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LGP-30 USERS' ORGANIZATION-POOL

DICTATOR
DODCO INTERPRETIVE CODE FOR THREE-ADDRESS WITH TECHNICAL OPTIMUM RANGE

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THIS PROGRAM IS [illegible]

LGP-30 USERS ORGANIZATION - POOL

DICTATOR, A Three Address Floating Point Interpreter

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ABTRACT

This manual descrobes a complete, self-contained, self-loading, floating-point, three-address interpreter for the LGP-30. This system is ideally suited for scientific and engineering calculations. Since the system is complete within itself no reference need be made to LGP-30 basic language. The Dictator program should be considered to be an integral part of the machine while it is being used.

No claim to originality is made in conjunction with the general philosophy attached to this system. Quite conversely, it was intentionally coded to parallel other widely accepted systems to the greatest degree possible while using the LGP-30 characteristics to their best advantage.

INTRODUCTION

When an engineer programs a problem on a digital computer such as the LGP-30 a minimum of his attention should be devoted to the machine code. DICTATOR presents a language which observes this requirement.

During the coding of DICTATOR three goals were considered of paramount importance. These were:

1. Simplicity of use and operation.
2. Speed of operation.
3. Storage availability for problems.

A number of special features were incorporated in DICTATOR to achieve simplicity. These included:

a. Program protection through the use of selective addresses.

b. A decimal addressing scheme as opposed to the track and sector notation used in basic language.

c. Identical input and output formats for data.

d. An internal optional accumulator trace.

e. Facilities to input and output data with control at the keyboard or internally within the system.

f. Ability to output data directly to tape with all conditions necessary for inputting fulfilled.

g. Grouping of instructions into logical classes.

h. Error stops which are easily identified.

i. An internal table "look-up" which can also be used as a double table "look-up."

DICTATOR is a "floating-point" system and automatically sets the location of the decimal point regardless of the operation executed. This is in contrast to fixed point programming in which the programmer must directly adjust decimal locations for each operation and must always check to assure that each operation utilized consistent data.

The author would appreciate any comments pertinent to the operation, use or coding of DICTATOR. Please address such comments to: Mr. Charles W. Laudeman, DODCO, Inc., Blawenburg, New Jersey.

LGP-30 Users Organization - POOL

DICTATOR*
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1.0) THE INTERPRETIVE SYSTEM

DICTATOR allows 1982 storage locations numbered 0002 to 1983 for storage of program instructions. Of these, 998 (locations 0002 to 0999) can be used to store data. All locations are available at all times.

The DICTATOR instructions fall into 6 major classes which are as follows:

Arithmetic

13 digit quantities of the type o_3AAAA BBBB CCCC

Function Evaluation

10 digit quantities of the type o_2o_2 BBBB CCCC

Output

10 digit quantities of the type o_2o_2 BBBB CCCC

Transfer

9 digit quantities of the type o_2 BBBB CCCC

Modify Address

9 digit quantities of the type o_2 BBBB CCCC

Miscellaneous

8 digit quantities of the type $800o_1$ CCCC

The characters o_1, o_2 and o_3 are one or two digit operation codes where o_3 is the operation code used with a three-address instruction; o_2 is the operation code used with a two-address instruction and o_1 is the operation code used with a one-address instruction. The four-digit addresses AAAA, BBBB and CCCC refer to locations within memory. More specifically, the addresses AAAA and BBBB refer to the contents of memory locations AAAA and BBBB and the four-digit address CCCC refers to the memory location where the result is to be stored. In addition to being stored in location CCCC, the result is also stored in location 0000 (the accumulator). This result can be called upon by the use of address 0000 for AAAA or BBBB of the next mathematical instruction. CCCC can be used as the CCCC address when the result will be needed only by the next mathematical step. There are a few exceptions where AAAA, BBBB or CCCC do not refer to memory locations but these will be explained wherever they occur.

*DODCO INTERPRETIVE CODE FOR THREE-ADDRESS WITH TECHNICAL OPTIMUM RANGE

To facilitate explanation of the instructions, the following notations will be used in the manual: the 4-digit address AAAA will be denoted A, the 4-digit address BBBB will be denoted B and the 4-digit address CCCC will be denoted C.

Note: An address refers to a memory location and the contents thereof. An address is not a piece of data. For example: The instruction 1 0100' 0200 0300' does not mean add 0100 and 0200 to get the sum 0300. It does, however, mean add the contents of memory location 0100 to the contents of memory location 0200 and place the sum in memory location 0300.

2) LIST OF INSTRUCTIONS

2.1) ARITHMETIC CLASS OF INSTRUCTIONS

Add -- 1AAAA'BBBBCCCC'

The contents of location A plus the contents of location B replaces the contents of location C. The sum also remains in the accumulator. A, B and C can be any even number from 0000 to 0998 inclusive. 0000 refers to the accumulator.

Subtract -- 2AAAA'BBBBCCCC'

The contents of location A minus the contents of location B replaces the contents of location C. The difference also remains in the accumulator. A, B and C can be any even number from 0000 to 0998 inclusive. 0000 refers to the accumulator.

Multiply -- 3AAAA'BBBBCCCC'

The contents of location A multiplied by the contents of location B replaces the contents of location C. The product also remains in the accumulator. A, B and C can be any even number from 0000 to 0998 inclusive. 0000 refers to the accumulator.

Divide -- 4AAAA'BBBBCCCC'

The contents of location A divided by the contents of location B replaces the contents of location C. The quotient also remains in the accumulator. A, B and C can be any even number from 0000 to 0998 inclusive. 0000 refers to the accumulator. If one attempts division by zero or an unfloated number, error stop 6 will be encountered.

Negative Multiply -- 5AAAA'BBBBCCCC'

The contents of location A multiplied by the contents of location B and multiplied by minus one replaces the contents of location C. The product also remains in the accumulator. A, B and C can be any even number from 0000 to 0998 inclusive. 0000 refers to the accumulator.

Move -- 6AAAA'BBBBCCCC'

Move A/2 data words (or A memory words, since one data word equals two memory words) from B, B + 2, B + 4, ... B + N to C, C + 2, C + 4.... C + N. The last word moved (the contents of B + N) will also remain in the accumulator. A does not refer to a location in memory, but rather to the amount of words to be moved and it must always move memory words in pairs.(i.e., A must always be an even number). If B = 0 or C = 0 (moving data from the accumulator or to the accumulator respectively), one and only one data word(two memory words) can be moved. If A = 0 or 1 (attempting to move less than two words), an error stop 3 will be encountered. A can be any number from 0002 to 0998 and B and C can be any even number from 0000 to 0998. 0000 for B or C refers to the accumulator.

Table-Lookup -- 7AAAA'BBBBCCCC'

With an independent argument located at A, scan the independent table located at B, B + 2, B + 4....B + N. When the argument is located within the table, place the independent value immediately smaller than the argument in location 0002 and place the independent value immediately larger than the argument in location 0004. Also place the two corresponding values from the dependent table, which is located at C, C + 2, C + 4 .... C + N, into locations 0006 and 0008. There are, however, some stipulations which can be briefly summarized thusly:

1 -- For the Independent Table:

a. The minimum value allowed in the table is ±0.00025, the minimum difference between successive quantities is 0.00025, and the maximum value allowable is ±26,2143.0.

b. The table should be loaded so that the least positive (or most negative) number is loaded in location B and proceed with ascending positive (or descending negative or both) numbers in successive even locations.

c. The table can be any length up to and including 32 arguments.

2.-- For the Dependent Table:

a. There are no restrictions on the magnitude of the numbers compromising the dependent table.

b. The table must be the same length as the independent table and must be located in successive even locations starting at C.

3.-- For the Independent Argument:

a. It must be in the range ±0.00025 to ±26,2143.0.

b. It cannot be smaller than the smallest value in the independent table or larger than the largest value in the independent table.

4.-- If the problem being coded employs a T.L.U. instruction, it is recommended that locations 0002, 0004, 0006 and 0008 not be used for storage of data since they are loaded with the four values generated by the T.L.U.

5.-- If these conditions are not met, an error stop will usually be endountered. However, it seemed to be neither practical nor justifiable to check these stipulations for all possible cases that may exist. It is therefore, left somewhat to the individual to see that these conditions are satisfied.

For the Independent Argument-Continued:

6.-- A can be 0000 (the accumulator) or any even number from 0010 to 0998. B and C can be any even number from 0010 to 0998.

7.-- The contents of the accumulator remain unaffected.

2.2) SPECIAL FUNCTION CLASS OF INSTRUCTIONS

Exponential -- 11'BBBBCCCC'

The quantity e^x replaces the contents of location C where x is initially the contents of location B. The quantity e^x also remains in the accumulator. x must be in the range $-88.6 \leq X \leq +88.6$. If outside this range, error stop 8 will be encountered. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

Natural Logarithm -- 12'BBBBCCCC'

The natural logarithm of the contents of location B replaces the contents of location C. The logarithm also remains in the accumulator. The argument in location B must be positive. If it is negative or zero, error stop 7 will be encountered. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

Square Root -- 13'BBBBCCCC'

The square root of the contents of location B replaces the contents of location C. The square root also remains in the accumulator. The argument in location B must be positive. If it is negative, error stop 9 will be encountered. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

Sine -- 14'BBBBCCCC'

The sine of the contents of location B replaces the contents of location C. The sine also remains in the accumulator. The argument in location B must be in radian measure. Maximum error is 5×10^{-8}, provided the argument does not exceed 33,600,000 radians. If the argument lies between 0.004 and 67,100,000 radians, the sine is evaluated using a 9th degree polynomial. If the argument is less than 0.004 radians, sine x = x. If the argument exceeds 67,100,000 radians, error stop 5 will be encountered. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

Cosine -- 15'BBBBCCCC'

The cosine of the contents of location B replaces the contents of location C. The cosine also remains in the accumulator. The argument in location B must be in radian measure. Maximum error is 5×10^{-8}, provided the argument does not exceed 33,600,000 radians. If the argument lies between 0.000001 and 67,100,000 radians, the cosine is evaluated using a 9th degree polynomial. If the argument is less than 0.000001 radians, cosine x = 1. If the argument exceeds 67,100,000 radians, error stop 5 will be encountered. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

Arctangent -- 16'BBBBCCCC'

The arctangent of location B replaces the contents of location C. The arctangent also remains in the accumulator. The result is in radian measure. The arctangent is valid for arguments in the 1st and 4th quadrants only for which the result is 0 to 1.57 radians. B and C can be any even number between 0000 and 0998. 0000 refers to the accumulator.

2.3) OUTPUT CLASS OF INSTRUCTIONS

Punch -- 17'BBBBCCCC'

Print all the data located between locations B and C inclusive with appropriately placed stop codes. If the punch is activated prior to the execution of this instruction(the punch must be energized manually since there is no provision for the computer to do so), a tape will be punched which can be read directly back into the computer with no modifications other than it must be preceeded by a data fill code or read in by an input instruction. Each data word printed is followed by a carriage return. If B or B and C equal 0000, the contents of the accumulator only are printed. For explanation of printout, refer to section on data handling. B and C can be any even number between 0000 and 0998. The contents of the accumulator are unaffected.

Print -- 18'BBBBCCCC'

Print all the data located between locations B and C inclusive with no stop codes inserted. Each data word printed is followed by the execution of a tab. Carriage returns can be controlled by print carriage return instruction (80090016) or by tabbing into the mechanical automatic carriage return, or by combinations thereof. If B or B and C equal 0000, the contents of the accumulator only are printed. For explanation of printout, refer to section on data handling. B and C can be any even number between 0000 and 0998. The contents of the accumulator are unaffected.

Optional Print -- 19'BBBBCCCC'

If the transfer control button is depressed prior to interpretation, operation is identical to that of a print instruction (18'BBBBCCCC'). If the transfer control button is not depressed, the instruction is ignored and the program proceeds sequentially. The contents of the accumulator are unaffected.

2.4) TRANSFER CLASS OF INSTRUCTIONS

Unconditional -- 1'BBBBCCCC'

The next instruction to be interpreted is located at C. B is meaningless but should be filled with 0000. C can be any number between 0002 and 1983. The contents of the accumulator are unaffected.

Sign -- 2'BBBBCCCC'

Test the sign of the number in the accumulator. It it is positive, the next instruction to be interpreted is located at B. If the accumulator contains a negative number, the next instruction to be interpreted is located at C. B and C can be any number between 0002 and 1983. The contents of the accumulator are unaffected.

Loop -- 3'BBBBCCCC'

If the loop counter referred to by B (0000 to 0003) contains a zero or a negative quantity, proceed to interpret the next instruction. If the designated counter contains some positive value, decrement the contents of the counter by one and transfer to location C and continue interpreting instructions there. B can be any number between 0000 and 0003 (counters 0, 1, 2 or 3). C can be any number between 0002 and 1983. The contents of the accumulator are unaffected.

2.5) MODIFY ADDRESS CLASS OF INSTRUCTIONS

Set C -- 4'BBBBCCCC'

Set the C address portion of the instruction located at B equal to C. The set C instruction can be used to set the C address of any instruction, regardless of class. B can be any number between 0002 and 1983. C can be any number from 0000 to 1983. The contents of the accumulator are unaffected.

Set B -- 5'BBBBCCCC'

Set the B address portion of the instruction located at B equal to C. CAUTION: The set B instruction can only be used to set the B address of an arithmetic class, special function class, or output class instruction. It will set the B address of a transfer class, set address or miscellaneous class instruction incorrectly. B can be any number between 0002 and 1983. C can be any even number between 0000 and 0998. The contents of the accumulator are unaffected.

Set A -- 6'BBBBCCCC'

Set the A address portion of the instruction located at B equal to C. The set A instruction can be used to set the A address of an arithmetic class instruction only. B can be any number between 0002 and 1983. C can be any even number between 0000 and 0998. The contents of the accumulator are unaffected.

Increment C -- 7'BBBBCCCC'

Increment the C address of the instruction in memory location B by the amount C. The C address of the increment C instruction does not refer to a memory location. It is the amount of the increment. B can be any number from 0002 to 1983, and C can be any number from 0000 to 1983. The contents of the accumulator are unaffected.

Increment B -- 8'BBBBCCCC'

Increment the B address of the instruction in memory location B by the amount C. The C address of the increment B instruction does not refer to a memory location. It is the amount of the increment. CAUTION: The increment B instruction can only be used to increment the B address of an arithmetic class, function class or output class instruction. It will increment the B address of a transfer class, set address class or miscellaneous class instruction incorrectly. B can be any number from 0002 to 1983 and C can be any even number from 0000 to 0998. The contents of the accumulator are unaffected.

Increment A -- 9'BBBBCCCC'

Increment the A address of the instruction in memory location B by the amount C. The C address of the increment A instruction does not refer to a memory location. It is the amount of the increment. B can be any number from 0002 to 1983. C can be any even number from 0000 to 0998. The contents of the accumulator are unaffected.

Using the increment address instructions, it is possible to "over-increment" an address. For purposes of illustration, assume an add instruction with a C address of 0800. If an attempt were made to increment this address by the amount 0400, the result certainly could not be 1200 for this is an illegal address; rather the result would be such that the C address would "overflow" into the B address thereby giving undesired addresses for B and C. It is therefore left to the programmer's discretion to be cautious in this respect.

2.6) MISCELLANEOUS CLASS OF INSTRUCTIONS

Set Loop Counter 0 -- 8000CCCC'

Set loop counter 0 equal to C. The counter should be set to the number of times the loop is to be repeated. The first pass through is not included in determining the number of loops involved. C does not refer to a memory location, but is the value to be placed in the counter. C can be any number between 0000 and 1999. The contents of the accumulator are unaffected.

Set Loop Counter 1 -- 8001CCCC'

Similar to set loop counter 0.

Set Loop Counter 2 -- 8002CCCC'

Similar to set loop counter 0.

Set Loop Counter 3 -- 8003CCCC'

Similar to set loop counter 0.

Input -- 8007CCCC'

Load data in location(s) C, C + 2, C + 4, ...C + N. If the word "group" is encountered, the next word entered is interpreted as a new C. If the word "exit" is encountered, input is terminated and the program proceeds sequentially. CAUTION: This instruction cannot be used to load the accumulator, therefore, C = 0000 should never be used. See section on data handling for explanation of input format. C can be any even number between 0002 and 0998. The contents of the accumulator are unaffected.

Halt -- 8008CCCC'

If C = 0000, stop unconditionally. If C = 0004, 0008, 0016 or 0032, stop occurs contingent upon break-point buttons 4, 8, 16 and 32, respectively (i.e., the program will halt if a break-point is programmed and the corresponding button is not depressed. However, if the button is depressed, the halt instruction will be ignored and the program proceed sequentially). When a programmed halt does occur, a depression of the start button will restart the program. C can be 0000,0004, 0008, 0016 and 0032. The contents of the accumulator are unaffected.

Print Character -- 8009CCCC'

Print the symbol or typewriter action indicated by the last 2 characters of C (e.g., 80090016 means print carriage return). Consult the tables for codes designating the various symbols. The contents of the accumulator are unaffected.

3.) EXTERNAL COMMANDS TO DICTATOR

Program Load - 1000XXXX'

Load program instructions from the Flexowriter (keyboard or tape) into locations X, X + 1, X + 2, X + 3 .... X + N. $0002 \geq X \geq 1983$.

Data Load -- 2000XXXX'

Load floating point data from the Flexowriter (keyboard or tape) into locations X, X + 2, X + 4 ....X + N. See the section on data handling for input format. This command cannot be used to load the accumulator. $0002 \geq X \geq 0998$ (even numbers only).

Interpretive Transfer -- 3000XXXX'

Transfer to location X and begin interpreting instructions there. X is usually (although not necessarily) the beginning of a program. $0002 \geq X \geq 1983$.

Trace Transfer -- 4000XXXX'

Transfer to location X and begin interpreting instructions there. Following the interpretation of each instruction, the contents of the accumulator are printed in floating form. There is no accumulator printout for the transfer class instructions. $0002 \geq X \geq 1983$.

Data Dump -- 5000XXXX'

Print the data in location X. If the transfer control button has been previously depressed, continue printing the data in X + 2, X + 4 .... X + N until the transfer control button is released. When the transfer control button is released, data "dumping" will be terminated and DICTATOR will await a new command. This command will not print the contents of the accumulator. Refer to the section on data handling for output format. $0002 \geq X \geq 0998$ (even numbers only).

Data Punch - 6000XXXX'

Data punch is similar to data dump with the exception that the data punch command inserts appropriately placed stop codes. $0002 \geq X \geq 0098$ (even numbers only).

Hex Load -- 7NNNMMMM'

Load N amount of hexadecimal words into location M, M + 1, M + 2 .... M + N where NNN and MMMM are in hexadecimal notations.

4.) DATA HANDLING

General

All data handled by DICTATOR is in floating point (self Scaling) form. As a matter of convenience, data format is identical on input and output and utilizes what is known as a split-on-fifty system. The characteristic consists of 8 characters of magnitude and a sign. The decimal exponent consists of 2 characters where exponent $10^0 = 50$, $10^1 = 51$, $10^{10} = 60$, $10^{-2} = 48$, etc. The assumed decimal point of the characteristic is after the first printed character, For purposes of illustration:

12345678 + 50 = 1.2345678
12345678 - 50 = -1.2345678
12345678 + 60 = 12,345,678,000 or 1.2345678×10^{10}
12345678 + 45 = 0.00001234567 or 1.2345678×10^{-5}
etc.

Input

On input we are limited by the physical size of the real accumulator. This necessitates inputting a data word in two parts. The first consists of the 8 digits of the characteristic, while the second contains the sign of the characteristic and the 2 digits of the exponent; e.g.,

12345678' + 50'

87654321' - 58'

33333333' + 43'

etc.

The characteristic must consist of 8 characters, and the leading character cannot be zero (except in the case where the characteristic is zero), otherwise error stop 3 will be encountered. On input, the exponent range is bounded by 00 and 99 (10^{-50} and 10^{49}). In other words, we can input any exponent that can be expressed by 2 decimal symbols. If during data input, the word "GROUP" is entered rather than a characteristic, the data input routine will cease loading in sequential even locations, and interpret the next word as a new initial location for storing the data which follows it. If the word "EXIT" is entered, the input of data is terminated and the program will proceed sequentially or DICTATOR will seek a new external command, depending on whether the data is being read in by an internal input instruction (8007CCCC) or an external command (2000XXXX). The code words "GROUP" or "EXIT" must occupy the input word normally occupied by the characteristic and the new initial fill address (in the case of "GROUP" must follow it immediately (occupy the word that normally would be the exponent). The words "GROUP" and "EXIT" are not stored into memory. They are code words to the data input routine. If an attempt is made to load data into a location numbered higher than 0998, error stop 2 will be encountered. If an attempt is made to load data into an odd numbered location, the even numbered location immediately preceeding it will be used.

Output

For data output, the decimal exponents have exactly the same meaning as for input (i.e., split on 50). There are, however, 2 formats incorporated for output of data. One is for print orders, the other for punch orders. When using the print order, the printing of the data word does not include stop codes, and each word printed is followed by the execution of a tab. This is so that one may set up the desired form of an output by positioning of the mechanical tab stops and automatic carriage return stop on the Flexowriter carriage. On the other hand, the punch order does include 2 stop codes with each data word, one after the characteristic and one after the exponent (where they are required by the data input routine). Each data word "punched" is followed by the execution of a carriage return.

If an attempt is made to print a data number with an exponent less than 00 (10^{-50}), the number will be printed as machine zero. If an attempt is made to print a data number with an exponent in excess of 99 (10^{49}), error stop 4 will be encountered (this will usually occur if one attempts to print a section of memory which contains instructions rather than data.)

Internally

In order to carry a sufficient amount of significant figures of characteristic and still be able to handle a reasonable range of exponents internally, two memory words are used to contain one data word. The even numbered location of the pair contains the characteristic and the odd number location contains the exponent. The data word is referred to by use of the even numbered member for the pair of memory locations.

Although the characteristic is represented by 8 figures on input and output, internally, it maintains 9 significant decimal figures. The characteristic and exponent are in binary configurations internally and have the following limitations:

$$0.500000000 \leq \text{char.}_2 \leq 0.999999999 \text{ or } \text{char.}_2 = 0.000000000$$

$$2^{-536,870,912} \leq \text{exp.}_2 \leq 2^{536,870,912}$$

For any practical purpose, the internal binary exponent range can be considered as unlimited. Internally, machine 0 carries a positive sign.

5.) LOADING DICTATOR

DICTATOR is a self-loading program. This means it requires no other routine to read it into memory. To load it, a "bootstrap" procedure must be executed. This is done as follows:

1. The tape containing the bootstrap and DICTATOR is placed in the tape reader.
2. The "Manual Input" button on the Flexowriter must be in the up position.
3. The "Conditional Stop" button on the Flexowriter must be in the up position.
4. Depress the "One Operation" button on the console.
5. Depress the "Start Read" button on the Flexowriter.
6. Depress the "Manual Input" button on the console.
7. Depress the "Start Read" button on the Flexowriter.
8. Depress the "Fill Instruction" button on the console.
9. Depress the "Start Read" button on the Flexowriter.
10. Depress the "One Operation" button on the console.
11. Depress the "Execute" button on the console.
12. Repear steps 6 through 11 as many times as required to cause the bootstrap to accept remaining instructions (i.e., cause the tape to print out the next procedural step).

13. Turn the Flexowriter "Connect" switch to "On".

14. Depress the "One Operation" button on the console.

15. Depress the "Normal" button on the console.

16. Depress computer start button on console.

The entire tape (the rest of the bootstrap and DICTATOR) will then automatically read in.

6.) PROGRAM ENTRY AND LOCATIONS 0000 AND 0001

To enable DICTATOR to accept commands, program instructions, or data, we must execute a 4-button sequence which is:

1. Depress "One Operation" button on the console.

2. Depress "Clear Counter" button on the console.

3. Depress "Normal" button on the console.

4. Depress "Start" button on the console.

Upon completion of this sequence, the manual input light on the Flexowriter will be energized indicating the computer will accept input from the keyboard or the tape reader will be energized and it will begin reading. Which of these two actions will transpire is dependent upon the position of the "Manual Input" button on the Flexowriter, down for the former and up for the latter. To read in a prepunched tape or from the keyboard, the "Conditional Stop" button must be in the "Up" position and the "Connect" switch in the "On" position.

There is also a special sequence used by DICTATOR known as the 6-button sequence. This is:

1. Depress "Manual Input" button on the console.

2. Depress "Clear Counter" button on the console.

3. Depress "Start" button on the console.

4. Depress "One Operation" button on the console.

5. Depress "Normal" button on the console.

6. Depress "Start" button on the Flexowriter.

The execution of this sequence will cause DICTATOR to continue interpreting in-instructions from the point at which it had been stopped. Consider an example where the computer is involved in some long calculation which requires several days running time and the computer is to be turned off at the end of each working day. The program then should have some provision for temporarily stopping the calculation (a halt conditional on a break-point). When the times comes to turn off the machine, the calculation should be stopped (by raising the break-point button) and the power properly turned off. When the time arrives to continue the calculation, after the machine has been properly turned on and

the break point is again depressed, execute the 6-button sequence. DICTATOR will re-interpret the halt order, but since the break point is depressed, the halt order will be ignored and the program will continue on. This is known as the STIM (start in the middle) procedure. To provide for the 4-button and 6-button sequences, locations 0000 and 0001 are occupied by a portion of DICTATOR, and it is quite reasonable to assume that they may be inadvertantly destroyed. If such an event transpires, it can be remedied by this procedure:

1. Depress the "Manual Input" button on the Flexowriter.
2. Depress the "Manual Input" button on the console.
3. Turn the "Connect" switch on the Flexowriter to "Off".
4. Type in U2000.
5. Depress "Fill Instruction" button on the console.
6. Depress "One Operation" button on the console.
7. Depress "Execute Instruction" button on the console.
8. Depress "Normal" button on the console.
9. Turn "Connect" switch on the Flexowriter to "On".
10. Depress "Start" button on the Flexowriter, at this point the input light on the Flexowriter should be energized; (if it is not, it indicates some mal function other than the loss of 0000 and 0001).
11. Type 70020000 on the keyboard.
12. Depress "Start" on the Flexowriter.
13. Type U2000 on the keyboard.
14. Depress "Start" on the Flexowriter.
15. Type U2000 on the keyboard.
16. Depress "Start" on the Flexowriter.

