# terak
## CORPORATION

# NEW PRODUCT BULLETIN  1

## MODEL 8518 DISK DRIVE

The Terak 8518 hard disk drive is now available for the Terak 8510/a and 8600 systems.  The 8518 provides mass storage capacities of 10, 20, or 40 megabytes (Mb) using an 8-inch Winchester-technology hard disk.  The 8518 is completely self-contained with its own power supply and high-performance DMA controller.  It connects directly to the 8510, 8515, or 8510/8600 using a dual-wide Q-bus interface card.  Software support for the 8518 is provided under RT-11/85 version 4 and UCSD Pascal version 2.0.

## Features

• **Three models available:  10, 20, and 40 Mb capacity**

• **Comprehensive self-diagnostics and test commands**

• **Flaw (disk defect) management**

• **Patented data recovery circuit**

• **Direct transfers to and from memory**

• **Housed in 8510-style cabinet**

## Hardware Characteristics

| | |
|---|---|
| Type: | Non-removable, 8-inch diameter, soft-sectored disk |
| Capacity: | Unformatted (formatted), 10 (8.9), 20 (17.8), or 40 (35.6) Mb |
| Transfer Rate: | 543 kbytes per second |
| Average Access Time: | 50 ms (10 Mb model), 55 ms (20 Mb model), or 65 ms (40 Mb model) |

## Software Characteristics

RT-11/85 version 4: Fully supported.  The 8518 can be soft-booted and can be used as the system device.
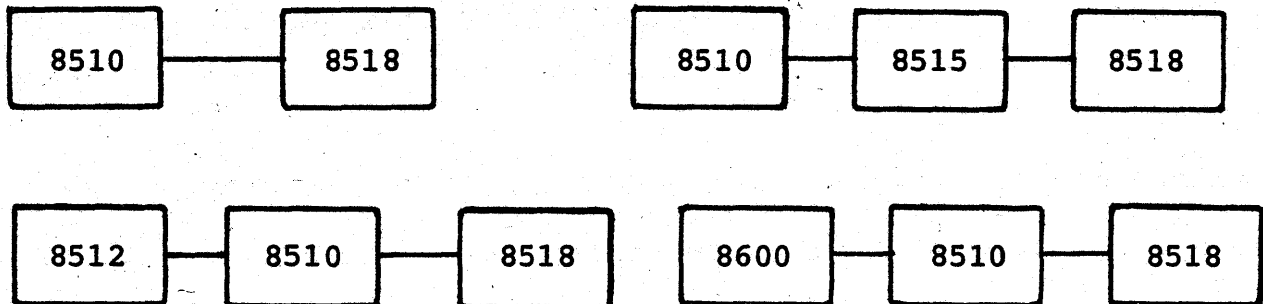
PASCAL version 2.0: Fully supported.  The 8518 can be used as a peripheral storage device.

## Prerequisites

Hardware:                Terak 8510 processor (or processor and Terak 8515) with dual-wide Q-bus slot available.

Software:                RT-11/85 version 4 operating system or UCSD PASCAL version 2.0 operating system. Earlier version software is not supported.

## Typical Configurations

```
+------+     +------+          +------+     +------+     +------+
| 8510 |-----| 8518 |          | 8510 |--| 8515 |-----| 8518 |
+------+     +------+          +------+     +------+     +------+

+------+     +------+     +------+     +------+     +------+     +------+
| 8512 |--| 8510 |-----| 8518 |     | 8600 |--| 8510 |-----| 8518 |
+------+     +------+     +------+     +------+     +------+     +------+
```

## Ordering Information

| Model*      | Capacity | First Shipments | List Price |
|-------------|----------|-----------------|------------|
| 8518-10MWA  | 10 Mb    | August 1981     | $ 7,985.   |
| 8518-20MWA  | 20 Mb    | October 1981    | $ 8,950.   |
| 8518-40MWA  | 40 Mb    | October 1981    | $11,200.   |

*Includes Q-bus interface and interconnecting cables                     8-6-81

# terak
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# NEW PRODUCT BULLETIN    2

## QUAD-DENSITY DISK SUBSYSTEM

Terak now offers the quadruple density floppy diskette subsystem for the entire product line. The new quad-density subsystem extends the storage capacity of an 8-inch diskette to 1.1 million bytes (Mb). The quadruple density is achieved by recording the diskette at twice the density of a single-density diskette _and_ recording on both surfaces of the diskette. The quad-density subsystem is available in the Terak 8510/a, 8512, 8515, and 8600 and allows industry-standard floppy disks to be written or read in single, dual, or quad density. Software support is provided under RT-11/85 and UCSD PASCAL.

