

Esso Research Experiences with *Chemical Abstracts* on Microfilm

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Late in 1964, The Chemical Abstracts Service announced that in 1965 it would lease *Chemical Abstracts* in microfilm form to subscribers to its current printed abstracts. With this move, microfilm entered a new stage—use in technical-information work as a publication medium for frequently employed tools rather than for largely archival documents.

Microfilm has been promising to take this step for nearly 20 years. For awhile, it seemed that its first major breakthrough would involve extensive use of the joint storage on microfilm of documents and their indexes, as in the Rapid Selector and its successors. Saul Herner has also called attention to technical-indexer use of a thesaurus in microfilm form (1). The first real step was taken in another field, however—retail business—when in the late 1950's Sears Roebuck and Company put its parts catalogs on ribbon microfilm for use in its retail stores on a rapid-access microfilm system designed for it by Recordak Corporation—the Recordak Lodestar system which we shall describe in this paper. Some organizations are already familiar with it, as two publishers employ it in their systems for indexed access to microfilmed sales catalogs of electronic and chemical equipment and materials.

An accompanying development, shared by the entire microfilm industry, has been the appearance of microfilm reader-printers. A whole new dimension opens up to the information searcher when by pushing a button he can quickly obtain his own copy of pertinent documents, instead of laboriously writing notes or ordering photocopies. This development, indeed, has markedly reduced dislike of microfilm by many previous users.

Esso Research's information people have for several years been interested in both the approach and the medium. In 1962, when the American Petroleum Institute's computer-based indexing system was entering the development phase, Esso Research's information-systems staff advocated the study of this medium for rapid-retrieval access to API abstracts when these are identified from the indexes only by accession numbers. Our systems staff then spearheaded a 1963–1964 API pilot study in which use of bound volumes of *Chemical Abstracts* was compared with similar use of Recordak Lodestar microfilm cartridges of *CA* for 1957–1961.

We were convinced by this experiment, and by a follow-up qualitative study at the Pure Oil Company, of both the value of the system for API abstracts and for those of *CA* itself. Both Esso Research and Pure Oil made

their data available to *CA*. Subsequently, Esso Research was the first subscriber to *Chemical Abstracts* on microfilm. Our subscription was formally placed in December 1964, and we received our leased set of *CA* in Recordak Lodestar cartridges late in February 1965.

From then until late August 1965, *CA* users in our Linden Research Library were able to use either the bound volumes of *CA* or the microfilm version on one Lodestar Reader Printer. We permitted this duplication deliberately, while we acquired operating experience, assessed advantages and problems, and waited for The Chemical Abstracts Service to announce its long-range leasing price schedule. We were also in close contact with both The Chemical Abstracts Service and Recordak Corporation on operational details. Early in August, we ordered two more Lodestar Reader Printers, and when one of these was received we removed the bound volumes of *Chemical Abstracts* from our Library shelves, thereby committing our Library users exclusively to employing the microfilm version of *CA* on Recordak Lodestar Reader Printers.

We have gone into this much history to explain why we are presuming to present a user study on an information tool that has not yet been commercially available for a full year. We feel that potential users need to be able to decide on the merits of the *Chemical Abstracts* microfilm on more-detailed information than the (very true) *CA* statements that the use of these microfilms saves 50% of the searchers' time, affords a compressed form of intact storage, and simplifies and permits reprinting of abstracts for staff use.

THE CA MICROFILM SYSTEM

The Chemical Abstracts Service has not yet published informational material about its microfilm beyond some brief statements in flyers, and there is only a limited literature (2) on the Recordak Corporation's equipment that is most suitable for using this microfilm. Therefore, a brief description of the system seems in order before we discuss aspects of its use.

The *Chemical Abstracts* microfilm will shortly be available in two editions, not just one. The first edition—that issued early this year—consists of 253 16-mm. reels, and contains three Recordak column-location codes—Kodamatic, Image Count, and Miracode. The second edition, now being prepared, will not contain the Miracode markings, because these interfere visually with use of the Kodamatic codes when the microfilm is in motion; only

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about 160 reels will be required. Both editions cover the 61 volumes of *Chemical Abstracts* from 1907 through 1964 and are updated twice yearly as the semiannual volumes of *Chemical Abstracts* are completed.

Selection of the proper reel is easily done (Figure 1) by glancing at the labels on "packages"—here, Recordak Lodestar cartridges. These are easily stored in a microfilm cabinet; the one shown in Figure 2 holds all of the 253 reels of the first edition of the CA microfilm.

