COMPUTER SYSTEMS LABORATORY
WASHINGTON UNIVERSITY
ST. LOUIS, MO. 63110

LINC Document No. 1 July 1969

Index of LINC Documents

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* Starred items are maintained by the authors and hence are available for local distribution only. Elsewhere they can be obtained from the sources indicated in the abstracts. Non-starred items are Computer Systems Laboratory documents, generally available to all LINC users.

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Abstracts

LD0* 8/15/68 LINC Documents Reference Manual

The manual is a guide to submitting, documenting and procuring the LINC documents described in LD1.

LD1 7/69 Index of LINC Documents

The Index is intended to describe items of current interest to Computer Systems Laboratory LINC users, primarily programmers.

LD2 7/23/63 LINC Control Console M. A. Wilkes

The operation of the classic LINC console functions is explained.

LD3 LINC Vol. 16, Programming and Use-I

LD3 is composed of LINC Document No. 37, No. 4 and No. 6.

LD4 1/69 Programming the LINC, 2nd edition

M. A. Wilkes and W. A. Clark

The volume, published in 1965, is an introduction to basic programming concepts and techniques, specifically LINC programming. The second edition corrects errors, and includes LINC Documents No. 27 and No. 35.

LD5 9/21/65 EXAM and STC S. M. Ornstein

EXAM does not always work in the upper memory of the classic LINC.

LD6 5/1/67 LAP6 Handbook M. A. Wilkes

LAP6 is an on-line program for the 2048-word LINC which uses the LINC keyboard and scope for communication with the user, and the magnetic tapes for storage and working area. It may be used for preparation and editing of any character string (manuscript) or specifically for LINC program preparation.

(Cont. on next page.)

(LD6 cont.) LAP6 handles the manuscript display in such a way that any portion of the manuscript can be displayed at any time and edited directly by simply adding or deleting lines. Changes are shown integrated with the manuscript display as the user types.

Meta commands provide automatic filing of manuscripts and programs on LINC tapes and handle the conversion and memory loading of LINC binary programs. Debugging aids include displays of symbol tables and errors, and repeatable access to the manuscript display for editing and reconverting. Meta commands may be added by the user to suit his needs. - author abstract.

LD7 5/1/67 LAP6 Manuscript Listings M. A. Wilkes

Procedures for assembling, configuring and modifying LAP6 are included with the teletype listings.

LD8* 5/31/67 DBLFLT M. D. McDonald, Biomedical Computer Laboratory, Washington Univ., 700 S. Euclid Ave., St. Louis, Mo. 63110

Biomedical Computer Laboratory Tech. Rep. No. 2. DBLFLT is a package of double precision floating point subroutines written for a basic (1K) LINC which can interpret the instructions ZTA (MSC 5), ZZZ (SKP 15) and OVF (SKP 14). The subroutines occupy all but six locations of two quarters and have been origined so as to reside in quarters 2 and 3. - author intro.

LD9 7/31/67 LAP6-2L M. A. Wilkes

LAP6 is modified for the μ-LINC 1 with unbuffered teletype printer.

LD10 8/14/67 LAP6-3L M. A. Wilkes

LAP6 is modified for LINC-8 operation.

LD11* 9/18/67 LAP6-1S F. T. Davidson, Spear, Inc., 335 Bear Hill Rd., Waltham, Mass. 02154

LAP6 is modified for the μ-LINC-300 with buffered teletype printer.

LD12* 9/18/67 LAP6-2S F. T. Davidson (see LD11)

LAP6 is modified for the μ-LINC-300 with buffered Kleinschmidt printer.

LD13* 9/18/67 LAP6-3S F. T. Davidson (see LD11)

LAP6 is modified for the μ-LINC-300 with unbuffered teletype printer.

LD14 7/69 Bibliography of LINC-Related Publications

A publication of the LINC Reference Library supplies all known references of documented LINC applications. The Bibliography is primarily research oriented.

LD15* 10/21/67 LAP6-1D R. M. Joy, Dept. of Pharmacology, Stanford Univ., Palo Alto, Calif. 94304

LAP6 is modified to make the COPY BINARY command more flexible.

LD16 12/1/67 LAP6-4L M. A. Wilkes

LAP6 is modified for μ-LINCs with no knobs.

LD17* 12/10/67 LAP6-1W C. C. Bjerke, Laboratory Computer Facility, Univ. of Wisconsin, 83 Medical Sciences Bldg., Madison, Wis. 53706

LAP6 is modified so that the FREE meta command can be given arguments.

LD18* 12/18/67 LAP6-5W C. C. Bjerke (see LD17)

LAP6 is modified to exclude the LINC-8 program of operation, PROGOFOP, from the LAP6 file area.

LD19* 12/21/67 LAP6-2W C. C. Bjerke (see LD17)

LAP6 is modified to make COPY BINARY and COPY MANUSCRIPT more flexible.

