Table IX. Ciba-Geigy Merger Reflected in Patent Issues

U.S. Patent Office Class	No. of patents assigned in ten-year period 1967–1976 to		
	Ciba	Geigy	Ciba-Geigy
8	41	38	19
23		3	
71	15	6	34
96	44		31
106	13	15	24
156			10
204	11		10
252	11	38	28
260	868	513	1094
423		7	
424	105	102	179
427	12		13
428		7	
526	9	8	

activities without ever formally contacting the organization. After the analysis is made, the acquisition or tender negotiations can begin with important background information obtained through this unusual approach to searching the patent literature. The same process could be used should one want to buy or sell selected areas of technology and want to know who the best prospects might be.

SUMMARY

We believe we have demonstrated that by utilizing common computer techniques on a database of publicly available information, unique and sometimes pseudoproprietary results can be obtained. Specifically, we believe that we have presented ways for analyzing the patent literature which give unusual and valuable results. Of statistical interest, we have identified that for 1976, over 40% of assigned patents were issued to only 125 companies. We have determined that foreign assignees play an important role in U.S. patents. Almost one-quarter of the top 125 companies were found to be foreign based and seven of the top 10 chemical companies were identified as European. With respect to further intelligence information, we noted that the cost in research dollars for obtaining patents is extremely high. By analyzing patent activity over a period of time we were able to show changes in research emphasis, and using Ciba-Geigy as a model we presented evidence that mergers and similar business developments might be predicted.

The prerequisites for this type of analysis are a database covering a significant collection of information and a desire to look for the unusual.

INPADOC: A Computerized Patent Documentation System†

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Received September 26, 1977

The International Patent Documentation Center, founded by the Republic of Austria by agreement with the World Intellectual Property Organization (WIPO) in Geneva, has built up a database covering patents from 45 countries. The various services available are described.

Over the past years the importance of patent literature to industrial research and development has changed fundamentally. Before the 1970s, patent documents reflected the state of the art with a three- to four-year delay due to the slow examination in the patent offices. In recent years, however, several offices have decided to publish unexamined applications within 18 months, which has made patent literature a timely type of technical information. With the introduction of unexamined patent documents the number of documents published increased dramatically.

Keeping track of these patent publications involves huge expenditures. There are about 300 000 publications a year, or some 1200 per workday, alone in the countries that publish unexamined applications (Belgium, France, Germany, Japan, the Netherlands, Portugal, South Africa, and the Scandinavian countries; Great Britain in the near future). Processing this mass of information is hardly conceivable today without electronic data processing. In order to achieve a favorable cost-performance ratio in solving this problem, it is best to store in a computer merely the bibliographic data—that is, application data, publication data, priority data, classification, applicant, inventor, and a significant title—with a short version and the complete text of the patent document recorded on microfilm or the complete document kept in numerical order according to patent numbers.

It was the aim of the International Patent Documentation Center to solve the first part of this problem, gathering and storing in a central database the bibliographic data of patent documents on a worldwise basis. This center was founded on the basis of an agreement concluded on May 2, 1972, between the Republic of Austria and the World Intellectual Property Organization in Geneva.

Why was this step taken? The patent offices in different countries were bound solely to their national assignments. The Paris Convention had established a basis for claiming foreign priority. Nevertheless, search and examination were done only on a national basis. Intellectual work and clerical effort were thus duplicated. Therefore the idea of the Patent Cooperation Treaty, PCT, was born. This treaty requires equally equipped search files in all patent offices working as search authorities. A check of the search files for completeness and correctness has to be effected, and duplicate documents emerging from priority claiming applications had to be eliminated from the search files.

A central database was required for solving this problem. Therefore, the agreement mentioned before was concluded. It provides for worldwide concentration of patent documents in a planned central database which is to play a major role under the Patent Cooperation Treaty, PCT, of 1970. This agreement is one step in the forthcoming international co-

† Presented in the symposium, "Trends in Handling Patent Information", before the Division of Chemical Information, 174th National Meeting of the American Chemical Society, Chicago, Ill., Aug. 28, 1977.

0095-2338/78/1618-0069$01.00/0

operation. In this agreement the Republic of Austria undertook to found and finance such a center. The World Intellectual Property Organization undertook to support fully the Vienna center in concluding the necessary agreements with the patent offices of all countries concerned.

Today the International Patent Documentation Center (INPADOC) gathers information on the bibliographic data of patent documents from 45 countries. This information is sent to INPADOC in machine-readable form (on magnetic tape or on punched cards) from 27 countries. For the other countries the information is keypunched from coding sheets or official gazettes supplied by the cooperating patent offices or institutions. More than 5.5 million citations concerning patent documents are already gathered in the two databases of INPADOC.

Here are a few figures to illustrate the growth of this database: At the beginning of 1974 there were 100 000 documents, at the beginning of 1975 2.5 million, at the beginning of 1976 nearly 3.5 million, at the beginning of 1977 4.5 million, and at the beginning of 1978 nearly 5.5 million. On an average, every 8 s of a working day a patent from one of the 45 different countries is added to the INPADOC database in one of 14 different languages. These data have to be brought into uniform data-processing formats at INPADOC and have to be stored using uniform standards. For instance, the basic bibliographic items like calendar dates are coded in quite different ways all over the world:

77 08 01
1 Aug 77
Aug 1, 1977
01 08 1977 } 77 08 01 (INPADOC format)

To allow the user of an information service access to the information, all bibliographic items have to be stored in the same format of the calender date, e.g., 77 08 01. Similar but quite complicated problems occur with standardization of applicant names. The same company name is written in quite different ways in different countries and cannot be found easily in indexes arranged alphabetically. Foreign alphabets like Katakana for Japan or the Cyrillic alphabet make use of existing files in patent offices even more complicated. Therefore, systems to transcode these alphabets into Latin characters had to be developed. INPADOC has devised appropriate computer programs which now enable it to standardize all variations in writing of applicant names making it possible to find each under a single name in the indexes. In weekly intervals, the gathered data are checked and standardized to update the INPADOC database. This update information is sent to cooperating patent offices as well as (or/and) to private parties in the form of a weekly update tape of their respective systems.