## Features

● Disk density is specified by the user at format time

● Single-, dual-, or quad-density format is automatically determined by the controller

● Variable density controller handles any mix of densities

● Over one million bytes on a single diskette

● Compatible with IBM 3740-2D diskette format

● One- or two-sided diskettes handled by all quad-density units in the subsystem

## Hardware Characteristics

Physical:              Housed in standard Terak 8510, 8512, or 8515 cabinet

Capacity:              1.1 Mb in quad-density mode

Recoding Format:       FM or MFM

Transfer Rate:         500 kbits per second (MFM), DMA data transfers

## Software Characteristics

Device Handlers:    Single-, dual-, or quad-density handlers are incorporated with variable density controller's software

Operating Systems:  RT-11/85 or UCSD PASCAL
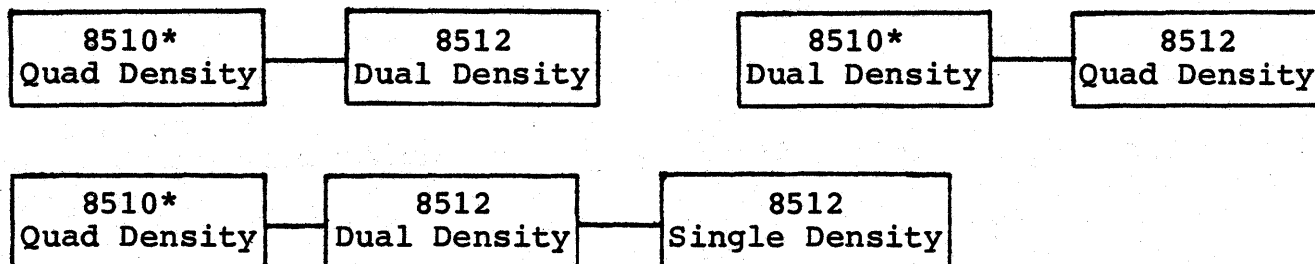
## Prerequisites

Hardware (8510):    None.  Specify variable density controller and quad-density disk subsystem when ordering. (Note:  Consult factory for information on field upgrading existing systems.)

(8512 or 8515):     Variable density controller in 8510

Software:           RT-11/85 version 3B or UCSD PASCAL version 1.5 operating system.

## Typical Configurations

| 8510*<br>Quad Density | — | 8512<br>Dual Density |   | 8510*<br>Dual Density | — | 8512<br>Quad Density |

| 8510*<br>Quad Density | — | 8512<br>Dual Density | — | 8512<br>Single Density |

*Must have variable density option

## Ordering Information

| Model | First Shipments | List Price |
|-------|-----------------|------------|
| 8510/a | August 1981 | * |
| 8600 | August 1981 | * |
| 8512-QDX | August 1981 | $ 2,570. |
| 8515-QDX | August 1981 | $ 3,270. |

*See current Terak price list for various          8-6-81
 model configurations.

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# NEW PRODUCT BULLETIN 3

## LSI-11/23 PROCESSOR OPTION

The versatile DEC LSI-11/23 processor is now available for all users of the Terak 8510/a and 8600 systems. This 16-bit MOS-LSI processor is offered as an option to new and current Terak system users. For existing Terak system users, the LSI-11/23 processor is supplied with with a Floating Point Unit (FPU), Memory Management Unit (MMU) and 64 kbytes of RAM bringing the existing system total memory to 128 kbytes. New systems ordered with the LSI-11/23 processor option include FPU, MMU and 128 kbytes of memory.

A prominent feature of the LSI-11/23 is its memory management capability. This feature allows the user to access a 256 kbyte address space by mapping the 16-bit memory address in the processor to an 18-bit physical address on the system's Q-bus. This memory management capability provides for functional compatibility with PDP 11/34, 11/60, and 11/70 software written under the RT-11 operating system.

