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Formulation of Kernel Terms for a Subject and Isolate Terms for a Classification Schedule for Use in the Synthesis of Class Number by Computer.

(Non-conventional methods in document retrieval. 9).

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[Compares the procedure for the synthesis of Class Number by the conventional method with the one using a general purpose computer. Suggests modified postulational method for the formulation of Kernel Terms. Discusses several problems in the Verbal Plane in naming the isolates in a classification schedule and the kernel ideas in a subject which may lead to homonym in Class Number. Gives some guidelines for the structuring of Kernal Terms and Isolate Terms to ensure a correct matching between such terms denoting one and the same idea.]

ABBREVIATIONS USED:

(ACI)	= Anteriorising Common Isolate	(CI)	= Common Isolate
(AD)	= Alphabetical Device	(END)	= Environment Device
(BCN)	= Basic Class Number	(GD)	= Geographical Divice
(BS)	= Basic Subject	(IN)	= Isolate Number
CC	= Colon Classification	(IT)	= Isolate Term
(CD)	= Chronological Device	(KT)	= Kernel Term
		(ND)	= Numerical Device
		(CN)	= Class Number

1 Introduction

11 GENERAL SCOPE OF THE PAPER

In an earlier paper (5) a step-by-step procedure and flow chart for the synthesis of (CN) according to a depth version of CC, for a subject going with a particular (BS) with the aid of a

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computer, were given. In synthesising (CN) with the aid of computer the helpfulness of using a freely faceted version of CC was also pointed out. In the project reported in this paper, and other papers to be published in the series on synthesis of (CN) with the aid of computer, the earlier work has been extended and modified to facilitate the selection by computer of a (BCN) and appropriate (IN) in the formation of (CN) for a subject going with the (BS) represented by that (BCN). Programs have also been drawn up to synthesise (CN) by computer using the different devices prescribed by CC — Alphabetical Device, Numerical Device, Environment Device, Geographical Device, and Chronological Device. The work on the use of Subject Device, (ACI), and the Phase Device will be reported in later papers.

12 Specific Scope

In the earlier paper the provision of an "inverted schedule" for use by the computer in synthesising (CN) has been suggested (6). The layout of the different schedules for the classification of subjects going with a particular (BS) according to the Facet Structure sequence, — that is, Personality, Matter, Energy, Space, and Time with the appropriate Rounds and Levels — was found helpful. The (IN) and (BCN) are assembled in the sequence in which they are picked up from the schedules. The resulting sequence of the components of the (CN) is in accordance with the guiding principles and postulates used by CC, although the (KT) are given in random sequence. The present paper deals essentially with the problems arising in the formulation of the (IT) in the schedule and the (KT) for a given subject. Such problems in the case of (IN) to be derived through the use of the devices prescribed by CC are also dealt with.

To facilitate understanding the discussions in the later sections of this paper, Sec 2 mentions the parts of the Schedule-on-Tape and the general procedure adopted for constructing (CN) using computer. Sec 3 describes in some detail the formulation of (KT) for a subject according to a modified Postulational Method.

2 Methodology

21 Schedule-on-Tape

The Schedule-on-Tape is in three parts.

1 Schedule of Main Subjects and (BS), called BS-schedule;

2 Schedule of Special Isolates for subjects going with each of the (BS), called SpI-schedule; and

3 Schedule of Common Isolates, called CI-schedule.

22 General Procedure for Constructing (CN)

221 *Conventional Method*

In formulating the sequence of computer operations in synthesising (CN), we have tried to analyse and follow closely the procedure conventionally adopted by the classifier in using the schedules of CC for classifying a subject. The classifier's procedure consists essentially of the following steps:

1 Facet analysis of the subject to be classified using the Postulational Method — that is, according to explicitly stated postulates and guiding principles (*See* Sec 3).

2 Consulting the CC Schedules to pick out the appropriate (BCN) and (IN). This usually involves the following sequence of operations:

21 Scanning the schedule of (BS);

22 Matching the (KT) denoting the (BS) idea with the name of a (BS) — that is, (BS) Term — given in the schedule of (BS);

23 Picking up the (BCN) from the schedule given against the (BS) Term that matches;

24 Proceeding to the schedule of Special Isolates for subjects going with that particular (BS);

Note.— This schedule is identified by the (BCN) and its name in natural language given at the head of the schedule.

25 Scanning through this schedule of Special Isolates and matching each of the (IT) with each of the given (KT);

26 Picking up the (IN) from the schedule given against each (IT) which match with a (KT);

27 Forming the (IN) using the appropriate device, wherever such instruction is given in the schedule; and

28 Wherever necessary scanning the appropriate schedule of Common Isolates and picking up the (IN) for the (KT) matching with an (IT) in that schedule,

3 Synthesising the (CN) by assembling the (BCN) and (IN) on the basis of the appropriate rules of CC.

222 *Using Computer*

The (KT) denoting the Kernel Ideas in the subject of the document or the query as the case may be, are given to the computer in random sequence. The computer begins the search first in the BS-schedule. Each of the (BS) Terms is compared with each of the given (KT). When a (BS) Term matches with a (KT), the machine picks up the (BCN) given in the schedule against the (BS) Term.