LD20* 12/27/67 Q&A M. D. McDonald (see LD8)

The Questions and Answers (Q&A) program for the LINC is a subroutine that allows the user to display textual information on the scope, ask questions of the viewer, and receive responses thereto. Character codes are compatible with LAP6 text. This Q&A is totally incompatible with the LAP4/GUIDE version. - author abstract.

LD21* 2/1/68 LAP6-1C W. H. Calvin, Univ. of Washington, Sch. of Medicine Seattle, Wash. 98105

LAP6 is modified for the LINC-8 and fanfold paper operation.

LD22* 2/9/68 LAP6-8W D. J. Nichols, Laboratory Computer Facility Univ. of Wisconsin, 83 Medical Sciences Bldg., Madison, Wisc. 53706

LAP6 is modified to print a NAME at the head of an index printout.

LD23* 2/21/68 LAP6-9W A. C. Roochvarg, Laboratory Computer Facility Univ. of Wisconsin, 83 Medical Sciences Bldg. Madison, Wisc. 53706

LAP6 is modified to print the symbol table during CV or DS.

LD24* 2/21/68 LAP6-6W A. C. Roochvarg (see LD23)

LAP6 is modified to make COPY FILE more flexible.

LD25 3/10/68 A few thoughts upon first approaching a LINC M. A. Wilkes

A step-by-step procedure describes mounting tapes and starting the LINC at the console; to be used in conjunction with LAP6.

LD26* 5/7/68 LAP6-1H G. W. Johnson, Institute of Oceanography Dalhousie Univ., Halifax, Nova Scotia, Canada

LAP6-3L is modified so the commands PX, LI, and PM use either high-speed punch or teletype.

LD27 6/1/68 User's Guide to LINC Variants M. A. Wilkes

A summary chart outlines the main differences between the classic LINC, micro-LINC 1, micro-LINC-300, and LINC-8 that affect programming.

LD28 4/29/69 LINC Users and Installations

Names and addresses of primary LINC, LINC-8, and micro-LINC users.

LD29 7/1/69 LAP6 Modifications M. A. Wilkes, ed.

A summary describes some of the LAP6 variations which might be of general interest. The modifications described are modifications to LAP6 itself unless otherwise indicated, and can be made with minimal effort to assembled copies of LAP6. The number of LAP6 words changed is indicated for each modification.

LD30 6/12/68 LAP6A M. A. Wilkes

Modifications are made to correct three errors in LAP6, making it the version distributed by the Laboratory as of 6/68. The LAP6 Handbook is not affected. LAP6A is compatible with all modifications described in LD29.

LD31 8/15/67 LAP6A Master Tape (write-up) M. A. Wilkes

Support documentation describes the contents of the LAP6A Master Tape (LD32) available from the Laboratory. The tape contains seven configurations of LAP6A and five special programs or manuscripts.

LD32 6/68 LAP6A Master Tape (magnetic tape) M. A. Wilkes

LD33 6/68 FLOS AND FLOD C. E. Molnar

Computer Systems Laboratory Tech. Rep. No. 8. This report describes two related LINC subroutine packages for floating point arithmetic. FLOS is a single-precision package written with speed and efficiency in use of memory space as the principal objectives. FLOD is a double-precision package which uses a similar number format and identical calling sequences. Both include subroutines for addition, subtraction, multiplication, division, fix, and float. Programs written to use FLOD can be run in single-precision using FLOS with minimal changes. - author abstract.

LD34 7/68 Instructions for Using the Motorola Printer G. C. Johns

Two programs are available for the Motorola Printer. FST lists LINC LAP6 manuscripts preceded by a symbol table. FML is a print manuscript program.

LD35 8/5/68 Programming the LINC Appendix III: LINC Modifications
M. J. Stucki and M. L. Pepper

In August 1965 an interrupt feature, the Z Register, and five new instructions were made available on the LINC.

LD36 7/69 LAP6A Configuration Summary M. A. Wilkes

Standard configuration, and LAP6A configurations 1 - 12 are available as described upon receipt of a marked tape.

LD37 4/65 Introduction to Binary Numbers and Binary Arithmetic
I. Thomae

The introduction includes number base conversion procedures, ones' complement arithmetic, binary addition, multiplication, and division.

LD38 8/24/68 CURVE C. Bryan

CURVE is a program which allows selected portions of a data curve to be displayed in an expanded form.

LD39 10/9/68 LAP6(A)-6L M. L. Pepper

LAP6 is modified to operate the teletype on either the classic LINC or the Micro-LINC, and knob 3 is used to control the number of lines displayed. - author abstract

LD40 2/7/69 LAP6-7L or LAP6A-7L M. L. Pepper

The keyboard combination: CASE DEL deletes the last character entered on the current line of a LAP6 manuscript. An EOL cannot be deleted, that is, it is impossible with CASE DEL to delete back into the previous line. The function of DEL, by itself, has not been changed. - author abstract.