The LSI-11/23 incorporates hardware and firmware to enhance floating-point arithmetic operations. Floating-point instructions are executed 10 times faster than when performed using FIS/EIS under the LSI-11/2. Single- and double-precision operations are handled with the same instruction set used in the PDP 11 systems.

## Features

- 3.0 MHz clock rate (approximately 2 times faster than the LSI-11/2)
- Memory management unit
- Up to 256 kbytes of memory
- 16-bit (word) or 8-bit (byte) addressable locations
- 16 programmable mapping registers
- Stack processing
- Direct memory access
- Asynchronous bus operations
- Floating point processor

## Prerequisites

Hardware:    None.  On existing 8510 processors, the LSI-11/23 replaces the LSI-11/2.  For new systems, specify the LSI-11/23 when ordering.  Minimum memory size, 128 kbytes.

Software:    RT-11/85 version 4 operating system or UCSD PASCAL version 2.0 operating system.  Earlier version is not supported.

## Functional Block Diagram
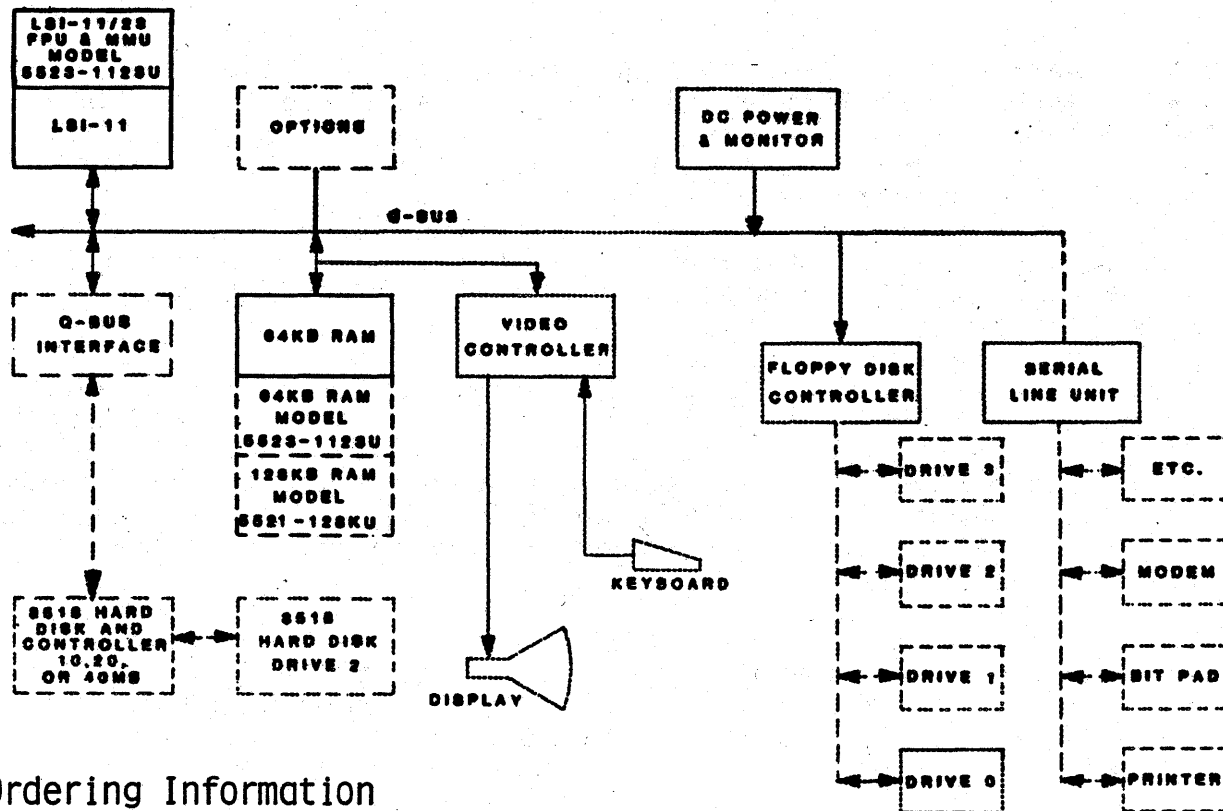


## Ordering Information

| Model | Description | First Shipments | List Price |
|---|---|---|---|
| New Systems* | | August 1981 | - - - |
| Upgrades | | | |
| 5523-1123U | LSI-11/23 processor with 64 kbytes of RAM | August 1981 | $ 5,560. |
| 5521-128KU | Adds 128 kbytes of RAM | August 1981 | $ 2,500. |

*See current Terak price list for various model configurations.