The machine then proceeds to the next part of the schedule — the SpI-schedule. With the aid of the (BCN) given at

the beginning of the schedule, it identifies the schedule for the subjects going with the particular (BC) for which the number was picked up in the earlier step. Each of the (IT) in the SpI-schedule is compared with each of the given (KT). When a match between an (IT) and a (KT) is established, the (IN) given against the (IT) is picked up. In this way the (IN) corresponding to each of the (KT) available in the SpI-schedule are picked up. They are simultaneously assembled one after the other with the (BCN) to form the (CN). It may be mentioned here that each (IN) in the schedule will have the appropriate Connecting Digit prefixed to it (7).

223 *Non-matching* (KT)

In doing the steps mentioned in the preceeding section, some (KT) may not match with any of the (IT) in the SpI-schedule for the particular (BS). Such a (KT) may represent either

1 An Isolate Idea deemed to be a manifestation of the Fundamental Category Space; or

2 An Isolate Idea deemed to be manifestation of the Fundamental Category Time; or

3 An Isolate to be derived by using one or the other of the devices prescribed by CC; or

4 A Basic Subject Idea or an Isolate Idea not included in the schedule.

224 *Space and Time Isolates*

The computer program provides for automatic search in the CI-schedule after the search in the BS-schedule and SpI-schedule is completed. In the CI-schedule the following sub-schedule of isolates are given with a suitable heading symbol:

Heading Symbol	Schedule of
EI	Common Energy Isolates
LI	Language Isolates
EN	Environment Isolates
SI	Space Isolates
TI	Time Isolates

Thus, if there is an isolate deemed to be manifestation of Space or of Time (for which (IN) is not found in the SpI-sche-

dule), the number for it will automatically be picked up in the schedules in the CI-schedule with the heading symbol "SI" or "TI" as the case may be.

The procedure and problems connected with the synthesis of (IN) according to a device are discussed in Sec 7 and its subdivisions.

3 Formulation of Kernel Terms

31 Modified Postulational Method

The first step in the formulation of (KT) for a subject is facet analysis of the subject to determine the Kernel Ideas according to explicitly stated postulates and guiding principles (13). The method, usually called Postulational Method, was used with modification.

311 *Step 0: Raw Title*

If there is already a title for the document, it may be used as the starting point — that is, as the Raw Title. If a section of a document is classified, it may not have a title. In such a case, we may begin with Step 1, the formulation of the Expressive Title.

312 *Step 1: Expressive Title*

The document is studied to select the Kernel Ideas. The (BS) with which the subject of the document may be deemed to go, is to be determined if not already evident from the terms in the Raw Title. Each of the Derived Composite Ideas, if any, is to be broken down into the respective Fundamental Constituent Ideas. The combination of the (BS) and the other Kernel Ideas thus selected should represent co-extensively the subjects dealt with in the document. If the subject is a multifocal one, it should preferably be broken up into the appropriate component compound subjects (1). The result of the work in this step will be an Expressive Title. A multi-focal subject may give rise to more than one Expressive Title.

313 *Step 2: Kernel Title*

The auxiliary and apparatus words in the Expressive Title are to be dropped, leaving the (KT) alone. The result of the work done in this step will be a Kernel Title.

314 *Step 3: Title in Standard Terms*

Each of the (KT) in the Kernel Title should be in standard current terminology. It is expected that such terminology will have been used for naming the isolates in the schedule used for classifying the documents. Therefore, the term from the schedule

can be used to replace any non-standard term in the Kernel Title. A suitable thesaurus can be of help in this connection (*See also* Sec 53). The result of the work done in this step will be a Title in Standard Terms.

32 EXAMPLE

321 *Step 0: Raw Title*

New methods of pen assembly.

322 *Step 1: Expressive Title*

Automatic assembly of Pilot brand fountain pens with fine point nib, 2 ml capacity plastic barrel, and gold cap.

323 *Step 2: Kernel Title*

Automatic. Assembly. Pilot brand. Fountain pen. Fine point nib. Plastic barrel. 2 ml barrel capacity. Gold cap.

324 *Step 3: Title in Standard Terms*

Assembly. Automatic. Fountain pen. Pen brand: Pilot. Fine point nib. Plastic barrel. Barrel capacity: 2. Gold cap.

4 Problems in Verbal Plane

41 CORRECT MATCHING

To synthesise the (CN) for a subject going with a (BS), the (KT) representing the (BS) and other isolate ideas going with it, are given to the computer in random sequence. The machine compares each of the terms in the BS-schedule, and the appropriate SpI-schedules with each of the (KT) (*See* Sec 222). When a (KT) correctly matches with a term in the schedule, it will pick up the number — (BCN) or (IN) as the case may be — given against the term in the schedule. Therefore, the correct matching of each (KT) with the corresponding term in the schedule denoting the same idea, is essential. Variations in spelling, use of singular and plural forms, grammatical and morphological variations between the (KT) and term in the schedule are some of the problems requiring attention.

