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SPECIAL REPORT

WISK 88

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The NRIMS Addressing System

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NUMERICAL ANALYSIS DIVISION

**NATIONAL RESEARCH INSTITUTE FOR MATHEMATICAL SCIENCES
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SECTION 1 - GENERAL DESCRIPTION

1.1 DESCRIPTION

This completely computer-based system was developed to make possible the generation of mailing lists, printed directly on special address label paper, for the reports, journals and periodicals which the Institute publishes. These mailing lists can be generated according to many different selection criteria, so that this is, in effect, an information retrieval system. The system is available for general use by any organization which has the same problem of mailing many different publications, whether these appear regularly or only once:

The system maintains a list of addresses, of unlimited size, on a tape or disk data set. With each address there are associated three separate fields of information on which the selection of the addressees for a particular publication can be based. The first field is called "Journal Interests". There may be up to 32 different journals (i.e. regular publications), each of which is assigned a code number 1 to 32. A subscriber (addressee) can be coded to have an interest in any subset of these journals. The second field, called "Functions", enables the field of employment of the subscriber (e.g. Industry) and his managerial status (e.g. manager) to be specified. The third field, called "Interest Profile", is a profile of the subscriber's professional fields of interest. Each profession has been assigned a code number according to a coding scheme developed by the Human Sciences Research Council (see References, Section 4). These code numbers are hierarchical in nature categorizing disciplines (e.g. engineering, medicine) which are subdivided into sub-disciplines (e.g. electrical, mechanical engineering) and further subdivisions, as necessary. A subscriber can have his interest coded in up to 10 different disciplines, anywhere in the hierarchical scale, with any interest implying an interest in all the component disciplines lower down in the scale in that discipline.

These three fields of selection can be used separately or in various combinations (e.g. 'mail journal 12 to all university lecturers interested in acoustics').

Facilities include the ability to change any address easily without having to recode all associated information. Any of the three fields for a subscriber can be altered independently of the others. The system constructs a mnemonic from significant parts of the address of each subscriber; this mnemonic is permanently stored and is used to search

for and guard against duplication during addition of new subscribers to the list.

The address list is maintained in an alphabetical order selected by the user. A display program can display the address list in a suitable format. This program can display the whole list, or the latest changes made, or the latest additions made. Another program, the selective display program, is virtually a comprehensive information retrieval program enabling any part of the address list to be displayed according to many different selection criteria.

1.2 OPERATION

The system will run on any machine of the IBM/360 series, having at least a disk drive, and controlled by the OS system. Except for the updating program which requires 200K bytes, all programs will run in 100K and less. However, slight changes to the data store in each program will enable the system to run in as little as 50K. The whole system is written in the assembler language.

SECTION 2 - REFERENCE GUIDE

2.1 SELECTION FACILITIES

Each subscriber has four different sets of information coded for him, which can be used for selection for the purposes of a specific mailing list or display.

2.1.1 THE IDENTIFICATION NUMBER

A unique identification number is permanently assigned by the system to each subscriber enabling direct retrieval of his data through this number.

2.1.2 THE JOURNAL INTERESTS

Up to 32 different journals or publications of a regular nature, which

are assigned code numbers 1 to 32, may be allocated. A subscriber may have his interest coded in any subset of these journals. For each journal a mail code and a copy code are available. The mail code specifies whether the subscriber is to receive the particular journal by airmail or surface mail (default is surface mail). If airmail is coded then "AIR" will be printed on his address label. The copy code specifies the number of copies of the journal that he is to receive (default is one copy). Depending on a parameter specified for the operation program, this number may be printed on the label or as many labels printed as there are copies required. This number is limited to 10 copies.

2.1.3 THE INTEREST PROFILE

This is used for publications of a one-time nature such as reports and papers. The disciplinary field of interest of the subscriber is coded here.

Each discipline has been assigned a code number through a coding scheme developed by the Human Sciences Research Council (see References, section 4). These code numbers are hierarchical in nature, categorizing disciplines (e.g. engineering, medicine) which are subdivided into sub-disciplines (e.g. electrical, mechanical engineering) and further subdivisions, as necessary. A subscriber can have his interest coded in up to 10 different disciplines, anywhere in the hierarchical scale, with any interest implying an interest in all the component disciplines lower down in the scale in that discipline. In the program OPERATE, which selects and prints addresses according to given selection criteria, all the different code numbers to which the report is relevant are specified and the program will select subscribers having one of the code numbers.

Some special subscribers, such as libraries, may wish to receive everything selected through the interest profile. For these the special code 000000 is available.

Note that any one-digit to six-digit numeric coding scheme could be used for this purpose. The interest profile could even be used for additional journals giving an unlimited range of journals which would be identified by a number of up to six digits (although with a maximum of ten per subscriber).

2.1.4 THE FUNCTIONS

Each subscriber can have up to 32 different functions coded for him. These functions, which are allocated code numbers 1 to 32 according to a function coding chart (see Section 5 Appendix) specify his administrative level and the type of organization to which he is attached. This makes

it possible to mail publications to persons in a specific professional category.

2.1.5 COMBINATIONS

Various combinations of journal interests, interest profiles and functions may be specified for the purposes of a specific mailing list which is to be generated. A full description may be found in Section 2.3.7, being the description of the program OPERATE.

2.2. THE DATA

There are two sequential data sets associated with a particular address list. One is the address list itself, and the other is only one record, four bytes in length, being a count of the highest identification number allocated in the first data set. These data sets may be on separate tapes or on a disk.

2.2.1 THE ADDRESS LIST DATA SET

This sequential data set may be on tape or on a direct access device. Records are 280 bytes in length and may be blocked. A blocking factor of 26 giving 7280-byte blocks will still permit all programs to run in 100K (except for the program update which requires 200K).

The records are organized into seven groups, based on the type of organization coded for the Function, and within each group they are in an alphabetical order as selected by the user. This enables coherent displays of the data to be made.

