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Vital Statistics on Abstracting and Indexing Revisited

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The second volume of *Indexing and abstracting: an international bibliography,* covering the period 1977–81 is analyzed and in part compared with the previous volume (ca. 1850–1976). The work lists 1426 items in 26 languages for the five-year period and over 200 earlier items not included in the previous volume. Compared with the previous five-year period, the number of items increased by 79%, especially those in non-English languages; Russian and Japanese items show the highest increase, accounting for 12% and almost 4% of the total, respectively. The top producers of A&I literature are English, Russian, German and Japanese authors. Three quarters of all items are journal articles and conference papers, one fifth are books or reports.

A total of 251 journals published 943 articles, and 34% of these were in 8 core journals (6 English, 1 German, 1 Russian). Conference proceedings yielded 166 papers. Automatic indexing showed a 12.5% decrease in English items but a steep rise in items written in other languages, especially on linguistic methods of automation. Some older topics declined in importance but new terms from Artificial Intelligence to Word processors now appear in the subject index.

1. Scope of the bibliography

The publication of the second volume of my bibliography of abstracting and indexing (A&I), covering the period 1977–81 (1) affords an opportunity to compare data and trends in the field of A&I as they are reflected in the professional literature of librarianship, documentation, and information science, as well as in other sources not primarily concerned with matters pertaining to information storage and retrieval, yet dealing with various aspects of A&I, sometimes from the point of view of entirely different disciplines and user groups.

In addition to articles in journals, conference proceedings, dissertations, books, and reports, the second volume covers also nonbook materials of all kinds, many of them listed retrospectively to the 1960s. In principle, no major changes have been made, although, as will be discussed in more detail below, some new topics as well as new terminology had to be accomodated. The bibliography is again divided into two major parts, the first and more extensive one devoted to indexing, the second dealing with abstracting and the databases or access services (formerly known only as A&I services, a term by no means obsolete). The emphasis is again on indexing systems which use verbal means of retrieval, be these subject headings, key words, words or phrases selected ●r extracted (manually or automatically) from text, or any other method based on words in natural language, whereas indexing languages based on symbolic representation, especially classification systems, have on purpose been excluded, except when they were dealt with in conjunction with verbal systems by way of comparison or in other contexts.

The most important expansion of the scope is in the area of searching, including contributions that show how various search strategies and techniques are not only influenced by the kind and type of indexing provided, but how these techniques in turn may influence the indexing. No such considerations were even faintly visible among the items covered in the first volume, primarily because online retrieval had not yet become a very widespread activity by the mid-seventies. It must be stressed, however, that material dealing with search techniques only (i.e. without any reference to indexing) are not included in the bibliography, the more so since there is now another (albeit not annotated) bibliography and its serial continuation (2) covering the topic of online searching and retrieval in all its ramifications.

2. Distribution of items by language

As was the case in the first volume, the second one also shows that contributions on A&I come from a large number of countries and are written in 26 languages. Table 1 compares the number of items in the five-year period 1972–76 with the period 1977–81. The figures in Table 1 are in some cases slightly different from those given in the introduction to the bibliography, due to

Table 1. Distribution of items by language*

Language	Items 1972–76	1977–81	Language	Items 1972–76	1977–81
Arabic (ARA)	2	4	Lithuanian (LIT)	1	3
Bulgarian (BUL)	1	1	Norwegian (NOR)	2	1
Chinese (CHI)	2	5	Persian	1	0
Czech (CZE)	21	29	Polish (POL)	4	25
Danish (DAN)	9	6	Portuguese (POR)	5	17
Dutch (DUT)	2	7	Romanian (RUM)	5	6
English (ENG)	593	862	Russian (RUS)	70	172
Finnish (FIN)	0	2	Serbocroatian (SCR)	0	2
French (FRE)	40	52	Slovak (SLO)	1	11
German (GER)	39	119	Slovenian (SLV)	0	1
Hebrew (HEB)	0	6	Spanish (SPA)	1	12
Hungarian (HUN)	2	13	Swedish (SWE)	2	5
Italian (ITA)	3	9	Ukrainian	1	0
Japanese (JPN)	13	55			

* Language codes in parentheses are those used in the OCLC-MARC system; they are applied in some of the following tables.

tabulation errors discovered only after the volume had been typeset. In order to allow a comparison with Table 2 in my earlier article (3), the figures for each language in the present Table 2 are broken down by items on indexing and abstracting respectively, and the increase in absolute figures and percentages is also given. Although all languages except some of those producing less than 10 items during 1977—81 show increases, the smallest increase (except for items in Czech) is in the otherwise quantitatively predominant English items, whereas Russian, German, Japanese and French items show a rather high rate of increase. Among the top five producers, the highest increase is in Japanese items.