7.) LOADING INSTRUCTIONS

Although all instructions occupy one memory word each internally, the limitations imposed by physical size of the accumulator and the difference between hexadecimal and decimal configurations obligates the user to enter an instruction in 2 parts (with the exception of the miscellaneous class which enters as one word). The following are the input formats:

Class	1st Part	2nd Part
Arithmetic	0_3 AAAA'	BBBBCCCC'
Transfer and Modify Address	0_2'	BBBBCCCC'
Function and Output	0_20_2'	BBBBCCCC'
Miscellaneous		800_01 CCCC'

All addresses must contain 4 characters (i.e., location 0 written as 0000, location 4 written as 0004, location 202 written as 0202, etc.). If an instruction can contain only even numbered addresses (arithmetic, function, and output classes), and an attempt is made to enter an odd numbered address as part of that instruction, it will be converted to the preceeding even address. If an attempt is made to enter an address which is too large, it will be converted to a lower legal address (e.g., 1 1040' 2000 1723' will be stored in memory as 1 0040 0000 0722 and 2'2070 5163' will be stored in memory as 2 0070 1163').

If an attempt is made to load instructions above location 1983, error stop 2 will be encountered. If an attempt is made to load an illegal instruction (a configuration of numbers which does not represent a valid instruction) error stop 1 will be encountered.

8.) ASSIGNMENT OF STORAGE

Since DICTATOR is self-contained and self-loading (i.e., it requires no subroutines stored externally to itself), it requires little effort to assign specific storage assignments. These are as follows:

0000 and 0001	Occupied by DICTATOR
0002 to 0999	Available for storage of data or program.
1000 to 1983	Available for storage of program only.
1984 to 4032	Occupied by DICTATOR
4032 to 4095	Temporary storage employed by DICTATOR

While on the subject of storage assignment, it should be pointed out that one would be wise to draw up a "storage assignment chart" prior to doing the actual coding. The sheet should list the locations within the data blocks, bearing in mind that a floating point data word occupies 2 memory locations.

It is also noteworthy to point out that a three-address interpreter effectively creates available memory space from the viewpoint that one three-address instruction is capable of performing an operation which could involve three single-address instructions.

DICTATOR employs a logical protection technique and cannot be destroyed by programming errors even though the programmer inadvertently may call for loading or storage within the DICTATOR area. This is accomplished by limiting legal data instruction addresses to given areas in the LGP-30 rather than by the more memory space sonsuming technique of electronic protection through circuit deactivation.

In the basic language addressing scheme of the LGP-30, the memory is divided into 64 tracks, each of which is subdivided into 64 sectors. This means that addresses 00064 to 0099, 0164 to 0194, 0264 to 0199 etc., are non-existant. To avoid these "holes" in the numbering, all addresses referred to by DICTATOR are in pure decimal notation (0000 to 1983 inclusive).

9.) WRITING, CHECKING AND CORRECTING PROGRAMS

Writing a Program

Let us consider a sample program to create a table of $\sqrt{X}$, X^2, X^3, sinX, cosX and tanX for all integer values of X where $1 \leq X \leq 90$. The following are the memory assignments.

Location	Contents	
0100	initial value of X	
0102	constant $\pi/180$	
0104	constant 1	
0106	temporary storage for X in radians	
0108	X	Values to be printed
0110	$\sqrt{X}$	
0112	X^2	
0114	X^3	
0116	sin X	
0118	cos X	
0120	tan X	

The program is to be loaded starting at location 1000.

The program is as follows:

Location	Explanation	Contents
	Load program starting in location 1000	1000 1000'
1000	Move initial value of X to working storage	60002'0100 0108'
1001	Set loop counter #1 for 90 passes	8001 0089'
1002	Form $\sqrt{X}$	13'0000 0110'
1003	Form X^2	30108'0108 0112'
1004	Form X^3	30000'0108 0114'
1005	X in radians = $X^o \cdot \pi/180$	30108'0102 0106'

1006	form sin X	14' 0000 0116'
1007	form cos X	15' 0106 0118'
1008	tan X = sin X/cos X	4 0116' 0000 0120'
1009	print carriage return	8009 0016'
1010	print $\sqrt{X}$, X, X^2, X^3, sin X, cos X and tan X	18' 0108 0120'
1011	$X_{new} = X_{n-1} + 1$	1 0108' 0104 0108'
1012	if not done, reduce counter 1 and repeat loop	3' 0001 1002'
1013	halt unconditionally	8008 0000'
	load data starting at location 0100	2000 0100'
0100	initial X	1000 0000' + 50'
0102	$\pi/180$	1745 3292' + 48'
0104	1	1000 0000' + 50'
	terminate data input	exit'
	transfer to 1000 and start program	3000 1000'

There are some items which should be particularly noted such as the use of the address zero (referring to the last result in the accumulator). It is sagacious to use 0000 wherever possible since this presents a saving in the execution time. Step 1002 uses 0000 for the B address for, although step 1002 can be entered by stepping sequentially through steps 1000 and 1001 or as a result of transferring from step 1012, the accumulator would contain the desired value of X as the result of steps 1000 or 1011 respectively. The contents of the accumulator are not affected by steps 1001 or 1012. It becomes quite obvious why 0000 was used in steps 1004 and 1006. Step 1008 is of particular interest in that the accumulator contains the divisor. Single address coding normally requires the dividend to be in the accumulator so that in the case where the divisor is in the accumulator, the programmer is obligated to store the divisor and enter the dividend into the accumulator. The ability of a three-address system to refer to the accumulator with the A, B and/or C address navigates around these steps quite efficiently. The loop counter and loop test were chosen to control the number of loops instead of subtracting the argument from a constant and testing the sign of the result because the loop counter is actually a fixed point counting device thereby allowing it to be faster and not have it subject to roundoff. The printed values could have been individually printed from the accumulator as they were computed, but the printing of the quantities in a "block" conserves time and memory space in that only one print instruction need be interpreted to print all the quantities involved.

Checking the Program

One method of checking the program would be to trace it by means of the running accumulator print-out. This would entail the use of the 4000 1000 command. However, the trace really wouldn't be feasible for a program of this nature where most of the immediate results are printed as final values. This certainly does not mean to imply that one should be reluctant to utilize this facility, for it really would be a powerful "debugging" tool. By the nature of this program, most of the difficulties, if there were any, could be resolved by inspection of the printed results. However, for programs of a more complex nature, this is not so easily accomplished. There is another "debugging" aid available which, when properly used, could assist in resolving many difficulties. On the assumption that the quantities sin X, cos X and tan X were all in error, the step which converts X in degrees to X in radians would certainly be suspect. This could easily be proven by using the "data dump" command to inspect X radians and degrees. This would entail the use of the 5000 0106 command with the transfer control button depressed until the contents of 0106 (Xradians) and 0108 (X degrees) are printed. Then by inspection of the two quantities, we could determine if the conversion were correct.

Correcting the Program

If it is desired to correct or change the program while it is in memory (corrections or changes to a program on tape are discussed elsewhere in the manual), DICTATOR has facilities to accomplish this. If it is desired to change the "table maker" program so that we compute X^4 rather than X^3 at step 1004, the instruction which now multiplies X^2 and X to get X^3 would be replaced by one which multiplies X^2 and X^2 to get X^4 (X^2 happens to be in the accumulator as a result of step 1003). To accomplish this change:

Load program beginning in location 1004	1000 1004'
$X^4 = X^2 \cdot X^2$	3 0000' 0000 0114'

The same method would be employed to replace erroneous instructions. If it is desired to change the program and data simultaneously (such as changing the instruction in 1001 to set the counter for 45 passes and changing the data in 1014 so the argument is incremented by two rather than one) it would be accomplished as follows:

Load program beginning in location 1001	1000 1001'
Set loop counter 1 for 45 passes	8001 0044'
Load data starting in location 0104	2000 0104'
2.0	2000000' + 50'
Terminate data input	EXIT'

10.) HANDLING TABULAR DATA

10.1) Single Table Loop-Up (function of one variable)

In order to determine the value of a dependent variable corresponding to a given value of an independent variable, a table loop-up routine is incorporated as an integral part of DICTATOR. It's use requires some prerequisites which are:

1. A table of independent values loaded in locations BBBB, BBBB + 2, BBBB + 4, ... BBBB + N. BBBB is the memory location referred to by the address BBBB in the table loop-up instruction.

    A. The minimum value allowed in the independent table is ±0.000025. The minimum difference between successive quantities is 0.000025. The maximum value allowed in the independent table is ±262143.0.

    B. The independent table should be loaded so that the least positive (or most negative) number is loaded in location BBBB and with ascending values in successive even locations.

    C. The independent table can be of any length up to and including 32 arguments (which would occupy 64 locations) providing the corresponding dependent table(s) is (are) equal in length.

2. A table of dependent values loaded in CCCC, CCCC + 2, CCCC + 4, ...CCCC + N. CCCC is the memory location referred to by the address CCCC in the table look-up instruction.

    A. There are no restrictions on the sign or magnitude of the values in the dependent table(s).

    B. The dependent table(s) must be of the same length as the independent table.

3. The argument must be stored in location AAAA. AAAA is the memory location referred to by the address AAAA in the table loop-up instruction.

    A. The magnitude of the argument must be within the scope of the independent table.

4. After interpretation of the table look-up instruction, location 0002 will contain the argument in the independent table which is located on the low side of the search argument and location 0004 will contain the next higher table argument value. Locations 0006 and 0008 will contain the corresponding values from the dependent tables. The contents of the accumulator are not affected by the table look-up instruction.

For example, let the argument be in the accumulator prior to the execution of the T.L.U. instruction and let it have the value 3.75 (written 37500000' + 50'). Let the tables be stored as follows:

Independent Table		Dependent Table	
Location	Contents	Location	Contents
0100	10000000' + 50'	0200	10000000' + 50'
0102	20000000' + 50'	0202	33333333' + 51'
0104	30000000' + 50'	0204	20200000' + 51'
0106	40000000' + 50'	0206	70000000' + 53'
0108	50000000' + 50'	0208	75000000' + 53'
0110	60000000' + 50'	0210	85000000' + 53'
0112	70000000' + 50'	0212	10000000' + 54'
0114	80000000' + 50'	0214	25000000' + 54'
0116	90000000' + 50'	0216	50000000' + 55'
0118	10000000' + 51'	0218	10000000' + 56'

The T.L.U. instruction would then be 7 0000' 0100 0200' where the A address denotes the location of the argument which in this case is 0000 (the accumulator), The B address denotes the initial location of the independent table which in the case is 0100 and the C address denotes the initial location of the dependent table which in this case is 0200. Upon completion of the T.L.U. instruction, the contents of 0002, 0004, 0006 and 0008 would be:

Location	Contents	
0002	30000000' + 50'	(from location 0104)
0004	40000000' + 50'	(from location 0106)
0006	20200000' + 51'	(from location 0204)
0008	70000000' + 53'	(from location 0206)

10.2) An Application of the T.L.U. Instruction

Consider a case where it is desired to loop up 3 dependent variables and retain the three interpolated values and the associated partial derivatives in storage. This application is illustrated by the following example:

1. The independent variable is Mach number, M.

2. The three dependent variables are drag coefficient, C_{D_e} ; lift curve slope, a and induced drag factor K.

3. The memory assignments are:

Location	Contents
0100	M
0800 -- 0830	Table of M values
0832 -- 0862	Table of corresponding C_{D_e} values
0864 -- 0894	Table of corresponding a values.
0896 -- 0926	Table of corresponding K values
0010 -- 0012	Used for temporary storage

4. At the completion of the routine, the interpolated values of C_{D_e} , a and K will be stored respectively in 0102, 0104 and 0106 with the associated partial derivatives stored respectively in 0108, 0110 and 0112.

5. The following terminology applies:

M_L = lower value of M from the table

M_U = upper value of M from the table

$C_{D_{e_L}}$ = lower value of C_{D_e} from the table

$C_{D_{e_U}}$ = upper value of C_{D_e} from the table

a_L = lower value of a from the table

a_U = upper value of a from the table

K_L = lower value of K from the table

K_U = upper value of K from the table

The program used to solve this problem is as follows:

Location	Explanation	Code
	Load program starting at location 1100	10001100'
1100	Look-up C_{D_e}	7 0100' 0800 0832'
1101	$M - M_L$	2 0100' 0002 0010'
1102	$\Delta M = M_U - M_L$	2 0004' 0002 0012'
1103	$C_{D_{e_U}} - C_{D_{e_L}}$	2 0008' 0006 0000'
1104	$\partial C_{D_e}/\partial M = (C_{D_{e_U}} - C_{D_{e_L}})/\Delta M$	4 0000' 0012 0108'
1105	$(\partial C_{D_e}/\partial M)\ (M - M_L)$	3 0000' 0010 0000'
1106	$C_{D_e} = C_{D_{e_L}} + (\partial C_{D_e}/\partial M)\ (M - M_L)$	1 0000' 0006 0102'
1107	Look-up a	7 0100' 0800 0864'
1108	$a_U - a_L$	2 0008' 0006 0000'
1109	$\partial a/\partial M = (a_U - a_L)/\Delta M$	4 0000' 0012 0110'
1110	$(\partial a/\partial M)\ \ (M - M_L)$	3 0000' 0010 0000'
1111	$a = a_L + (\partial a/\partial M)\ \ (M - M_L)$	1 0006' 0000 0104'
1112	Look-up K	7 0100' 0800 0896'
1113	$K_U - K_L$	2 0008' 0006 0000'
1114	$\partial K/\partial M = (K_U - K_L)/\Delta M$	4 0000' 0012 0112'
1115	$(\partial K/\partial M)\ (M - M_L)$	3 0000' 0010 0000'
1116	$K = K_L + (\partial K/\partial M)\ (M - M_L)$	1 0006' 0000 0106'
1117	Print M, C_{D_e}, a, K, $(\partial C_{D_e}/\partial M)$, $(\partial a/\partial M)$ & $(\partial K/\partial M)$	18' 0100 0112'
1118	stop	8008 0000'

10.3) DOUBLE TABLE LOOK-UP (Function of two variables)

By taking advantage of two of the inherent capabilities of DICTATOR, a program can easily be coded which will determine the value of a dependent variable which is the function of two independent variables. These two capapabilities are the ability of the move order to move pairs of instructions as well as data and the possibility of the dependent table for a T.L.U. instruction to be a "dummy" table consisting of instructions rather than data.

The best way to explain the double table look-up is by means of a sample program. The program involved is presented graphically by Figure 1, the object being to determine f (designated f_{xz}) for any combination of values of x and z (provided, of course, x and z are within the limits of the tables). For each of the 6 values of z represented, there exists a table of f values corresponding to a table of x values. When z is of such a value that it falls between two of the values of z for which there are tables, it naturally follows that both of the accompanying tables must be utilized and the value of f_{xz} obtained by interpolation. Knowing which two tables are to be utilized, the program must do two T.L.U. instructions where x is the independent table in both cases and the two selected tables of f are the two dependent tables. The problem, therefore, is one of notifying these two T.L.U. instructions as to which two of the six tables are to be used (this does not imply that the programmer is limited to six tables, six were arbitrarily chosen for the sample program).

This is where the "dummy" dependent table of instructions comes into being. A T.L.U. instruction is executed wherein the independent table consists of the values of z for which there are tables and the "dummy" dependent table consists of "set C address" instructions. Upon completion of this T.L.U., locations 0006 and 0007 will contain an appropriate pair of "set C" address instructions. Locations 0008 and 0009 will also contain a pair of "set C" address instructions, but because of the design of the "dummy" table; the pair in 0006 and 0007 (the pair corresponding to Z_L) are the two which are used. Using the move order, this pair can be moved into the main body of the program where, upon their interpretation, they will serve to set the C addresses of the two T.L.U. instructions (the C address will indicate the initial locations of the two dependent tables in question).

It should be pointed out that a program of this nature should be located, at least in part, below location 1000 because the move order is incapable of moving into locations numbered higher than 0998. In the sample program which follows, the enclosing of an address or instruction within brackets signifies that it is filled in and/or modified by the program. The interpolation is accomplished by (refer to Figure 1 for meaning of symbols):

$$\Delta X = X_U - X_L$$

$$\Delta Z = Z_U - Z_L$$

$$\left(\frac{\partial f}{\partial X}\right)_{Z_U} = \frac{f_{UU} - f_{LU}}{\Delta X}$$

$$\left(\frac{\partial f}{\partial X}\right)_{Z_L} = \frac{f_{UL} - f_{LL}}{\Delta X}$$

$$f_{XU} = f_{LU} + (\partial f/\partial X)_{ZU} \quad (X - X_L)$$

$$f_{XL} = f_{LL} + (\partial f/\partial X)_{ZL} \quad (X - X_L)$$

$$\left(\frac{\partial f}{\partial Z}\right) = \frac{f_{XU} - f_{XL}}{\Delta Z}$$

$$f_{XZ} = f_{XL} + (\partial f/\partial Z) \quad (Z - Z_L)$$

The tables would be loaded in memory as follows:

Location	Explanation	Contents
	Load starting in location 0100	
		20000100'
0100		10000000'+50'
0102		20000000'+50'
0104	Table of Z values	30000000'+50'
0106		40000000'+50'
0108		50000000'+50'
0110		60000000'+50'
	Load instructions starting in location 0112	10000112'
0112		4' 0906 0138'
0113		4' 0913 0152'
0114		4' 0906 0152'
0115	"dummy table"	4' 0913 0166'
0116		4' 0906 0166'
0117		4' 0913 0180'
0118		4' 0906 0180'

0119	"dummy table" (con't)	4' 0913 0194'
0120		4' 0906 0194'
0121		4' 0913 0208'
0122		4' 0906 0208'
0123		4' 0913 0208'
	Load data starting in location 0124	20000124'
0124	Table of X values	00000000'+50'
0126		50000000'+51'
0128		10000000'+52'
0130		15000000'+52'
0132		20000000'+52'
0134		25000000'+52'
0136		30000000'+52'
0138	Table of f values for Z = 1	40000000'+48'
0140		50000000'+48'
0142		65000000'+48'
0144		83000000'+48'
0146		10300000'+49'
0148		12600000'+49'
0150		15000000'+49'
0152	Table of f values for Z = 2	80000000'+48'
0154		95000000'+48'
0156		11000000'+49'
0158		12700000'+49'
0160		14700000'+49'
0162		17000000'+49'
0164		19000000'+49'
0166	Table of f values for Z = 3	12000000'+49'
0168		15000000'+49'
0170		16500000'+49'
0172		18500000'+49'
0174		20500000'+49'
0176		23000000'+49'
0178		26000000'+49'

0180		20000000'+49'
0182		21000000'+49
0184		22500000'+49'
0186	Table of f values for Z = 4	24500000'+49'
0188		27000000'+49'
0190		30200000'+49'
0192		34000000'+49'
0194		25000000'+49'
0196		27000000'+49'
0198		29000000'+49'
0200		31800000'+49'
0202	Table of f values for Z = 5	35000000'+49'
0204		38700000'+49'
0206		43500000'+49'
0208		32000000'+49'
0210		33800000'+49'
0212		36000000'+49'
0214	Table of f values for Z = 6	38700000'+49'
0216		41800000'+49'
0218		45500000'+49'
0220		50000000'+49'
		EXIT '

Other memory assignments are:

0222	X
0224	Z
0226	ΔZ
0228	$Z - Z_L$
0230	ΔX
0232	$X - X_L$
0234	$(\partial f / \partial X)_{ZL}$
0236	f_{XL}
0238	$(\partial f / \partial X)_{ZU}$
0240	f_{XU}
0242	$\partial f / \partial Z$
0244	f_{XZ}

The program is written as follows:

Location	Explanation	Code
	Load instructions starting in location 0900	10000900'
0900	Search Z tables	7 0224' 0100 0112
0901	$Z = Z_U - Z_L$	2 0004' 0002 0226'
0902	$Z - Z_L$	2 0224' 0002 0228'
0903	Move lower pair of Set C instructions	6 0002' 0006 0904'
0904	Set C address of 0906	[4' 0906 0000']
0905	Set C address of 0913	[4' 0913 0000']
0906	Search X table	7 0222' 0124[0000']
0907	$\Delta X = X_U - X_L$	2 0004' 0002 0230'
0908	$X - X_L$	2 0222' 0002 0232'
0909	$f_{UL} - f_{LL}$	2 0008' 0006 0000'
0910	$(\partial f/\partial X)_{ZL} = (f_{UL} - f_{LL}) / \Delta X$	4 0000' 0230 0234'
0911	$(\partial f/\partial X)_{ZL} \quad (X - X_L)$	3 0000' 0232 0000'
0912	$f_{XL} = f_{LL} + (\partial f/\partial X)_{ZL} (X - X_L)$	1 0006' 0000 0236'
0913	Search X table	7 0222' 0124[0000']
0914	$f_{UU} - f_{LU}$	2 0008' 0006 0000'
0915	$(\partial f/\partial X)_{ZU} = f_{UU} - f_{LU}) / \Delta X$	4 0000' 0230 0238'
0916	$(\partial f/\partial X)_{ZU} (X - X_L)$	3 0000' 0232 0000'
0917	$f_{XU} = f_{LU} + (\partial f/\partial X)_{ZU} (X - X_L)$	1 0006' 0000 0240'
0918	$f_{XU} - f_{XL}$	2 0000' 0236 0000'
0919	$(\partial f/\partial Z) = (f_{XU} - f_{XL}) / \Delta Z$	4 0000' 0226 0242'
0920	$(\partial f/\partial Z) (Z - Z_L)$	3 0000' 0228 0000'
0921	$f_{XZ} = f_{XL} + (\partial f/\partial Z) (Z - Z_L)$	1 0236' 0000 0244'
0922	Print Carriage Return	80090016'
0923	Print f_{XZ}	18' 0000 0000'
0924	Halt unconditionally	8008 0000'

DICTATOR
A Three Address Floating Point Interpreter

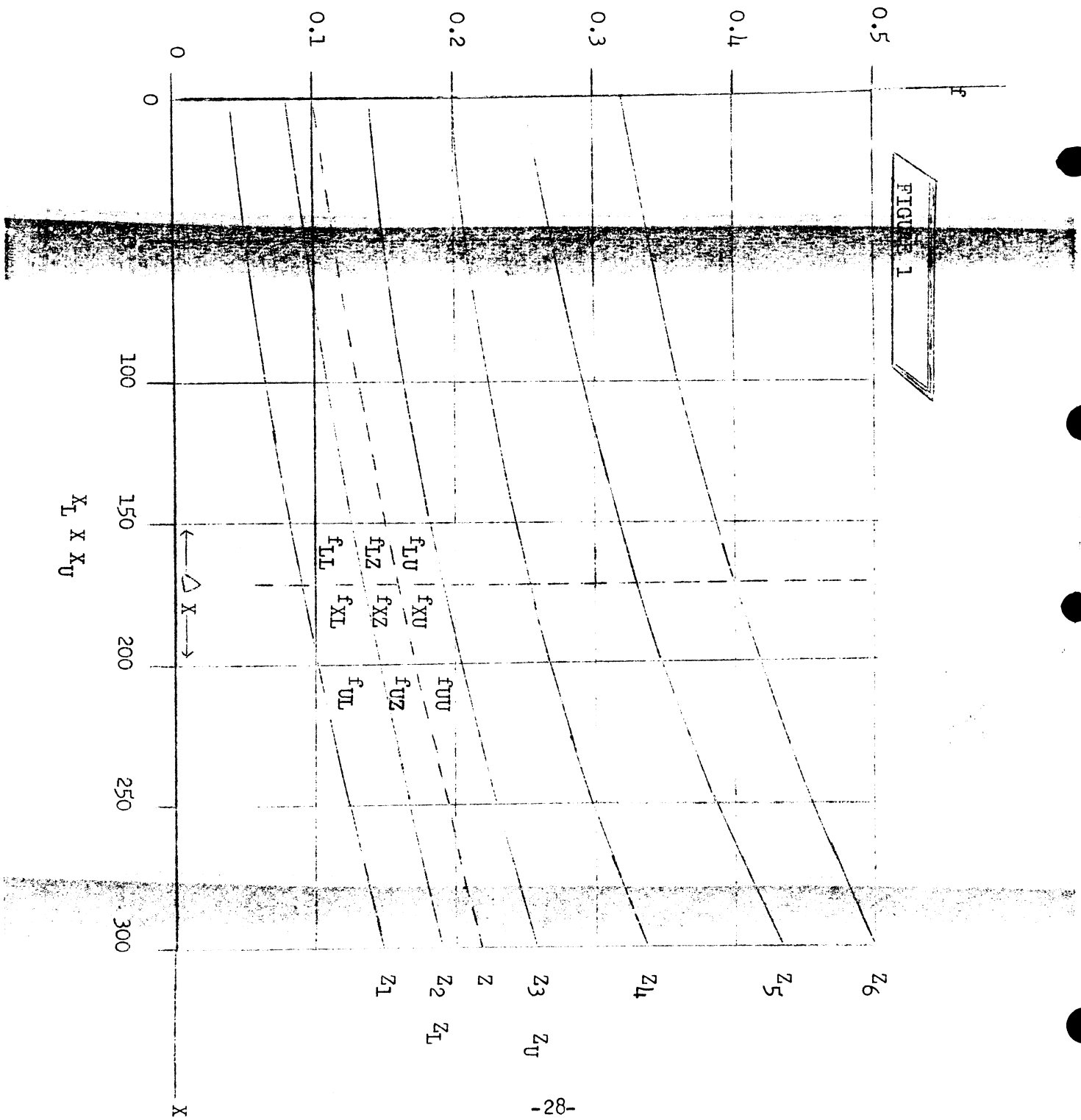


FIGURE 1

11.) CORRECTING TAPES

The apostrophe (') or stop code, as it is commonly designated in conjuction with the LGP-30, generates a start signal when it is read from punched tape. It should therefore be considered synonymous with a depression of the start button. When typing into the computer from the keyboard, the typing of a stop code does not generate a start signal, it does so only when read from punched tape.