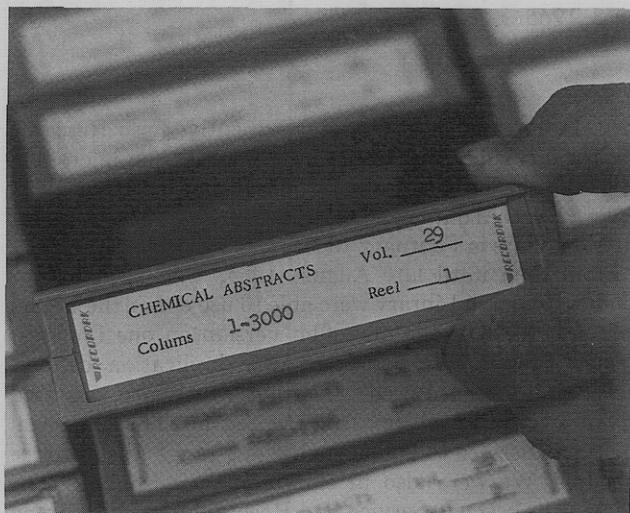


Figure 1. Selecting the proper reel.

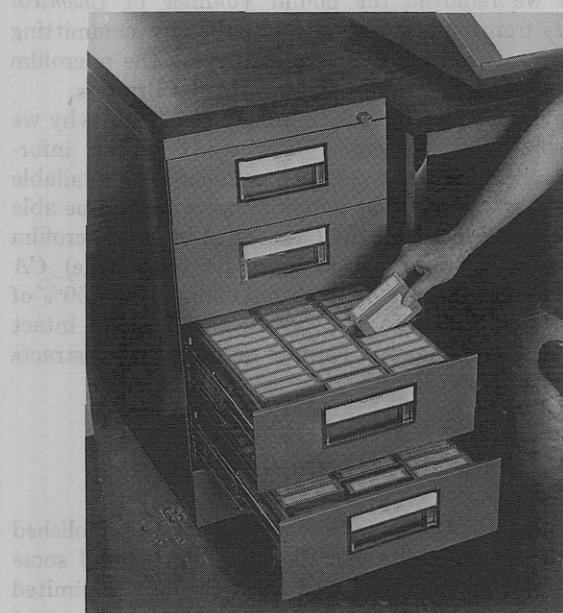


Figure 2. Cabinet holding all of CA on microfilm (except indexes).

It is worth noting that the microfilm can actually be used on most 16-mm. microfilm readers or reader-printers if the subscriber requests CA on simple 16-mm. microfilm reels. As we shall see later, however, Recordak's column-location systems combine with the unique characteristics of Recordak equipment to make it economically desirable for many subscribers to request that their reels be supplied in Recordak cartridges.

The three column-location scales that appear on the first edition of the CA microfilm are each designed for a specific Recordak system:

1. A Kodamatic system of horizontal lines, keyed to a scale fastened alongside the screen on the reader, has been placed between pages of abstracts, to the left of center in Figure 3. Gradually moving placement of these lines between the pages of abstracts causes the lines to "move" on the screen as the film is rapidly advanced in the microfilm reader, enabling the user to stop very close to the page that he is seeking. As noted, the Kodamatic lines on the first edition are partially obscured in use by the Miracode markings, but the second edition will not have this problem.

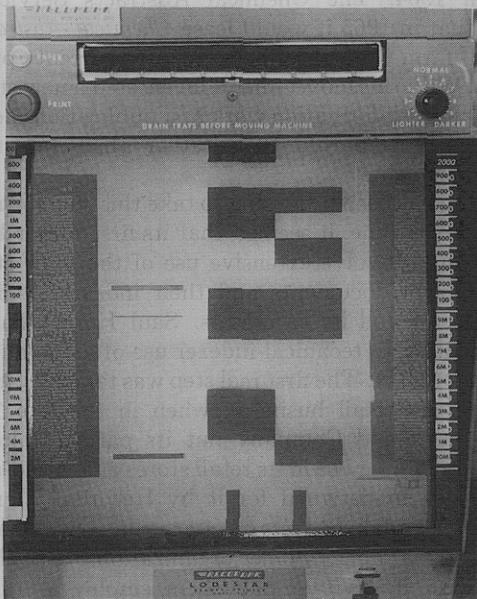


Figure 3. The first edition of the CA microfilm has short Kodamatic lines (left) and heavy Miracode symbols (right) between CA pages. These visual codes for locating column numbers interfere with each other when the film is in motion, so The Chemical Abstracts Service is publishing a second edition without the Miracode symbols.