Each record (one per subscriber) is divided as follows:

Offset	Type	Length	Description
0	Char.	1 byte	A digit used for sorting the data into group order. The system sets this digit based on the function coded for the subscriber, i.e. 1 = CSIR (Functions 1-4) 2 = University (Functions 5-8) 3 = Industry (Functions 9-15) 4 = State (Functions 16-22) 5 = Statutory body (Functions 23-29) 6 = Library, etc. (When all functions 1-32 are coded for the subscriber) 7 = Unclassified (None of functions 1-29 coded)
1	Char.	3 bytes	Three characters for sorting the subscriber into

Offset	Type	Length	Description
			alphabetic order within a group. These characters are picked up by the INITIATE and UPDATE programs as the first characters following a # symbol coded on the new subscriber's address. The # symbol is erased by these programs.
4	Bin.	32 bits	One bit for each of the 32 function codes. One bits specify the presence of a particular function. Any number of bits may be one. The first one bit found determines the subscriber's function group.
8	Bin.	1 word	A count of the total number of following interest profile fields, with a maximum of 10.
12	Packed	40 bytes	Ten 4-byte packed decimal fields, each containing an interest profile code.
52	Bin.	32 bits	The interest code, one bit per journal, a one bit specifying an interest in the particular journal. Any number of bits may be one.
56	Bin.	32 bits	The mail code, one bit per journal, a one bit specifying that the journal is to be sent airmail, otherwise surface mail.
60	Bin.	16 bytes	The copy code, one half byte per journal, specifying the number of copies to be mailed. A copy code of 0000 is treated as a copy code of 0001 to signify one copy.
76	Char.	8 bytes	An eight-character mnemonic for the subscriber. This mnemonic is used by the programs INITIATE and UPDATE to search for duplicates when adding new subscribers. It is constructed by these programs by extracting the first character from each of the first six character groups in the address, and then the first two digits of the first following numeric field.
84	Bin.	1 word	The integer unique identification number of the subscriber allocated by the system. This

Offset	Type	Length	Description
88	Char.	192 bytes	number cannot be altered by any program and is permanent for the subscriber until he is deleted. Store for six lines of address, 32 characters per line. The first character of line 1, which is never printed, is used by the UPDATE program to flag the latest changes and new subscribers for display by the DISPLAY program.

2.2.2 THE IDENTIFICATION NUMBER DATA SET

This data set consists of one record, four bytes in length, which contains a number which is equal to or greater than the highest identification number allocated to a subscriber on the address list data set. This makes it possible for the program UPDATE, to automatically allocate consecutive unique identification numbers to new subscribers who have to be added. This data set may be stored on the same disk as the address list data set or on another tape volume.

2.2.3 A NOTE ON THE LOCATION OF THE ADDRESS LIST AND IDENTIFICATION NUMBER DATA SETS

These two data sets, if they are both on a direct access device, must occupy the same volume to ensure that their mutual interdependence is preserved even if one of them is lost or damaged.

Should the identification number data set be lost or damaged, the SETIDEN program should be run to reset it to its correct value before making any additions to the address list dataset.

2.3 THE PROGRAMS

2.3.1 GENERAL

At the NRIMS the programs reside in a catalogued load module library called NNWW.P2901.ADDRSYST, residing on a 2314 disk. Sample JCL for using these programs is given in Section 3.2. There are seven programs in all.

- (i) ERCHECK Error checking program for checking data input to programs INITIATE and UPDATE.
- (ii) INITIATE Initializes the two address data sets and adds new

- subscriber data cards. To be used once only on creating an address list.
- (iii) DISPLAY Displays the contents of the address data sets in a suitable format.
 - (iv) UPDATE Performs updating of the address data with new subscriber data and/or modifications to existing data.
 - (v) OPERATE Generates an address printout on special address label paper according to specified input selection criteria.
 - (vi) SELECDIS Displays the contents of the address data according to given input selection criteria.
 - (vii) SETIDEN Used to set the highest identification number stored in the identification number data set in the case where this data set has become lost or damaged.

2.3.2 THE ADDRESSING SYSTEM CODING FORM

In the following program descriptions, the addressing system coding form, referred to by the acronym ADFORM, is often mentioned. A copy of this form is shown in Fig. 1. The general rules for coding this form are given here.

One coding form is used per subscriber. A unique identification number, written in the box for columns 75-80 is punched on all cards for the subscriber and serves to distinguish between the cards for different subscribers. In the case of new subscriber additions, this number can be any number, starting at (say) unity. In the case of changes to existing stored subscriber data, this number is the respective subscriber's own stored identification number.

On the form, card columns are numbered. By normal card punching conventions the symbol "-" for a set of columns means that the written data are to be right adjusted. For example 75-80 means right adjust in columns 75-80.

Each line on the form is one card. Only lines with something written in them need be punched. This is emphasized: it is only necessary to have cards for required information, other unused cards must not appear.

Subscribers being added or having their address changed must have at least one address card. If there is more than one, then these cards must be in order and together as a subset. Other cards may be in any order as long as all the cards for a particular subscriber are together as a set. For example, the interest profile card for a subscriber could precede the address cards.

ADDRESSING SYSTEM CODING FORM

Classification (tick applicable)

- ☐ New Subscriber
- ☐ Modification to existing subscriber

ADDRESS:

Line 1

Line 2

Line 3

Line 4

Line 5

Line 6

Insert the # sign before the three letters on which alphabetic sorting is to take place

JOURNAL INTERESTS:

tick 1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64

tick 1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64

FUNCTIONS:

tick 1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64

INTEREST PROFILE:

tick 1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64

FIGURE 1

It may sometimes be necessary, in the case of CHANGES in the program UPDATE, to completely delete a function field or an interest profile, with no replacement. In this case the appropriate box should be ticked to have a blank card punched (blank except for columns 74-80).

Address cards:

Code as many cards as required. Address lines are coded in columns 2-32 and 42-72 as indicated. The # symbol should be inserted immediately before the first three characters of a word which the program is to extract and store for later alphabetic sorting of the subscriber in the address list. The program will erase this symbol. Columns 1 and 41 are never used except for this # symbol, should it happen to fall at the beginning of an address line.

Journal interest cards:

Code as many cards as required. Fields (a field is composed of No., A, C) must be filled in consecutively without skipping any. No. is the journal code number in the range 1-32 (journal code numbers may be in any order). If a journal code number is given, then this indicates that the subscriber is interested in the journal. A is the mail code - code 1 for airmail; and C is the number of copies of the journal the subscriber is to receive, with a maximum of 9. If A and C are not coded, the defaults of surface mail and one copy will apply.

Function card:

Only one card per subscriber allowed. Boxes must be filled in with function code numbers in the range 1-32 without skipping any boxes. The function code numbers may be in any order, and a function number given indicates that the subscriber will have the coded function. The function coding scheme used at the NRIMS is given in the Appendix, Section 5.

