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Data-Backup Guidelines – 2017

The Importance of Backups

A properly planned and implemented backup process is vital to any organization. While hardware is a substantial capital investment, it is easily repaired or replaced. Failures can be covered by warrantees or service contracts, or can be fixed by purchasing replacement parts. New hardware can be purchased if the existing hardware cannot be repaired. Insurance can be purchased to cover damage. **However, business-critical data lost due to equipment failure is difficult (and very expensive) to recreate and replace.**

The data stored on the network server represents many hours of effort over a long period of time. Recreating this information is next to impossible. Even if printed records are available, re-entering the information is an expensive, labor-intensive task. Notes and other detail information that don't make it into the printed reports are likely lost forever.

There is no substitute for a properly functioning backup. The disk arrays in modern servers protect against service interruption and the loss of a day's work due to a single disk failure. However, a server's disk array does not protect against a user or application error.

A backup will usually be used to restore a single file or directory, although it may be needed to restore the entire server. The most common restore scenarios:

- A user makes changes to a document, and then wishes to recover the previous version.
- Changes are saved to a template document, rather than creating a new file.
- Access is needed to a deleted file.
- An application upgrade fails and corrupts its data files

Backup technologies include:

- Cartridge-based backup
- Disk-to-disk backup
- Cloud (Internet)-based backup
- Remote-server replication

These technologies are discussed in the next section, Backup Technologies.

This rest of this document is oriented to cartridge-based backups and includes:

- Cartridge-based backups and scheduling
- Daily procedure – Cartridge-based backup
- Cartridge rotation
- Cartridge storage
- Backup Rotation Calendar and Backup Event Log
- Cleaning the tape drive (for those with tape drives)
- Tape cartridge replacement (for those with tape drives)

Backup Technologies

Cartridge-based backup

Cartridge-based backup uses backup software (i.e.: BackupExec) and either a disk-dock or a tape drive to create a rotation of disks or tape cartridges for both onsite and offsite storage. (A disk dock, commonly called a toaster, is a docking station to permit quick and easy insertion and removal of a fixed-disk drive.) Contents of the server are backed-up to a cartridge at least daily. Cartridges are labeled for the day of the week (or month) and are rotated to a secure, offsite location to protect data in the event of a local disaster. Notes:

- Cartridges should be encrypted to ensure privacy if one is lost or stolen.
- While disks are less susceptible to most problems which damage tapes, they are more susceptible to shock damage, and should be transported in a padded case or box to prevent this.

Disk-to-Disk (D2D) backup

An additional server or a Storage Area Network (SAN) is installed to store data backups. Generally, there is sufficient space for multiple backup sets. The backups complete quickly, and administrators can quickly select and restore from several different points in time.

Proper disaster-recovery capability still requires that the data be moved offsite in some way. The simplest is a disk-dock or tape drive installed in this backup server to provide Disk-to-Disk-To-Cartridge. The backup data is copied to cartridge, either disk or tape, without loading the production servers or the network, and there are fewer worries about open files. This approach costs more than simply installing a cartridge drive in the data server. The ease of restoration and the reduced interference of the workday by the backup may make the extra cost worthwhile.

Cloud-based backup

Backup data is transferred to a server or backup device over the Cloud (Internet) to a provider of remote backup services (like Bryley Systems' Backup/Disaster Recovery offering). This is almost always done using a D2D backup as described above, so that the data can be compressed and transmitted efficiently.

One consideration to this type of backup is that the amount of data that needs to be transferred can often exceed the available bandwidth. The backup data needs to be transferred when the connection is not being used for other business purposes, so the transfer is typically restricted to overnight hours unless a dedicated circuit is purchased for this purpose.

If there is adequate time and bandwidth to transfer the data, this is a viable replacement for a cartridge-based backup. (This is more appropriate to smaller companies since larger companies tend to have too many modified files every day, or make use of large databases that need to be transferred in their entirety.)

Restore times are lengthened by the need to transport the files from the remote location – either over the network link or by transporting the files on physical media. This problem can be minimized by providing an onsite appliance to store backups locally.

Bryley Systems' Backup/Data Recovery – A hybrid D2D/Cloud-based backup

Bryley's Backup/Data Recovery (BU/DR) provides secure, real-time, automated, disk backup, disk imaging, file-level backups, and bare- metal restore for Microsoft Windows-based servers and workstations. It combines the speed and convenience of a D2D backup with the enhanced security of a Cloud-based backup.

