

Data General Data Control Unit DCU/50



Front end processors come in many sizes. Above is the DCU/50, which is contained on a 15-inch square circuit board, and fits into one I/O slot in a Data General NOVA or ECLIPSE processor.

MANAGEMENT SUMMARY

A NOVA or ECLIPSE computer, when performing all of the tasks necessary to handle communication lines, can find itself with little time to process the data. Handling transmission data at a 10,000 cps rate typically consumes about 65 percent of an ECLIPSE S/230 processor's time. At a 14,000 cps rate, 84 percent of its time would be consumed. At about 16,000 cps, no other processing would be possible. The obvious answer is to get a second computer. The Data General solution is the programmable DCU/50, a (logical) front-end computer that can dramatically reduce the host computer's overhead expended for communication. For a transmission rate of 10,000 cps, the DCU/50, residing physically within the host computer's cabinet, can reduce an S/230 host communications processing time from 65 percent to 10 percent. At a transmission rate of 12,000 cps the overhead reduction is from 72 percent to 12 percent. The addition of a second DCU/50 would permit each to process 10,000 cps of traffic utilizing only a total of 20 percent of the host's time. Up to four DCU/50's can be added to one host for an aggregate traffic volume of 40,000 cps and consuming 40 percent of the host's processing time. In effect, attaching a DCU/50 between and existing NOVA or ECLIPSE and Line Multiplexors will free as much as 50 percent of the processor's time for data processing. The cost for this throughput increase is \$3,000. Then, the transmission volume can be increased to 40,000 cps in increments of 10,000 cps by the addition of multiple DCU/50's. Each increment costs \$3,000.

The software support permits the addition of the DCU/50 without affecting the application programs. The only software modification necessary to install a DCU/50 is the regeneration of the Communications Access Manager (CAM), a subsystem of the three Data General Operating Systems. NOVA and ECLIPSE systems not

A specially tailored NOVA, dedicated to performing as a front-end processor to host NOVA or ECLIPSE computers. One DCU/50 can process up to 10,000 characters per second while taking up only 10 percent of the host's processing time.

A physical maximum of 256 communication lines can be accommodated. Asynchronous speeds to 9600 bps and synchronous speeds to 56K bps for full- or half-duplex lines are supported.

Up to four DCU/50's can be installed in one host for an aggregate line processing capability of 40,000 cps.

A host with existing compatible Line Multiplexors can add a DCU/50 for \$3,000. A typical communication subsystem interface for two dial-up lines, 56K bps synchronous line, and two leased voice grade lines can be purchased for \$8,510. The on-call service contract would cost \$108 per month.

Regeneration of CAM, the communications monitor, is the only software change required to install a DCU/50.

CHARACTERISTICS

VENDOR: Data General Corporation, Route 9, Westboro, Massachusetts 01772. Telephone (617) 366-8911.

DATE OF ANNOUNCEMENT: April 1975.

DATE OF FIRST DELIVERY: September 1975.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Data General Corporation.

CONFIGURATION

The Data Control Unit DCU/50 is a NOVA minicomputer tailored to serve as a dedicated communications controller for Data General NOVA and ECLIPSE host processors. Contained on one 15-inch square printed circuit board, the DCU/50 is housed within the host computer cabinet and occupies one of its I/O slots. Depending on the host model, the DCU/50 is cabled to one of two types of Communications Chassis, housed in a separate cabinet. Either chassis type can accommodate four Line Multiplexors. By the addition of multiple Expansion Communication Chassis, each accommodating 4 Line Multiplexors, a maximum of 16 line multiplexors could be attached to the DCU/50. The DCU/50, the Line Multiplexors and its Communication Chassis represent Data General's Communication Subsystem. The subsystem performs all line handling, character encoding, message formatting, queueing, transmission error detection/

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Table 1. Interface Features and Line Multiplexor Selection

Line	Type of Line Interface	Timing	Data Set Supported	Interface Features for Multiplexor	No. Lines Supported per Interface Feature	Line Multiplexor
Leased Local	RS232-C CCITY 24, DG-6012 Video Display	Asynchronous	Bell 103 (manual answer only)	Requires RS232-C Compatible #4261	4	ALM-16
	Teletype, DG-6012 Video Display	Asynchronous	33KSR, 35KSR	Requires Loop Interface #4260	4	ALM-16
Switched	RS232-C, CCITY 24	Asynchronous	Bell 102, 202	—	—	ALM-8
Leased Local	RS232-C, CCITY 24	Synchronous	Bell 201, 203, 208, 209	Options include Current Loop #4265 for use with Bell 303 data set and Cyclic Redundancy Checking #4266	One supports all synchronous lines in DCU/50	ALM-2

➤ using CAM would, naturally, require some degree of modification.

