

Burroughs Corporation 
COMPUTER SYSTEMS GROUP
SANTA BARBARA PLANT

B1800/B1700 INTERP/MONITOR

PRODUCT SPECIFICATION

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 I.P.S. 2219 0334

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GENERAL DESCRIPTION

INTERP/MONITOR is a program which formats and prints tables containing S-op frequency and execution times for B1800/B1700 S-machines. The information is gathered by means of a special interpreter which dynamically stores it in a table in memory. Most B1800/B1700 interpreters have the required code maintained in the source files but conditionally excluded from the object in release interpreters.

RELATED DOCUMENTATION

Name -----	Number -----
B1800/B1700 Software Operational Guide	1068731
B1800/B1700 MCP II	P. S. 2212 5462
B1800/B1700 MCP Control Syntax	P. S. 2219 0144
B1800/B1700 SDL (BNF Version)	P. S. 2212 5405
B1800/B1700 SDL S-Language	P. S. 2201 2389

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SOFTWARE REQUIREMENTS

INTERP/MONITOR requires a special interpreter which is a standard SDL interpreter with the inclusion of a special op which is used to clear the GISMO trace table to zeros in response to the following user input.

```
<job-number>AX CLEAR
```

The special operator is invoked by INTERP/MONITOR by using the SDL EXECUTE operator. parameter, the number of bits to be cleared in the GISMO trace table, is passed to the interpreter via the SDL EVALUATION stack.

Note: SDL/MONITOR and INTERP/MONITOR were both compiled in the past and are matched to each other. If one of these is recompiled, the other must be recompiled also. Both the source and the object of the program are released internally. However, the source for the interpreter should be the most current one available should it need to be recompiled.

The GISMO trace table is used for accumulating the information. The interpreter uses the pointer to this table which is maintained in HINTS. The table must be allocated at CLEAR/START by using a debug GISMO (GISMO/DEBUG) and setting the appropriate bit to cause the system initializer (SYSTEM/INIT) to allocate a trace table but not request any tracing. The TG SPO command may also be used to achieve the same result. It is crucial that GISMO and the interpreters do not attempt to use the table at the same time. Documentation on the GISMO trace table does not exist at the time of this writing.

The table is organized as an array of 96 bit entries, with the first 48 bits being a time accumulator and the second 48 bits a frequency accumulator.

HARDWARE REQUIREMENTS

The high resolution timer (HRT) is a hardware device which, when present, is resident in a B1800/B1700 I/O base or base extension. It maintains a 48 bit counter which is updated every micro-second. The HRT is not required in order to use INTERP/MONITOR although the program was originally designed to use information obtained from it. If the HRT is not present, INTERP/MONITOR can be used to print out the frequencies of S-ops,

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but all times will be indicated as zero. (See Appendix A of this document for more information on the HRT.)

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OPERATING INSTRUCTIONS

INTERP/MONITOR is executed from the SPO by the following statement.

EX INTERP/MONITOR

The program then generates an ACCEPT message to which the user should respond:

<job-number>AX READ

INTERP/MONITOR then reads a card file labelled CARDS which contains the mnemonics associated with the S-machine being measured. Each mnemonic must be on a separate card and the mnemonics must be in ascending S-op order. For example, for SDL, successive cards would be as follows:

LA
ILA
STOD
LITN
LIT
etc.

Each mnemonic may be a maximum of six characters, may begin anywhere on the card, and may contain any EBCDIC character except a blank. If, after reading the entire card file, INTERP/MONITOR determines that there is insufficient space in the GISMO trace table to accommodate the specified number of mnemonics, the program will request the user to CLEAR/START and provide the values to enter in the console switches to insure sufficient space.

If sufficient space is available, the user may then execute his program using the special interpreter which enters values into the table.

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COMMANDS

This section contains a description of the command set of INTERP/MONITOR. Commands are entered by issuing ACCEPTs to the program.

ANALYZE.TAPE.SINGLE

ANALYZE.TAPE

Syntax: ----- ANALYZE.TAPE.SINGLE -- <print variant> -->|
 ----- ANALYZE.TAPE -- <print variant> ----->|

(See the PRINT command for a description of <print variant>. See the DUMP.TO.TAPE and CLOSE commands for information on how the tape is generated.)

INTERP/MONITOR can analyze a tape in one of two ways. If the command entered is ANALYZE.TAPE.SINGLE, the program prints a table for each separate table on the tape. If the command is ANALYZE.TAPE, all of the files are analyzed and the information merged into one table.

