TA90 Cartridge Tape Subsystem

Digital's Highest-performance Tape Subsystem

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Fast, Reliable VAXcluster Tape Subsystem with IBM® 3480 Interchange Capability

Digital's highest-performance tape subsystem, the TA90, uses high density cartridges and features an IBM 3480-read/write-compatible recording format to meet data interchange needs for large systems. Cartridge tape is rapidly becoming the format of choice for large system backup. Now the TA90 offers this convenient format with Digital's VAXcluster systems to maximize reliability and minimize cost of ownership. In addition, a 200 megabyte per cartridge capacity and optional 6-cartridge automatic stack loaders give the TA90 an unattended backup capacity of 2.4 gigabytes, making it an excellent backup device for Digital's SA600 Storage Arrays.

The TA90 handles the most demanding storage tasks for your mainframe class systems, including high-speed backup, data interchange, journaling, transaction logging, and archiving. A TA90 subsystem can complete a backup task in half the time required by currently available reel-to-reel tapes on VAXclusters. For data collection, a 2 megabytes per second data transfer rate gives the TA90 first-rate capabilities. Powerful error recovery capabilities ensure data integrity by enabling the TA90 to correct up to 4 track errors "on the fly."

The TA90 meets the requirements of large-scale tape installations – offering IBM 3480 interchange compatibility, unattended operation, improved reliability over current subsystems, faster effective data rates, increased productivity, investment protection, and reduced cost of ownership.

Highlights

- Mainframe Class Tape Backup – TA90 is Digital's highest performance tape subsystem, completing backups in half the time of current reel-to-reel tape subsystems and handling other applications at data transfer rates up to 2.1 Mbyte/s. As a streaming drive, its reposition time of 80 ms makes it suitable for start-stop applications as well.

- Full IBM 3480 format compatibility.

- 200 megabyte capacity per cartridge; a 38% increase in capacity per unit of media, compared to 2400-ft. GCR reels.

- TA90 can reduce operator intervention by 85%, because of its 2.4 gigabyte unattended backup or data collection capacity per dual-drive unit with optional automatic 6-cartridge stack loaders (1.2 GB per drive/loader).

- TA90 provides significant savings in power, cooling, and drive space requirements, compared to reel-to-reel start/stop drives. The cartridges' small size and high capacity allow a sixfold reduction in physical storage space over reel-to-reel media.

- Performance enhancement with a 2 Mbyte cache buffer.

- Significant improvement in reliability and data integrity compared to GCR (6250 bpi) reel-to-reel tape units.

- Investment protection as a Digital Storage Architecture device.

- Designed for VAXcluster systems. Connects to HSC servers via the new K.SI (HSC5X-DA) high speed channel card; the K.SI supports previous Digital tape subsystems as well. Software support is provided by HSC software (V3.90).

## Configuration Flexibility Accommodates Growth

The TA90 Tape Subsystem is optimized for flexibility and growth, and is suitable for any size VAXcluster installation. The TA90 includes the master controller and dual transport unit. As many as three additional TU90 dual transport slave units can be connected to a single TA90 master controller, for a total of eight transports. The controller connects to the new K.SI (HSC5X-DA) high speed channel card in the VAXcluster Hierarchical Storage Controller (HSC), and is supported by Version 3.90 HSC software and VMS version 5.0.

Both master and slave versions can be equipped with optional automatic stack loaders, as described below (in the *Reduced Cost of Ownership* section), to reduce the need for operator attention during high capacity backups or file transfers.

Each TA90 master controller has two dual port STI (Standard Tape Interconnect) connections to the HSC. In typical VAXcluster configurations, the master controller can be connected to two separate HSCs. This dual porting feature allows each control unit to service two HSC controllers, which maximizes subsystem performance and significantly increases tape drive availability across the VAXcluster. In larger installations, two masters can be configured redundantly to provide even higher availability and performance. This option effectively eliminates any single point of failure. A dual communication adaptor is available to connect two controllers together, allowing further load balancing. The figure illustrates a typical maximum TA90 configuration within a VAXcluster.