In addition to handling digital communications, the DCU/50 can also be used to handle Data General's sensor-based subsystems.

One DCU/50 can be attached to multiple hosts. To accomplish this requires the DCU/50 to be housed in a special chassis and cabled to each host. However, such an arrangement strays from the basic architectural approach. If the reason for the multiple host hook-up is for fall-back, separate, redundant DCU/50's for each host might be a wise investment. The Line Multiplexors that can be used with the DCU/50 are housed in a separate chassis. Line characteristics are stored in the Line Multiplexor and can be readily changed with the supplied support software.

Asynchronous lines with speeds of up to 9600 bps and synchronous lines with speeds of up to 56K bps are supported. All lines can be either full- or half-duplex.

The host/DCU architecture is an excellent example of the assembly line approach successfully applied to electronic data processing. By assigning a part of the total job to a particular piece of hardware or to a particular module of software, large increases in production can be accomplished for modest increases in cost. In this case, by relegating the communication handling to the DCU/50, by relegating line interfacing to the Line Multiplexor, and by relegating message processing to the host, transaction volumes can be processed that would not be possible even with two hosts.

USER REACTION

Datapro was unable to contact enough users to collect a valid sample of user experience. We did talk to two users, each with a DCU/50 installed for over one year. Both users were satisfied with the hardware's reliability and Data General's maintenance performance, but one did have installation problems. One user employed its own software. The other user used CAM and has experienced software problems. □

➤ recovery, and data transfer to and from the host computer.

Three types of multiplexors are available: a 1 or 2 line Synchronous Line Multiplexor, a 4 or 8 line dial-up Asynchronous Line Multiplexor, and an 8 or 16 line dedicated Asynchronous Line Multiplexor. If the latter type is attached to a fully expanded Communication Chassis, a maximum of 256 full- or half-duplex lines could be physically attached to one DCU/50. However, as is true with most front-end processors, the physical capability is subject to throughput limitation. The throughput limitation of the DCU/50 is 10,000 characters per second. When the throughput exceeds 10,000 cps, the lines can be proportioned to multiple DCU/50's so that the traffic through each DCU/50 is no more than 10,000 cps. Up to four DCU/50's can be attached to a host for a total throughput processing capability of 40,000 cps. For this to be achieved, the apportioning of lines to each DCU/50 would have to be such that each DCU/50 received an ideal peak rate of 10,000 cps. Regardless of the number of DCU/50's employed, the maximum number of lines supported for one host is 256 asynchronous full- or half-duplex lines.

The DCU/50 programmable processor has a 300 nanosecond memory cycle, 1K words of 16-bit bipolar RAM local memory, and an instruction repertoire that is a subset of the NOVA and ECLIPSE instruction set. The processor has a memory I/O bus that connects to the host computer interface in a manner that includes a connection to a direct memory access channel. This connection gives the DCU/50 direct access to 31K words of host memory, permitting data transfer between the lines and the host without host processor intervention. An I/O bus, independent of the memory I/O bus, interfaces with Line Multiplexors located in the Communication Chassis. A real-time clock is included within the DCU/50.

TRANSMISSION SPECIFICATIONS

Each Line Multiplexor provides full character buffering and is mounted on a 15-inch-square printed circuit board. The PC board is plugged into a slot in the Communications Chassis. A multiplexor is tailored for the specific line characteristics of each line it supports by altering code stored in the multiplexor. Support software enables the user to specify the line characteristics and even define a unique protocol. This capability permits easy alteration of line configurations. ➤

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Table 2. Line Multiplexor Capacity Options

<u>Line Multiplexor</u>	<u>Feature #</u>	<u>No. of Lines Supported</u>	<u>Timing</u>	<u>Speed</u>	<u>Remarks</u>
ALM-16	4257	16	Asynchronous	Up to 9600 bps	
	4258	8	Asynchronous	Up to 9600 bps	
ALM-8	4255	8	Asynchronous	Up to 9600 bps	Full modem control
	4256	4	Asynchronous	Up to 9600 bps	Full modem control
SLM-2	4263	2	Synchronous	Up to 56,000 bps	Full modem control
	4264	1	Synchronous	Up to 56,000 bps	Full modem control

Note: All lines can be either full- or half-duplex.

The following line characteristics can be set for the two Asynchronous Line Multiplexors, ALM-16 and ALM-8. Parity can be set for odd, even, or none. The firmware will automatically check incoming data for proper parity and strip parity before passing the data to the DCU/50. Parity will be appended automatically to outgoing data. Code level can be set at 5, 6, 7 or 8. Line speed is selectable up to 9600 bps via programmed clock selection from four source frequencies that are set at installation. The number of stop bits can be set to one or two.

