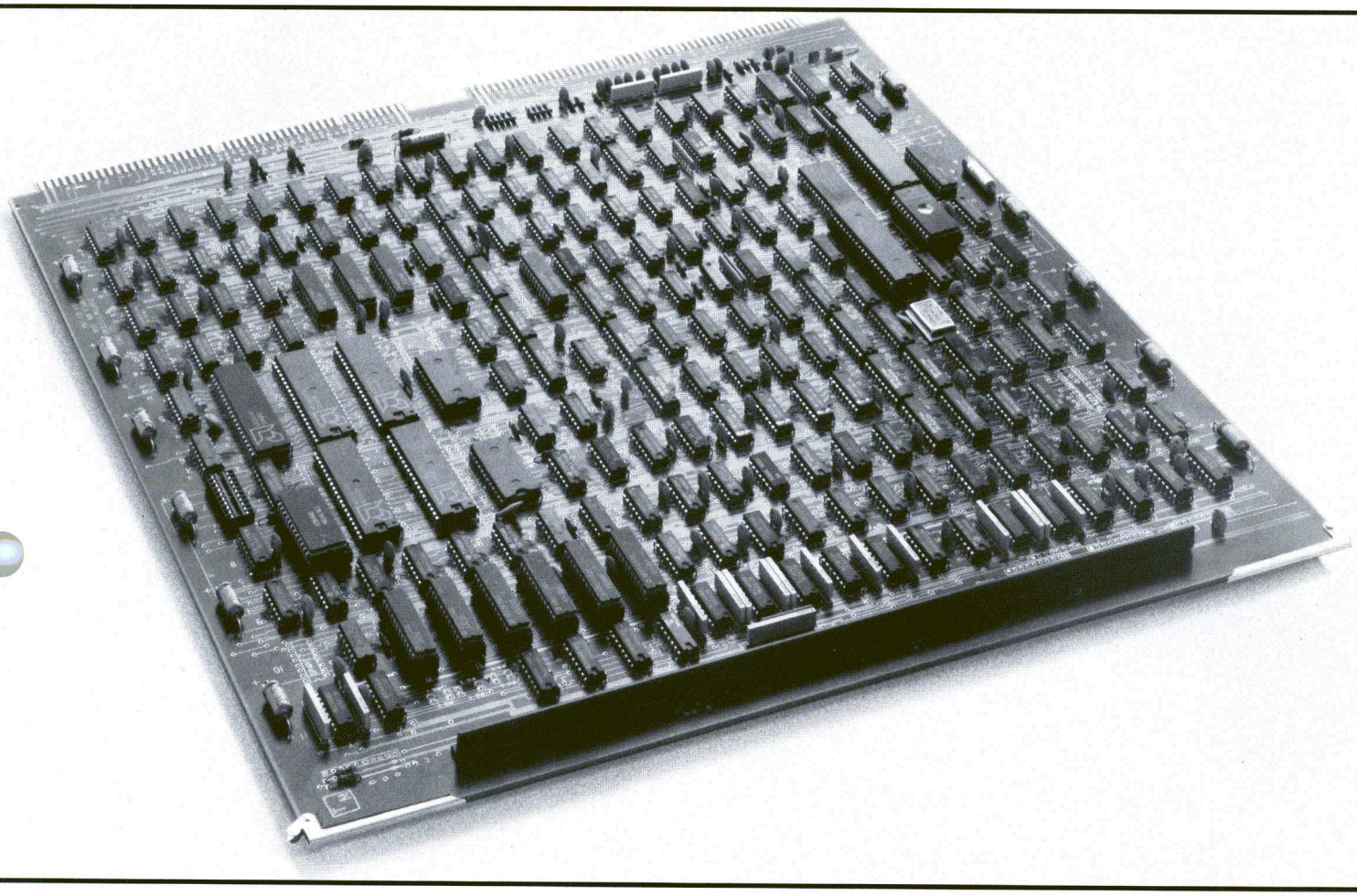
Dual Function Disk/Tape Controller for Nova & Eclipse: Model ZDF-1

ZETA



- True emulation of Data General disk and tape subsystems under unmodified RDOS and AOS. No software patching!
- Dual function convenience—one ZDF-1 supports up to four SMD disk drives and eight formatted tape drives simultaneously.
- E^2PROM technology allows configuration from the console and virtually unlimited drive choice.
- Concurrent, high data transfer rates: 2 MB/sec on disk and 1 MB/sec on tape.
- Plug compatible with both FCC-hardened and non-FCC chassis.
- Full factory support: 2-year warranty, 48-hour return/repair policy, Customer Support Hotline, and much more!