42 HOMONYM

421 (BS) *Term and* (ACI) *Term*

Consider the (KT):

History. India. Education.

The terms 'History' and 'Education' can both occur in the schedule of (BS) in CC. If the (BCN) for 'Education' alone is to be selected by the computer from the BS-schedule, then it should be prevented from picking out the number given against History' in the same schedule. Further, it should be made to

pick out the number for 'History' from some other schedule, say, the schedule of (ACI).

Such a conflict between a (BS) Term and an (ACI) Term has already been recognised in the conevntional method of constructing (CN) (3). Such a conflict must be avoided.

422 *Special Isolate Term and* (ACI) *Term*

Consider the (KT):

Education. Biology. Teaching technique. Case study.

Taking the (KT) together in the facet structure sequence given below, two different (CN) can be constructed:

T;3(G)y7 = Education, Teaching technique, = T;3(G)-7
Biology, Case study

The two (CN) actually represent two different subjects. Such a homonym must be avoided.

423 *Special Isolate Term and Posteriorising* (CI) *Term*

Consider the (KT):

India. Pilot brand. Fountain pen production.

Taking the (KT) together in the facet structure sequence given below, two different (CN) can be constructed.

MP85,ZPI-Z44 = Fountain pen production, = MP85,ZPI.
44 Pilot brand, India

The two (CN) actually represent two different subjects. Such a homonym must be avoided.

424 *Special Isolates for Subjects going with a* (BS)

The following pairs of (CN), each constructed on the basis of one and the same group of (KT), give rise to homonyms (4). The (CN) are based on the available scheme for the classification of subjects going with the Host Subject 'Diesel Engine Production engineering'.

SN	Class Number	Kernel Terms	Class Number
1	D8,9L22,025:82	= Commodity Production engineering, Diesel engine, Tank, Maintenance	= D8,9L22-(c8): 82
2	D8,9L22-(c2-3): 7	= Commodity Production engineering, Diesel engine, Truck, Medium size, Assembly	= D8,9L22-(c2)-Z9c: 7

5 Correct Matching

51 Single-worded (KT)

1 In a single-worded (KT) the full word, and not merely a part of it, should match with the term in the schedules denoting the same idea. Consider for example, the two (KT) 'Determinant and Determination'. It will not be sufficient if the first nine characters in the terms match with each other. The first term occurs in the schedule of (BS), whereas the second term occurs in the schedule of Common Energy Isolates.

2 The spelling of the (KT) and the term in the schedule denoting the same idea should also match. Consider for example, the two spellings 'Color' and 'Colour' for one and the same word.

3 There should also be no morphological or grammatical variation between the (KT) and the term in the schedule denoting the same idea.

52 Multi-worded (KT)

In the case of a multi-worded (KT)

1 Each word in the term should satisfy the conditions mentioned in categories 1 to 3 in Sec 51; and

2 The sequence of the words in the term in the schedule should match that of the words in the (KT). For example, if an (IT) in the schedule for classification of subjects going with the (BS) Fountain Pen Production is given as 'GOLD CAP' then the (KT) used to express the same idea should be GOLD CAP' and not 'CAP OF GOLD' or 'CAP: GOLD or GOLDEN CAP

53 Aids in Minimising Variation

To minimise the chances of variation between the (KT) and the term used in the schedule to denote the same idea, some of the guiding principles for the formulation of the Heading in a Class Index Entry (9) can be used with advantage.

531 *Nominative Case, Singular Form*

It has been found helpful to give each (KT) and each (IT) in the nominative case, singular form as far as practicable.

532 *Use of Term given in the Schedule*

In doing facet analysis according to the Postulational Method the Classifier is recommended to refer to the appropriate schedules in the scheme for classification used in formulating the Title in Standard Terms.

533 *Use of Thesaurus*

The use of a suitable thesaurus in arriving at a Standard Term for use in the schedule and to denote the same idea in a (KT) is now widely practised.

534 *Canon of Context not Used*

In a conventional schedule the full name of an isolate, particularly if it is a multi-worded one, may not be given. Some words may be omitted. Using the Canon of Context the classifier determines the full (IT) and what it denotes. Terms in the name of the characteristic on the basis of which the isolate concerned is derived may be used for this purpose. In preparing the schedule for use by the computer, it has been found more convenient, for the time being, to give the full name of the isolate in the schedule, instead of depending on the Canon of Context.

Here is an example from the schedule for the classification of subjects going with the (BS) Fountain Pen Production.

Conventional	for Computer
By Material of Feeder	Material of Feeder
Metal	Metal feeder
Bronze	Bronze feeder
Brass	Brass feeder
Stainless steel	Stainless steel feeder
Non-metal	Non-metal feeder
Glass	Glass feeder
Plastics	Plastics feeder
Bakelite	Bakelite feeder
Hard rubber	Hard rubber feeder
Horn	Horn feeder

This helps to avoid homonym. For instance, names of materials such as bronze, brass, stainless steel, glass, plastics, and hard rubber are applicable to the material of which the neck of the pen, barrel of the pen, and cap of the pen, is made. Therefore, each of these terms may appear in different parts of the schedule. To avoid the computer picking out the number against the wrong (IT), the name of the isolate is given in full.