The following line characteristics can be set for the Synchronous Line Multiplexor, SLM-2. Parity can be set as described above. Level code can be set at 6, 7 or 8. Receive SYN characters and transmit SYN and DLE characters can be set for each line.

The ALM-16 Asynchronous Line Multiplexor, is available to support either 8 or 16 lines. The 16 line version costs 35 percent more than the eight line version. Each supports leased or local lines with speeds up to 9600 bps. This type of multiplexor requires one of two types of Interface Modules for cabling to the lines or data sets. Each Interface Module supports four lines and is plugged directly onto the multiplexor. The Compatible Interface Module supports EIA RS232-C and CCITT V.24 interface standards and the interface requirements for the Data General 6012 Video Display. The Loop Interface module supports 33KSR and 35KSR teletypewriters and the interface requirements for the DG-6012 Video Display.

The ALM-8 Asynchronous Line Multiplexor, with full modem control, is available to support either 4 or 8 lines. The 8 line version costs 35 percent more than the 4 line version. Each supports RS232-C and CCITT V.24 interface standards for switched lines with speeds up to 9600 bps.

The SLM-2 Synchronous Line Multiplexor, with full modem control, is available to support either one or two lines. The two line version costs 50 percent more than the one line version. Each supports leased or local lines with speeds up to 56K bps. An optional Current Loop Interface Feature is available to support a Bell 303 data set. One feature is required for each line requiring such support. Another option that is applicable for all synchronous lines in a DCU/50 is the Cyclic Redundancy Generator/Checker Feature. Either CRC-16 or CCITT-16 polynomials can be selected to employ Cyclic Redundancy Checking for all synchronous lines. The SLM-2 will support IBM Binary Synchronous Protocol.

All lines supported by the Line Multiplexors can be full- or half-duplex. Table 1 tabulates the interface features and type of Line Multiplexor required for each supported line interface. Table 2 indicates the line capacity options available for each Line Multiplexor.

The Communications Chassis, which provides the electrical connection for the Line Multiplexors, is selected based on the host processor. There is one Chassis that is used with all

ECLIPSE models and with NOVA 2, 1210, 1220, 820 hosts. Another Chassis is used with NOVA 800, 830, 840, 1200 hosts. Both chassis contain four slots for four Line Multiplexors and each chassis can be expanded using the same expansion feature. Up to three chassis expansion features can be added to a communication chassis for a total of 16 slots.

SOFTWARE

NOVA and ECLIPSE host software includes the Communications Access Manager (CAM). This highly modular software subsystem operates as an integral part of the three host operating systems: the Real-Time Operating System, the Real-Time Disk Operating System, and the Mapped Real-Time Disk Operating System.

CAM is generated via a support program called COMGEN. In an interactive mode with the user, a tailored version of CAM is generated to support specific line types, character sizes, control characters, buffer sizes, time-out intervals, message assembly rules, encoding, protocols, etc.

A portion of the generated CAM software resides in the host, and a portion resides in the DCU/50. In addition to supporting synchronous and asynchronous lines, CAM can support multidrop operation on a dedicated line. Data General's Fortran IV and V and COBOL includes communications I/O that is supported by CAM.

Software is also provided for emulation of an IBM 2780, 3780, or HASP workstation.