Interest profile card:

Only one card per subscriber allowed. In the case of new subscriber additions, boxes must be filled in consecutively without skipping any boxes. There is one exception to this rule in the CHANGES of program UPDATE, Section 2.3.6. As many boxes as required should be filled in. A single code 000000 coded for a subscriber will enable this subscriber to be always selected whenever the interest profile is one of the selection criteria. Any one-digit to six-digit numeric coding scheme may be used. An example of the disciplinary coding scheme developed by the Human Sciences Research Council is given in the Appendix, Section 5.

2.3.3 THE PROGRAM ERCHECK

This is an error checking utility which must be run in the step preceding the programs INITIATE and UPDATE. Each card and set of cards will be checked for syntactical errors, which will be listed and will be copied onto a temporary file which is passed on to the following program. The program will abend with a user completion code of 4095 if any errors are found, thus inhibiting execution of following programs if COND=(1,LE) is specified on the job card. If no errors are found the program will terminate normally, permitting execution of following programs.

2.3.4 THE PROGRAM INITIATE

2.3.4.1 Description

This program initializes an address data set (ddname ADDR) and adds new subscriber data cards. Up to 1500 subscribers may be added. Further additions may be made using the UPDATE program.

Through the use of the mnemonic, generated by the program, duplicates are searched for, and a listing of all duplicates is printed. To each subscriber the program allocates a unique identification number, starting with unity. This number has no relation to the number coded on ADFORM. The highest number allocated is stored in the identification number data set (ddname IDEN).

2.3.4.2 Data Input

Card 1 Operation control card with NEW SUBSCRIBERS in columns 1-15.
Cards 2 to N Subscriber data cards coded using ADFORM.
Card N+1 / in column 1 to close the deck.

A unique identification number for each subscriber (no connection with the stored identification number allocated by the program) must be written on ADFORM in the box for columns 75-80. This number will be punched on all cards for the subscriber to distinguish between different subscribers.

The rules for coding ADFORM in section 2.3.2 should be used. At least one address card must be present for each subscriber, otherwise any or none of the other cards may be punched.

2.3.4.3 Requirements

This program must be run as the second of four job steps as shown in the JCL listing in section 3.2.2. The first step employs ERCHECK to check the input data, while the following steps are: SORTD to sort the created address list data set into group and alphabetic order, and a final DISPLAY to display all the data. COND=(1,LE) must be coded on the job card to terminate the job if ERCHECK finds

any errors in the input data.

2.3.5 THE PROGRAM DISPLAY

This program will display the address data in a suitable format. The display is arranged in function groups, while the subscribers in each group are in alphabetic order.

If no PARM field is given in the EXEC statement for this program, a total display of all data will be made. If a PARM field is given, it may contain 1 to 3 characters, being one or more of the following A,C,N where A = perform a total display of all subscriber data;

C = display the latest changes to the stored address data processed by the UPDATE program;

N = display the latest new subscribers added to the address data by the UPDATE program.

Example: PARM='CA' will give two displays: changes only, and a total display.

2.3.6 THE PROGRAM UPDATE

2.3.6.1 Description

This program is used to perform modifications and additions to the stored address data. The program will call SORT-MERGE internally to sort the final address data set again if necessary and will call DISPLAY internally to display the final data set according to one or more of the following specified options:

- (a) total display;
- (b) new subscribers only;
- (c) changes only;
- (d) subscribers deleted only.

The program will scan the list for duplication when adding new subscribers. Any subscribers whose data were not found for the purpose of effecting changes, will have their identification numbers printed out in a warning message.

2.3.6.2 Data Input

The input data deck consist of various operation control cards, immediately followed, where required, by data cards for the specific operation requested. The end of each such set of data cards for an operation is indicated by a card with a § sign in column 1.

Generally, except for the display operation control cards, there may be at most one of each of the operation control cards in the input stream. More than one is treated as an error by the preceding step ERCHECK. The operation control cards may appear in any order

with one exception and there is no limit to the number of different such cards. Even all the cards could be used if necessary. The one exception to the order of operation control cards is the DISPLAY DELETIONS card which may appear anywhere, provided it precedes the DELETIONS operation control card and its associated data deck.

(a) Display control cards

Any subset of these, or none, may be coded. The display will be made after all updating and sorting has been completed.

DISPLAY ALL (cols 1-11) Invokes a display of all address data.

DISPLAY NEW SUBSCRIBERS (cols 1-23) Invokes a display of new subscribers added in this run.

DISPLAY DELETIONS (cols 1-17) Invokes a display of subscribers deleted in this run. Place anywhere before a DELETIONS control card.

DISPLAY CHANGES (cols 1-15) Invokes a display of all subscribers who had any change made to their data through an input via the CHANGES data deck in the present run.

(b) Other operation control cards

ZERO BITS (cols 1-9) This command enables one or more specified journals to be deleted from the entire address list without having to identify each subscriber individually. The respective interest bits, mail codes and copy codes of each subscriber will be zeroed.

This card requires a single following data card which contains the numbers of the journals to be deleted. This card must be coded according to the rules for functions cards on ADFORM but with blanks in columns 74-80. Terminate with a § card.

DELETIONS (cols 1-9) This command enables specified subscribers to be deleted.

The card is followed by one or more cards on which are coded the stored identification numbers of subscribers to be deleted. The cards are coded according to the rules for Interest Profile cards on ADFORM but with blanks in columns 74-80. Terminate the deck with a § card.

NEW SUBSCRIBERS (cols 1-15) This command enables new subscribers to be added.

This card is followed by a deck of cards coded on ADFORM according to the rules of section 2.3.1. At least one address card must be present for each subscriber, otherwise any or none of the other cards may be coded.

For each subscriber a unique number on ADFORM in cols. 75-80 must be coded to distinguish its cards from those for other subscribers.

Up to 500 subscribers may be added in a run - see limitations, section 2.3.6.3. The program stores them temporarily on the data set with ddname NEW, which should be of an appropriate size (see JCL sample in section 3.2.2).

Terminate the deck with a \$ card.

CHANGES (cols 1-7) This command enables any changes to be made to stored subscriber data.

This card must be followed by a deck of cards coded on ADFORM as explained below. Terminate the deck with a \$ card.

Subscribers to be changed are identified to the program by their stored identification number which must be written in columns 75-80 of all changes cards for the subscriber.