2. For the second column-location system, Image Count squares appear below each page (Figure 4). These are usable only on Recordak Lodestars specifically equipped with an (extra cost) Image Count keyboard. This system permits keyboard selection of exact column numbers. Image Count squares will also be included in the second edition of the CA microfilm, one under each column.
3. Miracode identification of column numbers (not subjects) also appears on the microfilm between pages of abstracts, to the right of the Kodamatic lines (Figure 3). As mentioned, this code will not appear on the second edition of the CA microfilm, but the first edition is of obvious interest to those who use Miracode equipment for other purposes.

While we touch on the economics of several of the possible combinations of CA microfilm and readers, we chiefly consider in this paper the use of CA microfilm in Recordak cartridges on Recordak Lodestar Reader Printers equipped with Kodamatic scales (Figure 5). This is the combination that we are presently using at Esso Research, and the one that we also had used in earlier tests with the experimental CA microfilm. It is the combination

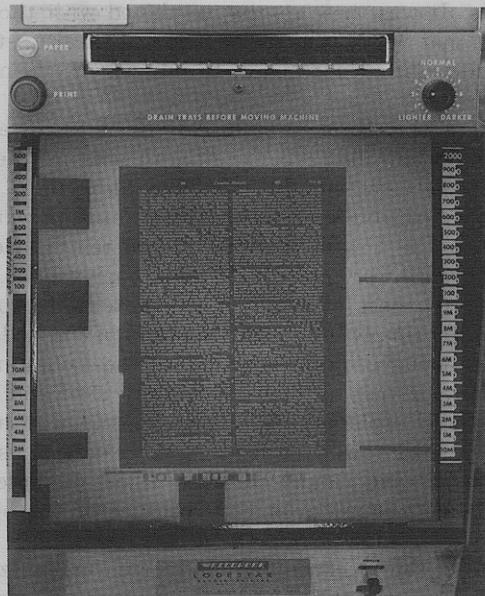


Figure 4. The Image-Count square is positioned below each CA page.



Figure 5. Using CA microfilm on a Recordak Lodestar Reader Printer equipped with a Kodamatic column-location scale at right of screen.

that will make best use of the second edition of the CA microfilm, although our 1965 tests naturally had to be made with the first edition.

This CA searching system is used in the following sequence at Esso Research. First, the searcher prepares his list of abstract numbers by searching the printed CA indexes, preferably arranging this list in numerical order by CA volumes and by column numbers within these. For each CA abstract number (a combination of volume number, column number, and approximate location in the column) the searcher selects the appropriate microfilm cartridge from the cabinet (Figure 2) and inserts it into a slot in the side of the Lodestar reader-printer (Figure 6).

Pressing down on the inserted cartridge locks it in place and turns on the equipment. No threading of a film leader is required on the Lodestar, a major advantage of this equipment.



Figure 6. Inserting a Lodestar cartridge in the side of a Lodestar Reader Printer. No handling of a film leader is required.

The searcher then throws the appropriate switch to "Advance" and watches the Kodamatic lines "move" on the screen until he judges that he is near the desired column number. He then moves the film forward or back at slow speed until the page containing the exact column appears on the screen before him. If he wants a copy of the abstract after he has read it, he then presses the "Print" button, and 30 seconds later he has his print (Figure 7). If he is in a hurry, he can go ahead with his search in the last half of this period—as soon as the image returns to the screen.

COMPARATIVE LOOKUP TIMES

When we conducted our studies in 1963-1964, we were principally interested in determining abstract-lookup

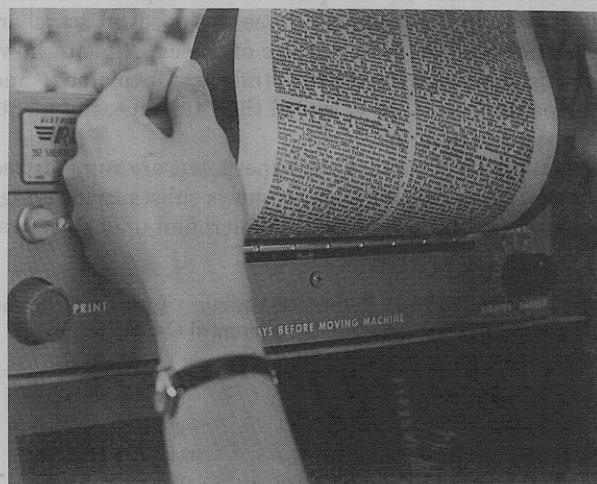


Figure 7. Removing the print of a CA page, as it emerges from a Lodestar Reader Printer.

times for the bound volumes and the microfilm. Use of the bound volumes involves: (1) removing the proper volumes from shelves (and sometimes reshelfing a few, to prevent chaos); (2) turning the pages to the desired column number; (3) scanning the identified abstract to determine relevance, then reading to grasp the factual information clearly if the abstract is indeed pertinent; and (4) making such handwritten notes as are desired for later recall of the facts and/or the bibliographical citation for the pertinent document.