LD41 2/14/69 LAP6-8L or LAP6A-8L M. L. Pepper

Two corrections have been made to the teletype routines:
a) The last page of a PM is full length.
b) PM, PX, and LI print full 11-inch pages. - author abstract

LD42 2/14/69 LAP6-9L or LAP6A-9L M. L. Pepper

Instead of displaying the current line marker at the far right, it is displayed at the position of the next character to be entered. - author abstract

LD43 2/17/69 LAP6-10L or LAP6A-10L M. L. Pepper

LAP6A-10L is a combination of LAP6 modifications 6L, 7L, and 8L. It includes:
1. Single character delete
2. Corrections to the teletype routines
3. Compatibility between the classic LINC and the micro-LINC 300. - author abstract

LD44 3/21/69 LAP6-11L or LAP6A-11L M. Seiden

Location statements in LAP6 can include any expressions which are legal for the right side of an equality statement. - author abstract

LD45 3/28/69 PRINT-7 M. J. Stucki

PRINT-7 is a general purpose subroutine providing a flexible teletype printout facility for both the classic LINC and the SPEAR LINC. TTCODE-7 is the table of teletype codes used by PRINT-7. - author abstract

LD46 4/17/69 PROGLO P. Handler and M. Seiden

PROGLO is a routine to permit loading from a LAP6 file in a manner similar to the LAP6 meta command *LO*. The program to be loaded is specified by name and unit. - author abstract.

LD47* 8/68 Binary-to-LAP6 Disassembler (BINLAP6)

C. C. Bjerke (see LD17)

BINLAP6 disassembles a binary program stored on LINC tape to an equivalent LAP6 manuscript. Locations which are referenced by the address fields of instructions are tagged. The user may specify that certain areas be converted to octal numbers or text, rather than instructions. - author abstract

LD48* 11/6/68 L6DISASS

C. M. Malpus, The University of Leeds, Dept. of Physiology, The School of Medicine, Leeds 2, Eng.

L6DISASS is a disassembler program. It converts a binary program in the lower LAP6 binary working area into a LAP6 manuscript with symbolic and relative addressing, and adds this to the current LAP6 manuscript. - author abstract

LD49* 9/68 COMPARE

D. J. Nichols (see LD22)

COMPARE will compare the contents of two sets of LINC tape blocks. Errors are either displayed on the LINC scope or printed on the Teletype. - author abstract

LD50* 6/10/68 FIND 1

R. A. Harshman, UCLA, Dept. of Linguistics, 405 Hilgard, Los Angeles, Calif.

FIND 1 allows the user to define catagories or classes of data sets to be searched for in a large file. It then locates and retrieves relevant data from the files stored on magnetic tape. Files can be written in natural language (e.g., English) and entries need not be specially coded for subject headings or cross references. It is possible to search for data fitting into categories not anticipated when the file was created.

The files are created and stored as LAP6 manuscripts. - author abstract

LD51* 8/68 LINC Tape Dump (TAPEDUMP)

M. S. Lenahan, Laboratory Computer Facility, Univ. of Wisconsin, 83 Medical Sciences Bldg. Madison, Wis. 53706

TAPEDUMP will print the contents of LINC tape with octal, unsigned or signed decimal, or octal and alphanumeric conversions. The output device may be either the LINC Teletype or a line printer. - author abstract

LD52* 10/67 Averager System for the Classic LINC

D. J. Nichols (see LD22)

"The averager system consists of three programs." AVERAGER computes "the average response of some signal-generating device to a series of excitations. AVELIST produces a list of blocks containing data from the program AVERAGER." LATAMP measures latency and amplitude for the user.

LD53* 8/11/67 Instructions for Using LINC-CALCOMP Plot Subroutine Package (LAP6).*

A. M. Engebretson and D. J. Manson Biomedical Computer Laboratory, Washington Univ., 700 S. Euclid Ave., St. Louis, Mo. 63110

LD54* 8/8/68 FLOPDLN, FACTORAL, and FPSINCOS, A Set of Double Precision Floating Point Routines for the LINC to be used with the FLOD Floating Point Package

Jay E. DeJongh, Digital Speech Compression Branch, Data Sciences Lab., Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Bedford, Mass.

