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Semiannual Technical Summary

Graphics

30 November 1966

Lincoln Laboratory

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Lexington, Massachusetts
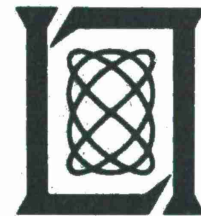
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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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# GRAPHICS

SEMIANNUAL TECHNICAL SUMMARY REPORT
TO THE
ADVANCED RESEARCH PROJECTS AGENCY

1 JUNE 1966 – 30 NOVEMBER 1966

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LEXINGTON   MASSACHUSETTS
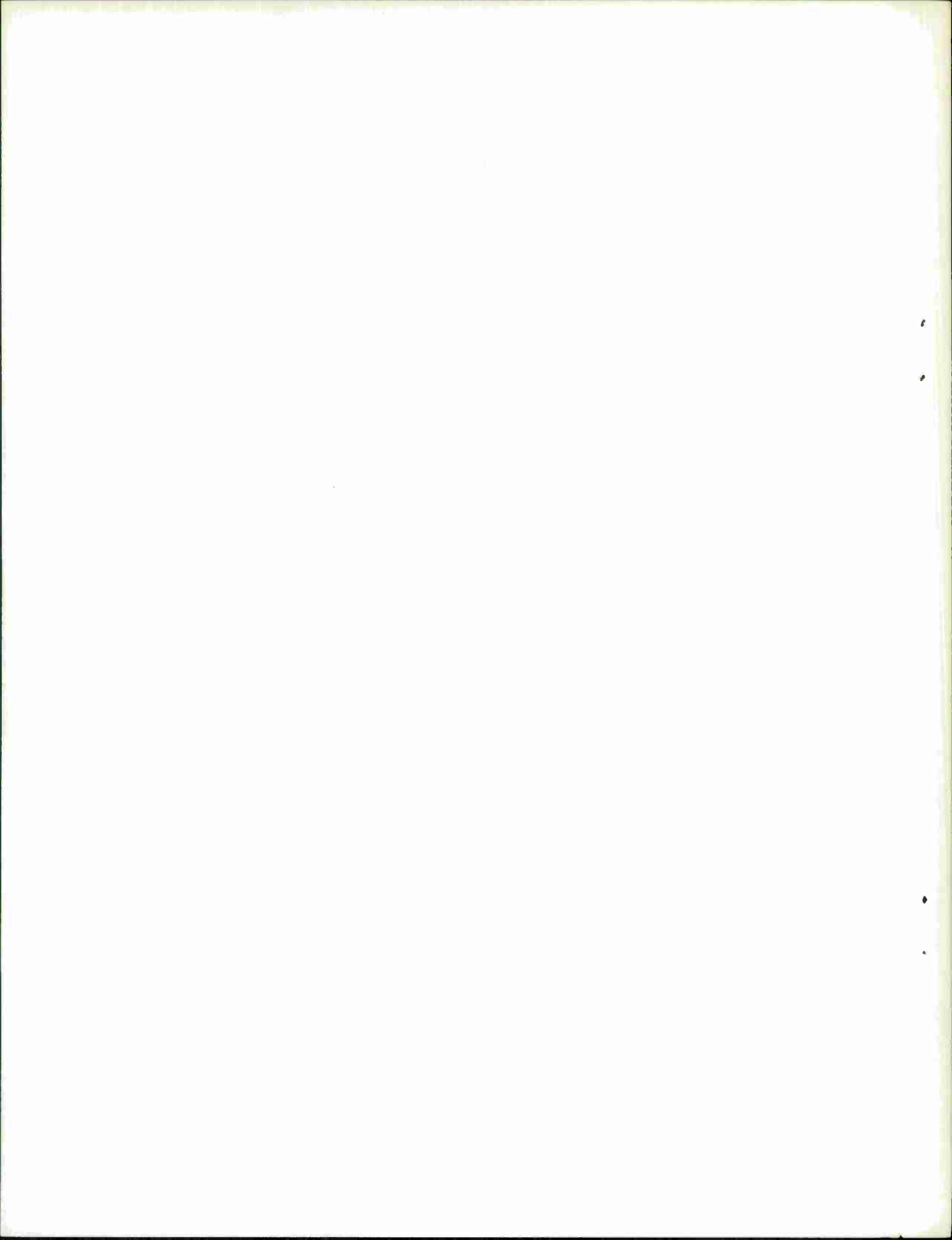
ABSTRACT