As we have just reviewed, use of the *CA* microfilm on the Lodestar involves substituting: for step 1, removing the proper cartridge from storage (open trays, during the experiments); for step 2, putting the cartridge in the microfilm reader-printer and spinning to the desired column number; and, for step 4, making a print from the microfilm for the pertinent abstract. While it is possible that there are other differences—some microfilm users may be postponing part of their real study of the factual information until later reading of the prints at their desks—it was the total time for both sequences that we measured in our experiments and in our later use of the complete set of *CA* microfilm.

In late 1963, before we placed the microfilm equipment in the Library for our experiments, we asked some users of the bound volumes in our Library to record pertinent data for their searches, including note taking. Of the 32 individuals who participated, the seven from our Technical Information Division (TID) made 30 of the 67 searches. Chemists, chemical engineers, and patent attorneys from seven other Esso Research divisions also participated. Each member of the volunteer group was instructed in the use of an appropriate form and was told to exclude the time that he spent in using the *CA* indexes because his data would ultimately be used in a comparison with the use of *CA* on microfilm.

For our early-1964 study of the microfilm, Recordak Corporation loaned us a Lodestar Reader Printer equipped with a Kodamatic scale. Five years of *CA* (1957-1961) were microfilmed and placed in Lodestar cartridges; the film was keyed with both Kodamatic and Image Count markings for page location, although only the Kodamatic indexing was used in the test.

The individuals in this part of the experiment were restricted to TID personnel. Three of the seven searchers had participated in the first phase of the experiment, however. Again, the object of the study was explained, and participants were asked to record their time measurements on a revised data form.

Data from both parts of the experiment are summarized in Table I. The last line clearly shows substantial savings in lookup time for use of the *CA* microfilm under the test

Table I. 1963-1964 Reference-Lookup Tests on Bound Volumes of *CA* and the Experimental *CA* Microfilm

	Bound volumes	Exptl. microfilm ^a
Test participants	32	7
Searches	67	11
References consulted	924	464
Time required (min./ref.)	2.02	0.92

^a In cartridges on the Recordak Lodestar PES Reader Printer, using the Kodamatic scale.

conditions. It was these results, combined with those in Table III, that we transmitted to The Chemical Abstracts Service, and that encouraged us to subscribe to its microfilm edition.

From late May through early August of 1965 we conducted an uncontrolled experiment with users of the first edition of the complete *CA* microfilm files—those users who were willing to record their names, dates of searches, Lodestar usage times, number of references viewed, number of references copied, and total copies made. The form used (a sheet of paper with appropriate column headings) was simply fastened to the front of the Lodestar. No formal explanation on how to use the Lodestar was given to any participant, but the Library staff and other TID personnel explained the system to any who asked. Only the partially obscured Kodamatic scale was used to locate abstracts, and many searchers (most of those outside TID) did not use even this, because of the optical confusion involved.

Data from this uncontrolled study are summarized in Table II. Because of the effect on the users of the partially obscured Kodamatic scale, about the only new conclusions that can be drawn are that the average microfilm-searching time at Esso Research is now a little over a minute per reference, and that the average searcher makes a single print of about half of the abstracts that he consults. While this is not shown, users seem to be gaining speed with experience. We anticipate that the average microfilm-searching time will again be somewhat less than a minute per reference when we obtain the second edition of the *CA* microfilm.

Table II. 1965 Reference-Lookup Experience with the First Edition of the Complete *CA* Microfilm File

	TID people	Others	All users
Individuals	12	20	32
Searches	108	52	160
References consulted			
Total	2484	601	3085
Per workday	45	11	56
Time required,			
min./ref.	1.13	1.69	1.24
Prints/reference			
Consulted	0.52	0.43	0.51
Copied	1.02	1.00	1.02

USER REACTIONS

At the time that we planned our original tests in 1963, we included steps to determine the acceptability of the image on the screen, and that of prints made from the microfilm, to be compared with reader acceptance of the printed version of *CA*. We deemed this study necessary because the microfilm actually supplied to users in the Recordak Lodestar system is a third-generation copy, and hard-copy prints are thus fourth generation. Also, 16-mm. film is employed, whereas most microfilm experience in libraries has been with 35-mm. film.

