THE DESIGN OF RECORDS FOR FIELD WORK

BY

LANCELOT HOGBEN and K. W. CROSS

From the Department of Medical Statistics, University of Birmingham

There is little doubt that large numbers of physicians and medical officers could usefully collaborate in a great variety of large-scale inquiries of no mean importance, if research workers themselves were more fully aware of the need for designing records with due regard to certain principles which the medical curriculum does not as yet accommodate. Current supervision of case notes in medical instruction and current methods of completing them in almost all hospitals still adhere to a traditionally narrative pattern, entrusting the observer to use his or her own discretion about what to record or when to record it. Even when the topic of interest is the single individual, as in a type of inquiry recently discussed by Hogben and Sim (1953), the wastage of information by reliance on the narrative record may be enormous; but it is inevitably so if we seek to pool information about different individuals and from different sources. If the record then contains no reference to a particular attribute (A) of a particular individual, we have no certain clue to which of three possibilities is correct:

- (a) the individual was *not-A*;
- (b) the individual was A, but the observer did not deem the fact to be worth recording;
- (c) the individual was A, but the observer forgot to mention it in the case summary.

One example from published work (Hogben, Worrall, and Zieve, 1932) on the genetic basis of alcaptonuria will make this clear. Available records of individuals with this condition disclosed the following results referable to 45 fraternities containing in all 125 sibs:

Relationship of Parents	Fraternities	Alcaptonurics
First cousins ..	12	26
First cousins, consanguineous of unknown degree ..	1	1
Unrelated ..	20	36
Unstated (if any) ..	12	20
Total	45	83

If we confine our attention to individuals concerning whose parentage we have definite information,

the sample percentage of alcaptonurics with consanguineous parents is therefore 42. If we assume that parents are not consanguineous unless otherwise stated, the percentage is 24.4; and there are good enough theoretical reasons for being well-nigh certain that the lower figure is correct. Thus the alcaptonurics illustrate the truism that writers of case histories in essay form are prone to record information only if it seems to call for special comment. *Unless records explicitly call for information, what information they do supply is of little, if any, value.*

This is true of almost any medical investigation which takes within its scope records of different individuals and observations on different occasions; but it is still more true when observers with different standards of what is important collaborate, especially when the designation of one and the same sign or symptom involves an act of *interpretation*. Thus a preliminary desideratum of such investigation is a proforma which contains no terms other than those which are verbally definable by general admission and otherwise explicitly in the context, or are valid in the sense that they conform to the criterion of the *identity parade*. In truth, ambiguity may arise at a much more elementary level. Thus the item "(1) *married*; (2) *not married*", set out as an exclusive A or *not-A* attribute in a *niche* for the marital status of the individual, leaves the observer free to place a divorced person in either category, unless the words *as yet* or *hitherto* follow the negative particle.

What is less widely recognized is that each such *niche* of the observational record should also be statistically* unambiguous in the sense that the attributes it accommodates constitute an *exclusive* and *exhaustive* set in the sense that:

- (a) no more than one attribute of the set specified can pertain to one and the same individual;
- (b) every individual is specifiable by one such attribute.

Interpreted literally, the last requirement is a council of perfection, but we can satisfy the requirements of an exclusive-exhaustive taxonomy by the

*In speaking of a taxonomic specification as *statistically* unambiguous if exhaustive and exclusive as here defined, we do so because repeated enumeration till totals agree is highly wasteful. If the classification is exhaustive, the total recorded for any *niche* will be the size of sample, and if exclusive the sum of the enumerated subsets indicated by the code numbers for the several rows will be equivalent thereto. We then have a double check on the reliability of the enumeration without recourse to repetition.

device of the open cell: *other—unspecified—doubtful*. Bacon remarks that nature is more diverse in her operations than is man in his conceptions; and it is indeed prudent to employ the open-cell even if disposed to believe both that the nomenclature is unequivocal and that it covers all contingencies. Two items in an obstetrical record designed by the Department of Medical Statistics sufficiently illustrate its use (16 and 17 at foot of page).

