WISC

USERS'

MANUAL

WISCUM--1

Prepared by the Staff

of the

Computing Laboratory

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Madison, Wisconsin

INDEX

GENERAL

The WISC is a synchronous sequential three address binary digital computer located in the Computing Laboratory of the Department of Electrical Engineering of the University of Wisconsin.

The WISC uses a magnetic drum rotating at 3600 R.P.M. to store all data and instructions. There are a total of 1024 storage locations on the drum, each of which is capable of storing a group of 50 binary digits.

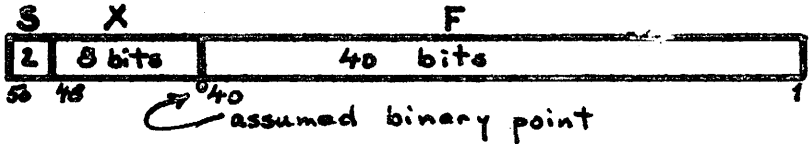
Any arithmetic operation is completed within four drum revolutions, but because of the integrally synchronized nature of the computer, four instructions are being executed at any given time. Hence, the effective time of execution for any arithmetic instruction is one drum revolution (about 17 milliseconds); the basic clock rate of the computer is 100 kilocycles per second.

WORDS

All words in the WISC consist of 50 binary digits. For convenience, these bits are grouped into sets of four bits each, and references to the actual bits are made in the hexadecimal (base 16) number system. The hexadecimal characters used in this laboratory are the ten Arabic numerals 0 through 9 and the first six lower case letters a through f .

The bits within a work are numbered right to left from one to fifty, representing the time sequence in which they appear within the machine. However, the thirteen hexadecimal characters which are used to make up a word are numbered from left to right. Since this is the sequence most familiar to the user, it is in this order that the hexadecimal characters are supplied to the computer, and it will be in this order that results are delivered from the computer.

If a word is to be treated as a number, the bits are thought of as being grouped into a 40 bit binary fraction and an 8 bit binary exponent of the base two. Both parts of a number carry a sign, with bit 49 representing the sign of the exponent and bit 50 the sign of the fraction (a plus sign is stored as a zero and a minus sign is stored as a one). It should be noted, as shown below, that the assumed binary point separates the fraction from the exponent.



Hence, numbers within the WISC are stored as

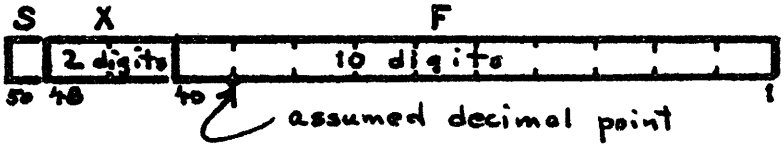
$$2^q \times p$$

where q is the exponent (with its sign) and p is the binary fraction

(with its sign). It should be observed that p must be less than unity in magnitude because it is a binary fraction. Moreover, a "normalized" number is stored so that bit 40 of a normalized number must be a one; this means that p is greater than or equal to one-half in magnitude. Zero, however, is always stored as a completely blank word.

For greater convenience, a decimal format is available for the input and output of data. Conversion between the decimal and normalized binary formats is accomplished by a stored subroutine.

In a decimal format the bits of a word are considered to be grouped into ten digits of significant figures and two digits of an exponent of the base ten. Again, each portion of a number carries a sign with the same convention as used in the binary format. To conform with standard scientific notation, the decimal point is assumed to follow the first significant figure.



A number expressed in this format would be

$$10^{Q} \times P$$

where Q is the decimal exponent (with its sign) and P is the group of significant figures (with its sign). Q is restricted to be less than 76 in magnitude, and P is restricted to be equal to or greater than one, and less than ten in magnitude. As in the binary format, zero is represented by a completely blank word.

If a word is to be treated as an order, the bits are considered to be grouped into five fields: three address fields of 12 bits each, an order field of 4 bits, and a special information field of 10 bits. A complete description of the meaning and use of these fields is given in the section on orders.

MODES OF ARITHMETIC OPERATION

There are three modes of arithmetic operation available to the user of the WISC. These modes of operation differ primarily in the manner in which the exponent portion of numbers are handled.

The normal operation of the computer is with the "Arithmetic Mode Selector" (mounted on the console) set to the "Floating Point" position. Two modes of operation are then available to the programmer through the use of a key bit in each arithmetic order. If bit 49 of an arithmetic order is a zero the order will be executed in the floating point mode; if bit 49 of an arithmetic order is a one the order will be executed in the ordinary fixed point mode.

With the "Arithmetic Mode Selector" set at the "Fixed Point -- A" position all arithmetic will be performed in the ordinary fixed point mode. With the "Arithmetic Mode Selector" set to "Fixed Point -- 0" position all arithmetic will be performed in the special fixed point mode. Bit 49 is not used in any arithmetic order if the selector is set to either of these positions.

In the floating point mode arithmetic is performed with the numbers assumed to be in the normalized binary format described above. All results are delivered in the correct normalized binary format if both operands were in the standard format. If both operands were not in the standard format the result will not, in general, be in the standard format. In some cases the result will be meaningless if both operands were not in the standard format.

In the ordinary fixed point mode arithmetic is performed with the numbers assumed to be only 40 bit binary fractions. The exponent of the A operand will be delivered as the exponent of the result. It is not necessary to have the operands in the normalized format, and the result will not, in general, be in the normalized format. However, since the result is a binary fraction (with an attached exponent), the result of any arithmetic operation must be less than unity in magnitude.

In the special fixed point mode arithmetic is again performed with the numbers assumed to be only 40 bit binary fractions, but the exponent of the result will always be zero.

It should be noted that no saving is time is achieved in any of the modes of operation because of the integrally synchronized nature of WISC operations.

ORDERS

The WISC employs a three address type of order structure. Each order consists of an order type (one of the sixteen types available), three addresses, and certain special information. Each address refers to a unique storage location on the magnetic drum.

All orders to be executed by the computer are stored on the drum and are read from the drum before execution. Because of the sequential operation of the WISC, orders are normally executed in the sequence in which they appear on the drum; certain orders, however, instruct the computer to take the next instruction from a specified drum position and then to proceed sequentially from that position.

There are four classes of orders available in the sixteen order types of the WISC:

Arithmetic orders instruct the computer to perform some arithmetic on two operands located in specified storage locations and to deliver the result to a specified storage location.

Control orders instruct the computer to perform some control function (such as punching a paper tape) and then to take the next

instruction from a specified drum position rather than from the next sequential location.

Comparison orders combine some of the features of each of the above. They instruct the computer to perform some arithmetic on two operands located in specified storage locations, and depending on the result to take the next instruction from one of two drum positions. If the conditions of the comparison are met the next instruction is taken from a specified drum position, but if the conditions of the comparison are not met the next instruction is taken from the next sequential position.

Logical orders instruct the computer to perform some logical (non-arithmetic) operation on two words located in specified storage locations.

In the following description of the order types, each order will be identified by its name and by a set of three letters which serves as a mnemonic code for that order. The execution time (in milliseconds) for each order is also listed. A skeleton form of each order shows the pertinent parts of the order. The order type is always given by the fourth hexadecimal character of the order. The address of a storage location X is indicated by -X- and the contents of storage location X is indicated by (X) .

If the "Arithmetic Mode Selector" is in the "Floating Point" position all arithmetic and comparison orders have two meanings, with bit 49 serving to decide which mode of operation is to be used for that order. In the order descriptions all arithmetic orders have an n for the first character in the skeleton form to indicate the two possible operations. The mnemonic codes for the two orders are identical: the code for the floating point order (bit 49 is a zero) is in upper case letters; the code for the fixed point order (bit 49 is a one) is in lower case letters.

0 Read Paper Tape (RPT) (34 + 17 N)

0 00 0 -A- -B- -C-

This order fills locations -A- through -B- with words supplied from the input tape reader. After filling these locations the next instruction will be taken from -C- .

Since this order uses the input buffer storage the tape should have been read into the buffer storage before this order is reached in the program. It is desirable to limit all inputs to blocks of 32 words or less, because the buffer storage can hold only 32 words; if more than 32 words are required by a RPT order, operation will be correct, but the computer will have to wait while tape is read into the buffer storage.

If the input is restricted so that the computer does not have to wait for the tape reader, this order requires about 34 + 17 N milliseconds (where N is the number of words to be taken from the

buffer storage) for completion. If tape must be read into the buffer storage this order requires about 34 + 1500 M milliseconds (where M is the number of words to be read into buffer storage) for completion.

1 Extract (EXT) (34)

0 xx 1 -A- zyz -C-

This order replaces a specified number of bits in (C) with bits from (A). The x information identifies where in (A) the extraction is to begin; the y information identifies where in (C) the replacement is to begin; the z information specifies the number of bits to be replaced. Each of these pieces of information is given by six bits. These bits are arranged in the EXT order as shown below:

00 00xx xxxx 0001 AAAA AAAA AAAA zxyy yyyy zzzz CCCC CCCC CCCC

The x information is given by bits 41 through 46. The y information is given by bits 17 through 22. The z information is split into two portions for better compatibility with the hexadecimal code used in input: the two most significant bits are given by bits 23 and 24 and the four least significant bits are given by bits 13 through 16.

1 Clear and Extract (CLE) (34)

1 xx 1 -A- yzy -C-

This order is very similar to the EXT order described above. However, (C) is cleared to a zero (a completely blank word) before the extraction takes place.

2 Multiply (MPY) (mpy) (17)

n 00 2 -A- -B- -C-

This order replaces (C) with the product of (A) and (B).

3 Divide (DIV) (div) (17)

n 00 3 -A- -B- -C-

This order replaces (C) with the quotient of (A) divided by (B).

4 No Operation (NOP) (17)

0 00 4 000 000 000

This order does nothing except introduce a delay of 17 milliseconds.

5 Transfer (TRA) (34)

0 00 5 000 000 -C-

This order causes the next instruction to be taken from -C- rather than from the next sequential location.

5 Breakpoint Transfer (BTR) (34 or 17)

1 00 5 0kk 000 -C-

This order is executed like a TRA order IF any of the eight Breakpoint Switches on the console that correspond to bits k (switch No. 1 corresponds to bit 25) are set to "Yes" OR if the Breakpoint Override Switch on the console is set to "Override." If none of these conditions is met this order is executed like a NOP order.

6 Halt and Transfer (HTR) (-)

0 00 6 000 000 -C-

This order causes the computer to halt after completing all operations than in progress. When the computer halts (C) will be displayed in the order register display on the console. When the computer is started the next instruction will be taken from -C- rather than from the next sequential location.

6 Breakpoint Halt and Transfer (BHT) (- or 17)

1 00 6 0kk 000 -C-

This order is executed like a HTR order IF any of the eight Breakpoint Switches on the console that correspond to bits k (switch No. 1 corresponds to bit 25) are set to "Yes" OR if the Breakpoint Override Switch on the console is set to "Override." If none of these conditions is met this order is executed like a NOP order.

7 Punch Paper Tape (PPT) (34 + 17 N)
(34 + 1500 M)

0 00 7 -A- -B- -C-

This order causes the contents of -A- through -B- to be punched on paper tape in standard form with the desired format control (as described in the section on console controls). After the specified words are delivered to the output buffer storage, the next instruction will be taken from -C- .

Since this order delivers words to the output buffer storage, which can hold only 32 words, output should be limited to blocks of no more than 32 words. If this is not done, operation will be correct but the computer will have to wait for the punch to punch the paper tape.

If the output is restricted so that the computer does not have to wait for the punch this order requires about 34 + 17 N milliseconds (where N is the number of words to be delivered to the buffer storage) for completion. If the punch must operate this order requires about 34 + 1500 M milliseconds (where M is the number of words to be punched) for completion.

8 Add (ADD) (add) (17)

n 00 8 -A- -B- -C-

This order replaces (C) with (A) + (B) .

