HASH$ - Calculate File Hash Total

The HASH$ routine can be used to calculate a simple Hash Total for a Global or Windows file.

1. Invocation

To calculate the file hash total code:

```
CALL HASH$ USING fd hash [length]
```

where fd is a **closed** OR$98 or OR$98X FD containing the name of the file. The 32-bit hash value is returned in the PIC X(4) hash field. By default only the first 256-bytes of the file are considered. For GSM SP-27, and later, the block-length for the hash algorithm can be specified in the optional PIC 9(4) COMP length field.

2. STOP Codes and Exception Conditions

No STOP codes are generated by HASH$.

The following EXIT codes may be returned by HASH$:

EXIT code	$$COND	Description
12506	6	The file specified in the OR$98 or OR$98X FD could not be opened.
12507	7	The file specified in the OR$98 or OR$98X FD could not be read.

3. Programming Notes

HASH$ calculates the Adler-32 checksum by calculating two 16-bit checksums and concatenating their bits into the 32-bit result. The first 16-bit checksum, A, is the sum of all bytes in the string plus one. The second 16-bit checksum, B, is the sum of the individual values of A from each step.

At the beginning of an Adler-32 run, A is initialized to 1, B to 0. The sums are done modulo 65521 (the largest prime number smaller than 2^{16}).

The function may be expressed as:

$$A = 1 + D_1 + D_2 + \ldots + D_n \pmod{65521}$$
$$B = (1 + D_1) + (1 + D_1 + D_2) + \ldots + (1 + D_1 + D_2 + \ldots + D_n) \pmod{65521}$$
$$= n \times D_1 + (n-1) \times D_2 + (n-2) \times D_3 + \ldots + D_n + n \pmod{65521}$$

$$Adler\text{-}32(D) = B \times 65536 + A$$

where D is the string of bytes for which the checksum is to be calculated, and n is the length of D.

For GSM SP-27, and later, if the optional block length is absent a default length of 256 is used. If the supplied block length is 0, the extent of the file is used. If the supplied block length is larger than the file-extent it is truncated to the file extent. The HASH$ algorithm is relatively slow and may be slow if the block length is large.

4. Examples
[EXAMPLES REQUIRED]

5. Copy-Books
None.

6. See Also
HASHX$ Calculate File Hash Total
HASHE$ Calculate File Hash Total (extended)