The following parts of the subscriber's data may be changed independently of the other parts, which are left unaltered: in other words only required portions of the data need be changed, it is not necessary to rewrite all the data. The parts which can be changed are the address, journal interests, functions and the interest profile.

- (a) The address If any part of the address is to be changed, the whole address must be rewritten. The # symbol for alphabetic sorting must be coded. If necessary, the sort program will reset this subscriber's position in the sorted address list.
- (b) The journal interests
 - (i) Addition of new journals. Merely write in the numbers of the new journals on ADFORM. Data for other journals will not be affected.
 - (ii) Deletion of journals. Write the numbers of the journals to be deleted, i.e. those in which this subscriber is no longer interested, and place ** in the A and C columns. Data for other journals will not be

affected.

Addition and deletion of journals may be mixed; the same journal could be deleted and then added again if desired, on one card. Code in any order on ADFORM but without skipping any fields (except for A and C boxes in a field where defaults apply).

(c) The function

Additions, deletions and changes to the functions are made by writing an entirely new set of functions which will replace all the existing functions. If all the functions are to be deleted, instruct a blank card to be punched (except for cols. 74-80).

(d) The interest profile

There are 10 coding fields on the card, which positionally correspond to the 10 profile fields in the stored data. Coded entries will replace stored entries from the point of coding. Therefore to add further profile fields, skip as many boxes on ADFORM as there are already stored profiles on the record and start coding from there on. Take care that an intervening blank field is not inadvertently created through skipping too many boxes - in this case added data are lost. To delete a profile field, it is best to rewrite the whole interest profile, starting at the first box. A profile code of 000000 will enable the subscriber to be always selected under interest profile.

A very large number of CHANGES cards are allowed; the limitations are described in the following section 2.3.6.3.

2.3.6.3 Limitations

There is a limit to the total number of modifications in any one run. As CHANGES data are of varying lengths, exact specification of this limit is difficult.

There are two main areas of data storage:

- (a) Each address changed and each address added generates a new mnemonic field which is stored in a "new mnemonics" store for duplication checks (it is also stored with the address). This store is limited to 500 mnemonics and associated identification numbers, i.e. the total number of subscribers added and subscribers whose address is changed may not exceed 500 in one run.

- (b) Each DELETION and each CHANGE requires data to be stored in a data area of 90000 bytes and also an associated identification number and operation code to be stored in an operation area of sufficient size for 1000 id numbers and op. codes. Assuming (say) 100 bytes of changes data per subscriber (data are of varying length depending on size of change - they may be 1 to 280 bytes in length), 900 subscribers could have their data changed in one run, allowing an extra 100 deletions (the data area is not used by DELETIONS).

Thus in the mixed case where there are both DELETIONS, CHANGES and NEW SUBSCRIBERS, we could specify limits of (say) 400 new subscribers, 100 deletions, 900 changes of which at most 100 could have their address changed.

In the individual case where only one of the above operations is carried out in a run, the limits would be: 500 new subscribers; 1000 deletions; 1000 changes, with a maximum of 500 address changes.

2.3.6.4 Requirements

The catalogued procedure ADDRUPDT should be used (see JCL samples section 3.2.2) to run this program. The first step will be ERCHECK, checking all the data input. DD cards must be supplied for ADDR, IDEN and SORTOUT (which gives the same data set as specified for ADDR). COND=(1,LE) will ensure termination of the job if ERCHECK finds any errors in the data input.

2.3.7 THE PROGRAM OPERATE

2.3.7.1 Description

This program will select subscribers from the address list according to the specified selection criteria and will print out their addresses on special address label paper.

A facility exists in this program, enabling the following to be performed:

- (a) Temporary additions of new subscribers can be made to the address list (these new subscribers will still have to be permanently added using the UPDATE program). This is effected through the NEW SUBSCRIBERS command.
- (b) Temporary changes can be made to the stored subscriber data (for example a new address). (These changes will still have to be made permanent through the UPDATE program). This is effected

through the OLD SUBSCRIBERS command. The program will use the replacement data instead of the stored data for the respective subscribers. When making use of this feature, it is necessary to code all relevant data on ADFORM as the program will entirely ignore stored data for the identified subscribers.

The above two facilities permit OPERATE to be run under conditions of urgency without having to run UPDATE prior to it with the latest changes and additions.

2.3.7.2 Data Input

- (i) The commands NEW SUBSCRIBERS and/or OLD SUBSCRIBERS must appear at the head of the input stream if used. These commands can only be used once.

NEW SUBSCRIBERS (cols 1-15) Follow this card with a deck of cards coded on ADFORM according to the rules of section 2.3.2. Terminate the deck with a ♂ card. A maximum number of 100 new subscribers is allowed.

OLD SUBSCRIBERS (cols 1-15) Follow this card with a deck of cards coded on ADFORM according to the rules of section 2.3.2. These data will temporarily, for the duration of the run, entirely replace the stored data for the subscriber identified by the number in columns 75-80. Consequently all data fields which could be selected during the run must be included, otherwise the subscriber might not be selected. Terminate the deck with a ♂ card. A maximum number of 100 old subscribers is allowed.

- (ii) Following the cards of (i), if any, the following sets of cards may now appear:

- (a) a selection command card;
- (b) associated data cards;
- (c) a ♂ card (i.e. ♂ in column 1 to terminate the data deck).

Any number of sets (a) to (c) are allowed. Each set will cause one scan through the whole address list according to the specified criteria and will generate a printout of the addresses of selected subscribers on special address label paper. A unique one-character to four-character identifier should be punched on the selection command card, which will be printed on the labels to differentiate between the labels for different sets.

There are 14 different selection control cards. Except

for the IDEN (identification number) control card, these control cards are composed of one or more of the keywords FUNC (function), PROF (interest profile) or JOUR (journal interest) which can be linked together by a combinatorial symbol ϵ (being the logical operation 'and'= \cap) or \emptyset (being the logical operation 'or'= \cup).

Thus for example the following selection control card
FUNC

means: 'select subscribers on function only',

while the following,

FUNC \emptyset PROF ϵ JOUR

means: 'select subscribers with the specified functions or specified interest profile fields, who do have an interest in the specified journals'.

