Digital Pathways offers a range of Timing Control Units that are battery supported to maintain time and date during power down. Timing is provided by a crystal controlled oscillator and does not require interaction with the computer to update the time and date.

PDP-11*

TCU-100;
The Timing Control Unit, built on a quad-size board, is fully operational when it arrives at your premises and can be interrogated by the computer to give you the:

- Month and Day
- Hour and Minute
- Second

The TCU continues to operate on its own rechargeable battery power, with the computer off, for a period of up to three months.

Resetting the time/date is performed by a simple software routine.

The TCU can be set to interrupt:

- at a particular month and day
- at a particular hour and minute
- at a particular second
- at intervals (less than 2 seconds) which are integral multiples of .48 milliseconds (1/2048 sec.)

TCU addresses, interrupt priority, leap year capability and vector address are determined by jumpers.

TCU-150;
The timing specifications are the same as the TCU-100. A year counter has been added. Leap year is an automatic function of the TCU-150. The interrupt capability has been removed. Resetting the time/date is performed by a simple software routine.

LSI-11/2*

TCU-50D;
This is a dual-size board with the same time and date functions as the TCU-100, but without the interrupt capability. Resetting the time/date is performed by a simple software routine. TCU addresses are determined by jumpers.

LSI-11*

TCU-50Q;
Functionally the same as the TCU-50D, but built on a quad-size board. There is room on this board to add customer options such as a millisecond or year counter.

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INTEL MULTI-BUS

TCU-410;
The TCU-410 is designed to operate in the multi-bus and is compatible with the SBC/BLC micro-computer systems. Provides date and time in sequential address as follows:

- Year
- Month
- Day
- Hour
- Minute
- Second

I/O address is selected by jumper. Resetting the time/date is performed by a simple software routine. Leap year is an automatic function of the TCU-410.

COMPUTER AUTOMATION NAKED-MINI

TCU-310;
The TCU-310 is a half-size board designed to operate in the LSI 4 computer series. The date/time is read as follows:

- Year-Month-Day
- Hour-Minute
- Second

Leap year is an automatic function of the TCU-310. Resetting the date/time is performed by a simple software routine. Address selected by jumpers.

MOTOROLA MICROMODULE/EXORciser**

TCU-68;
The TCU-68 is designed to operate in both the Micro-module bus and the EXORciser bus. Provides date and time in sequential address as follows:

- Year
- Month
- Day
- Hour
- Minute
- Second

Resetting the date/time is performed by a simple software routine. I/O address is selected by jumper. Leap year is an automatic function of the TCU-68.

HP-2100 SERIES

TCU-2100;
This unit can replace or complement the HP TBG card. Timing is provided by a 1MHz crystal controlled oscillator. Time periods of 1 millisecond, 10 milliseconds, 100 milliseconds, 1 second and 10 seconds can be selected by jumpers, or under program control.

In addition to providing the same timing functions as the TBG card, the TCU-2100 offers the following additional features:

- a 25 bit up/down counter to keep count of missing time periods (ticks) during power or program failure.
- On board batteries to keep the oscillator and counters working during power failure.

These added features now make it possible to leave your 2100 unattended without losing current time (as the missed ticks are counted at an accelerated rate upon restoration of program or power).

LOCKHEED SUE COMPUTERS

TCU-200;
Functionally the same as the TCU-100. A year counter and millisecond counter have been added, the word format being:

- Year-Month-Day
- Hour-Minute
- Seconds-Milliseconds (1/1024)

The date/time interrupt feature has been removed and the ΔT interrupt expanded. Time intervals of between 1/1024 seconds to 64 seconds are available.

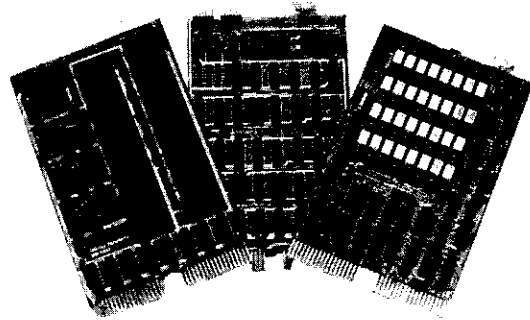Resetting the date/time is performed by a simple software routine.