Thus

Plastics feeder.	Plastics barrel.
Plastic neck.	Plastics cap.

Obviously, for correct matching, the (KT) should also be given in full as the corresponding (IT) in the schedule.

54/58 Homonym

54 RECOGNITION OF THE POSSIBILITY

To avoid the possibility of two different (CN) being constructed on the basis of one and the same group of (KT), it is

essential, in the first place, to recognise such a possibility and examine the different situations in which it arises. A few such cases have been recognised in the conventional way of synthesising (CN) (3). Some examples are given in Sec 42 and its subdivisions. The problems can be resolved to a very large extent if care is taken in the naming the isolates in the schedule and the Kernel Ideas.

55 (BS) TERM AND (ACI) TERM

The possible conflict between a (BS) Term and an (ACI) Term has been pointed out in Sec 421, with an example.

551 *Solution* 1

One possible approach to a solution is as follows: At the time of formulating the (KT) for a subject, it is possible for the classifier to distinguish the (BS) Term from the (ACI) Term when both of them occur concurrently. The latter can then be marked off with an appropriate suffix such as "(ACI)". Thus the (KT) mentioned in Sec 421 may be formulated as:

History (ACI). India. Education.

Then, there will be no term in the BS-schedule that will match with the (KT) 'History (ACI)'. Further, the suffix can be used as a means to direct the computer to look for the isolate matching with History (ACI)' in the schedule of (ACI).

552 *Solution* 2

Another possible approach to a solution is as follows:

For the example given in Sec 421, let the computer pick up the (BCN) for 'Education' as well as for 'History' from the BS-schedule. Let it then check up the SpI-schedule for 'History' to pick out the (IN) for the remaining (KT) — in this case 'Teaching Technique'. There will be no matching (IT) in this SpI-schedule. The computer can then check up the SpI-schedule for 'Education'. There will be an (IT) matching the (KT) 'Teaching Technique'. The corresponding (IN) will be picked up and the synthesis of (CN) can be done.

This kind of learning process is a fairly common experience when a beginner classifies documents. However, the first solution is simpler, unambiguous, and safer.

56 SPECIAL ISOLATE TERM AND (ACI) TERM

The possible conflict between a Special Isolate Term in the schedule for the classification of subjects going with a particular (BS) and an (ACI) Term has been pointed out in Sec 422, with an example.

The (IN) "7" in the (CN) T;3(G)–7 denotes "Case study

method" of teaching. Therefore, while formulating the (KT) for the subject the full (KT) "Case study method" could be used in this case. This will be in conformity with the guideline mentioned in Sec 534 — that is, not to use the Canon of Context but to use the full name of the isolate. Obviously, it is presumed that in the schedule for the classification of subjects going with the (BS) Education, the corresponding (IT) will be given as "Case study method".

"The (IN) "y7" in the (CN) T;3(G)y7 denotes the (ACI) "Case study". Although there is practically no likelihood of any conflict of this term with a term in the schedule of (BS), it would be safer and helpful to formulate the (KT) as "Case study (ACI)", as has already been mentioned in Sec 551.

57 SPECIAL ISOLATE TERM AND POSTERIORISING (CI) TERM

The possible conflict between a Special Isolate Term in the schedule for the classification of subjects going with a particular (BS) and a Posteriorising (CI) Term has been pointed out in Sec 423, with an example.

The (IN) "Z44" in the (CN) MP85,ZPI–Z44 denotes "India make"; whereas the (IN) "44" in the (CN) "MP85, ZPI.44" denotes the Geographical Isolate "India". Therefore, following the guideline mentioned in Sec 534, the (KT) in the former case could be given in full — that is, as "India make" instead of "India" alone. It is again presumed that in the schedule for the classification of subjects going with the (BS) Fountain Pen Production the (IT) 'India make' is ued. (*See also* Sec 76).

58 SPECIAL ISOLATES FOR SUBJECTS GOING WITH A (BS)

581 *Helpful Sequence of Search*

In the particular methodology adopted in our work, the computer is programmed to first search in the schedule of (BS) to pick out the appropriate (BCN) by matching the appropriate (KT) with a (BS) Term. It then searches *only* in the schedule of Special Isolates for the classification of subjects going with that particular (BS) in order to pick out the appropriate (IN). That is, searching in the schedules of Special Isolates for subjects going with other (BS) is avoided. This reduces to a considerable extent the possibility of matching a (KT) with an (IT) in a schedule for subjects going with a (BS) different from that desired. In turn, the occurrence of homonym among Special Isolates in the schedules for subjects going with different (BS) is avoided. However, as pointed out in Sec 424, there can still be a few cases of conflict among Special Isolates for subjects going with one and the same (BS).