This phenomenon is due to two causes: first, writers in Russian, German, Japanese, French, and so on are now indeed more prolific than they were in the earlier five-year period; second, items in the previous volume were largely culled from Western A&I services whose coverage of Russian, other Slavic and East European, and Japanese literature ranged from zero to relatively few items; thus, some contributions in these languages during the 1972—76 period may have gone unnoticed. For the second volume, in addition to scanning about a hundred journals, items were taken from the major Western A&I services (which in the meantime had improved their coverage) and from the Soviet service *Informatics Abstracts* (the English version of *Informatika*, the Russian-language abstract journal); the latter covers of course the Soviet and East European scene more thoroughly and often exclusively. An effort was also made to scan the major Japanese journals in the information field, many of which carry English abstracts. Thus, the increase of items is due both to increased productivity and better coverage.

All figures in Table 2 refer to items produced during the period 1972—81 only. The volume contains also 220 items belonging either to the period 1972—1976 or earlier which came to my attention after the completion of the first volume; those for the 1972—76 period were counted with the items from that period in the first volume, but earlier items were not included in Table 2. On the other hand, the second volume lists 11 books and 3 articles published in 1982 and 1983 which were included because of their special importance or because they continue items first published in 1981, and these were not counted in the following tabulations. All items contained in the second volume are, however, included in Table 1, hence the totals in that table do not add up to those given in Table 2.

3. Increase in number of entries

As predicted in the previous article, the most conspicuous fact in a comparison of the two bibliographies is the sheer growth in the number of contributions. In order to make meaningful statistical comparisons, all figures for the first volume have been computed for the five-year period 1972—76 only, and are thus not comparable with those given in the various tables in the previous article. As Table 2 shows, the total number of entries in the five-year period 1977—81 is 1426, an overall increase of 630 items or 79% over the previous five-year period 1972—76. The increase is even more impressive, not to say spectacular, when looking at the

Table 2. Distribution of items by period, type of entry and language*

		ENG	RUS	GER	JPN	FRE	CZE	POL	POR	HUN	SPA	SLO	Other	Total non-ENG	Total	Percent
1972—76	I	515	53	31	11	15	20	4	4	1	0	1	28	168	683	86
	A	78	17	8	2	1	1	0	1	1	1	0	3	35	113	14
Subtotal		593	70		39	13	16	21	5		1		31	203	796	100
1977—81	I	627	115	108	42	36	20	19	12	10	9	11	45	427	1054	74
	A	235	57	11	13	16	9	6	5	3	3	0	14	137	372	26
Subtotal		862	172		119	55	52	29	25	17	13	12	59	564	1426	100
Increase	N	269	102		80	42	36	8	21	12	11	11	10	28	361	630
	%	45	146		205	323	225	38	525	240	550	1200	1000	90	177	79

* In decreasing order of 1977—81 number of items. I = Indexing, A = Abstracting.

figures for abstracting only, where the increase of 259 items is more than twice as large as the number for 1972—76. Here too most of the increase is due to the much higher number of non-English contributions.

4. The top producers of A&I literature

In the previous article, a prediction was made that in the next few years Russian items would perhaps constitute 10% of the entire A&I literature, and that Japanese might reach 2%. As it turned out, these estimates were rather too conservative: as Table 3 shows, Russian contributions during the 1977—81 period rose to 12%, while Japanese items rose almost twice as much as predicted, and hold the fourth rank, a truly remarkable fact, considering that these contributions are aimed at readers in only a single country, very few people outside Japan being able to read its professional literature. Actually, the Japanese share is even somewhat larger than shown in Table 3 because many Japanese authors publish also in English. German items occupy again the third rank but with a more than doubled percentage of items (8.3% of the total in 1977—81 as compared to 3.9% in the (roughly comparable) period 1970—76 as shown in Table 3, column C of the previous article. French items are in fifth place, and all other languages together furnish only less than 12% of the total A&I literature.