9 Add Absolute Values (ADA) (ada) (17)

n 00 9 -A- -B- -C-

This order replaces (C) with $|(A)| + |(B)|$.

a Subtract (SUB) (sub) (17)

n 00 a -A- -B- -C-

This order replaces (C) with (A) - (B).

b Subtract Absolute Values (SUA) (sua) (17)

n 00 b -A- -B- -C-

This order replaces (C) with $|(A)| - |(B)|$.

c Transfer on Zero (TZE) (tze) (34 or 51)

n 00 c -A- -B- -C-

This order causes the next instruction to be taken from -C- IF (A) - (B) is zero; if this condition is met this order requires 51 milliseconds for execution. If (A) - (B) is not zero the next instruction is taken from the next sequential location; this order then requires 34 milliseconds for execution.

d Transfer on Zero Absolute (TZA) (tza) (34 or 51)

n 00 d -A- -B- -C-

This order causes the next instruction to be taken from -C- IF $|(A)| - |(B)|$ is zero; if this condition is met this order requires 51 milliseconds for execution. If $|(A)| - |(B)|$ is not zero the next instruction is taken from the next sequential location; this order then requires 34 milliseconds for execution.

e Transfer on Negative (TNE) (tne) (34 or 51)

n 00 e -A- -B- -C-

This order causes the next instruction to be taken from -C- IF (A) - (B) is negative*; if this condition is met this order requires 51 milliseconds for execution. If (A) - (B)

- - - - - - - - - -

* Zero, regardless of how produced, is always treated as positive in the WISC.

is not negative the next instruction is taken from the next sequential location; this order than requires 34 milliseconds for execution.

f Transfer on Negative Absolute (TNA) (tna) (34 or 51)

n 00 f -A- -B- -C-

This order causes the next instruction to be taken from -C- IF $|(A)| - |(B)|$ is negative*; if this condition is met this order requires 51 milliseconds for execution. If $|(A)| - |(B)|$ is not negative the next instruction is taken from the next sequential location; this order than requires 34 milliseconds for execution.

TIMING CONSIDERATIONS

Short Memory

Because of the integral synchronization of the WISC, the result of an arithmetic order will not be delivered to the drum location specified by the order in time to be used by the next order. To circumvert this difficulty, all arithmetic results are delivered to a special storage location called "short memory" as soon as they are produced. If short memory coding(800_{16}*) is used for the A or B address of an arithmetic, extract, or comparison order, the result of the preceding order will be obtained for the specified operand.

If the result of an arithmetic order is to be used only by the next order, short memory coding may be used in place of a drum address for the C address of the former. The result will then be delivered only to short memory, whence it will be available until another arithmetic, comparison, extract, or input order destroys it.

Since all comparison orders are actually subtract and compare operations, the result of the subtraction called for in a comparison order is available from short memory on the same basis as the result of a normal arithmetic order.

Because an extract order requires two cycles for execution, the result of an EXT or CLE order may be obtained by using the drum address of that result in the next order. Do NOT use short memory coding to obtain this result! However, short memory contains that A operand of the extract order (shifted the

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* If it is not clear what number system is being used, the base of the number system is used as a subscript to the number

appropriate number of places) at the conclusion of an extract order, and this may be obtained by using short memory coding in the next order. The shifting of the A operand loses bits at one end of the word and supplies zeros at the other end of the word.

Automatic Delays

Whenever the computer attempts to read a word from the drum at the same time that a word is being written onto the drum an automatic delay of one cycle takes place. During this cycle of delay, writing takes place, and reading is permitted during the next cycle. This will cause all programs to run slightly slower that would be expected from the times listed for the execution of the orders (about 10% increase in running time time is typical).

Because all instructions are read from the drum slightly before they are used, it is necessary to have completed any modifications of an order some time before that order is to be executed. This means that there must be at least two cycles between the instruction that modifies an order and that order itself. It is better to leave at least one more cycle (in addition to the two mentioned above) between the two orders to prevent an automatic delay of one cycle.

SUBROUTINES

A number of subroutines are available to WISC users for such special operations as: evaluation of commonly used function, solution of differential equations, program modification, etc. The WISC Library Book contains an index of the subroutines available, and Users' Sheets which give for each subroutine:

Operation performed
Data required
Number of memory locations used
Average time for completion
The linkage or calling sequence required

Persons interested in more detailed information about a particular subroutine may consult members of the staff of the Computing Laboratory for more complete descriptions, copies of the program, and flow diagrams.

All subroutines make use of certain shared Operational Storage locations (OPSTO's) on the drum (locations 354-$35e_{16}$). The user links to any subroutine by planting a link word in location $35f_{16}$, which is therefore known as Linkage Opsto (LO). In a standard linkage this link word contains the address of the operand, the address for the result, and the address of the next instruction.

To illustrate, suppose that instruction 120 completes the calculation of a quantity y and delivers it to 200, that the square root of y is wanted, and that the square root subroutine is in locations 001-012. The following three word linkage causes the square root of y to be calculated and stored in location 201, and control returned to location 124.

```
120:   xxx x xxx xxx 200
121:   100 8 123 3ff 35f
122:   000 5 000 000 001
123:   000 0 200 201 124
124:    next operation
```

LINKAGE TO SQUARE ROOT

All subroutines are written to be used in the memory with their first instruction in location 001 . If any subroutine is to be used in another location (as must be the case when more than one are used), it must be adapted for that location. The Modification and Adaption Subroutine (MAD) is a permanently stored subroutine for accomplishing this by examining the addresses of all orders in the subroutine and modifying all that refer to locations within the subroutine.

In addition to MAD, two other important subroutines are permanently stored on the drum for the convenience of the user: CON-DECON and ITR. CON converts any number inserted in floating decimal format to floating binary; DECON accomplishes the reverse conversion of floating binary numbers before output. The selection between these two is made by tagging the link work as + or - , respectively

(see Appendix E 1). The third of these important subroutines is the Introcomputational Test Routine (ITR). This test routine quickly (500 ms) checks almost all the high-speed circuits of the computer, and stops if any fault is discovered. It should be incorporated at frequent intervals in all programs run on the machine.

In addition to the three important subroutines described above, a set of 24 commonly used constants is also permanently stored in the memory (PERSTO). Appendix B provides a list of these constants.

PREPARATION OF TAPES

After coding is completed, the last step in readying the problem for running on the computer is to cut it on a 6-channel paper tape using the Flexowriter electric typewriter. Each character of a word corresponds to the striking of one key on the Flexowriter, which in turn produces one row of holes on the tape. Each word (instruction or number) must consist of thirteen characters, followed by a comma and either a TAB or a CARRIAGE RETURN. Extra spaces, CR's, or other symbols may be inserted as desired; only the 16 hexadecimal characters 0-9 and a-f , and the comma (End of Word) are of any significance to the computer. At the end of every tape "Stop Code" and several "Tape Feed" sprocket holes should be punched.

It is possible to reproduce a tape by feeding it through the tape reader of the Flexowriter while the "Punch" control is on. In this type of reproduction, however, Code Deletes (a row of holes across the tape which may be used to "erase" errors), Tape Feeds, and Stop Codes are not reproduced.

After cutting the tape, it is good practice to prepare a typed listing of the program from the tape just cut. This listing should then be checked against the original version of the program to catch any mistakes that have occurred in typing. When the programmer is certain that the tape is an accurate copy of his program, he is ready to run his problem on the computer.

OPERATION OF COMPUTER

Do not turn on the computer ! Only persons designated by the staff of the Computing Laboratory are authorized to energize or deenergize it. If you sign up in advance for computing time, you will minimize waiting and delay.

To identify the following lights and switches, refer to the diagram of the console, Appendix F :

Pilot Lights at the top of the console indicate the state of the machine: Stopped, Running, Emergency Halt.

Order Register, a bank of 50 neons, displays in hexadecimal code the order about to be executed. (It will show certain other features during the odd cycles of multi-cycle orders such as EXT, RPT, PPT, etc.)

Order Counter gives the location of the next order to be executed, unless a comparison or control order already in progress changes the sequence.

Speed Switch allows the user to select the speed of computation: FULL (60 operations a second), RAPID (8), MEDIUM (2), and SLOW (1/2).

Mode Switch selects the type of operation. Under the MANUAL setting the computer will advance one cycle each time the RUN bottom is depressed and released. On the SEMI-AUTOMATIC setting the computer will continue to run as long as the RUN bottom is held down. With this switch set to AUTOMATIC, the computer will start running as soon as the RUN bottom is depressed and released, and will stop only when the STOP buttom is depressed (or a Halt order decoded.)

Clear Button clears the contents of the Order Register to a complete blank. (This should be done only when the computer is stopped to prevent it from overwriting portions of the program.) When the RUN bottom is then depressed the computer will execute the order in the order register. Since this order will now be the order 000 0 000 000 000 , the computer will read one word from input buffer storage, write it into storage location 000 , and then transfer to that location for the next instruction. This is the usual method for getting started.

Breakpoint Switches
Breakpoint Override Switch These are discussed under the BKT and BHT orders. On the Breakpoint Switches up corresponds to "Yes".

Arithmetic Mode Switch is located above the Order Register. It should be left set for floating point operation unless approved by one of the staff members of the Computing Laboratory.

The switches on the extreme left side of the input console control the motors for the reader and the rewind drive.

To load a tape, it should be fed over the reader drive sprocket with the motor stopped. If the "Clear--Empty" button is now depressed, the input unit is ready to accept new information from the tape. When the "Start" button is now depressed, the tape reader will start reading words from the tape and storing them in the buffer storage. Note that the computer may be operating on another part of the program or another program while all this is going on. The reader will stop whenever it reads a Stop Code on the tape, or at the end of the word being read if the input "Stop" button is depressed.

If more than 32 words are loaded at one time it is possible to load the entire tape into the buffer storage ready for high speed transfer to the memory when the computer executes a RPT order. If a tape of more than 32 words is presented to the computer before a RPT order is executed, automatic circuits will halt the tape reader when the buffer is full, and reading will be resumed when buffer has been emptied. Operation will be correct, but time will be lost.

The switch on the right panel of the console controls the motor for the punch. This switch should never be left in the "off" position.

When the "Tape Feed" button is depressed the punch advances the tape and punches sprocket holes but no information. When the "Stop Code" button is depressed Stop Codes are punched on the tape. Before a tape is removed from the punch, a Stop Code should be punched and then the tape advanced by means of the "Tape Feed".

When the "Clear--Empty" button is depressed the output unit is readied to accept information from the computer. As soon as the output unit receives such information the punch begins delivering the information and continues until all the words have been punched on the tape (or the "Clear--Empty" button is again depressed).

Since the output buffer storage can hold 32 words, PPT orders should call for output in blocks of no more than 32 words. If too many words are called for, or PPT orders occur too frequently, automatic delays ensure correct operation, but again time will be lost.

The "Format Control" allows the user to determine the number of columns that will be listed across the page when the output is typed by the Flexowriter.

If it appears that immediate shut-down of the computer is necessary and no staff member can be reached, the main power switch located on the power supply rack near the door to Room 3024 may be thrown to remove all power from the computer. A fire extinguisher is located at the other side of this door.

PRECAUTIONS

If the B operand (the divisor) of a floating point division is not normalized, a meaningless result will be produced.

If the B operand (the divisor) of a fixed point division is smaller than the A operand a meaningless result will be produced.

If an overflow occurs in any fixed point addition the fraction will be shifted one place to the right to prevent loss of the most significant bit, and the exponent will be adjusted to compensate for this shift.

If the A or B address of an order is the same as the C address of the order preceding (unless the preceding order is an extract order), it cannot be guaranteed that the result of the preceding order will be obtained, nor can it be guaranteed that the previous contents of the location will be obtained. Use short memory coding.

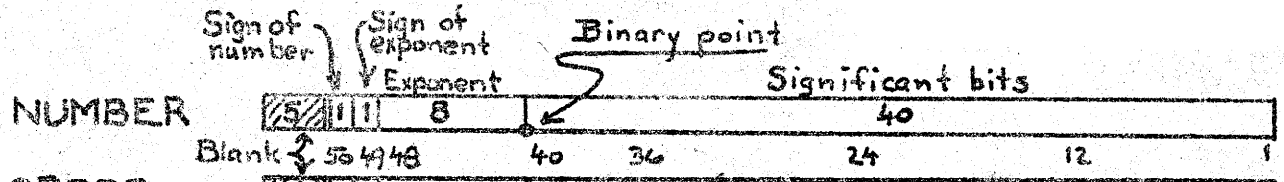
Short memory coding following an extract order will give the shifted A operand. If the result of the extract order is desired, use the address of that result directly.

Do not attempt to achieve an exact equality, such as is tested for by a TZE order, of any two numbers when either or both have passed through CON.

It is impossible to write into PERSTO.