Another problem for INPADOC was finding suitable means for distributing this enormous amount of information. The database should be accessible to highly trained people well equipped with the necessary hardware, but also to specialists of patent offices which have no computer terminal and no datalines at their disposal. Therefore INPADOC decided to use COM, Computer Output on Microfiche, as one output medium. Computer Output on Microfiche is the most suitable solution if large amounts of information are to be accessed by a number of different users without additional costs of maintaining the system; 10 000 pages of information can be filmed every hour at INPADOC to create the indexes without delay.

INPADOC was planned to be a central data exchange agency for patent offices throughout the world. The Republic of Austria assumes the task of financing it, but from the very beginning INPADOC was intended to produce services from these data to be offered worldwide to private industry as well.

5. EDITION
INPADOC BACKFILE
(IRF VERSION B)
JANUARY 1978

COUNTRIES NEW CC	COUNTRIES OLD CC	TYPE OF DOC.		FROM PUB.DAT END OF 1972	FROM DOC.NO.	TOTAL	
AT	(OE)	P	AUSTRIA	69.12.1o	276.7o1	27.65o	
BE	(BE)		BELGIUM	64.o5.15	643.oo1	136.6o4	
CA	(CA)		CANADA	7o.o8.o4	848.159	2.147	+
CH	(CH)	A	SWITZERLAND	69.o8.29	5.274/62	63.977	
CH	(CH)	P	SWITZERLAND	69.o3.31	47o.127		
DE	(DT)	P	FED.REP. OF GERMANY OS, AS, PS	67.o1.o5	1.2o1.322		++
DE	(DT)	U	FED.REP. OF GERMANY GM	68.1o.17	6.6oo.oo1	546.672	++
DK	(DK)	P	DENMARK	68.o4.29	111.ooo	14.o82	
ES	(ES)	P	SPAIN	68.o1.o1	234.239	76.o42	
ES	(ES)	U	SPAIN	68.o1.o1	7o.949		
FI	(SF)	P	FINLAND	68.o5.31	4o.oo1	6.442	
FR	(FR)		FRANCE PAT	68.11.29	1.548.oo1		
FR	(FR)	M	FRANCE MED	68.o5.2o	6.o51	199.611	
FR	(FR)	E	FRANCE ADD	68.12.2o	92.7o1		
GB	(GB)		GREAT BRITAIN	69.o4.3o	1.15o.oo1	151.585	
IL	(IL)		ISRAEL	68.o1.25	18.116	18.4oo	++
LU	(LU)		LUXEMBOURG	45.o6.o2	27.693	21.o68	
NL	(NL)		NETHERLANDS	64.o3.1o	6.4oo.oo1	147.319	
NO	(NO)	P	NORWAY	68.o7.o1	115.ooo	11.176	
SE	(SW)	P	SWEDEN	68.o4.o1	3oo.oo1	52.242	
US	(US)	A	USA PAT	68.o1.o2	3,36o.8oo	345.191	
US	(US)	E	USA REISSUE	68.o1.o2	26.328		
ZA	(ZA)		SOUTH AFRICA	71.o1.27	6o/4.596	13.668	++
ZM	(ZB)		ZAMBIA	68.1o.16	198/67	69o	++
						1,834,766	

+ ONLY DOCUMENTS CLAIMING CA-PRIORITY

++ THESE DOCUMENTS ARE NOT PUBLISHED AS CLOSED SERIES OF DOC.NO.

Figure 1. INPADOC backfile database.

INPADOC DATA-BASE 78o2o3
VERSION A

	CC	CC*	COUNTRIES	PUBLICATION DATES	FREQU. OF PUBLIC.
	AR		ARGENTINIA	73o2o8 - 751o31	M
++	AT	OE	AUSTRIA	73o11o - 78o115	M
	AU		AUSTRALIA	73o118 - 77o929	W
	BE		BELGIUM	73o1o1 - 77123o	T
	BG		BULGARIA	73o215 - 771111o	3M
	BR		BRASIL	76o1o6 - 771227	W
+	CA		CANADA	74o1o1 - 78o124	W
	CH		SWITZERLAND	73o115 - 771215	2W
	CS		CZECHOSLOVAKIA	73o222 - 77123o	M
	CU		CUBA	74o213 - 77o6o8	B.B.
	CY		CYPRUS	75o3o1 - 77o318	B.B.
	DD	DL	GERMAN DEMOCR. REP.	73o1o5 - 771228	W
	DE	DT	FED. REP. OF GERMAN	73o1o4 - 78o2o2	W
	DK		DENMARK	73o1o2 - 78o116	W
	EG	ET	EGYPT	76o131 - 77113o	M
	ES		SPAIN	73o1o1 - 78o1o1	2W
	FI	SF	FINLAND	73o131 - 77123o	T/M
	FR		FRANCE	73o1o5 - 78o113	W
	GB		GREAT BRITAIN	73o1o4 - 77123o	W
	GR		GREECE	77o7o4 - 771111o	T
	HK		HONGKONG	76o3o5 - 771216	W
	HU		HUNGARY	73o129 - 771228	M
	IE	EI	IRELAND	73o11o - 7711o9	2W
	IL		ISRAEL	73o13o - 771o31	M
	IN		INDIA	75o8o2 - 77o226	W
	IT		ITALY	73o125 - 771111o	M
	JP	JA	JAPAN	73o4o2 - 78o1o7	T
	KE		KENYA	75o711 - 77o923	W
	LU		LUXEMBOURG	73o1o5 - 78o118	T
	MC		MONACO	751o1o - 77o812	3M
	MN	MO	MONGOLIA	72112o - 76o312	B.B.
	MW		MALAWI	73o5o9 - 77o6o8	M
	NL		NETHERLANDS	73o1o2 - 78o112	T
	NO		NORWAY	73o1o2 - 771212	T/W
	PH		PHILIPPINES	75o7o3 - 771o18	W
	PL	PO	POLAND	73o228 - 771231	CA 2M
	PT		PORTUGAL	76o1o1 - 78o1o1	M
	RO	RU	RUMANIA	73o12o - 771215	M
	SE	SW	SWEDEN	73o1o8 - 78o123	T/W
	SU		USSR	73o1o8 - 78o115	W
	TR		TURKEY	73o1o1 - 7611o1	2M
	US		UNITED STATES OF AMERICA	73o1o2 - 771227	W
	YU		YUGOSLAVIA	73o228 - 771o31	2M
	ZA		SOUTH AFRIKA	73o131 - 77o831	M
	ZM	ZB	ZAMBIA	73o122 - 77o921	M