(a) The 14 selection control cards are as follows:

<u>control data</u>	<u>coded in card columns</u>
IDEN	1-4
FUNC	1-4
PROF	1-4
JOUR	1-4
FUNC ϵ PROF	1-11
FUNC \cap PROF	1-11
FUNC ϵ JOUR	1-11
FUNC \cap JOUR	1-11
PROF ϵ JOUR	1-11
PROF \cap JOUR	1-11
FUNC ϵ PROF ϵ JOUR	1-18
FUNC ϵ PROF \cap JOUR	1-18
FUNC \cap PROF ϵ JOUR	1-18
FUNC \cap PROF \cap JOUR	1-18

On each selection control card the following additional information may be coded:

cols. 73-76: A one-character to four-character alphabetic identifier for the set, which will be printed on each label to permit differentiation between labels for different sets.

cols. 78-80: The abbreviation LIM for limit may be coded. This will only be acted upon for sets where JOUR is one of the selection keywords. It

will cause one label per subscriber to be printed, with the number of copies required printed on the label. If LIM is omitted, as many labels as there are copies required will be printed for each subscriber selected from sets which include the keyword JOUR.

Selection command keywords:

IDEN Select subscribers with given identification numbers. Up to 100 identification numbers may be coded on following data cards, which are coded in the same way as the interest profile card on ADFORM but with I in column 74 and blanks in columns 75-80.

JOUR Select subscribers with an interest in one of the given journals. The following data deck must contain one card coded as the function card on ADFORM but with J in column 74 and blanks in columns 75-80. The journals to be selected are coded in consecutive blocks on this card. If this is one of the keywords, then any subscriber selected will have the label printed according to the mailcode and copy code for the lowest numbered journal in the given list in which he is found to have an interest. A mail code of unity will cause AIR to be printed on the labels, otherwise nothing extra is printed. The copy code will be used subject to what appears in columns 78-80, as explained above.

FUNC Select subscribers with one of the given functions. The following data deck must contain one card coded as the function card on ADFORM, but with blanks in cols. 75-80, which lists the applicable functions to be checked for.

PROF Select subscribers with one of the given interest profile fields. Up to 100 various interest profile fields which are to be checked for must be given on cards in the following data deck, coded as the interest profile card on ADFORM, but with blanks in cols. 75-80. Note that for any disciplinary code number given, all higher level disciplinary code

numbers must also be given to comply with the specifications of section 2.1.3. For example if the paper to be mailed deals with system simulation (code 154210) then the code for control 154200 and electrical engineering 154000 should also be given. Do not give the interest profile code 000000 as subscribers having this code are automatically selected.

- (b) The data deck following the selection control card must contain the required data cards as explained above, which may be in any convenient order.
 - (c) The last card of a selection set is a § card to close the set.
- (iii) Example: A run is to be made as follows:
- (a) a report dealing with wave propagation (interest profile code 154310) is to be mailed to those interested;
 - (b) a general report dealing with advances in generating equipment (codes 154100-154150) is to be mailed to all those interested in these fields, all of whom must be at least heads of divisions, and also to those who are interested in journals 1 or 21, with a limit of one label each.

The following set of cards will do the job.

card columns:	77777778
1234.....	34567890
PROF	RUNA
154310 154300 154000	P
§	
FUNC e PROF e JOUR	RUNB LIM
0121	J
0307111418212528	F
154100 154110 154120 154130 154140 154150	P
154000	P
§	

2.3.7.3 Requirements

The PRINT data set must specify SYSOUT=(B,,9) signifying address label paper. The printing layout provides for three labels 9.5 cm. wide by 3.56 cm. deep (3.75 in. by 1.4 in.) in a row on paper of overall width 32 cm. (12.5 in.). The user can easily alter the printing routine in this program to provide for other label paper arrangements.

2.3.8 THE PROGRAM SELECDIS

2.3.8.1 Description

This is an information retrieval program. It will display any portion of the address list, selected according to selection criteria specified in the same way as for the OPERATE program. It can also, if required, display the rest of the address list, or only the rest of the address list, which contains subscribers not selected through the given criteria.

2.3.8.2 Data Input

The input stream is composed of any number of display sets made up as described. Each set will cause as many scans through the list as there are selection control cards. Selected subscribers will be written to a temporary data set with ddname DISKSEL while subscribers not selected will be written to a temporary data set with ddname DISKRES. Finally, on reading the END card, a display of these data sets will be made as was specified on the display control cards. The program will then process the next set, first clearing out the temporary data sets DISKSEL and DISKRES.

The display set is made up as follows:

- (a) one or more display command cards;
- (b) one or more selection sets each composed as follows (similarly to OPERATE program input):
 - (i) a selection command card;
 - (ii) associated data cards;
 - (iii) a \$ card;
- (c) a card with END in cols 1-3.

The display set (a)-(c) may be repeated as many times as required, while within each display set, the selection set (b) (i)-(iii) may be repeated many times.

- (a) The display command cards are as follows:

DISPLAY SELECTED (cols 1-16) This will cause a display of the data set DISKSEL, i.e. of those subscribers who are selected by the selection criteria given.

DISPLAY NOT SELECTED (cols 1-20) This will cause a display of the data set DISKRES, i.e. of those subscribers who are not selected by the selection criteria given.

DISPLAY ALL (cols 1-11) This will generate two displays, one of subscribers selected according to the selection criteria given, and one of the remaining subscribers.

- (b) The selection command card and associated data cards are exactly as described in the data input section 2.3.7.2 of the OPERATE program. The only difference is that columns 73-80 on the selection command card are not used.

2.3.9 THE PROGRAM SETIDEN

2.3.9.1 Description

This is a small utility which will set the highest identification number stored on the data set with ddname IDEN. This utility should only be used in the case when the IDEN data set has become lost or damaged as described in section 2.2.3.

2.3.9.2 Data Input

One card is required, with the new highest identification number in the address list data set; it will be stored in the respective data set (ddname IDEN). Code this number right-adjusted in columns 1-6 of the card.

SECTION 3 - OPERATION GUIDE

3.1 SYSTEM GENERATION

The standard label tape with volume serial ADRSYS is arranged as follows (TM=tape mark):

- 1 80-byte volume label record.
- 2 80-byte data set header label records.

TM

1680-byte records (80 byte records blocked 21) containing the card image assembler source decks. The data set name is
DSNAME=ADDRSYST.SOURCE There are approximately 4900 cards.

TM

- 2 80-byte data set trailer label records.

TM

- 2 80-byte data set header label records.