Here Item 16 is *exhaustive* in the sense that it allows for a positive, negative or doubtful test and for no test at all. As it stands, it is not *exclusive* unless we also know (as we did) that:

- (a) an individual if tested would have submitted to one only of the three tests specified;
- (b) no other laboratory test was in use at the time.

Such then are the elementary desiderata of a record for research involving observations on different individuals or even (Hogben and Sim, 1953) on the same individual, more especially if different observers collaborate; and one may hazard the opinion that medical students would get a better training in the art of observation and in medical semantics, if required to complete a pre-designed record appropriate to the type of case instead of relying on individual judgment set out in narrative. Be that as it may, the art of designing the best form such a record may take is one which comes by long experience only, in the absence of any texts which fully discuss the issues involved. Hence the hope that what follows will be of service to research workers in medicine.

The choice of words and categories referred to in the foregoing remarks is by no means always an easy intellectual exercise; nor is the need for it self-evident. What makes the need for a statement of principles more pressing is that clarity is not enough.

It does not suffice to ensure that we shall record all the information we require and that we have no doubts about the meaning of what we have recorded. Other desiderata of the design of the record are the possibility of rendition and of extracting the data for analysis with minimal effort. If the investigation subsumes a very large number of records, the last-named requirement implies suitability for enlisting mechanical devices for sorting or tabulation. Even when the records are relatively few, it will be possible to delegate the task of extracting the data for tabulation to a clerical assistant with confidence only if it is also possible to formulate instructions for a hand-sort in terms which require no technical acquaintance with the topic.

A layout which permits the fullest use of mechanical aids is equally suitable for a hand-sort by a clerical assistant. Mechanical aids first came into use for enumeration, costing, and tabulating information which is largely numerical, as in accountancy. If the data of a record are qualitative, it will be possible to feed the information to the machine only if translated into its own language, *i.e.* a numerical code. The salesman's view, encouraged by experience of accountancy, the totalizer, and market research, is that the bottleneck of mechanical aids is the operation of punching and verifying. We have listened to many discussions on the value of photo-electric devices for eliminating the punch-card, and have no doubt that one or other will come into general use eventually; but the effort expended and the liability to error incurred in conveying coded information to a punch-card is trivial in comparison with the problem of translating highly-specialized information involving an immense vocabulary of technical terms into a code. If we are to make the fullest use of case history material, we must find

Col. No. 16. Pregnancy Diagnosis Test Performed	None	Aschheim-Zondek			Friedmann			Hogben		
		Positive	Negative	Doubtful	Positive	Negative	Doubtful	Positive	Negative	Doubtful
Code (row)	0	1	2	3	4	5	6	7	8	9

Col. No. 17. Ante-Natal Care	None	Hospital Out- Patient Depart- ment	Private Prac- titioner	Hospital Out- Patient Depart- ment and Private Practitioner	Corpora- tion Ante- Natal Clinic	Corporation Ante-Natal Clinic and Pri- vate Practitioner	Corporation Ante-Natal Clinic and Hos- pital Out-Patient Department	Other (specify)
Code (row)	0	1	2	3	4	5	6	9

Specify ante-natal clinic.....

some means of *coding at source*. By coding at source, we mean that the expert observer must be his own translator.

In what follows we may assume that the machine operates with punched cards, and that the layout of the observational record suffices to give all the necessary instructions to the operator responsible for punching. Accordingly, it will show on the left-hand margin of each *niche* the column or columns which accommodate the corresponding items of information and on the right-hand a *box* to accommodate the specification of the appropriate row to punch. As stated, no problem of translation arises when the information is intrinsically numerical:

16-18 Systolic blood pressure (mm.) 8 a.m.

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19-21 Systolic blood pressure (mm.) 10 p.m.