*Trademark of Digital Equipment Corporation

**Trademark of Motorola Inc.

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Digital Pathways offers a series of RAM and ROM systems designed for the Digital Equipment Corporation PDP-11* and LSI-11* computers. Most of these systems offer built-in bank-switching capability, enabling the system to extend far beyond the normal DEC memory bounds.

LSI-11/2 (Dual Width Boards)

RMA-032;
This is a 32K words x 16 bit random access memory module with 450 nanosecond access time. When used in a "stand-alone"configuration only one of these modules can be accommodated by any given computer and only 28K of the 32K is available for use. Assignment of the available address space is carried out by means of a set of jumper wires. When a Bank Switch Controller is added to the system and the memory modules are put under its control (by connecting a jumper cable and activating a switch on each memory module) then up to 1024K words of memory are accessible to the computer. Memory circuits included.

RMS-016;
This is a 16K x 16 bit read-only memory system based upon the Intel 2716 EPROM or the compatible 2316E masked ROM. Again, this module may be used in a "stand-alone" configuration if memory space is available. In this mode, assignment of memory to address space is done in 4K blocks making use of jumper wires. Any or all of the four 4K blocks may be so assigned. When the BSC-256 is added to the system, the RMS-016 may be placed under its control. In this case it will occupy 16K out of the possible 1024 words which can be supervised by one Bank Switch Controller. Memory circuits not included.

BSC-256;
This module, called the Bank Switch Controller, is the key to the bank-switching capability of the system. It communicates by means of a "daisy-chained" cable to each of the memory modules under its control. The Controller simultaneously enables up to seven 4K blocks of either ROM or RAM out of a possible 256 such blocks, assigning each a portion of the available memory space.

LSI-11 (Quad Width Boards)

ROM-016;
This is a self contained bank-switchable 16K word read-only memory system based upon the Intel 2716 EPROM or its compatible ROM, the 2316E. Bank-switch control is incorporated within each module. In addition, it contains an indirect addressing mode for use when no address space is available.

RMP-004;   including 4 EPROMs
This board includes 4K words of read-only bank-switchable memory and a built in programmer for 2716 EPROMs. Except for the reduced memory size, it is functionally identical to the ROM-016. Typical programming time for 2K words is 100 seconds.

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PDP-11 (Hex Boards)

RMP-116;
This board accommodates up to 16K words of 2716 Intel EPROMs or 2316E ROMs. A programmer has been built into the board for programming 2716s in place. Aside from the programmer, this board is logically identical to the ROM-016 and incorporates both bank-switching capability and an indirect addressing mode for use where no memory space is available.

ROM-116;
This board is identical to the RMP-116 except for its programming capability, which has been removed.

RMS-124;
This board accommodates up to 24K words of 2716 or 2316E read-only memory. Its address allocation is determined entirely by a set of wire jumpers. Any portion of the memory from 2K words up to the full 24K words can be enabled in this way. No bank-switching capability is built into the board.

Remote Programmer;