To understand the first point, one must consider that in the *CA* microfilm system Recordak has had to prepare an original negative microfilm of the printed *CA* pages, make a positive microfilm (master) from it, and then print the negative microfilms actually supplied to each sub-

scriber. The last step could have been omitted if only microfilm readers rather than reader-printers were to be popularly used, i.e., if it would have been permissible to supply positive microfilm, but the advantage to the reader-printer user of being able to make black-on-white prints has made it mandatory to supply negative microfilm. [Recordak is able to make diazo negatives from the original negative, and thus to skip one step, but CA has elected to supply the (more permanent) silver negatives, and not to skip that step.]

Readability data in terms of users' reactions to *Chemical Abstracts* typography in the form of printed text, microfilm-viewer image on the Recordak Lodestar Reader Printer, and Lodestar prints are summarized in Table III. No really significant difference can be noted; users of the Lodestar Reader Printer seemed happy to view abstracts with it instead of with the printed volumes.

Table III. 1963-1964 Readability Tests on CA in Various Forms

Medium viewed	Readability, vote %				Number of voters
	Very easy	Moderately easy	Little difficulty	Very difficult	
Printed volumes	17	80	3	0	32
Lodestar Reader					
Printer Screen ^a	25	63	12	0	7
Lodestar Reader					
Printer Print ^a	25	75	0	0	7

^aUsing the experimental reels.

We have not conducted any systematic studies of user reactions since we received the first commercial edition of the CA microfilm in February 1965, but we are aware of general satisfaction with it, except for complaints about the first edition's superimposed visual scales. Our TID information researchers, reference librarians, and patent searchers are uniformly enthusiastic about it; since these are our heaviest users of CA, their votes are important.

As long as we had the bound volumes of CA in the Library, awaiting receipt of more Lodestars, we did not make any formal attempt to sell the use of the microfilm to the staff members of other Esso Research divisions who come to the Library to use CA. We noted, however, that many of them were interested in TID-searcher use of the CA microfilm system, which was then placed alongside the Library's alcove for the bound volumes, and that some of these other-division searchers used the microfilm equipment (after brief instruction) when it was not in use by a TID searcher. The availability of CA on microfilm was announced to the Esso Research staff in a story in the company's biweekly newspaper on September 3, 1965, two weeks after we removed the bound volumes of CA from the Library reading room. We have encountered much less than the usual reaction to change, because of the user advantages of the system. Adverse reaction to microfilm as such has been absent.

We also have another user reaction to report—considerable satisfaction on the part of two of TID's information researchers on the quick and economical compilation of bibliographies produced by pasting clipped Lodestar abstract prints on sheets of paper and copying these sheets on a Xerox 914.

We would not have you believe, of course, that TID's Library and systems staffs have had no problems in the

use of the CA microfilm. Indeed, until The Chemical Abstracts Service announced its forthcoming second edition of the microfilm, we were both academically and economically unhappy about the damage to the use of the Kodamatic visual-lookup system that was caused by the Miracode patterns. For comparison with the first edition of the CA microfilm, Figure 8 shows the visual clarity, during film movement, of having uncluttered Kodamatic lines of adequate length between pages of Esso Research abstracts on a Lodestar cartridge. We assume that the second edition of the CA microfilm will have this same utility.

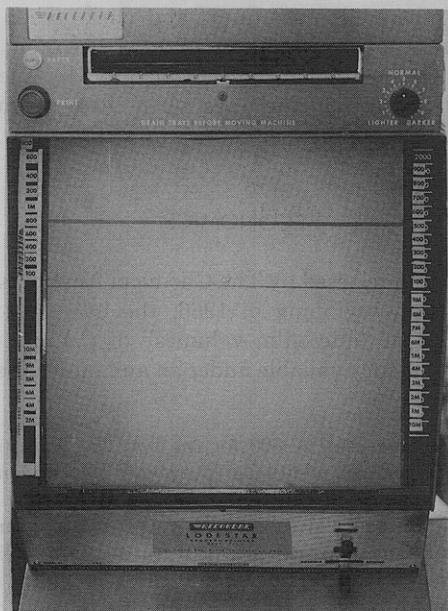


Figure 8. Kodamatic lines of adequate length between frames, unobscured by a second visual-use scale, will make it much easier with the second edition of the CA microfilm to locate CA columns on a Lodestar's Kodamatic scale. Shown here, with the film in motion, is a microfilm containing unobscured Kodamatic lines between pages of Esso Research abstracts.