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22-23 Erythrocyte count ($\times 10^{-5}$)

--	--

Here it suffices to insert the relevant numbers in the box. For instance, a red blood count of 3,700,000 will appear as

3	7
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, signifying that the punch-card operator punches Row 3 in Col. 22 and Row 7 in Col. 23. Similarly, a red blood count of 900,000 will appear as

0	9
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.

We may here assume that we use ten rows per column, labelled 0-9, in the simplest way. Only one hole will then appear on any column of the punch-card. By use of additional X and Y rows, a column can in fact accommodate any one of more than ten units of information, and some machines interpret more than one hole per column; but the investigator who is not *au fait* with the subtleties of the machine's performance will be wise to follow a plan which—if less economical than it need be—is easy to understand and to interpret when the time comes to issue appropriate instructions for sorting and tabulating the information which the machine can digest.

Much information can be explicitly coded by recourse to an instruction to ring or tick the appropriate item as illustrated by (15) the second item of a record for cases of cerebral thrombosis:

13-14 Duration of Stay (*days*)
01 to 99 (= 99 or more)

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15 Initial Speech

Speech Normal		Speech Defective		Aphasia without Comprehension	
B.P. Normal	Hyper-tensive	B.P. Normal	Hyper-tensive	B.P. Normal	Hyper-tensive
0	1	2	3	4	5

In contradistinction to *self-coding*, as illustrated by the above, we must sometimes rely on *coding by reference*, in which event it is wise to give the appropriate verbal specification below, leaving completion of the document by recourse to the code till the observational record is otherwise complete. For instance, we may lay out *diagnosis* as below by recourse to the W.H.O. list of diseases:

Diagnosis (Code K). Specify.....

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There are unfortunately few such codes available for use, and of these some are too bulky or open to objection on other grounds. For England and Wales, the official *Industry Code* would be adequate as it stands if the employed person could produce any document disclosing his or her code specification. Actually, the employer retains the only document on which this specification appears. This dilemma calls for official intervention at a high level, pending which we cannot use it to code industry. Unlike the official code of industries, the Ministry of Labour numbered list of *occupations* is too vast for Record Office use and is ill-adapted to the requirements of occupational medicine without translation into a secondary code based on taxonomical categories relevant to the end in view. Accordingly, it may be preferable to use an *ad hoc* code specifying medically relevant conditions of work (*e.g.* sedentary, nocturnal, outdoor, migratory), responsibility, and training, in contradistinction to explicit denomination of the patient's job.

As an example of such a layout for a miniature code with appropriate instructions for the benefit of the user, we have recommended the following:

Occupation

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Code G Code H

Employment Status (Code G)

To operate Code G first ask whether the patient is an employee, and check answer if Yes by asking name of employer(s). Then place in 41-57 by appropriate questions. Be careful to distinguish *clerical work* (routine typing, shorthand, book-keeping) from *administrative work* (including responsible secretarial posts and qualified accountants). If the answer to the first question is No, the only difficulty which calls for comment is the distinction between the man or woman on his own (*self-employed*) and the employer. A shop-proprietor or farmer who has help from a relative or relatives *not* registered employee(s) for National Insurance is in this context *self-employed*.

No Occupation:

Independent means (other than savings or pension from previous employment)	..	..	..	01
Retired	..	..	..	02
Housewife or homemaker (not in receipt of wage or salary)	..	..	..	10
Schoolchild	..	..	..	11
Other dependent	..	..	..	12

Self-Employed:

Profession (private practice)	..	..	..	11
Other	..	..	..	20

Employer (owner or partner)	..	..	..	30
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Employee:

Managerial or Administrative (executive grade)	..	..	..	41
Professional (other than above)	..	..	..	42
Foreman, Supervisor	..	..	..	43
Clerk	..	..	..	44
Salesman, Shop Assistant	..	..	..	45
Porter, Messenger	..	..	..	51
Domestic, <i>Resident</i>	..	..	..	52
Domestic, <i>Non-resident</i> (cleaners, canteen, counterhands, waiters)	..	..	..	53
Caretaker, Watchman	..	..	..	54
Car Park or Lift Attendant	..	..	..	55
Skilled or Semi-skilled Artisan	..	..	..	56
General Labourer	..	..	..	57
Other	..	..	..	89