If the command is ANALYZE.TAPE then after collecting all of the information from each tape, INTERP/MONITOR will ask if more tapes are to be accumulated. A user response of "Y" will cause INTERP/MONITOR to read another tape. A user response of "N" will cause INTERP/MONITOR to print out the accumulated tables in the requested formats. The totals in this table are a simple accumulation; there is no attempt to weigh the various tables accumulated.

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CLEAR

Syntax: ----- CLEAR ----->|

This command clears the entire GISMO trace table to zeros.

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CLOSE

Syntax: ----- CLOSE ----->|

After the DUMP.TO.TAPE command has been used to dump tables to a tape, this command is used to close and rewind the tape.

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DUMP.TQ.TAPE

Syntax: ----- DUMP.TQ.TAPE ----->|

This command causes the current contents of the GISMO trace table to be dumped to tape. Any number of tables may be dumped to one tape since the tape remains open and not rewound after the table is dumped. The tape file may be closed and rewound by entering the CLOSE command.

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PARAMS

Syntax: ----- PARAMS ----- SPO ----->
 I----> CARDS -->I

This option provides the user with the ability to enter parameters from the card reader or the SPO. (See the PRINT command.) If they are entered from the card reader, column one of the card must contain an I, a T, or an O to indicate which parameter is on the card. Only one of each is permitted. The actual text must begin in column 2.

The abbreviations indicate the following:

I -- INTERPRETER.NAME
 T -- TITLE
 O -- TIMER.OVERHEAD

Example of input from cards:

```

1
.
ISDL/TIMERINT
TSDL/COMPILER OF MCP ON SYS 805
06

```

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PRINT

Syntax: ---- PRINT ----- <print variant> ----->|

At any time, the user may enter a print command to request that the current contents of the table be printed. INTERP/MONITOR makes a copy of the trace table within itself using one S-op to move the values from the GISMO trace table, thereby insuring that no user program can change the values in the table while they are being printed.

The table can be printed in any combination of four formats. It may be ordered by S-op, time, frequency, or printed alphabetically. When the table is ordered by time or frequency, zero entries may be suppressed by including the SUPPRESS option. The ALL variant will print four tables, one each by time, frequency, S-op and alphabetical.

All possible print variants are shown in the syntax below.

```
<print variant>----->|
      |-- BY ->|      |
                        |<-----|
                        |-- TIME ----->|
                        |-- TIMES ----->|
                        |-- FREQUENCY ----->|
                        |-- FREQUENCIES ----->|
                        |-- FREQ ----->|
                        |-- FREQS ----->|
                        |-- ALPHABETIC ----->|
                        |-- ALPHABETICAL ----->|
                        |-- ALPHA ----->|
                        |-- S.OP ----->|
                        |-- S.OPS ----->|
                        |-- SUPPRESS ----->|
                        |-- SUP ----->|
                        |-- ALL ----->|
```

The user is requested to enter the following information to be used in printing the table.

INTERPRETER.NAME

The first 21 characters will be used to identify the name of the interpreter that is being measured.

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TITLE	The title entered will be included in the output of the table. It may be up to 80 characters in length.
TIMER.OVERHEAD	This decimal number will be subtracted from the time associated with each S-op. The user calculates the time required in the interpreter to turn the timer off and on between each S-op. The value entered will be printed on the listing.

The parameters specified above may be entered from the card reader if the PARAMS option is used. (See PARAMS in this section.)

Note: For debugging purposes, if the leftmost bit of the console switches is on, INTERP/MONITOR will not request the above information. Blanks will be assumed for INTERPRETER.NAME and TITLE and zero for TIMER.OVERHEAD. (See MCP manual for use of the SPD "SE" command.)

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SIQP

Syntax: ----- STOP ----->|

This command terminates INTERP/MONITOR.

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APPENDIX A - HIGH RESOLUTION TIMER

This appendix describes a B1800/B1700 Hardware Module that may be connected to the I/O Exchange (a standard channel) and provide a real time clock function. A number of variants are described which control the counter attributes and actions. The module will occupies B1800/B1700 card.

The counter may be read using conventional I/O Exchange commands from the processor.

The counter can be operated as one 48 bit device or as four 12 bit devices in order to test overflow logic. It can also be preset to a number using conventional I/O Exchange commands.

Counter overflows will not trigger a service request, but can be detected through a TEST STATUS command.

OPERATIONS

The descriptions of the following operations use terminology applicable to the B1800/B1700 I/O BUS.