Allow at least two cycles between an order which modifies another order and the order being modified.

ORDER CODE



CODE	SYMBOL	OPERATION	X	T	A	B	C
0	RPT	Read Paper Tape	1	0000	00 Address for first word	00 Address for last word	00 Address of next order
1	EXT	Extract	00 00 χ(6)	0001	s0 Address of operand A	z(2) y(6) z(4)	00 Address for result
1	CLE	Clear and Extract	01 00 χ(6)	0001	s0 Address of operand A	z(2) y(6) z(4)	00 Address for result
2	MPY	Multiply	0n	0010	s0 "	s0 Address of operand B	r0 "
3	DIV	Divide	0n	0011	s0 "	s0 "	r0 "
4	NOP	No Operation		0100			
5	TRA	Transfer	00	0101			00 Address of next order
5	BTR	Breakpoint Transfer	01	0101	00 00 BP switches effective		00 "
6	HTR	Halt and Transfer	00	0110			00 "
6	BHT	Breakpoint Halt & Trans	01	0110	00 00 BP switches effective		00 "
7	PPT	Punch Paper Tape	00	0111	00 Address of first word	00 Address of last word	00 "
8	ADD	Add	0n	1000	s0 Address of operand A	s0 Address of operand B	r0 Address for result
9	ADA	Add Absolute	0n	1001	s0 "	s0 "	r0 "
a	SUB	Subtract	0n	1010	s0 "	s0 "	r0 "
b	SUA	Subtract Absolute	0n	1011	s0 "	s0 "	r0 "
c	TZE	Transfer on Zero	0n	1100	s0 "	s0 "	00 Next order if A - B = 0
d	TZA	Transfer on Zero Absolute	0n	1101	s0 "	s0 "	00 Next order if |A| - |B| = 0
e	TNE	Transfer on Negative	0n	1110	s0 "	s0 "	00 Next order if A - B < 0
f	TNA	Transfer on Negative Abs	0n	1111	s0 "	s0 "	00 Next order if |A| - |B| < 0

n = 0 Do arithmetic in floating point
n = 1 " " " fixed point

s = 0 This is an actual address
s = 1 Use preceding result for this operand

r = 0 This is an actual address
r = 1 Do not deliver result to storage

χ: first bit to Extract
y: place to insert first bit
z: number of bits to Extract

SIGN: 0 = plus
1 = minus

WISC
DRUM STORAGE ASSIGNMENTS

~~5/12/59~~ ~~5/29/59~~ 1/5/60 2/19/60

DEC	HEX	USE	NO.
0	000	USED FOR INPUT	1
1 to 851	001 to 353	AVAILABLE FOR USE	851
852 to 862	354 to 35e	OPSTO	11
863	35f	LINKAGE OPSTO	1
864 to 951	360 to 3af	CONVERSION ROUTINES (0 for CON — 2 for DECON) [100 8 L+2 3ff 35f / 5 / 360 / {0 2 00 0 JN,[JN,[A]	~~88~~ ~~93~~ 80
952 to 976	3b0 to 3d8	MODIFICATION ADAPTATION ROUTINE [100 8 L+2 3ff 35f / 5 / 3b0 / 0 J JW,[k A]	~~37~~ 34
977 to 999	3d9 to 3e7	TEST ROUTINE (ITR) [~~000 1 L+1 01c 35ff~~ 100 B L+1 3ff 35f / 5 / B 3d3]	21 ~~19~~ 1

Also 3d1 3d2

DEAD STORAGE (5 TRACKS)

1000	3e8	HALT ORDER	000	6	000	000	3e8	
1001	3e9	~~2~~	~~000~~	~~0~~	~~000~~	~~000~~	~~000~~	~~2^{16}~~
1002	3ea	~~2^{0}~~	~~000~~	~~0~~	~~000~~	~~000~~	~~001~~	2
1003	3eb	$2^{-12} = 10^{A}$	000	0	010	000	000	
1004	3ec	4^{C}	000	0	000	000	004	
1005	3ed	$\sqrt{2} = 1.414\,21356$	001	b	504	f33	3fa	
1006	3ee	.1111...	000	f	fff	fff	fff	
1007	3ef	4^{X}	004	0	000	000	000	
1008	3f0	1×2.4	005	8	000	000	000	
1009	3f1	$e = 2.718\,281\,828$	002	a	df8	545	8a3	
1010	3f2	$\pi = 3.141\,592\,654$	002	c	9af	daa	222	
1011	3f3	2^{C}	000	0	000	000	002	
1012	3f4	10^{-9}	11d	8	970	5f4	137	
1013	3f5	10^{10}	022	9	502	f90	000	
1014	3f6	10	004	a	000	000	000	
1015	3f7	2^{-8}	000	0	100	000	000	
1016	3f8	$2^{-1} = .1 = 1/2$	000	8	000	000	000	
1017	3f9	$2^{-2} = .01$	000	4	000	000	000	
1018	3fa	$2^{-4} = .0001 \equiv$ E order $= 1^{F}$	000	1	000	000	000	
1019	3fb	1^{A}	000	0	001	000	000	
1020	3fc	1^{B}	000	0	000	001	000	
1021	3fd	1^{C}	000	0	000	000	001	
1022	3fe	1	001	8	000	000	000	
1023	3ff	0	000	0	000	000	000	

PERSTO 24

HEXADECIMAL to DECIMAL CONVERSION TABLE

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
01	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
02	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
03	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
04	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
05	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
06	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
07	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
08	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
09	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
0a	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
0b	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
0c	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
0d	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
0e	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
0f	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
10	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271
11	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
12	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303
13	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
14	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
15	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351
16	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367
17	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383
18	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399
19	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415
1a	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431
1b	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447
1c	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463
1d	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479
1e	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495
1f	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511

HEXADECIMAL to DECIMAL CONVERSION TABLE

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
16	20	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527
	21	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543
17	22	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559
	23	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575
18	24	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591
	25	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607
19	26	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623
	27	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639
20	28	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655
	29	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671
21	2a	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687
	2b	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703
22	2c	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719
	2d	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735
23	2e	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751
	2f	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767
24	30	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783
	31	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799
25	32	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815
	33	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831
26	34	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847
	35	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863
27	36	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879
	37	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895
28	38	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911
	39	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927
29	3a	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943
	3b	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959
30	3c	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975
	3d	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991
31	3e	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007
	3f	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023

HEXADECIMAL to DECIMAL CONVERSION TABLE

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
40	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039
41	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055
42	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071
43	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087
44	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103
45	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119
46	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135
47	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151
48	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167
49	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183
4a	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199
4b	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215
4c	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231
4d	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247
4e	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263
4f	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279
50	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295
51	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311
52	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327
53	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343
54	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359
55	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375
56	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391
57	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407
58	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423
59	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439
5a	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455
5b	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471
5c	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487
5d	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503
5e	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519
5f	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535

HEXADECIMAL to DECIMAL

CONVERSION TABLE

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
60	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551
61	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567
62	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583
63	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599
64	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615
65	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631
66	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647
67	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663
68	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679
69	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695
6a	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711
6b	1712	1713	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727
6c	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743
6d	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759
6e	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775
6f	1776	1777	1778	1779	1780	1781	1782	1783	1784	1785	1786	1787	1788	1789	1790	1791
70	1792	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802	1803	1804	1805	1806	1807
71	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823
72	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	1839
73	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855
74	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871
75	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887
76	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
77	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
78	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
79	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
7a	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
7b	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
7c	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
7d	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
7e	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
7f	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047

HEXADECIMAL to DECIMAL

CONVERSION TABLE

800-9ff

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
80	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063
81	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079
82	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095
83	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111
84	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127
85	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143
86	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159
87	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175
88	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191
89	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207
8a	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223
8b	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239
8c	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255
8d	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271
8e	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287
8f	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303
90	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319
91	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335
92	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351
93	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367
94	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383
95	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399
96	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415
97	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431
98	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447
99	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463
9a	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479
9b	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495
9c	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511
9d	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527
9e	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543
9f	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559

800-9ff

HEXADECIMAL to DECIMAL

CONVERSION TABLE

a00-bff

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
a0	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575
a1	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591
a2	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607
a3	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623
a4	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639
a5	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655
a6	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671
a7	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687
a8	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703
a9	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719
aa	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735
ab	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751
ac	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767
ad	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783
ae	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799
af	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815
b0	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831
b1	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847
b2	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863
b3	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879
b4	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895
b5	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911
b6	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927
b7	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943
b8	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959
b9	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975
ba	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991
bb	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007
bc	3008	3009	3010	3011	3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022	3023
bd	3024	3025	3026	3027	3028	3029	3030	3031	3032	3033	3034	3035	3036	3037	3038	3039
be	3040	3041	3042	3043	3044	3045	3046	3047	3048	3049	3050	3051	3052	3053	3054	3055
bf	3056	3057	3058	3059	3060	3061	3062	3063	3064	3065	3066	3067	3068	3069	3070	3071

a00-bff

HEXADECIMAL to DECIMAL

CONVERSION TABLE

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
c0	3072	3073	3074	3075	3076	3077	3078	3079	3080	3081	3082	3083	3084	3085	3086	3087
c1	3088	3089	3090	3091	3092	3093	3094	3095	3096	3097	3098	3099	3100	3101	3102	3103
c2	3104	3105	3106	3107	3108	3109	3110	3111	3112	3113	3114	3115	3116	3117	3118	3119
c3	3120	3121	3122	3123	3124	3125	3126	3127	3128	3129	3130	3131	3132	3133	3134	3135
c4	3136	3137	3138	3139	3140	3141	3142	3143	3144	3145	3146	3147	3148	3149	3150	3151
c5	3152	3153	3154	3155	3156	3157	3158	3159	3160	3161	3162	3163	3164	3165	3166	3167
c6	3168	3169	3170	3171	3172	3173	3174	3175	3176	3177	3178	3179	3180	3181	3182	3183
c7	3184	3185	3186	3187	3188	3189	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199
c8	3200	3201	3202	3203	3204	3205	3206	3207	3208	3209	3210	3211	3212	3213	3214	3215
c9	3216	3217	3218	3219	3220	3221	3222	3223	3224	3225	3226	3227	3228	3229	3230	3231
ca	3232	3233	3234	3235	3236	3237	3238	3239	3240	3241	3242	3243	3244	3245	3246	3247
cb	3248	3249	3250	3251	3252	3253	3254	3255	3256	3257	3258	3259	3260	3261	3262	3263
cc	3264	3265	3266	3267	3268	3269	3270	3271	3272	3273	3274	3275	3276	3277	3278	3279
cd	3280	3281	3282	3283	3284	3285	3286	3287	3288	3289	3290	3291	3292	3293	3294	3295
ce	3296	3297	3298	3299	3300	3301	3302	3303	3304	3305	3306	3307	3308	3309	3310	3311
cf	3312	3313	3314	3315	3316	3317	3318	3319	3320	3321	3322	3323	3324	3325	3326	3327
d0	3328	3329	3330	3331	3332	3333	3334	3335	3336	3337	3338	3339	3340	3341	3342	3343
d1	3344	3345	3346	3347	3348	3349	3350	3351	3352	3353	3354	3355	3356	3357	3358	3359
d2	3360	3361	3362	3363	3364	3365	3366	3367	3368	3369	3370	3371	3372	3373	3374	3375
d3	3376	3377	3378	3379	3380	3381	3382	3383	3384	3385	3386	3387	3388	3389	3390	3391
d4	3392	3393	3394	3395	3396	3397	3398	3399	3400	3401	3402	3403	3404	3405	3406	3407
d5	3408	3409	3410	3411	3412	3413	3414	3415	3416	3417	3418	3419	3420	3421	3422	3423
d6	3424	3425	3426	3427	3428	3429	3430	3431	3432	3433	3434	3435	3436	3437	3438	3439
d7	3440	3441	3442	3443	3444	3445	3446	3447	3448	3449	3450	3451	3452	3453	3454	3455
d8	3456	3457	3458	3459	3460	3461	3462	3463	3464	3465	3466	3467	3468	3469	3470	3471
d9	3472	3473	3474	3475	3476	3477	3478	3479	3480	3481	3482	3483	3484	3485	3486	3487
da	3488	3489	3490	3491	3492	3493	3494	3495	3496	3497	3498	3499	3500	3501	3502	3503
db	3504	3505	3506	3507	3508	3509	3510	3511	3512	3513	3514	3515	3516	3517	3518	3519
dc	3520	3521	3522	3523	3524	3525	3526	3527	3528	3529	3530	3531	3532	3533	3534	3535
dd	3536	3537	3538	3539	3540	3541	3542	3543	3544	3545	3546	3547	3548	3549	3550	3551
de	3552	3553	3554	3555	3556	3557	3558	3559	3560	3561	3562	3563	3564	3565	3566	3567
df	3568	3569	3570	3571	3572	3573	3574	3575	3576	3577	3578	3579	3580	3581	3582	3583