8-6-81

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# NEW PRODUCT BULLETIN 4

## 19-INCH COLOR MONITOR

A high-resolution 19-inch color monitor is now available for the Terak 8510a/8600 Color Graphics System. This 19-inch monitor is offered as an added-cost alternate to the 13-inch monitor which is standard with the 8510a/8600 system.

The 19-inch monitor satisfies those special application requirements where a larger color graphics image is desirable. Such applications typically include classroom presentations, computer-aided design, and long-distance viewing.

## Features

- Rack mountable

- Contrast filter for image enhancement

- In-line gun

- No convergence adjustments

- External degaussing control

- Brightness, gain, and volume controls

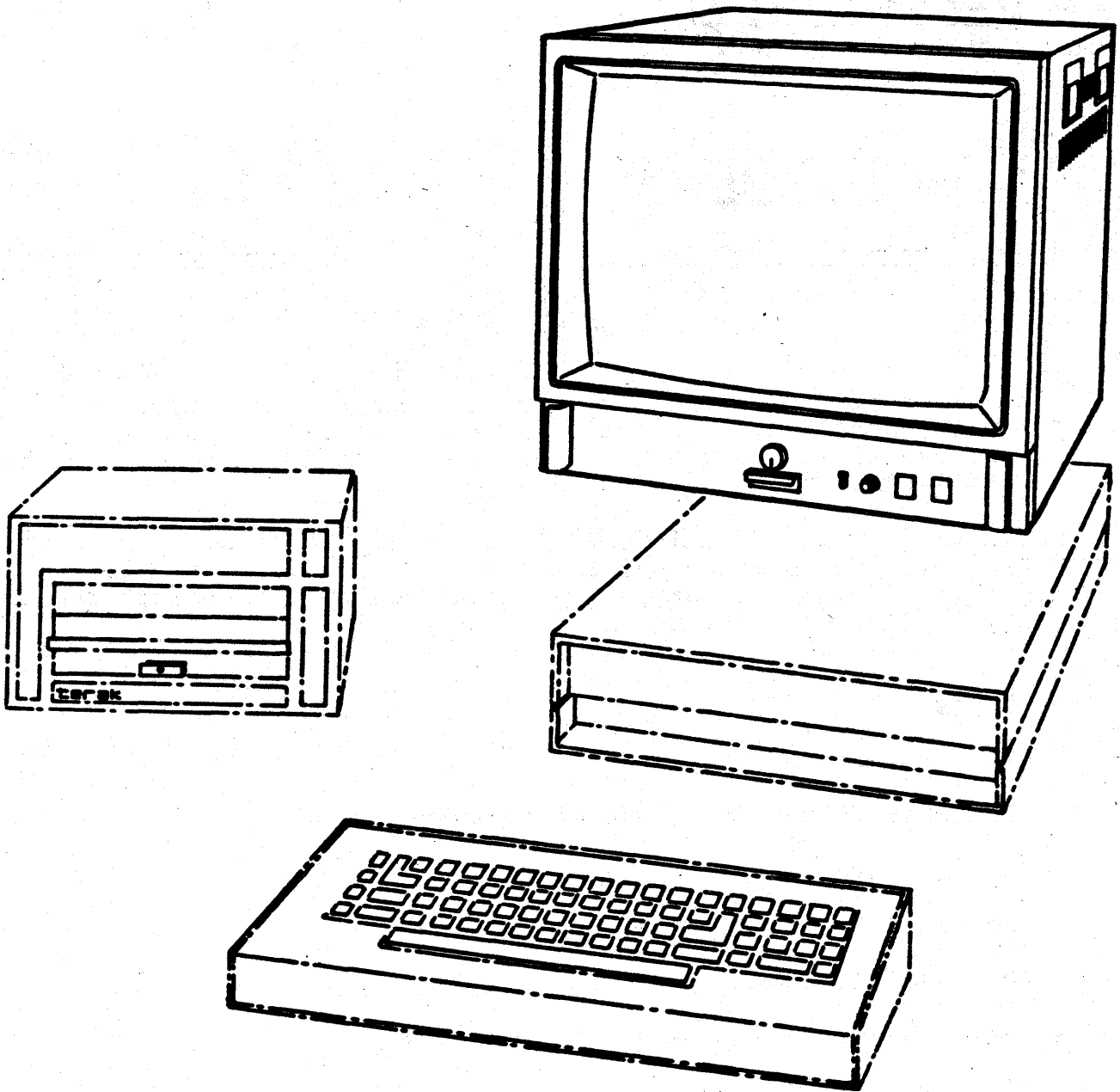- 0.31 millimeter pitch

- Long persistence phosphor

## Hardware Characteristics

Replaces standard 13-inch monitor in Terak 8600 System. All interfaces and interconnecting cables included.

## Software Characteristics

No special software or modifications to existing software are required.

# Typical System Configuration

# Ordering Information

| Model | First Shipments | List Price |
|---|---|---|
| 8601-19LP | Contact Factory | Contact Factory |

8-6-81

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# NEW PRODUCT BULLETIN  5

## BUS EXTENSION MODULES

Terak now offers enhanced Q-bus extension modules for the 8510/a
and 8600 graphic computer systems. These modules provide the
user with increased system flexibility by permitting a greater