Correcting an error on punched tape may be accomplished in various ways. The method of correcting the error depends upon the type of error, although some errors may be corrected in various ways. The purpose of the following discussion is to explain the basic correcting techniques and encourage the reader to analyze his particular problem closely before deciding on the best corrective method. For this reason the following discussion breaks the corrective methods into groups.

GROUP 1

Perhaps the easiest error to correct is one which is detected immediately after the wrong key has been depressed. In this case all that needs to be done is:

1. Turn the "Feed Knob" at the left side of the tape punch back one notch.
2. Press the "Code Delete" lever once.
3. Continue by depressing the proper key on the keyboard.

GROUP 2

At times the particular combination of holes punched by an erroneous character may be a portion of the combination desired. If this is the case the operator need only turn the "Punch Feed Knob" back one notch and continue by depressing the proper key. Consult the table in the appendix to determine if a character can be "re-punched".

GROUP 3

Another type of error is the one in which an incorrect word is punched on tape and cannot be corrected by either of the methods given above. As an example, suppose the instruction 15' 0000 0800' were punched instead of the correct instruction 14'0000 0800'. The operator may correct this error by punching a correction on the end of the tape. If the 14' 0000 0800' instruction were to be placed in memory location 1024, the correction to be added to the tape would be:

1000 1024'

14' 0000 0800'

The 15' 0000 0800' would be entered into 1024 but the 14' 0000 0800' would later replace it.

Group 4

The most general method of correcting a word on tape is to reproduce the tape up to the error, punch the correct word, and then start reproducing again with the word following the one in error. The sequence of this purpose is:

1. Turn Flexowriter "Connect" switch to "Off".
2. Put bad tape in reader (the"Manual Input" button on the Flexowriter must be in the up position to enable the reader).
3. Depress "Punch On"" button.
4. Depress "Cond. Stop" button.
5. Depress "Start Read" button (the original tape will now be reproduced automatically as long as the "Cond. Stop" button is depressed).
6. When close to bad word(s), lift "Cond. Stop" switch.
7. Read one word at a time by use of the "Start Read" button (depress this one button once for every word to be reproduced before the bad word(s) is (are) reached.
8. Punch correct word(s) manually.
9. Lift "Punch On" to off position.
10. Depress "Start Read" to pass bad word(s).
11. Depress "Punch On" again.
12. Depress "Cond. Stop" again.
13. Depress "Start Read" to copy remainder.

Note: The "Cond. Stop" must be up whenever a tape is read into the machine.

12.) POWER SEQUENCING:

General

It is very important, in fact, imperative, that the "manual input" button on the console be depressed prior to making any change in power status to the LGP-30! Failure to comply with this stipulation is almost certain to
$ result in at least a partial destruction of the contents of memory. The Royal McBee Corporation recommends the computer not be turned off or put in standby for small periods of time during the working day, as this would possibly lead to serious physical damage of the memory unit.

Turning Power On

1. Check to see that the remote power source is on (for some installations this implies depressing a wall mounted circuit-breaker to "ON".)

2. Depress "Manual Input" button on console -- IMPORTANT.

3. Depress "Power On" button (the red "Stand By" button will light up).

4. Depress the "Stand By" button (this is an optional step, since if "Stand By" is not depressed, the machine will automatically stand by for 50 sec. during which time half voltage is applied to the filaments of all tubes and in some machines, the drum will start to rotate).

5. Depress "Operate" button (the yellow stand by to operate light will be illiminated, full voltage applied to filaments, and the drum brought up to speed; time required: 50 sec.).

6. When green "Operate" button lights, D.C. voltage is applied to the circuits and computer is ready for use.

7. Turn Flexowriter "Power" on (toggle switch).

Turning Power Off

1. Turn Flexowriter "Connect" switch to off.

2. Turn Flexowriter "Power" off.

3. Depress "Manual Input" button on console -- IMPCRTANT.

4. Depress "Power Off" button.

5. Push wall-mounted circuit-breaker to off position. (It naturally follows that this applies only to installations which have circuit-breakers adjacent to the computer.).

6. Complete log of machine time for day (if required).

7. Cover machine.

A-P-P-E-N-D-I-X

SUMMARY OF INSTRUCTIONS

Arithmetic:	01	A	B	C
Add	1	0000 to 0998'	0000 to 0998	000C to 0998'
Sub	2	0000 to 0998'	0000 to 0998	0000 to 0998'
Mul	3	0000 to 0998'	0000 to 0998	0000 to 0998'
Div	4	0000 to 0998'	0000 to 0998	0000 to 0998'
Neg Mul	5	0000 to 0998'	0000 to 0998	0000 to 0998'
Move	6	0002 to 0998'	0000 to 0998	0000 to 0998'
T.L.U.	7	0000 to 0998'	0010 to 0990	0010 to 0990'

Transfer	02	B	C
Unc	1'	0000	0002 to 1983'
Sign	2'	0002 to 1983	0002 to 1983
Loop	3'	0000 to 0003	0002 to 1983

Modify Address:	02	B	C
Set C	4'	0002 to 1983	0000 to 1983'
Set B	5'	0002 to 1983	0000 to 1983'
Set A	6'	0002 to 1983	0000 to 1983'
Increment C	7'	0002 to 1983	0000 to 1983'
Increment B	8'	0002 to 1983	0000 to 1998'
Increment A	9'	0002 to 1983	0000 to 0998'

Logical Functions:	02	B	C
Exp	11'	0000 to 0998	000C to 0998'
Log	12'	0000 to 0998	000C to 0998'
Sort	13'	0000 to 0998	0000 to 0998'
Sin	14'	000C to 0998	0000 to 0998'
Cos	15'	0000 to 0998	0000 to 0998
Arctan	16'	0000 to 0998	0000 to 0998'

Output:	02	B	C
Punch	17'	0000 to 0998	0000 to 0998'
Print	18'	000C to 0998	0000 to 0998'
Opt. Print	19'	0000 to 0998	0000 to 0998'

Miscellaneous:	03	C
Set loop ctr # 0	8000	0000 to 3999'
Set loop ctr # 1	8001	0000 to 3999'
Set loop ctr # 2	8002	0000 to 3999'
Set loop ctr # 3	8003	0000 to 3999'
Input	8007	0002 to 0998'
Halt	8008	0000 to 0032'
Print Character	8009	0001 to 0062'

SUMMARY OF COMMANDS TO DICTATOR

Prog. Load	1000XXXX'
Data Load	2000XXXX'
Interp. transfer	3000XXXX'
Trace transfer	4000XXXX'
Data dump	5000XXXX'
Data punch	6000XXXX'
Hex load	7NNNMMMM'

INPUT FORMATS

Arithmetic	o_3AAAA' BBBBCCCC'
Transfer and Modify Address	o_2' BBBBCCCC'
Logical and Output	$o_2\dot{o}_2$' BBBBCCCC'
Miscellaneous	800o_1CCCC'
Data	CCCCCCCC' +EE'

ERROR STOPS

All error stops (with the exception of T.L.U.) occur as a carriage return followed by the printing of the appropriate number.

	During Loading	During Running
1.	Illegal instruction entered	Illegal instruction encountered.
2.	Program load counter exceeds 1983 or data load counter exceeds 0998.	Instruction counter exceeds 1983.
3.	Illegal data entered (less than 8 characters for characteristic)	Illegal move order (trying to move less than 2 words, A = 0000 or 0001).
4.		Attempting to print data with exponent greater than 10^{49}.
5.		Argument for Sine or Cosine equal to or greater than 2^{26} radians.
6.		Attempting division by zero or unfloated number.
7.		Zero or negative argument for $\text{Log}_e X$.
8.		Argument for e^X less than -88.6 or greater than +88.6.
9.		Argument for square root is negative.

Stop with instruction register cleared and counter register containing 100000 000000 indicates an error in table look-up such as argument not in table or illegal argument.

BYPASS FOR ALL ERROR HALTS IS A DEPRESSION OF THE START BUTTON, (EITHER ONE) WHICH WILL RETURN CONTROL TO THE INPUT SECTION OF DICTATOR.

If the computer stops while trying to print a floating point number, check to see that the connect switch is on and that the manual input light is not illuminated. If the latter is the cause, a depression of the "start" on the Flexowriter will overcome it.

If A or B Address is 0000, subtract 30 milliseconds; if C address is 0000, subtract 45 milliseconds. Unless otherwise noted, all times are in milliseconds.

Add	450
Subtract	455
Multiply	415
Divide	415
Negative Multiply	430
Move	150 + 85A (A = amount of words moved)
Table Look-up	1 second.
Unconditional Transfer	75
Sign Transfer	135
Loop Transfer	175
Set C	285
Set B	205
Set A	190
Incfement C	285
Increment B	205
Increment A	190
Exponential	670
Logarithm	720
Square Root	680
Sine	740
Cosine	740
Arctangent	720
Punch	28 words per minute
Print	28 words per minute
Optional Print	28 words per minute
Set Counter	150
Input	20 words per minute
Halt	105
Print Character	180

DICTATOR loads in approximately 30 minutes via Flexowriter.

SUMMARY OF COMMANDS FOR PRINT CHARACTER INSTRUCTION

Character	Code	Character	Code
)0	80090002	Pp	80090033
Ll	80090006	Qq	80090058
*2	80090010	Rr	80090013
"3	80090014	Ss	80090061
△4	80090018	Tt	80090045
%5	80090022	Uu	80090041
$6	80090026	Vv	80090031
'7	80090030	Ww	80090062
8	80090034	Xx	80090039
(9	80090038	Yy	80090009
Aa	80090057	Zz	80090001
Bb	80090005	Space	80090003
Cc	80090053	_-	80090007
Dd	80090021	=+	80090011
Ee	80090037	:,	80090015
Ff	80090042	?/	80090019
Gg	80090046	].	80090023
Hh	80090049	[,	80090027
iI	80090017	LC	80090004
Jj	80090050	UC	80090008
Kk	80090054	CS	80090012
Ll	80090006	CR	80090016
Mm	80090029	TAB	80090024
Nn	80090025	BS	80090020
Oo	80090035	'	80090032

SUMMARY OF "RE-PUNCHES"

Character punched in error	can become
0	1 2 3 4 5 6 7 8 9 f g j k q w
1	1 3 5 7 9 g k w
2	2 3 6 7 f g q w
3	3 7 g w
4	4 5 6 7 j k q w
5	5 7 k w
6	6 7 q w
7	7 w
8	8 9 f g j k q w
9	9 g k w
f	f g q w
g	g w
j	j q w
k	k w w
q	q w
w	w

z	b y r i d n m p e u t h c a s
b	b r d m e t c s
y	y r n m u t a s
r	r m t s
i	i d n m h c a s
d	d m c s
n	n m a s
m	m s
p	p e u t h c a s
e	e t c s
u	u t a s
t	t s
h	h a s
c	c s
a	a s
s	s

MODIFICATIONS REQUIRED TO CHANGE LENGTH OF DICTATOR OUTPUT DATA

1. Execute 4-button sequence.
2. Type hex fill to location 3646: 700124G8
3. Depress "start" on Flexowriter.
4. Type in appropriate constant:
   - A. for characteristic length of 4 digits -- J
   - B. for characteristic length of 5 digits --10
   - C. for characteristic length of 6 digits --14
   - D. for characteristic length of 7 digits --18
   - E. for characteristic length of 8 digits --1J
5. Depress "start" on Flexowriter.

E is the normal characteristic length; i.e, 8 digits.

CAUTION! when punching out data from memory, 8 digits must be punched for the characteristic since the data input section will indicate an error if the characteristic is less then 8 digits.

DICTATOR INSTRUCTION PRINT SUBROUTINE

To further facilitate "debugging" of programs and to transfer programs from memory to punched tape, a separate subroutine has been coded for use with DICTATOR. This subroutine, known as DIP, is a high-speed decimal instruction print routine which occupies locations 1700 through 1983. It is loaded in hexadecimal form by DICTATOR. If the area occupied by DIP is not needed for storage by the programmer, it is recommended that DIP be left in memory as a permanent facility.

To employ DIP, the following procedure should be observed:

1.) Execute the 4-button sequence. (One Operation, Clear Counter, Normal And Start; in that order).

2.) Enter a command of the type 9000XXXX, where XXXX is the initial location to be printed.

3.) Depress "Start Button" on the Flexowriter.

4.) Enter a word of the type YYYY, where YYYY is the final location to be printed.

5.) Depress "Start Button" on the Flexowriter.

6.) DIP will then print the contents of memory locations XXXX through YYYY as instructions and in decimal notation. If it encounters a configuration which does not represent a valid instruction, error stop one will be encountered.

DIP has the ability to generate either of two distinct output formats. This is dependent upon the position of the transfer control switch, "up" for "print" and "down" for "punch". The formats are as follows:

1.) "Print" -- transfer control "up".

This output format is suited for visual identification of the instructions and their associated memory assignments. The instructions are printed four to a line and the printing of each line of instructions is preceeded by the printing of a four digit address which is the location of the first instruction of that printed line. The printed instructions are separated by double spaces while the operation code and the individual addresses are separated by single spaces.

2.) "Punch -- transfer control "down"

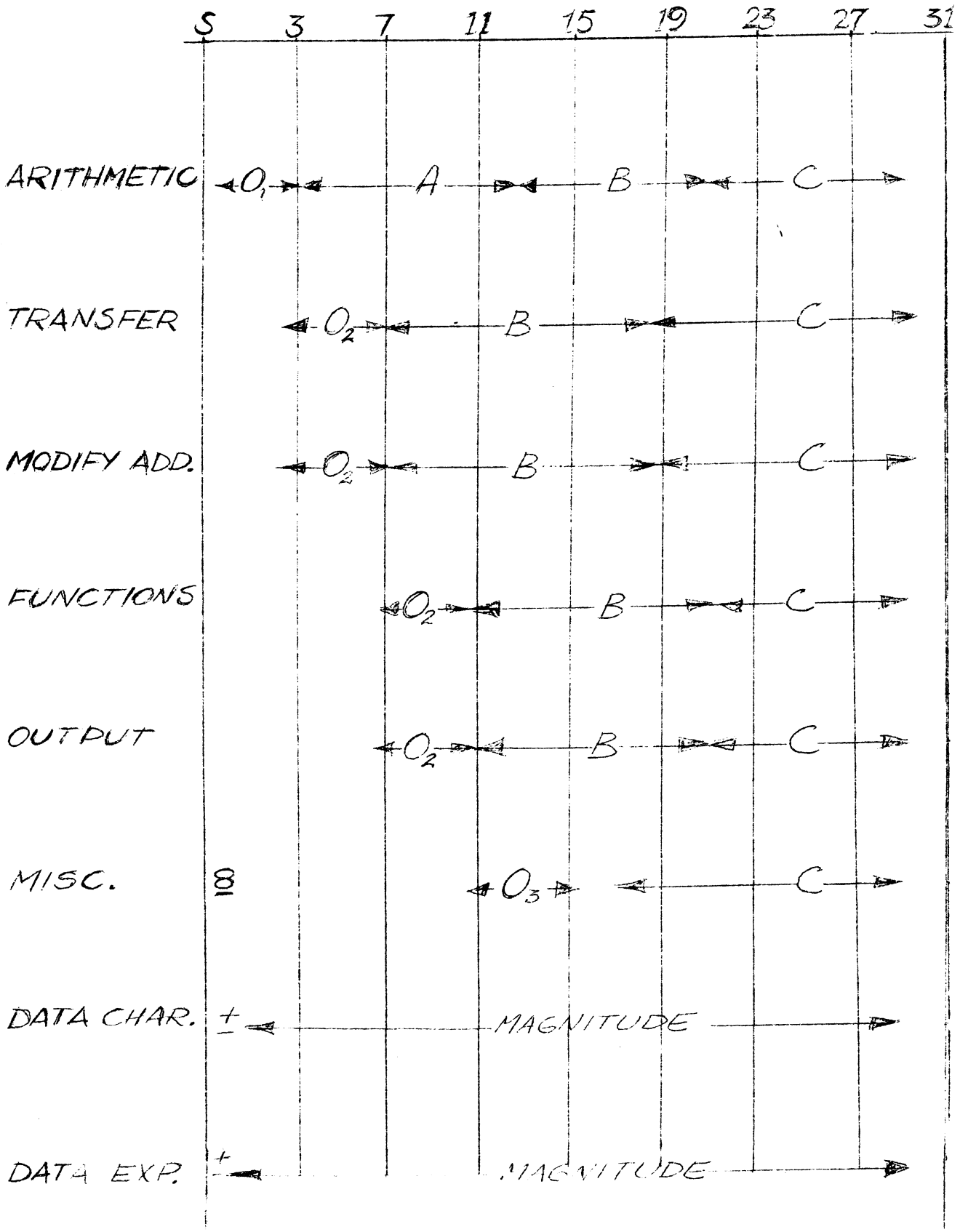
This output format is suited for identification by the computer. If the punch has been previously activated, a usable tape will be punched. It is usable in that it can, with no alteration other than it must be preceeded by a program load command, be read into the computer by DICTATOR. The instructions are printed four to a line with properly inserted stop codes.

One very useful application of this format is for transferring to paper tape which were corrected in memory.

DODCO

Program No. 124

INTERNAL FORMAT



D. I. C.

DICTATOR INTERPRETER CHECK

	Load Data	20000002'
	+2.0	20000000'+50'
	-2.0	20000000'-50'
		GROUP'
		0006'
	+1.0	10000000'+50'
	+3.0	30000000'+50'
		EXIT'
	Load Instructions	10001675'
1675	Set "A" Address	6'16800004'
6	Set "B" Address	5'16830002'
7	Set "C" Address	4'16811682'
8	Unc. Transfer	1'00001680'
9	Unc. Halt	80080000'
1680	Add	1[0002]'00060000'
1	Test on Minus	2'1679[1679]'
2	Subtract	20000'00060004'
3	Neg. Multiply	50000'[0000]0000'
4	Test on Plus	2'1685 1679'
5	Set CTR. #0	80000001'
6	SQ. Rt.	13'0000 0006'
7	Loop Test	3'0000 1686'
8	Sine	14'0000 0008'
9	Cosine	15'00060000'
1690	Divide	40008'0000 0008'
1	Arctangent	16'00000000'
2	Multiply	30000'0000 0006'
3	Move	60002'0004 0008'
4	Log_e	12'0002 0000'
5	Exp^e	11'0000 0004'
6	Print C.R.	80090016'
7	Print	18'00020006'
8	Punch	17'00080008'
1699	Halt	800 80000'
	Interp. Transfer	30001675'

DICTATOR INTERPRETER CHECK

The DICTATOR interpreter Check (DIC) provides a general check of the interpretation of the various instructions and the input-output facilities of DICTATOR. When DIC is utilized it destroys the previous contents of locations 0002 through 0009 and 1675 through 1699. DIC is also self-destructive so that once it has been used it must be reloaded to be used again. DIC was intentionally coded this way so the input section would be checked when DIP is executed.

To load and use DICTATOR:

1.) Place the DIC tape in the reader.

2.) Insure that the "cond. stop" switch is "up".

3.) Insure that the "connect" switch is "on".

4.) Insure that the "manual input" switch on the Flexowriter is "Up.".

5.) Execute the 4-button sequence.

if all is in order, the output will be:

20000000+50 20000000+50 19999999+50 20000000'-50'

ADDENDUM 1 TO DICTATOR MANUAL

Additional Features of Move Order

Although the move order was designed primarily to transplant data within memory, its use is not limited to performing this operation. More specifically, the move order interpretation was coded to move memory locations in pairs (a pair being an even numbered location and the following add location) within the confines of the data storage area (locations 0002 through 0999). With this definition in mind, it becomes evident that the move order can also move instructions provided two prerequisites are fulfilled. These are, of course, that the instructions must be moved in pairs (i.e., an even amount of instructions must be moved), and they can only be moved within the confines of locations 0002 through 0999.

The move order can also be used to propagate a number, such as zero, through the data storage area. This is possible because in moving a block of data, the first data word (or pair of memory words) is completely moved before the second data word(or pair of memory words) of the block is moved. Therefore, if a move order, such as 60012'00080010 was to be executed, it would be interpreted as follows:

1. Move the contents of locations 0008 and 0009 to 0010 and 0011
2. " " " " " 0010 " 0011 " 0012 " 0013
3. " " " " " 0012 " 0013 " 0014 " 0015
4. " " " " " 0014 " 0015 " 0016 " 0017
5. " " " " " 0016 " 0017 " 0018 " 0019
6. " " " " " 0018 " 0019 " 0020 " 0021

It becomes quite evident that before the contents of 0010 and 0011 are moved to 0012 and 0013, their original contents have been replaced by the contents of 0008 and 0009. One can readily see that the contents of 0008 and 0009 are going to propagate through locations 0010 and 0011, 0012 and 0013....0020 and 0021. The rule to use is then:

AAAA is the amount of locations to contain the propagated pair of memory words. In the above example, locations 0010 through 0021 represent twelve locations, therefore, AAAA = 0012. Another method is: 0010 through 0020 represent six data locations, so that multiplied by two (since one data word equals two memory words) is twelve, and therefore, AAAA = 0012.

BBBB is the location of the data word or the even numbered member of the pair of locations to be propagated. In the above example, then, BBBB = 0008.

CCCC is BBBB + 2. This applies only if a single data word or pair of memory words is to be propagated. It follows that a block of data can also be propagated through the data storage area. For example, if a block of 2,3, or 4 data words were to be propagated, CCCC would be BBBB + 4, BBBB + 6 or BBBB + 8 respectively.

Another use of the move order is simulation of a delay line. If an iterative process has been coded and any particular quantity is to be delayed for two loops, the delay can be accomplished with a move order. Another way of stating this is: if a quantity (designated X_N) is computed during one loop (designated loop N) is used in some computation two loops later (that loop designated loop N + 2) and the process is to be continuous, one can visualize the somewhat complex address modification necessary to perform this. However, a single move order neatly circumnavigates the use of any address modification. The application of the move order to solve the aforementioned problem is:

1. Assign storage locations to the delay line. For the example assign locations 0010, 0012 and 0014.

2. As the quantity X_N is computed, store it in the highest numbered location of the delay line (this is analogous to the delay line input) which in this case is location 0014.

3. Remove the previously delayed quantity from the lowest numbered location of the delay line (this is analogous to the delay line output) which in this case is location 0010.

4. Execute the move order which causes each quantity in the delay line to move to the next lower data storage location in the delay line. In this case, the move order is 6004'0014 0012'. The move order must move downward in memory (i.e., CCCC= BBBB- 2 for delaying one quantity, CCCC = BBBB - 4 for delaying 2 quantities, etc.) since moving upward (CCCC > BBBB) with an overlap of storage locations causes propagation.

With the quantities X_{N-2} in location 0010 and X_{N-1} in location 0012, the following will occur:

Loop N

The quantity X_N is stored in location 0014. The quantity X_{N-2} is "picked up" at location 0010 for a computation. X_{N-1} is moved to location 0010 and X_N is moved to location 0012.

Loop N + 1

The quantity X_{N+1} is stored in location 0014. The quantity X_{N-1} is "picked up" at location 0010 for a computation. X_N is moved to location 0010 and X_{N+1} is moved to location 0012.

Loop N + 2

The quantity X_{N+2} is stored in location 0014. The quantity X_N is "picked up" at location 0010 for a computation. X_{N+1} is moved to location 0010 and X_{N+2} is moved to location 0012.

Loop N + 3

The quantity X_{N+3} is stored in location 0014. The quantity X_{N+1} is"picked up"at location 0010 for a computation. X_{N+2} is moved to location 0010 and X_{N+3} is moved to location 0012.

etc..

Additional Temporary Data Storage

If an occasion arises wherein data must be stored external to locations 0002 thru 0999, the solution lies in using a move order. For example let us suppose some data had to be stored in locations 1000 thru 1098. Initially the data would have to be located within the confines of the normal data storage, say locations 0200 thru 0298. Executing a move order such as 60102'0198 0998' would move 0198 to 0998, 0200 to 1000, 0202 to 1002,..... 0298 to 1098. One additional word is moved from 0198 to 0998 since CCCC cannot be greater than 0998. However, during the moving operation, the 0998 is incremented internally up to and including 1098. However, we are unable to operate on or call for this data while it is stored outside the normal data storage area. Therefore, when we desire to see it we are obligated to return it to the normal storage area, let us say to locations 0300 thru 0398. This can again be done by a move order. The order could be 60102'0998 0298'. Again the extra data word must be moved since BBBB cannot exceed 0998. Keep in mind that this particular operation will destroy the contents of 0298 in this case.

Special Print Format When Data Exponent is Less Than 10^{-50}

When an attempt is made to print a data word whose exponent is less than 10^{-50}, the word is printed as zero. However, to notify the operator that the data is not a machine zero internally but rather a meaningful number with a small exponent, it will print as a single zero followed by a tab. That is, the characteristic is printed as a single zero and the exponent is not printed.