582 *Different Ideas Denoted by an* (IN)

Consider Example 1 given in the table in Sec 424. In the group of (KT) given therein, — Commodity production engineering, Diesel engine, Tank, Maintenance — the (1T) 'Tank' can denote two different ideas in the subjects going with the Host Subject Diesel Engine Production. These are distinguished in the (CN). In the (CN) D8.9L22,025: 82, the (IN) "025" denotes "Tank" as an organ of the diesel engine; on the other hand, in the (CN) D8.9L22-(c8);82, the (IN) "(c8)" denotes "Tank" as the Vehicle or Carrier in which the diesel engine is used. The two isolate ideas can, therefore, be distinguished by using the full name in the (KT). For example, in the latter case, taking a suitable term from the name of the characteristic on the basis of which the isolate is derived, we may formulate the (KT) as Tank Vehicle" instead of merely as "Tank". This will be in conformity with the guideline mentioned in Sec 534.

583 *Qualifier to Different Isolates*

Consider Example 2 in the table in Sec 424. In the (CN) D8.9L22-(c2-3): 7, the (IN) "(c2-3)" denotes "Medium size truck" for which the diesel engine is used. This means the idea denoted by the term "Medium size" is a qualifier to the isolate idea denoted by the term "Truck". In the (CN) D8.9L22-(c2)-Z9c: 7, the (IN) "(c2)" denotes the isolate idea "Truck" for which the diesel engine is used; and the (IN) "Z9c" denotes the isolate idea "Medium size engine". Here "Medium size" is a qualifier to the isolate "Engine". Thus, the conflict can again be resolved by using the full name for the isolate in the respective schedules. The respective (KT) will also be formulated accordingly. For example,

By Purpose
By Vehicle
By Size
Small size vehicle
Medium size vehicle
Large size vehicle
By Kind
Motor car
Truck

By Size of engine
Small size engine
Medium size engine
Large size engine

This is in conformity with the guideline mentioned in Sec 534.

6/7 DEVICES FOR FORMING (IN)

6 Use of Device

61 HELPFULNESS

CC has prescribed different devices to form (IN). These

devices help to

1 Increase productivity in the design and development of a scheme for classification;

2 Shorten the schedules to a considerable extent;

3 Provide hospitality in Array;

4 Provide hospitality in Chain;

5 Give autonomy to the classifier in the construction of Class Numbers;

6 Satisfy the Canon of Consistent Sequence;

7 Satisfy the Canon of Helpful Sequence;

8 Satisfy the Canon of Mnemonics;

9 Satisfy the Principle of Local Variation, wherever applicable; and

10 Generally conform to the Law of Parsimony in the design and development of schemes for classification.

It will, therefore, be helpful if these devices can be used in synthesising (CN) with the aid of computer.

7 Problems in Using Device

71 General

The different problems mentioned in Sec 4 and its sub-divisions and the provisional solutions to each of them given in Sec 5 and its sub-divisions are applicable to the formation of (IN) using the different devices prescribed by CC. These problems are essentially concerned with the formulation of the (IT) and the (KT).

72 Special

In the case of an isolate enumerated in the schedule the computer has to correctly identify the (IT) with the (KT) and then pick up the corresponding (IN) from the schedule. In using a device for forming an (IN) three principlal steps are involved:

1 Identifying the (KT) with an Isolate Term in the schedule which requires the use of a device to form the (IN);

2 Recognising the particular device to be used; and

3 Forming the (IN) according to the rules for using the device.

The verbal plane is involved in Step 1 itself — that is, matching each (KT) with the appropriate (IT). A suitable structuring of the (KT) and the (IT) is important. To facilitate understanding the problem and procedure involved, the use of each of the devices is described in the succeeding sections. For definieness, the schedule for the classification of subjects going with the (BS) Fountain Pen Production is used in giving examples.

73 ALPHABETICAL DEVICE

731 *Rule for Forming* (IN)

Single-worded Name.—The (AD) consists in using the first or the first-two or the first-three etc initial letters (all in Roman capitals) of the name of entity, existential or conceptual, for the formation or subdivision of an isolate.

The (AD) can be conveniently used in respect of proper names, trade names, brand names and certain technical nomenclature. such as the names of genera and species of microorganisms, plants, and animals which are internationally current (12).

Multi-worded Name.— In a multi-worded name, the (AD) is to be applied to each of the component words in the name and the resulting groups of letters in each of them are to be connected by the Connecting Digit "=" (equal to sign) (14).

Examples:

Bacillus cereus	B=C	Black Bird brand BL=B
Bacillus subtilis	B=S	Blue Diamond brand BLU=D
Bacillus subtilsi	C5	Blue Diamond 75 BLU=D=75
B=S=C5		

732 *Occurrence in the Schedule*

The use of (AD) is found helpful to form an (IN) for an isolate derived on the basis of the characteristic 'By Brand'. In the schedule for the subject Fountain Pen Production, this may occur in the form 'By Brand of pen', 'By Brand of nib' etc.

733 *Instruction in Schedule*

In a conventional schedule the instruction to use (AD) may take the form of the following statement:

Fountain Pen
Z By Brand
Note.— To be derived by (AD)
(*Illustrative*)
ZPI Pilot
ZRE Redex

734 *Term in SpI-schedule*

The term used in the SpI-schedule to denote the Quasi Isolate 'By Brand of Pen' is 'PEN BRAND'. Similarly, the term used to represent the Quasi Isolate 'By Brand of nib' is 'NIB BRAND'.