As organizational needs grow, additional TA90s can be added to the VAXcluster easily and efficiently. The supported limits to this growth are two TA90 master subsystems and twelve transports per HSC server. As each master subsystem is added, system managers can adjust the assignment of transports to controllers through a panel in the controller cabinet.
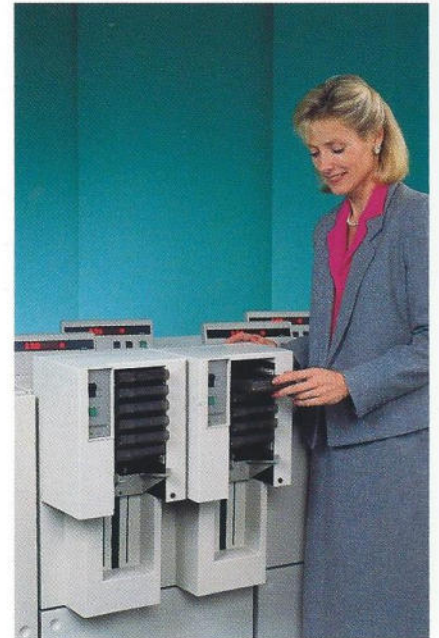
## Performance, Capacity and Data Interchange for Large System Backup Needs

The TA90 provides the performance and capacity you need for your main-frame class installation. With a potential streaming data transfer rate of 2.7 Mbyte/s, depending on host system capabilities, the TA90 is Digital's highest-performance tape subsystem.

Actual performance will depend on your system configuration and application. Backup operations can complete in half the time required by current reel-to-reel tape subsystems through a combination of fast, automated loading and media changing with a new, more efficient VMS Backup utility.

Using VMS Backup, a TA90 can back up an RA90 disk in 30-35 minutes, and can back up an RA81 disk in 15 minutes. HSC Local Backup can make a physical copy of an RA90 disk in 18 minutes or less, using the two transports of a TA90 subsystem.

Data collection and file transfer applications can sustain transfer rates of about 2 MB/s.

The Digital Storage Architecture (DSA) contributes to this performance. Using the DSA software protocol (Tape Mass Storage Control Protocol or TMSCP), the TA90 controller will prefetch upcoming commands and data while the tape drive is completing current data transfers. These commands are stored in the

19,000 bits per inch
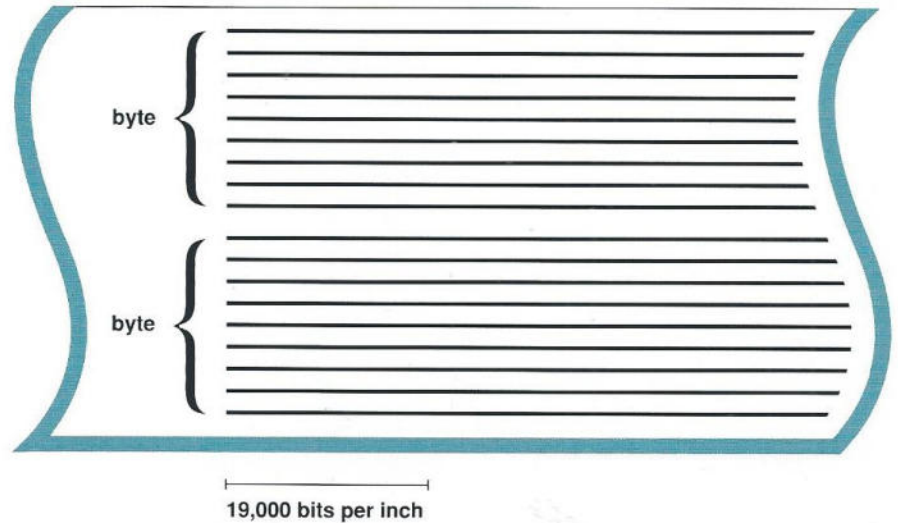
TA90/3480 Recording Format records 38,000 bytes per inch on 18 parallel tracks.

subsystem's 2 Mbyte cache, allowing the tape drive to move immediately from one operation to the next without waiting for new instructions to arrive from the host processor. This capability helps optimize performance.

The TA90K cartridge media have a capacity of 200 Mbytes each, which combines with the automatic cartridge loaders and the subsystem's high performance to provide a suitable backup capability for the SA600, SA550 and SA650 Storage Arrays.