45 TOTAL

CC* CC TILL 771231
\+ WITH PERMISSION OF INFORMATION CANADA
++ PATENTBLATT (PATENT JOURNAL)
T DAILY
W WEEKLY
2W FORTNIGHLY
M MONTHLY
2M 6 TIMES PER YEAR
3M QUARTERLY
CA 2M APPROX. 6 TIMES PER YEAR
B.B. REGULARLY

Figure 2. Current INPADOC database.

In the long term, the cost of running the center is to be met largely by selling these services to the users.

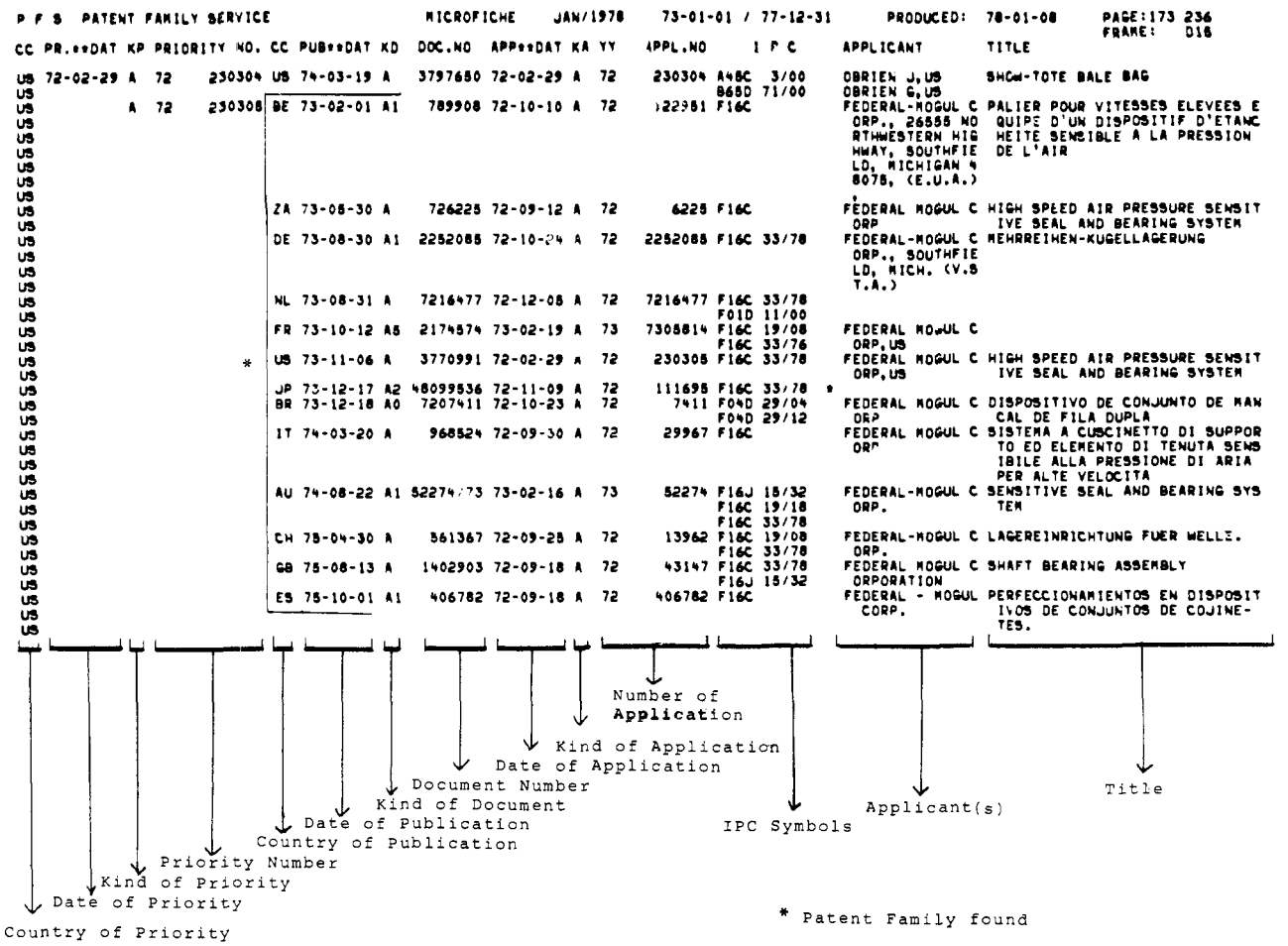

Figure 3. Example of a Patent Family Service.