735 *Kernel Term*

In formulating the (KT) to represent a particular "brand name" of pen, the first consideration is that it should match with the (IT) 'PEN BRAND'. However, to form the (IN) the brand

name should also be available to the computer. Let "PILOT" be the brand name. The (KT) is then formulated as "PEN BRAND: PILOT". But the (IT) 'PEN BRAND' will not match fully with the (KT). Only the first two words will match.

736 *Device Symbol*

Against the (IT) the symbol "AD" is placed in a predetermined character position. This serves two purposes. The computer, in scanning the terms in the schedule will first establish a match between the first two words in the (KT) 'PEN BRAND: PILOT' and the (IT) 'PEN BRAND'. Normally, for a non-device isolate as there is no full matching between the (KT) and (IT) the computer will pass on to the next (IT). However, the computer checks all the 44 character positions allotted to each entry in the schedule. For an (IN) to be formed by (AD), it will sense the device symbol "AD" in the character positions 43 and 44. Then it executes a sub-routine to form the (IN) by (AD). Thus the device symbol is helpful as a means to

1 Prevent the machine in skipping to the next (IT) although the (KT) and (IT) do not completely match; and

2 Indicate to the machine the particular sub-routine to be executed in forming the (IN).

737 *Steps in Forming* (IN)

The computer program provides for

1 Selecting the first two letters in the name of the entry concerned — in our example from the brand name "PILOT"; and

2 Adding them to the (IN) given against the (IT) concerned in the SpI-schedule for Fountain Pen Production.

738 *Example*

Isolate: Pilot brand pen

In the SpI-schedule for Fountain Pen Production the entry is given as follows:

−Z PEN BRAND AD

The (KT) is formulated as 'PEN BRAND: PILOT'. The result of using (AD) will be the (IN) −ZPI

In the case of a multi-worded name, the (KT) may be formulated as: 'PEN BRAND: BLACK BIRD'.

The computer program provides for the selection of the first two letters in each of the words in the term, and connecting each group of digits with the Connecting Digit "=".

The result of using (AD) will be the (IN) −ZBL=BI.

74 Numerical Device

741 *Rule for Forming* (IN)

The (ND) consists in using the numbers in Indo-Arabic numerals given as a quantitative measure of an entry, for the formation or subdivision of an isolate. If there are two or more parts in the quantitative measure, indicating a relation similar to that of genus and species, the two parts may be connected by the Connecting Digit "=" (equal to sign) (2).

Example :

Let A represent "Height of door".

Then A4 may represent "4 ft high door"; and

A4=5 may represent "4 ft 5 in high door".

742 *Occurrence in Schedule*

The use of (ND) is found helpful to form (IN) for an isolate involving a quantitative measure. For example, in deriving isolates on the basis of the characteristic "By Capacity of barrel", it will not be necessary to enumerate all the possible quantitative measures of capacity. It is sufficient if suitable instruction is given in the SpI-schedule to add the appropriate number for the capacity to the (IN) in the schedule.

743 *Instruction in schedule*

1 *Simple case.*— In a conventional schedule the instruction to use (ND) may take the form of the following statement:

2Z By Barrel capacity (ml)
Note.— To be derived by (ND).
(Illustrative)

2Z2 2 ml

2Z2=5 2·5 ml

2 *Qualitative and Quantitative Measure.*— The representation in the (CN) of qualitative as well as quantitative measures may be necessary. Documents warrant it. For example, the barrel capacity of pen may be specified in this manner. The entry in the conventional schedule of Special Isolates may then be as follows:

2Z By Barrel capacity (ml)
2ZB Small (0·02 to 1·5 ml)
2ZC Medium (> 1·5 upto 2·5 ml)
2ZE Large (> 2·5 ml)
Note.— If in a document the capacity is specified, the given figure for it is to be added to the (IN) 2ZB, 2ZC, or 2ZE, as the case may be, representing the range in which the given figure for capacity falls, using (ND).
(Illustrative)

2ZC1=8 1·8 ml
2ZE3 3 ml

744 *Term in SpI-schedule*

1 *Simple case.*— The term used in the SpI-schedule to denote the Quasi Isolate "By Capacity of barrel" is 'BARREL CAPACITY'.

2 *Qualitative and Quantitative Measure.*— The term used in the SpI-schedule to denote the different qualitative barrel capacities mentioned in category 2 in Sec 743 may be as follows:

'Barrel capacity small'
'Barrel capacity medium'
'Barrel capacity large'

745 *Kernel Term*

1 *Simple case.*— The structure of the (KT) is similar to that in the case of the brand name. If the Kernel Idea to be represented is "2 ml capacity barrel", then the (KT) is formulated as 'BARREL CAPACITY: 2·'. The problem of matching the (KT) and the (IT) is similar to that in the case of brand name (*See* Sec 735).