H1-124

LGP-30 CODING SHEET

PREPARED FOR:				PAGE 1 OF 19
JOB NO.	PROGRAM NO.	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9-22-59
PROBLEM: DICTATOR				TRACK 0

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
;0002636	/						
/0002600	/	☒					
700120f4		0032	f	1f 90	/		
70012kg0		33	2	0000	/		
		34			/		
		35			/	☒	
Location1700		36	xs	3358	/	1 @ 3	
		37	t	0058	/	9 @ 3	
		38	xu	4245	/	error stop 1	
,00000001	'	39			/	☒	
		40	xz	0026	/		
		41	xp	3256	/		
		42	b	[ ]	/		
		43	xh	6322	/	☒	
		44	xh	6309	/		
		45	t	0053	/	neg.	
		46	s	0232	/	1 @ 3	
		47	t	0362	/	☒ not 3	address
		48	e	0334	/	70000000	
		49	m	0335	/	1 @ 18	
		50	a	0336	/	xp0631	
		51	c	0216	/	☒	
		52	u	0212	/		
		53	a	0132	/	7 @ 3	
		54	t	0419	/	misc.	
		55	xz	0041	/	☒	
		56	xu	4245	/	illegal	
,00000001	'	57		3wwj	/	(121)	
		58	xn	3344	/	1 @ 30	
		59	xe	3445	/	☒ 3wwq	
		60	xr	3246	/	binarize lo	
		61	xu	3250	/		
		62	xn	3448	/	1 @ 30	
		63	y	0042	/	☒ b[lo]	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK 1

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		0 1 0 0	b	0 1 4 3	/	3 @ 29	
		0 1	x c	6 3 1 6	/	c.r.ctr.	
		0 2	u	0 1 0 6	/		
		0 3	x z	0 0 5 3	/	☒	
		0 4	x p	0 3 1 9	/	"space"	
		0 5	u	0 0 4 2	/		
		0 6	x p	0 0 5 6	/	input lf	
		0 7	x i	0 0 0 0	/	☒	
		0 8	x n	3 3 4 4	/	1 @30	
		0 9	x e	3 4 4 5	/	3wwq	
		1 0	x r	3 2 4 6	/	binarize lf	
		1 1	x u	3 2 5 0	/	☒	
		1 2	x n	3 4 4 8	/	1 @30	
		1 3	x a	4 9 6 3	/	1 @ 29	
		1 4	y	0 2 3 6	/	b[lf+1]	
		1 5	u	0 1 1 8	/	☒	
0 0 0 0 0 0 2	'	1 6	7 j w	w 0 0 0	/	>.999 @ 13	
		1 7	2	0 j 5 0	/	>.001 @ 5	
		1 8	x p	1 6 3 3	/		
		1 9	8 0 0 t	0 0 4 2	/	☒	punch
		2 0	b	0 0 4 2	/		
		2 1	e	0 0 5 7	/	3wwj	
		2 2	n	0 2 3 7	/	>.001 @ 8	
		2 3	x z	0 0 0 9	/	☒	
		2 4	x p	1 6 3 9	/		
		2 5	r	0 2 4 0	/		
		2 6	u	0 1 6 2	/		
		2 7	x z	0 0 1 3	/	☒	
		2 8	x p	0 3 4 3	/	"space"	
		2 9	u	0 1 0 3	/	another "space"	
		3 0	x p	0 2 0 3	/		
		3 1	x p	0 2 5 4	/	☒	

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PREPARED FOR: LGP-30 USER'S ORGANIZATION- POOL

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JOB NO. 95 | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 0 1	'	0 1 3 2	7	0 0 0 0 0 0 0	/	1 @ 3	
		3 3	b	0 2 1 9	/	7wwwwwq	
		3 4	x	e 6 3 2 0	/		
		3 5	u	0 1 4 4	/	X	
		3 6	b	0 2 5 1	/	3wq	
		3 7	x	e 6 3 0 9	/		
		3 8	n	0 1 1 7	/	>.001@ 5	
		3 9	x	h 6 3 2 5	/	X c in t.s.	
		4 0	u	0 2 2 1	/		
		4 1	x	p 0 3 6 2	/		
0 0 0 0 0 0 0 1	'	4 2	7	8 0 0 0 0 0 0	/		
		4 3	x	z 0 0 0 3	/	X 3 @ 29	
		4 4	x	z 0 0 3 0	/		
		4 5	[x	p 0 2 0 3]	/	2nd char.	
		4 6	u	0 2 5 4	/		
		4 7	b	0 2 1 9	/	X 7wwwwwq	
		4 8	x	e 6 3 3 4	/		
		4 9	u	0 1 5 1	/		
0 0 0 0 0 0 0 1	'	5 0	2	8 0 0 0 0	/	10 @ 17	
		5 1	x	z 0 0 3 7	/	X	
		5 2	[x	p 0 2 0 2]	/	1st char.	
		5 3	u	0 1 5 4	/		
		5 4	n	0 4 1 2	/	10@ 31	
		5 5	x	h 6 3 2 0	/	X	
		5 6	e	0 1 4 2	/	78000000	
		5 7	m	0 3 2 9	/	1@ 17	
		5 8	a	0 1 3 0	/	xp0203	
		5 9	c	0 1 4 5	/	X	
		6 0	u	0 1 3 3	/		
0 0 0 0 0 0 0 1	'	6 1			/		
		6 2	x	h 6 3 3 4	/		
		6 3	e	0 1 4 2	/	X 78000000	

FORM LP-12 Royal McBee Corporation X PAGE DETACH

LGP-30 CODING SHEET

PREPARED FOR: LGP-30 USER'S ORGANIZATION - POOL				PAGE 4 OF 9
JOB NO.	PROGRAM NO. 1	PROGRAM PREPARED BY: C.Laudeman	PROGRAM CHECKED BY:	DATE 9-22-59
PROBLEM: DICTATOR				TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0200	m	0329	/	1 @ 17	
		01	a	0130	/	xp0203	
		02	c	0152	/		
		03	u	0147	/	X	
		04	800t	0348	/	punch	
		05	u	0120	/	print	
00000001	'	06			/		
		07	m	0150	/	X 10 @ 17	
		08	e	0451	/	3j00	
		09	a	0131	/	xp0254	
		10	c	0239	/		
		11	u	0238	/	X	
		12	xb	3862	/		
		13	a	0042	/	1 @ 29	
		14	u	0215	/		
		15	xz	0001	/	X	
		16	[xp	0631]	/	"0_1"	
		17	800t	0263	/	punch	
		18	u	0261	/		
00000002	'	19	7wwwwwq		/	X	
		20			/		
		21	b	0307	/	7wj00	
		22	xe	6309	/		
		23	d	0409	/	X >.999 @ 17	
		24	u	0308	/		
		25	xz	0011	/		
		26	xp	1641	/	c.r.	
		27	u	0042	/	X	
00000001	'	28	wwq	000	/		
		29	b	0408	/		
		30	xc	6316	/		
		31	u	0204	/	X	

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JOB NO. | PROGRAM NO. .124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 0 1	'	0 2 3 2	1 0 0 0 0 0 0 0		/	1 @ 3	
		3 3	b	0 2 1 9	/	7wwwwwq	
		3 4	x	e 6 3 2 0	/		
		3 5	u	0 2 4 4	/	X	
		3 6	b	[ ]	/	1f+1	
0 0 0 0 0 0 1	'	3 7		8 3 1 4	/	>.001 @ 7	
		3 8	x	z 0 0 2 4	/		
		3 9	[x	p 0 2 5 4]	/	X 4th char.	
		4 10	U	[ ]	/		
0 0 0 0 0 0 2	'	4 1	w	0 0 0 0 0 0	/	1 @ 3-1 @ 7	
		4 2			/		
		4 3	x	z 3 9 0 0	/	X	
		4 4	x	z 0 0 3 0	/		
		4 5	[x	p 0 2 0 3]	/	3rd char.	
		4 6	u	0 2 0 7	/		
0 0 0 0 0 0 5	'	4 7	w	0 0 0 0 0 0	/	X 1 @ 3-1 @ 7	
		4 8			/		
		4 9			/		
		5 10	w	0 0 0 0 0 0	/	1 @ 3 - 1 @ 7	
		5 11		3 w q	/	X	
		5 12	x	p 0 16 5 4	/		
		5 13	x	p 0 2 6 2	/		
		5 14	n	0 4 1 2	/		
		5 15	x	h 6 3 2 0	/	X	
		5 16	e	0 1 4 2	/	78000000	
		5 17	m	0 3 2 9	/	1 @ 17	
		5 18	a	0 1 3 0	/	xp0203	
		5 19	c	0 2 4 5	/	X	
		6 10	u	0 2 3 3	/		
		6 11	x	z 0 0 4 7	/		
		6 12	x	p 0 3 1 3	/	"space"	
		6 13	c	0 0 4 2	/	X	

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LGP-30 CODING SHEET

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JOB NO. | PROGRAM NO. E1-124 | PROGRAM PREPARED BY: C. Laudeman | DATE 9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		0 3 10 10	x b	6 3 2 2	/		
		10 11	e	0 4 1 6	/	ww80000	
		10 12	m	0 4 5 2	/	>.001 @ -8	
		10 13	u	0 3 0 4	/	☒	
		10 14	r	0 2 4 0	/	"A"	
		10 15	u	0 1 6 2	/		
		10 16	u	0 1 3 6	/		
, 0 0 0 0 0 0 0 1	'	10 17	7 w	j 0 0	/	☒	
		10 18	8 0 0 t	0 3 3 7	/	punch	
		10 19	x z	0 0 5 9	/		
		11 10	x p	0 3 2 5	/	"space"	
		11 11	r	0 2 4 0	/	☒ "b"	
		11 12	u	0 1 6 2	/		
		11 13	8 0 0 t	0 3 5 3	/		
		11 14	u	0 3 5 1	/		
		11 15	e	0 5 0 1	/	☒ 780000	
		11 16	m	0 5 0 2	/	1 @ 9	
		11 17	a	0 2 5 3	/	xp0262	
		11 18	h	0 4 4 7	/		
		11 19	s	0 1 4 1	/	☒ xp0362	
		12 10	t	0 0 5 5	/	illegal	
		12 11	s	0 2 4 3	/	xz3900	
		12 12	t	0 3 2 4	/	0.k.	
		12 13	u	0 0 5 5	/	☒ illegal	
		12 14	x z	0 0 1 0	/		
		12 15	x p	0 6 4 0	/	"1"	
		12 16	x b	3 8 6 2	/	1@ 29	
		12 17	a	0 0 4 2	/	☒	
		12 18	u	0 4 4 9	/		
, 0 0 0 0 0 0 0 1	'	12 19		4 0 0 0	/	1 @ 17	
		13 10	x b	6 3 1 6	/	c.r. ctr.	
		13 11	x s	3 4 1 0	/	☒ 1 @ 29	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		03 12	t	0229	/	c.r.	
		13 13	u	0344	/		
,0000002	'	13 14	7	0000000	/		
		13 15		2000	/	☒ 1 @ 18	
		13 16	x	p0631	/		
		13 17	x	z0023	/		
		13 18	x	p3253	/	"p"	
		13 19	u	0311	/	☒	
		14 10	x	p2454	/		
,0000003	'	14 11			/		
		14 12			/		
		14 13	w	0000	/	☒	
		14 14	x	c6316	/	c.r.ctr.	
		14 15	8	00t0040	/	punch	
		14 16	u	0127	/	print	
,0000001	'	14 17			/	☒	
		14 18	x	z0034	/		
		14 19	x	p3200	/	"p"	
		15 10	u	0225	/		
		15 11	x	z0037	/	☒	
		15 12	x	p0303	/	"space"	
		15 13	x	b6325	/		
		15 14	r	0240	/	"c"	
		15 15	u	0162	/	☒	
		15 16	b	0042	/	lo	
		15 17	s	0236	/	lf+1	
		15 18	t	0330	/	not done	
		15 19	x	z0045	/	☒	
		16 10	x	p3211	/		
		16 11	x	u3163	/		
		16 12	a	0241	/	1 @ 3-1 @ 7	
		16 13	t	0315	/	☒ not mod.f,address or tra	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C.Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK 4

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		04 00	e	0250	/	w000000	
		00 01	xm	4544	/	1 @ 14	
		00 02	a	0252	/	xp0654	
		00 03	c	0439	/	X	
		00 04	s	0340	/	xp2454	
		00 05	t	0413	/	o.k.	
		00 06	u	0055	/	illegal	
0 0 0 0 0 0 4	'	00 07			/	X	
		00 08		j	/	3 @ 29	
		00 09	7j	ww00	/	>.001 @ 14	
		00 10			/		
		00 11	xp	0251	/	X	
0 0 0 0 0 0 1	'	00 12		f	/	10 @ 31	
		00 13	b	0042	/		
		00 14	xa	5836	/	1 @ 29	
		00 15	u	0438	/	X	
0 0 0 0 0 0 3	'	00 16	ww	8000	/		
		00 17		8314	/	>.001@ 7	
		00 18			/		
		00 19	x	0005	/	X	
		00 20	xp	3435	/	"8"	
		00 21	e	0343	/	w0000	
		00 22	m	0508	/	1 @ 6	
		00 23	xz	0009	/	X	
		00 24	xp	0239	/	"0"	
		00 25	a	0411	/	xp0251	
		00 26	c	0436	/		
		00 27	b	0042	/	X	
		00 28	xa	4514	/	1 @ 29	
		00 29	c	0042	/		
		00 30	xb	6309	/		
		00 31	xz	0017	/	X	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK 4

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/						
		0432	x p	0247	/	"0"	
		33	e	0462	/	3wwj	
		34	n	0463	/	>.001 @ 7	
		35	x z	0021	/		
		36	[x p	0251]	/	03	
		37	u	0354	/		
		38	x z	0024	/		
		39	[x p	0654]	/	"02"	
		410	u	0456	/		
,0000001	'	411			/		
		412	b	0228	/	wwq000	
		413	x e	6322	/		
		414	d	0116	/	>.999 @ 13	
		415	u	0308	/		
		416	x z	0032	/		
		417	[x p	0262]	/	02	
		418	u	0136	/		
		419	c	0042	/		
		510	u	0446	/		
,0000005	'	511		3j00	/		
		512	418f	0000	/	>.001 @ 8	
		513			/		
		514			/		
		515			/		
		516	c	0042	/		
		517	x b	6322	/		
		518	x e	6044	/	1wwj	
		519	n	0417	/	>.001 @ 7	
		610	x c	6325	/		
		611	u	0442	/		
0000002	'	612		3www	/		
		613		8314	/	>.001 @ 7	

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OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

ROBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK 0

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 0 0 0	x p	0 0 5 0	/		
		0 0 1	x c	6 3 5 1	/		
		0 0 2	x i	0 0 0 0	/		
		0 0 3	t	0 0 3 9	/	X	
		0 0 4	s	0 0 3 3	/	1 @ 3	
		0 0 5	t	0 1 5 1	/	instruction	
		0 0 6	s	0 1 5 6	/	1 @ 3	
		0 0 7	t	0 2 2 2	/	X prog. load	
		0 0 8	s	0 1 5 8	/	1 @ 3	
		0 0 9	t	0 4 5 5	/	data load	
		0 1 0	u	0 0 1 1	/		
		0 1 1	s	0 0 3 3	/	X 1 @ 3	
		0 1 2	t	2 9 3 2	/	interp. trans.	
		0 1 3	s	0 1 5 6	/	1 @3	
		0 1 4	t	2 9 4 3	/	trace trans.	
		0 1 5	s	0 1 5 8	/	X 1 @ 3	
		0 1 6	t	0 9 6 0	/	data dump	
		0 1 7	u	0 0 1 8	/		
		0 1 8	s	0 0 3 3	/	1 @ 3	
		0 1 9	t	1 0 1 0	/	X data punch	
		0 2 0	y	0 0 5 2	/	-1 @ 11c0000	
		0 2 1	e	0 2 5 7	/	7ww0000	
		0 2 2	n	0 2 5 8	/	1 @ 27	
		0 2 3	a	0 0 5 2	/	X -1@ 11cmmmm	
		0 2 4	c	0 0 2 7	/		
		0 2 5	x p	0 0 1 1	/		input hex
		0 2 6	x i	0 0 0 0	/		word
		0 2 7	x c	0 0 0 1	/	X nnncmmmm	
		0 2 8	b	0 0 2 7	/		
		0 2 9	s	0 2 5 1	/	1 @ 11-1 @ 29	
		0 3 0	t	0 0 0 0	/	done	
		0 3 1	u	0 0 2 4	/	X	

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JOB NO.	PROGRAM NO. [illegible]-124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9-22-59
PROBLEM: DICTATOR INPUT - OUTPUT SECTION				TRACK 0

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
,0000002	'	0032	8000	0000	/	-1 @ 30	
		33	1000	0000	/	1 @ 3	
		34	e	0163	/	61q1q1q0	
		35	m	0221	/	☒ -6 @ 4	
		36	xa	6322	/		t.s.1
		37	xh	6323	/		t.s.2
		38	u	0042	/		
		39	a	0111	/	☒ 7 @ 3	(here for neg.)
		40	t	0112	/	misc.	
		41	u		/	special command or test	
		42	e	0300	/	7q00wq00	
		43	m	0229	/	☒ -156 @ 8	
		44	xa	6323	/		t.s.2
		45	xh	6331	/		t.s.3
		46	u	[ ]	/		
		47	a	0262	/	☒ c200010	(inc. prog. load ctr.
		48	c	0106	/	prog. load ctr.	
		49	u	0000	/		
		50	xh	6322	/		t.s.1
		51	u	0034	/	☒	
,0000004	'	52	wwwk	0000	/	-1 @ 11c0000	
		53	w00	0000	/		
		54	8	0000	/	1 @ 12	
		55	ww6	0000	/	☒ 1 @ 3-10 @ 15	
		56	a	0242	/	10 @ 15	
		57	xh	6343	/		t.s.
		58	n	0144	/	1 @ 30	
		59	e	0231	/	☒ 1wwwq	
		60	r	0046	/		binarize
		61	u	0050	/		routine
		62	xh	6348	/	misc. addr. /2	
		63	u	0100	/	☒	

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JOB NO. | PROGRAM NO. #124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK 1

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0100	x	b6343	/		t.s.
		0101	e	02444	/	w0000	(inst.)
		0102	x	a6331	/	misc. addr/2	
		0103	a	00032	/	X -1 @ 0	Instr. is a0032
		0104	u	01005	/		
		0105	x	a6348	/	misc.addr/2	
		0106	x	c [ ]	/	prog. load ctr.	
		0107	b	01006	/	X prog. load ctr.	
		0108	s	03233	/	$c1999_{10}$	
		0109	t	00447	/	legal ctr.	
		0110	u	10448	/	illegal ctr.	
0000001	!	0111	7	0000000	/	X 7@ 3	
		0112	a	00555	/	1 @ 3-10 @ 15 (here for misc)	
		0113	t	00556	/	legal misc.	
		0114	u	10445	/	illegal inst.	
		0115	n	03001	/	X 1 @14	
		0116	e	02599	/	lwwj0000	
		0117	r	00446	/		binarize
		0118	u	00500	/		routine
		0119	x	h6362	/	X "a" addr/2	
		0120	x	b6306	/		t.s
		0121	e	02433	/	7000	(inst.)
		0122	n	03081	/	1 @ 19	
		0123	u	01455	/	X	
		0124	x	i0000	/	input 2nd part (arith,	
		0125	u	01299	/		Logical output)
		0126	a	02411	/	8 @ 15	
		0127	x	h6306	/	X	t.s.
		0128	u	01115	/		
		0129	n	01444	/	1 @ 30	
		0130	e	02522	/	lwwjlww	
		0131	r	00446	/	X	binarize routine

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JOB NO. | PROGRAM NO. L-124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR INPUT-OUTPUT SECTION | TRACK 1

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 1 3 2	u	0 0 5 0	/		binarize routine
		1 3 3	m	0 3 1 9	/	1 @ 1	
		1 3 4	x h	6 3 2 0	/	n1	
		1 3 5	e	0 3 2 1	/	X 3wq0000	
		1 3 6	m	0 3 2 2	/	-127/128 @ 0	
		1 3 7	u	0 1 4 1	/		
„ 9 9 9 9 9 9 3	!	1 3 8	3 w w q	3 w w q	/		
		1 3 9	4 0 0 0 0 0 0		/	X 1 @ 5	
		1 4 10		2	/	1 @ 30	
		1 4 11	x a	6 3 2 0	/	n1	
		1 4 12	x a	6 3 2 8	/	1st part(arith.logical, output)	
		1 4 13	u	0 1 0 6	/	X store (arit, logical, output)	
„ 0 0 0 0 0 0 1	!	1 4 14		2	/	1 @ 30	
		1 4 15	x a	6 3 3 1	/	"A"addr/2	
		1 4 16	u	0 1 4 7	/		
		1 4 17	x a	6 3 6 2	/	X "A"addr./2	
		1 4 18	x p	0 0 3 4	/		
		1 4 19	x c	6 3 2 8	/	1st part(arit,logical,or output)	
		1 5 10	u	0 1 2 4	/		
		1 5 11	a	0 2 3 0	/	X 1 @ 3-1 @ 15	
		1 5 12	t	0 1 6 0	/	2 address inst.	
		1 5 13	s	0 2 1 1	/	7 @ 15	
		1 5 14	t	0 1 2 6	/	legal 3 address	
		1 5 15	u	1 0 4 5	/	X illegal inst.	
„ 9 9 9 9 9 9 4	!	1 5 16	1 0 0 0	0 0 0 0	/	1 @ 3	
		1 5 17	1 w w j	0 0 0 0	/		
		1 5 18	1 0 0 0	0 0 0 0	/	1 @ 3	
		1 5 19	1 0 0 0	0 0 0 0	/	X 1 @ 7	
		1 6 10	a	0 2 3 2	/	1 @ 15-2 @ 27	
		1 6 11	t	0 2 3 3	/	legal 2 address inst.	
		1 6 12	u	1 0 4 5	/	illegal inst.	
1 0 0 0 0 0 0 1	!	1 6 13	6 1 q 1	q 1 q 0	/	X	

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JOB NO. | PROGRAM NO. -124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK 2

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		02 10 0	x	i 0 0 0 0	/	input 2nd part(mod.or tran.	
		10 1	n	0 1 4 4	/	1 @ 30	
		10 2	e	0 1 3 8	/	3wwq3wwq	
		10 3	r	0 0 4 6	/	X	binarize
		10 4	u	0 0 5 0	/		routine
		10 5	n	0 2 4 8	/	1 @ 30	
		10 6	x	h 6 3 5 6	/	nl	
		10 7	e	0 1 5 7	/	X lwwj0000	
		10 8	m	0 2 3 7	/	-31/32 @ 0	
		10 9	u	0 2 1 2	/		
0 0 0 0 0 0 2	!	11 0		4	/	1 @ 29	
		11 1	7	0 0 0 0	/	X 7 @ 15	
		11 2	x	a 6 3 6 2	/	1st part	
		11 3	x	a 6 3 5 6	/	nl	
		11 4	u	0 1 0 6	/	store(mod.or trans)	
		11 5	a	0 3 3 0	/	X 10 @ 31	
		11 6	n	0 1 5 9	/	1 @ 7	
		11 7	e	0 0 5 3	/	w000000	
		11 8	x	p 0 0 0 4	/		
		11 9	x	c 6 3 6 2	/	X 1st part	
		12 0	u	0 2 0 0	/		
0 0 0 0 0 0 1	!	12 1	k	0 0 0 0 0 0 0 0	/	-6 @ 4	
		12 2	n	0 1 4 4	/	1 @ 30	
		12 3	e	0 2 4 5	/	X 3wwq	
		12 4	r	0 0 4 6	/		binarize
		12 5	u	0 0 5 0	/		routine
		12 6	n	0 2 4 8	/	1 @ 30	
		12 7	y	0 1 0 6	/	X prog. load ctr.	
		12 8	u	0 0 0 0	/		
0 0 0 0 0 0 4	!	12 9	g	2 0 0 0 0 0 0 0	/	-156 @ 8	
		13 0	w	w w 0 0 0 0	/	1 @ 3-1 @ 15	
		13 1		l w w w q	/	X	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		02 32		wwq0	/	1 @ 15-2 @ 27	
		33		s0255	/	-2 @27+10 @ 31	
		34		t0215	/	mod.addr. or trans.inst.	
		35		a0250	/	X 10 @ 31	
		36		u0239	/		
2100000001	!	37		84000000	/	-31/32 @ 0	
		38		xz0010	/	10'sqs-10's	
		39		n0054	/	X 1 @12	
		40		u0246	/		
2100000005	!	41		80000	/	8 @ 15	
		42		f0000	/	10 @ 15	
		43		70000	/	X	
		44		w0000	/		
		45		3wwq	/		
		46		e0261	/	780000	
		47		u0148	/	X	
2100000008	!	48		2	/	1 @30	
		49		80000000	/	1@ 4	
		50		f	/	10 @ 31	
		51		wwwwj	/	X 1@ 11-1 @ 29	
		52	1wwj	1wwj	/		
		53	w0000002		/	-1 @30+1 @ 30	
		54	77g9q94		/	10-50+/@ -162	
		55	wwwwwwqf		/	X -2@ 27+10 @ 31	
		56		z0638	/	1o 10's	
0000000009	!	57	7ww0000		/		
		58		10	/	1 @ 27	
		59	1wwj0000		/	X	
		60		f00	/		
		61	7800000		/		
		62		k1w04	/	c1975 10	
		63	93880000		/	X -555 36 @ 16	

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OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

OBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		0 3 0 0	7 q 0 0	w q 0 0	/		
		0 0 1	2	0 0 0 0	/	1 @ 14	
		0 0 2	x s	6 3 0 3	/	-switch	
		0 0 3	x z	0 6 0 0	/	☒	
		0 0 4	x h	6 3 4 7	/	exp.t.s.	
		0 0 5	e	0 3 4 8	/	400	
		0 0 6	s	0 8 2 1	/	1 @ 30	
		0 0 7	u	0 3 4 3	/	☒	
0 0 0 0 0 0 1	!	0 0 8		1 0 0 0	/	1 @ 19	
		0 0 9	e	0 3 2 4	/	7wwwwwwq	Instr. is e0324
		0 1 0	r	0 0 4 6	/		binarize
		0 1 1	u	0 0 5 0	/	☒	routine
		0 1 2	e	0 3 4 1	/	7wwq0000	
		0 1 3	m	0 2 6 3	/	-55536 @ 16	
		0 1 4	a	[ ]	/		
		0 1 5	u	0 3 1 6	/	☒	
		0 1 6	x a	6 3 3 1	/		t.s.3
		0 1 7	a	[ ]	/		
		0 1 8	u	0 7 0 0	/		
0 0 0 0 0 0 8	!	0 1 9	4 0 0 0	0 0 0 0	/	☒ 1 @1	
		0 2 0		8 0 0 0	/	1 @ 16	
		0 2 1	3 w q	0 0 0 0	/		
		0 2 2	8 1 0 0	0 0 0 0	/	-127/128 @ 0	
		0 2 3	k	l w 0 0	/	☒ c1984 10	
		0 2 4	7 w w w	w w w q	/		
		0 2 5		2	/	1@ 30	
		0 2 6		q 0 0	/		
		0 2 7	r	0 3 1 4	/	☒	
		0 2 8	u	0 3 0 9	/		
0 0 0 0 0 0 2	!	0 2 9	4 j 4	g 3 w q	/	$4x10^7$ @ 30	
		0 3 0		f	/	10 @ 31	
		0 3 1	r	0 3 1 7	/	☒	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9-22-59
PROBLEM: DICTATOR INPUT - OUTPUT SECTION				TRACK 3

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		0332	u	0354	/		
0000001	'	33	98967	wq	/	$8x10^7$ @ 30	
		34	xi	0000	/		
		35	t	0331	/	☒ $\leq 8x10^7$ @ 30	
		36	s	0158	/	1 @ 3	
		37	t	0538	/	0 word or not data	
		38	r	0317	/		
		39	u	0354	/	☒	
0000003	'	40	1312	k00	/	$1x10^7$ @ 30	
		41	7wwq	0000	/		
		42	20000	0000	/	1 @ 2	
		43	t	0415	/	☒ pos. char.	
		44	b	0302	/	-switch (xs6303)	
		45	c	0417	/	+ switch	
		46	u	0361	/		
0000002	'	47		840	/	☒ 33 @ 25	
		48		400	/		
		49	xc	6300	/	char. 10^{-50} @ -162	
		50	xp	0036	/		
		51	xi	0000	/	☒ input sign and exp.	
		52	n	0210	/	1 @ 29	
		53	u	0304	/		
		54	n	0140	/	1 @ 30	
		55	t	0327	/	☒ $\geq 4x10^7$ @ 30	
		56	r	0314	/		
		57	u	0309	/		
		58	xz	0000	/		
0000002	'	59	10000	0000	/	☒ 1 @ 2-1 @ 3	
		60		1200	/		
		61	xb	6347	/	exp. t s.	
		62	e	0420	/	3j0 10's	
		63	m	0249	/	☒ 1@ 4	(Q to 29)

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OBLEM: DICTATOR INPUT - OUTPUT SECTION | TRACK 4

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0400	a	0622	/	lo table 10's	
		01	y	0423	/	m( )	
		02	a	0238	/	tlO'sQ s tlO's	
		03	y	0453	/	X A( )	
		04	x	b6347	/	exp.t.s.	
		05	e	06207	/	3j (units)	
		06	a	0256	/	lo table units	
		07	y	0422	/	X	
		08	a	0623	/	tl'sq's-tl's	
		09	y	0452	/	A( )	
		10	u	0421	/		
0000002	'	11	78	0000	/	X	
		12		8	/	1 @ 28	
		13	x c	0003	/	store exp.	
		14	u	0417	/		
		15	b	0651	/	X +switch (xb6303)	
		16	u	0345	/		
		17	X a	6303	/	+ switch	
		18	X c	0002	/	store char.	
		19	u	0448	/	X	
0000001	'	20		3j0	/		
		21	x b	63000	/	char. 10-50 @ -162	
		22	m ( )		/		
		23	m ( )		/	X	
		24	s	0139	/	1 @ 5	
		25	t	0526	/	shifts	
		26	s	0462	/	1 @ 4-1 @ 5	
		27	t	0519	/	X shift 4	
		28	s	0600	/	1 @ 3-1 @ 4	
		29	t	0511	/	shift 3	
		30	s	0359	/	1 @ 2-1 @ 3	
		31	t	0506	/	X shift 2	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR INPUT - OUTPUT SECTION

TRACK 4

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 4 3 2	s	0 5 1 8	/	1@ 1-1@ 2	
		3 3	t	0 4 6 3	/	shift left 1	
		3 4	a	0 6 4 9	/	1 @1	
		3 5	r	0 4 5 1	/	X	
		3 6	u	0 4 3 8	/		
		3 7	x z	0 0 0 0	/		
		3 8	x c	6 3 0 3	/	shift char.	
		3 9	u	0 4 5 0	/	X	
0 0 0 0 0 0 1	'	4 0		3 8	/	1'sq's-1's	
		4 1	u	[ ]	/	exit	
		4 2	s	0 6 2 8	/	c0998$_{10}$ @ 29	
		4 3	t	0 4 5 8	/	X legal data ctr.	
		4 4	u	1 0 4 8	/	illegal data ctr.	
0 0 0 0 0 0 3	'	4 5		1 w w j	/		
		4 6		1 j	/	7 @ 29	
		4 7	7 7 g 9 q 9	f	/	X	
		4 8	b	0 4 1 3	/		
		4 9	u	0 4 4 2	/		
		5 0	b	0 6 2 9	/	-162 @ 29	
		5 1	s	( )	/	X	
		5 2	a	( )	/		
		5 3	a	( )	/		
		5 4	u	0 4 1 3	/		
		5 5	r	0 4 4 1	/	X	
		5 6	u	0 5 5 8	/		
		5 7	u	0 0 0 0	/		
		5 8	a	0 6 3 7	/	c0999$_{10}$ @29	
		5 9	u	0 5 3 2	/	X load ctr.	
0 0 0 0 0 0 3	'	6 0		2	/	1 @ 30	
		6 1		2 8	/	1o10'q-10's	
		6 2	4 0 0 0	0 0 0	/	1@4-1@5	
		6 3	a	0 6 4 9	/	X 1 @1	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 5

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		05 10 10	n	0636	/	1 @ 30	
		10 11	r	0451	/		
		10 12	u	0438	/		
		10 13	xz	0001	/	X	
0000002	'	10 14		4	/	1 @ 29	
		10 15	8	000000	/	1@ 4	
		10 16	a	0342	/	1@ 2	
		10 17	n	0650	/	X 1@29	
		10 18	r	0451	/		
		10 19	u	0438	/		
		11 10	xz	0002	/		
		11 11	a	0033	/	X 1@ 3	
		11 12	n	0648	/	1@ 28	
		11 13	u	0515	/		
0000001	'	11 14		2	/	1 @ 30	
		11 15	r	0451	/	X	
		11 16	u	0438	/		
		11 17	xz	0003	/		
0000001	'	11 18	2	000000	/	1 @1 - 1@2	
		11 19	a	0150	/	X 1 @ 4	
		12 10	n	0635	/	1 @ 27	
		12 11	r	0451	/		
		12 12	u	0438	/		
		12 13	xz	0004	/	X	
		12 14	z	0638	/	Lo 1's	
0000001	'	12 15		78	/	30 @ 29	
		12 16	a	0462	/	1@ 5	
		12 17	n	0663	/	X 1@26	
		12 18	r	0451	/		
		12 19	u	0438	/		
		13 10	xz	0005	/		
0000001		13 11	77999994		/	X 10^{-80} + 1 @ - 162	

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JOB NO.	PROGRAM NO. E1 - 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 5

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		05 12	y	0418	/	Char. loc. ctr.	
		13	a	0662	/	1 @ 29	
		14	y	0413	/	Exp. loc. ctr.	
		15	xp	0021	/	X	
		16	xc	6322	/	gard. loc.	
		17	u	6334	/		
		18	s	0253	/	-1 @ 3 + 1@ 30 here for not date	
		19	t	0549	/	X char = 0	---->
		10	s	0626	/	9948	
		11	t	1051	/	error	----->
		12	s	0514	/	1 @ 30	
		13	t	0441	/	X exit	---->
		14	s	0630	/	fqw5j	
		15	t	1051	/	error	----->
		16	s	0325	/	1 @ 30	
		17	t	0555	/	X group	------>
		18	u	1051	/	error	----->
		19	xp	0035	/		
		10	xi	0000	ø		
		11	xc	6302	/	X clear acc.	
		12	xc	6303	/	0 to char storage	
		13	u	0413	/	store 0 exp and clear.	
0 0 0 0 0 0 1	'	14	8	0000	/	1 @ 4	
		15	xp	0041	/	X	here for group
		16	xc	6342	/	Garb loc.	
		17	xi	0000	/		
		18	n	0144	/	1 @ 30	
		19	e	0445	/	X 1 w w j	
		10	r	0046	/		binarize
		11	u	0050	/		routine
		12	n	0248	/	1 @ 30	
		13	u	0532	/	X	

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OBLEM: DICTATOR | TRACK 6

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
0 0 0 0 0 2 2	!	0 6	8	0 0 0 0 0 0	/	1 @ 3-	1 @ 4
		0 1	4	0 0 0 0 0 0	/		10^{0}
		0 2	4 f	8 1 7 j	8 0	/		10^{10}
		0 3	5 6 g j	7 5 q	4	/	☒	10^{20}
		0 4	6 4 w	9 6 4 q	j	/		10^{30}
		0 5	7 5 8 j	f 7 j	f	/	table 10's	10^{40}
		0 6	4 4 6 j	3 g 1	q	/		10^{50}
		0 7	4 w f 7	9 3 9	0	/	☒	10^{60}
		0 8	5 j g f	q g 5	0	/		10^{70}
		0 9	6 g w 3	g k 3	4	/		10^{80}
		1 0	7 k f j	3 j 1	0	/		10^{90}
		1 1			4	/	☒	
		1 2			8 8	/		
		1 3			1 0 j	/		
		1 4			1 9 0	/		
		1 5			2 1 4	/	☒	table 10'sQ's
		1 6			2 9 j	/		
		1 7			3 2 0	/		
		1 8			3 f 4	/		
		1 9			4 2 8	/	☒	
		2 0			4 f j	/		
		2 1		f 0 0 0	0	/	10 @ 15	
		2 2		z 0 6 0	1	/	Lo table 10's	
		2 3		x z 0 0 1	4	/	☒	lo tl's-tl's
		2 4		z 0 6 3	8	/	Lotl's	
0 0 0 0 0 0 8	!	2 5			1 0	/	1 @ 27	
		2 6			9 9 4 8	/		
		2 7			3 j	/	☒	
		2 8		k 0 w 9	8	/	c0998 $_{10}$ @ 29	
		2 9	w w w w w	k 7	8	/	-162 @ 29	
		3 0		f 9 w 5	j	/		
		3 1	4 0 0 0 0 0	0 0		/	☒	1 @ 1

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PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		06 12	7	wj00	/		
		13 13	xb	6319	/	ctr.	
		13 14	u	0932	/		
000016	'	13 15		10	/	X 1 @ 27	
		13 16		2	/	1 @ 30	
		13 17	k	0w9j	/	c0999$_{10}$ @ 29	
		13 18	7wwwwwwq		/		10^0
		13 19	5000000	0	/	X	10^1
		14 10	6400000		/		10^2
		14 11	7k00000		/		10^3
		14 12	4q200000		/	table units	10^4
		14 13	61f80000		/	X	10^5
		14 14	7f120000		/		10^6
		14 15	4j4g4000		/		10^7
		14 16	5w5q1000		/		10^8
		14 17	7731594000		/	X	10^9
		14 18		8	/	1 @ 28	
		14 19	4000000	0		1 @1	
		15 10		4	/	1 @ 29	
		15 11	xb	6303	/	X +switch	
000012	'	15 12		0	/		
		15 13		10	/		
		15 14		1j	/		
		15 15		28	/	X	
		15 16		38	/	table units Q's	
		15 17		44	/		
		15 18		50	/		
		15 19		60	/	X	
		16 10		6j	/		
		16 11		78	/		
		16 12		4	/	1 @ 29	
		16 13		20	/	X 1 @ 26	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C.Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK 7

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 7 0 0	n	0 7 3 6	/	1 @ 28	
		0 0 1	m	0 9 2 3	/	10^{-57} @ -187	
		0 0 2	s	0 5 3 1	/	$10^{-50}+1$ @ -162	
		0 0 3	t	0 7 1 1	/	X $=10^{-50}$ @ -162	
		0 0 4	a	0 2 5 4	/	10^{-50} @ -162+1	
		0 0 5	u	0 3 4 9	/		
		0 0 6	y	0 7 2 8	/	B[ ] char.	
		0 0 7	a	0 6 5 0	/	X 1 @ 29	
		0 0 8	u	0 7 2 6	/		
		0 0 9	u	0 7 3 3	/		
0 0 0 0 0 0 1	!	0 0 1 0	8	0 0 0 0 0 0	/	1 @ 4	
		0 0 1 1	a	0 4 4 7	/	X $10^{-50}+2$ @ -162	
		0 0 1 2	u	0 3 4 9	/		
		0 0 1 3	z	0 6 1 1	/	Lo table 10'Q's	
0 0 0 0 0 0 1	!	0 0 1 4	7 8	0 0 0 0 0 0	/		
		0 0 1 5	a	1 0 0 1	/	X 332_{10} @ 29	
		0 0 1 6	t	0 7 2 1	/	use 0	
		0 0 1 7	x h	6 3 0 3	/	for shift test	
		0 0 1 8	d	0 3 4 7	/	33 @ 25	
		0 0 1 9	x h	6 3 0 5	/	X part quo.	
		0 0 2 0	u	0 7 4 2	/		
		0 0 2 1	b	1 0 0 0	/	50 @ 29	
		0 0 2 2	x c	6 3 3 7	/	clear exp. to 50	
		0 0 2 3	b	0 7 0 9	/	X u0733	
		0 0 2 4	c	0 8 1 0	/	u[ ]	
		0 0 2 5	u	0 9 1 3	/		
		0 0 2 6	y	0 7 5 5	/	b[ ] exp.	
		0 0 2 7	x z	0 0 0 0	/	X	
		0 0 2 8	b	[ ]	/	char.	
		0 0 2 9	t	0 7 3 7	/	char. neg.	
		0 0 3 0	u	0 7 3 1	/		
		0 0 3 1	r	0 8 1 0	/	X	

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JOB NO.	PROGRAM NO.	PROGRAM PREPARED BY:	PROGRAM CHECKED BY:	DATE
	124	C. Laudeman		9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0713 12	u	0754	/		print plus
		13 13	x	p1118	/		
		13 14	u	0925	/		
0000002	'	13 15		29j	/	X	167_{10} @ 29
		13 16		8	/		1 @ 20
		13 17	m	1002	/		-1 @ 0
		13 18	r	0810	/		
		13 19	u	0754	/	X	
		14 10	x	p0726	/		print minus
		14 11	u	0925	/		
		14 12	e	0714	/		78000000
		14 13	m	0929	/	X	1 @ 25
		14 14	a	0759	/		Lo table 10's
		14 15	y	0817	/		d[ ]
		14 16	a	0461			Lo table 10'sQ's-10's
		14 17	y	0826	/	X	s[ ]
		14 18	s	0713	/		Lo table 10'q's
		14 19	n	1028	/		10 @ 31
		15 10	x	c6336	/		exp. base 10
		15 11	u	0760	/	X	
0000002	'	15 12	w	w8000	/		
		15 13		714	/		29 @ 29
		15 14	x	c6340	/		/char/
		15 15	b	[ ]	/	X	exp.
		15 16	s	0731 5	/		167_{10} @ 29
		15 17	t	0715	/		legal
		15 18	u	1054	/		exp. too large
		15 19	z	06.01	/	X	
		16 10	b	0446	/		7 @ 29
		16 11	x	c6319	/		print dtr.
		16 12	x	b6305	/		part quo
		16 13	e	0949	/	X	7wwwwwwg

FORM LP-12 Royal McBee Corporation X CARRIAGE RETURN

LGP-30 CODING SHEET

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JOB NO.	PROGRAM NO.	PROGRAM PREPARED BY:	PROGRAM CHECKED BY:	DATE
	124	C. Laudeman		9-22-59

PROBLEM: DICTATOR | TRACK 8

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 8 0 0	m	1 0 3 6	/	10 @ 25	
		0 1	e	1 0 3 7	/	3j	
		0 2	a	0 6 2 4	/	Lo table units	
		0 3	y	0 8 1 8	/	X d[ ]	
		0 4	a	0 4 4 0	/	Lo table l'q's l's	
		0 5	y	0 8 2 7	/	s[ ]	
		0 6	s	0 9 2 8	/	Lo table l'q's	
		0 7	x a	6 3 3 6	/	X exp. base 10	
		0 8	x c	6 3 3 7	/	exp. base 10	
		0 9	u	0 8 1 1	/		
		1 0	u[	0 7 3 3]	/		
		1 1	x b	6 3 4 0	/	X /char/	
		1 2	m	1 0 6 2	/	1 @ 2	
		1 3	u	0 8 1 7	/		
		1 4	u[	]	/		
		1 5	x b	6 3 5 1	/	X /char/	
		1 6	u	0 8 3 8	/		
		1 7	d [	]	/		
		1 8	d [	]	/		
		1 9	m	0 8 5 5	/	X 10^{50} @ 169	
		2 0	u	0 8 2 2	/		
1 0 0 0 0 0 0 1	'	2 1		2	/	1 @ 30	
		2 2	x c	6 3 5 1	/	/char/10^0 or 10^1	
		2 3	b	0 9 3 8	/	X u0832	
		2 4	x a	6 3 0 3	/	shift test q	
		2 5	u	0 8 2 6	/		
		2 6	s [	]	/		
		2 7	S [	]	/	X	
		2 8	c	0 8 1 4	/		
		2 9	u	0 8 1 4	/		
		3 0	u	0 9 0 0	/		
		3 1	u	0 8 1 5	/	X	

FORM LP-10 Royal McBee Corporation X CARRIAGE RETURN

LGP-30 CODING SHEET

PREPARED FOR: LGP-30 USER'S ORGANIZATION - POOL

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JOB NO.	PROGRAM NO.	PROGRAM PREPARED BY:	PROGRAM CHECKED BY:	DATE
	124	C. Laudeman		9-22-59

PROBLEM: DICTATOR

TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 8 3 2	s	0 8 4 7	/	1 @ 30	
		3 3	s	0 6 6 2	/	1 @ 29	
		3 4	s	1 0 6 3	/	1 @ 28	
		3 5	a	0 9 5 0	/	X 1 @ 27	
		3 6	x n	6 3 5 1	/	/char/ 10^{0} or 10^{2}	
		3 7	u	0 8 3 8	/		
		3 8	s	0 7 1 0	/	1 @ 4	
		3 9	t	0 9 0 4	/	X 10^{-1}	
		4 0	a	0 5 0 5	/	1 @ 4	
		4 1	r	0 8 5 6	/	s[ ]	
		4 2	u	0 8 4 4	/		
		4 3	x	0 0 0 0	/	X	
		4 4	r	0 9 3 0	/	t[ ]	
		4 5	u	0 9 1 3	/		
		4 6	u	[ ]	/	stop code or no stop code	
0 0 0 0 0 0 1	'	4 7		2	/	X 1 @ 30	
		4 8	x h	6 3 6 3	/		
		4 9	e	0 7 1 4	/	78000000	
		5 0	u	0 8 5 8	/		
		5 1	x a	6 3 3 7	/	X exp. base 10	
		5 2	d	0 9 2 4	/	9.9999999 @ 25(q of 27)	
		5 3	u	0 9 4 4	/		
0 0 0 0 0 0 2	'	5 4		4	/	1 @ 29	
		5 5	l l l g	0 q j q	/	X 10^{50} @ 169	
		5 6	s	[ ]	/		
		5 7	u	0 8 5 1	/		
		5 8	m	1 0 1 6	/	1 @ 17	
		5 9	a	1 0 1 7	/	X p0208	
		6 0	c	0 9 3 2	/		
		6 1	x b	6 3 1 9	/	print ctr.	
		6 2	s	1 0 2 7	/	1 @29	
		6 3	u	0 9 3 0	/	X	

X CARRIAGE RETURN

LGP-30 CODING SHEET

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9-22-59

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0,9,0,0	b	1,0,4,3	/	1@ 1	
		0,0,1	x m	6,3,5,1	/	/char/	
		0,0,2	u	0,8,3,8	/		
0,0,0,0,0,0,1	'	0,0,3	8	0,0,0,0,0,0,0	/	X -1 @0	
		0,0,4	a	0,5,5,4	/	1 @ 4	
		0,0,5	n	1,0,4,1	/	10@ 31	
		0,0,6	r	0,8,5,6	/		
		0,0,7	u	0,8,4,4	/	X	
		0,0,8	x z	0,0,0,1	/		
		0,0,9	z	1,1,6,3	/		
		0,1,0	z	2,7,1,8	/		
0,0,0,0,0,0,2	'	0,1,1	l	6,0,0,0	/	X xz2200	
		0,1,2	3 w,w,w,w,w,w,q		/	1@ 1-1	@ 30
		0,1,3	x h	6,3,6,3	/		
		0,1,4	e	0,9,5,7	/	78000000	
		0,1,5	m	0,9,5,8	/	X 1 @ 17	
		0,1,6	a	0,9,5,9	/	p0208	
		0,1,7	c	0,9,3,2	/		
		0,1,8	u	0,6,3,3	/		
		0,1,9	x c	6,3,0,5	/	X clear	acc.
		0,2,0	8 t	0,9,4,0	/		
		0,2,1	x z	0,0,0,3	/		
		0,2,2	u	0,0,0,0	/		
0,0,0,0,0,0,2	'	0,2,3	6,4,6 w	0,2,4,8	/	X 10-57	@ 189
		0,2,4		2,7 q	/	9.9999999 @ 25	
		0,2,5	b	0,8,5,4	/	1 @ 29	
		0,2,6	x c	6,3,1,9	/	ctr.	
		0,2,7	u	0,8,5,6	/	X	
		0,2,8	z	0,6,5,2	/	Lo table	unit 9's
0,0,0,0,0,0,1	'	0,2,9		4,0	/	1 @ 25	
		0,3,0	i	[ ]	/		
		0,3,1	x z	0,0,1,7	/	X	

M 1000 Royal McBee Corporation X CARRIAGE RETURN

LGP-30 CODING SHEET

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 9

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		0 9 3 2	p	[ ]	/		
		3 3	x c	6 3 1 9	/	CTR.	
		3 4	x b	6 3 6 3	/		T.S.
		3 5	e	1 0 5 7	/	X 7wwwwwq	
		3 6	n	1 0 4 4	/	10 @ 31	
		3 7	u	0 8 4 8	/		
		3 8	u	0 8 3 2	/		
0 0 0 0 0 0 1	'	3 9	4 0 0 0	0 0 0 0	/	X 1 @ 1	
		4 10	b	0 7 5 5	/		
		4 1	a	1 0 2 7	/	1 @ 29	
		4 2	u	0 7 0 6	/		
0 0 0 0 0 0 1	'	4 3	4 0 0	0 0 0 0	/	X 1 @ 5	
		4 4	r	0 9 3 0	/		
		4 5	u	0 9 1 3	/		
		4 6	u	0 9 4 7	/		
		4 7	x z	0 0 0 0	/	X	
		4 8	u	[ ]	/	0 print tab on stope code & ca ret.	
0 0 0 0 0 0 2	'	4 9	7 w w w w w q		/		
		5 10		1 0	/	1 @ 27	
		5 1	x p	1 6 0 0	/	X	
		5 2	x z	0 0 0 0	/		
		5 3	x p	[ ]	/		
		5 4	x z	0 0 0 0	/		
		5 5	x z	0 0 0 0	/	X error stop	
		5 6	u	0 0 0 0	/		
0 0 0 0 0 0 2	'	5 7	7 8 0 0	0 0 0 0	/		
		5 8		4 0 0 0	/	1 @ 17	
		5 9	x p	2 0 8	/	X	
		6 10	r	0 8 4 6	/		
		6 1	u	1 0 0 5	/		
		6 2	x z	0 0 0	/		
		6 3	u	0 8 1 0	/	X	

X CARRIAGE RETURN

LGP-30 CODING SHEET

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JB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
OBLEM: DICTATOR				TRACK 10

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 5	'	1 0 0 0		j 8	/	50 @ 29	
		0 1		5 3 0	/	332_{10} @ 29	
		0 2	8 0 0 0	0 0 0 0	/	-1 @ 0	
		0 3		2 0	/	X 8 @ 29	
		0 4	3 w w w	w w w q	/	2 @ 2 - 1 @ 30	
		0 5		r 0 9 4 8	/		
		0 6		u 1 0 2 9	/	COMMON BINARIZE	
		0 7		u 1 0 0 8	/	X	
		0 8		x p 2 4 5 8	/	TAB	
		0 9		u 0 9 1 9	/	Common Exit	
		1 0		r 0 8 4 6	/		
		1 1		u 1 0 1 9	/	X	
		1 2		x z 0 0 0 0	/		
		1 3		x p 3 2 6 3	/	Stop Code	
		1 4		x z 0 0 0 0	/		
		1 5		u 0 8 1 0	/	X	
0 0 0 0 0 0 1	'	1 6		4 0 0 0	/	1 @ 17	
		1 7		x p 0 2 1 8	/		
0 0 0 0 0 0 1	'	1 8	1 w w w	w w w q	/	1 @ 2 - 1 @ 30	
		1 9		r 0 9 4 8	/	X	
		2 0		u 1 0 2 9	/	Common Binarize	
		2 1		u 1 0 2 2	/		
		2 2		x p 3 2 0 8	/	Stop Code	
		2 3		x z 0 0 0 0	/	X	
		2 4		x p 1 6 1 0	/	Carriage return	
		2 5		u 0 9 1 9	/	Common Exit	
0 0 0 0 0 0 3	'	2 6		3 w w w	w q	/	1 @ 9 - 1 @ 30
		2 7			4	/	X 1 @ 29
		2 8			f	/	10 @ 31
		2 9		n 0 1 4	4	/	1 @ 30
		3 0		e 0 4 4	5	/	lwwj
		3 1		r 0 0 4	6	/	X Binarize Routine