To achieve its goal, INPADOC has two databases at its disposal at present: the backfile database (Figure 1), which is expanded from case to case, and the current INPADOC database (Version A, Figure 2), which is constantly updated. The use of these two databases is possible according to the following search criteria: the priority data, that is, the country, date, and number for the *Patent Family Service* (Figure 3); the IPC for the *Patent Classification Service* (Figure 4); the name of the applicant, or a corresponding standard in the case of more important applicants, for the *Patent Applicant Service* (Figure 5); the name of the inventor for the *Patent* Inventor *Service* (Figure 6); and the publication data, that is, the country of publication, the date, and the document number, for the *Numerical Database* (NDB) (Figure 7).

INPADOC's customers can obtain information either by making an individual request by telephone, by telex, or by letter, or by subscribing to the various subscription services. As far as individual queries about patent families (IRF-Individual Request for Family) are concerned, a direct-access data system is used for processing individual requests for patent families. The patent family is determined on the basis of the priority country, the priority application date, and the priority number. Therefore those corresponding patents can also be found which carry an applicant name different from that of the priority applicant. For corresponding patents filed in a foreign country without Union priority being claimed, the following search criteria can also be used: name of the applicant, name of the inventor, and corresponding IPC. In addition, for every patent applicant, every inventor, and every IPC, INPADOC can supply lists or COM microfiche giving the corresponding patent publications. They contain all bibliographic data. Taking into account INPADOC's worldwide data coverage, such data lists according to name of applicant, name of inventor, or IPC class or subclass or classification down to the subgroup level have not been provided at all so far at comparable cost. Processing an individual request takes one or two workdays, but in urgent cases the information can be supplied immediately by telephone or by telex.

In addition to these individual request services, which are available to all enterprises and individual users including nonsubscribers, there are the subscription services. Among these services, the INPADOC Patent Gazette (IPG) should be first mentioned, because it offers new possibilities of patent surveying hitherto almost not feasible. In its structure and basic idea, the INPADOC Patent Gazette is the equivalent of a national patent gazette. Contrary to the latter, though, it gives a simultaneous survey of patent documents from 45 countries. It is published weekly on COM microfiche. Each weekly delivery contains the data of the patent documents added to the INPADOC database in the preceding week. The IPG is composed of three parts: a classification part, SCS (Figure 8); an applicant part, SAS (Figure 9); and a numerical part, SNS (Figure 10).

In the classification part, documents are listed not only in their main citation, but also in all other classifications indicated on the document. This assures the user of a high probability of covering all documents of interest. A further advantage of the IPG is the simultaneous listing of all equivalences, or patent family members, stored in the INPADOC database. Thus, if a user surveying a particular field finds one of the newly received documents difficult or impossible to read in the original language, he can gain immediate access to its contents via the indication of an equivalent document. This saves translation costs and makes it possible to obtain information about all other countries where a patent for the invention concerned has been applied for. The applicant part

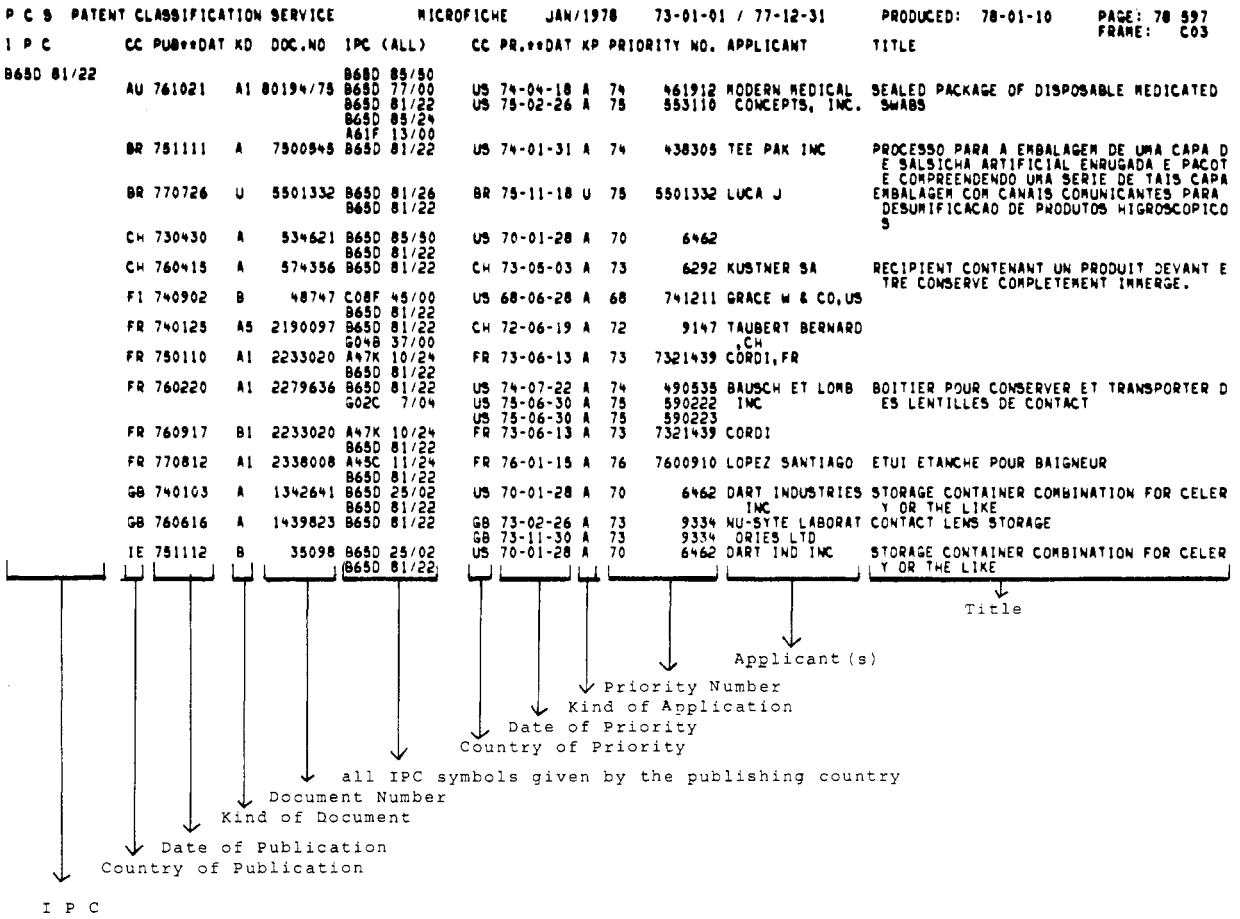

Figure 4. Example of a Patent Classification Service.