Maintenance of the reader-printers represents somewhat more than a simple shift in clerical work from shelving volumes. The developing solution must be changed every 100-150 prints if these are to be of optimum black-on-white contrast (necessary for in-house inclusion in bibliographies that are to be photocopied or photo-offset duplicated). While this change of solution is a simple matter on the Lodestar Reader Printer (replacing a bottle), users must be trained to ask to have it done as soon as the background of their prints acquires a grayish tinge. Naturally, new rolls of paper must be inserted at unpredictable times, and the equipment must be cleaned periodically (every 100-150 prints, or only daily if more prints are made). Incidentally, bleach-containing cleansers should not be used; their residues promptly oxidize fresh developer and react with the equipment.

Recordak Corporation does not sell a table or cabinet base specifically for its Lodestars, but libraries may very well not want to place these machines on standard-height tables if they wish to please either short ladies or tall gentlemen who use bifocal eyeglasses. No one table height

will please every reader equally, of course, so recourse may have to be made to adjustable-height chairs, or to tables of various heights if more than one Lodestar is used.

The CA microfilm reels are generally of good quality, as predicted by our earlier user studies, and most of them have the same darkness and contrast. Only occasionally must the user adjust the darkness control, even when he is making prints of many different abstracts.

Focus must be as sharp as possible if prints of optimum clarity are desired. For all normal purposes the entire page is satisfactorily readable on both screen and prints if the center is in the sharpest focus.

Finally, the equipment hums and clicks when in use, minor noises that are audible in an otherwise quiet library. This fact was mentioned (but not bitterly) by a few users of the CA volumes in the days when these volumes and the microfilm equipment stood side by side.

ECONOMICS

Information released by The Chemical Abstracts Service indicates that, beginning in 1966, the base cost for the complete set of "microfilm volumes" of CA, exclusive of indexes and made available under an annual lease arrangement, will be:

1. For the first year, \$1,800 for the first 25 scientists served, plus \$50 for each additional 25 scientists, up to a maximum of \$2,500 for 351 scientists or more, and
2. For the second and subsequent years, \$1,200/year for the first 25 scientists served, plus \$50/year for each additional 25 scientists, up to a maximum of \$1,900/year for 351 scientists or more (3).

In our calculations we have used the last of these figures in all cases, deliberately to err on the high side.

To lease the microfilm, one must first subscribe to the current year's printed volumes, at \$1,200/year. We have not included this cost in our calculations, however. The Recordak Corporation has informed us (4) that its microfilm equipment may either be purchased or rented. In June 1965, a Lodestar Reader Printer, Model PES, sold for \$2,665 and rented for \$864/year, while a Recordak MagnaPrint Reader Printer, Model PE-1A, sold for \$1,250 and rented for \$540/year. In our calculations we have avoided discussion of amortization rates by using the annual rental figure for the Lodestar; this again gives us the higher alternative. (Some of the rent paid can be applied toward later purchase, but we have ignored this in our calculations.)

Before comparative costs can be calculated, however, various other factors must be taken into consideration. For the purposes of our calculations we have assumed that:

1. The cost of microfilm-machine maintenance can be balanced against the cost of everyone's resheling the CA bound volumes and depreciation of the furniture. These assumptions are probably somewhat inaccurate, but none of the costs are of sufficient size to affect over-all calculations; therefore, they have not been included in detailed calculations.

2. To minimize queuing of would-be users, one should provide at least three Recordak Lodestar Reader Printers for a lookup load of 300 abstracts/day, at least two Lodestars for a load of 200 abstracts/day, and at least one Lodestar for a load of 100

abstracts/day or less. However, more machines may be needed at each of these use levels, so we have allowed for this in the alternative calculations in Figure 9. Incidentally, libraries with very low use loads may want to use the less-expensive Recordak MagnaPrint Reader Printer, since this machine can also be equipped (at additional cost) to handle 35-mm. reel microfilm and microfiche. However, we have included the higher-priced equipment in our calculations because it is also the faster to use. Use of the MagnaPrint machine adds 12-20 seconds to thread the film leader for each abstract that requires inserting a different cartridge.