c00-dff

HEXADECIMAL to DECIMAL

CONVERSION TABLE

e00-fff

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
e0	3584	3585	3586	3587	3588	3589	3590	3591	3592	3593	3594	3595	3596	3597	3598	3599
e1	3600	3601	3602	3603	3604	3605	3606	3607	3608	3609	3610	3611	3612	3613	3614	3615
e2	3616	3617	3618	3619	3620	3621	3622	3623	3624	3625	3626	3627	3628	3629	3630	3631
e3	3632	3633	3634	3635	3636	3637	3638	3639	3640	3641	3642	3643	3644	3645	3646	3647
e4	3648	3649	3650	3651	3652	3653	3654	3655	3656	3657	3658	3659	3660	3661	3662	3663
e5	3664	3665	3666	3667	3668	3669	3670	3671	3672	3673	3674	3675	3676	3677	3678	3679
e6	3680	3681	3682	3683	3684	3685	3686	3687	3688	3689	3690	3691	3692	3693	3694	3695
e7	3696	3697	3698	3699	3700	3701	3702	3703	3704	3705	3706	3707	3708	3709	3710	3711
e8	3712	3713	3714	3715	3716	3717	3718	3719	3720	3721	3722	3723	3724	3725	3726	3727
e9	3728	3729	3730	3731	3732	3733	3734	3735	3736	3737	3738	3739	3740	3741	3742	3743
ea	3744	3745	3746	3747	3748	3749	3750	3751	3752	3753	3754	3755	3756	3757	3758	3759
eb	3760	3761	3762	3763	3764	3765	3766	3767	3768	3769	3770	3771	3772	3773	3774	3775
ec	3776	3777	3778	3779	3780	3781	3782	3783	3784	3785	3786	3787	3788	3789	3790	3791
ed	3792	3793	3794	3795	3796	3797	3798	3799	3800	3801	3802	3803	3804	3805	3806	3807
ee	3808	3809	3810	3811	3812	3813	3814	3815	3816	3817	3818	3819	3820	3821	3822	3823
ef	3824	3825	3826	3827	3828	3829	3830	3831	3832	3833	3834	3835	3836	3837	3838	3839
f0	3840	3841	3842	3843	3844	3845	3846	3847	3848	3849	3850	3851	3852	3853	3854	3855
f1	3856	3857	3858	3859	3860	3861	3862	3863	3864	3865	3866	3867	3868	3869	3870	3871
f2	3872	3873	3874	3875	3876	3877	3878	3879	3880	3881	3882	3883	3884	3885	3886	3887
f3	3888	3889	3890	3891	3892	3893	3894	3895	3896	3897	3898	3899	3900	3901	3902	3903
f4	3904	3905	3906	3907	3908	3909	3910	3911	3912	3913	3914	3915	3916	3917	3918	3919
f5	3920	3921	3922	3923	3924	3925	3926	3927	3928	3929	3930	3931	3932	3933	3934	3935
f6	3936	3937	3938	3939	3940	3941	3942	3943	3944	3945	3946	3947	3948	3949	3950	3951
f7	3952	3953	3954	3955	3956	3957	3958	3959	3960	3961	3962	3963	3964	3965	3966	3967
f8	3968	3969	3970	3971	3972	3973	3974	3975	3976	3977	3978	3979	3980	3981	3982	3983
f9	3984	3985	3986	3987	3988	3989	3990	3991	3992	3993	3994	3995	3996	3997	3998	3999
fa	4000	4001	4002	4003	4004	4005	4006	4007	4008	4009	4010	4011	4012	4013	4014	4015
fb	4016	4017	4018	4019	4020	4021	4022	4023	4024	4025	4026	4027	4028	4029	4030	4031
fc	4032	4033	4034	4035	4036	4037	4038	4039	4040	4041	4042	4043	4044	4045	4046	4047
fd	4048	4049	4050	4051	4052	4053	4054	4055	4056	4057	4058	4059	4060	4061	4062	4063
fe	4054	4065	4066	4067	4068	4069	4070	4071	4072	4073	4074	4075	4076	4077	4078	4079
ff	4080	4081	4082	4083	4084	4085	4086	4087	4088	4089	4090	4091	4092	4093	4094	4095

e00-fff

DECIMAL to HEXADECIMAL

CONVERSION TABLE

0000-0400

	0	1	2	3	4	5	6	7	8	9
0	000	001	002	003	004	005	006	007	008	009
1	00a	00b	00c	00d	00e	00f	010	011	012	013
2	014	015	016	017	018	019	01a	01b	01c	01d
3	01e	01f	020	021	022	023	024	025	026	027
4	028	029	02a	02b	02c	02d	02e	02f	030	031
5	032	033	034	035	036	037	038	039	03a	03b
6	03c	03d	03e	03f	040	041	042	043	044	045
7	046	047	048	049	04a	04b	04c	04d	04e	04f
8	050	051	052	053	054	055	056	057	058	059
9	05a	05b	05c	05d	05e	05f	060	061	062	063
10	064	065	066	067	068	069	06a	06b	06c	06d
11	06e	06f	070	071	072	073	074	075	076	077
12	078	079	07a	07b	07c	07d	07e	07f	080	081
13	082	083	084	085	086	087	088	089	08a	08b
14	08c	08d	08e	08f	090	091	092	093	094	095
15	096	097	098	099	09a	09b	09c	09d	09e	09f
16	0a0	0a1	0a2	0a3	0a4	0a5	0a6	0a7	0a8	0a9
17	0aa	0ab	0ac	0ad	0ae	0af	0b0	0b1	0b2	0b3
18	0b4	0b5	0b6	0b7	0b8	0b9	0ba	0bb	0bc	0bd
19	0be	0bf	0c0	0c1	0c2	0c3	0c4	0c5	0c6	0c7
20	0c8	0c9	0ca	0cb	0cc	0cd	0ce	0cf	0d0	0d1
21	0d2	0d3	0d4	0d5	0d6	0d7	0d8	0d9	0da	0db
22	0dc	0dd	0de	0df	0e0	0e1	0e2	0e3	0e4	0e5
23	0e6	0e7	0e8	0e9	0ea	0eb	0ec	0ed	0ee	0ef
24	0f0	0f1	0f2	0f3	0f4	0f5	0f6	0f7	0f8	0f9
25	0fa	0fb	0fc	0fd	0fe	0ff	100	101	102	103
26	104	105	106	107	108	109	10a	10b	10c	10d
27	10e	10f	110	111	112	113	114	115	116	117
28	118	119	11a	11b	11c	11d	11e	11f	120	121
29	122	123	124	125	126	127	128	129	12a	12b
30	12c	12d	12e	12f	130	131	132	133	134	135
31	136	137	138	139	13a	13b	13c	13d	13e	13f
32	140	141	142	143	144	145	146	147	148	149
33	14a	14b	14c	14d	14e	14f	150	151	152	153
34	154	155	156	157	158	159	15a	15b	15c	15d
35	15e	15f	160	161	162	163	164	165	166	167
36	168	169	16a	16b	16c	16d	16e	16f	170	171
37	172	173	174	175	176	177	178	179	17a	17b
38	17c	17d	17e	17f	180	181	182	183	184	185
39	186	187	188	189	18a	18b	18c	18d	18e	18f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

0400-0799

	0	1	2	3	4	5	6	7	8	9
40	190	191	192	193	194	195	196	197	198	199
41	19a	19b	19c	19d	19e	19f	1a0	1a1	1a2	1a3
42	1a4	1a5	1a6	1a7	1a8	1a9	1aa	1ab	1ac	1ad
43	1ae	1af	1b0	1b1	1b2	1b3	1b4	1b5	1b6	1b7
44	1b8	1b9	1ba	1bb	1bc	1bd	1be	1bf	1c0	1c1
45	1c2	1c3	1c4	1c5	1c6	1c7	1c8	1c9	1ca	1cb
46	1cc	1cd	1ce	1cf	1d0	1d1	1d2	1d3	1d4	1d5
47	1d6	1d7	1d8	1d9	1da	1db	1dc	1dd	1de	1df
48	1e0	1e1	1e2	1e3	1e4	1e5	1e6	1e7	1e8	1e9
49	1ea	1eb	1ec	1ed	1ee	1ef	1f0	1f1	1f2	1f3
50	1f4	1f5	1f6	1f7	1f8	1f9	1fa	1fb	1fc	1fd
51	1fe	1ff	200	201	202	203	204	205	206	207
52	208	209	20a	20b	20c	20d	20e	20f	210	211
53	212	213	214	215	216	217	218	219	21a	21b
54	21c	21d	21e	21f	220	221	222	223	224	225
55	226	227	228	229	22a	22b	22c	22d	22e	22f
56	230	231	232	233	234	235	236	237	238	239
57	23a	23b	23c	23d	23e	23f	240	241	242	243
58	244	245	246	247	248	249	24a	24b	24c	24d
59	24e	24f	250	251	252	253	254	255	256	257
60	258	259	25a	25b	25c	25d	25e	25f	260	261
61	262	263	264	265	266	267	268	269	26a	26b
62	26c	26d	26e	26f	270	271	272	273	274	275
63	276	277	278	279	27a	27b	27c	27d	27e	27f
64	280	281	282	283	284	285	286	287	288	289
65	28a	28b	28c	28d	28e	28f	290	291	292	293
66	294	295	296	297	298	299	29a	29b	29c	29d
67	29e	29f	2a0	2a1	2a2	2a3	2a4	2a5	2a6	2a7
68	2a8	2a9	2aa	2ab	2ac	2ad	2ae	2af	2b0	2b1
69	2b2	2b3	2b4	2b5	2b6	2b7	2b8	2b9	2ba	2bb
70	2bc	2bd	2be	2bf	2c0	2c1	2c2	2c3	2c4	2c5
71	2c6	2c7	2c8	2c9	2ca	2cb	2cc	2cd	2ce	2cf
72	2d0	2d1	2d2	2d3	2d4	2d5	2d6	2d7	2d8	2d9
73	2da	2db	2dc	2dd	2de	2df	2e0	2e1	2e2	2e3
74	2e4	2e5	2e6	2e7	2e8	2e9	2ea	2eb	2ec	2ed
75	2ee	2ef	2f0	2f1	2f2	2f3	2f4	2f5	2f6	2f7
76	2f8	2f9	2fa	2fb	2fc	2fd	2fe	2ff	300	301
77	302	303	304	305	306	307	308	309	30a	30b
78	30c	30d	30e	30f	310	311	312	313	314	315
79	316	317	318	319	31a	31b	31c	31d	31e	31f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