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OB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
ROBLEM: DICTATOR				TRACK 10

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1 0 3 2	u	0 0 5 0	/	Binarize	Routine
		3 3	n	0 2 4 8	/	1 @ 30	
		3 4	x p	1 6 2 0	/		
		3 5	u	0 7 0 6	/	X	
0 0 0 0 0 0 9	!	3 6		2 8 0	/	10 @ 25	
		3 7		3 j	/		
		3 8	z	1 2 0 0	/		
		3 9	x s	6 3 1 9	/	X	
		4 10	4	0 0 0 0 0	/	1 @ 9	
		4 11		f	/	10 @ 31	
		4 12	3 w w w w w w	q	/	1 @ 1 - 1 @ 30	
		4 13	4 0 0 0 0 0 0	0	/	X 1 @ 1	
		4 14		f	/	10 @ 31	
		4 15	b	0 3 0 3	/	xz0500	
		4 16	y	0 9 5 3	/		
		4 17	u	0 9 5 1	/	X	
		4 18	b	0 2 6 0	/	xz1000	
		4 19	y	0 9 5 3	/		
		5 10	u	0 9 5 1	/		
		5 11	b	0 3 2 6	/	X xz1400	
		5 12	y	0 9 5 3	/		
		5 13	u	0 9 5 1	/		
		5 14	b	0 3 6 0	/	xZ1800	
		5 15		0 9 5	/	X	
		5 16					
0 0 0 0 0 0 7	!	5 17	7 w		/		
		5 18			/	1 @ 29	
		5 19					
		6 10				1 @ 12	
		6 11					
		6 12	2 0 0		/	1 @ 2	
		6 13				1 @ 2	

Royal McBee Corporation CARRIAGE RETURN

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OBLEM: DICTATOR | TRACK 11

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		1 1 0 0	b [ ]		/		
		0 1	x h	6 3 5 1	/	T.S.	
		0 2	x h	6 3 5 2	/	T.S.	
		0 3	t	1 9 1 9	/	☒	Single Address ------->
		0 4	s	0 0 3 3	/	1 @ 3	
		0 5	t	1 7 5 6	/	not 3 address	------>
		0 6	s	0 1 5 6	/	1 @ 3	
		0 7	t	1 2 0 1	/	☒	Add ------>
		0 8	s	0 1 5 8	/	1 @ 3	
		0 9	t	1 2 0 3	/	Subtract	----->
		1 0	u	1 1 1 1	/		
		1 1	s	0 0 3 3	/	☒	1 @ 3
		1 2	t	1 6 1 5	/	Multiply	---->
		1 3	s	o 1 5 6	/	1 @ 3	
		1 4	t	1 7 0 7	/	Divide	----->
		1 5	s	0 1 5 8	/	☒	1 @ 3
		1 6	t	1 6 2 2	/	Neg. Multiply	------->
		1 7	u	1 1 1 8	/		
		1 8	s	0 0 3 3	/	1 @ 3	
		1 9	t	1 6 3 7	/	☒	Move ----->
		2 0	u	3 0 0 7	/	T.L.U.	------>
0 0 0 0 0 0 3	'	2 1	3 w	w w w w w q	/	1 @ 1 - 1 @ 30	
		2 2	3 w	w w w w w q	/	1 @ 5 - 1 @ 30	
		2 3	1 w	w w w w w q	/	☒	1 @ 2 - 1 @ 30
		2 4	b [ ]		/		
		2 5	t	1 8 6 1	/		
		2 6	u	1 1 0 0	/		
0 0 0 0 0 3 8	'	2 7	j j	4 0 f 5 f	/	☒	C_5 @ 1
		2 8		4 0	/	1 @ 25	
		2 9	x c	6 3 1 7	/		
		3 0	6 2	g g q w f	/	c_9 @ 1	
		3 1		w w 8	/	☒	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laude man | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 11

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		1 1 3 2		1 3 w w j	/		
		1 3 3	7 w w w w w w q		/	1 @ 0	
		1 3 4	4 0 0 0 0 0 0 0		/	1 @ 1	
		1 3 5	2 0 0 0 0 0 0 0		/	☒ 1 @ 2	
		1 3 6	1 0 0 0 0 0 0 0		/	1 @ 3	
		1 3 7	8 0 0 0 0 0 0 0		/	1 @ 4	
		1 3 8	4 0 0 0 0 0 0 0		/	1 @ 5	
		1 3 9	2 0 0 0 0 0 0 0		/	☒ 1 @ 6	
		1 4 10	1 0 0 0 0 0 0 0		/	1 @ 7	
		1 4 11	8 0 0 0 0 0 0		/	1 @ 8	
		1 4 12	4 0 0 0 0 0 0		/	1 @ 9	
		1 4 13	2 0 0 0 0 0 0		/	☒ 1 @ 10	
		1 4 14	1 0 0 0 0 0 0		/	1 @ 11	
		1 4 15	8 0 0 0 0 0		/	1 @ 12	
		1 4 16	4 0 0 0 0 0		/	1 @ 13	
		1 4 17	2 0 0 0 0 0		/	☒ 1 @ 14	
		1 4 18	1 0 0 0 0 0		/	1 @ 15	
		1 4 19	8 0 0 0 0		/	1 @ 16	
		1 5 10	4 0 0 0 0		/	1 @ 17	
		1 5 11	2 0 0 0 0		/	☒ 1 @ 18	
		1 5 12	1 0 0 0 0		/	1 @ 19	
		1 5 13	8 0 0 0		/	1 @ 20	
		1 5 14	4 0 0 0		/	1 @ 21	
		1 5 15	2 0 0 0		/	☒ 1 @ 22	
		1 5 16	1 0 0 0		/	1 @ 23	
		1 5 17	8 0 0		/	1 @ 24	
		1 5 18	4 0 0		/	1 @ 25	
		1 5 19	2 0 0		/	☒ 1 @ 26	
		1 6 10	1 0 0		/	1 @ 27	
		1 6 11	8		/	1 @ 28	
		1 6 12	4		/	1 @ 29	
		1 6 13	2		/	☒ 1 @ 30	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 12

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		1 2 0 0	[	]	/	Acc Exp.	
		0 1	b	1 7 2 3	/	xa6319	
		0 2	u	1 2 0 4	/		
		0 3	b	1 0 3 9	/	☒ xs6319	
		0 4	h	1 3 3 3	/		
		0 5	u	1 3 0 6	/		
		0 6	b	1 2 4 9	/	Loc Acc. Char.	
		0 7	y	1 2 5 0	/	☒	
		0 8	u	1 2 3 0	/		
		0 9	a	1 0 3 8	/	Lo Tables + 30	
		1 0	u	1 3 4 6	/		
0 0 0 0 0 0 3	'	1 1	6 4 8 7	q k 5 0	/	☒ π/2 @ 1	
		1 2		4	/	1 @ 29	
		1 3	1 0 0 0 0 0 0		/	1 @ 7	
		1 4	b	[ ]	/	A char.	
		1 5	x h	6 3 5 8	/	☒	
		1 6	x h	6 3 5 9	/		
		1 7	x h	6 3 6 0	/		
		1 8	b	[ ]	/	A exp.	
		1 9	x h	6 3 6 2	/	☒	
		2 0	x h	6 3 6 3	/		
		2 1	x h	6 3 0 0	/		
		2 2	x b	6 3 5 1	/		
		2 3	e	1 0 5 9	/	☒ 7wj00	
		2 4	s	0 2 1 0	/	1 @ 29	
		2 5	t	1 2 0 6	/	use acc. for B	
		2 6	a	0 6 6 2	/	1 @ 29	
		2 7	m	1 2 1 3	/	☒ 1 @ 7	
		2 8	y	1 2 5 0	/		
		2 9	u	1 2 3 1	/		
		3 0	b	0 9 0 9	/	Loc. Acc. Exp -1	
		3 1	a	0 2 1 0	/	☒ 1 @ 29	

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LGP-30 CODING SHEET

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OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

ROBLEM: DICTATOR | TRACK 12

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		12	y	1254	/		
		13	u	1250	/		
		14	b	1263	/	Loc Acc.	Char.
		15	y	1214	/	X	
		16	u	1244	/		
		17	e	0752	/	ww80000	
		18	s	0210	/	1 @ 29	
		19	t	1234	/	X use Acc. for A	----->
		20	a	0662	/	1 @ 29	
		21	m	0320	/	1 @ 16	
		22	y	1214	/		
		23	u	1245	/	X	
		24	b	0909	/	Loc. Acc.	Exp. -1
		25	a	0210	/	1 @ 29	
		26	y	1218	/		
		27	u	1214	/	X	
ρ ρ ρ ρ ρ ρ 1	'	28	7	wwwwq	/	2 @ 9 - 1 @ 30	
		29	z	1436	/	Loc. Acc.	Char.
		30	b	[ ]	/	B Char.	
		31	x	h6330	/	X	
		32	x	h6331	/		
		33	x	h6332	/		
		34	b	[ ]	/	B Exp.	
		35	x	h6334	/	X	
		36	x	h6335	/		
		37	u	[ ]	/		
0 0 0 0 0 0 1	'	38	4	0000000	/	1 @ 1	
		39	x	h6345	/	X	
		40	a	0525	/	30 @ 29	
		41	t	1448	/	use A B - A>29	----->
		42	u	1401	/		
		43	z	1436	/	X	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 13

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 1	'	1 3 10 10	4	0 0 0 0 0 0 0	/	1 @ 1	
		10 11	x	b 6 3 3 0	/	B Char.	
		10 12	u	1 4 4 0	/		
		10 13	x	b 6 3 2 5	/	X	
		10 14	t	1 4 1 9	/	Store result	------->
		10 15	u	2 9 5 6	/		
		10 16	c	1 4 4 2	/		
		10 17	r	1 2 5 7	/	X	
		10 18	u	2 8 3 0	/		
		10 19	x	b 6 3 5 9	/	A Char.	
		11 10	t	1 3 1 5	/	Neg.	----->
		11 11	s	0 1 4 0	/	X 1 @ 30	
		11 12	t	1 3 6 2	/	A = 0	------->
		11 13	u	1 3 1 5	/		
0 0 0 0 0 0 1	'	11 14		4	/		
		11 15	x	b 6 3 3 0	/	X B Char.	
		11 16	t	1 3 1 9	/	Neg.	----->
		11 17	s	0 1 4 6 0	/	1 @ 30	
		11 18	t	1 4 4 1 8	/	B = 0	----->
		11 19	x	b 6 3 3 4	/	X B exp.	
		12 10	x	s 6 3 6 3	/	A exp.	
		12 11	t	1 2 5 1 9	/	A exp. > B exp.	------>
		12 12	s	1 0 5 1 8	/	1 @ 29	
		12 13	t	1 3 4 5	/	X A = B	-------->
		12 14	s	0 1 5 1 3	/	29 @ 29	
		12 15	t	1 2 1 0 1 9	/	B - R $\leq$ 29	-------->
		12 16	u	1 3 6 2	/		
0 0 0 0 0 0 1	'	12 17	2	0 0 0 0 0 0 0	/	X 1 @ 2	
		12 18	c	1 2 1 0 1 0	/	Acc. Exp.	
		12 19	u	1 3 1 0 1	/		
0 0 0 0 0 0 1	'	13 10	3	w w w w w w q	/	1 @ 1 - 1 @ 30	
		13 11	x	b 6 3 1 6 0	/	X A char.	

LGP-30 CODING SHEET

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 13

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1332	m	[ ]	/		
		133	x a/s	6319	/		
		134	t	1356	/	Neg.	-------->
		135	s	0650	/	X 1 @ 29	
		136	t	1418	/	Zero	-------->
		137	s	1459	/	1 @ 1 - 1 @ 30	
		138	t	1460	/	No overflow	------->
		139	x h	6325	/	X	
		140	b	1200	/	Acc. Exp.	
		141	a	1027	/	1 @ 29	
		142	c	1200	/	Acc. Exp.	
		143	u	1303	/	X	
0 0 0 0 0 0 1	'	144			/		
		145	b	0910	/	Loc 1 @ 1	
		146	y	1332	/		
		147	u	1348	/	X	
		148	x b	6334	/	B Exp.	
		149	c	1200	/	Acc. Exp.	
		150	b	1815	/	1 @ 1	
		151	x m	6330	/	X B char.	
		152	u	1354	/		
0 0 0 0 0 0 1	'	153		3 w q	/		
		154	x c	6319	/		
		155	u	1331	/	X	
		156	a	1042	/	1 @1- 1 @ 30	
		157	t	1444	/	overflow	----->
		158	s	1330	/	1 @ 1 - 1 @ 30	
		159	a	1417	/	X 1 @ 9 - 1 @ 30	
		160	t	1554	/	Not 9 zeros	------>
		161	u	1512	/		
		162	x b	6334	/	B Exp.	
		163	u	1328	/	X	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM:	DICTATOR			TRACK 14

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
0 0 0 0 0 0 1	'	1 4 0 0	3 w w w w w w	q	/	1 @ 1 - 1 @ 30	
		0 1	b	1 9 3 7	/	Lo Table of shifts	
		0 2	x s	6 3 4 5	/		
		0 3	y	1 4 5 3	/	☒	
		0 4	u	1 4 5 2	/		
0 0 0 0 0 0 3	'	0 5	[	]	/	Acc. Char	
		0 6	[	]	/	Acc. Char.	
		0 7		w w 8	/	☒	
		0 8	x b	6 3 5 8	/	A char.	
		0 9	u	1 4 1 9	/		
		1 0	x m	6 3 6 0	/	A Char.	
		1 1	u	1 3 3 3	/	☒	
		1 2	x c	6 3 0 8	/		
		1 3	x b	6 3 6 3	/	A exp.	
		1 4	c	1 2 0 0	/	Acc. Exp.	
		1 5	b	1 2 5 8	/	☒ 1 @ 1	
		1 6	u	1 4 1 0	/		
0 0 0 0 0 0 1	'	1 7	3 w	w w w q	/	1 @ 9 - 1 @ 30	
		1 8	x c	6 3 3 3	/		
		1 9	h	1 4 0 5	/	☒ Here to Load Acc.	
		2 0	h	1 4 0 6	/		
		2 1	h	1 4 3 6	/		
		2 2	h	1 4 3 7	/		
		2 3	x b	6 3 5 2	/	☒	
		2 4	e	1 3 5 3	/	3wq	
		2 5	u	1 5 6 1	/		
		2 6	b	1 4 0 5	/		
		2 7	c	[ ]	/	☒	
		2 8	b	1 2 0 0	/		
		2 9	c	[ ]	/		
		3 0	b	1 1 0 0	/		
		3 1	a	0 2 1 0	/	☒ 1 @ 29	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 14

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		14 32	y	1100	/		
		33	s	2119	/	11w+0	
		34	t	1100	/		----->
		35	u	1048	/	☒ Error	----->
0 0 0 0 0 0 4	'	36	[	]	/		
		37	[	]	/		
		38		2	/	1 @ 30	
		39	4 0 0 0 0 0 0 0		/	☒ 1 @ 1	
		40	x	c 6319	/		
		41	u	1442	/		
		42	x	a/s 6319	/		
		43	u	1419	/	☒	
		44	s	1816	/	1 @ 1 - 1 @ 30	
		45	u	1339	/		
0 0 0 0 0 0 2	'	46	1	0 0 0 0 0	/	2 @ 12	
		47		68	/	☒ 26 @ 29	
		48	x	b 6363	/	A exp.	
		49	c	1200	/	Acc. Exp.	
		50	u	1408	/		
0 0 0 0 0 0 1	'	51		8	/	☒ 2 @ 29	
		52	x	b 6331	/	B Char.	
		53	m	[ ]	/		
		54	x	c 6319	/		
		55	u	1413	/	☒	
		56	z	1134	/		
		57	x	z 0016	/		
		58	u	1419	/	+ Switch	
0 0 0 0 0 0 1	'	59	3 w w w w w w	j	/	☒ 1 @ 1 - 1 @ 29	
		60	a	0 9 3 9	/	1 @ 1	
		61	s	1040	/	1 @ 9	
		62	t	1513	/	10 zeros	-------->
		63	a	1142	/	☒ 1 @ 9	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 15

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1 5 0 0	s	0943	/	1 @ 5	
		0 1	t	1509	/		
		0 2	a	1138	/	1 @ 5	
		0 3	s	0518	/	X 1 @ 2	
		0 4	t	1526	/		
		0 5	a	1327	/	1 @ 2	
		0 6	n	0821	/	1 @ 30	
		0 7	u	1419	/	X	
		0 8	s	1744	/	2 @ 5 - 1 @ 30	
		0 9	a	1138	/	1 @ 5	
		1 0	x	h6360	/		
		1 1	u	1542	/	X	
		1 2	s	1248	/	2 @ 9 - 1 @ 30	
		1 3	a	1142	/	1 @ 9	
		1 4	n	1743	/	1 @ 23	
		1 5	x	h6301	/	X	
		1 6	b	1210	/		
		1 7	s	1003	/	8 @ 29	
		1 8	u	1521	/		
		1 9	x	b6355	/	X	
		2 0	u	1419	/		
		2 1	c	1210	/		
		2 2	x	b6301	/		
		2 3	t	1359	/	X	
		2 4	u	1461	/		
		2 5	s	1004	/	2 @ 2 - 1 @ 30	
		2 6	a	1062	/	1 @ 2	
		2 7	x	h6313	/	X	
		2 8	b	1210	/		
		2 9	s	1058	/	1 @ 29	
		3 0	c	1210	/		
		3 1	u	1534	/	X	

FORM LP-10 Royal McBee Corporation X CARRIAGE RETURN

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 15

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1 5 3 2	s	1 0 1 8	/	1 @ 2 - 1 @ 30	
		3 3	u	1 5 0 6	/		
		3 4	x b	6 3 1 3	/		
		3 5	n	0 5 1 4	/	X 1 @ 30	
		3 6	t	1 5 5 1	/		
		3 7	u	1 5 0 3	/		
0 0 0 0 0 0 1	'	3 8		3 w q	/		
		3 9	t	1 4 3 0	/	X	
		4 0	c	[ ]	/		
		4 1	u	1 8 6 1	/		
		4 2	b	1 2 0 0	/		
		4 3	s	0 2 5 8	/	X 4 @ 29	
		4 4	c	1 2 0 0	/		
		4 5	x b	6 3 6 0	/		
		4 6	n	0 6 2 5	/	1 @ 27	
		4 7	t	1 5 5 5	/	X	
		4 8	u	1 5 0 0	/		
0 0 0 0 0 0 1	'	4 9	8	0 0 0 0	/	1 @ 12	
		5 0	s	1 1 2 2	/	1 @ 5 - 1 @ 30	
		5 1	a	1 1 2 3	/	X 1 @ 2 - 1 @ 30	
		5 2	t	1 5 3 2	/	Not 2 zeros ------>	
		5 3	u	1 5 2 5	/		
		5 4	s	1 0 2 6	/	1 @ 9 -1 @ 30	
		5 5	a	1 6 0 6	/	X 1 @ 5 - 1 @ 30	
		5 6	t	1 5 5 0	/	Not 5 zeros ----->	
		5 7	u	1 5 0 8	/		
		5 8	m	0 9 0 3	/	- 1 @ 0	
0 0 0 0 0 0 2	'	5 9		8	/	X 2 @ 29	
		6 0	7	0 0 0 0	/	7 @ 15	
		6 1	n	1 2 1 2	/	1 @ 29	
		6 2	y	1 4 2 7	/		
		6 3	a	1 3 1 4	/	X 1 @ 29	

RM LP-12 Royal McBee Corporation X CARRIAGE RETURN

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 16

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		16 10	y	1429	/		
		10 11	s	1451	/	2 @ 29	
		10 12	t	1430	/		
		10 13	u	1426	/	X	
0000001	!	10 14		1wwj	/		
		10 15	b	1200	/		
0000001	!	10 16	3wwwwwq		/	1 @ 5 - 1 @ 30	
		10 17	r	1257	/	X	
		10 18	u	2830	/		
		10 19	xb	6359	/	A char.	
		11 10	xm	6332	/	B char	
		11 11	t	1633	/	X Character neg. ---->	
		11 12	s	1134	/	1 @ 1	
		11 13	t	1642	/	Do shift ------>	
		11 14	u	1629	/		
		11 15	b	1458	/	X + switch	
		11 16	c	1652	/		
		11 17	u	1607	/		
		11 18	xc	6340	/		
		11 19	b	2041	/	X 7ww 803wq	
		12 10	u	1960	/		
0000001	!	12 11	6000		/	6 @ 15	
		12 12	b	1558	/	M0903 - 1 @ 0 (-switch)	
		12 13	c	1652	/	X	
		12 14	u	1607	/		
		12 15	b	[ ]	/		
		12 16	s	0662	/	1 @ 29	
		12 17	u	1539	/	X	
0000001	!	12 18	0000q	0000	/		
		12 19	a	1258	/	1 @ 1	
		13 10	xc	6316	/	char.	
		13 11	u	1647	/	X	

FORM LGP-10 Royal McBee Corporation X CARRIAGE RETURN

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laude man	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 16

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
0 0 0 0 0 0 0 1	'	16 32	2	0 0 0 0 0 0 0 0	/	1 @ 29	
		33	a	0 9 1 2	/	1 @ 1 - 1 @ 30	
		34	t	3 0 4 9	/	No Shift ------->	
		35	a	1 1 2 1	/	☒ 1 @ 1 - 1 @ 30	
		36	u	1 6 4 3	/		
		37	e	0 7 5 2	/	ww80000	
		38	s	1 0 6 0	/	1 @ 12	
		39	t	1 0 5 1	/	☒ if A = 0 or 1 (illegal instruction)->	
		40	x c	6 3 1 9	/	CTR.	
		41	u	1 7 0 2	/		
		42	a	1 3 0 0	/	1 @ 1	
		43	n	1 8 5 1	/	☒ 1 @ 30	
		44	x c	6 3 1 6	/	T.S.	
		45	u	1 6 4 6	/		
		46	s	0 5 0 4	/	1 @ 29	
		47	x a	6 3 6 2	/	☒ A exp.	
		48	x a	6 3 3 4	/	B. exp.	
		49	c	1 2 0 0	/		
		50	u	1 6 5 1	/		
		51	x b	6 3 1 6	/	☒	
		52	u	1 4 1 9	/	± switch	
		53	u	1 4 1 9	/		
		54	t	1 6 6 2	/	Neg ---->	
		55	s	1 1 3 4	/	☒ 1 @ 1	
		56	t	1 7 2 9	/	Do shift ---->	
		57	a	1 8 1 5	/	1 @ 1	
		58	u	1 6 5 9	/		
		59	x c	6 3 1 0	/	☒	
		60	u	1 7 1 8	/		
0 0 0 0 0 0 0 1	'	61	8	0 0 0 0	/	1 @ 12	
		62	a	1 8 1 6	/	1 @ 1 - 1 @ 30	
		63	t	1 7 3 5	/	☒ NO shift ----->	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 17

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1700	s	1815	/	1 @ 1 - 1 @ 30	
		01	u	1730	/		
		02	xb	6352	/		
		03	e	0632	/	X 7 wj00	
		04	s	0854	/	1 @ 29	
		05	t	1745	/	use Acc. For B ---->	
		06	u	1737	/		
		07	r	1257	/	X	
		08	u	1237	/		
		09	xb	6331	/	B char.	
		10	t	1714	/	Neg. ------->	
		11	s	2340	/	X 1 @ 1	
		12	t	3032	/	°/° error ------>	
		13	u	1714	/		
		14	b	1043	/	1 @ 1	
		15	xm	6358	/	X A char.	
		16	xd	6331	/		
		17	u	1654	/		
		18	b	0854	/	1 @ 29	
		19	xa	6362	/	X A exp.	
		20	xs	6335	/	B exp.	
		21	c	1210	/	Acc. Exp.	
		22	u	1724	/		
		23	xa	6319	/	X	
		24	xb	6310	/		
		25	u	1419	/		
		26	e	2655	/	wwB	
		27	n	1856	/	X 1 @ 24	
		28	u	1618	/		
		29	a	1815	/	1 @ 1	
		30	n	1438	/	1 @ 30	
		31	xc	6310	/	X	

FORM LP-10 Royal McBee Corporation X CARRIAGE RETURN

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 17

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		1 7 3 2	u	1 7 1 9	/		
		3 3	b	1 4 1 2	/	xc6308	
		3 4	u	1 7 5 0	/		
		3 5	s	1 1 2 1	/	X 1 @ 1 - 1 @ 30	
		3 6	u	1 6 5 9	/		
		3 7	a	1 8 5 2	/	1 @ 29	
		3 8	m	1 8 1 7	/	1 @ 7	
		3 9	y	1 8 2 5	/	X B [ ] Char.	
		4 0	a	0 6 6 2	/	1 @ 29	
		4 1	y	1 8 2 0	/		
		4 2	u	1 8 0 1	/		
0 0 0 0 0 0 2	!	4 3		1 0 0	/	X 1 @ 23	
		4 4	7 w w w w w q		/	2 @ 5 - 1 @ 30	
		4 5	b	1 8 2 4	/	B 1405	
		4 6	c	1 8 2 5	/		
		4 7	b	1 6 0 5	/	X B 1200	
		4 8	c	1 8 2 0	/		
		4 9	u	1 8 0 0	/		
		5 0	c	1 8 2 2	/		
		5 1	b	2 1 2 3	/	X xc6317	
		5 2	c	1 8 3 1	/		
		5 3	u	1 7 5 4	/		
		5 4	x c	6 3 1 9	/		
		5 5	u	1 8 2 0	/	X	
		5 6	a	2 4 0 7	/	1 @ 3 - 1 @ 7	
		5 7	t	2 0 3 0	/	Logical or output ---->	
		5 8	s	2 6 3 0	/	3 @ 7	
		5 9	t	1 8 5 3	/	X Transfer --->	
		6 0	s	2 3 3 2	/	3 @ 7	
		6 1	x t	3 1 1 3	/	Set address ---->	
		6 2	x u	3 1 0 3	/	Inc. Address ---->	
0 0 0 0 0 0 1	!	6 3		4	/	X 1 @ 29	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM:	DICTATOR			TRACK 18

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		18 00	x	c 6 3 1 9	/		
		00 01	x	b 6 3 5 1	/		
		00 02	e	1 5 3 8	/	3wq	
		00 03	s	0 3 2 5	/	X 1 @ 30	
		00 04	t	1 7 3 3	/	c = 0 (use Acc.)	----->
		00 05	n	1 0 2 7	/	1 @ 29	
		00 06	a	0 9 2 1	/	2 @ 29	
		00 07	y	1 8 2 2	/	X	
		00 08	s	1 0 5 8	/	1 @ 29	
		00 09	y	1 8 3 1	/		
		00 10	u	1 8 2 0	/		
0 0 0 0 0 0 1	'	00 11	3	0 0 0 0 0	/	X 6 @ 12	
		00 12	y	1 9 6 2	/	C [ ]	
		00 13	x	b 6 3 6 3	/		
		00 14	u	1 9 5 0	/		
0 0 0 0 0 0 3	'	00 15	4	0 0 0 0 0 0 0	/	X 1 @ 1	
		00 16	3	w w w w w w q	/	2 @ 1 - 1 @ 30	
		00 17	1	0 0 0 0 0 0 0	/	1 @ 7	
		00 18	x	c 6 3 4 0	/		
		00 19	u	1 9 4 8	/	X	
		00 20	b	[ ]	/	Exp.	
		00 21	h	1 2 0 0	/		
		00 22	c	[ ]	/	ExP	
		00 23	u	1 8 2 5	/	X	
		00 24	b	1 4 0 5	/		
		00 25	b	[ ]	/	Char.	
		00 26	h	1 4 0 5	/		
		00 27	h	1 4 0 6	/	X	
		00 28	h	1 4 3 6	/		
		00 29	h	1 4 3 7	/		
		00 30	u	1 8 3 1	/		
		00 31	c	[ ]	/	X Char.	