Report No. CRBS-68-01.
This report describes three double precision floating point routines for the LINC.
1. FLOPDLN calculates $\ln_e N$ and $\log_{10} N$.
2. FACTORAL calculates N!
3. FPSINCOS calculates sin N and cos N. - author abstract

LD55* 12/11/68 LAP6DISP C. M. Malpus (see LD48)

A subroutine to display strings of characters on the scope display. The characters are entered into the main program using the text facility of LAP6,....Up to 15 lines of text, each containing up to 24 characters, may be entered. The display self-centers vertically. - author abstract

LD56* 6/18/69 LAP6-2H G. W. Johnson (see LD26)

LAP6 is modified to make the COPYFILE, PRINT INDEX, and DISPLAY INDEX commands more flexible.

LD57* 6/69 GRAPHX D. J. Manson (see LD53)

Biomedical Computer Laboratory Monograph No. 114. GRAPHX is an interpreter designed to read and execute a control manuscript which has been typed and edited under LAP6 control. The system facilitates CALCOMP data plotting and may be used to provide, in a variety of formats, a hard copy plot of any single precision data on tape. In addition to plotting figures, GRAPHX is designed to act as a master control system to direct the execution of data acquisition or manipulation routines. - author intro.

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Contents

LD58 7/69 TAPESPY M. Seiden

This program displays the contents of tape as characters or in graphical form. Adjacent tape blocks may be viewed by adjusting knob zero, to control both the speed and direction of the scan. On the Spear Micro-LINC 300, the program uses buffered tape instructions for continuous display. - author abstract
See also LD59.

LD59 7/69 TAPESPY (Program Listing and Documentation) M. Seiden

A flowchart, listings, and additional program notes on TAPESPY described in LINC Document No. 58.

LD60 7/69 FIND1-1L M. Seiden

FIND1-1L is a modification of FIND1R (LD50). Instead of printing its results on the teletype, it creates a LAP6 manuscript in the working area of the unit 1 tape. - author abstract

LD61 7/69 FIND1μL M. Seiden

FIND1μL is a modification of FIND1R (LD50) to print on the Spear Micro-LINC teletype using OPR 42 or on the classic LINC. The keyboard answering procedure has been modified.- author abstract

LD62 7/10/69 SCAN M. J. Stucki

The subroutine SCAN provides a general purpose mechanism for scanning a string of characters (6-bit) stored on LINC tape. Scanning takes place on a quarter of memory (any quarter) assigned to the routine and into which the routine reads the character string block at a time. - author abstract

LD63 8/13/69 WHICH P. Handler

WHICH is a short routine that jumps to different locations depending on which LINC-type computer is used to run it, allowing automatic adjusting of programs. - author abstract

LD64 5/66 LAP5: LINC Assembly Program M. A. Wilkes

Reprint from Proc. DECUS Spring Symp., Boston, May 1966. The LAP6 editing and COPY FILE algorithms are described.

LD65* 3/65 A LINC Utility System

M. D. McDonald, S. R. Davisson, and J. R. Cox, Jr.
Biomedical Computer Laboratory, Washington Univ., 700 S. Euclid Ave., St. Louis, Mo. 63110

Biomedical Computer Lab. Tech. Rep. No. 1. For the 1024-word LINC. "This utility system is composed of ... LAP4 ... and GUIDE .... LAP4 operates on the manuscript of a symbolic program and aids in its creation, display, filing and retrieval, modification, and conversion to a binary program. GUIDE operates on binary programs and assists in the maintenance of a file of binary programs and in the execution of programs in this file." - author intro.

LD66* 6/1/67 LINC Computer User-Interactive Programs and Macro Instructions

W. E. Reynolds, R. B. Tucker, T. B. Coburn, and J. C. Bridges, Dept. of Genetics, Stanford Univ. School of Medicine, Palo Alto, Calif.

Dept. of Genetics Tech. Rep. No. IRL-1055. This report describes four program packages. (1) A program package which enables the LINC and a Teletype to be used as a very sophisticated desk calculator including graphical output with a Calcomp plotter. (2) A general purpose double precision floating point subroutine package. (3) A set of input-output routines providing for the communication of octal, decimal and alphanumeric information via a Teletype. (4) Additional information on the LOSS system (see "An Operating System for the LINC Computer," R. K. Moore, NASA Technical Report No. IRL-1038) under which the above packages may be used. - author abstract

(5)

LD67* 5/5/67 CROSSREF R. C. Schroeppel, Eaton-Peabody Lab., Massachusetts Eye and Ear Infirmary, 243 Charles St., Boston, Mass. 02114

Prints the tags contained in a LAP6 or LAP4 manuscript and the line numbers which contain references to them. - author abstract

LD68* 3/23/68 AVERAGE C. M. Malpus (see LD48)

This program constructs an average transient of repetitively evoked events input through one of the analogue channels. The average transient is displayed with a calibration. - author abstract

LD69* 7/68 Print Manuscripts (PRINTMSS) D. J. Nichols (see LD22)

PRINTMSS provides a convenient means of listing more than one [LAP6] manuscript without operator action between each manuscript. The output device may be either the Teletype or line printer. - author abstract