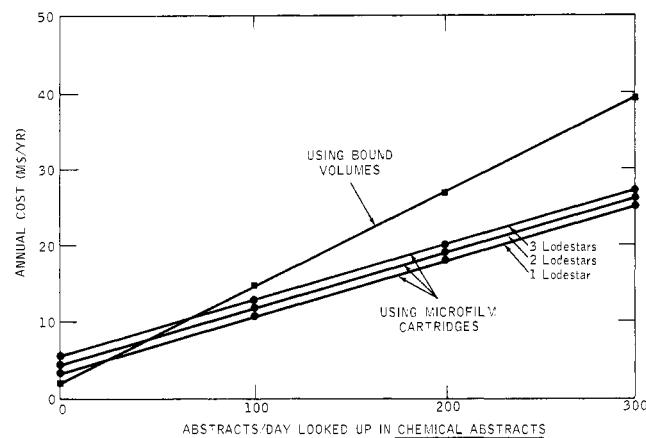


Figure 9. Annual costs for using CA mediums at various use levels.

3. The floor space required for shelving the bound volumes of CA, aisle space, and table space for CA users has been set at 200 square feet for all lookup loads, whereas the space requirements for three, two, and one Recordak Lodestar Reader Printers and the CA microfilm are 75, 50, and 25 square feet, respectively. Floor space for the indexes—still needed with the latter—is 20 square feet. The "rental" cost for this floor space has been set at \$10/sq. ft./year.

4. Based on the Esso Research data in Tables I and II, locating, reading, and taking notes on an abstract in the bound volumes of CA (once the abstract number is known) takes two minutes, while locating, reading, and copying a desired abstract from the CA microfilm takes one minute (especially with the second edition). As shown in Table II, also, searchers using the latter method make copies of half of the abstracts that they look up, with these prints costing \$0.08 each. For both methods of searching, the in-library time of the searchers is worth \$15/hr., including salaries, benefits, and operating expenses but not administrative burden. Obviously, users at other companies will have to determine these factors for themselves.

5. There are 250 working days/year.

These assumptions lead to the annual costs for the different abstract-lookup loads that are shown in Table IV and Figure 9. The latter enables the reader to calculate the cost effect of having one, two, or three Lodestar Reader Printers at any lookup load, and demonstrates rather clearly that, if our assumptions are reasonable, the lookup load where the use of the CA microfilm becomes less expensive than use of the bound volumes is reasonably low (25-65 abstracts/day, depending on the number of Lodestar Reader Printers).

Since we have deliberately loaded some of our assumptions against the CA microfilm and have still obtained the favorable picture shown in Figure 9, it will come as no

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Table IV. Annual Cost for Using CA Mediums
at Various Use Levels

	Use of microfilm			
	Abstracts looked up/day (50% copied)			
	300	200	100	50
Lodestar rental	\$ 2,550	\$ 1,700	\$ 850	\$ 850 ^a
Floor space at \$10/ft. ² /year	950	700	450	450 ^a
Lookup time at \$15/hr.	18,750	12,500	6,250	3,150
Lodestar copies at \$0.08	3,000	2,000	1,000	500
Microfilm lease	1,900	1,900	1,900	1,900 ^a
	\$27,150	\$18,800	\$10,450	\$6,850

	Use of Bound Volumes			
	Abstracts looked up/day			
	300	200	100	50
Floor space at \$10/ft. ² /year	\$ 2,000	\$ 2,000	\$ 2,000	\$2,000 ^a
Lookup time at \$15/hr.	37,500	25,000	12,500	6,250
	\$39,500	\$27,000	\$14,500	\$8,250

^a Fixed costs at zero lookup.

surprise that we have arrived at the general conclusion that use of the *CA* microfilm in Recordak Lodestar Reader Printers is economic for *CA*-using organization whose searchers have abstract-lookup work rates and workloads similar to those that we anticipate at Esso Research with the second edition of the *CA* microfilm.

We have not extended our detailed calculations to other methods of use of the *CA* microfilm, such as having all searchers turn over to microfilm-machine operators (clerks) the lists of abstract numbers that they have located in the *CA* indexes, with the clerks then making prints of all the abstract numbers for them. On the basis of our other assumptions, this procedure would decrease the cost of the lookup time (cut it over half; *i.e.*, no "reading" time would be required. Abstract-locating time is known to require only 20-30 sec./abstract, and printing time 15-30 sec./print, so clerical-copying time would be about 1 min./abstract). It would reduce the number of Lodestar Reader Printers required (by increasing the use factor), but would double the cost of Lodestar prints (since all abstracts would be copied for the searchers). A glance at Table IV shows that there would be net savings for such a method, provided that searchers would be willing thus to wait for the abstracts that they have located in the indexes.