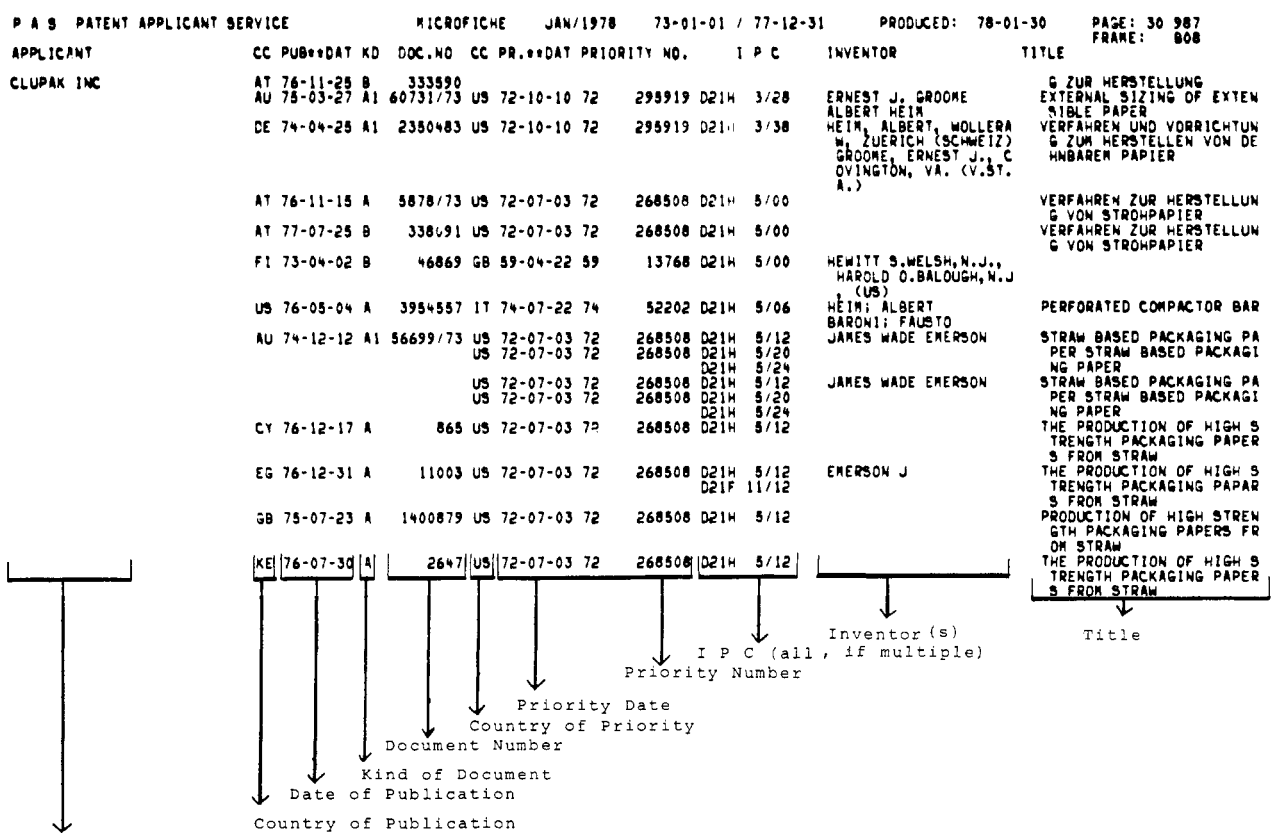

Figure 5. Example of a Patent Applicant Service.