For added convenience, Digital Pathways offers a desk top unit which can be used to program 2716 EPROMs remotely in coordination with either an RMP-004 or an RMP-116. With the use of this unit it is not necessary to turn the power off on the computer while changing EPROMs or to remove the RMP from the computer. Connection to the RMP is by means of a 50 conductor flat cable.
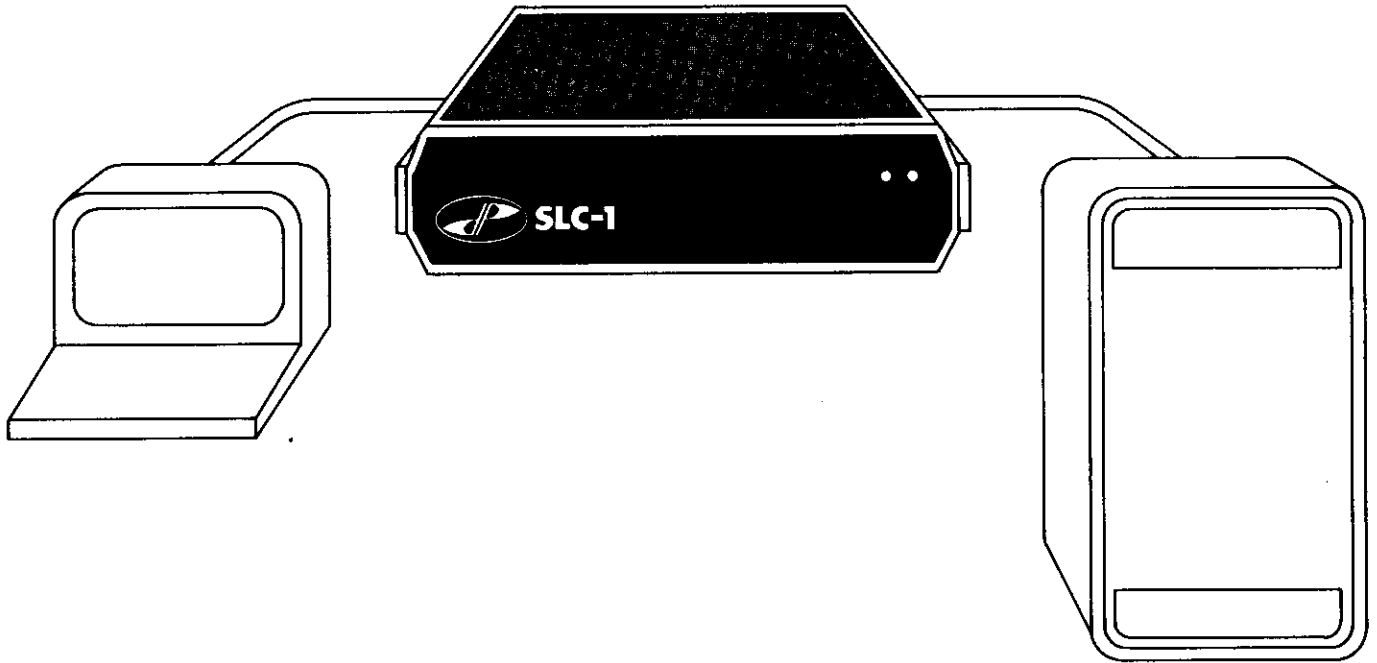
*Trademark of Digital Equipment Corporation

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SLC-1 THE TIME MACHINE

Features

- **Battery supported calendar clock.** Can supply the user with year, month, day, hour, minute, second, day of the week, week of the year and day of the year.

- **6502 microprocessor controlled.**

- **2K bytes EPROM.** Expandable within the cabinet to 12K bytes.

- **384 bytes RAM.** Expandable within the cabinet to 12K bytes.

- **Dual UARTS.** The UARTS are independent of each other and can be operated with the 20mA loop or RS232 at one of sixteen selectable baud rates.

- **Jumper selectable parity and stop bits.**

- **Optional 10 digit display.** Displays month, day, hour, minute and second.

- **Automatic message response capability.** The SLC can be initialized to intercept and respond to user messages.

- **KIM bus expansion.** The standard bus address, data and control signals are available via a flat ribbon cable.

- **Rechargeable nicad batteries.** To support the calendar and CMOS memory during power down.

- **Attractive durable plastic cabinet.** Size 12½" W × 11⅝" D × 3" H. Contains PCB, power supply and fan.

General

■ The Digital Pathways' SLC-1 is a battery supported calendar clock designed to operate between any host computer and a terminal using the standard RS232 or 20mA loop serial interface. The following information is available when requested: year, month, day, hour, minute, second, day of the week, week of the year, day of the year. Of course, as with all Digital Pathways clock products, you do not lose date or time as a result of power failures.

■ No modifications to your operating system are necessary. Installation is easy—simply unplug the RS232 connector from your terminal and plug it into the socket marked "J1" at the back of the SLC. With the jumper cable provided, connect from "J2" socket back to your terminal.

■ The SLC is controlled by a 6502 microprocessor system that can be expanded to 12K bytes of RAM, and 12K bytes of EPROM. Provision has also been made to allow KIM bus expansion to additional devices. There is an optional ten digit display that will display the date and time.

