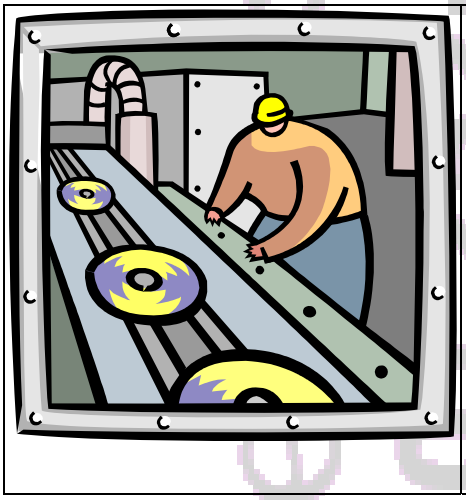

THE 7 FATAL MISTAKES OF STORING DATA, MUSIC & PHOTOS ON CDS:

Everything you always wanted to know about the pitfalls of burning CDs but didn't know who to ask.

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1) Introduction and Abstract.

It has been said that the main cause of problems is solutions. That is certainly the case with CDs.

When I started researching this white paper, I, like most people, assumed that when it came to CDs you could buy them, burn them and then do what you wanted with them --without giving it another thought. I also assumed that there was little, if any, downside to their use.

What I found was the exact opposite. Recordable CDs (CD-Rs & CD-RWs) are amazingly complex and it is not as simple as it seems to successfully burn, store and mail CDs.

The purpose of this paper, therefore, is to help you identify and avoid the most common mistakes involved in burning data, music and photos onto CDs. It should help you improve your odds of burning a CD and getting it to do what you want.

To my knowledge, this is the only place you will find this information. I searched for and downloaded over 1,000 pages of raw information and it wasn't easy to find. It took 7 months and uncounted hours to find it, read it and condense it and write it for this paper.

In addition, parts of this paper are simply not available anywhere else. For example, I found nothing anywhere about which mailing product is best for different applications and how the new Post Office re-classification of CDs affects your mailing choices.

Finally, I need to thank my customers. Much of what is in this White Paper is the contribution of generous customers who took the time to write me and share with me their experiences with CDs. Their assistance is deeply appreciated and was invaluable to me both in terms of knowing what was important and in many of the details that appear throughout.

What's involved...

The ability of CDs to accept and store data is a combination of the CD, the information to be burned, the burner, the burner software, and the manner in which the CDs are stored or used. This white paper will address all of these issues since Fatal Mistakes can be caused by any of them.

As companies and individuals come to depend on CDs, making sure (a) what you want is on the CD and (b) that you can retrieve it at will is growing and will continue to grow in importance.

2) Focus Of This Paper

There are two kinds of CDs. CD-ROMs and recordable CDS (CD-Rs & re-writeable- CD-RWs). CD-ROMs are typically mass-manufactured products like the music CDs you buy. The information on these discs, in the form of what are called "lands" and "pits" (the zeros and ones a computer reads), is molded into them at the time of manufacture. Nothing can be added or subtracted from them. They are fixed as created.

CD-R (Recordable discs) and CD-RW (Re-writeable discs), on the other hand, are Optical Media. They are basically sandwiches of a dye and a metallic layer held together by polycarbonate substrate. Information is burned onto these discs by high-powered laser. This burned information, in turn, is read by a lower-powered reading laser.

This paper will be concerned with CD-Rs and CD-RWs only. And, we will talk of them interchangeably since they share the same issues.

3) The 7 Fatal Mistakes Of Storing CDs

Ensuring the permanence of your CDs (and indeed of any modern information medium) is a combination of manufacturers' and users' responsibilities. CDs in general last longer than other digital storage media.

However, CDs are not care-free.

They are frequently handled, dropped, scratched, piled on desktops, and baked in hot cars, etc., etc. Also, there are some hidden risks and problems associated with their use. Those dangers and risks are what this white paper discusses. They are:

(1) How Buying The Wrong CD Can Get You Into Trouble [6 Pages]
(2) How to Avoid Burning "Coasters", or unusable CDs [9 Pages]
(3) How Improper Labeling Can Destroy a CD [7 Pages]
(4) How the Wrong Mailing Media Can Sabotage The Best Laid Plans [25 Pages]
(5) How "File and Forget" Can Cost A Fortune [6 Pages]
(6) How Improper Storage Can Lead to Catastrophe [30 Pages]
(7) Neglect the Human Factor At Your Peril [3 Pages]

Helping you avoid these fatal errors will be the main concern of this paper.

4) Why This Is Important

Almost unnoticed, CDs are changing the way businesses perform many of their critical functions from selling customers, to archiving critical information, to distributing information products. For example, the traditional photo negative that has been around for something like a hundred years is on its way out. Digital cameras are taking over.

Thus, all sorts of business are entrusting their future to CDs. Such trust carries with it certain built-in risks that must be assessed and responded to. That is what I hope this white paper will help you do – avoid the preventable things that can go wrong.

In many case, it's no one fault that things go wrong. It's usually a lack of information.

For example, the difficulties of keeping information in digital form is true across digital storage media. Something like 10% to 20% of data the Viking probes sent back from Mars are on obsolete tapes and no longer available. Thousands of satellite images of Earth are stored on tapes that the US Geological Survey can't read.

If the organizations behind these projects, with all their resources and all their collective brains, could not anticipate these problems, then, in many ways, this is just the nature of digital technologies. If they knew they were going to have a problem, they would have done something about it.