TM

800-byte records (80 byte records blocked 10) containing the "unloaded" version of the system load modules (unloaded with IEHMOVE). DSNAME=ADDRSYST.MODULES

TM

- 2 80-byte data set trailer label records.

TM

2 80-byte data set header label records.

TM

1680-byte records (80 byte records blocked 21) containing the card image sample problems. The data set name is
~~DSNAME=ADDRSYST.SAMPLE~~ There are approximately 130 cards.

TM

2 80-byte data set trailer label records.

TM

TM

The card image assembler source decks of the first file are arranged in consecutive order as follows:

<u>Identification in cc 73-75</u>	<u>Sequence No. range in cc 76-80</u>	<u>No. of cards</u>	<u>Description</u>
ER	00000- 04250	436	ERCHECK CSECT
INI	00000- 03690	371	INITIATE CSECT
DIS	00000- 05100	516	DISPLAY CSECT
NEW	00000- 03520	353	NEWINIT CSECT
UPD	00000- 10100	1018	UPDATE CSECT
OPE	00000- 10110	1012	OPERATE CSECT
SDI	00000- 03850	391	DISPLAY CSECT only for load module SELECDIS
SEL	00000- 07550	755	SELECDIS CSECT
SET	00000- 00380	39	SETIDEN CSECT

As the load modules are blocked at 6144 bytes on a 2314, they can only be reloaded from the tape onto a 2314. Storage requirements on the 2314 are approximately 12 tracks and 1 directory block.

Should it be desired to generate the system on a 2311, it will be necessary to create the 7 load modules from the assembler source decks. These load modules will be as follows:

<u>Load Module</u>	<u>Entry Point</u>	<u>Contains CSECTS</u>
ERCHECK	ERCHECK	ERCHECK
INITIATE	INITIATE	INITIATE
DISPLAY	DISPLAY	DISPLAY
UPDATE	UPDATE	UPDATE
		NEWINIT
		DISPLAY
OPERATE	OPERATE	OPERATE
SELECDIS	SELECDIS	SELECDIS
		DISPLAY (FOR SELECDIS)*
SETIDEN	SETIDEN	SETIDEN

* Note that the DISPLAY CSECT in the load module SELECDIS is not the same as that used in load modules DISPLAY and UPDATE. This CSECT is identified by the three characters SDI in columns 73-75 of the assembler source decks in the first file on the ADRSYS tape.

The system can also be operated from object decks in card form, in which case the object decks for the various programs would be arranged in the same way as in the above table.

The sample data supplied consists of 4 packages of data for the programs INITIATE, UPDATE, OPERATE and SELECDIS.

3.2 JCL FOR THE SYSTEM

3.2.1 DESCRIPTION

The programs will run under any of the O.S. options. DOS operation would require changes to the supervisor and data management macros used by the programs.

On the CSIR's IBM 360/65 using OS-MVT the programs have been designed to run in at most 100K, except for the UPDATE program, which because of its large data storage, requires a 200K partition. These partitions hold for full track blocking of the address list data set (i.e. 7280 byte blocks, giving 26 records per block). By diminishing this data set blocking factor and the data storage areas in the programs, all programs could be easily redesigned to run in an overall region of 50K.

Section 3.2.2 contains a sample listing of the JCL used to run the system. Throughout, the following standard DD cards are used:

DDname IDEN - the data set containing the count of the highest subscriber identification number used in the ADDR data set. RECFM=F, BLKSIZE=4. The data set contains only one record;

DDname ADDR - the data set containing the subscriber address data, one 280-byte record per subscriber.