Table 3. Top producers of A&I literature, 1977—81

Rank	Language	Number of entries	Percentage of total
1	English	862	60.4
2	Russian	172	12.0
3	German	119	8.3
4	Japanese	55	3.9
5	French	52	3.7
	Other	166	11.7
	Total	1426	100.0

5. Authorship and productivity

The contributions in the 1977—81 period come from 1671 named sources, 1647 (98.6%) of which are persons (author or editors), while 24 (1.4%) are corporate bodies, as shown in Table 4. These figures do not include entries listed by title only and lacking any names of persons; almost all of these are nonbook media. The figures seem to confirm the familiar bibliometric results of many investigations into the publishing pattern of authors in scientific and technical fields, namely that the overwhelming majority of authors publish only once, and that the number of prolific authors is very small. It should, however, be borne in mind that authors on A&I are also writing on other topics (some of them quite extensively), so that the statement on productivity actually pertains to publications on A&I only, and not to authors as such.

The 20 most prolific authors on A&I (who contributed 5 or more items but constitute only 1.3% of all personal authors) were the following: K.G.B. Bakewell, H.H. Wellisch (14 items each); T.C. Craven, G. Salton (13); E. Garfield, C. Oppenheim, P. Willett (10); R. Fugmann (9); J. Farradane, J. Janos, E.M. Keen, J. Sørensen (7); J.D. Anderson, D. Austin, Y. Ebinuma, A.C. Foskett (6);

Table 4. Authorship and productivity, 1977—81.

Number of entries	Personal authors N	%	Corporate authors N	%
1	1360	82.5	16	66.7
2	186	11.3	5	20.8
3	54	3.3	1	
4	27	1.6	1	12.5
5	4		1	
6	4			
7	4			
9	1	1.3		
10	3			
13	2			
14	2			
Total	1647	100.0	24	100.0

and C.D. Roninson, K. Sparck-Jones, E. Svenonius, V. Verdier (5). Fifteen of these authors wrote only in English, one (Ebinuma) only in Japanese, while the following four authors wrote both in English and in other languages: Fugmann in German (3); Janoš in Czech (2) and German (1); Sørensen in Danish (2), German (1) and Swedish (1); and Wellisch in Hebrew (1).

6. Types of publications on A&I

As Table 5 shows, journal articles constituted exactly two thirds of all publications on A&I in 1977—81, and if conference papers are added, more than three quarters of all writings on A&I appeared in these two forms; incidentally, many conference papers were subsequently published as journal articles, a well-known phenomenon also in other scientific and technical fields. The dissertations (27 Ph. D. theses and 7 Masters' theses) also appeared often in condensed form as articles about one to two years after their completion or were summarized in conference papers. Almost one fifth of all publications is in the form of books and reports. Nonbook media (NBM), that is, sound recordings, tape-slide shows, videotape and filmstrips, practically all of which are produced for training in the use of indexes and abstracts, were only few in number, but it should be noted that the bibliography lists altogether 32 NBM items, 22 of which were produced in the period 1960—1976. It is

Table 5. Types of publications on A&I, 1977—81

Type	Number	Percentage
Articles	943	66.1
Conference papers	166	11.6
Dissertations	34	2.4
Books and reports	273	19.2
Nonbook media	10	.7
Total	1426	100.0

likely that a considerable number of NBM exists which is not listed in any bibliographic tool because it is well known that bibliographic control of NBM is spotty at best, many tape-slide shows, movies of videorecordings being produced locally by libraries, schools and small independent producers.

7. Core journals

The previous bibliography, spanning a very long period,

did not allow for any meaningful analysis of core journals or patterns of scattering of literature. The period 1977–81, however, clearly shows the familiar Bradford-type distribution of journals and their contributions, as shown in Table 6. If fully international coverage is considered, the first eight journals (ranks 1–6) clearly constitute the "core", yielding more than a third of all articles. If English-language articles only are considered, the organ of the Society of Indexers in the U.K. (shared by three other indexing societies in Australia, Canada and the U.S.). *The Indexer,* is not unexpectedly the most productive journal on A&I in English, since it is entirely devoted to those subjects. It will gladden the heart of the editor and readers of this journal that it occupies the third rank after the rather specialized but highly productive *Journal of Chemical Information.* Clearly, these and the three other titles occupying ranks 5 and 6 constitute the "English core" within the core group of journals on A&I. The first 11 English-language journals (many of which would in any case be read or at least scanned by users interested in the broader aspects of library and information science) yielded 273 articles (29% of the total), and if the 48 papers on A&I in the *Proceedings* of ASIS annual and semi-annual meetings are added, as well they should, the coverage rises to 34%. Although sheer quantity is certainly not the most important criterion in evaluating core journals, most users of the literature on information retrieval would probably agree that the journals in the first 14 ranks are also those that provide articles of high quality, many of them original contributions reporting research or interesting and innovative applications of systems and methods.