TA90 thin film head technology supports 18 tracks on the half-inch wide chromium dioxide tape, and a linear bit density approximately three times the 6,250 bpi Group Code Recording (GCR) standard. This results in a total data density of 38,000 bytes per inch. The 4 x 5 x 1-inch cartridges are approximately one-fourth the size of a standard tape reel but store up to 38% more data.

The TA90 recording format is fully read/write compatible with IBM 3480 tape drives. This allows the same degree of data interchange that users have traditionally enjoyed with industry-standard nine-track tape.

Outstanding Reliability and Data Integrity

The TA90 ensures a high degree of data integrity and system reliability and represents a significant improvement in uptime relative to reel-to-reel systems. The subsystem records Error Correction Code (ECC) and Cyclic Redundancy Check characters on the tape and uses this information to make quadruple-track error correction without CPU intervention. Data integrity is further enhanced by a two-dimensional parity feature.

In terms of reliability, TA90-class drives have a proven record of excellence. In addition, two TA90s can be configured redundantly in a VAX-cluster to eliminate the possibility of a single point of failure and maximize system availability. The subsystems are further supported by VAXsimPLUS, so that any problems which may occur can be identified and corrected before they interfere with operations.

As mentioned earlier, the subsystem achieves the high streaming transfer rate typically required for backup applications with the help of a built-in 2-Mbyte cache buffer. To help ensure data integrity, the buffer is software-selectable; that is, you can turn the cache on or decide not to use it, depending on your application. This flexibility and control is important, because for applications such as
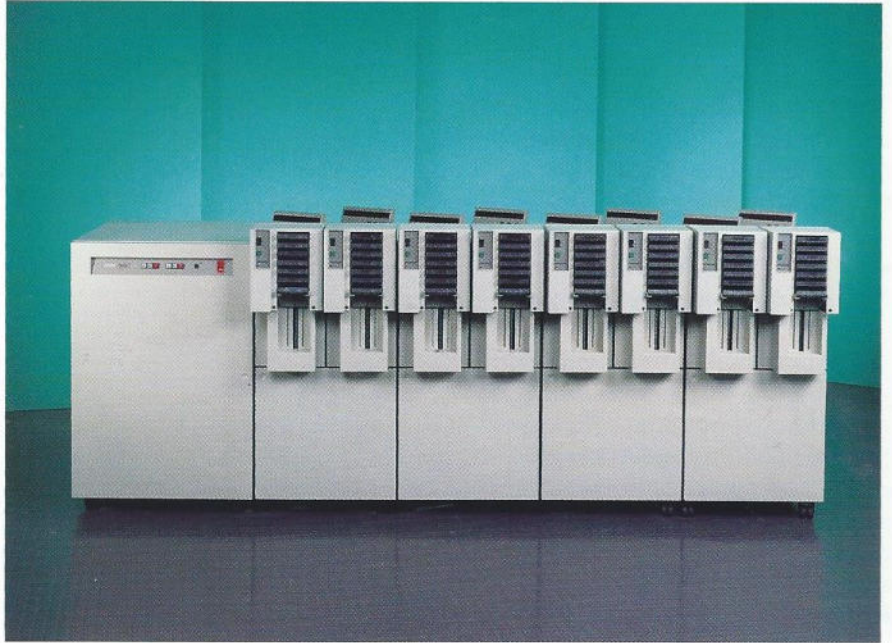
Maximum TA90 Configuration Within a VAXcluster
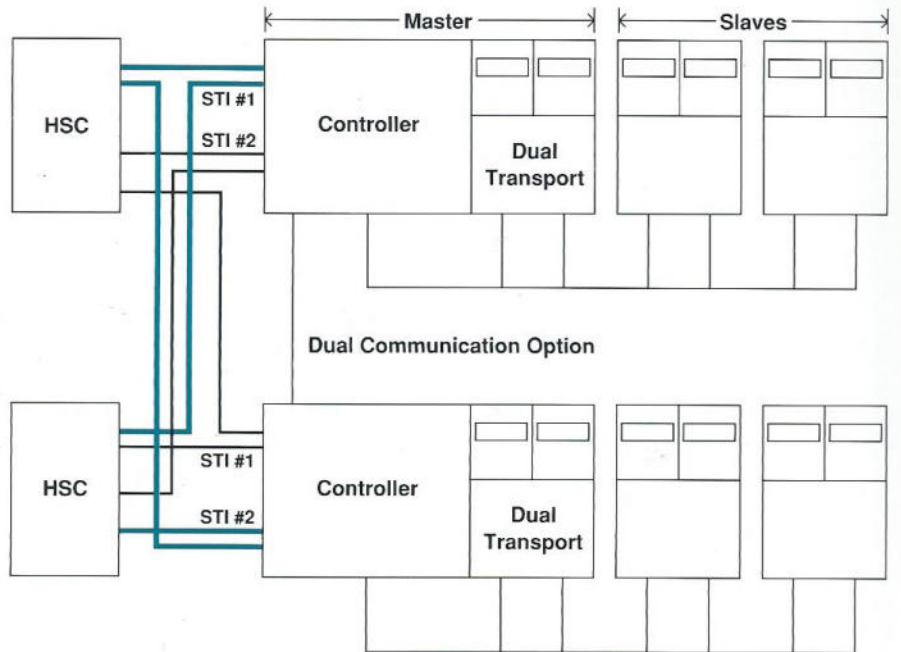
This configuration provides maximum throughput, and redundancy for high availability. Each HSC server is supporting two masters and a total of 12 transports.