range and mix of devices to be added to the Q-bus. Each bus
extension module consists of printed wiring boards, an external
interface board (EIB), interconnecting flat cables, and continuity
cards. The printed wiring boards are plugged into an available
Q-bus slot in the host device's backplane and the EIB is installed
on the rear of the host device to allow connection to other devices
in the system.

To complement the extension modules, Terak also provides the Q-bus
continuity card. The continuity card consists of a single printed
wiring board which is inserted in the backplane of the Terak 8510
or 8515 to provide electrical continuity between two nonadjacent
modules. In those system configurations where the arrangement
and combination of modules operating on the Q-bus may be constrained
by interrupt and DMA priority rules, adding the Q-bus continuity
card will provide the user with greater flexibility in the
assignment of modules to slots in the backplane.

## Features

- Provision for extended memory addressing (up to 256 kbytes)
  of LSI-11/23

- Supports the 8600 color system interface

- Greater flexibility in module assignment using Q-bus continuity
  card

## Hardware Characteristics

All bus extension modules and the Q-bus continuity card are fully
self-contained printed wiring boards. The extension modules are
supplied with all required interconnecting cables and external
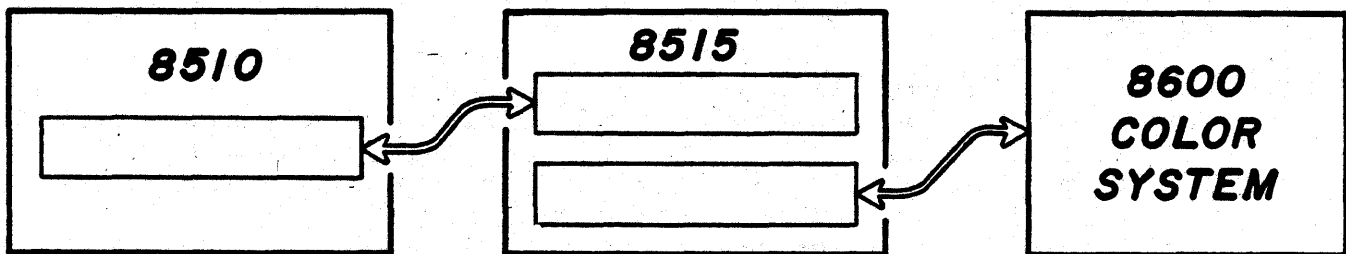interface boards.

# Software Characteristics

The extension modules and continuity card are transparent to all system software and user programs.