P I S PATENT INVENTOR SERVICE MICROFICHE JAN/1978 73-01-01 / 77-12-31 PRODUCED: 78-01-26 PAGE: 29 707 FRAME: G01

INVENTOR	CC PUB**DAT KD	DOC.NO	CC PR.**DAT	PRIORITY NO.	I P C	APPLICANT	TITLE
DOLBY RAY MILTON	US 76-07-27 A	3972010	US 66-08-02 66 GB 68-01-10 68	569615 1540			
	DE 74-01-10 A1	2332316	GB 72-06-29 72	30541	H04B 3/36	DOLBY LABORATORIES IN C., NEW YORK, N.Y. (V.ST.A.)	AUSGANGSSCHALTUNG UND VE RFAHREN ZU IHRER ANWEND UNG
	DE 74-10-17 A1	2413799	GB 73-03-23 73	14272	H04B 15/00	DOLBY LABORATORIES IN C., NEW YORK, N.Y. (V.ST.A.)	SCHALTUNGSANORDNUNG ZUR STOERGERAEUSCHVERMINDER UNG
	DE 74-02-14 C2	1299689	US 58-06-02 58	739051	H04N 5/78	AMPEX CORP., REDWOOD CITY, CALIF. (V.ST.A .)	SYSTEM ZUR WIEDERGABE MA GNETISCH AUFGEZEICHNETE R FARBFERNSEHSIGNALE
	DE 75-12-04 B2	1412010	US 58-05-19 58	736239	H04N 5/795	AMPEX CORP., REDWOOD CITY, CALIF. (V.ST.A .)	SIGNALVERARBEITUNGSEINRI CHTUNG FUER DIE WIEDERG ABE EINES AUF MAGNETBAN D AUFGEZEICHNETEN ZUSAM MENGESETZTEN VIDEOSIGNA LS
	DE 76-07-08 C3	1412010	US 58-05-19 58	736239	H04N 5/795	AMPEX CORP., REDWOOD CITY, CALIF. (V.ST.A .)	SIGNALVERARBEITUNGSEINRI CHTUNG FUER DIE WIEDERG ABE EINES AUF MAGNETBAN D AUFGEZEICHNETEN ZUSAM MENGESETZTEN VIDEOSIGNA LS
	US 77-05-17 A	4024344	GB 74-11-16 74	49724	H04R 5/00	DOLBY LABORATORIES, I NC.	CENTER CHANNEL DERIVATIO N FOR STEREOPHONIC CINE MA SOUND
	DE 76-05-20 A1	2551326	GB 74-11-16 74	49724	H04R 5/04	DOLBY LABORATORIES IN C., NEW YORK, N.Y. (V.ST.A.)	SCHALTUNGSANORDNUNG ZUR ABLEITUNG EINES MITTELK ANALSIGNALES FUER STERE OFONE TONWIEDERGABEANLA GEN

INVENTOR
Date of Publication
Country of Publication
Kind of Document
Document Number
Country of Priority
Priority Date
Priority Number
I P C (all, if multiple)
Applicant(s)
Title

Figure 6. Example of a Patent Inventor Service.

N D B NUMERICAL DATA BASE MICROFICHE JAN/1978 73-01-01 / 77-12-31 PRODUCED: 78-01-15 PAGE:261 815 FRAME: J16

CC	DOC.NO	KD	PUB**DAT	APP**DAT	KA	APPLIC. NO.	CC	PR.**DAT	KP	PRIORITY NO.	I P C	APPLICANT	INVENTOR	TITLE
US	4056834	A	77-11-01	76-05-20	A	76 688288	JP	75-05-26	A	75 63186	G11B 15/66 G11B 23/04	MATSUSHITA ELEC TRIC INDUSTRIA L CO., LTD.	HIROYASU; MAMOR U	MAGNETIC VIDEO RECORDER AND C ASSETTE PROVID ING TAPE LOADI NG
US	4056835	A	77-11-01	76-04-20	A	76 678596	US	76-04-20	A	76 678596	G11B 21/22 G11B 15/04 G11B 5/12	DICTAPHONE CORP ORATION	WHITNEY; JAMES C. CIARALDI; ANTHO NY	HEAD SUPPORT AN D EJECT MECHAN ISM FOR RECORD ING AND/OR PLA YBACK APPARATU S
US	4056836	A	77-11-01	76-03-23	A	76 669553	US	76-03-23	A	76 669553	H02H 7/22	HUGHES AIRCRAFT COMPANY	KNAUER; WOLFGAN G	METHOD AND APPA RATUS FOR INTE RRUPTING LARGE CURRENT
US	4056837	A	77-11-01	75-10-24	A	75 625615	US	75-10-24	A	75 625615	H02H 3/28	WESTINGHOUSE EL ECTRIC CORPORA TION	MISENCIK; JOHN J. ZAKRZEWSKI; GAR Y S.	GROUND FAULT CI RCUIT INTERRUP TER WITH TRIP LEVEL ADJUSTME NT
US	4056838	A	77-11-01	76-09-20	A	76 725067	US	76-09-20	A	76 725067	H02H 3/26	WESTINGHOUSE EL ECTRIC CORPORA TION	LEIB; MICHAEL J .	IN-BAND SIGNAL-TO-NOISE RATIO MONITOR FOR A N FSK RELAYING SYSTEM

Document Number
Country of Publication
Kind of Document
Publication Date
Application Date
Kind of Application
Application Number
Country of Priority
Priority Date
Kind of Priority
Priority Number
I P C
Applicant(s)
Inventor(s)
Title

Figure 7. Example of a Numerical Database.