2 *Qualitative and Quantitative Measure.*— The structure of the (KT) to represent qualitative and quantitative measure mentioned in Sec 744, category 2 will be as follows:

'Barrel capacity small: 0·8'
'Barrel capacity medium: 1·3'
'Barrel capacity large: 2·8'

3 *Specification of Range.*— In some cases, the range of measure may be given. For example, "Pens with barrel capacity of 1·2 to 3·5 ml". In the conventional method, the notation to indicate the range is $1 \cdot 2 \rightarrow 3 \cdot 5$. However, in the ICL 1903 computer the digit "→" (forward arrow) is not available. Therefore, the digit ">" (greater than) has been used in its place in formulating the (KT). The (KT) for the above example may be formulated as 'Barrel capacity: $1 \cdot 2 > 3 \cdot 5$'. Other examples are

'Barrel capacity small: $0 \cdot 3 > 1 \cdot 2$'
'Barrel capacity medium: $1 \cdot 6 > 2$'
'Barrel capacity large: $2 \cdot 8 > 3 \cdot 5$'

746 *Device Symbol*

Against the (IT), the symbol "ND" is placed in the predetermined character positions 43 and 44. The function of this symbol is similar to that of the symbol "AD" (*See* Sec 736).

747 *Steps in Forming* (IN)

The program provides for the addition of the number for the quantitative measure given in the (KT) to the (IN) given in the SpI-schedule for Fountain Pen Production.

748 *Example*

Isolate: Barrel capacity of pen

In the SpI-schedule for Fountain Pen Production the entry is given as follows:

2Z BARREL CAPACITY ND

The (KT) for quantitative measure will be formulated as

BARREL CAPACITY: 2
BARREL CAPACITY: 2·5
BARREL CAPACITY: 2·8 > 3·5

The result of using (ND) will be the (IN)

−2Z2 when the (KT) is BARREL CAPACITY: 2;
−2Z2=5 when the (KT) is BARREL CAPACITY: 2·5;

and

−2Z2=8>3·5 when the (KT) is BARREL CAPACITY: 2·8 > 3·5

75 ENVIRONMENT DEVICE

751 *Rule for Forming* (IN)

The (END) consists in using the appropriate environment characteristic (as given in the schedule of Common Environment Isolate) for the formation or subdivision of an isolate which is capable of such formation or subdivision, or when the individualisation of the isolates may be made to depend conveniently on the 'Environment' to which the entity concerned is adapted to, or the phenomenon concerned takes place, or one that may be definitely associated in any other manner or for any other purpose.

Examples:

The following are a few isolates occurring in the schedule of Common Environment Isolates (8):

L	Environment	M4	High Pressure	U	Physical feature
M	Physical	M41	Low temperature	UA3	Tropical
M27	Pressure	N	Chemical	UA7	Arctic
M271	Low Pressure	N3	Acidic		

If the (IN) 1 represents "Clothing", then
1UA3 would represent "Clothing for Tropical Environment".

752 *Occurrence in Schedule*

The use of (END) is found helpful to form (IN) for an isolate such as "Pen adapted to tropics" derived on the basis of

a characteristic such as "By Environment to which the pen is adapted".

753 *Instruction in Schedule*

In a conventional schedule the instruction to use (END) may take the form of the following statement:

M By Environment adopted to
Note.— To be derived by (END)
(*Illustrative*)
MUA3 Tropical
MUA7 Arctic

754 *Term in SpI-schedule*

The term used in the SpI-schedule to denote the Quasi Isolate "By Environment adopted to" is 'ENVIRONMENT'

755 *Kernel Term*

The structure of the (KT) is similar to that in the case of the brand name. If the Kernel Idea to be represented is 'Tropical environment', then the (KT) is formulated as 'ENVIRONMENT: TROPICAL'.

756 *Device Symbol*

Against the (IT) the symbol "EN" is placed in the predetermined character positions 43 and 44. The function of this symbol is similar to that of the symbol "AD" (*See* Sec 736),

757 *Steps in Forming* (IN)

The program provides for

1 Matching the (KT) denoting the "Environment" with the appropriate (IT) in the schedule marked "EN" at its beginning — that is, header — in the CI-schedule;

2 Picking up the (IN) given against the matching (IT) in the CI-schedule; and

3 Adding this (IN) to the (IN) given against the (IT) 'Environment' in the SpI-schedule for Fountain Pen Production.

758 *Example*

Isolate: Pen adapted to tropical environment

In the SpI-schedule for Fountain Pen Production the entry is given as follows:

—M ENVIRONMENT EN

The (KT) will be formulated as 'ENVIRONMENT: TROPICAL'. The result of using (END) to form the (IN) for the (KT) 'ENVIRONMENT: TROPICAL' will be the (IN) —MUA3

76 Geographical Device

761 *Rule for Forming* (IN)

The (GD) consists in using the appropriate geographical characteristic (that is, continents, countries, states, districts, etc, as the case may be) for the formation or subdivision of an isolate which is capable of such formation or subdivision, or when the individualisation of an isolate may be made to depend conveniently on the place of origin, or prevalence, or habitation or one that may be definitely associated with the appropriate focus in any other manner or for any other reason (11).