## System Interconnection Diagrams
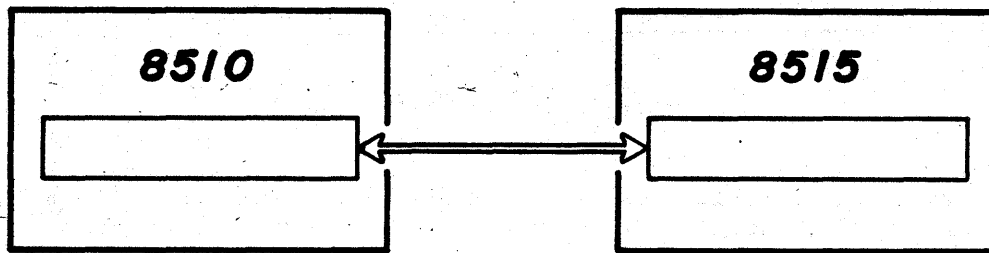
**8510/8515 CONFIGURATION**

**8510/8515/8600 CONFIGURATION**

## Ordering Information

| Model Number | Configuration | First Shipments | List Price |
|---|---|---|---|
| 2015-EC2 | 8510/8515 | August 1981 | $290. |
| 2015-EC3 | 8510/8515/8600 | August 1981 | $420. |

8-6-81

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# NEW PRODUCT BULLETIN 6

## RT-11/85 version 4.0 OPERATING SYSTEM

Version 4.0 of the RT-11/85 operating system is now available from Terak. This version of the operating system is designed to provide the user with interactive, real-time programming capability on the Terak 8510/a and 8600 systems.

This expanded version of the operating system complements and supports the newest hardware and software products which have recently been announced by Terak. Version 4.0 supports the following hardware:

- Up to four variable- or quad-density disk drives
- Up to two DEC RL-01 hard disk drives
- One Terak 8518 hard disk drive
- Up to eight asynchronous serial interface modules or
- Up to eight 16-bit parallel interface modules, or a combination thereof

Version 4.0 also supports the new software products including FORTRAN IV version 2.5, BASIC-11, MACRO 11, and the SIGGRAPH 2D level 1 graphics library for color and black-and-white systems. This new operating system also allows the user to dynamically select the system device and system console by using loadable device handlers.

## Features

- Foreground/Background monitor supports two simultaneously executing programs
- Single job monitor uses less system overhead
- Extended memory monitor for LSI-11/23 systems
- Baseline monitor for programs requiring maximum memory
- New hardware products fully supported
- New software products fully supported
- Bootable from Terak 8518 QB, QX, or RL01 disk drives

## System Programs

- EDIT and TECO for text editing and word processing applications
- PIP for transfer and management of files on peripheral devices
- DUP for general utility functions on mass storage devices
- DIRECTORY for management of file-structured devices
- MACRO-11 to support macro assembly language programming
- LINKER to convert object modules into a run-time format
- LIBRARIAN to manage libraries of object-module subroutines
- BATCH for job control in the batch processing environment
- ODT, PATCH, SIPP, SLP, and VDT to provide a comprehensive program testing and debugging capability

## Utility Programs

- DUMP to print the contents of a file in various formats
- SRCCOM to compare two ASCII files
- FORMAT (Terak's version) to initialize diskettes and specify recording density
- CSLOAD to load and display a character set
- PAS2RT to transfer files from UCSD PASCAL to RT-11 format
- LOAD86 to load the 8600 Gemini operating system

## Prerequisites

Terak 8510/a or 8600 graphics computer system

## Ordering Information

| Model | Description | First Shipments | List Price |
|-------|-------------|-----------------|------------|
| 6000-RTU | System upgrade* | August 1981 | $   840. |
| 6101-RTV4 | License | August 1981 | $ 2,000. |

*License for RT-11 version 3B is a prerequisite

8-6-81

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# NEW PRODUCT BULLETIN  7

## FORTRAN IV version 2.5

An enhanced version of FORTRAN IV is now available for the Terak
Graphic Computer Systems.  Designated FORTRAN IV/RT-11 version
2.5, this new version of the powerful, machine-independent pro-
gramming language is based on ANSI FORTRAN X3.9.  It includes
versatile extensions which allow the user to produce and interact
with graphic displays.  In addition to the basic and extended
FORTRAN features, version 2.5 includes a library of FORTRAN-
callable graphics subroutines which conform to SIGGRAPH 2D level
1 standards.  These library subroutines enable the user to gen-
erate black-and-white and color displays.  Terak's extensions
to the SIGGRAPH-standard subroutines provide the user with even
greater capability including joystick and cursor control.  FOR-
TRAN IV version 2.5 operates on the TERAK 8510 under RT-11/85
version 4.0 with a minimum of 512 kbytes of on-line storage.

