



## OLDAS: An On-Line Continuous System Simulation Language

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OLDAS (An On-Line Digital Analog Simulator) is a tool for the simulation of continuous systems, or more simply, for the solution of differential equations. It is a conversational system that provides a user with the means to construct, modify, and run programs written in the MIMIC language [1].

OLDAS operates in a time-shared mode on an IBM 360/40. The user terminal consists of an IBM 2250 display with a light-pen, alphanumeric keyboard, character generator, vector generator, and a 4K buffer. A 2311 disk pack drive is utilized for storage of user programs in both source and compiled forms, input data, and results of program runs.

There are three displays through which the user interacts with OLDAS. The displays, called the PROGRAM, OPTIONS, and OUTPUT displays, present key words or phrases which the user selects with the light-pen to exercise the functions of the system. The PROGRAM display provides a user with the means to construct a MIMIC program, store it on the disk, retrieve it, change it, and enter it into the processor for compilation and sorting. The program is displayed and stored in the form of pages of which there are three types: PARAMETER, PROGRAM, and FUNCTION. The PROGRAM display is shown in Fig. 1 with a PROGRAM page. From this display the user may also bring in previously compiled versions of a program for execution from the disk. These compilations are referred to as machine states and there are two types: TIME 0 and TIME N. These states contain all the information needed to execute a program from its initial conditions, or to resume execution from some point in the course of a run.

The OPTIONS display shown in Fig. 2 is used to specify integration options, set up the OUTPUT display, and designate results to be saved on the disk. Parameters may be displayed on request and changed if desired. The

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PROGRAM NAME PAGE PROGRAM
LOAD(P)(U) STORE(P)(U) ENTER KILL START
DELETE
LCV BEGIN Y EXPRESSION
SET INITIAL ELEVATION ON ENTER
INIT INIT LOGIC TRUE.TRUE.FALSE)
ITERATION CONTROL LOGIC TRUE.TRUE.TRUE.FALSE)
CYSEN PSN(Y.TRUE.TRUE.FALSE)
NYSEN PSN(CYSEN.1.)
YSEN NOT(NYSEN)
PROJECTILE PATH
YDOT INT((0.YSEN.N.TRUE.YSEN)
Y INT(YDOT.1.TRUE.YSEN)
XDOT INT((0.YCOS.TRUE.YSEN)
INT(XDOT.0.TRUE.YSEN)
ELEVATION ANGLE CORRECTION
DE TRANGE=X
DEGRATE DEGRATE
TS TS(DEGRATE+TS2.YSEN.0.)
TS( TS1.CYSEN.0.)
DELANG TS2=DELANG
YSENIN YSEN=N(DELANG)
YSCOS YSCOS=DELANG)
SAMPLE CONTROL LOGIC
DTN PSN(X-DEGRATE.FALSE.FALSE.TRUE)
DT PSN(Y-DEGRATE..00..00.1.)
CYSEN PSN(DTSEN)
CYSEN SCL(1.)
TERMINATE ON DEA
DEA APS(DE)
PRINT..DEA)
END

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FIG. 1. PROGRAM display.

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OPTIMUM
INTEGRATION
MAXIMUM INTERVAL _____
MINIMUM INTERVAL _____
RECORDING INTERVAL _____
ELAPSED TIME FOR RECORDING INTERVAL 1. _____

DISPLAY
DIGITAL X _____ Y _____ Z _____
GRAPHICAL X _____ Y _____ Z _____
          X MIN _____ MAX _____
          Y MIN _____ MAX _____
          Z MIN _____ MAX _____

SAVE _____

DISPLAY PARAMETER INITIAL _____ 0.1000000000
ENTER PARAMETER _____

DISPLAY CURRENT VALUE OF RESULTS _____

BEGIN COMPUTATION AT TIME ZERO DERIV SAVE PREVIOUS SAVED VALUES
CONTINUE COMPUTATION
SAVE CURRENT MACHINE STATE
RESTORE SAVED MACHINE STATE
RESTORE MACHINE STATE TO SAVED TIME ZERO STATE
RETURN TO PROGRAM DISPLAY
END RUN

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current value of results may also be displayed. The TIME 0 and TIME N states are saved from this display and may also be brought in as from the PROGRAM display. When the user commands execution to begin or to resume, the OUTPUT display comes up. On this display, see Fig. 3, results are plotted and displayed digitally as execution proceeds. The user is therefore able

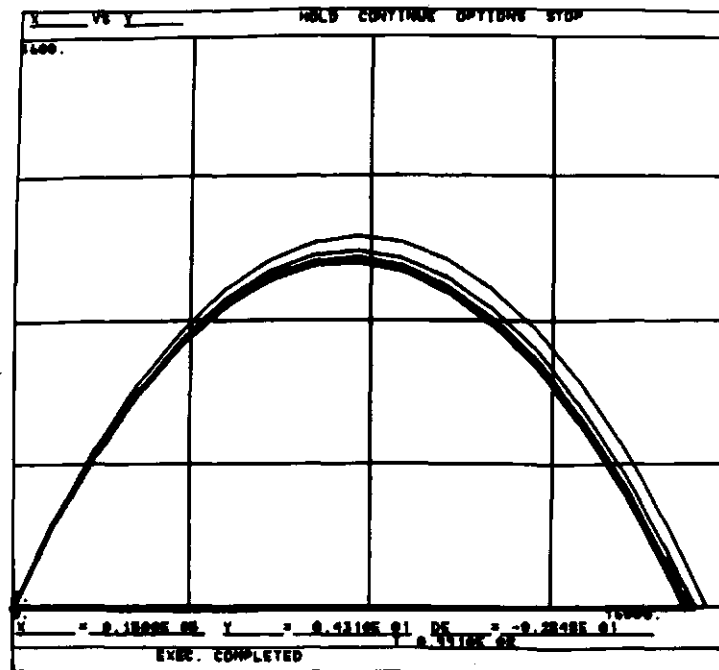


FIG. 3. OUTPUT display.

to monitor a run dynamically. Execution can be halted at any time and return made to the OPTIONS display where any program or system parameters can be inspected and/or changed and execution resumed. From the OPTIONS display, return may be made to the PROGRAM display to change the source code or to start a new program.

OLDAS first went into use in April 1967. Since then usage has steadily increased to the point where it is now quite heavy. Some of the areas in which the system has been successfully used are fire control system simulation, optimization studies, exterior and terminal ballistics, spectrum analysis, and curve fitting.

## REFERENCE

1. PETERSEN, H. E., and SANSOM, F. J., MIMIC—A Digital Simulator Program, SESCO Internal Memo 65-12, Directorate at Computation, Deputy for Studies and Analysis Systems Engineering Group, Wright-Patterson Air Force Base, Dayton, Ohio, 1965.