The Noval 760 Operating Manual

Noval Inc., 8401 Aero Dr., San Diego CA 92123, (714) 277-8700, has completed the first edition of the Noval 760 Operating Computer Operating Manual. This 1 inch (2.5 cm) thick loose-leaf manual is available by itself for $20. The manual describes hardware characteristics of available modules, as well as the software of the firm's interactive assembly and editing system, BASIC interpreter, and utility routines.

This computer was developed by Gremlin Industries for in-house use as a design system for video arcade game and educational software, and should make an excellent option for many readers interested in graphics and complete systems with "turn key" characteristics. Use the manual alone if you want to investigate what this system package contains.

Circle 647 on inquiry card.

A New Wire Dispenser-Stripper for Wire Wrap and Other Applications

A new wire dispenser from OK Machine and Tool Company, 3455 Conner St., Bronx NY 10475, combines cutting and stripping ability in one unit. Wire is drawn out of the dispenser to the desired length, cut with the built-in plunger, and pulled through the stripping blades. Dispenser includes 50 feet (15 meters) of AWG 30 insulated solid copper wire available in four colors. People who use conventional wire wrap will find this to be an excellent addition to the tool kit.

Circle 648 on inquiry card.

Data General Enters the Personal Computing Market

The Computer Store, a chain of retail personal computer outlets in the Northeast, has announced that they will be distributing the entire line of Data General's Micro-NOVA microcomputers, peripherals and software.

Free catalogs are now available from The Computer Store, 120 Cambridge St., Burlington MA 01803, which describe the full line of products, including expansion memories and interfaces; DOS, RTOS, BASIC, FORTRAN and development software; the DASHER matrix printer and the 6000 line of video terminals.

Circle 649 on inquiry card.

Digital Equipment's Comments on the Heathkit H11

The following information was received from Digital Equipment Corporation, one party to the synergistic two-some of Heath Company and DEC.

Digital Equipment Corporation announced the signing of a multimillion dollar contract for LSI-11 microcomputers and related products by Heath Company, a subsidiary of Schlumberger, Ltd. The microcomputers, to be delivered over a 3 year period, will be incorporated into Heath's H11 computer...
kits, which will be marketed primarily for hobby, personal and small business applications via Heath's 50 stores and mail order catalog. The contract includes a licensing arrangement providing use of assembly and higher level programming languages such as PAL-11, ED-11, FOCAL and BASIC with the H11 computer.

Digital's microcomputer forms the central element of each H11 computer. Each is a full computer on a board with the operating characteristics of a standard PDP-11 16 bit minicomputer. Currently there are about 10,000 LSI-IIs in use in a variety of applications ranging from scoreboard animation to complex medical instrumentation. The H11 represents the top of Heath's line of computer kits. It is priced at $1,295 and is scheduled for shipment this fall.

The LSI-11, unlike most other microcomputers, has a central processor with a full 16 bit word length. It comes with built-in memory of 4,096 word (8,192 byte) capacity. Console operations are microcoded so a terminal can be used for program control and debugging.

**A New Chip on the Block**

We received an interesting preliminary product description for a television raster scan display controller recently, sent in by a gentleman at SMC Microsystems Corporation, 35 Marcus Blvd., Hauppauge NY 11787. The product involved is a 40 pin N-channel MOS LSI device called the CRT 5027 Video Timer-Controller. This device will be of some interest to those homebrewer and designers who are interested in a minimum hassle path to a raster scan display (where minimum is relative to homebrewing the same logic out ofSSI and MSI parts).

What this device does is establish all frame formatting, character scanning and sync timing for a video display (with the single exception of the dot address counter which cannot be practically implemented in MOS integrated circuits). The video display functions use seven 8 bit control registers connected to a bi-directional byte oriented data bus with appropriate select lines allowing easy integration in the typical microprocessor system. The boxes entitled "Operation" and "Additional Features" accompanying this note are copied from page 3 of the SMC document, and summarize the salient features of the product.