Configuration Versatility Through E²PROM Technology

Because Zetaco believes it's important that you have a choice of drives when integrating mass storage subsystems, the ZDF-1 is designed to be versatile.

One of the keys to this versatility is E²PROM (Electrically Erasable Programmable Read Only Memory) technology. Instead of via problematic on-board switches, all drive characteristics and functions are selectable from the console via special downline-loaded software on a drive-by-drive basis. Drives of differing speeds & capacities can be intermixed on one ZDF-1, and easily configured from the console without removing the board from the chassis.

Parameters of popular SMD disk and formatted tape drives such as Century Data, Control Data, Fujitsu, Cipher, Megatape, Pertec, STC, Kennedy and others, are already programmed into the Configurator Software, ready to be selected and loaded, at the touch of a keystroke, into the non-volatile E²PROM memory.

E²PROM technology also offers future flexibility: because it can be written to, you can input characteristics of drives not already in the Configurator Program. The last menu in this software offers a fill-in-the-blank arrangement, so you can easily integrate new drives as they become available, without changes to the controller or operating system.

All controller functions are also selectable from the console via the Configurator Program, instead of on-board switches.

CPU Compatibility

The ZDF-1 interfaces to the Data Channel on Nova and Eclipse minicomputers, in an "I/O only" slot. It is designed to be plug compatible with either the FCC-hardened or the non-FCC chassis, with cabling for both chassis styles offered optionally.

A microprocessor-based design, ZDF-1 uses DG's standard drivers and low-power components to assure true emulation, reliable operation, and minimal power consumption. Delayed pick-hold provides disk drive power sequencing to eliminate excessive peak current demand on the AC power source.

Unit interrupt and priority are user-definable via the configuration software.

Disk Control Features

Unlike competitive controllers that support only two drives, the ZDF-1 simultaneously supports up to four SMD disk drives with data transfer rates up to 2 MB/sec. Because characteristics are chosen on a port-by-port basis, a brand/speed/capacity mix of drives may be integrated on this one controller, including Winchester, removable media and fixed/removable media drives.

Software Compatibility

Under standard RDOS and AOS operating systems, full emulation of Zebra, Vulcan and Kismet subsystems is provided. Your choice of three emulation modes means that no matter which drives you choose, maximum usable storage capacity can be obtained under true emulation.

Many drives that do not ordinarily map out efficiently under DG parameters may be accommodated by configuring them as 'logical' rather than 'physical' drives, thereby optimizing storage capacity yields from a variety of different drives.

Emulation Mode 1: 6060, 6061, 6067

In this mode, disk characteristics are mapped exactly like a DG Zebra (6060, 6061, 6067) disk subsystem. These emulations support 24 sectors per track under unmodified RDOS or AOS. DG's DKINIT and DFMTR are used to format the drive.

Emulation Mode 2: 6122, 6160, 6161, 6214

Disk characteristics under Mode 2 are mapped exactly as a DG Vulcan or Kismet (6122, 6160, 6161, 6214) disk subsystem. 35 sectors per track are supported under unmodified RDOS (Rev. 7.0 & above) or AOS. DG's standard DKINIT and DFMTR are used to format the drive.

Emulation Mode 3: Expanded 606X/61XX

For use under RDOS only, this mode provides the capability to interface any drive with up to 64 heads, 2048 cylinders, and 64 sectors per track. Drives are not required to be mapped exactly like DG subsystems in this versatile mode. Zetaco's disk formatter and initializer programs are provided with the controller to establish the RDOS-compatible parameters. (Note that AOS is not supported in Mode 3.)

Sector Slip™ Option

O.E.M. customers frequently have critical applications that require contiguous sectors of error-free recording surface. Since error-free media is difficult to obtain and impossible to maintain, Zetaco's optional Sector Slip formatting feature is an effective solution.