762 *Occurrence in Schedule*

The use of (GD) is found helpful to form an (IN) for an isolate such as "India make pen", and "Japan make nib" derived on the basis of the characteristics "By Make of pen" and "By Make of nib" respectively.

763 *Instruction in Schedule*

In a conventional schedule the instruction to use (GD) may take the form of the following statement:

Fountain pen
Z1 By Make
Note.— To be derived by (GD)
(*Illustrative*)
Z42 Japan
Z44 India

764 *Isolate Term*

The term used in the Spl-schedule to denote the Quasi Isolate "By Make of pen" is 'PEN MAKE'. Similarly, that used to denote "By Make of nib" is 'NIB MAKE'.

765 *Kernel Term*

The structure of the (KT) is similar to that in the case of brand name. If the Kernel Idea to be represented is "Japanese pen", then the (KT) is formulated as 'PEN MAKE: JAPAN'. Similarly, if the Kernel Idea to be represented is "German nib", then the (KT) is formulated as 'NIB MAKE: GERMANY'.

766 *Device Symbol*

Against the (IT) the symbol "SI" is placed in the predetermined character positions 43 and 44. The function of the symbol is similar to that of the symbol "AD" (*See* Sec 736).

767 *Steps in Forming* (IN)

The program provides for

1 Matching the (KT) denoting the "Country of make" with the appropriate (IT) in the schedules marked "SI" at its beginning — that is, header — in the CI-schedule;

2 Picking up the (IN) given against the matching (IT) in the CI-schedule omitting the Connecting Digit "dot" prefixed to it;

3 Adding the remaining group of digits to the (IN) given against the (IT) 'Pen make' or 'Nib make' as the case may be in the SpI-schedule for Fountain Pen Production.

768 *Example*

Isolate: Japan make pen.

In the SpI-schedules for Fountain Pen Production the entry is given as follows:

—Z	PEN MAKE	SI

The (KT) will be formulated as "PEN MAKE: JAPAN". The result of using (GD) to form the (IN) for the (KT) 'PEN MAKE: JAPAN' will be —Z42.

77 CHRONOLOGICAL DEVICE

771 *Rule for Forming* (IN)

The (CD) consists in using the appropriate chronological characteristic for the formation or subdivision of an isolate, capable of chronological formation or subdivision, or when the individualisation of an isolate may be made to depend conveniently on the period of origin or birth or on the year of first investigation, or of discovery or of initiation, or of commencement, or of occurrence, or on the year that may be definitely associated with the isolate in any other manner or for any other reason (10).

The chronological number is to be worked out to the first or first two or first three digits of the year forming the epoch as specified in the respective rules of CC.

Example :

If J	represents	1500 to 1599 AD	then	J5	will represent	1550's
K	„	1600 to 1699 AD	„	K69	„	1969
L	„	1700 to 1889 AD	„	L00	„	1700
M	„	1700 to 1899 AD	„	M95	„	1895
N	„	1900 to 1999 AD	„	N68	„	1968

772 *Occurrence in Schedule*

The use of (CD) is found helpful to form an (IN) for an isolate such as "19th century style pen" and "1960 style pen", each derived on the basis of the characteristic "By Style of pen".

773 *Instruction in Schedule*

In a conventional schedule the instruction to use (CD) may take the form of the following statement:

Fountain Pen
Z9 By Style
Note.— To be derived by (CD).
(*Illustrative*)
Z9N5 Style of 1950's
Z9N68 Style of 1968

774 *Isolate Term*

The term used in the SpI-schedule to denote the Quasi Isolate "By Style of pen" is 'PEN STYLE'.

775 *Kernel Term*

The structure of the (KT) is similar to that in the case of brand name. If the Kernel Idea to be represented is "Fountain pen style of 1960" then the (KT) is formulated as 'PEN STYLE: 1960'. If the Kernel Idea to be represented is "Fountain pen style of 19th century", then the (KT) is formulated as 'PEN STYLE: 18'.

776 *Device Symbol*

Against the (IT) the symbol "TI" is placed in the predetermined character positions 43 and 44. The function of the symbol is similar to that of the symbol "AD" (*See* Sec 735).

777 *Steps in Forming* (IN)

The program provides for

1 Matching of the first two digits of the (KT) denoting the century with the appropriate (IT) in the schedule marked "TI" at its beginning — that is, header — in the CI-schedule;

2 Adding to the (IN) given against the (IT) (in this case the digit denoting the century) the digits in the (KT) representing the decade, year etc, if any;

3 Picking up the (IN) formed according to Step 2 above omitting the Connecting Digit "Single inverted comma" prefixed to it; and

4 Adding the resulting group of digits to the (IN) given against the (IT) 'PEN STYLE' in the SpI-schedule for Fountain Pen Production.

778 *Example*

Isolate: Pen style of 1968.

In the SpI-schedule for Fountain Pen Production the entry is given as follows:

—Z9 PEN STYLE TI

The (KT) will be formulated as "PEN STYLE: 1968". The result of using (CD) to form the (IN) for the (KT) 'PEN STYLE: 1968' will be — Z9N68.

Similarly, for the (KT) 'PEN STYLE: 18', the (IN) will be —Z9M.

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