Benefits include:

- Safe, secure, encrypted backup of mission-critical data without intervention.
- Quick-and-easy restoration of data at file, disk, or hardware level.
- Eliminates cartridge swapping and administration.

The Bryley BU/DR process:

- We initially take an image of your data and copy it to an onsite appliance.
- Bryley then streams encrypted, incremental/differential changes from your site to our data-center daily.
- When the streamed incremental/differential backup exceeds the throughput of your Internet connection, we retrieve a new image.

Bryley BU/DR data storage and availability:

- Data-center storage is fully redundant with daily, weekly, monthly backups.
- Weekly and monthly backups are encrypted and stored offsite at a secure location in a fire-proof safe.
- For mission-critical equipment (servers), we install an appliance onsite to provide local backup and speed the process.

Remote-server replication

Files are replicated over a WAN or Internet link to a redundant server in real-time. This provides quick recovery for any problem with the production server – with the proper software; the replica server can stand in for the production server without the users realizing that there was any interruption. Most replication programs support common database and messaging servers, allowing for individual messages and transactions to be replicated.

This is a way to provide enhanced availability, but does not replace a proper backup. Like redundant disk drives in a server, all changes are replicated to the remote server, including undesired ones. A backup, with offsite rotation and multiple versions to restore from, is still required.

Cartridge-Based Backups and Scheduling

The purpose of a backup is to ensure that needed information can be quickly recovered, whether a user inadvertently deletes files, or a disaster requires restoring all files to a new server.

All server drives should be backed up every after every workday. For most companies, this will be every weeknight, but Saturday and Sunday should also be included if substantial changes are made during the weekend.

A full backup involves copying all files on the server to cartridge. Incremental and differential backups can save time (by backing up only those files that have changed), but they increase the complexity of a restore. Unless the time required for a full backup cuts into the workday, all backups should be full backups. (A faster disk or tape drive should be considered if this situation exists.)

At a minimum, backup applications should have scheduling, verification, and logging functions. The most widely used applications are Backup Exec from Veritas and ARCserve from Computer Associates. Both applications are available for several network operating systems. Both products also have optional agents available to backup additional file servers, workstations, database servers and messaging servers. (Because database and message store files are always open, the agents are required to back them up properly. The agent creates the backup by querying the server for all records.)

Most backup routines backup the server drives only. All users should store their data files on the server drives.

Often there are sensitive files that users are reluctant to store on the server. Modern server operating systems have sufficient security that this should not be an issue. If it is deemed necessary to store these files on a workstation hard drive, provisions must be made to backup these files as well.

Most server-backup programs can be configured to backup workstations. A recent version of Windows should be used on such a workstation if all necessary applications are supported since the newer versions provide security for the locally stored files and it is not necessary for the user to be logged in when the backup occurs.

Another on-premise alternative is a separate, locally installed disk-dock, external drive, or tape drive with backup software for the workstation. Like the server backup, this workstation backup must be checked daily, and sufficient cartridges must be purchased, properly stored, properly rotated, and replaced if needed.

The drawback to these on-premise, workstation-backup alternatives is that the user must remember to log off, rather than shut down at the end of the day. Failed backups happen regularly, especially if the user is used to shutting down daily.

Daily Procedure – Cartridge-Based Backup

A designated backup administrator should perform these tasks every morning, as part of his or her daily routine. This procedure should be done as early in the day as possible, to allow the maximum amount of time for any problems to be resolved before the next scheduled backup.

1. Launch the backup program and check the status display. If the program is already running, refresh the display.
2. If the previous backup is not yet complete, or shows an error status, do not proceed until the problem has been resolved.
3. Verify that the schedule for the next backup is correct.
4. Remove the cartridge from the dock or drive and store it properly
5. Insert the cartridge for the next backup.

There should be at least one other person familiar with these tasks to perform them when the primary administrator is unavailable.

The backup status must be checked and the cartridge changed every workday. If a day is missed, the scheduled backup will run as soon as a new cartridge is inserted. Any file that is in use when a backup is running will not be backed up properly and cannot be reliably restored. The dock or drive will unload the cartridge when the backup is complete and the same sequence will occur the next day. Backups will continue to run at the wrong time until the problem in noticed and corrected.