## Features

- Conforms to ANSI FORTRAN X3.9

- Fast, one-pass compilation

- Mixed-mode arithmetic

- Character manipulation using BYTE data type

- PRINT, TYPE, and ACCEPT statements

- ENCODE and DECODE statements

- Demonstration programs included

- Color and black-and-white graphics

- Supplied on single-density diskettes

- Joystick and cursor control

# Optional Features

- Compiler-level debug routines

- Virtual array processing (requires LSI-11/23 option in Terak 8510)

- System library of RT-11 features callable from FORTRAN

- Object-time system modules to perform various utility functions

# System Characteristics

Compiler:                ANSI FORTRAN X3.9 with extensions

Graphics Library:        SIGGRAPH 2D level 1 standard for color and
                         black-and-white

                         Terak extensions support line drawing and
                         character displays in a coordinate system

Demonstration            FORTRAN programs using the graphics library
Programs:                provide hands-on familiarization for the
                         user

# Prerequisites

Hardware:                Terak 8510/a or 8600 system with minimum
                         of 512 kbytes on-line storage.

Software:                RT-11/85 version 4.0 operating system

# Ordering Information

| Model | Description | First Shipments | List Price |
|-------|-------------|-----------------|------------|
| 6102-FOV2.5 | License | August 1981 | $ 850. |
| 6002-FOU | System Upgrade* | August 1981 | $ 450. |

*License for FORTRAN IV version 2.0                           8-6-81
 is a prerequisite

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# NEW PRODUCT BULLETIN 8

## BASIC-11 version 2.0C

BASIC-11 version 2.0C is an enhanced version of the conversational program language developed at Dartmouth College. BASIC-11 for the Terak Graphic Computer Systems provides the user with an efficient programming language plus SIGGRAPH-standard graphics support for color and black-and-white applications. In addition to the standard and SIGGRAPH features, BASIC-11 offers Terak's graphics programming extensions which include setting and clearing of the screen at the pixel level, testing pixel structure, performing pixel masking, and controlling the orientation and mapping of characters to the display page. Terak-provided features also include utility programs for program listing and directory listing as well as a package of demonstration programs which provide the user with immediate hands-on experience in the graphics programming environment. BASIC-11 version 2.0C operates on the Terak 8510/a and 8600 under RT-11/85 version 4.0.

## Features

- SIGGRAPH 2D level 1 graphic support for black-and-white **and** color applications

- In-line editing

- Automatic program line renumbering

- Trigonometric functions

- Binary-, octal-, and character-to-integer functions

- Formatted output with PRINT USING statement

- String handling

- Vitrual arrays on disk for string, integer, and real data types

- Joystick and cursor control

- Supplied on single-density diskettes

## System Characteristics

| | |
|---|---|
| Interpreter: | Provided in a ready-to-use version and as object code modules with which user can custom build an interpreter. Conforms to Dartmouth BASIC with extensions. |
| Graphics Library: | Conforms to SIGGRAPH 2D level 1 standards for color and black-and-white.

Terak extensions provide control of hardware graphic features plus line drawing and character displays in a coordinate system. |
| Demonstration Programs: | BASIC programs using the graphics library provide hands-on familiarization for the user. |

## Prerequisites

| | |
|---|---|
| Hardware: | Terak 8510/a or 8600 system. |
| Software: | Requires RT-11/85 version 4.0 operating system |

## Ordering Information

| Model | Description | First Shipments | List Price |
|---|---|---|---|
| 6101-BAV2.0 | License | August 1981 | $ 950. |
| 6001-BAU | System Upgrade* | August 1981 | $ 330. |

*License for BASIC-11 version 1 is a prerequisite

8-6-81