And, it's both a hardware and a software problem. Technology changes and people move on without realizing the consequences of abandoning something they assumed was fixed forever. And, as I say, this paper's purpose is to help you make sure you don't find yourself in that sort of situation.

5) Why CDs Are Taking Over

Storage media, in general, can be classified according to its capacity, capabilities, speed, data availability, durability and cost. The reason CDs have become the storage media of choice is because they offer so many advantages across each of these areas. It is the only portable storage technology, for example, that is interchangeable across hardware and platforms.

Further, CDs can store large amounts of information – 650 MBs, at minimum. This means it can hold 74 minutes of audio, 45 minutes of MPEG-2 video, hundreds of photos and up to 4 file cabinets of documents. This is far greater than other removable devices such as ZIP Drives (at 250MBs).

Therefore, they can save a company a fortune by compressing file cabinets of records down to a fraction of that space. Stacks of documents can be reduced to a simple disc. And, CDs also make it possible to create powerful, multi-media presentations economically.

In addition, there is an installed base of approximately one billion CD-ROM drives. Each of these drives can read CD based media. So you have broad compatibility. And finally, the cost of CD storage is low, just pennies per megabyte. This makes CDs the lowest cost-per-megabyte of just about any currently available storage media.

All of these advantages are what is driving the conversion over to CDs from other portable media. And, since so much about business now depends on CDs, it's important that any decisions about CDs be based on the best information available. That's what this paper will try to offer.

6) Main Summary & Conclusion Of Our Findings:

Probably the key thing that I learned, from both customers and the other research that I did for this paper is that, if you are burning CDs for a long-term purpose, you have to be much better informed about the consequences of every choice you make, than if you are doing something that is going to be quickly consumed and discarded. There are other conclusions, to be sure; but, this is the one discovery that stood out for me.

For example, if you are burning CDs that have little or no intrinsic value and will be used one-time and discarded, almost any CD that will work with your machine will be adequate. You don't have to buy an expensive, archival-safe CD. The cheapest that will burn what you want to burn is fine.

On the other hand, if you are producing CDs that have to endure for substantial periods of time, you have to choose a little more carefully. You must start with an archival quality CD.

The same with labeling your CDs. Use-and-discard CDs can use just about use any of the popular labeling methods. But, if your CDs has to endure for a long period of time you have to be much more careful in labeling them so that they are not delaminated or otherwise damaged over time.

Filing also is the same sort of thing. For CDs that must hold the information you are burning on them for long periods of time, you will have to choose something that will protect the CD from external sources of damage. But, the choice you make must also protect your CD from damage caused by that very storage medium itself.

Finally, the one major exception to this long-term/short-term distinction is in the area of mailing and distribution of your CDs In mailing CDs you have to be especially concerned with the new

Postal Regulations that went into effect July 2002. These will have a definite impact on what you choose and how you want to mail.

If you have any questions or comments, please either e-mail us or phone us. Our e-mail is gse@cdsleeves.com & our phone is (818) 865-7942.

Summary of The 7 Fatal Mistakes and Consequences

Mistake	Description	Consequences…	Remedy
#1 Using the Wrong CD **[6 Pages]**	Not all CDs are made with the same formula. Some are more suitable for short term use; others for Long-Term Storage	Not all CDs will protect data, music and photos over the long term. In addition, some survive the mails better than others.	Use only Mitsui Archival Quality CDs for long-term storage of data, music and photos. Use an appropriate mailing media as described in that section.
#2 How to Avoid Burning Coasters **[9 Pages]**	Buffer underrun is the main cause of burning a dud CD. But it is also important to "walk in your audiences shoes" and make it easy for them to use what you send	Buffer underrun ruins the CD. It is completely useless. Also useless if incompatible with your audience's computer. And, if they don't have clear instructions and tools, they'll just throw it out and move on.	Follow procedures outlined in this section and you should be able to eliminate these problems.
#3 How Improper Labeling Destroys CD **[7 Pages]**	There are 6 popular ways to label CDs. All are ok for short-term programs; long term only one or two	Labeling a CD with the wrong material or ink can lead to the destruction of the CD over time.	Follow the labeling tradeoffs presented in this section.
#4 How the Wrong Mailing Media Can Kill the Best Laid Plans **[25 Pages]**	CDs can be damaged in the mails, if not protected properly	Unknown number of broken and unusable CDs delivered to your audience	Follow guidance offered in this section. Basic tradeoff is cost vs. protection

Summary of The 7 Fatal Mistakes and Consequences (Continued)

Mistake	Description	Consequences…	Remedy
#5 How "File and Forget" Can Cost a Fortune **[6 Pages]**	You can't just file and forget CDs. You need to be concerned about Quality Control, Hardware and Software changes as well as Cataloging, Control and Oversight.	Can't open data, music or photo files when you need them. If IRS or forensic info or photos could be a disaster.	See recommendations. Each of these areas of concern are discussed in depth in this section and appropriate remedies suggested.
#6 How Improper Storage Can Lead to Catastrophe **[30 Pages]**	Delamination and failure to protect CDs from other physical and chemical damage	Using the wrong storage media over the long-term can lead to complete loss of data, music or photos stored on CDs	Each of the major and most popular storage media and the relevant tradeoffs discussed in this section.
#7 Neglect The Human Factor At Your Peril **[3 Pages]**	Comes under the heading of Murphy's Law: If something can go wrong, it will go wrong at the worst possible time.	Human error accounted for 53% of system crashes studied between 1985 and 1993.	Cautions and controls are discussed in this section.