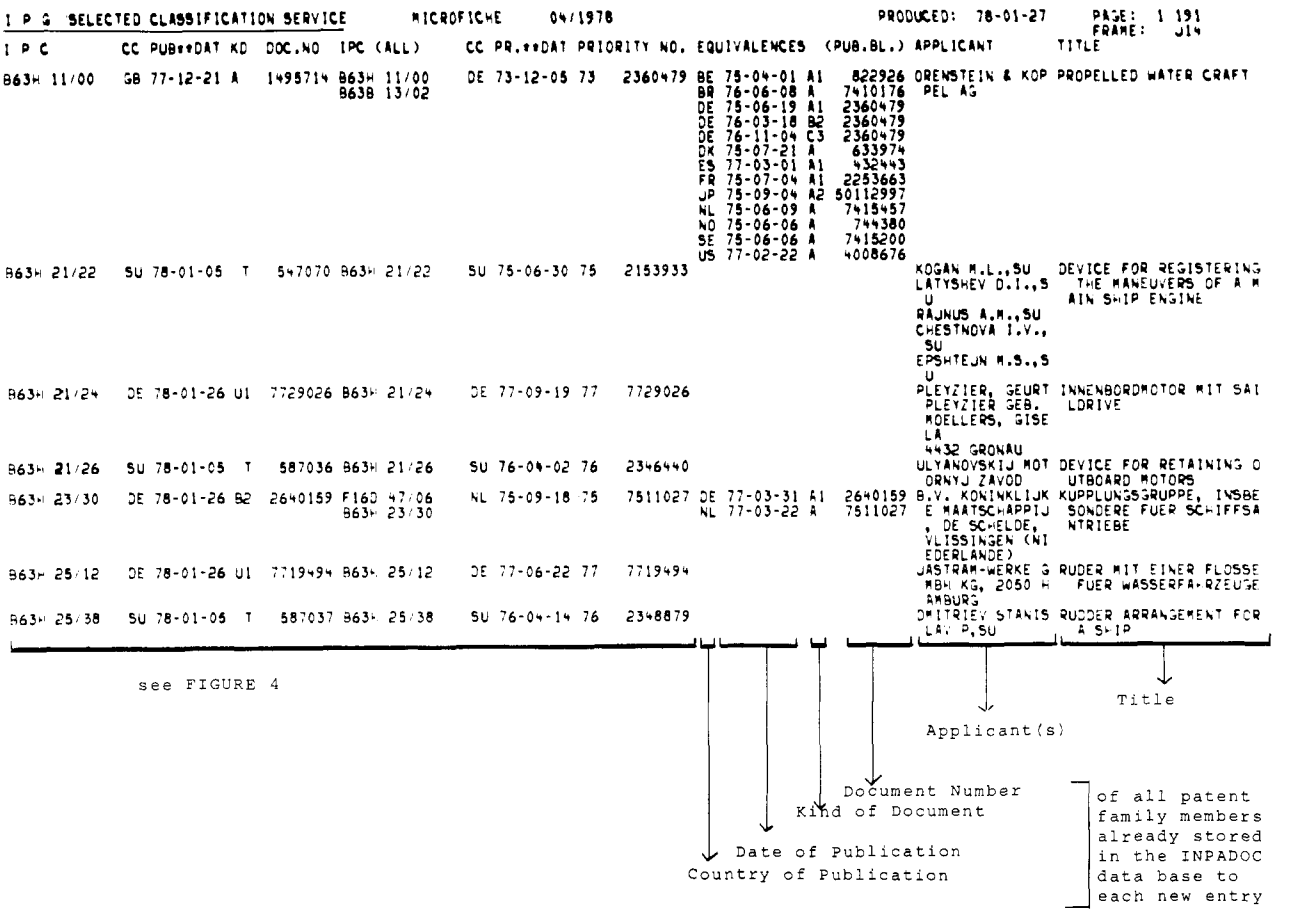

Figure 8. IPG Selected Classification Service.

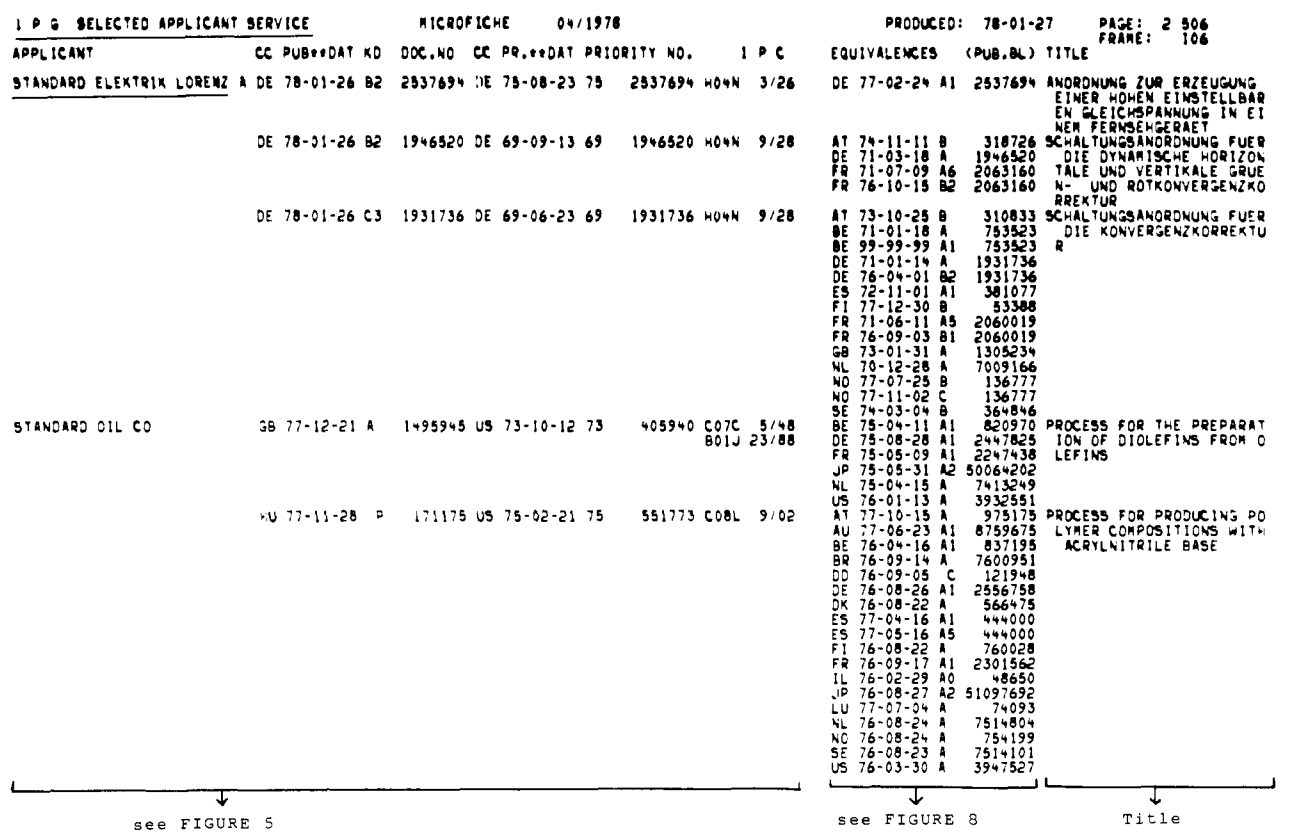

Figure 9. IPG Selected Applicant Service.

of the IPG is extremely useful for surveying the application activities of a particular applicant or competitor in the market. The numerical part gives access to every document solely by way of its number.