Cartridge rotation

Multiple cartridges should be used to:

- Insure there is a complete backup available in the event of a backup error
- Allow at least some backups to be kept offsite
- Provide more than one potential source to replace a corrupt or missing file

Cartridges should be rotated according to a set schedule and labeled appropriately, so that the proper cartridge can be found when it is needed for a restore. Cartridge labels should also indicate the date that the cartridge was placed in service, so it can be replaced when appropriate. If there is more than one disk-dock or tape drive in use, the server name or drive number should also be indicated on the label.

Any cartridge rotation that is easy to follow and ensures that at least a week passes before data is overwritten will be effective. As more cartridges are used, it is more likely that there will be copies of a corrupt or missing file available.

Five-cartridge rotation

This rotation uses five cartridges with the following labels:

Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*

Each cartridge is used on the indicated day of the week. Data can only be recovered from the preceding week. This is a minimal, but adequate, cartridge rotation.

A common variation of this rotation uses ten cartridges, which are labeled Monday-A, Monday-B, Tuesday-A, Tuesday-B, etc. The cartridges are used in alternate weeks, and data can be recovered from the preceding two weeks.

Nine-cartridge rotation

This rotation uses nine cartridges, but allows for recovery of files for up to a month.

The nine cartridges have the following labels:

Monday	*Tuesday*	*Wednesday*	*Thursday*	
Friday-1	*Friday-2*	*Friday-3*	*Friday-4*	*Friday-5*

The Monday through Thursday cartridges are used each week. Friday-1 is used on the first Friday of each month. The remaining Friday cartridges are used in subsequent weeks.

Data can be restored from any of the previous five business days, or from the end of the previous four weeks.

Thirteen-cartridge rotation

This is a hybrid of the five-cartridge and nine-cartridge rotations above.

The thirteen cartridges have the following labels:

Monday-A	*Tuesday-A*	*Wednesday-A*	*Thursday-A*	
Monday-B	*Tuesday-B*	*Wednesday-B*	*Thursday-B*	
Friday-1	*Friday-2*	*Friday-3*	*Friday-4*	*Friday-5*

The Monday through Thursday cartridges are used in alternating weeks. Friday-1 is used on the first Friday of each month. The remaining Friday cartridges are used in subsequent weeks.

Data can be restored from any day in the previous two weeks, or from the end of the previous four weeks.

Twenty-cartridge rotation

This rotation uses twenty cartridges with the following labels:

Monday	*Tuesday*	*Wednesday*	*Thursday*
Friday-1	*Friday-2*	*Friday-3*	*Friday-4*
January	*February*	*March*	*April*
May	*June*	*July*	*August*
September	*October*	*November*	*December*

The Monday through Thursday and Friday-1 through Friday-3 cartridges are used the same way as the nine-cartridge rotation. Friday-4 is used on the fourth Friday of a month with five Fridays. The January through December cartridges are used on the last Friday of the month.

Data can be restored from any day of the previous week, any of the last four Fridays, or from the end of any of the proceeding twelve months.

If a cartridge from the last day of the month is preferred, add a Friday-5 cartridge to the rotation and insert the cartridge for the month on the appropriate day.

Cartridge storage

Preferred storage methods

Cartridges should not be stored in proximity to the server. The server's monitor and UPS generate magnetic fields that can corrupt data if cartridges are placed too close. (This is primarily true for tape cartridges rather than disk cartridges.)

Disk and tape cartridges should be stored in a locked box or cabinet, preferably a fire-resistant one. This should be a sufficient distance from the server that a minor incident (such as a broken water pipe) that damages the server will not damage the cartridges as well.

Offsite Storage

To protect against a major disaster, at least one recent cartridge should be stored offsite. This should be at a branch office or at the home of a trusted employee. A small fire-resistant storage container for the remote site is recommended.

Offsite storage, usually with courier service, is available. There are companies that specialize in cartridge storage, and the service is often also available from companies that provide storage for paper files.

All offsite cartridges must be encrypted to protect data in the event of loss or theft.

Storage environment

The cartridges need to be stored so they are protected from:

- Unauthorized access
- Inappropriate temperature and humidity levels
- Dust
- Magnetic fields (especially tape cartridges)
- Physical shock

Access to cartridges
Cartridges should be stored in a secure location; secure them as you would secure any other confidential business records.

Temperature and Humidity
Cartridges should be stored in a location where the temperature and humidity are at levels where people are comfortable. They should not be subject to wide variations in temperature and humidity.