A total of 251 journals published 943 articles on A&I, but, as the lower portions of Table 6 indicate, there is the usual long tail of journals which published only one or two occasional articles during the five-year period. Many of the latter are journals not normally concerned with information work in general, much less with A&I, but serving quite different interests. Thus, articles on indexing or abstracting appeared, to mention just a few unexpected sources, in *Accountants' Weekly, Applied Ergonomics, Kew Bulletin* (of the famous Kew botanical gardens outside London), *Local Historian, Mechanical Engineering, Plant Engineering,* and *Practical Lawyer.* Titles alone are, however, not always indicative of the intended audience: *Sourdough,* which had an article on newspaper indexing, is not a professional journal for bakers but an Alaskan library journal:

8. Contributions on automatic A&I

Since the previous article dwelt specifically on items dealing with automatic indexing and abstracting, it is of interest to analyze this topic as reflected in the lite-

Table 6. Ranked list of journals publishing articles on A&I, 1977–81

Rank	Title	Language	Number of items	Cumulative number of items	Percent coverage of total
1	Nauchno-Tekhnicheskaya Informatsiya	RUS	86		
2	Indexer	ENG	77	163	
3	J. Chem. Inform. Comp. Sci.	ENG	36	199	
4	International Classification	ENG/GER	27	226	
	Informatik	GER	24	250	
5	Information Processing & Management	ENG	24	274	
	J. ASIS	ENG	24	298	
6	Database	ENG	23	321	34
7	Dokumentation/Information	GER	20	341	
8	Dokumentesyon Kenkyu	JPN	19	360	
9	Aslib Proc.	ENG	18	378	
10	Library Resources & Technical Serv.	ENG	15	393	
11	RQ	ENG	13	406	
12	Nachrichten für Dokumentation	GER	12	418	
13	Intern. Forum f. Inform. & Docum.	ENG	11	429	
14	J. of Documentation	ENG	10	439	47
15	4 journals, each publishing 9 items	a	36	475	
16	7 journals, each publishing 9 items	b	56	531	
17	2 journals, each publishing 7 items	ENG	14	545	
18	6 journals, each publishing 6 items	c	36	581	
19	5 journals, each publishing 5 items	d	25	606	64
20	16 journals, each publishing 4 items	e	64	670	
21	23 journals, each publishing 3 items	f	69	739	
22	32 journals, each publishing 2 items	g	64	803	
23	140 journals, each publishing 1 item	h	140	943	100

a) 2 ENG, 1 ea. CZE, RUS
b) 2 ea. CZE, ENG, FRE, 1 SPA
c) 5 ENG, 1 ea. DUT, POL
d) 4 ENG, 1 JPN
e) 12 ENG, 1 ea. HEB, POL, POR, RUS
f) 12 ENG, 3 GER, 1 ea. ITA, LIT, POR, RUM, SWE, multilingual
g) 18 ENG, 3 GER, 2 JPN, 1 ea. CZE, DAN, FIN, FRE, HEB, POL, POR, RUS
h) 90 ENG, 13 RUS, 7 GER, 5 FRE, 4 JPN, 3 SLO, 2 ea. CZE, HUN, ITA, RUM, SPA, SWE, 1 ea. ARA, BUL, CHI, NOR, POR, SCR, SLV

rature of 1977–81. Relevant entries constituted only 12.4% of the total number of entries, a sharp drop of 25% from the percentage of 15.5% in the previous five-year period, even though the absolute number of items rose by 47% from 121 in 1972–76 to 178 in 1977–81. An analysis by language reveals that the number of English-language contributions was actually 12.5% less in the more recent five-year period, whereas contributions from non-English speaking countries rose by 165% from 40 to 106. Thus, while there was a 2:1 ratio of English to non-English items on automatic A&I in 1972–76, the ratio in 1977–81 was about 2:3. It seems that, similar to the process observed in the earlier article, developments that originated in the English-speaking world and especially in the U.S. are taken over after a time lag of several years in other parts of the world.