3.2.2 SAMPLE JCL LISTING

```
*
* OS JCL USED TO RUN ADDRESSING SYSTEM
* NOTE: COND=(1,LE) MUST BE GIVEN ON THE JOB CARD FOR 1. INITIATE AND
*       2B. UPDATE, TO TERMINATE THE JOB IF ERCHECK FINDS AN ERROR IN
*       THE DATA.
*
*
*
*1. THE PROGRAM INITIATE
*
*
// REGION=100K,COND=(1,LE)
//JOB LIB DD DSN=NNWW.P2901.ADDRSYST,DISP=(SHR,PASS,KEEP)
//STEP1 EXEC PGM=ERCHECK
//STORE DD DSN=STORE,UNIT=SPool,DISP=(NEW,PASS),
// SPACE=(CYL,(5,1)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680)
//PRINT DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1064)
//CARD DD *
      INPUT DATA CARDS HERE
/*
//STEP2 EXEC PGM=INITIATE
//CARD DD DSN=*.STEP1.STORE,DISP=(OLD,DELETE)
//ADDR DD DSN=ADDRESS,UNIT=SYSTEM,DISP=(NEW,CATLG),
// SPACE=(TRK,(60,10)),VOLUME=SER=S90003,
// DCB=(RECFM=FB,LRECL=280,BLKSIZE=7280)
//IDEN DD DSN=IDENTITY,UNIT=SYSTEM,DISP=(NEW,CATLG),
// SPACE=(4,(1)),VOLUME=SER=S90003,DCB=(RECFM=F,BLKSIZE=4)
//PRINT DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=73,BLKSIZE=1022)
/*
//STEP3 EXEC SORTD,PARM='CORE=78000,MSG=AP'
//SORTIN DD DSN=ADDRESS,DISP=(OLD,KEEP)
//SORTOUT DD DSN=ADDRESS,DISP=(OLD,KEEP)
//SORTWK01 DD UNIT=(SPOOL,SEP=sortin),SPACE=(TRK,(15),,CONTIG)
//SORTWK02 DD UNIT=(SPOOL,SEP=sortin),SPACE=(TRK,(15),,CONTIG)
//SORTWK03 DD UNIT=(SPOOL,SEP=(sortin,sortwk01)),
// SPACE=(TRK,(15),,CONTIG)
//SORTWK04 DD UNIT=(SPOOL,SEP=(sortin,sortwk01)),
// SPACE=(TRK,(15),,CONTIG)
//SORTWK05 DD UNIT=(SPOOL,SEP=(sortin,sortwk01,sortwk03)),
```

```
// SPACE=(TRK,(15),,CONTIG)
//SORTWK06 DD UNIT=(SPOOL,SEP=(SORTIN,SORTWK01,SORTWK03)),
// SPACE=(TRK,(15),,CONTIG)
//SYSIN DD *,DCB=BLKSIZE=80
    SORT FIELDS=(1,4,CH,A),SIZE=E1500
/*
//STEP4 EXEC PGM=DISPLAY
//ADDR DD DSNAME=ADDRESS,DISP=(OLD,KEEP)
//IDEN DD DSNAME=IDENTITY,DISP=(OLD,KEEP)
//PRINT2 DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=7182)
/*
*
*
* 2. (A) THE CATALOGED PROCEDURE FOR THE PROGRAM UPDATE
*
*
./ ADD LIST=ALL,NAME=ADDRUPDT
./ NUMBER NEW1=10,INCR=10
//GO EXEC PGM=ERCHECK
//STEPLIB DD DSNAME=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//STORE DD DSNAME=εSTORE,UNIT=SPOOL,DISP=(NEW,PASS),
// SPACE=(TRK,(10,5)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680)
//PRINT DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1064)
//CARD DD DDNAME=SYSIN
//UPDATE EXEC PGM=UPDATE
//STEPLIB DD DSNAME=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//CARD DD DSNAME=εSTORE,UNIT=SPOOL,DISP=(OLD,DELETE)
//NEW DD UNIT=SPOOL,SPACE=(TRK,(10,5)),
// DCB=(RECFM=FB,LRECL=280,BLKSIZE=7280)
//DEL DD UNIT=SPOOL,SPACE=(TRK,(5,1)),DCB=(RECFM=F,BLKSIZE=280)
//PRINT1 DD SYSOUT=X,DCB=(RECFM=FA,BLKSIZE=105)
//PRINT2 DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=7182)
//SYSOUT DD SYSOUT=X,DCB=(RECFM=FA,BLKSIZE=133)
//SORTLIB DD DSNAME=SYS1.SORTLIB,DISP=SHR
//SORTIN DD DSNAME=NNWW.P2901.ADDRWORK,UNIT=SYSTEM,DISP=(NEW,KEEP),
// VOLUME=SER=S90003,SPACE=(TRK,(40,5)),
// DCB=(RECFM=FB,LRECL=280,BLKSIZE=7280)
//SORTWK01 DD UNIT=(SPOOL,SEP=SORTIN),SPACE=(TRK,(26),,CONTIG)
//SORTWK02 DD UNIT=(SPOOL,SEP=SORTIN),SPACE=(TRK,(26),,CONTIG)
```

```
//SORTWK03 DD UNIT=(SPOOL,SEP=(SORTIN,SORTWK01)),
// SPACE=(TRK,(26),,CONTIG)
//SORTWK04 DD UNIT=(SPOOL,SEP=(SORTIN,SORTWK01)),
// SPACE=(TRK,(26),,CONTIG)
//SORTWK05 DD UNIT=(SPOOL,SEP=(SORTIN,SORTWK01,SORTWK03)),
// SPACE=(TRK,(26),,CONTIG)
//SORTWK06 DD UNIT=(SPOOL,SEP=(SORTIN,SORTWK01,SORTWK03)),
// SPACE=(TRK,(26),,CONTIG)
//SCRATCH EXEC PGM=IEHPRGM
//SYSPRINT DD SYSOUT=X
//DD1 DD UNIT=SYSTEM,VOLUME=SER=S90003,DISP=OLD
*
* 2.(B)THE PROGRAM UPDATE USING THE CATALOGED PROCEDURE A DDRUPDT THE
* ADDRWORK DS IS A STORE TO WHICH WHOLE ADDRESS LIST IS COPIED WITH ALL
* ALTERATIONS AND AT END, COPIED BACK. KEPT TO SCRATCH STEP IN CASE OS ABENDS.
*
// REGION=200K,COND=(1,LE)
//UPDATE EXEC ADDRUPDT
//GO.CARD DD *
    INPUT DATA HERE (OPERATION CONTROL CARDS AND ASSOCIATED DATA CARDS)
/*
//UPDATE.ADDR DD DSN=ADDRESS,DISP=(OLD,KEEP)
//UPDATE.IDEN DD DSN=IDENTITY,DISP=(OLD,KEEP)
//UPDATE.SORTOUT DD DSN=ADDRESS,DISP=(OLD,KEEP)
//SCRATCH.SYSIN DD *,DCB=BLKSIZE=80
    SCRATCH DSN=NNWW.P2901.ADDRWORK,VOL=2314=S90003,PURGE
/*
*
*
* 3. THE PROGRAM OPERATE
* CODE SYSOUT=(B,,9) FOR PRINT SYSOUT CLASS INDICATING SPECIAL ADDRESS
* LABEL PAPER
*
*
*
// REGION=100K
//JOB LIB DD DSN=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//OPERATE EXEC PGM=OPERATE
//ADDR DD DSN=ADDRESS,DISP=(OLD,KEEP)
```

```
//PRINT DD SYSOUT=(B,,9),DCB=(RECFM=FBA,LRECL=111,BLKSIZE=7215)
//CARD DD *,DCB=BLKSIZE=80
    INPUT DATA HERE (OPERATION CONTROL CARDS AND ASSOCIATED DATA CARDS)
/*
*
*
* 4. THE PROGRAM DISPLAY
* THE PARM FIELD MAY BE ONE TO THREE CHARACTERS LONG, BEING ANY OF A,C,N,
* WHERE A GIVES A TOTAL DISPLAY, C DISPLAYS THE LATEST CHANGES ONLY, N
* DISPLAYS THE LATEST NEW SUBSCRIBERS ADDED ONLY. IF NO PARM FIELD IS
* GIVEN THEN A TOTAL DISPLAY IS MADE. THE EXAMPLE WILL GIVE TWO DISPLAYS
* - 1. ALL SUBSCRIBERS AND 2. LATEST CHANGES ONLY
*
*
// REGION=50K
//JOB LIB DD DSN=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//DISPLAY EXEC PGM=DISPLAY,PARM='AC'
//ADDR DD DSN=ADDRESS,DISP=(OLD,KEEP)
//IDEN DD DSN=IDENTITY,DISP=(OLD,KEEP)
//PRINT2 DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=7182)
/*
*
*
* 5. THE PROGRAM SELECDIS - SELECTIVE DISPLAY
*
*
// REGION=100K
//JOB LIB DD DSN=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//SELECDIS EXEC PGM=SELECDIS
//ADDR DD DSN=ADDRESS,DISP=(OLD,KEEP)
//IDEN DD DSN=IDENTITY,DISP=(OLD,KEEP)
//DISKSEL DD UNIT=SPOOL,SPACE=(TRK,(40,5)),
// DCB=(RECFM=FB,LRECL=280,BLKSIZE=7280)
//DISKRES DD UNIT=SPOOL,SPACE=(TRK,(40,5)),
// DCB=(RECFM=FB,LRECL=280,BLKSIZE=7280)
//PRINT1 DD SYSOUT=X,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=7182)
//CARD DD *
    INPUT DATA HERE (OPERATION CONTROL CARDS AND ASSOCIATED DATA CARDS)
/*
```



```
*
*
* 6. THE PROGRAM SETIDEN - FOR SETTING THE HIGHEST IDENTIFICATION NUMBER
*   STORED ON IDEN. TO BE USED ONLY WHEN THIS DS HAS BEEN LOST OR DAMAGED.
*
*
// REGION=10K
//JOB LIB DD DSN=NNWW.P2901.ADDRSYST,DISP=(SHR,KEEP)
//SETIDEN EXEC PGM=SETIDEN
//IDEN DD DSN=IDENTITY,DISP=(OLD,KEEP)
//PRINT DD SYSOUT=X,DCB=(RECFM=F,BLKSIZE=133)
//CARD DD *,DCB=BLKSIZE=80
      1 CARD WITH NEW HIGHEST ID.NO., RIGHT ADJUSTED IN COLS 1-6.
/*
```