A cartridge that has been left in an area where the temperature is above 90°F or below 50°F should be kept in a normal storage environment for 24 hours before being used.

Dust
The storage area should be clean and free of airborne particles. Cartridges should be stored in their plastic cases, which should in turn be put into a storage box or file drawer.

Magnetic fields
Cartridges, especially tape cartridges, should be protected from exposure to magnets and magnetic fields, including those generated by monitors, speakers, UPS, motors, and other machinery.

Shock damage
Cartridges should be handled carefully. The internal parts of the cartridge can become misaligned if the cartridge is dropped or handled roughly.

Backup-Rotation Calendar and Backup-Event Log

Use the Backup Event Log to record backup errors. Also, note when a new disk cartridge, tape cartridge, or cleaning cartridge is placed into service.

Check off each successful backup on the calendar pages. If using a tape drive, note each cleaning. The calendar specifies which cartridge should be used each day.

The calendar is based on a nine-cartridge rotation. The month-end cartridges for 20 and 21 rotations are indicated in **bold** (last Friday) and *italic* (last business day). The left column labels each week A or B for ten and thirteen-cartridge rotations.

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January 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge	1	2 ☐ ☐ Monday	3 ☐ ☐ Tuesday	4 ☐ ☐ Wednesday	5 ☐ ☐ Thursday	6 ☐ ☐ Friday-1	7
B Backed up Cleaned Cartridge	8	9 ☐ ☐ Monday	10 ☐ ☐ Tuesday	11 ☐ ☐ Wednesday	12 ☐ ☐ Thursday	13 ☐ ☐ Friday-2	14
A Backed up Cleaned Cartridge	15	16 ☐ ☐ Monday	17 ☐ ☐ Tuesday	18 ☐ ☐ Wednesday	19 ☐ ☐ Thursday	20 ☐ ☐ Friday-3	21
B Backed up Cleaned Cartridge	22	23 ☐ ☐ Monday	24 ☐ ☐ Tuesday	25 ☐ ☐ Wednesday	26 ☐ ☐ Thursday	27 ☐ ☐ Fri-4/**Jan**	28
A Backed up Cleaned Cartridge	29	30 ☐ ☐ Monday	31 ☐ ☐ Tuesday				

February 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
B Backed up Cleaned Cartridge				1 ☐ ☐ Wednesday	2 ☐ ☐ Thursday	3 ☐ ☐ Friday-1	4
A Backed up Cleaned Cartridge	5	6 ☐ ☐ Monday	7 ☐ ☐ Tuesday	8 ☐ ☐ Wednesday	9 ☐ ☐ Thursday	10 ☐ ☐ Friday-2	11
B Backed up Cleaned Cartridge	12	13 ☐ ☐ Monday	14 ☐ ☐ Tuesday	15 ☐ ☐ Wednesday	16 ☐ ☐ Thursday	17 ☐ ☐ Friday-3	18
A Backed up Cleaned Cartridge	19	20 ☐ ☐ Monday	21 ☐ ☐ Tuesday	22 ☐ ☐ Wednesday	23 ☐ ☐ Thursday	24 ☐ ☐ Fri-4/**Feb**	25
B Backed up Cleaned Cartridge	26	27 ☐ ☐ Monday	28 ☐ ☐ Tuesday				

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March 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
B Backed up Cleaned Cartridge				1 ☐ ☐ Wednesday	2 ☐ ☐ Thursday	3 ☐ ☐ Friday-1	4
A Backed up Cleaned Cartridge	5	6 ☐ ☐ Monday	7 ☐ ☐ Tuesday	8 ☐ ☐ Wednesday	9 ☐ ☐ Thursday	10 ☐ ☐ Friday-2	11
B Backed up Cleaned Cartridge	12	13 ☐ ☐ Monday	14 ☐ ☐ Tuesday	15 ☐ ☐ Wednesday	16 ☐ ☐ Thursday	17 ☐ ☐ Friday-3	18
A Backed up Cleaned Cartridge	19	20 ☐ ☐ Monday	21 ☐ ☐ Tuesday	22 ☐ ☐ Wednesday	23 ☐ ☐ Thursday	24 ☐ ☐ Friday-4	25
B Backed up Cleaned Cartridge	26	27 ☐ ☐ Monday	28 ☐ ☐ Tuesday	29 ☐ ☐ Wednesday	30 ☐ ☐ Thursday	31 ☐ ☐ Fri-5/**Mar**	

