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PROPOSALS FOR THE MCR DISPLAY MINI-COMPUTERS

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Introduction

Two Imlac PDS 1 display mini-computers have been ordered for installation in the MCR. The first will have two display consoles (with keyboards) attached to one processor unit and the second will have one display console and keyboard. Both will have 4 K of 16 bit core store. The first, which will have a light pen, will be dedicated to

a) injection (first display console)

b) PS operation (second console - eventually in place of CODD).

The second PDS 1 will be dedicated to the PSB. The injection and PS operation display consoles will back each other up and the two PDS 1's will back each other up.

The interface hardware to connect these two computers to the IBM 1800 is being designed and built (G. Baribaud and C. Guillaume). The software is being designed and the purpose of this note is to outline the present proposals. Will anyone with objections or suggestions please contact the author as soon as possible. Notes containing more detailed information will be available later.

Delivery of the first PDS 1 is expected in May (roughly) and some user software should be available in September 1971 (roughly).

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Display possibilities

The screen of each display is 20 cm (horizontal) by 30 cm (vertical). The analogue XY signals are produced by hardware vector generators operating under software control. This software is in the form of a "display list" in the PDS 1 core store, which is executed by the display processor and modified by the mini-computer. The display list is modified according to information received from the IBM or from the PDS 1 keyboard.

For character display, the screen provides a matrix of approximately 60 lines of 80 characters (character size approximately 2.5 mm, similar to type-written capitals).

The proposed character set is:

Letters	:	A - Z (capitals only)
Digits	:	0 - 9
Symbols	:	+ - . , [ ]* / = ? > < %
Special symbols:		blank, new line, cursor (marker) tab (?), underline (?)

For graphical display, most of the screen could be used. Resolution could at best be 1/1000 (approximately), but as core store is restricted less accuracy will be possible in practice (perhaps 1/100, depends on complexity of display).

The bottom few lines of the alphanumeric matrix will be reserved for use by the system; otherwise the user program may employ the screen as required. A cursor (marker) will be provided by the software, together with control keys on the keyboard for various special functions.

The maximum amount of information that may be displayed at once is limited by core store size and by flicker. Probably it will be approximately 1500 characters, or 1000 characters plus graphs, but we will need to experiment.

Because of the restricted core store, the PS PDS 1 will be able to drive only one of its two display consoles at once. An agreement between injection and PS operators will be necessary to avoid arguments.

Software organization

In the IBM there will be interrupt servicing subroutine(s) (SPAR) for communication with the PDS 1's, plus queueable coreloads for the PS and PSB partitions.

In the PDS 1 there will be a 1 K EXEC, handling input/output and the display. EXEC routines will update the display and there will be an error monitor routine. 2 K will be used for the display list and a communication buffer, leaving 1 K for a USER program.

A USER program will be loaded into the PDS 1 (and a corresponding coreload queued in the IBM if necessary) when a program request is received. Program requests will come either from a PRU button, or via EXEC from a PDS 1 keyboard. A USER program will be able to create a display, conduct a conversation via the display console, send information or controls to the IBM, and receive information from the IBM - all by use of EXEC subroutines. Also, of course, it will be able to perform a certain amount of computation. However, EXEC will be capable of creating a display on instructions from an IBM coreload alone (with no USER program - operating like CPLOT or CODD). Similarly a USER program might require no coreload to be present in the IBM partition until the USER program had been completed and was ready to transmit information to the IBM.

Subroutines will be provided in the IBM to help users organize communications between the PDS 1's and the 1800.

Programs for the PDS 1's will be written in PDSA, a language based on the manufacturer's assembly language, but modified to suit our needs. Programs will be assembled from cards to disk by the 1800.

Transfers between the computers will be in the form of requests (interrupts), controls, or data files (data sets). Files will have a length of up to approximately 240 useful words (though chaining will be possible). If necessary, the IBM will be able to force a reload or restart in the PDS 1. Thus the IBM is the master, and the PDS 1 the slave, in the event of errors.

EXEC and the IBM subroutines will provide for the following types of file:

Binary (for loading programs)
EBCDIC (for text)
X-Y list (for graphs)
STAR-CODE (for sending controls to the IBM in the format:

STARC address
Data word
STARC address
Data word
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)

Suggestions for other types of file <u>needed</u> will be welcome. Note, however, the "escape" feature: EXEC will transmit and receive files of a type it does not recognise, but then USER must be able to interpret them. A similar facility will be provided in the IBM subroutines. Lightpen handling on the PS displays will also be performed by an escape from EXEC to USER.

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<u>Distribution</u>

MPS and SI Scientific staff
CO Computer Section
CO Operators