Zetaco's Sector Slip feature consists of a stand-alone utility program that vigorously analyzes the disk for marginal sectors, then reformats the disk such that those sectors are ignored during operation. In effect, the bad sectors become invisible to the system. The on-board firmware is programmed to slip past these bad sectors during read & write operations without further instructions from the host. When this feature is active, the CPU has the impression of flawless, contiguous media.

Another benefit of Sector Slip is that it allows the use of a disk drive that has more errors than the Bad Block Table accommodates, because sectors flagged as bad under Sector Slip are not recorded on the table. For full information, contact Zetaco.

Data Integrity

Header Verification: Each sector contains a separate header preamble consisting of sector, head, and cylinder positioning data, along with an associated header CRC. This preamble is automatically checked before any data transfer is executed. Before each header and data field is a Sync Byte (as opposed to a single Sync Bit) to further ensure correct identification and verification of these fields.

ZETACO

High Performance, True Emulation and Dual Function Convenience

ZDF-1

Zetaco's newest Slot Saver™ is a single board, dual function disk and tape controller you can trust for years of operational reliability and true Data General emulation. It combines Zetaco's performance-proven disk and tape control capabilities with technological enhancements, such as E²PROM's and high data transfer rate support, to result in a convenient and flexible means of accommodating your mass storage needs on Nova & Eclipse minicomputers.

To ensure reliability and performance, the ZDF-1 employs two functionally dedicated microprocessors, one for disk and one for tape. This means that tape activity can occur simultaneously with disk activity, without slowdown or impedence to either, resulting in optimum speed and performance on the entire system.

It has always been Zetaco's design philosophy that a truly emulating controller should achieve high performance without software patching. Patching can be cumbersome and the root of problems later when operating system revisions are made. That's why Zetaco has designed the ZDF-1 to obtain optimum formatted yields and performance while running under unmodified DG operating systems, RDOS and AOS, without patching of any kind. You can be assured of high performance and trouble-free longevity... all under true emulation, now and in the future.

With **Read/Look-Ahead,** the coupler assumes and issues a sequential 'read' command within the time limit of the reinstruct period, which is either nominal or what the user chose through Dynamic Gap Length Select. This permits the CPU to take advantage of the full inter-record gap length timing before acknowledging the coupler's decision to read another record. Should the next command not be a 'read,' the buffered coupler ensures tape repositioning at the end of the last record actually read. Once this feature is selected, it is activated for all tape drives connected to the controller.

Self-Test and Verification

Comprehensive self-diagnostics are built into the ZDF-1 to provide full operational verification of over 90% of the board every time it is powered up. 'Go/no go' and 'controller active' status are indicated with LED's on the board edge.

Each Unit Fully Tested

The ZDF-1 Disk/Tape Controller is manufactured under state-of-the-art conditions, and checked by our experienced Quality Assurance team throughout the production cycle. From incoming components to assembly, through burn-in and final test, each unit is repeatedly examined to ensure that it meets Zetaco's stringent quality standards.

Final testing includes two phases: first, the controller is exercised under the most demanding conditions, whereby each operational module is run at its maximum speed and capacity. Each unit is then installed and tested for an extended period of time on a computer system the same or equivalent to the customer's specified configuration. Only after successful completion of these tests is the unit shipped.

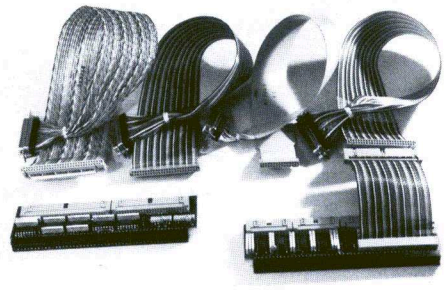
Guided Installation

The ZDF-1 Disk/Tape Controller is shipped with complete documentation, detailed installation instructions, formatter/initializer programs if required, Zetaco diagnostic software, a protective cover, and cabling (if ordered). Standard program media is 9 track magnetic tape, in your choice of 800 or 1600 bpi.

Reliable Cabling

Zetaco offers a full line of compatibly designed cables for controller-to-peripheral connection. Our fully tested cables, manufactured in-house for superior quality, are recommended for use with the ZDF-1 to help ensure system reliability and prevention of the line noise and hard-to-trace system malfunctions that poor quality or improper cabling can cause.

Both standard and FCC-shielded cables are available for the ZDF-1. Please refer to Zetaco's cable brochure for detailed information.