Manual Mode

Switched to the manual mode, the user can enter the correct time by pressing the switch marked "Enter". If the SLC-1 has been properly initialized the correctly formatted time will be sent to the computer.

Automatic Mode

With the auto/manual switch in the auto position the SLC-1 will intercept requests for time from the computer, and reply with the correct time automatically. Additional user messages can be handled in this mode.

Initializing the SLC-1

The format of messages between computer and terminal does vary from one system to another. The SLC can be initialized to fit your system by following the instructions in the user's manual. This only has to be done once since battery supported memory will retain this information during power down.

Applications

■ Any computer system requiring battery supported date/time.

■ Unattended systems—to maintain date/time, and respond to messages automatically even after power failures.

■ Process control.

■ Smart key—numerous messages and responses at the push of a key.

■ With the addition of peripherals the SLC-1 becomes a general purpose computer for use in the home, office, and industrial environment.

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Telephone [415] 493-5544
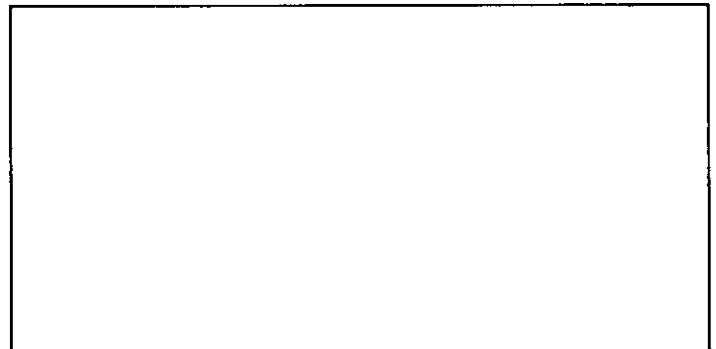
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A Note About the SLC-1, "Time Machine"

Thank you for asking for information on the SLC-1, "Time Machine," our Micro-computer system!

The SLC-1 is <u>both</u> a stand-alone accurate battery supported time keeper <u>and</u> a general purpose microprocessor system. This combination of "calendar clock" and microprocessor enables the user to expand an existing computer system with minimal installation effort and complete software compatibility.

Underlying the flexibility of the SLC-1 is a built-in software system which allows the user to set up the unit by following a series of very simple steps. The manual which accompanies each unit describes installation and initialization procedures in detail.

Applications of the SLC-1 are practically unlimited. It becomes a complimentary part of any existing computer system and allows the user to define its functions via the host terminal. The user's instructions are retained in the SLC-1's battery-powered memory and, therefore, need be initialized only once. When on-line in the Automatic mode, the SLC-1 monitors output from the host processor which it passes, unchanged, to the terminal until it recognizes a "key phrase." It then responds by typing a "key response" to the host processor.

Here is a summary of the commands which may be used when the SLC-1 is set in the local (off-line) mode:

Type on host terminal:	The SLC-1 responds by:
T	Printing the current date & time
H	Setting new hours, minutes, seconds
Y	Setting new month, day, year
W	Setting new day of week, week of year
E	Erasing all key-response pairs
L	Listing all key-response pairs
A	Appending a new key-response pair
M	Setting or clearing special print mode
D	Displaying specified bytes of memory
S	Altering hexadecimal bytes in RAM
G	Going to a new address

There is also a set of ten special control characters in responses which further expands the flexibility and usefulness of the SLC-1.

On the next page we have provided an example of a routine for initializing the SLC-1. The technical specifications are shown following the sample routine. If you have questions about the way the "Time Machine" can be utilized in your application, please contact us. We would welcome the opportunity to talk with you.

Sincerely,

L. C. Birkwood
Marketing Manager, Timer Division

Initializing the SLC-1

The following is a step-by-step example of initializing the SLC-1 in an LSI-11 system which uses Digital Equipment Corporation's RT-11 operating system. Characters that are underlined are typed by the SLC-1 or the computer. Characters that are not underlined are those which are typed by the user.

1. Switch to off-line   SAMSYN   V10.2
2. The M command makes all
    characters visible; i.e. $LC>M
    (LF)=Line Feed
3. Switch to on-line & boot   @173000G
    system
4. This becomes the   (CR)
                                      (LF)RT-11FB(SP)(SP)(SP)(SP)V02C-02(CR)
        Key-phrase   (LF)(CR)
                                      (LF).