1. INITIAL COUNT D-SET INTO COUNTER:

Counter is D-Set to a number by reading 24 bits during each of two RC times. This is done with a TRANSFER OUT B command.

2. READ THE COUNTER:

Before a new count, the 48 bits are latched and can be read into the processor with two RC'S without stopping the counter. The D-Set condition of the latches is stopped during the time the count is being read into the processor. All these are done with a TRANSFER IN. Note -- TRANSFER OUT to a counter does not start the counter, nor does TRANSFER IN stop the counter.

3. OTHER FUNCTIONS:

- A. TEST: On a normal test, the unit will return status as well as normal I.D.

EX08 = 0 for counting up
 = 1 for counting down

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EX09 = 0 for no overflow/underflow in lowest order
 12 bit counter since last D-Set
 = 1 for overflow/underflow occurred in lowest
 order 12 bit counter after last D-Set
 EX10 = 0 (same as EX09, for second 12 bit counter)
 = 1 (same as EX09, for second 12 bit counter)
 EX11 = 0 (same as EX09, for third 12 bit counter)
 = 1 (same as EX09, for third 12 bit counter)
 EX12 = 0 (same as EX09, for highest order 12 bit counter)
 = 1 (same as EX09, for highest order 12 bit counter)
 EX13 = 1 for four 12 bit counter configuration
 = 0 for 48-bit counter configuration
 EX16-EX19 = 0001 for counter stopped
 = 0010 for counter counting

B. TEST & CLEAR

Same as above but also clears all logic including counter outputs to zero. A clear command stops the counter and sets it in a 48 bit, counting-up configuration as well as resetting the overflow flip-flops. The status reported during RC time will be that of the counter immediately before the clear.

C. OPTIONS

A TRANSFER_OUT_A operation may be used to set options in the HRT. At CA time, a variant indicates one of the following operations:

EX00-EX02 = 000 - start counting
 001 - stop counting
 010 - count up
 011 - count down
 100 - counter structured as one 48 bit counter
 101 - counter structured as four 12 bit counters

During RC time, TRANSFER_OUT_A returns status and I.D., as during RC time of a TEST command. In XFRIN and XFRDTB commands, 48 bits of data are always transferred. Therefore, two RC times will always follow the CA time of either of these two commands.

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FUNCTIONS IN DETAIL

1. READ COUNT INTO COUNTER:

At CA time, if the channel address is equal, the TRANSFER OUT PHASE B instruction bits are strobed into the 3-bit register and decoded. The command register will not be cleared until the end of the second RC time. Note that there exists an F/F, RC1F, to differentiate the two RC's. With the first RC, the first 24 bits are D-Set into the lower part of the counter and with second RC, another 24 bits are D-Set into the upper-half of the counter.

2. READ THE COUNT OUT:

The XFRIN command is decoded and the D-Set Mode of the latch is stopped. The contents of the latch are read by two RC's with 24 bits each time onto the exchange lines, the lower order 24 bits being enabled onto the exchange lines before the higher order bits.

Note: The TRANSFER OUT A command is being used primarily to set the configuration of the counter (either 1x48 bits or 4x12 bits) and to stop and start it counting either up or down. The TEST STATUS and TEST AND CLEAR commands are used to determine the counter's status.

GENERAL COMMENTS ON B1700 HIGH SPEED TIMER MODULE

It is anticipated that the Timer Module will be an "add on" device and will not be present on all B1700's. As such, its use will be confined to special runs and in some cases specialized software available "in house". Thus, for the timer portion of the MODULE, one 48-bit counter running at a 1MHz rate is sufficient. If additional counting functions are desired, then the one hardware counter can be programatically "gated" into one or more memory buckets to provide the needed capabilities.

From a diagnostic point of view, the hardware is capable of breaking the counter into 4-12 bit counters, disconnecting the overflow logic between these counters, but allowing the driving 1 MHz signal to be programatically moved to the low order position of each of the 12 bit counters. In this way, each of the 12 bit sections can be individually tested, including its overflow, in a short period of time. In the 12 bit configuration, the overflow from each counter will set the overflow flip-flops, but will not feed into the next higher 12 bit counter.

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Note: This timer module may only be used with MCP's of Mark Level 4.1 or later and must be on Channel 15. The device I.D. for the module is 100000 (binary) which was chosen to insure that even if the MCP sees the device, it will ignore it since it looks like a datacomm I.D. However, this should never occur because GISMO reports "MISSING DEVICE" for all inquiries on Channel 15.

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