The new APEX display executive is operational. The compiler-compiler, VITAL, has been used to generate a number of compilers, including one for a second version of CORAL. A CRT display sequence is being constructed which will incorporate both the newly designed conic waveform generator and a character generator, and will handle as many as ten display stations. The Harvard remote terminal will be checked out during the next quarter. The hardware and software for the first phase of the SDC network experiment are completed — experimentation is under way.

CONTENTS

GRAPHICS

I. GRAPHICAL SERVICE SYSTEM

During this past reporting period, the new APEX display executive has been completed and placed in operation. It provides considerable speed improvement as well as shifting the main display burden from the main frame to a SNAT channel. A preliminary version of the CORAL II programming system is operating, although considerably more development remains. The CORAL II action routines are complete and debugged; the compiler (made with VITAL) is working while being revised and improved.

During the next few months, a light pen, Rand Tablet and 3-D wand input executive features will be added to APEX. In addition, the basic input and syntax phases of the VITAL system will be augmented and improved for graphical input languages and general-purpose interactive typed languages; i.e., the flexible input features of VITAL need not be usable only with actions which compile code.

II. VITAL

The TX-2 compiler-compiler, VITAL, has been debugged and modified sufficiently to be used to create several compilers. The system is convenient to use; the major additions remaining to be finished are an input-output format facility and relocatable code generation. This latter feature will also be added to the M5 assembler. The relocatable code from either source (M5 or a VITAL compiler) can then be combined by a loader which is under development.

III. NEW DISPLAY SEQUENCE

A new CRT display sequence for the TX-2 computer has been designed and is under construction. Included in the system is a conic waveform generator, character generator, and the ability to multiplex a maximum of ten display stations. The waveform generator is based on the homogeneous coordinate system which allows easy program manipulation of display patterns. The generator uses multiplying digital-to-analog decoders in a hybrid configuration to generate the horizontal and vertical deflection signals for the CRT's. A commercial symbol generator will provide the alphanumeric symbols.

The multiplying decoder, the key component of the generator, has been designed. Closed-loop bench tests in which conic sections were generated have been made. The digital data buffers and control sections have been completed and the analog section is now under construction.

The digital control for this new display is designed to allow easy addition of new features, such as storage displays, input tablets or 3-D wands. It also makes use of feedback signals from individual CRT deflection systems to initiate the next operation. Thus, fast and slow deflection CRT displays can be mixed without compromising their individual capabilities.

IV. THREE-DIMENSIONAL WAND

A paper on the Lincoln Wand was presented at the Fall Joint Computer Conference. A film was also made which shows the wand being used to construct and manipulate objects in 3-D

perspective, using the hidden-line routines previously developed. The film also demonstrates the use of the wand for control function pointing as well as drawing.

V. HARVARD REMOTE TERMINAL

Most of the code necessary to generate and maintain the display files, including the conic expander, has been coded, punched onto tapes and assembled once to check for undefined tags, address violations, etc. All the display routines will be assembled for the second time in the near future. When the PDP-338 is available, the display package will be ready to load and debug.

Design of the interrupt calls for the network is awaiting final definition of the interrupt handler for TX-2.

VI. COMPUTER NETWORK STUDY

During the past quarter, the low-speed data channel and the data terminal were finished. The low-speed data terminal is a new input-output sequence (Sequence 57) for the TX-2 computer. This sequence will handle a large number of concurrently operating low-speed input-output devices in a random, interleaved fashion. Automatic selection of the highest priority unit is provided. The data terminal is the first input-output unit to be connected to the above data channel. It provides the hardware necessary for automatically placing or answering calls on the Western Union Broadband Switching Exchange and then sending data in an ASCII-compatible, asynchronous format at 1200 bits/second. This equipment will be used in the computer network experiments with System Development Corporation.

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14. KEY WORDS

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