0800-1199

	0	1	2	3	4	5	6	7	8	9
80	320	321	322	323	324	325	326	327	328	329
81	32a	32b	32c	32d	32e	32f	330	331	332	333
82	334	335	336	337	338	339	33a	33b	33c	33d
83	33e	33f	340	341	342	343	344	345	346	347
84	348	349	34a	34b	34c	34d	34e	34f	350	351
85	352	353	354	355	356	357	358	359	35a	35b
86	35c	35d	35e	35f	360	361	362	363	364	365
87	366	367	368	369	36a	36b	36c	36d	36e	36f
88	370	371	372	373	374	375	376	377	378	379
89	37a	37b	37c	37d	37e	37f	380	381	382	383
90	384	385	386	387	388	389	38a	38b	38c	38d
91	38e	38f	390	391	392	393	394	395	396	397
92	398	399	39a	39b	39c	39d	39e	39f	3a0	3a1
93	3a2	3a3	3a4	3a5	3a6	3a7	3a8	3a9	3aa	3ab
94	3ac	3ad	3ae	3af	3b0	3b1	3b2	3b3	3b4	3b5
95	3b6	3b7	3b8	3b9	3ba	3bb	3bc	3bd	3be	3bf
96	3c0	3c1	3c2	3c3	3c4	3c5	3c6	3c7	3c8	3c9
97	3ca	3cb	3cc	3cd	3ce	3cf	3d0	3d1	3d2	3d3
98	3d4	3d5	3d6	3d7	3d8	3d9	3da	3db	3dc	3dd
99	3de	3df	3e0	3e1	3e2	3e3	3e4	3e5	3e6	3e7
100	3e8	3e9	3ea	3eb	3ec	3ed	3ee	3ef	3f0	3f1
101	3f2	3f3	3f4	3f5	3f6	3f7	3f8	3f9	3fa	3fb
102	3fc	3fd	3fe	3ff	400	401	402	403	404	405
103	406	407	408	409	40a	40b	40c	40d	40e	40f
104	410	411	412	413	414	415	416	417	418	419
105	41a	41b	41c	41d	41e	41f	420	421	422	423
106	424	425	426	427	428	429	42a	42b	42c	42d
107	42e	42f	430	431	432	433	434	435	436	437
108	438	439	43a	43b	43c	43d	43e	43f	440	441
109	442	443	444	445	446	447	448	449	44a	44b
110	44c	44d	44e	44f	450	451	452	453	454	455
111	456	457	458	459	45a	45b	45c	45d	45e	45f
112	460	461	462	463	464	465	466	467	468	469
113	46a	46b	46c	46d	46e	46f	470	471	472	473
114	474	475	476	477	478	479	47a	47b	47c	47d
115	47e	47f	480	481	482	483	484	485	486	487
116	488	489	48a	48b	48c	48d	48e	48f	490	491
117	492	493	494	495	496	497	498	499	49a	49b
118	49c	49d	49e	49f	4a0	4a1	4a2	4a3	4a4	4a5
119	4a6	4a7	4a8	4a9	4aa	4ab	4ac	4ad	4ae	4af

DECIMAL TO HEXADECIMAL

CONVERSION TABLE

1200-1599

	0	1	2	3	4	5	6	7	8	9
120	4b0	4b1	4b2	4b3	4b4	4b5	4b6	4b7	4b8	4b9
121	4ba	4bb	4bc	4bd	4be	4bf	4c0	4c1	4c2	4c3
122	4c4	4c5	4c6	4c7	4c8	4c9	4ca	4cb	4cc	4cd
123	4ce	4cf	4d0	4d1	4d2	4d3	4d4	4d5	4d6	4d7
124	4d8	4d9	4da	4db	4dc	4dd	4de	4df	4e0	4e1
125	4e2	4e3	4e4	4e5	4e6	4e7	4e8	4e9	4ea	4eb
126	4ec	4ed	4ee	4ef	4f0	4f1	4f2	4f3	4f4	4f5
127	4f6	4f7	4f8	4f9	4fa	4fb	4fc	4fd	4fe	4ff
128	500	501	502	503	504	505	506	507	508	509
129	50a	50b	50c	50d	50e	50f	510	511	512	513
130	514	515	516	517	518	519	51a	51b	51c	51d
131	51e	51f	520	521	522	523	524	525	526	527
132	528	529	52a	52b	52c	52d	52e	52f	530	531
133	532	533	534	535	536	537	538	539	53a	53b
134	53c	53d	53e	53f	540	541	542	543	544	545
135	546	547	548	549	54a	54b	54c	54d	54e	54f
136	550	551	552	553	554	555	556	557	558	559
137	55a	55b	55c	55d	55e	55f	560	561	562	563
138	564	565	566	567	568	569	56a	56b	56c	56d
139	56e	56f	570	571	572	573	574	575	576	577
140	578	579	57a	57b	57c	57d	57e	57f	580	581
141	582	583	584	585	586	587	588	589	58a	58b
142	58c	58d	58e	58f	590	591	592	593	594	595
143	596	597	598	599	59a	59b	59c	59d	59e	59f
144	5a0	5a1	5a2	5a3	5a4	5a5	5a6	5a7	5a8	5a9
145	5aa	5ab	5ac	5ad	5ae	5af	5b0	5b1	5b2	5b3
146	5b4	5b5	5b6	5b7	5b8	5b9	5ba	5bb	5bc	5bd
147	5be	5bf	5c0	5c1	5c2	5c3	5c4	5c5	5c6	5c7
148	5c8	5c9	5ca	5cb	5cc	5cd	5ce	5cf	5d0	5d1
149	5d2	5d3	5d4	5d5	5d6	5d7	5d8	5d9	5da	5db
150	5dc	5dd	5de	5df	5e0	5e1	5e2	5e3	5e4	5e5
151	5e6	5e7	5e8	5e9	5ea	5eb	5ec	5ed	5ee	5ef
152	5f0	5f1	5f2	5f3	5f4	5f5	5f6	5f7	5f8	5f9
153	5fa	5fb	5fc	5fd	5fe	5ff	600	601	602	603
154	604	605	606	607	608	609	60a	60b	60c	60d
155	60e	60f	610	611	612	613	614	615	616	617
156	618	619	61a	61b	61c	61d	61e	61f	620	621
157	622	623	624	625	626	627	628	629	62a	62b
158	62c	62d	62e	62f	630	631	632	633	634	635
159	636	637	638	639	63a	63b	63c	63d	63e	63f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

1600-1999

	0	1	2	3	4	5	6	7	8	9
160	640	641	642	643	644	645	646	647	648	649
161	64a	64b	64c	64d	64e	64f	650	651	652	653
162	654	655	656	657	658	659	65a	65b	65c	65d
163	65e	65f	660	661	662	663	664	665	666	667
164	668	669	66a	66b	66c	66d	66e	66f	670	671
165	672	673	674	675	676	677	678	679	67a	67b
166	67c	67d	67e	67f	680	681	682	683	684	685
167	686	687	688	689	68a	68b	68c	68d	68e	68f
168	690	691	692	693	694	695	696	697	698	699
169	69a	69b	69c	69d	69e	69f	6a0	6a1	6a2	6a3
170	6a4	6a5	6a6	6a7	6a8	6a9	6aa	6ab	6ac	6ad
171	6ae	6af	6b0	6b1	6b2	6b3	6b4	6b5	6b6	6b7
172	6b8	6b9	6ba	6bb	6bc	6bd	6be	6bf	6c0	6c1
173	6c2	6c3	6c4	6c5	6c6	6c7	6c8	6c9	6ca	6cb
174	6cc	6cd	6ce	6cf	6d0	6d1	6d2	6d3	6d4	6d5
175	6d6	6d7	6d8	6d9	6da	6db	6dc	6dd	6de	6df
176	6e0	6e1	6e2	6e3	6e4	6e5	6e6	6e7	6e8	6e9
177	6ea	6eb	6ec	6ed	6ee	6ef	6f0	6f1	6f2	6f3
178	6f4	6f5	6f6	6f7	6f8	6f9	6fa	6fb	6fc	6fd
179	6fe	6ff	700	701	702	703	704	705	706	707
180	708	709	70a	70b	70c	70d	70e	70f	710	711
181	712	713	714	715	716	717	718	719	71a	71b
182	71c	71d	71e	71f	720	721	722	723	724	725
183	726	727	728	729	72a	72b	72c	72d	72e	72f
184	730	731	732	733	734	735	736	737	738	739
185	73a	73b	73c	73d	73e	73f	740	741	742	743
186	744	745	746	747	748	749	74a	74b	74c	74d
187	74e	74f	750	751	752	753	754	755	756	757
188	758	759	75a	75b	75c	75d	75e	75f	760	761
189	762	763	764	765	766	767	768	769	76a	76b
190	76c	76d	76e	76f	770	771	772	773	774	775
191	776	777	778	779	77a	77b	77c	77d	77e	77f
192	780	781	782	783	784	785	786	787	788	789
193	78a	78b	78c	78d	78e	78f	790	791	792	793
194	794	795	796	797	798	799	79a	79b	79c	79d
195	79e	79f	7a0	7a1	7a2	7a3	7a4	7a5	7a6	7a7
196	7a8	7a9	7aa	7ab	7ac	7ad	7ae	7af	7b0	7b1
197	7b2	7b3	7b4	7b5	7b6	7b7	7b8	7b9	7ba	7bb
198	7bc	7bd	7be	7bf	7c0	7c1	7c2	7c3	7c4	7c5
199	7c6	7c7	6c8	7c9	7ca	7cb	7cc	7cd	7ce	7cf

DECIMAL to HEXADECIMAL

CONVERSION TABLE

2000-2399

	0	1	2	3	4	5	6	7	8	9
200	7d0	7d1	7d2	7d3	7d4	7d5	7d6	7d7	7d8	7d9
201	7da	7db	7dc	7dd	7de	7df	7e0	7e1	7e2	7e3
202	7e4	7e5	7e6	7e7	7e8	7e9	7ea	7eb	7ec	7ed
203	7ee	7ef	7f0	7f1	7f2	7f3	7f4	7f5	7f6	7f7
204	7f8	7f9	7fa	7fb	7fc	7fd	7fe	7ff	800	801
205	802	803	804	805	806	807	808	809	80a	80b
206	80c	80d	80e	80f	810	811	812	813	814	815
207	816	817	818	819	81a	81b	81c	81d	81e	81f
208	820	821	822	823	824	825	826	827	828	829
209	82a	82b	82c	82d	82e	82f	830	831	832	833
210	834	835	836	837	838	839	83a	83b	83c	83d
211	83e	83f	840	841	842	843	844	845	846	847
212	848	849	84a	84b	84c	84d	84e	84f	850	851
213	852	853	854	855	856	857	858	859	85a	85b
214	85c	85d	85e	85f	860	861	862	863	864	865
215	866	867	868	869	86a	86b	86c	86d	86e	86f
216	870	871	872	873	874	875	876	877	878	879
217	87a	87b	87c	87d	87e	87f	880	881	882	883
218	884	885	886	887	888	889	88a	88b	88c	88d
219	88e	88f	890	891	892	893	894	895	896	897
220	898	899	89a	89b	89c	89d	89e	89f	8a0	8a1
221	8a2	8a3	8a4	8a5	8a6	8a7	8a8	8a9	8aa	8ab
222	8ac	8ad	8ae	8af	8b0	8b1	8b2	8b3	8b4	8b5
223	8b6	8b7	8b8	8b9	8ba	8bb	8bc	8bd	8be	8bf
224	8c0	8c1	8c2	8c3	8c4	8c5	8c6	8c7	8c8	8c9
225	8ca	8cb	8cc	8cd	8ce	8cf	8d0	8d1	8d2	8d3
226	8d4	8d5	8d6	8d7	8d8	8d9	8da	8db	8dc	8dd
227	8de	8df	8e0	8e1	8e2	8e3	8e4	8e5	8e6	8e7
228	8e8	8e9	8ea	8eb	8ec	8ed	8ee	8ef	8f0	8f1
229	8f2	8f3	8f4	8f5	8f6	8f7	8f8	8f9	8fa	8fb
230	8fc	8fd	8fe	8ff	900	901	902	903	904	905
231	906	907	908	909	90a	90b	90c	90d	90e	90f
232	910	911	912	913	914	915	916	917	918	919
233	91a	91b	91c	91d	91e	91f	920	921	922	923
234	924	925	926	927	928	929	92a	92b	92c	92d
235	92e	92f	930	931	932	933	934	935	936	937
236	938	939	93a	93b	93c	93d	93e	93f	940	941
237	942	943	944	945	946	947	948	949	94a	94b
238	94c	94d	94e	94f	950	951	952	953	954	955
239	956	957	958	959	95a	95b	95c	95d	95e	95f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