LGP-30 CODING SHEET

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 18

PROBLEM: DICTATOR | TRACK

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		18 12	s	1661	/	1 @ 12	
		13 13	xa	6319	/	CTR.	
		13 14	t	1430	/	Done	------>
		13 15	u	1840	/	X	
		13 16	b	1822	/		
		13 17	a	1559	/	2 @ 29	
		13 18	u	1807	/		
0 0 0 0 0 0 1	'	13 19	l	00000	/	X 1 @ 15	
		14 10	xc	6319	/		
		14 11	b	1820	/		
		14 12	u	1845	/		
0 0 0 0 0 0 2	'	14 13	ww	q0000	/	X	
		14 14	6	00000	/	6 @ 15	
		14 15	a	02110	/	1 @ 29	
		14 16	y	1825	/		
		14 17	a	06612	/	X 1 @ 29	
		14 18	y	18210	/		
		14 19	u	18136	/		
0 0 0 0 0 0 3	'	15 10		lwwj	/	2000	
		15 11		2	/	X 1 @ 30	
		15 12		4	/	1 @ 29	
		15 13	e	16014	/	lwwj	
		15 14	xc	63410	/	u[ ]	
		15 15	u	19011	/	X	
0 0 0 0 0 0 1	'	15 16		810	/	1 @ 24	
		15 17	e	18413	/	wwq000	
		15 18	m	11444	/	1 @ 11	
		15 19	y	11010	/	X	
		16 10	u	11214	/		
		16 11	xb	63410	/		
		16 12	y	11010	/		
		16 13	u	11010	/	X	

LGP-30 CODING SHEET

PREPARED FOR: LGP-30 USERS' ORGANIZATION - POOL | PAGE 39 OF 1

JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 19

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 1	'	1 9 0 0	8	0 0 0 0	/	1 @ 12	
		0 1	x b	6 3 5 1	/		
		0 2	s	2 3 3 8	/	2 @ 7	
		0 3	t	1 8 6 1	/	X	unconditional Trans. ----->
		0 4	s	1 1 4 0	/	1 @ 7	
		0 5	t	1 8 5 7	/		Transfer or Sign ----->
		0 6	e	1 6 2 8	/		
		0 7	u	1 9 0 8	/	X	
		0 8	m	1 1 4 4	/		
		0 9	a	2 2 5 9	/	Loc. 1st.	CRT.-1 (z1927)
		1 0	y	1 6 2 5	/		
		1 1	y	1 5 4 0	/	X	
		1 2	u	1 6 2 5	/		
		1 3	x b	6 3 6 3	/		
		1 4	e	1 8 4 3	/	wwq0000	
		1 5	m	1 1 4 4	/	X	1 @ 11
		1 6	y	1 9 3 8	/	B [ ]	
		1 7	y	1 9 6 0	/	E [ ]	
		1 8	u	1 8 1 2	/		
		1 9	e	2 6 3 4	/	X	7wwwwwq
		2 0	s	2 0 0 6	/		10 @ 15
		2 1	t	2 0 0 8	/		single address ------->
		2 2	u	1 0 4 5	/		Illegal Instruction ---->
		2 3	a	2 7 0 2	/	X	1 @ 7
		2 4	t	1 9 3 8	/		Set C ---->
		2 5	u	1 7 2 6	/		Set B
		2 6	b	2 9 4 8	/		
		2 7	u	1 9 6 0	/	X	
0 0 0 0 0 0 6	'	2 8	[ ]		/		CTR. 0
		2 9	[ ]		/		CTR. 1
		3 0	[ ]		/		CTR. 2
		3 1	[ ]		/	X	CTR. 3

X CARRIAGE RETURN

LGP-30 CODING SHEET

EPARED FOR: LGP-30 USERS' ORGANIZATION - POOL | PAGE 40 OF 1

OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

OBLEM: DICTATOR | TRACK 19

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 2	'	1 9 3 2		4 0 0 0 0	/	4 @ 15	
		3 3			/		
		3 4	t	1 4 3 0	/		------>
		3 5	u	1 0 4 5	/	X	Error-illegal inst. ---->
0 0 0 0 0 0 1	'	3 6	7	0 0 0 0	/	7 @ 15	
		3 7	z	1 1 3 4	/		
		3 8	b	[ ]	/		
		3 9	t	1 9 5 7	/	X	Neg. ------>
		4 10	s	2 5 2 6	/	1 @ 7	
		4 11	t	1 9 4 4	/		not transfer or modify add -->
		4 12	s	2 4 5 7	/	9 @ 7	
		4 13	t	1 9 5 7	/	X	Transfer or modify add. ---->
		4 14	b	2 2 2 3	/	ww8	
		4 15	u	2 9 5 2	/		
		4 16	s	1 6 6 1	/		
		4 17	u	1 9 3 4	/	X	
		4 18	b	2 2 2 7	/	wwwwq000	
		4 19	u	1 9 6 0	/		
		5 10	a	2 3 0 8	/	1 @ 7	
		5 11	t	1 9 2 3	/	X	Not set A ----->
		5 12	e	1 1 3 1	/	ww8	
		5 13	n	2 3 1 1	/	1 @ 15	
		5 14	x c	6 3 4 0	/		
		5 15	b	2 1 2 7	/	X	7007wwwq
		5 16	u	1 9 6 0	/		
		5 17	x b	6 3 6 3	/		
		5 18	e	2 8 4 4	/		
		5 19	u	1 8 1 8	/	X	
		6 10	e	[ ]	/		
		6 11	x a	6 3 4 0	/		
		6 12	c	[ ]	/		
		6 13	u	1 4 3 0	/	X	

M LP-12 Royal McBee Corporation CARRIAGE RETURN

LGP-30 CODING SHEET

PREPARED FOR: LGP-30 USERS' ORGANIZATION - POOL				PAGE 41 OF 1
JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 20

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		2 0 0 0	e	1 8 5 0	/	lwwj	
		0 0 1	x c	6 3 3 7	/		
		0 0 2	e	2 8 1 7	/	ww8	
		0 0 3	m	1 6 3 2	/	X 1 @ 2	
		0 0 4	x c	6 3 4 0	/		
		0 0 5	u	1 9 3 8	/		
0 0 0 0 0 0 2	'	0 0 6	f	0 0 0 0	/	10 @ 15	
		0 0 7	8	0 0 0 0	/	X 1 @ 12	
		0 0 8	a	1 8 4 4	/	6 @ 15	
		0 0 9	t	2 0 4 9	/	set CTR.	
		0 1 0	s	1 9 3 2	/	4 @ 15	------->
		0 1 1	t	2 0 2 6	/	X not print char. or stop ---->	
		0 1 2	e	2 3 6 2	/	wj	
		0 1 3	n	1 1 2 8	/	1 @ 25	
		0 1 4	a	1 4 5 7	/	xz0016	
		0 1 5	y	2 0 4 4	/	X	
		0 1 6	x b	6 3 5 2	/		
		0 1 7	e	1 8 3 9	/	1 @ 15	
		0 1 8	s	0 1 4 0	/	1 @ 30	
		0 1 9	t	2 4 5 8	/	X z Order ----->	
		0 2 0	u	2 0 4 2	/		
		0 2 1	c	1 2 0 0	/		
		0 2 2	u	2 1 5 1	/		
0 0 0 0 0 0 1	'	0 2 3	2	0 0 0 0	/	X 1 @ 14	
		0 2 4	z	[ ]	/		
		0 2 5	u	1 4 3 0	/		
		0 2 6	a	1 1 4 8	/	1 @ 15	
		0 2 7	t	1 0 4 5	/	X illegal inst. ---->	
		0 2 8	e	1 4 0 7	/	ww8	
		0 2 9	u	2 0 5 5	/		
		0 3 0	a	2 8 5 9	/	1 @ 7 - 1 @ 12	
		0 3 1	t	1 0 4 5	/	X illegal instruction ----->	

LGP-30 CODING SHEET

PREPARED FOR: LGP-30 USERS' ORGANIZATION - POOL				PAGE 42 OF 1
JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 20

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/ ☒						
		20312	s	1811	/	6 @ 12	
		31313	t	2107	/	logical Class ----->	
		31314	s	1549	/	1 @ 12	
		31315	t	2832	/	☒ Punch ----->	
		31316	u	2856	/		
		31317	x b	6352	/		
		31318	e	2060	/	3wwj	
		31319	c	[ ]	/	☒	
		31410	u	1430	/		
0 0 0 0 0 0 1	!	31411	7 w w	8 0 3 w q	/		
		31412	b	1100	/		
		31413	a	1058	/	☒ 1 @ 29	
		31414	x p	[02 1 6]	/		
		31415	y	1100	/		
		31416	x z	0000	/		
		31417	u	1100	/	☒	
0 0 0 0 0 0 1	!	31418	j 0 0 0	0 0 0 0	/	-1 @ 1	
		31419	a	1621	/	6 @ 15	
		31510	e	1936	/	7 @ 15	
		31511	m	2023	/	☒ 1 @ 14	
		31512	a	2824	/	Lo CTR. -2	
		31513	y	2039	/		
		31514	u	2037	/		
		31515	r	0441	/	☒ }	INPUT
		31516	u	0532	/		
		31517	u	1430	/		
0 0 0 0 0 0 4	!	31518	2 k 4 1	3 j j j	/	√2 @ 2	
		31519		7 8	/	☒ 30 @ 29	
		31610		3 w w j	/		
		31611			/		
		31612	s	2512	/	1 @ 12	
		31613	t	2318	/	☒ Cosine ------>	

LGP-30 CODING SHEET

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 21

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		2 1 0 0	u	2 4 1 5	/	Arctangent	---->
		0 1	x b	6 3 5 1	/		
		0 2	u	2 1 1 0	/		
		0 3	x m	6 3 3 2	/	X	Shift. Char.
		0 4	x h	6 3 5 4	/	N/2	
		0 5	x b	6 3 5 5	/		
		0 6	u	2 8 0 2	/		
		0 7	r	1 2 5 7	/	X	
		0 8	u	1 2 2 3	/		
		0 9	u	2 1 4 8	/		
		1 0	s	1 4 4 6	/	2 @ 12	
		1 1	t	2 1 4 4	/	X	Exponential ----->
		1 2	s	2 5 2 7	/	1 @ 12	
		1 3	t	2 1 5 8	/	logarithmic ------>	
		1 4	s	1 9 0 0	/	1 @ 12	
		1 5	t	2 7 5 9	/	X	√ square root -------->
		1 6	s	1 1 4 5	/	1 @ 12	
		1 7	t	2 2 1 8	/	sine	----->
		1 8	u	2 0 6 2	/		
0 0 0 0 0 0 1	'	1 9	l	1 w 4 0	/	X	
		2 0	b	1 7 6 3	/	1 @ 29	
		2 1	c	1 2 0 0	/		
		2 2	u	2 7 1 0	/		
		2 3	x c	6 3 1 7	/	X	
		2 4	x b	6 3 3 9	/		
		2 5	u	1 4 1 9	/		
0 0 0 0 0 0 2	'	2 6			/		
		2 7	7 0 0 7	w w w q	/	X	
		2 8	c	1 2 0 0	/	Acc. Exp.	
		2 9	u	2 1 2 4	/		
		3 0	x c	6 3 4 5	/		
		3 1	s	0 2 1 0	/	X	1 @ 29

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 2/22/59
PROBLEM: DICTATOR				TRACK 21

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/						
		2 1 3 2	u	2 2 4 1	/		
0 0 0 0 0 0 0 1	'	3 3	7	w j 0 0	/		
		3 4	b	2 7 6 3	/	4 @ 29	
		3 5	c	1 2 0 0	/	Acc.	
		3 6	s	2 0 5 8	/	√2 @ 2	
		3 7	x a	6 3 2 3	/	x - √2	
		3 8	u	2 5 6 0	/		
0 0 0 0 0 0 0 1	'	3 9		w w j	/		
		4 0	b	0 3 1 9	/	1 @ 1	
		4 1	m	1 2 0 0	/		
		4 2	c	1 2 0 0	/		
		4 3	u	1 5 1 9	/		
		4 4	x b	6 3 3 0	/		
		4 5	u	2 6 0 1	/		
		4 6	x b	6 3 3 2	/		
		4 7	u	2 1 6 2	/		
		4 8	x b	6 3 3 4	/		
		4 9	c	1 2 0 0	/		
		5 0	u	2 1 0 1	/		
		5 1	x b	6 3 3 0	/		
		5 2	t	2 1 5 4	/		------>
		5 3	u	2 4 0 5	/		
		5 4	x c	6 3 2 6	/		
		5 5	x s	6 3 2 7	/		
		5 6	u	1 3 5 6	/		
0 0 0 0 0 0 0 1	'	5 7		3 w q	/		
		5 8	x b	6 3 3 0	/		
		5 9	m	0 6 3 1	/	1 @ 1	
		6 0	x h	6 3 2 3	/		
		6 1	u	2 5 2 0	/		
		6 2	m	1 1 3 4	/	1 @ 1	
		6 3	u	2 1 3 0	/		

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 22

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 1	!	2 2 10 10		3 j	/	15 @ 29	
		10 11	x b	6 3 3 0	/		
		10 12	u	1 4 1 9	/		
		10 13	m	1 1 3 3	/	X	M [Lo] Table
		10 14	x h	6 3 4 0	/	x^2 @ 1	
		10 15	m	2 3 4 1	/	C_q @ -4	
		10 16	a	2 3 4 2	/	C_7 @ -3	
		10 17	x m	6 3 4 3	/	X	X^2 @ 2
		10 18	a	2 3 4 4	/	c_5 @ -1	
		10 19	x m	6 3 4 5	/	x^2 @ 1	
		11 10	a	2 3 3 9	/	C_j @ 0	
		11 11	x m	6 3 4 0	/	X	x^2 @ 1
		11 12	a	2 3 5 5	/	C_1 @ 1	
		11 13	x m	6 3 4 2	/	X @ 1	
		11 14	u	2 2 1 5	/		
		11 15	d	1 2 5 8	/	X	1 @ 1
		11 16	x a	6 3 5 9	/	x @ 1	
		11 17	u	1 3 3 4	/	To normalize ----->	
		11 18	r	2 2 4 0	/	Here for size	
		11 19	u	2 1 4 6	/	X	
		12 10	x b	6 3 0 6	/	Flag	
		12 11	t	2 3 5 7	/		
		12 12	u	2 5 5 5	/		
0 0 0 0 0 0 1	!	12 13	w w	8	/	X	
		12 14	b	0 2 1 0	/	1 @ 29	
		12 15	u	2 2 2 8	/		
		12 16	n	1 1 3 9	/	N[Lo + 6]	Table
0 0 0 0 0 0 1	!	12 17	w w w w	q 0 0 0	/	X	
		12 18	c	1 2 0 0	/		
		12 19	u	2 2 0 1	/		
0 0 0 0 0 0 2	!	13 10	2 0 0 0	0 0 0 0	/	1 @ 2	
		13 11	2 0 0 0	0 0 0 0	/	X	1 @ 2

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 22

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		2 2 3 2	m	2 7 1 8	/	1 @ 1	
		3 3	x c	6 3 5 5	/	Shifted Char	
		3 4	b	1 7 6 3	/	1 @ 29	
		3 5	e	1 2 0 0	/	☒	
		3 6	s	1 0 5 8	/	1 @ 29	
		3 7	t	2 2 5 3	/	Exp. even	------>
		3 8	b	0 2 1 0	/	1 @ 29	
		3 9	u	2 2 5 5	/	☒	
		4 10	u	[ ]	/		
		4 11	x c	6 3 0 6	/	Set Flag ---	
		4 12	s	1 2 0 0	/	Exp.	
		4 13	t	2 3 4 5	/	☒ E P > 0	
		4 14	x h	6 3 0 9	/	Temp. Store. For Exp. --->	
		4 15	a	2 2 0 3	/	M [Lo] Table	
		4 16	h	2 3 2 5	/	Scale	
		4 17	s	2 3 1 2	/	☒ M[Lo + 9] Table	
		4 18	x h	6 3 0 6	/		
		4 19	s	2 2 0 0	/	15 @ 29	
		5 10	t	2 3 2 3	/		----->
		5 11	x c	6 3 1 6	/	☒	
		5 12	u	2 3 2 6	/		
		5 13	b	2 7 1 8	/	1 @ 1	
		5 14	u	2 1 0 3	/		
		5 15	x a	6 3 3 4	/	☒	
		5 16	u	2 8 1 4	/		
		5 17	x b	6 3 4 3	/		
		5 18	u	2 2 6 1	/		
		5 19	z	1 9 2 8	/	☒ 1st. CTR 0	
		6 10	s	0 0 3 2	/	-4 @ 2	
		6 11	x h	6 3 4 0	/	X_f	
		6 12	s	1 1 3 4	/	2 @ 2	
		6 13	t	2 3 0 2	/	☒	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 23

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		23 00	s	2615	/	1 @ 2	
		01	u	2305	/		
		01 2	b	2231	/	1 @ 2	
		01 3	u	2304	/	☒	
		01 4	xs	6340	/	X_f	
		01 5	d	1134	/	1 @ 1	
		01 6	xh	6342	/	X @ 1	
		01 7	u	2309	/	☒	
0 0 0 0 0 0 1	'	01 8	1	0000000	/	1 @ 7	
		01 9	xh	6359	/	X @ 1	
		11 0	u	2313	/		
9 9 9 9 9 9 1	'	11 1	1	00000	/	☒ 1 @ 15	
		11 2	m	1142	/	M[Lo + 9]	Table
		11 3	xm	6342	/	x @ 1	
		11 4	xh	6343	/	x^2 @ 2	
		11 5	d	1258	/	☒ 1 @ 1	
		11 6	xh	6345	/	x^2 @ 1	
		11 7	u	2204	/		
		11 8	r	2240	/	Here for cosine	
		11 9	u	2114	/	☒	
		12 0	xb	6306	/	Flag	
		12 1	t	2257	/		---->
		12 2	u	2333	/		
		12 3	xb	6345	/	☒	
		12 4	m	2353	/	$\pi/2$ @ -1	
		12 5	x	0000	/	Scale	
		12 6	xh	6355	/	X_{ce}	
		12 7	e	2356	/	☒ 7wwwwwq	
		12 8	xc	6343	/	x_c	
		12 9	c	1200	/	0 --->	Acc. Exp.
		13 0	u	2240	/		
		13 1	n	1200	/	☒ N[Lo + 31]	Table

FORM LP-10 Royal McBee Corporation ☒ CARRIAGE RETURN

LGP-30 CODING SHEET

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)B NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
OBLEM: DICTATOR				TRACK 23

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 0 1		2 3 3 2	3	0 0 0 0 0 0	/	$3^{@}$ 7	
		3 3	x	b 6 3 5 5	/	x_{ce}	
		3 4	t	2 2 5 7	/		
		3 5	s	0 8 2 1	/	X 1 @30	
		3 6	t	2 3 5 0	/		
		3 7	u	2 2 5 7	/		
0 0 0 0 0 0 7	'	3 8	2	0 0 0 0 0 0	/	2 @ 7	
		3 9	f k 5 1	0 w f 6	/	X $c_{3@0}$	
		4 10	4	0 0 0 0 0 0	/	1 @ 1	
		4 11	4	w 6 g k q	/	c_q @ - 4	
		4 12	w g 3 6	j j q 6	/	c_7 @ -3	
		4 13			/	X	
		4 14	1 4 6 6	8 f w 6	/	c_5 @ -1	
		4 15	a	2 3 3 1	/	N[Lo + 31] Table	
		4 16	h	2 3 2 5	/		
		4 17	s	2 2 2 6	/	X N[Lo + 6] Table	
		4 18	t	3 0 5 3	/		Error Halt ----~
		4 19	u	2 3 2 3	/		
		5 10	b	1 8 1 5	/	1 @ 1	
		5 11	x	c 6 3 3 0	/	X	
		5 12	u	2 2 2 4	/		
0 0 0 0 0 0 4	'	5 13	2 8	g q 6 0 k j	/	$\pi/2$ @ -1	
		5 14			/		
		5 15	2 4	8 7 q k 4 8	/	X c_1 @ 1	
		5 16	7	w w w w w w q	/		
		5 17	x	b 6 3 4 3	/	x_c	
		5 18	s	2 2 3 0	/	1 @ 2	
		5 19	t	2 2 6 0	/	X	---->
		6 10	u	2 2 6 1	/		
		6 11	z	1 1 5 1	/		
0 0 0 0 0 0 3	'	6 12		w j	/		
		6 13	7	w j 0 0	/	X	

M LP-12 Royal McBee Corporation ⊠ CARRIAGE RETURN

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 24

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		24 00	w j 6 g w 8 w 0		/	C_{11} @ 1	
		00 01	x h 6 3 5 1		/		
		00 02	x s 6 3 4 5		/	1 @ q = exp.	
		00 03	x s 6 3 4 6		/	☒	
		00 04	u 2 5 0 8		/		
		00 05	x b 6 3 2 7		/	$0 < \tan^{-1} = \pi/2$	
		00 06	u 1 3 3 5		/	normalize	+ 1
0 0 0 0 0 0 2	!	00 07	w 0 0 0 0 0 0		/	☒ 1 @ 3	- 1 @ 7
		00 08	q f f g 3 j 8 4		/	c3 # 1	
		00 09	m [ ]		/	Shift Y	right
		01 00	a 2 6 3 2		/	1 @ 1	
		01 01	x h 6 3 5 1		/	☒ y * 1	
		01 02	s 1 1 3 4		/	1 @ 1	
		01 03	s 0 6 4 9		/	1 @ 1	
		01 04	u 2 5 0 8		/		
		01 05	x b 6 3 3 0		/	☒ B char.	
		01 06	t 2 4 1 9		/	Neg char.	----->
		01 07	m 1 4 3 9		/	1 @ 1	
		01 08	u 2 4 2 0		/		
		01 09	m 2 0 4 8		/	☒ -1 @ 1	
		02 00	x h 6 3 4 2		/	Y	
		02 01	b 1 2 0 0		/		
		02 02	t 2 4 3 2		/	neg.	------>
		02 03	s 2 0 5 9		/	☒ 30 @ 29	
		02 04	t 2 4 2 7		/	ok	------>
		02 05	b 1 2 1 1		/	$\pi/2$ @ 1	
		02 06	u 2 4 5 5		/		
		02 07	b 1 4 5 6		/	☒ Z 1134	
		02 08	a 1 2 0 0		/		
		02 09	y 2 5 0 1		/		
		03 00	u 2 5 0 1		/		
0 0 0 0 0 0 1	!	03 01	3 w w w w k 3 4		/	☒ C_1 @ 1	