backup, the cache provides a significant performance gain; but in other applications such as data collection or transaction logging, a cache can create a risk of data loss: In these applications, data is normally deleted in the CPU after it is written to the tape. If a tape cache is involved, this information is deleted after it is written to the cache and before it is recorded on tape. Any error in the data transfer from cache to physical tape (e.g. power failure) would be unrecoverable. When running such applications, it is important to turn the cache off.

Tape Resource Sharing for Greater Accessibility at Lower Cost

The TA90 provides a fast, shared-access resource for VAXcluster users, because it is connected to the HSC Controller. When multiple tape drives are shared via the HSC, rather than being locally attached to a single CPU, there is more likelihood that multiple users can access drives when needed. The HSC controller operates as a specialized, independent node in the cluster, performing many I/O functions and leaving the host CPUs free to perform other tasks.

Connection to the HSC Maximizes Performance

The HSC supports a unique Local Backup and Restore utility that allows the system to maximize tape drive performance and to back up or restore a disk at very high speed. Using the utility, a TA90 can take as little as 16-18 minutes to back up a 1.2 Gbyte RA90 disk drive. Because this
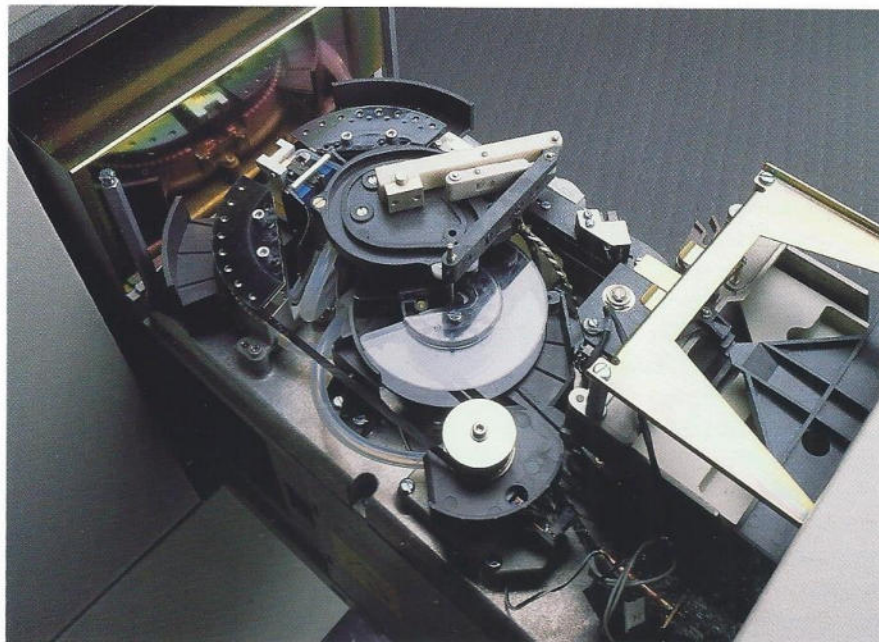
utility does not involve the host CPUs, it is possible to perform backup with virtually no effect on the other operations of the cluster. Similarly, the backup operation is not hindered by the timesharing activities of the CPUs.