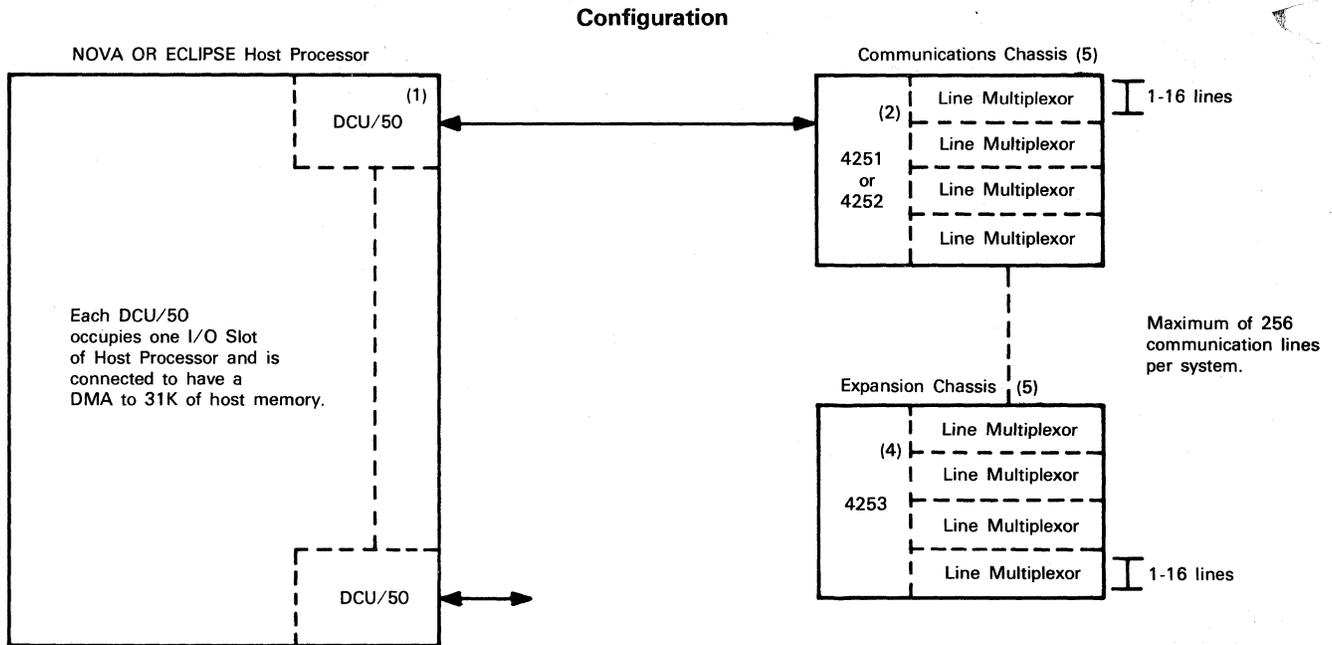
For a small number of lines and low throughput, the Line Multiplexors can be directly attached to the host. CAM can then be generated to perform the functions performed by the DCU/50. The cost is dramatic in terms of host overhead. When volume or lines increase, a DCU/50 can be installed and CAM regenerated for the DCU/50 to perform the communications function, to the relief of the host's overhead.

PRICING

Data General offers the equipment on a purchase only basis, with two types of separately priced maintenance agreements: the On-Call Service contract and the Factory Service contract, which involves return of factory equipment to a designated repair location. In either case, all parts and labor are included at no additional cost. For non-contract, on-site service, the maintenance rates range from \$35 to \$45 per hour, depending upon shift and holiday considerations.

The Communications software is licensed and bundled so that it is included without additional charge on a system with sufficient hardware to operate it.

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- (1) DCU/50 has use of 32K 16-bit words of memory: 1K of its own memory and 31K of host memory.
- (2) Communication Chassis # 4251 is used with host ECLIPSE and NOVA 2, 1210, 1220, and 820; # 4252 is used with host NOVA 800, 830, 840, and 1200. The communication chassis supports four Line Multiplexors.
- (3) Choice of three Line Multiplexors: ALM-16, ALM-8, SLM-2. See Table 2 for number of lines supported. See Table 1 for additional features required with ALM-16.
- (4) Expansion communication chassis supports four Line Multiplexors; maximum of three expansion chassis per Communication Chassis.
- (5) Chassis are normally mounted in procesor cabinet.

The Data General Software Subscription Service provides automatic updates and documentation for Data General software at a price ranging from \$50 to \$350 per software product, and for \$75 per product on any order totalling \$1,000 or more. The Hardware Subscription Service provides automatic updates, additions, and new docu-

mentation on all Data General Hardware for a fixed yearly fee.

The Data General Users' Group provides a forum for interchange of programs. The programs are available for a fee to cover reproduction and distribution costs.

		Monthly Maintenance		
		Purchase Price	On-call Service Contract	Factory Service Contract
4250	DCU/50	\$3,000	\$36	\$18
4251	Communication Chassis for Eclipse, Nova 2, 1210, 1220, 820	1,800	22	11
4252	Communication Chassis for Nova 800, 830, 840, 1200	1,800	22	11
4253	Expansion Communication Chassis	1,400	14	7
MULTIPLEXORS & INTERFACES				
4255	ALM-8, 8 lines	2,000	16	8
4256	ALM-8, 4 lines	1,250	16	8
4257	ALM-16, 16 lines	2,000	20	10
4258	ALM-16, 8 lines	1,300	20	10
4260	Current Loop Interface Module for ALM-16 to support teletype & 6012 video display	160	2	1
4261	RS232-C Compatible Interface Module for ALM-16	160	2	1
4263	SLM-2, 2 lines	1,500	12	6
4264	SLM-2, 1 line	1,000	12	6
4265	Single-Line Current Loop Interface for SLM-2	200	2	1
4266	CRC Generator/checker for Synchronous Lines	500	4	2