LGP-30 CODING SHEET

EPARED FOR: LGP-30 USERS' ORGANIZATION - POOL | PAGE 50 OF /

OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 24

ROBLEM: DICTATOR | TRACK 24

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		24 32	a	1447	/	26 @ 29	
		33	t	2541	/	tan $^{-1}$ = 0 (use zeros) --->	
		34	xc	6320	/		
		35	s	1200	/	☒	
		36	a	2801	/	z1133	
		37	y	2409	/		
		38	u	2506	/		
		39	m	2518	/	☒ c_{15} @ 1	
		40	a	2462	/	c_{13} @ 1	
		41	xm	6327	/	x^2 @ 0	
		42	a	2400	/	C11 @ 1	
		43	xm	6329	/	☒ x^2 @ 0	
		44	a	1130	/	c_9 @ 1	
		45	xm	6331	/	x^2 @ 0	
		46	a	2461	/	c_7 @ 1	
		47	xm	6333	/	☒ x^2 @ 0	
		48	a	1127	/	c_5 @ 1	
		49	xm	6335	/	x^2 @ 0	
		50	a	2408	/	c_3 @ 1	
		51	xm	6337	/	☒ x^2 @ 0	
		52	a	2431	/	C_1 @ 0	
		53	xm	6339	/	x @ 0	
		54	a	2505	/	$\pi/4$ @ 1	
		55	xc	6327	/	☒	
		56	u	2021	/		
0 0 0 0 0 0 0 1	'	57	9	0000000	/	9 @ 7	
		58	b	2044	/		
		59	y	2024	/	☒	
	:	60	u	2024	/		
0 0 0 0 0 0 0 2	'	61	w	7191 3 9 k 2	/	c_7 @ 1	
		62	1	6 6 2 j f 4	/	c_{13} @ 1	
		63	xa	6342	/	☒	

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OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

ROBLEM: Dictator | TRACK 25

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		2500	u	2401	/		
		01	b	[ ]	/		
		02	x	h 6345	/	1 @ q = Exp.	
		03	x	h 6346	/	☒	
		04	u	2463	/		
0000001	'	05	3243	w 6f6	/	π/4 @ 1	
		06	x	b 6342	/		
		07	u	2409	/	☒	
		08	x	d 6351	/		
		09	x	h 6339	/		
		10	x	m 6339	/		
		11	x	h 6333	/	☒	
		12	x	h 6327	/		
		13	x	h 6335	/		
		14	x	h 6329	/		
		15	x	h 6337	/	☒	
		16	x	h 6331	/		
		17	u	2439	/		
0000002	'	18	ww	gk 9408	/	c_{15} @ 1	
		19	5809	j 0000	/	☒ 1/log. 2^e @ 0	
		20	s	1163	/	1 @ 30	
		21	x	t 3160	/	argument < 0 error ----->	
		22	u	2523	/		
		23	a	2545	/	☒ √2 @ 2 + 1 @ 30	
		24	x	c 6339	/		
		25	u	2549	/		
0000002	'	26	1000	0000	/	1 @ 7	
		27	8	0000	/	☒ 1 @ 12	
		28	m	2600	/		
		29	a	2544	/	c_5 @ 7	
		30	x	m 6309	/	Y^2 @ 0	
		31	a	2653	/	☒ c_3 @ 7	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 25

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		25 32	x m	6 3 1 8	/	y^2 @ 0	
		33	a	2 7 1 9	/	c_1 @ 7	
		34	x m	6 3 2 0	/		
		35	a	2 7 5 7	/	☒ .5 @ 7	
		36	u	2 5 4 6	/		
		37	x h	6 3 0 9	/	y^2 @ 0	
		38	u	2 5 3 9	/		
		39	x h	6 3 1 8	/	☒ y^2 @ 0	
		40	u	2 5 2 8	/		
		41	x c	6 3 6 3	/		
		42	c	1 2 0 0	/	0 to exp.	
		43	u	1 4 1 9	/	☒	
0 0 0 0 0 0 2	↑	44	2 4 q	6 j 2 0	/		
		45	2 k 4 l	3 j j q	/	√2 @ 2 + 1 @ 30	
		46	x a	6 3 1 1	/		
		47	m	2 5 1 9	/	☒ 1/log. 2^e @ 0	
		48	u	1 3 3 4	/	normalize ---->	
		49	b	1 2 0 0	/	acc. exp.	
		50	s	2 6 3 6	/	1 @ 29	
		51	d	2 7 3 0	/	☒ 1 @ 24	
		52	u	2 5 5 3	/		
		53	x h	6 3 1 1	/		
		54	u	2 1 3 4	/		
		55	x b	6 3 3 4	/	☒	
		56	u	2 2 2 8	/		
		57	t	2 5 4 1	/	acc = 0	√0 = 0 ---->
		58	x b	6 3 3 0	/		
		59	u	2 2 3 2	/	☒	
		60	x d	6 3 3 9	/		
		61	x h	6 3 2 0	/	Y @ 0	
		62	x m	6 3 2 0	/	y^2 @ 0	
		63	u	2 5 3 7	/	☒	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 26

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0 0 0 0 0 0 1	'	2 6 0 0	l g j f q 9 6		/		
		0 1	m 2 6 4 4		/	Log_2 e@ 3	
		0 2	x h 6 3 2 4		/		
		0 3	t 2 7 0 4		/	X neg char. ----->	
		0 4	r 2 6 5 4		/		
		0 5	u 2 6 2 0		/		
		0 6	a 0 8 2 1		/	1 @ 30	
		0 7	m 2 6 5 7		/	X 2 $\log_{10}$ 2 @ 0	
		0 8	u 2 7 3 1		/		
		0 9	a 0 6 3 1		/	1 @ 1	
		1 0	n 0 4 6 0		/	1 @ 30	
		1 1	u 1 4 1 9		/	X	
0 0 0 0 0 0 8	'	1 2	w w w w w w w j		/		
		1 3	2 4 k 7 6 3 w 2		/	A_1 @ 2	
		1 4	2 5 5 9 q q 2		/	A_q @ 2	
		1 5	2 0 0 0 0 0 0 0		/	X 1 @ 2	
		1 6	7 f 3 q 4		/	A_7 @ 2	
		1 7	l 4 q q 0 q		/	A_6 @ 2	
		1 8	1 5 3 5 1 7 6 6		/	A_2 @ 2	
		1 9	8 q g 6 g j		/	X A_5 @ 2	
		2 0	x c 6 3 0 6		/		
		2 1	s l 2 0 0		/		
		2 2	s 2 7 5 8		/	3 @ 29	
		2 3	t 2 6 5 9		/	X ----->	
		2 4	a 2 7 0 3		/	M_L (1 @ 0)	
		2 5	u 2 6 2 6		/		
		2 6	c 2 6 4 8		/		
		2 7	a l 7 6 3		/	X 1 @ 29	
		2 8	h l 2 0 0		/		
		2 9	u 2 7 1 2		/		
0 0 0 0 0 0 1	'	3 0	3 0 0 0 0 0 0		/	3 @ 7	
		3 1	n l l 6 2		/	X	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 26

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0000005	'	2632	4000	0000	/	1 @ 1	
		33		8	/	2 @ 29	
		34	7www	wwwq	/	1 @ 0	
		35	7www	wwwq	/	X 1 @ 0	
		36		4	/	1 @ 29	
		37	xz	3000	/		
		38	xb	6324	/		
		39	m	[ ]	/	X	
		40	e	2612	/	wwwwwwwj	
		41	a	1763	/	1 @ 29	
		42	h	1200	/		
		43	u	2645	/	X	
0000001	'	44	1715	4764	/	$\log._2 e$ @ 3	
		45	xb	6324	/		
		46	u	2648	/		
		47	xb	0000	/	X	
0000001	'	48	[	]	/		
		49	e	2635	/		
		50	s	0636	/	1 @ 30	
		51	t	2710	/	X char = 1 @ 2	---->
		52	u	2654	/		
0000001	'	53	3k8	q24j	/	$2 \log_{10}$ 2 @ 0	
		54	u	[ ]	/	$2 \log_{10}$ 2 @ 0	
0000001	'	55		ww8	/	X N_L (1 @ 29)	
		56	m	1160	/		
0000002	'	57	4k10	4k42	/		
		58	4k10	4k42	/		
		59	a	6631	/	X	
		60	y	6639	/		
		61	a	6633	/	2 @ 29	
		62	h	[illegible]	/		
		63	s	[illegible]	/	X	

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OB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Lauderman | PROGRAM CHECKED BY: | DATE 9/22/59

OBLEM: DICTATOR | TRACK 27

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		2 7 0 0	x	t 3 1 1 8	/	Error	----->
		0 1	u	2 6 3 8	/		
0 0 0 0 0 0 0 1 '		0 2	1	0 0 0 0 0 0 0	/	1 @ 7	
		0 3	m	1 1 3 3	/	X 1 @ 0	
		0 4	r	2 6 5 4	/		
		0 5	u	2 7 2 0	/		
		0 6	s	2 6 3 5	/	1 @ 1 - 1 @ 30	
		0 7	m	2 6 5 7	/	X 2 $\log_{10}$ 2 @ 0	
		0 8	a	2 6 5 8	/	2 $\log_{10}$ 2 @ 0	
		0 9	u	2 7 3 1	/		
		1 0	b	2 6 3 2	/	1 @ 1	
		1 1	u	1 4 1 9	/	X	
		1 2	b	2 6 4 8	/	Instruction is B2648	
		1 3	s	2 6 5 6	/	M 1160	
		1 4	t	2 6 4 5	/	In range	----->
		1 5	u	2 1 2 0	/	X	
0 0 0 0 0 0 0 4 '		1 6	8	2 3 w k w 1	/	A_3 @ 2	
		1 7	4	0 0 0 0 0 0 0	/	1 @ 1	
		1 8	4	0 0 0 0 0 0 0	/	1 @ 1	
		1 9	g	8 f f 3 g 2	/	X c_1 @ 7	
		2 0	x	c 6 3 0 6	/		
		2 1	s	1 2 0 0	/		
		2 2	s	2 7 5 8	/		
		2 3	t	2 6 5 9	/	X	---->
		2 4	a	2 7 0 3	/	M_L (1 @ 0)	
		2 5	u	2 7 2 6	/		
		2 6	c	2 6 4 8	/		
		2 7	u	2 6 2 8	/	X	
		2 8	n	1 1 5 4	/		
		2 9	x	z 3 4 0 0	/		
0 0 0 0 0 0 0 1 '		3 0		8 0	/		1 @ 24
		3 1	x	h 6 3 1 7	/	X	

RM LP-10 Royal McBee Corporation X CARRIAGE RETURN

LGP-30 CODING SHEET

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OB NO. | PROGRAM NO. - 124 | PROGRAM PREPARED BY: C. Lauderman | PROGRAM CHECKED BY: | DATE 9/22/59

ROBLEM: DICTATOR | TRACK 27

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		27 32	x	h 6318	/		
		33	x	h 6319	/		
		34	x	h 6320	/		
		35	x	h 6321	/	☒	
		36	x	h 6322	/		
		37	m	2616	/	A_7 @ 2	
		38	a	2617	/	A_6 @ 2	
		39	x	m 6318	/	☒	
		40	a	2619	/	A_5 @ 2	
		41	x	m 6320	/		
		42	a	2614	/		
		43	x	m 6322	/	☒	
		44	a	2716	/		
		45	x	m 6317	/		
		46	a	2618	/		
		47	x	m 6319	/	☒	
		48	a	2613	/		
		49	x	m 6321	/		
		50	s	2615	/	1 @ 2	
		51	t	2609	/	☒	------>
		52	a	2717	/	1 @ 1	
		53	x	h 6339	/		
		54	b	1200	/		
		55	a	1027	/	☒ 1 @ 29	
		56	u	2128	/		
0 0 0 0 0 0 0 2	↑	57	2	0 0 0 0 0 2	/	.5 @ 7	
		58		j	/	3 @ 29	
		59	x	b 6331	/	☒ Here for √	
		60	x	t 3116	/	√neg. = error	----->
		61	s	1212	/	1 @ 29	
		62	u	2557	/		
0 0 0 0 0 0 0 2	↑	63		10	/	☒ 4 @ 29	

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LGP-30 CODING SHEET

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 28

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		28 00		4 0 0	/	1 @ 21	
		00 01		z 1 1 3 3	/		
		00 02		a 0 6 3 1	/	1 @ 1	
		00 03		u 2 8 1 9	/	X	
		00 04		x b 6 3 5 4	/	N/2	
		00 05		x d 6 3 5 5	/	X_N	
		00 06		u 2 8 0 7	/		
		00 07		x a 6 3 5 7	/	X $xn/2$	
		00 08		u 2 8 1 1	/		
		00 09		t 2 8 1 8	/	Not done	------->
		01 00		u 2 1 4 0	/	Done	------>
		01 01		x h 6 3 4 7	/	X $X_n + 1$	
		01 02		x s 6 3 5 5	/	X_N	
		01 03		u 2 8 0 9	/		
		01 04		c 1 2 0 0	/		
		01 05		b 2 2 3 0	/	X 1 @ 2	
		01 06		u 2 1 0 3	/		
0 0 0 0 0 0 1	!	01 07		w w 8	/		
		01 08		x b 6 3 4 7	/		
		01 09		x h 6 3 5 5	/	X	
		02 00		m 0 6 4 9	/	.5 @ 0	
		02 01		x h 6 3 5 7	/		
		02 02		u 2 8 0 4	/		
0 0 0 0 0 0 1	!	02 03		2	/	X 1 @ 30	
		02 04		z 1 9 2 6	/		
0 0 0 0 0 0 1	!	02 05		j	/	3 @ 29	
		02 06		r 0 9 4 8	/		
		02 07		u 2 8 4 7	/	X	common output beginning
		02 08		x p 3 2 0 0	/		Stop Code
		02 09		u 2 9 5 8	/		
		03 00		x b 6 3 5 2	/		
		03 01		u 1 2 3 7	/	X	

FORM LP-10 Royal McBee Corporation X CARRIAGE RETURN

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JOB NO. | PROGRAM NO. 1 .124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 28

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		2 8 3 2	r	0 8 4 6	/		
		3 3	u	2 8 2 6	/		
		3 4	x	z 0 0 0 0	/		
		3 5	x	p 3 2 0 0	/	☒	
		3 6	x	z 0 0 0 0	/		
		3 7	u	0 8 1 0	/		
		3 8	m	1 8 1 7	/	1 @ 7	
		3 9	a	2 8 2 5	/	☒ 3 @ 29	
		4 10	y	0 7 5 5	/		
		4 11	s	1 0 2 7	/	1 @ 29	
		4 12	y	0 7 2 8	/		
		4 13	u	2 9 0 1	/	☒	
,0 0 0 0 0 0 1	'	4 14		l w w j	/		
		4 15	x	a 6 3 1 7	/		
		4 16	u	0 9 4 1	/		
		4 17	e	2 1 3 3	/	☒ 7wj00	
		4 18	x	h 6 3 4 2	/		
		4 19	s	2 8 0 0	/	1 @ 21	
		5 10	t	2 9 2 5	/	use acc. ------->	
		5 11	u	2 8 3 8	/	☒	
		5 12	x	c 6 3 1 7	/		
		5 13	u	0 7 2 8	/		
		5 14	b	1 1 0 0	/		
		5 15	u	1 4 3 1	/	☒	
		5 16	s	2 0 0 7	/	1 @ 12	
		5 17	8 0 0 t	2 8 6 0	/		
		5 18	u	1 9 4 6	/		
0 0 0 0 0 0 1	'	5 19	w	8 0 0 0 0	/	☒ 1 @ 7	- 1 @ 12
		6 10	r	0 8 4 6	/		
		6 11	u	2 9 0 5	/		
		6 12	x	z 0 0 0 0	/		
		6 13	u	0 8 1 0	/	☒	

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JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 29

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		2 9 0 0	x z	2 6 0 0	/		
		0 1	x b	6 3 5 1	/		
		0 2	n	0 2 1 0	/	1 @ 29	
		0 3	e	2 1 3 9	/	X	wwj
		0 4	u	2 9 6 1	/		
		0 5	r	0 9 4 8	/		
		0 6	u	2 8 4 7	/	Common output beginning	
		0 7	u	2 9 1 1	/	X	
		0 8	c	1 4 3 0	/	Run or Trace Switch	
		0 9	x b	6 3 5 9	/		
		1 0	u	2 9 2 9	/		
		1 1	x p	2 4 6 1	/	X	Tab
		1 2	b	0 7 5 5	/		
		1 3	x s	6 3 4 2	/		
		1 4	t	2 8 4 5	/	Re-Do	-------->
		1 5	x z	0 0 0 0	/	X	
		1 6	u	2 8 5 4	/		
		1 7	r	0 0 4 6	/	Binarize	
		1 8	u	0 0 5 0	/		
		1 9	u	2 9 3 4	/	X	
		2 0	x c	6 3 4 2	/		
		2 1	u	2 8 5 2	/		
0 0 0 0 0 0 1	'	2 2		2	/	1 @ 30	
		2 3	x c	6 3 0 9	/	X	
		2 4	u	2 8 6 0	/		
		2 5	b	2 9 4 7	/		
		2 6	y	0 7 5 5	/		
		2 7	b	1 4 0 6	/	X	Acc. Char.
		2 8	u	0 7 2 9	/		
		2 9	e	2 9 5 1	/	3wwwq	
		3 0	u	2 9 1 7	/		
		3 1	u	2 9 2 3	/	X	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 29

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		2,9,3,2	n	0,8,4,7	/	1 @ 30	
		3,3	u	2,9,3,7	/		
		3,4	n	2,9,4,9	/	1 @ 30	
		3,5	y	1,1,0,0	/	X	
		3,6	u	1,1,0,0	/		
		3,7	x,h	6,3,5,9	/		
		3,8	b	2,9,5,0	/	B1100	
		3,9	u	2,9,0,8	/	X	
0,0,0,0,0,0,3	'	4,0			/		
		4,1			/		
		4,2	4,0,0,0,0,0,0,0		/	1 @ 1	
		4,3	n	2,9,2,2	/	X 1 @ 30	
		4,4	x,h	6,3,5,9	/		
		4,5	b	2,9,3,1	/	U2923	
		4,6	u	2,9,0,8	/		
		4,7	z	1,2,0,0	/	X	
0,0,0,0,0,0,2	'	4,8	7,w,w,w,w,j	0,0	/		
		4,9		2	/	1 @ 30	
		5,0	b	1,1,0,0	/		
		5,1	3	w,w,w,q	/	X 1 @ 2	
		5,2	x,e	6,3,6,3	/		
		5,3	m	0,5,1,8	/		
		5,4	x,c	6,3,4,0	/		
		5,5	u	1,9,2,6	/	X	
		5,6	a	2,9,4,2	/	1 @ 1	
		5,7	u	1,4,1,9	/		
		5,8	x,z	0,0,0,0	/		
		5,9	x,p	1,6,4,5	/	X	
		6,0	u	2,9,1,2	/		
		6,1	a	2,6,4,7	/	xb0000	
		6,2	x,h	6,3,4,2	/		
		6,3	u	2,8,5,2	/	X	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM: DICTATOR				TRACK 30

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		30 10 10	s	1250	/		
		10 11	xh	6323	/	CTR.	
		10 12	xs	3131	/	63 @ 29	
		10 13	t	3039	/	☒ OK	------>
		10 14	xu	3163	/	error (argument are in table)	
		10 15	a	1027	/	1 @ 29	
		10 16	u	3022	/		
		10 17	r	1257	/	☒ Get A & B	
		10 18	u	1237	/		
		10 19	u	3013	/		
		11 10	b	1132	/		
		11 11	e	3040	/	☒	
		11 12	u	3005	/		
		11 13	b	2361	/	z1151	
		11 14	xs	6300	/	Arg. EXE.	
		11 15	y	3044	/	☒ M[ ]	
		11 16	s	3052	<	Z1134	
		11 17	xt	3163	/	exp. > 17 (too large) ----->	
		11 18	s	0661	/	30 @ 29	
		11 19	t	3043	/	☒ OK ----->	
		12 10	xu	3163	/	Error (exp. >-11) ---->	
		12 11	b	1250	/		
		12 12	y	3058	/	M[ ]	
		12 13	a	1852	/	☒ 1 @ 29	
		12 14	u	3025	/		
		12 15	y	3040	/	S [ ]	
		12 16	xs	3141	/	3 @ 29	
		12 17	u	3000	/	☒	
		12 18	xy	3143	/		
		12 19	a	3051	/	2 @ 29	
		13 10	xy	3145	/		
		13 11	xu	3121	/	☒	

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PREPARED FOR: LGP-30 USERS' ORGANIZATION - POOL | PAGE 02 OF 1

JOB NO. | PROGRAM NO. 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

PROBLEM: DICTATOR | TRACK 30

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
		3 0 3 2	b	2 9 0 0	/	xZ2600	
		3 3 3	y	0 9 5 3	/	Print 0	
		3 3 4	u	0 9 5 1	/		
		3 3 5	b	2 1 5 7	/	X	
		3 3 6	x e	6 3 5 1	/		
		3 3 7	n	1 8 5 2	/	1 @ 29	
		3 3 8	x u	3 1 3 6	/		
		3 3 9	b	2 3 6 1	/	X zl151	
		4 0	s	[ ]	/	exp.	
		4 1	y	3 0 5 6	/		
		4 2	u	3 0 5 6	/		
		4 3	x b	6 3 5 8	/	X arg. char.	
		4 4	m	[ ]	/		
		4 5	x c	6 3 3 1	/	shifted arg. exp.	
		4 6	u	3 0 2 1	/		
0 0 0 0 0 0 .2	'	4 7			/	X	
		4 8			/		
		4 9	s	1 4 0 0	/		
		5 0	u	1 6 3 0	/		
0 0 0 0 0 0 0 1	'	5 1		8	/	X 2@29	
		5 2	z	1 1 3 4	/		
		5 3	b	0 9 1 1	/	xz2200	
		5 4	y	0 9 5 3	/	Print 5	
		5 5	u	0 9 5 1	/	X	
		5 6	b	[ ]	/	Shift constant	
		5 7	u	3 0 5 8	/		
		5 8	m	[ ]	/	char of table	
		5 9	x s	6 3 3 1	/	X Fixed point arg.	
		6 0	t	3 0 1 1 0	/	Repeat ----->	
		6 1	b	3 0 1 4 0	/	s[ ]	
		6 2	x s	3 1 1 4 1	/	3 @ 29	
		6 3	u	3 0 2 8	/	X	

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JOB NO.	PROGRAM NO. 124	PROGRAM PREPARED BY: C. Laudeman	PROGRAM CHECKED BY:	DATE 9/22/59
PROBLEM:	DICTATOR			TRACK - 1

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	X					
0C198410		-100	xe	0000	/		
00000002	'	01	78	0000	/		
		02	40	0000	/		
		03	xs	3112	/	X	
		04	xt	3106	/		------->
		05	xu	4245	/		
		06	xc	6363	/		
		07	xu	3109	/	X	
00000001	'	08	200	0000	/		
		09	xb	4745	/		
		10	xc	5160	/		
		11	u	5113	/	X	
00000001	'	12	300	0000	/		
		13	xc	6363	/		
		14	xb	3100	/		
		15	xu	3110	/	X	
		16	xb	3142	/	xz3800	
		17	xu	3139	/	Print 9	
		18	xb	5929	/	xz3400	
		19	xy	4153	/	X Print 8	
		20	xu	4151	/		
		21	xs	3850	/	1 @ 29	
		22	xy	3151	/		
		23	xa	4759	/	X 2 @ 29	
		24	xy	3153	/		
		25	xu	6235	/		
		26	xy	3155	/		
		27	xa	4263	/	X 2 @ 29	
		28	xy	3157	/		
		29	xs	5958	/	3 @ 29	
		30	xu	3132	/		
		31	xz	0063	/	X	

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LGP-30 CODING SHEET

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OB NO. | PROGRAM NO. M - 124 | PROGRAM PREPARED BY: C. Laudeman | PROGRAM CHECKED BY: | DATE 9/22/59

ROBLEM: DICTATOR | TRACK -1

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION OPERATION	INSTRUCTION ADDRESS	STOP	CONTENTS OF ADDRESS	NOTES
	/						
	/	☒					
		-1 3 2	x y	3 1 4 7	/		
		3 3	x a	3 6 1 2	/	2 @ 29	
		3 4	x y	3 1 4 9	/		
		3 5	x u	3 1 4 3	/	☒	
		3 6	x a	4 2 5 8	/	1 @ 29	
		3 7	x a	6 3 2 3	/	CTR.	
		3 8	x u	3 1 2 6	/		
		3 9	x y	4 1 5 3	/	☒	
		4 0	x u	4 1 5 1	/		
0 0 0 0 0 0 1	'	4 1		j	/	3 @ 29	
		4 2	x z	3 8 0 0	/		
		4 3	b	[ ]	/	☒ I.T.	
		4 4	x h	0 0 0 2	/		
		4 5	b	[ ]	/	I.T.	
		4 6	x h	0 0 0 4	/		
		4 7	b	[ ]	/	☒ D.T.	
		4 8	x h	0 0 0 6	/		
		4 9	b	[ ]	/	D.T.	
		5 0	x h	0 0 0 8	/		
		5 1	b	[ ]	/	☒ I.T.	
		5 2	x h	0 0 0 3	/		
		5 3	b	[ ]	/	I.T.	
		5 4	x h	0 0 0 5	/		
		5 5	b	[ ]	/	☒ D.T.	
		5 6	x h	0 0 0 7	/		
		5 7	b	[ ]	/	D.T.	
		5 8	x h	0 0 0 9	/		
		5 9	x u	4 6 3 0	/	☒	
		6 0	x b	5 8 3 7	/	xz 3000	
		6 1	x y	4 1 5 3	/	Print 7	
		6 2	x u	4 1 5 1	/		
		6 3	x z	0 0 0 0	/	☒	

M LP-12 Royal McBee Corporation ☒ CARRIAGE RETURN