Complete Backup From Zetaco

Zetaco's full two-year warranty, which has been an industry exclusive for over 5 years, attests to the confidence we have in our products. With our technical sales and support staff, and fully trained Authorized Stocking Distributor network, you can be assured of any support you may need.

In the rare event of a hardware failure, our 48-hour turnaround policy on repair/replacement means minimal downtime for you.

Our fully staffed Customer Support Hotline (612-941-9480) is available to answer your technical questions and troubleshoot on the phone every weekday, 8 a.m. to 5 p.m. (CST).

Zetaco Authorized Stocking Distributors package, install, and maintain complete peripheral subsystems using a wide variety of peripheral brands to meet your specific needs. Call us for the name and phone number of the one nearest you throughout the U.S. and Europe.

Direct and implied seeks are supported, as are overlap seeks, for use in a multiple drive system to improve system performance.

Automatic Error Retry: A 32-bit Error Correction Code (ECC) facilitates data error detection and correction of up to an 11-bit error burst. The actual ECC error correction can be performed either by the system software or on the controller before transfer to the Data Channel. This feature is activated via a software command.

Data Recovery: Other unique features that aid in the recovery of data are Data Strobe Early/Late, and 2 positioner offset commands. These functions work in concert with the ECC, enabling the controller to try every possible combination of position factors to read data. This helps compensate for media flaws.

Bad Sector Flags: As each sector is tested during the format program operation, a bad sector bit is set in those sectors that will not support error-free data, thereby preventing data transfers onto known bad sectors.

Error Logging: The number of errors corrected on a per unit basis is maintained in registers that are readable and re-settable via the operating system, thus allowing the user to monitor each drive's performance and reliability.

Data Late Immunity

Zetaco's exlusive Ping-Pong Buffering feature and switchable DMA throttle control minimize 'data late' problems while maintaining the maximum allowable data transfer rates between the controller and the CPU.

Ping-Pong (toggle) Buffering is a better alternative to traditional FIFO buffers because it allows the concurrent, yet independent, action of two separate full-sector buffers. After disk data is ECC checked and soft error corrected by the controller, it fills or empties one buffer while the system empties or fills the other. This results in continuous transfer of verified data with minimal interruptions to the CPU, and prevents the data under/overflows that are a common problem with traditional FIFO buffers.

The throttle control feature establishes the maximum number of consecutive DMA transfers allowable, so that conflict with other DMA devices and the potential for 'data late' conditions are minimized. Like other features on the ZDF-1, this is configurable via a software command from the console.

Multiple Sector Transfers

Absolute contiguous transfers up to a full track in length are supported. Sector interleaving, to smooth out the transfer timing between CPU and disk drive and to help minimize 'data late' conditions, is programmable from 2:1 to 6:1.

Media Compatibility

Media compatibility with other SMD controller manufacturer's formats is user selectable, allowing pack interchangability and true second sourcing on controllers. Like other features, it is chosen on a port-by-port basis via the Configurator Program.

Dual Port Support

Fully compatible with standard RDOS, Model ZDF-1 supports the Dual Port feature, used when a disk drive is shared by two CPU's.

Tape Control Features

Model ZDF-1 supports up to eight formatted tape drives with the industry-standard Pertec interface, fully supporting data transfer rates up to 1 MB/sec. Because characteristics are programmed separately for each drive, a brand/type/speed mix may be integrated on this one controller. Choose any combination of start/stop and streaming drives, including CacheTape, GCR, dual- and tri-density.

Software Compatibility

Zetaco's ZDF-1 is a true emulator of DG magnetic tape subsystems 6021 and 6125, under unmodified RDOS or AOS. As a true emulator, the ZDF-1 supports all the features of these subsystems, plus has further performance enhancements.

The streaming mode features support DG's high speed backup utilities, such as BURST and PCOPY, to provide full optimization of streaming drive technology.

Tape Data Buffering

One KB of on-board tape data buffering permits continuation of controller-to-drive data transfers while the controller awaits the next 'read' command. This smoothing process minimizes potential reinstruct timing overruns and undesirable drive repositioning.

High Speed File Search

During a file search on dual-speed drives, the controller will automatically select the higher speed when the file is located more than 16 records away from the current tape position, dramatically improving file access time.