Local Backup writes a physical copy of a disk to tape. The copy is a block-for-block transfer with no data compaction or file reorganization. Local Restore is the inverse process and requires restoration of the full volume. The utility runs on any HSC, and can access any disk and tape drives on the same HSC.

Unattended Operation and Reduced Cost of Ownership

The TA90 requires only one media load to back up two RA90 disks, which can reduce operator intervention by 85% (compared to a dual TA79 subsystem), eases backup tasks and saves time and cost. Each optional cartridge stack loader feeds up to 6 cartridges automatically, and the capacity of 6 cartridges corresponds to the capacity of a fully loaded RA90 disk (1.2 Gbytes). Since the loaders are supplied in pairs, the potential for minimally attended operation is significant.

In addition, cleaning functions take less time, and with the decreased form factor of tape cartridges, media storage onsite occupies less space and operator overhead. With a TA90 installation, organizations could realize a 38%

increase in capacity per unit of media, a sixfold reduction in physical storage space over reel-to-reel media, and a significant savings in power, cooling, and space requirements.

Built-in Investment Protection

As a Digital Storage Architecture (DSA) system, your TA90 investment is protected because DSA is supported on a wide range of Digital CPUs and operating systems. Under DSA, all tape drives use the same protocols. This means that no program changes are needed as you upgrade from one DSA storage device to another over time within any DSA-supported operating system environment. As new developments in technology emerge and new software releases occur, your TA90 system will be able to take advantage of them without expensive changes to your application code.

For more information...

If you would like to learn more about the TA90 Tape Cartridge Subsystem or other Digital products, call your nearest Digital Sales Office or ask your Digital Sales Representative. Or you can call our toll-free number (in the United States only), 1-800-DEC-INFO (800-332-4636), Monday through Friday, 8:15 A.M. to 5:00 P.M. Eastern Time.

Specifications

Performance

Read/write speed	78.7 ips
Data transfer rate *(max)*	2.7 Mbytes/sec.
Rewind speed *(avg)*	157 ips
Rewind time per cartridge	48 sec.

Data Organization

Number of tracks	18
Recording density *(max)*	38,000 bytes per inch
Capacity *(formatted)*	200 mbytes
Max. record length	65534 bytes
Recording medium	TA90K tape cartridge

TA90 format and cartridge conform to the proposed ANSI X3B5 standard.

Operating Environment

Temperature range	15°C-32°C (59°F-90°F)
Relative humidity	20%-80%
Wetbulb temp *(max)*	25.6°C
Altitude *(max)*	2438m (8000 ft.)
Noise level *(max)*	69 dbA

Power Requirements

Voltage at 60Hz	208/240 V 60Hz	
Voltage at 50Hz	TBD	
Phase	3 Phase	
Power consumption *(max)*	1.9KVA	
Heat dissipation	6100 BTU/hr.	
	60 Hz	**50 Hz**
Power plug type	Russell-Stoll #3760	country specific
Power receptacle	Russell-Stoll #3754	country specific
Power cord length *(max)*	4.6m (15 ft.)	

TU90 transports receive power from the TA90 master control unit. No external power cord is required.

Specifications (continued)

	TA90 Master	TU90 Slave
Physical Characteristics		
Height	108 cm (42.6 in)	108 cm (42.6 in)
Width	117 cm (46.0 in)	51 cm (20.0 in)
Depth	75 cm (29.8 in)	75 cm (29.8 in)
Weight	350 kg (770 lb)	155 kg (340 lb)
Depth with loader	93 cm (36.8 in)	93 cm (36.8 in)
Weight with loader	364 kg (800 lb)	169 kg (370 lb)
Clearance Requirements		
Front	91 cm (36.0 in)	101 cm (39.9 in)
Right side	61 cm (24.0 in)	61 cm (24.0 in)
Left side	61 cm (24.0 in)	0 cm (0.0 in)
Rear	91 cm (36.0 in)	91 cm (36.0 in)
Configuration Parameters		
Drives per formatter	8 max.	
Formatters per HSC50/70	2 max.	
Drives per HSC*	12 max.	
Dual porting	Yes	
Max. I/O cable length	24.4m (80 ft.)	
(STI from HSC to controller)		

*HSC5X-DA, HSC code 3.90 and VMS V5.0 are required to support TA90; ULTRIX support will be
provided in V3.1

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