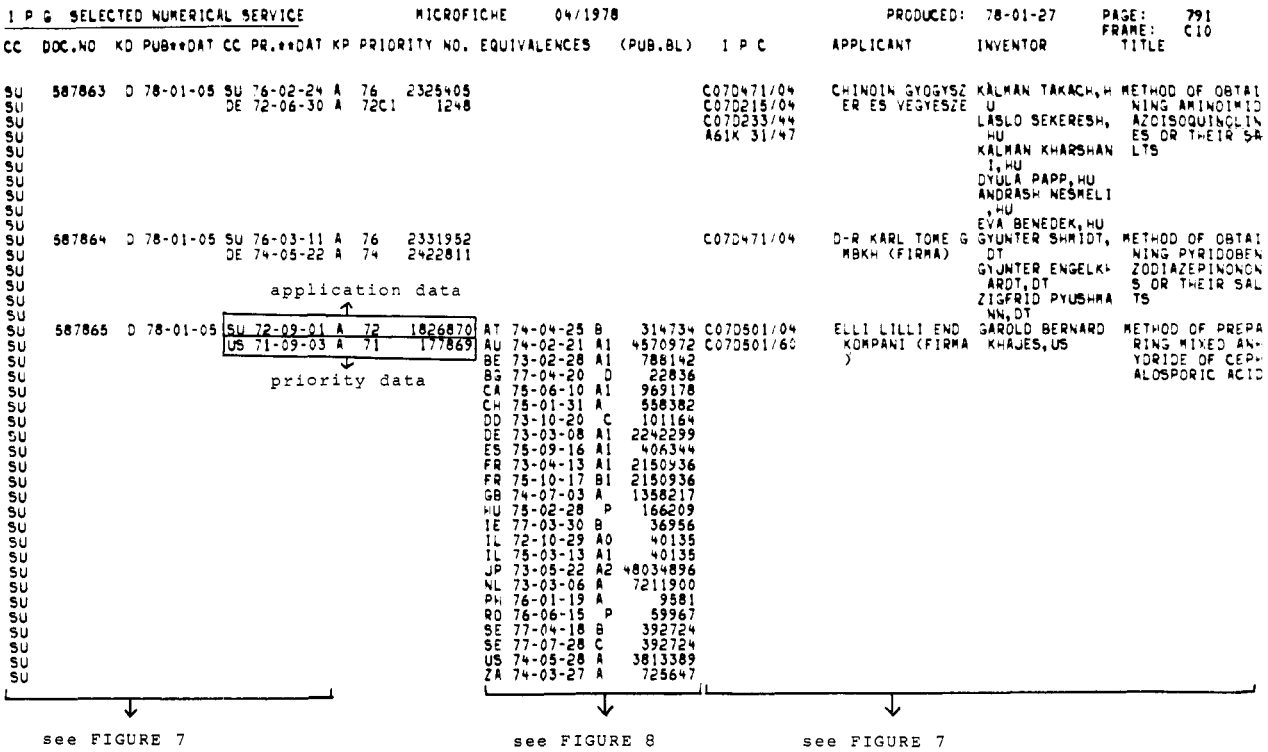

Figure 10. IPG Selected Numerical Service.

The three parts of the IPG are complemented by corresponding cumulated index services. These are the Patent Classification Service, the Patent Applicant Service, the Patent Inventor Service, and the Numerical Database. These index services are published every three months. Each new issue published in the same calendar year contains all the data received by INPADOC since the latest January issue in cumulated form. The January issue of the following year covers all the data of the preceding year in a uniform cumulation with the data of the previous years up to a period of five years.

The Patent Family Service (PFS) combines the individual documents on the basis of common priority claims. It is produced on COM microfiche in issues accumulated monthly (January, January to February, January to March, etc.) and, at the beginning of the year, accumulated over the previous years up to a period of five years per issue. A complete listing of patent families from INPADOC's entire data stock is made possible by this service. A subscription to the INPADOC Family Data Tape (IFD) is also possible for enterprises wishing to conduct a computer survey of the patent documents published in the 45 countries.

INPADOC also runs a *copy service* so that complete copies of patent documents found by means of the bibliographic data can also be supplied. The service offers paper copies of documents from a collection of patent documents of 23 countries that is complete to a great extent as well as microfilm copies of the patent documents of 19 countries. These services are complemented by special services, in particular those covering Japanese documents (translations, searches, file histories). All of these services can be supplied by INPADOC's general agent in the United States:

IFI Plenum Data Company
Mr. Harry Allcock, Vice President
Crystal Plaza One, Suite 1100
2001 Jefferson Davis Highway
Arlington, Virginia 22202
Telephone: (703) 521-1140
Cable Address "UNITERM"
Telex: 0899278

and in Europe by:

INPADOC
Möllwaldplatz 4
A-1040 Vienna, Austria
Telephone: (0222) 65 87 84
Telex: 07-6337

In the past five years the cooperation of the patent offices, which is the basis of all INPADOC efforts, has created a worldwide network. The patent offices are the sources as well as the users of a steady flow of information concentrated in the Vienna center. But this system is now also used broadly in research centers in companies over the world.

In the near future, INPADOC plans to provide access to the database via on-line data networks. However, past experience has shown that it is also necessary to continue and even to increase the output by microfiche as well as to update them. It is this combination of on-line and microfiche that gives the users the most efficient access to the database. Moreover, INPADOC intends to introduce an individual request service and a subscription service supplying interested customers with paper printouts from the database according to specific customer profiles. Thus INPADOC will offer its customers and potential prospects all desirable possibilities of best using this comprehensive patent database.