A particularly conspicuous preponderance of foreign contributions can be observed in the application of linguistic methods to automatic indexing. In fact, as footnotes b) and c) of Table 7 indicate, only a single item came from an author whose mothertongue is English, whereas all others were contributions by foreign authors, seven of whom preferred to write in English (no doubt in order to bring their papers to the attention of a wider audience). Most numerous were the Russian (and other Slavic language) articles, followed by German and French ones, and there were even two Japanese items. It is remarkable that just the most highly inflected languages, which would seem to be least amenable to linguistic methods of automation, are attracting both theoretical and practical efforts of linguists and indexers, whereas interest in English-language automatic indexing by means of linguistic methods is minimal compared with English writings on term frequency, term weighting,

and other methods. In view of the relative (and so far quite moderate) success of linguistic methods reported by foreign authors, it is difficult to find an explanation for this phenomenon.

Could it be that the decline in English contributions on automatic indexing (and the even more conspicuous dearth of items on automatic abstracting) are due to a certain disenchantment on the part of American and British researchers? This would not be too surprising after more than three decades of searching for the elusive philosophers' stone which, like the quest of the alchemists, yielded valuable insights and by-products but has so far not led to a pot of gold. With the sole exception of the earliest and crudest method of automatic indexing, namely the KWIC system (which, despite the pun intended by its acronym, is neither quick nor does it really perform indexing, since it shifts the burden of cumbersome and tedious searching on the user, and indexes only words that authors chose to put in titles) all other methods have so far failed to produce anything even approaching human indexing in either quality or economic feasibility. The only tangible product so far has been a large (and often incomprehensible) mass of articles and reports, often written by mathematicians and statisticians, some of whom apparently failed to achieve success in their chosen fields proper, who seem to have great fun putting abstruse formulae on paper, showing conclusively how "smart" their automatic systems are in comparison with unreliable and inevitably biased human indexing. Curiously, somehow or other their ingenious and fully automatic systems seem to have escaped attention of managers at *Chemical Abstracts, BIOSIS, Engineering Index,* and other databases who still stubbornly insist on human indexing.

9. Obsolescent topics and new terms

The previous article considered in detail the rise and fall of three topics in indexing as reflected in the number of contributions over a period of more than a quarter of a century, namely chain indexing, links and roles, and Uniterms. After having given rise to a considerable body of literature, these three topics showed a marked decline around 1975, such methods having been found to be not cost-effective or simply superseded by more sophisticated indexing techniques. As Table 8 shows, these three topics, as well as a fourth one which in the previous five-year period still generated a very high number of items, namely punched cards, all now declined to practically nil, at least as far as the Western world is concerned. Some contributions on the use of punched cards of various kinds still came in, mostly from East-

Table 7. Items on automatic A&I, by method, period and language*

| | 1972–76 | | | 1977–81 | | |
	E	N	Total	E	N	Total
Automatic indexing						
General	8	4	12	4	12	16
KWIC/KWOC	19	2	21	7[a]	9	16
Keyword extraction	11	12	23	9	11	20
Term frequency	7	3	10	16	14	30
Term weighting	7	1	8	11	2	13
Probabilistic indexing	4	6	10	6	2	8
Linguistic methods	9	4	13	8[b]	40[c]	48
Free terms	3	0	3	4	4	8
Comparisons of methods	8	4	12	5[d]	4	9
Automatic abstracting	5	4	9	2	8	10
Total	81	40	121	72	106	178
Increase/ (Decrease) {Items				(9)	66	57
Percent				(12.5)	165	47

* E = English, N = Non-English.
a) Including 1 item by a Japanese author.
b) Including 2 items by a Czech author, and 1 item each by a French, German, Japanese, Russian, and Slovak author; thus, only 1 item was by an English-speaking author.
c) 15 items by Russian authors, 10 by German, 8 by French, 3 by Czech, 2 by Polish, and 1 item each by Japanese and Slovak authors.
d) 1 item each by a Czech and Dutch author.