5. Switch to off-line   SAMSYN V10.2
6. Erases previous pairs & $SLC>E
    insures that key #0 follows
7. Append this key $LC>A
                                      RESPONSE=?
                                      (↑Z TO END)
8. Hours:minutes:seconds   TIME(SP)↑R:↑Q:↑P(CR)
9. Day-month-year   DATE(SP)↑T-↑Y-↑S(CR)
                                      ↑Z
10. Here the user types the   KEY=?
    key phrase exactly as it   (↑Z TO END)
    was printed in step 4.   (CR)
                                      (LF)RT-11FB(SP)(SP)(SP)(SP)V02C-02(CR)
                                      (LF)(CR)
                                      (LF).↑Z
                                      $LC>

    Next: Return to on-line mode
    place the manual/auto switch
    in the "AUTO" position & reboot
    RT-11. We then see
11.   @173000G
    SLC-1 prints current   RT-11FB   V02C-02
    date and time.   .TIME 17:37:15
                                      DATE 18-APR-79

****

SPECIFICATIONS

Power: 115 VAC, 60 HZ
          +5 VDC @ 1 Amp
          +12 VDC @ 70m Amp
          -12 VDC @ 60m Amp

Battery Power:
          +3.6V   @ 20μAmp

Operating Temperature:
          0-50° C.

Accuracy:
    Normal power: Phase locked to 60 HZ.
    Battery power: $\pm$ 5 seconds per month.

Display:
    0.6" LED, 7 segments

Baud Rate:
    75-9600

Note: Factory-set for RS-232 at 300 Baud
      unless otherwise specified by the
      user.

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PRICE LIST *

PRODUCT	QUANTITY			
	1-9	10-49	50-99	100 Up
TIMING CONTROL UNITS				
TCU-50D (LSI-11)	$325	$292	$260	$228
TCU-50Q (LSI-11)	325	292	260	228
TCU-100 (PDP-11)	495	445	395	345
TCU-150 (PDP-11)	460	414	368	322
TCU-200 (Lockheed)	550	495	440	385
TCU-310 (Comp. Auto.)	385	345	308	270
TCU-410 (Multibus)	325	292	260	225
TCU-2100 (HP 2100)	395	355	315	275
SERIAL LINE CLOCK				
SLC-1 (without display)	640	575	512	480
10-Digit Display Option	190	171	152	140
MEMORY UNITS				
RMP-116 (PDP-11)	895	805	720	630
ROM-116 (PDP-11)	695	625	555	490
RMS-124 (PDP-11)	450	405	360	315
RMP-004 (LSI-11)				
Without EPROMS	675	607	540	475
With EPROMS	795	715	645	585
ROM-016 (LSI-11)	695	625	555	485
Bank Switchable Memory Family for DEC LSI-11 Based Computers				
RMS-016	300	270	240	210
RMA-032 Without 16K Chips	450	400	360	315
With 16K Chips	990	890	800	700
BSC-256	300	270	240	210

* ALL PRICES FOB PALO ALTO, CA.

PRICING INFORMATION

TIMING CONTROL UNIT — (TCU-50)

QUANTITY	PRICE
1–9	$325
10–49	$295
50–99	$260
100 up	$225

PRICING INFORMATION

TIMING CONTROL UNIT — (TCU-100)

QUANTITY	PRICE
1–9	$495
10–49	$440
50–99	$385
100 up	$345

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Dear Sir:

Here is the literature you requested from us. If you have any questions or comments about our products, please feel free to contact us, and we shall do our best to help you.

To help us service our customers more effectively, would you take a few minutes to fill out and mail the attached pre-paid information card? We thank you, in anticipation, for your co-operation.

Digital Pathways C.

Which of our products is of most interest to you? _____

_____

How immediate are your needs? _____

    Today ☐   6 Months ☐   1 Year ☐   For Reference Only ☐

Would you like a representative to contact you? _____

Would you like to be on our mailing list? _____

Name _____

Company _____

Address _____

Telephone _____