2400-2799

	0	1	2	3	4	5	6	7	8	9
240	960	961	962	963	964	965	966	967	968	969
241	96a	96b	96c	96d	96e	96f	970	971	972	973
242	974	975	976	977	978	979	97a	97b	97c	97d
243	97e	97f	980	981	982	983	984	985	986	987
244	988	989	98a	98b	98c	98d	98e	98f	990	991
245	992	993	994	995	996	997	998	999	99a	99b
246	99c	99d	99e	99f	9a0	9a1	9a2	9a3	9a4	9a5
247	9a6	9a7	9a8	9a9	9aa	9ab	9ac	9ad	9ae	9af
248	9b0	9b1	9b2	9b3	9b4	9b5	9b6	9b7	9b8	9b9
249	9ba	9bb	9bc	9bd	9be	9bf	9c0	9c1	9c2	9c3
250	9c4	9c5	9c6	9c7	9c8	9c9	9ca	9cb	9cc	9cd
251	9ce	9cf	9d0	9d1	9d2	9d3	9d4	9d5	9d6	9d7
252	9d8	9d9	9da	9db	9dc	9dd	9de	9df	9e0	9e1
253	9e2	9e3	9e4	9e5	9e6	9e7	9e8	9e9	9ea	9eb
254	9ec	9ed	9ee	9ef	9f0	9f1	9f2	9f3	9f4	9f5
255	9f6	9f7	9f8	9f9	9fa	9fb	9fc	9fd	9fe	9ff
256	a00	a01	a02	a03	a04	a05	a06	a07	a08	a09
257	a0a	a0b	a0c	a0d	a0e	a0f	a10	a11	a12	a13
258	a14	a15	a16	a17	a18	a19	a1a	a1b	a1c	a1d
259	a1e	a1f	a20	a21	a22	a23	a24	a25	a26	a27
260	a28	a29	a2a	a2b	a2c	a2d	a2e	a2f	a30	a31
261	a32	a33	a34	a35	a36	a37	a38	a39	a3a	a3b
262	a3c	a3d	a3e	a3f	a40	a41	a42	a43	a44	a45
263	a46	a47	a48	a49	a4a	a4b	a4c	a4d	a4e	a4f
264	a50	a51	a52	a53	a54	a55	a56	a57	a58	a59
265	a5a	a5b	a5c	a5d	a5e	a5f	a60	a61	a62	a63
266	a64	a65	a66	a67	a68	a69	a6a	a6b	a6c	a6d
267	a6e	a6f	a70	a71	a72	a73	a74	a75	a76	a77
268	a78	a79	a7a	a7b	a7c	a7d	a7e	a7f	a80	a81
269	a82	a83	a84	a85	a86	a87	a88	a89	a8a	a8b
270	a8c	a8d	a8e	a8f	a90	a91	a92	a93	a94	a95
271	a96	a97	a98	a99	a9a	a9b	a9c	a9d	a9e	a9f
272	aa0	aa1	aa2	aa3	aa4	aa5	aa6	aa7	aa8	aa9
273	aaa	aab	aac	aad	aae	aaf	ab0	ab1	ab2	ab3
274	ab4	ab5	ab6	ab7	ab8	ab9	aba	abb	abc	abd
275	abe	abf	ac0	ac1	ac2	ac3	ac4	ac5	ac6	ac7
276	ac8	ac9	aca	acb	acc	acd	ace	acf	ad0	ad1
277	ad2	ad3	ad4	ad5	ad6	ad7	ad8	ad9	ada	adb
278	adc	add	ade	adf	ae0	ae1	ae2	ae3	ae4	ae5
279	ae6	ae7	ae8	ae9	aea	aeb	aec	aed	aee	aef

DECIMAL to HEXADECIMAL

CONVERSION TABLE

2800-3199

	0	1	2	3	4	5	6	7	8	9
280	af0	af1	af2	af3	af4	af5	af6	af7	af8	af9
281	afa	afb	afc	afd	afe	aff	b00	b01	b02	b03
282	b04	b05	b06	b07	b08	b09	b0a	b0b	b0c	b0d
283	b0e	b0f	b10	b11	b12	b13	b14	b15	b16	b17
284	b18	b19	b1a	b1b	b1c	b1d	b1e	b1f	b20	b21
285	b22	b23	b24	b25	b26	b27	b28	b29	b2a	b2b
286	b2c	b2d	b2e	b2f	b30	b31	b32	b33	b34	b35
287	b36	b37	b38	b39	b3a	b3b	b3c	b3d	b3e	b3f
288	b40	b41	b42	b43	b44	b45	b46	b47	b48	b49
289	b4a	b4b	b4c	b4d	b4e	b4f	b50	b51	b52	b53
290	b54	b55	b56	b57	b58	b59	b5a	b5b	b5c	b5d
291	b5e	b5f	b60	b61	b62	b63	b64	b65	b66	b67
292	b68	b69	b6a	b6b	b6c	b6d	b6e	b6f	b70	b71
293	b72	b73	b74	b75	b76	b77	b78	b79	b7a	b7b
294	b7c	b7d	b7e	b7f	b80	b81	b82	b83	b84	b85
295	b86	b87	b88	b89	b8a	b8b	b8c	b8d	b8e	b8f
296	b90	b91	b92	b93	b94	b95	b96	b97	b98	b99
297	b9a	b9b	b9c	b9d	b9e	b9f	ba0	ba1	ba2	ba3
298	ba4	ba5	ba6	ba7	ba8	ba9	baa	bab	bac	bad
299	bae	baf	bb0	bb1	bb2	bb3	bb4	bb5	bb6	bb7
300	bb8	bb9	bba	bbb	bbc	bbd	bbe	bbf	bc0	bc1
301	bc2	bc3	bc4	bc5	bc6	bc7	bc8	bc9	bca	bcb
302	bcc	bcd	bce	bcf	bd0	bd1	bd2	bd3	bd4	bd5
303	bd6	bd7	bd8	bd9	bda	bdb	bdc	bdd	bde	bdf
304	be0	be1	be2	be3	be4	be5	be6	be7	be8	be9
305	bea	beb	bec	bed	bee	bef	bf0	bf1	bf2	bf3
306	bf4	bf5	bf6	bf7	bf8	bf9	bfa	bfb	bfc	bfd
307	bfe	bff	c00	c01	c02	c03	c04	c05	c06	c07
308	c08	c09	c0a	c0b	c0c	c0d	c0e	c0f	c10	c11
309	c12	c13	c14	c15	c16	c17	c18	c19	c1a	c1b
310	c1c	c1d	c1e	c1f	c20	c21	c22	c23	c24	c25
311	c26	c27	c28	c29	c2a	c2b	c2c	c2d	c2e	c2f
312	c30	c31	c32	c33	c34	c35	c36	c37	c38	c39
313	c3a	c3b	c3c	c3d	c3e	c3f	c40	c41	c42	c43
314	c44	c45	c46	c47	c48	c49	c4a	c4b	c4c	c4d
315	c4e	c4f	c50	c51	c52	c53	c54	c55	c56	c57
316	c58	c59	c5a	c5b	c5c	c5d	c5e	c5f	c60	c61
317	c62	c63	c64	c65	c66	c67	c68	c69	c6a	c6b
318	c6c	c6d	c6e	c6f	c70	c71	c72	c73	c74	c75
319	c76	c77	c78	c79	c7a	c7b	c7c	c7d	c7e	c7f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

3200-3599

	0	1	2	3	4	5	6	7	8	9
320	c80	c81	c82	c83	c84	c85	c86	c87	c88	c89
321	c8a	c8b	c8c	c8d	c8e	c8f	c90	c91	c92	c93
322	c94	c95	c96	c97	c98	c99	c9a	c9b	c9c	c9d
323	c9e	c9f	ca0	ca1	ca2	ca3	ca4	ca5	ca6	ca7
324	ca8	ca9	caa	cab	cac	cad	cae	caf	cb0	cb1
325	cb2	cb3	cb4	cb5	cb6	cb7	cb8	cb9	cba	cbb
326	cbc	cbd	cbe	cbf	cc0	cc1	cc2	cc3	cc4	cc5
327	cc6	cc7	cc8	cc9	cca	ccb	ccc	ccd	cce	ccf
328	cd0	cd1	cd2	cd3	cd4	cd5	cd6	cd7	cd8	cd9
329	cda	cdb	cdc	cdd	cde	cdf	ce0	ce1	ce2	ce3
330	ce4	ce5	ce6	ce7	ce8	ce9	cea	ceb	cec	ced
331	cee	cef	cf0	cf1	cf2	cf3	cf4	cf5	cf6	cf7
332	cf8	cf9	cfa	cfb	cfc	cfd	cfe	cff	d00	d01
333	d02	d03	d04	d05	d06	d07	d08	d09	d0a	d0b
334	d0c	d0d	d0e	d0f	d10	d11	d12	d13	d14	d15
335	d16	d17	d18	d19	d1a	d1b	d1c	d1d	d1e	d1f
336	d20	d21	d22	d23	d24	d25	d26	d27	d28	d29
337	d2a	d2b	d2c	d2d	d2e	d2f	d30	d31	d32	d33
338	d34	d35	d36	d37	d38	d39	d3a	d3b	d3c	d3d
339	d3e	d3f	d40	d41	d42	d43	d44	d45	d46	d47
340	d48	d49	d4a	d4b	d4c	d4d	d4e	d4f	d50	d51
341	d52	d53	d54	d55	d56	d57	d58	d59	d5a	d5b
342	d5c	d5d	d5e	d5f	d60	d61	d62	d63	d64	d65
343	d66	d67	d68	d69	d6a	d6b	d6c	d6d	d6e	d6f
344	d70	d71	d72	d73	d74	d75	d76	d77	d78	d79
345	d7a	d7b	d7c	d7d	d7e	d7f	d80	d81	d82	d83
346	d84	d85	d86	d87	d88	d89	d8a	d8b	d8c	d8d
347	d8e	d8f	d90	d91	d92	d93	d94	d95	d96	d97
348	d98	d99	d9a	d9b	d9c	d9d	d9e	d9f	da0	da1
349	da2	da3	da4	da5	da6	da7	da8	da9	daa	dab
350	dac	dad	dae	daf	db0	db1	db2	db3	db4	db5
351	db6	db7	db8	db9	dba	dbb	dbc	dbd	dbe	dbf
352	dc0	dc1	dc2	dc3	dc4	dc5	dc6	dc7	dc8	dc9
353	dca	dcb	dcc	dcd	dce	dcf	dd0	dd1	dd2	dd3
354	dd4	dd5	dd6	dd7	dd8	dd9	dda	ddb	ddc	ddd
355	dde	ddf	de0	de1	de2	de3	de4	de5	de6	de7
356	de8	de9	dea	deb	dec	ded	dee	def	df0	df1
357	df2	df3	df4	df5	df6	df7	df8	df9	dfa	dfb
358	dfc	dfd	dfe	dff	e00	e01	e02	e03	e04	e05
359	e06	e07	e08	e09	e0a	e0b	e0c	e0d	e0e	e0f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

3600-3999

	0	1	2	3	4	5	6	7	8	9
360	e10	e11	e12	e13	e14	e15	e16	e17	e18	e19
361	e1a	e1b	e1c	e1d	e1e	e1f	e20	e21	e22	e23
362	e24	e25	e26	e27	e28	e29	e2a	e2b	e2c	e2d
363	e2e	e2f	e30	e31	e32	e33	e34	e35	e36	e37
364	e38	e39	e3a	e3b	e3c	e3d	e3e	e3f	e40	e41
365	e42	e43	e44	e45	e46	e47	e48	e49	e4a	e4b
366	e4c	e4d	e4e	e4f	e50	e51	e52	e53	e54	e55
367	e56	e57	e58	e59	e5a	e5b	e5c	e5d	e5e	e5f
368	e60	e61	e62	e63	e64	e65	e66	e67	e68	e69
369	e6a	e6b	e6c	e6d	e6e	e6f	e70	e71	e72	e73
370	e74	e75	e76	e77	e78	e79	e7a	e7b	e7c	e7d
371	e7e	e7f	e80	e81	e82	e83	e84	e85	e86	e87
372	e88	e89	e8a	e8b	e8c	e8d	e8e	e8f	e90	e91
373	e92	e93	e94	e95	e96	e97	e98	e99	e9a	e9b
374	e9c	e9d	e9e	e9f	ea0	ea1	ea2	ea3	ea4	ea5
375	ea6	ea7	ea8	ea9	eaa	eab	eac	ead	eae	eaf
376	eb0	eb1	eb2	eb3	eb4	eb5	eb6	eb7	eb8	eb9
377	eba	ebb	ebc	ebd	ebe	ebf	ec0	ec1	ec2	ec3
378	ec4	ec5	ec6	ec7	ec8	ec9	eca	ecb	ecc	ecd
379	ece	ecf	ed0	ed1	ed2	ed3	ed4	ed5	ed6	ed7
380	ed8	ed9	eda	edb	edc	edd	ede	edf	ee0	ee1
381	ee2	ee3	ee4	ee5	ee6	ee7	ee8	ee9	eea	eeb
382	eec	eed	eee	eef	ef0	ef1	ef2	ef3	ef4	ef5
383	ef6	ef7	ef8	ef9	efa	efb	efc	efd	efe	eff
384	f00	f01	f02	f03	f04	f05	f06	f07	f08	f09
385	f0a	f0b	f0c	f0d	f0e	f0f	f10	f11	f12	f13
386	f14	f15	f16	f17	f18	f19	f1a	f1b	f1c	f1d
387	f1e	f1f	f20	f21	f22	f23	f24	f25	f26	f27
388	f28	f29	f2a	f2b	f2c	f2d	f2e	f2f	f30	f31
389	f32	f33	f34	f35	f36	f37	f38	f39	f3a	f3b
390	f3c	f3d	f3e	f3f	f40	f41	f42	f43	f44	f45
391	f46	f47	f48	f49	f4a	f4b	f4c	f4d	f4e	f4f
392	f50	f51	f52	f53	f54	f55	f56	f57	f58	f59
393	f5a	f5b	f5c	f5d	f5e	f5f	f60	f61	f62	f63
394	f64	f65	f66	f67	f68	f69	f6a	f6b	f6c	f6d
395	f6e	f6f	f70	f71	f72	f73	f74	f75	f76	f77
396	f78	f79	f7a	f7b	f7c	f7d	f7e	f7f	f80	f81
397	f82	f83	f84	f85	f86	f87	f88	f89	f8a	f8b
398	f8c	f8d	f8e	f8f	f90	f91	f92	f93	f94	f95
399	f96	f97	f98	f99	f9a	f9b	f9c	f9d	f9e	f9f

