISK CARTRIDGE (CODED AS
*                               FPB.HDWR FOR MCP)
*  FILLER                   BIT(8)
*  SORT.PURGE.INPUT.FILE   BIT(8)    1 = CLOSE CORRESPONDING
*                               INPUT FILE WITH PURGE
*  SORT.MEDIA.NUMBER       BIT(8)    NUMBER OF E.U'S OR TAPES(3-8)
*  SORT.RECORD.SIZE        BIT(24)
*  SORT.INPUT.HDWR         BIT(6)    HARDWARE
*  SORT.INPUT.RECSIZE      BIT(24)   MAXIMUM RECORD SIZE IN BITS
*  SORT.INPUT.BLKSIZE      BIT(24)   MAXIMUM BLOCK SIZE IN BITS
*  SORT.INPUT.CLOSE        BIT(12)   CLOSE TYPE
*  FILLER                   BIT(1)
*  SORT.OUTPUT.HDWR        BIT(6)    HARDWARE
*  SORT.OUTPUT.RECSIZE     BIT(24)   MAXIMUM RECORD SIZE IN BITS
*  SORT.OUTPUT.BLKSIZE     BIT(24)   MAXIMUM BLOCK SIZE IN BITS
*  SORT.OUTPUT.CLOSE       BIT(12)
*  FILLER                   BIT(12)
*  SORT.NMBR.RECORDS       BIT(24)   NUMBER OF RECORDS IN INPUT
*                               FILE DEFAULT = 20,000
*  FILLER                   BIT(1)
*  SORT.NUMBER.KEYS        BIT(5)    NUMBER OF SORT KEYS
*  SORT.KEY.LENGTH         BIT(24)   TOTAL LENGTH OF KEY(S) IN
*                               BITS
*  SORT.FIRST.SIGN         BIT(8)    0000
*  SORT.SECOND.SIGN        BIT(8)    0000
*  FILLER                   BIT(28)
*  SORT.DUPCHECK           BIT(1)    DUPLICATE CHECKING
*  FILLER                   BIT(19)
*  SORT.MEMORY.SIZE        BIT(24)   MEMORY SIZE IN BITS
*                               TO ALLOCATE
*  FILLER                   BIT(57)
*
*****

```

TABLE 3.2 SORT INFORMATION

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```

*****
*
*   UNSIGNED KEY(S)
*   01  KEY.FLAG          BIT(4),
*       02 SIGN FLAG     BIT(1),
*       02 DIRECTION     BIT(1),
*
*       02 FILLER        BIT(1),
*       02 TRAN.KEY      BIT(1)
*
*   01  KEY.LENGTH       BIT(12),
*   01  KEY.DISPLACEMENT BIT(20),
*
*   SIGNED KEY(S)
*
*   01  KEY FLAGS        BIT(4),
*       02 SIGN.FLAG     BIT(1),
*       02 DIRECTION     BIT(1),
*
*       02 NEW.SIGN      BIT(1),
*       02 FILLER        BIT(1),
*
*   01  LENGTH.AND.SIGN  BIT(12)
*       02 LENGTH        BIT(4),
*       02 SIGN          BIT(8),
*
*   01  SIGN DISPLACEMENT BIT(20),
*
*
*
*****
    
```

TABLE 3.3 SORT KEY(S)

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### SORT KEY DESCRIPTORS

The sort key may contain a maximum of thirty 36-bit key descriptions. Each description will specify ascending or descending order, key length, and key displacement. An additional description must be supplied for signed keys which specify the type, length, and displacement of the sign. Each key may have a total length of 4095 bits. In a combination of signed and unsigned keys, each signed key counts as two keys, and the total must not exceed 30.

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