April 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
B Backed up Cleaned Cartridge							1
A Backed up Cleaned Cartridge	2	3 ☐ ☐ Monday	4 ☐ ☐ Tuesday	5 ☐ ☐ Wednesday	6 ☐ ☐ Thursday	7 ☐ ☐ Friday-1	8
B Backed up Cleaned Cartridge	9	10 ☐ ☐ Monday	11 ☐ ☐ Tuesday	12 ☐ ☐ Wednesday	13 ☐ ☐ Thursday	14 ☐ ☐ Friday-2	15
A Backed up Cleaned Cartridge	16	17 ☐ ☐ Monday	18 ☐ ☐ Tuesday	19 ☐ ☐ Wednesday	20 ☐ ☐ Thursday	21 ☐ ☐ Friday-3	22
B Backed up Cleaned Cartridge	23	24 ☐ ☐ Monday	25 ☐ ☐ Tuesday	26 ☐ ☐ Wednesday	27 ☐ ☐ Thursday	28 ☐ ☐ Fri-4/**Apr**	29

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May 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge	Apr. 30	1 ☐ ☐ Monday	2 ☐ ☐ Tuesday	3 ☐ ☐ Wednesday	4 ☐ ☐ Thursday	5 ☐ ☐ Friday-1	6
B Backed up Cleaned Cartridge	7	8 ☐ ☐ Monday	9 ☐ ☐ Tuesday	10 ☐ ☐ Wednesday	11 ☐ ☐ Thursday	12 ☐ ☐ Friday-2	13
A Backed up Cleaned Cartridge	14	15 ☐ ☐ Monday	16 ☐ ☐ Tuesday	17 ☐ ☐ Wednesday	18 ☐ ☐ Thursday	19 ☐ ☐ Friday-3	20
B Backed up Cleaned Cartridge	21	22 ☐ ☐ Monday	23 ☐ ☐ Tuesday	24 ☐ ☐ Wednesday	25 ☐ ☐ Thursday	26 ☐ ☐ Fri-4/**May**	27
A Backed up Cleaned Cartridge	28	29 ☐ ☐ Monday	30 ☐ ☐ Tuesday	31 ☐ ☐ Wednesday			

June 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge					1 ☐ ☐ Thursday	2 ☐ ☐ Friday-1	3
B Backed up Cleaned Cartridge	4	5 ☐ ☐ Monday	6 ☐ ☐ Tuesday	7 ☐ ☐ Wednesday	8 ☐ ☐ Thursday	9 ☐ ☐ Friday-2	10
A Backed up Cleaned Cartridge	11	12 ☐ ☐ Monday	13 ☐ ☐ Tuesday	14 ☐ ☐ Wednesday	15 ☐ ☐ Thursday	16 ☐ ☐ Friday-3	17
B Backed up Cleaned Cartridge	18	19 ☐ ☐ Monday	20 ☐ ☐ Tuesday	21 ☐ ☐ Wednesday	22 ☐ ☐ Thursday	23 ☐ ☐ Fridat-4	24
A Backed up Cleaned Cartridge	25	26 ☐ ☐ Monday	27 ☐ ☐ Tuesday	28 ☐ ☐ Wednesday	29 ☐ ☐ Thursday	30 ☐ ☐ Fri-5/**Jun**	

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July 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge							1
B Backed up Cleaned Cartridge	2	3 ☐ ☐ Monday	4 ☐ ☐ Tuesday	5 ☐ ☐ Wednesday	6 ☐ ☐ Thursday	7 ☐ ☐ Friday-1	8
A Backed up Cleaned Cartridge	9	10 ☐ ☐ Monday	11 ☐ ☐ Tuesday	12 ☐ ☐ Wednesday	13 ☐ ☐ Thursday	14 ☐ ☐ Friday-2	15
B Backed up Cleaned Cartridge	16	17 ☐ ☐ Monday	18 ☐ ☐ Tuesday	19 ☐ ☐ Wednesday	20 ☐ ☐ Thursday	21 ☐ ☐ Friday3	22
A Backed up Cleaned Cartridge	23	24 ☐ ☐ Monday	25 ☐ ☐ Tuesday	26 ☐ ☐ Wednesday	27 ☐ ☐ Thursday	28 ☐ ☐ Fri-4/**Jul**	29