DECIMAL to HEXADECIMAL

CONVERSION TABLE

4000-4095

	0	1	2	3	4	5	6	7	8	9
400	fa0	fa1	fa2	fa3	fa4	fa5	fa6	fa7	fa8	fa9
401	faa	fab	fac	fad	fae	faf	fb0	fb1	fb2	fb3
402	fb4	fb5	fb6	fb7	fb8	fb9	fba	fbb	fbc	fbd
403	fbe	fbf	fc0	fc1	fc2	fc3	fc4	fc5	fc6	fc7
404	fc8	fc9	fca	fcb	fcc	fcd	fce	fcf	fd0	fd1
405	fd2	fd3	fd4	fd5	fd6	fd7	fd8	fd9	fda	fdb
406	fdc	fdd	fde	fdf	fe0	fe1	fe2	fe3	fe4	fe5
407	fe6	fe7	fe8	fe9	fea	feb	fec	fed	fee	fef
408	ff0	ff1	ff2	ff3	ff4	ff5	ff6	ff7	ff8	ff9
409	ffa	ffb	ffc	ffd	ffe	fff				

12/25/59

WISC LIBRARY

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0.01		
.02		
.03.01	CON	Conversion-Deconversion
.04.01	ADA	Adaptation
.02	MOD	Modification
.03	MOV	Move
0.05.01	LOD	Load
.02	LAD	Load and Adapt
1.01.01	FAIR	Floating Arithmetic Interpretive Routine
2.01.01	SQR	Square Root
.02	EXS	Exponential (infinite series)
.03	SCR	Sine-Cosine Routine (infinite series)
.04	LNS	Logarithm (base e)
.05	ATS	Arctangent (infinite series iteration)
.06	ATP	Arctangent (polynomial approximation)
.07	CUR	Cube Root
.08	EXP	Exponential (polynomial approximation)
.09	INP	Logarithm (either base) (polynomial approximation)
.10	GAP	Gamma Function (polynomial approximation)
.02.01	CAC	Complex Arithmetic (Cartesian)
.03.01	ILT	Inverse Laplace Transform
3.01		
.02.01	RKS	Runge-Kutta Step
.02	IIT	Integral Interval Tester
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.05.01	PRS	Polynomial Root Solver
3.05.02	QUF	Quadratic Formula
.06.01	SER	Simultaneous Equations Routine (algebraic)
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.07.01	SP4	Spangenberg--Problem 8-4
.08		
.09		
9.01.01	ITR	Intracomputational Test Routine
.02	VER	Verification
.03	RWC	Read-Write Check

File No. 0.03.01

Conversion-Deconversion

CON

Operation

$$P \times 10^{Q} \rightleftharpoons p \times 2^{q}$$

Use

a) Calling Linkage

L	:	100	8	L+2	3ff	35f
L + 1	:	000	5	—	—	360
L + 2	:	000	2	$-N_1-$	$-N_L-$	β

where

$-N_1-$ = address of first number to be converted

$-N_L-$ = address of last number to be converted

0 for CON (dec to bin)

2 for DECON (bin to dec)

b) Storage

DEAD STORAGE
360 to 3af

11 opstos: 355 to 35f

Requirements and Performance

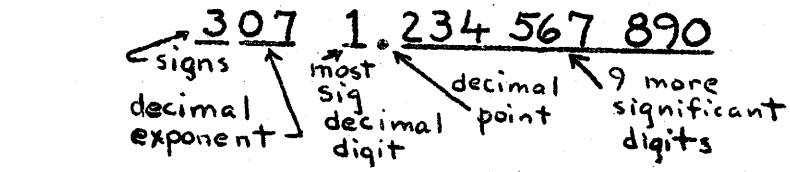
a) Method of operation
Floating point

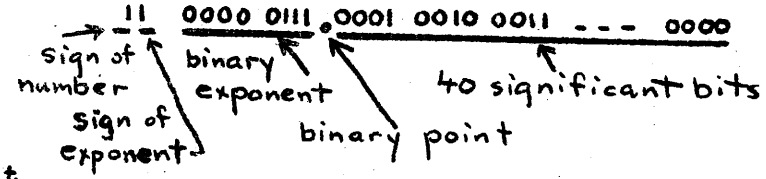
b) Range and form of variable
Floating point
$|Q| \leq 76$ $|q| \leq 255$

c) Accuracy
CON --- 33 bits
DECON -- ±1 in 10th digit

d) Performance time
CON --- about 3 sec/no.
DFCON -- about 3 sec/no.

NUMBER FORMATS





SIGN CODE

sign of no.	sign of exp.	bit 50	bit 49	1st char
+	+	0	0	0
+	−	0	1	1
−	+	1	0	2
−	−	1	1	3

File No. 0.04.01

Modification and Adaption Routine

MAD

ADAPTATION

Operation

To modify the INTERNAL (or RELATIVE) addresses of a subroutine to apply to the present location of the subroutine

Use

a) Calling Linkage

L	100	8	L+2	3ff	35f
L + 1	000	5	000	000	3b1
L + 2	0	j	W_i	k	β

b) Explanation of Symbols

Assume a library subroutine consists of j words, the first k of which are orders. It is written for storage starting with location 001, but is presently loaded into a block of j locations starting with W_i.

MODIFICATION

Operation

To modify the addresses of a group of orders that refer to a band of words that have been relocated.

Use

a) Calling Linkage

L	100	8	L+2	3ff	35f
L + 1	000	5	000	000	3b1
L + 2	2	L+3	m	p	β
L + 3	000	0	f	l	s

b) Explanation of Symbols

Assume of group of orders located in positions m to p refer to a band of words which were located in positions f to l, but these words have been moved to a band starting with position s.

GENERAL

Storage

Dead storage 3b0 to 3d1
Also uses the Set-Up and Completion blocks of CON.
Eleven opstos: 355 to 35f.

Requirements and Performance

a) Method of Operation: Address modification, either in fixed or floating point computer.

b) Other information required: The subroutine or orders to be modified, which may be either fixed or floating point hexadecimally coded WISC orders

c) Performance time: Approximately.5 sec/order

d) Limitations: MAD does not move any words . It merely accounts for some movement of words that has taken place.

Also please note that the A address of BTR and HIT orders are treated as drum addresses.

Operation

Intracomputational Test Routine

A brief (21 word) test routine to be scheduled frequently by the programmer during the course of a computation.

ITR

Use

a) Calling Linkage

```
L     :   100 8 L+1  3ff  35f
L + 1 :   000 5 000   β    3d3
```

c) Storage

Dead storage: **3d3** to **3e7**

4 opstos: **35e** to **35f**

Requirements and Performance

a) Method of operation **Floating point**

b) Additional routines required **None**

c) Performance time **Approximately .50 sec**

d) Recommended frequency of use **Every 2000-5000 machine cycles at convenient points in a program.**

General

ITR is to be programmed during a problem, its purpose being to provide some degree of assurance that the machine is working correctly on the problem. Each successful passing of this routine will be interpreted as a reasonable guarantee of the reliability of the machine results up to that point.

Please note, however, that ITR does not test input, output, or half orders, and tests very few storage locations.

If the computer fails to pass ITR, it will halt with 100 9 3e5 3ff 35e showing in the lights. Call the engineer in charge.

WISC LIBRARY

Appendix E-4

File No. 2.01.01

Operation

Square Root Routine

$r = \sqrt{b}$

SQR

Use

a) Calling Linkage

L :	100	3	[L+2]	[3ff]	[35f]
L + 1 :	—	5	[—]	[—]	[SQR:1]
L + 2 :	—	0	- b -	- r -	β

b) Adaptation Link Word

L + 2 : 012 $-W_1-$ 012 β

c) Storage

j = 18 words

k = 18 orders

0 constants

3 opstos: 35d to 35f

Requirements and Performance

a) Method of operation Floating point — successive Newton-Ralphson iterations

b) Additional routines required None

c) Range and form of variable b must be real and normalized

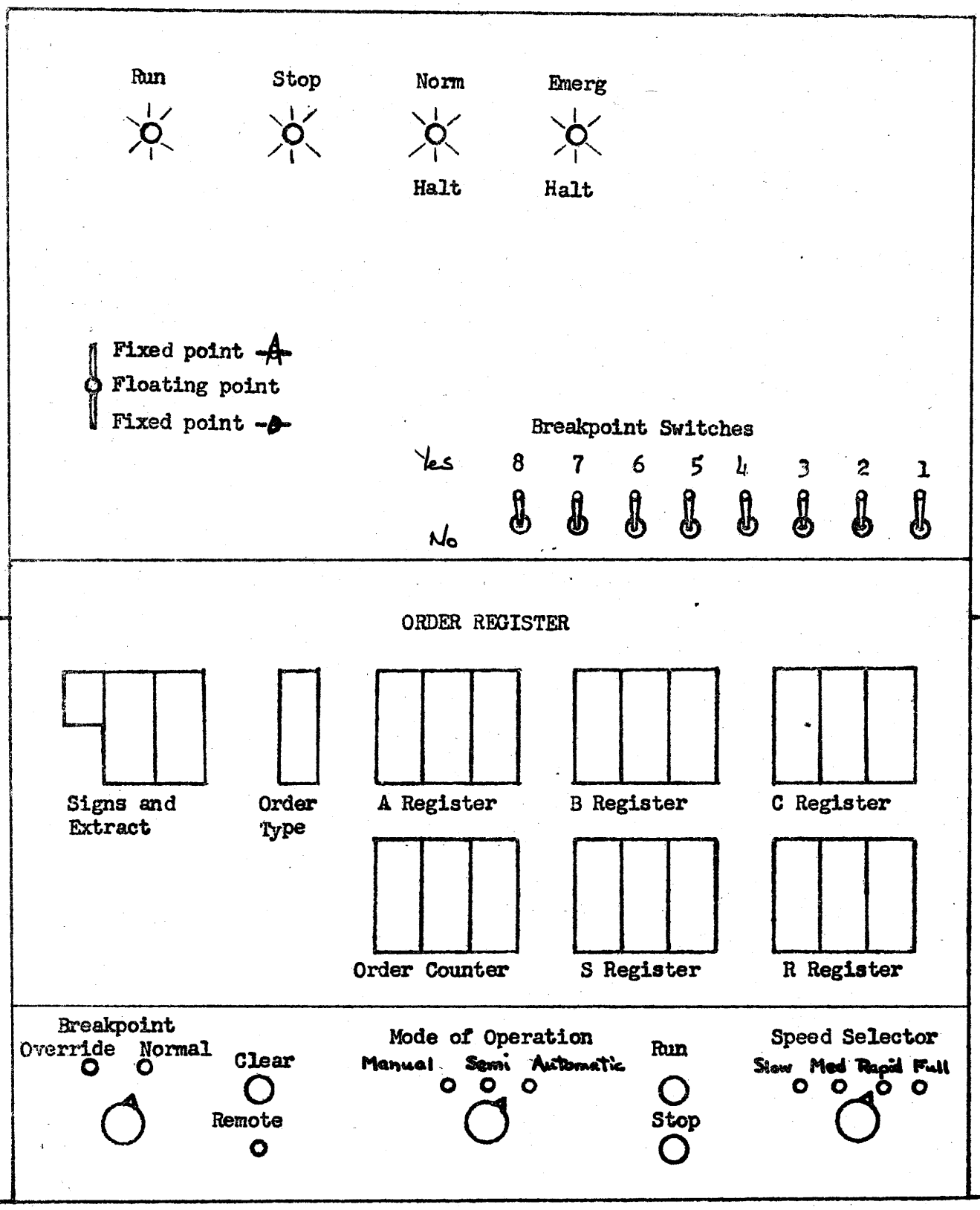
If $b < 0$, $r = \sqrt{|b|}$ is furnished with a negative sign.