We have also not stated the case in any detail for use of the Recordak MagnaPrint Reader Printer, which also obtains some advantages from cartridges instead of reels, nor have we presented any calculations for use of simple reel-type reader-printers. We have not yet studied the presumed economic (time-saving) benefits from having an Image Counter keyboard attached to Recordak Lodestar Reader Printers; we plan to buy such a keyboard next year to determine its exact merits. Finally, we are unable to discuss the economics of the use of Miracode equipment, although we doubt that anyone would buy this solely for use with the *CA* microfilm.

Incidentally, microfilm *readers* are available at costs considerably lower than for the reader-printers, such as \$475 (\$210/year rental) for a Recordak Portable Reader, Model 20-20 (4). While lack of ability to make prints on

readers cancels out some of the economic incentive for using the *CA* microfilm, we plan to acquire one or two of the portable readers (which can take cartridges or reels) as stand-by equipment for rush period in our Library, and for desk use for *other* microfilms. We will not allow the *CA* microfilm to be removed from the Library.

DISCUSSION

We have not attempted to present all of the statistical data collected in our tests, although they apparently reveal some interesting facts about the different types of users at Esso Research. For example, some of the difference in the lookup times required by TID and non-TID users of the *CA* microfilm, other than the latter's nonuse of the obscured visual-lookup scale on the first edition, may result from an information-worker tendency to copy abstracts as quickly as they are identified as pertinent, *vs.* a laboratory-scientist tendency to mull over the facts before the copy button gets pushed.

We are certain that the relative lookup, reading, and "copying" times will vary somewhat from organization to organization, depending upon such factors as the average length of abstract pertinent to the specific group (longer abstracts should take more time to scan), the *CA*-using habits of the group, and the ratio of literature-searcher users to laboratory-scientist users. Each group has much to determine for itself, although we anticipate that many groups will discover savings from use of the *CA* microfilm system, enough to encourage them to seek management authorization for library expenditures for microfilm equipment and the *CA*-microfilm lease in order to save money of *CA*-searcher time.

The Chemical Abstracts Service has long been willing to license an organization, at a not-inconsiderable fee, to copy its copyrighted abstracts for *in-house use* (5). This right, including the right to photocopy current-volume (not-yet-microfilmed) abstracts, is included in the *CA*-microfilm lease without any requirement for keeping track of the number of copies. *CA*-microfilm subscribers who

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incorporate *CA* abstracts in their literature reports or in-house abstract bulletins can therefore count this right as a partially offsetting economic benefit.

The formula for the subscription price is not a simple one. A "scientist served" is not one who by training might be expected to use the *CA* microfilm, but instead is one who actually does, or who benefits from it directly. Since the microfilm will normally be housed only in one place, it would not be difficult to establish a statistically valid sampling schedule to count the direct users. On the other hand, *CA* also requires the inclusion of an estimate of the "scientists served" by copies of bibliographies or abstract bulletins that include *CA*-derived abstracts.

As we have shown, the economics of acquiring and using the *CA* microfilm are favorable for well-used libraries already possessing complete sets of bound volumes. This new medium should also be attractive to new or branch libraries which can actively use *CA* but have been hesitant because of the initial costs of the bound volumes, shelving, and floor space; note, however, that the decennial (and later annual) indexes will still have to be purchased and shelved. On our part, we are seriously considering a second set of the *CA* microfilm for a branch library which has limited floor space but already has the *CA* indexes since 1947.

The day will come, of course, when the *CA*-microfilm system that we have discussed here will seem an antiquated method of looking up abstracts. For the immediate future, however, we believe that this system is both useful and economical. We hope that other publishers of sec-

ondary journals will reproduce their reference sets in this manner.

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Nomenclature of Coordination Compounds. Present Status*

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The field of chemical knowledge suggested by the heading "Coordination Compounds" is extensive. Research is currently very active in this field. Consequently, it is important that the underlying principles of nomenclature used in this field be sufficiently broad to handle adequately new compounds resulting from such research. Recently the author attempted to summarize existing practices and needs in the nomenclature of coordination compounds (13). Inadvertently, certain items were overlooked or treated in too little detail. For the sake of completeness, the discussion is contained here.

Designation of Geometrical Isomerism in the Coordination Sphere. Chernyaev (9) used the patterns shown in Figure 1

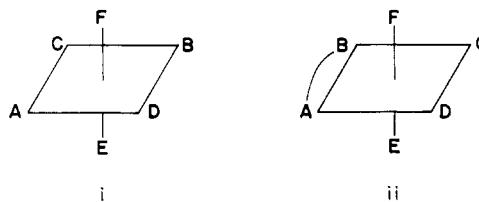


Figure 1.

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