August 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
B Backed up Cleaned Cartridge	July 30	July 31	1 ☐ ☐ Tuesday	2 ☐ ☐ Wednesday	3 ☐ ☐ Thursday	4 ☐ ☐ Friday-1	5
A Backed up Cleaned Cartridge	6	7 ☐ ☐ Monday	8 ☐ ☐ Tuesday	9 ☐ ☐ Wednesday	10 ☐ ☐ Thursday	11 ☐ ☐ Friday-2	12
B Backed up Cleaned Cartridge	13	14 ☐ ☐ Monday	15 ☐ ☐ Tuesday	16 ☐ ☐ Wednesday	17 ☐ ☐ Thursday	18 ☐ ☐ Friday-3	19
A Backed up Cleaned Cartridge	20	21 ☐ ☐ Monday	22 ☐ ☐ Tuesday	23 ☐ ☐ Wednesday	24 ☐ ☐ Thursday	25 ☐ ☐ Fri-4/**Aug**	26
B Backed up Cleaned Cartridge	27	28 ☐ ☐ Monday	29 ☐ ☐ Tuesday	30 ☐ ☐ Wednesday	31 ☐ ☐ Thursday		

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September 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
B Backed up Cleaned Cartridge						1 ☐ ☐ Friday-1	2
A Backed up Cleaned Cartridge	3	4 ☐ ☐ Monday	5 ☐ ☐ Tuesday	6 ☐ ☐ Wednesday	7 ☐ ☐ Thursday	8 ☐ ☐ Friday-2	9
B Backed up Cleaned Cartridge	10	11 ☐ ☐ Monday	12 ☐ ☐ Tuesday	13 ☐ ☐ Wednesday	14 ☐ ☐ Thursday	15 ☐ ☐ Friday-3	16
A Backed up Cleaned Cartridge	17	18 ☐ ☐ Monday	19 ☐ ☐ Tuesday	20 ☐ ☐ Wednesday	21 ☐ ☐ Thursday	22 ☐ ☐ Friday-4	23
B Backed up Cleaned Cartridge	24	25 ☐ ☐ Monday	26 ☐ ☐ Tuesday	27 ☐ ☐ Wednesday	28 ☐ ☐ Thursday	29 ☐ ☐ Fri-5/**Sept**	30

October 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge	1	2 ☐ ☐ Monday	3 ☐ ☐ Tuesday	4 ☐ ☐ Wednesday	5 ☐ ☐ Thursday	6 ☐ ☐ Friday-1	7
B Backed up Cleaned Cartridge	8	9 ☐ ☐ Monday	10 ☐ ☐ Tuesday	11 ☐ ☐ Wednesday	12 ☐ ☐ Thursday	13 ☐ ☐ Friday-2	14
A Backed up Cleaned Cartridge	15	16 ☐ ☐ Monday	17 ☐ ☐ Tuesday	18 ☐ ☐ Wednesday	19 ☐ ☐ Thursday	20 ☐ ☐ Friday-3	21
B Backed up Cleaned Cartridge	22	23 ☐ ☐ Monday	24 ☐ ☐ Tuesday	25 ☐ ☐ Wednesday	26 ☐ ☐ Thursday	27 ☐ ☐ Fri-4/**Oct**	28
A Backed up Cleaned Cartridge	29	30 ☐ ☐ Monday	31 ☐ ☐ Tuesday				

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November 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge				1 ☐ ☐ Wednesday	2 ☐ ☐ Thursday	3 ☐ ☐ Friday-1	4
B Backed up Cleaned Cartridge	5	6 ☐ ☐ Monday	7 ☐ ☐ Tuesday	8 ☐ ☐ Wednesday	9 ☐ ☐ Thursday	10 ☐ ☐ Friday-2	11
A Backed up Cleaned Cartridge	12	13 ☐ ☐ Monday	14 ☐ ☐ Tuesday	15 ☐ ☐ Wednesday	16 ☐ ☐ Thursday	17 ☐ ☐ Friday-3	18
B Backed up Cleaned Cartridge	19	20 ☐ ☐ Monday	21 ☐ ☐ Tuesday	22 ☐ ☐ Wednesday	23 ☐ ☐ Thursday	24 ☐ ☐ Fri-4/**Nov**	25
A Backed up Cleaned Cartridge	26	27 ☐ ☐ Monday	28 ☐ ☐ Tuesday	29 ☐ ☐ Wednesday	30 ☐ ☐ Thursday		