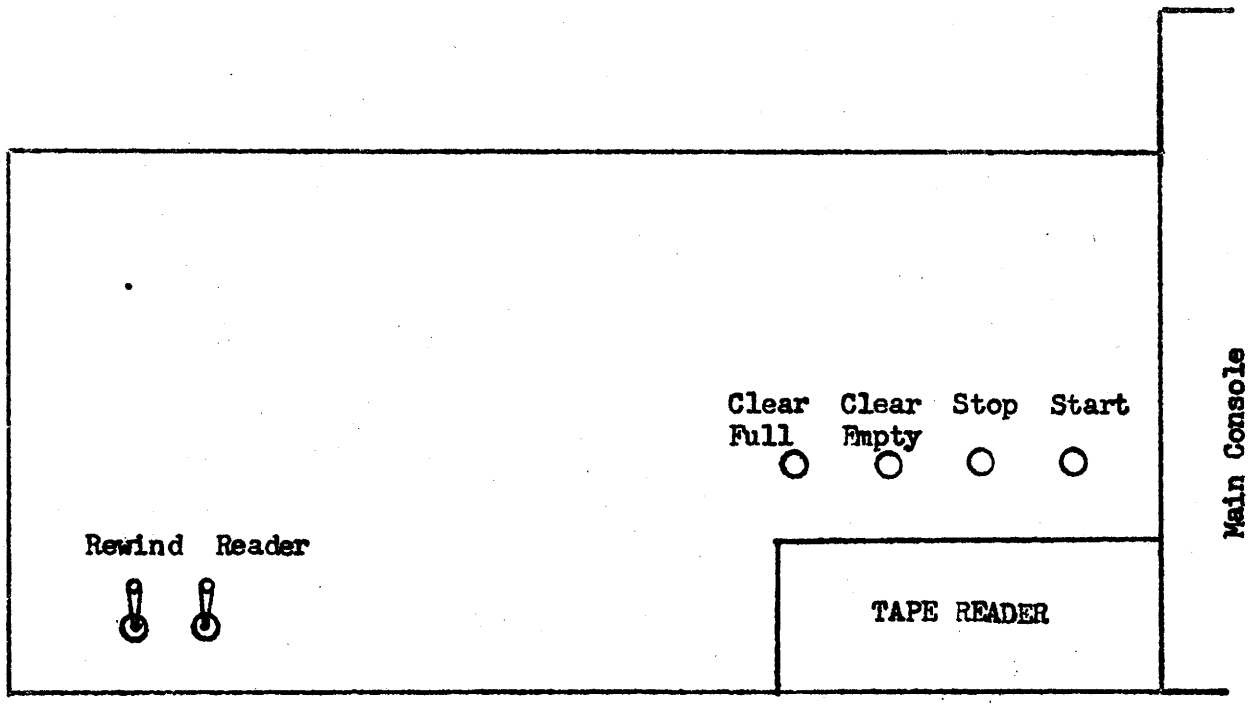
d) Accuracy 1×2^{-40} of significant number.

e) Performance time

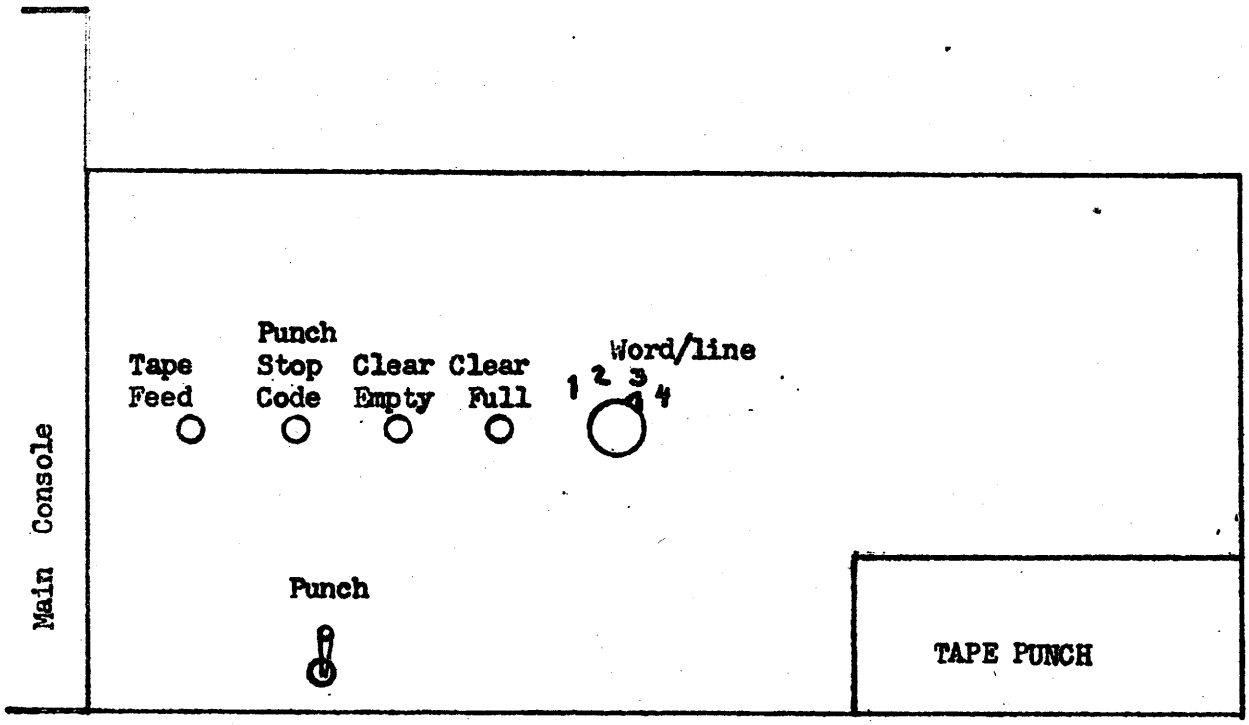
About 1.1 sec.

MAIN CONSOLE





INPUT CONSOLE



OUTPUT CONSOLE

EXAMPLE #1

$$f = \frac{(x + y + z^2)^2}{|w| + |x+y|}$$

$w = 0.51$ $\quad x = -3.8$

$y = -0.49$ $\quad z = 1.23$

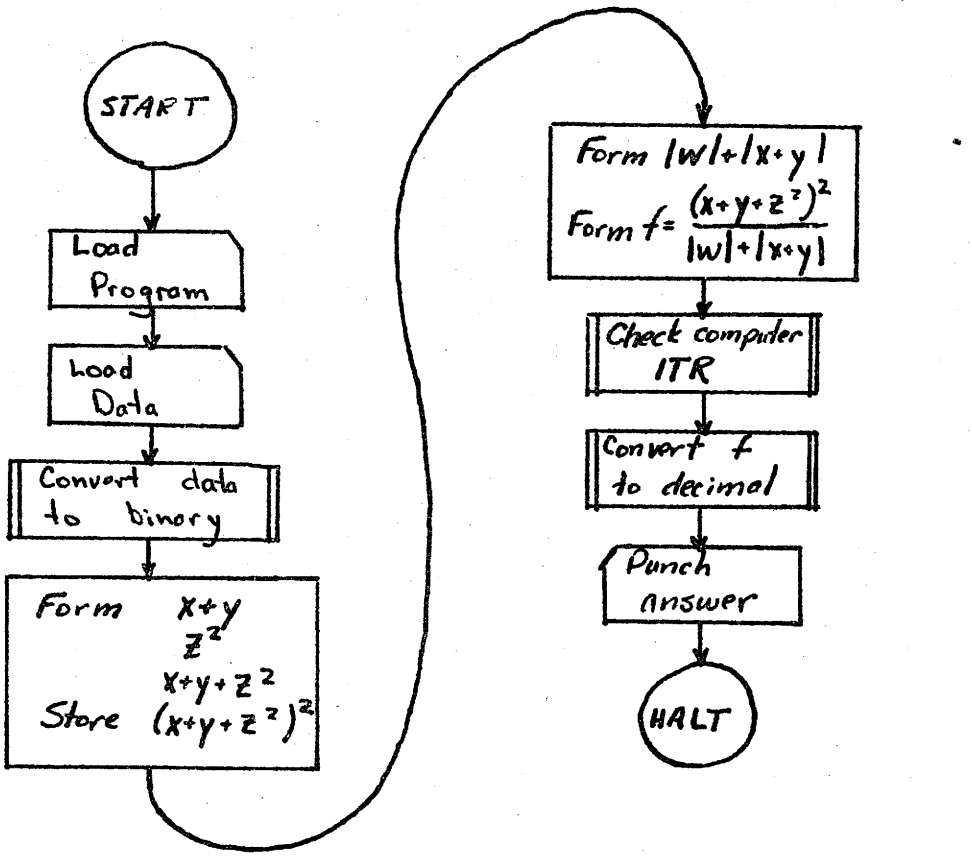
Note links to subroutines :

CON - DECON - ITR .

Note use of short memory (800) for A, B, and C addresses.

Note final transfer to 3e8 .

Note use of floating and fixed point operations.



WISCoding for Example #1 $f = \frac{(x+y+z^2)^2}{|w|+|x+y|}$

By CWMc Date 5-2-60 Page 2 2

FLOW ORDER #	#	X	TYPE	A	B	C	#	HEXADECIMAL X	T	A	B	C	
			RPT	[ ]	[ ]	[ ]		/	0	101	110	101	
			RPT	[201] w, x, y, z	[204] *+1	[102]	101	/	0	201	204	102	
			add	*+2 [104] +	0 [3ff] → LO	[35f]	2	100	8	104	3ff	35f	CON
			TRA	[ ]	[ ] CON	[360]	3	/	5	/	/	360	CON
			—	[201] w, x, y, z	[204] *+1	[105]	4	/	0	201	204	105	CON
			ADD	x [201] +	y [203] → SUM	[301]	5	/	8	202	203	301	
			MPY	z [204] ×	z [204] "	[ ]	6	/	2	204	204	800	
			ADD	x+y [301] +	z^2 [ ] "	[ ]	7	/	8	301	800	800	
			MPY	" [ ] "	[ ] → Num	[302]	8	/	2	800	800	302	
			ADA	|w| [201] +	|x+y| [301] "	[ ]	9	/	9	201	301	800	
			DIV	Num [302] ÷	" [ ] → f	[303]	a	/	3	302	800	303	
			add	*+1 [10c] +	0 [3ff] → LO	[35f]	b	100	8	10c	3ff	35f	ITR
			TRA	[ ]	[ ] ITR	[3d3]	c	/	5	/	/	3d3	ITR
			add	*+2 [10f] +	0 [3ff] → LO	[35f]	d	100	8	10f	3ff	35f	DECON
			TRA	[ ]	[ ] DECON	[360]	e	/	5	/	/	360	DECON
			—	[303] f	[303] *+1	[110]	f	200	0	303	303	110	DECON
			PPT	[303] f	[303] HALT	[3e8]	110	/	7	308	308	308	
				[ ]	[ ]	[ ]							
				[ ]	[ ]	[ ]							
				.51 [ ]	[ ]	[ ] W	201	101	5	100	/	/	
				-3.8 [ ]	[ ]	[ ] X	2	200	8	800	/	/	
				+.49 [ ]	[ ]	[ ] Y	3	301	4	900	/	/	
				1.23 [ ]	[ ]	[ ] Z	4	/	1	230	/	/	
				[ ]	[ ]	[ ]							
				[ ]	[ ]	[ ]							