Exclusive Streaming Enhancements

DG users integrating streamer tape drives can find that constraints of disk access, CPU cycle time, and operating system limitations do not allow for command execution within the normal drive-dependent reinstruct (gap) period.

Many of these environmental restrictions are circumvented via the Dynamic Gap Length Select and Read/Look-Ahead features, allowing full capitalization of the benefits that streaming drives offer.

With Zetaco's **Dynamic Gap Length Select,** a streaming drive's limited reinstruct period can be artificially extended to let you control the trade-off between throughput and media conservation. Undesirable start/stop action is kept to a minimum, thereby optimizing streamer performance, when the inter-record gap is extended sufficiently to accommodate both the read and write operations. This feature is selectable via the Configurator Program on a drive-by-drive basis.

ZDF-1 Specifications

Operational

CPU Interface: Nova & Eclipse via the Data Channel. Requires an "I/O only" slot.

Disk Drive Interface: SMD*

Tape Drive Interface: Pertec*

DG Subsystem Emulations: 6060, 6061, 6067, 6122, 6160, 6161, 6214 disk subsystems, and 6021 and 6125 tape subsystems.

Operating Systems: Unmodified RDOS or AOS.

Data Transfer Rates: 2 megabytes per second on disk, 1 megabyte per second on tape.

Disk Device Codes: Primary Controller 27g; Secondary Controller 67g; others selectable via Configurator Program.

Tape Device Codes: Primary Controller 22g; Secondary Controller 62g; others selectable via Configurator Program.

Bus Load: 1 unit load.

Interrupt Priority Mask Bit: 7 standard

Disk Sector Addressing: Contiguous or interleaved, programmable 1:1 up to 6:1.

Disk Sectors Per Track: 24 or 35 standard; others selectable.

Disk Data Per Sector: 512 bytes.

Disk Data Storage Buffer: 2-sectored Ping-Pong (toggle) Buffering.

Tape Data Storage Buffer: 1 KB.

Data Channel Latency: 422 microseconds typical for full performance. 1 second maximum allowable.

Error Correction Polynomial: 32 bits.

Controller Registered: 7 accessible.

Memory Address: 16 bits.

Power Requirements

40 watts, ± 5% (+5vdc @ 8.0 amps from CPU)
.25 watts, ± 5% (−5vdc @ 0.5 amps from CPU)

Physical

Disk Drives Supported: up to four logical drives

Tape Drives Supported: up to eight

Size: 15″ x 15″ (38.1 x 38.1 cm)

Cables: FCC internal cables provided with controller. 'A' and 'B' FCC external and non-FCC cables are sold separately. Refer to Zetaco's cable brochure for full details.

Operating Environment: 0°C to 55°C with 10% to 90% relative humidity (non-condensing).

Shipping Weight: 10 lbs/4.54 kg. (Includes controller, documentation, diagnostic software)

*For a complete list of drive compatibilities, contact Zetaco.

Zetaco constantly strives to improve its products and may therefore modify the specifications and descriptions presented in this brochure, without prior notice.

High Performance Backed by Experience and Service

Our main business is peripheral interfaces and has been for over a decade. The company was founded as Custom Systems Inc. in 1972 and remains under the same management today. That continuity assures you of a reputable, reliable source.

Our specialty is peripheral interfaces for Data General and Texas Instruments minicomputers. We concentrate our efforts and resources on these technologies, so you are assured of true emulation and compatibility.

Guided Installation: Each Zetaco product is shipped complete with detailed installation instructions, and a Customer Support Hotline (612-941-9480) is available to answer your questions.

Exclusive 2-Year Warranty: All Zetaco products are warranted against defects in material and workmanship for up to two years from date of shipment. Refer to Zetaco's Terms & Conditions Policy for complete warranty information.

Variety: Zetaco currently offers a complete line of Data General-compatible peripheral controllers and processor enhancements: SMD disk controllers, mag tape couplers, Slot Savers™, general purpose I/O, communications multiplexors, line printer controllers, memory expansion, and others. Normal delivery time on standard product is 30 days, ARO.

Custom Designs: Many O.E.M.'s have taken advantage of the engineering resources of Zetaco and Custom Systems Inc. Contact us to design interfaces to your specifications.

References: We have a long, prestigious list of satisfied customers and we'll be happy to supply you with references.

ZETACO

The Link To Tomorrow.

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