December 2017

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A Backed up Cleaned Cartridge						1 ☐ ☐ Friday-1	2
B Backed up Cleaned Cartridge	3	4 ☐ ☐ Monday	5 ☐ ☐ Tuesday	6 ☐ ☐ Wednesday	7 ☐ ☐ Thursday	8 ☐ ☐ Friday-2	9
A Backed up Cleaned Cartridge	10	11 ☐ ☐ Monday	12 ☐ ☐ Tuesday	13 ☐ ☐ Wednesday	14 ☐ ☐ Thursday	15 ☐ ☐ Friday-3	16
B Backed up Cleaned Cartridge	17	18 ☐ ☐ Monday	19 ☐ ☐ Tuesday	20 ☐ ☐ Wednesday	21 ☐ ☐ Thursday	22 ☐ ☐ Friday-4	23
A Backed up Cleaned Cartridge	24	25 ☐ ☐ Monday	26 ☐ ☐ Tuesday	27 ☐ ☐ Wednesday	28 ☐ ☐ Thursday	29 ☐ ☐ Fri-5/**Dec**	30
A Backed up Cleaned Cartridge	31						

Backup Event Log

Date/Time	Tape Event	Comments

Cleaning the tape drive

The magnetic tape surface is a layer of metal or metallic oxide. A small amount of this surface rubs off on to the tape drive's heads with each use. The buildup of these magnetic particles eventually prevents the tape heads from reading and writing reliably. To prevent this, clean the tape drive on a regular schedule.

Some tape drives can indicate, either through a light on the drive or a signal to the backup application that they need to be cleaned. It is important to note that this indication is based on a self-test (that was not 100% successful), or the drive has encountered a threshold number of soft (correctable) errors. While the drive should be cleaned at this indication, it should be cleaned before these errors appear.

Cleaning cartridges

Cleaning cartridges should either be manufactured by or approved by the tape-drive manufacturer.

Cleaning the tape drive involves inserting the cleaning cartridge in the drive the same way a regular tape cartridge is inserted. The cleaning cycle runs for 30-90 seconds, and then the cleaning cartridge is ejected. Follow any specific instructions included with the tape drive or cleaning cartridge.

All cleaning cartridges are provided with a card or label to record each use. After the recommended number of uses, discard and replace the cartridge.

Cleaning schedule

In general, tape drives should be cleaned weekly.

DAT, Mammoth, Travan, and other 4mm, 8mm and ¼ inch tape formats should always be cleaned weekly. If the tapes are being used at or near their full capacity may need to be cleaned more often than once per week.

Half-inch (DLT and LTO) tape drives with low utilization may not need to be cleaned weekly. If the total runtime of the backups for a week is less 40 hours, and the server is in fairly clean, climate-controlled environment, clean the drive every other week. If errors occur, or the server environment is less than ideal, clean weekly.

Cleaning cartridges were not available for SDLT drives when they were initially released. It was later determined that cleaning did benefit the drives, especially when they were not located in a climate-controlled datacenter.

In addition to scheduled cleanings, the tape drive should be cleaned when:

- The drive or software indicates a cleaning is required.
- A backup fails due to a tape drive error.

- A new tape cartridge has been used for the first time. (This does not apply to newer ½ inch drives (SDLT and LTO.) Clean these drives normally unless errors occur.)

Tape cartridge replacement

Tape cartridges wear out. In addition to the loss of magnetic particles each time the cartridge is used, there is wear on the internal moving parts of the cartridge, and the plastic tape substrate stretches slightly. Eventually, the drive will no longer be able to align the heads to the tracks on the tape.

Smaller cartridge formats are more susceptible to misalignment due to wear.

If a single tape cartridge is suspect, clean the drive before inserting that cartridge for its next scheduled use. If the backup still fails, replace the cartridge. If the cartridge is near scheduled replacement, all cartridges of similar age and usage frequency should be replaced.

Continuing to use worn or damaged cartridges will result in failed backups. It will likely create a need for additional drive cleaning, and can result in reduced lifetime for other cartridges.

Recommended Tape-Cartridge Replacement Intervals

Tape format	Used weekly	Used bi-week	Used month
4mm (DDS)	6 months	12 months	24 months
8mm (AIT, Mammoth)	18 months	36 months	
1/4” (SLR, Travan)	12 months	24 months	
½” (DLT,SDLT,LTO)	36 months		

Replacement cartridges should be either manufactured by or approved by the drive manufacturer.