SECTION 4 - REFERENCES

A numeric coding scheme for different speciality fields has been developed by the Human Sciences Research Council. An example is given in the Appendix, Section 5. The code booklet for Engineering Disciplines is already available and may be obtained on application to:

The Human Sciences Research Council,
Private Bag 41,
Pretoria.
(Telephone 2-8831)

Code booklets for the other natural science specialised fields will be released early in 1971. These codes will include Astronomy, Land Surveying, Biology, Agriculture, Forestry, Chemistry, Earth Science, Mathematics, Statistics, Medical Science, Physics and Applied Mathematics, Technology. An example is given in the Appendix, Section 5.

SECTION 5 - APPENDIX

5.1 THE FUNCTION CODING CHART

Fig. 2 shows the chart as it was developed for the purposes of the NRIMS. There are a five groups on the chart. A sixth group is used for subscribers who have all of the functions 1-32 coded - to enable them to receive all publications in which the function is one of the selections. Finally there is a seventh group - an unclassified group for subscribers with no function or one of the functions 30, 31,32.

Within a group, the individual function designations may be varied to suit the user. To change the organization of the groups will however require small changes to be made in all the programs except for ERCHECK, OPERATE and SETIDEN. This is because the program DISPLAY will display the subscribers in the groups as set up for the NRIMS.

C.S.I.R.	UNIVERSITIES TECHNICAL COLLEGES RESEARCH UNITS PROFESSIONAL SOCIETIES	MUNICIPALITIES POST OFFICE S.A.R. S.A.A. ISCOR ESCOM ETC.	STATE (DEPT. OF DEFENCE S.A. WEATHER BUREAU ETC.)	STATUTORY ORGANISATIONS AND OTHERS, FOREIGN ORGANISATIONS			
PRESIDENT, DEPUTY, VICE 1	PRINCIPAL RECTOR PRESIDENT OF SOCIETY 5	DIRECTOR GENERAL MANAGER 9	MINISTER SECRETARY DEPUTY SECRETARY 16	DIRECTOR 23			
MEMBER OF C.S.I.R. COUNCIL 30							
MEMBER OF ADVISORY COMMITTEE FOR MATHEMATICS 31							
MEMBER OF ADVISORY COMMITTEE FOR ELECTRICAL ENGINEERING 32							
DIRECTOR OF INSTITUTE 2	DEANS OF FACULTY AND HEADS OF RESEARCH INSTITUTES SECRETARY OF SOCIETY 6	MANAGERS AND CHIEF ENGINEER 10	DIRECTORS OF RESEARCH 13	CHIEF ENGINEER 17	HEADS OF RESEARCH DEPARTMENTS 20	CHIEF ENGINEER 24	HEADS OF RESEARCH DEPARTMENTS 27
HEADS OF DIVISIONS 3	PROFESSORS AND HEADS OF RESEARCH DIVISIONS 7	HEADS OF ENGINEERING SECTIONS 11	HEADS OF RESEARCH DIVISIONS/ DEPARTMENTS 14	HEADS OF ENGINEERING SECTIONS 18	HEADS OF RESEARCH DIVISIONS 21	HEADS OF ENGINEERING SECTIONS 25	HEADS OF RESEARCH DIVISIONS 28
RESEARCH OFFICERS 4	LECTURERS AND RESEARCH STAFF 8	ENGINEERS 12	SCIENTISTS 15	ENGINEERS 19	SCIENTISTS 22	ENGINEERS 26	SCIENTISTS 29

FIGURE 2: THE FUNCTION CODING SCHEME

5.2 THE INTEREST PROFILE CODING SCHEME

The coding scheme which the NRIMS uses for the interest profile was developed by the Human Sciences Research Council as described in sections 1.1 and 4. An extract from this scheme for engineers is given below. It is emphasized that any one-digit to six-digit numeric coding scheme can be used without requiring any program changes.

<u>Urban, Regional and Site Planning</u>	153700
Urban services	153710
Industrial layouts	153720
Traffic planning	153730
Site layout	153740
<u>ELECTRICAL ENGINEERING</u>	154000
Electrical Power	154100
Machines and transformers	154110
Power stations	154120
Transmission and distribution	154130
Switchgear and protection	154140
Utilization	154150
<u>Control</u>	154200
System simulation	154210
System design and application	154220
Components	154230
<u>Communications</u>	154300
Another extract from the scheme for mathematics and statistics appears below.	
<u>MATHEMATICS; STATISTICS</u>	160000
<u>Biometry</u>	161000
Biometrical genetics	161100
Biometrical plantsociology	161200
General biometry	161300
<u>Mathematics</u>	162000
Algebra and theory of numbers	162100
General	162110
Homological algebra	162120
Linear algebra, polynomials	
theory of invariants	162130
Rings, fields	162140

Theory of groups	162150
Theory of numbers	162160
Analysis	162200
Functional analysis	162210
Series and summability	162220
Special functions and	
Fourier analysis	162230
Theory of functions	162240
Theory of measure and integration	162250

-----ooooo000ooooo-----