Table 8. Some obsolescent topics

| Topic | Number of entries | |
	1972–76	1977–81
Chain indexing	14	1
Links and roles	22	0
Punched cards	145	15[a]
Uniterms	11	4[b]

a) 6 items in English (of which 3 in historical reviews), 9 non-English.
b) 1 item in an historical review, 1 each on applications in the Netherlands, Czechoslovakia, and India.

European countries and developing countries, but in the West the micro-computer had done away with these earlier means of mechanization and automation, and only in historical reviews was mention still made of these topics which were once at the very focus of interest in the indexing literature. Sic transit gloria mundi. (It should be noted that the subject index to the 1977—81 bibliography lists many more items than the ones tabulated in Table 8, but these pertain to items published prior to 1977 not included in the first volume.)

On the other hand, the subject index for 1977—81 contains terms not yet found in the previous one, among them those listed in Table 9. This, to be sure, is not a complete listing of new terms, but focuses only on those that generated a sizable amount of items or seemed otherwise important (e.g. Artificial intelligence). The term "Databases" is somewhat ambiguous since many writers use it to include both printed and electronic forms of access services, but by and large most contributions on databases pertain to the online versions of A&I services. Surprisingly, a few topics which are by no means obsolete failed to result in any contributions, e.g. copyright in indexes (despite the fact that copyright, or more specifically downloading, is now one of the topics most hotly debated in relation to databases), and the somewhat related issue of indexers' remuneration is also missing from the 1977—81 contributions. Are all indexers and abstracters happy with the salaries or fees they get?

Reports on organizations of and for indexers and abstracters continued to be published, and reveal a

Table 9. Some new terms in the 1977—81 subject index

Terms	Number of items listed
Artificial intelligence	2
Databases	30
Freelancing	5
Microcomputers	27
Online systems	18
Software	43
Word processors	5

picture of increasing awareness of professionalism and the need for concerted action and mutual support among indexers and abstracters around the world, as witness the steady growth of societies of indexers in the U.K. (where it all started), in the U.S., Canada and Australia. And finally, writings of a humorous nature are still forthcoming, a sure sign that, despite dire predictions of indexers soon going to be replaced by machines, they have not lost their sense of humor.

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(See article by Niehoff/Mack, p.3)

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     E. IRON       F.  NASA


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     C. EI         D.  INSPEC
     E. IRON       F.  NASA
         ?A, C, D, F

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TERM TYPE    VOCAB     TERM

YOUR TERM    NASA      VIBRATION
REL PHRAS    EI        VIBRATORS
REL PHRAS    EI        VIBRATIONS
REL PHRAS    INSPEC    VIBRATIONS
RELATED      DOE       ACOUSTICS
RELATED      EI        ACOUSTICS
RELATED      INSPEC    ACOUSTICS
RELATED      NASA      ACOUSTICS
RELATED      DOE       AMPLITUDES
RELATED      NASA      AMPLITUDES
RELATED      NASA      ANTINODES
RELATED      DOE       COMPACTING
RELATED      NASA      COMPACTING
RELATED      NASA      CYCLIC LOADS
RELATED      NASA      DISPLACEMENT
RELATED      EI        DYNAMICS
RELATED      INSPEC    DYNAMICS
RELATED      NASA      DYNAMICS
RELATED      EI        ELASTIC WAVES
RELATED      INSPEC    ELASTIC WAVES
RELATED      NASA      ELASTIC WAVES
RELATED      NASA      FATIGUE (MATERIALS)
RELATED      DOE       HARMONICS
RELATED      INSPEC    HARMONICS
RELATED      DDE       MOTION
RELATED      DOE       OSCILLATIONS
RELATED      INSPEC    OSCILLATIONS
RELATED      DOE       OSCILLATORS
RELATED      EI        OSCILLATORS
RELATED      INSPEC    OSCILLATORS
RELATED      DOE       RESONANCE
RELATED      INSPEC    RESONANCE
RELATED      DOE       STANDING WAVES
RELATED      INSPEC    WAVES
WD MATCH     DOE       OSCILLATION MODES
WD MATCH     EI        SAND,FOUNDRY--COMPACTION
WD MATCH     EI        METAL FINISHING--VIBRATION
WD MATCH     EI        STROBOSCOPES
STM MATCH    EI        VIBRATIONS--MEASUREMENT
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FIGURE 1   TYPICAL VSS SESSION USING MENU-DRIVEN MODE