Persons interested in seriously pursuing homebrew (or commercial) design with this device are advised to write SMC for a copy of the brochure. Who will be the first reader to homebrew a high resolution graphic display using this chip for timing, about 16 K bytes of memory, and a good black and white monitor? Find out when (sooner or later) the task is accomplished and a construction project is documented as an article.

**Operation**

The design philosophy employed was to allow the device to interface effectively with either a microprocessor based or hardware logic system. The device is programmed by the user in one of two ways: either processor data bus as part of the system initialization routine, or during power up via a PROM tied on the data bus and addressed directly by the Read Select outputs of the chip. (See figure 6). Seven bit words are required to fully program the chip. Bit assignments for these words are shown in Table 1. The information contained in these seven words consists of the following:

**Horizontal Formatting**:
Characters/Data Row
A 3 bit code providing 8 mask programmable character lengths from 20 to 132. The standard device will be masked for the following character lengths: 20, 32, 40, 64, 72, 80, 96, and 132.

**Horizontal Sync Delay**
3 bits assigned providing up to 8 character times for generation of "front porch".

**Horizontal Sync Width**
8 bits assigned providing up to 256 character times for horizontal synchronization.

**Horizontal Line Count**
8 bits assigned providing up to 256 character times for total horizontal formatting.

**Skew Bits**
A 2 bit code providing from 0 to 2 character skew between the horizontal address counter and the horizontal blank and sync signals to allow for retiming of video data prior to generation of composite video signal. The Cursor Video signal is also skewed as a function of this code.

**Vertical Formatting**: Interlaced/Non-interlaced

Scans/Frame
8 bits assigned, defined according to the following equations: Let X = 8 - value of 8 assigned bits.

1) in interlaced mode—scans/frame = 2X + 513. Therefore for 525 scans, program X = 6 (000000110). Vertical sync will occur precisely every 262.5 scans, thereby producing two interleaved fields.
Range = 513 to 1023 scans/frame, odd counts only.

2) in non-interlaced mode—scans/frame = 2X + 256. Therefore for 262.5 scans, program X = 3 (00000011). Range = 256 to 766 scans/frame, even counts only.

In either mode, vertical sync width is fixed at three horizontal scans (3H).

**Vertical Data Start**
8 bits assigned providing scan line resolution in vertical data positioning with respect to vertical sync. The Data Row Counter is reset at vertical sync and will not begin counting until the scan line selected by these eight bits.

**Data Rows/Frame**
6 bits assigned providing up to 64 data rows per frame.

**Last Data Row**
6 bits to allow up or down scrolling via a predeclared line count of the last displayed data row.

**Scans Data Row**
4 bits assigned providing up to 16 scan lines per data row.

**Additional Features**

**Device Initialization**

Under microprocessor control—The device can be reset under system or program control by presenting a B11 address on A6-3. The device will remain reset at the top of the even field page until a start command is executed by presenting a B11 address on A0.

**Self-Loading**—In a non-processor environment, the self-loading sequence is effected by presenting and holding the B111 address on A0-3 and is initiated by the receipt of the strobe pulse (05). The B111 address should be maintained long enough to insure that all seven registers have been loaded (in most applications under one millisecond). The timing sequence will begin one line scan after the B111 address is removed. In processor based systems, self-loading is initiated by presenting the B111 address to the device. Self-loading is terminated by presenting the start command to the device which also initiates the timing chain.

**Scrolling**—In addition to the Register 6 storage of the last displayed data row a "scroll" command (address 111FA) presented to the device will increment the first displayed data row counter to facilitate up scrolling in certain applications.

28,000 members worldwide who wish to exchange programs and information. "DECUS holds special symposia and publishes a journal. The DECUS library contains over 800 programs designed for the PDP-11 family of computers, many of which were developed for or can run on the LSI-11," he said.