Unspecified	..	..	..	99
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Place of Work (Code H)

To operate Code H it is necessary to be clear about the distinction between B (*temporary*) and C (*mobile*). A person whose place of work is temporary (B) here signifies one who habitually changes his place of work (*plumber, interior-decorator, jobbing gardener, gas-fitter, piano-tuner*). A person whose work is mobile is one who is continually on the move (*postman, milkman, messenger, engine-driver, bargee, bus-conductor*). Code *commercial travellers* as Temporary (mixed) 40. If in doubt, code as 99.

A. Fixed

Private Dwelling	..	..	..	11
Factory or Workshop (other than 22)	..	..	..	21
Repair Shop	..	..	..	22
Retail Shop or Showroom	..	..	..	23
Warehouse	..	..	..	24
Office	..	..	..	25
Canteen, Restaurant, Hotel	..	..	..	26
Laboratory	..	..	..	27
Institution	..	..	..	28
Laundry	..	..	..	29
Place of Entertainment	..	..	..	31
Mine	..	..	..	32
Lines of Communication, above ground (Stations, Depots, Signal Box, Railway Yards, Docks, etc.)	..	..	..	33
Lines of Communication, below ground	..	..	..	34
Outdoor (other than above).	..	..	..	35

B. Temporary

Indoor	..	..	..	41
Outdoor	..	..	..	42
Mixed	..	..	..	40

C. Mobile

On foot or cycle	..	..	..	51
Vehicle above ground	..	..	..	52
Vehicle below ground	..	..	..	53
Air transport	..	..	..	54
Water transport	..	..	..	55

D. Other	..	..	..	89
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E. Unspecified	..	..	..	99
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Locality is another headache, partly because of the diversity of area specifications (e.g. local government, food, electricity and gas, parliamentary) relevant to different administrative or other ends in view, and partly because many patients can supply no definite domiciliary information other than street and house number. At one time or another, one may need to know the educational authority responsible for a child, the accident hospital nearest to the home, the reservoir which provides its water supply. An address does not necessarily supply the information, since houses on opposite sides of a street may be in different county boroughs with a different water supply and a different educational budget. A grid is unworkable for the same reason; and much which would be of value to research (e.g. in connexion with blood-group donor distributions) will not be available on medical documents until the Post Office, Ministry of Town and Country Planning, and Ministry of Local Government get together to work out a national code for domiciliary specification. Meanwhile, as a *pis aller*, we ourselves use a code of our own based on the Local Food Office as stated on the patient's ration card. We should like to commend to the consideration of the Central Statistical Office the setting up of a National Co-ordination Committee on domiciliary, occupational, and industrial aspects of the coding problem.

Aside from the specialist knowledge which the construction of appropriate codes entails, the task is not one to dismiss lightly. Any sequence of numbers like those of the telephone directory will, of course, satisfy the requirements of a punch-card system, if the only end in view is to feed the information to the machine; but the proper design of a code should make the food digestible. As far as is practicable, this means that every cipher allocated to a column should be referable to some unique level of a taxonomical hierarchy. It is then possible to extract information of a particular type by a sort based on one column alone. For example, the 3-cipher sequence 001 to 456 suffices to accommodate all the 456 medical units (hospitals, clinics, sanatoria, convalescent homes, mental institutions, and colonies) of a particular region; but administrative requirements of one kind or another may call for information referable to medical units of a "Group" under the Act, to medical units situated within the boundaries of a particular unit of local government, to medical units with a particular type of accommodation (e.g. casualty department, beds for mental cases), and so forth. A 4-cipher or 5-cipher sequence for a designation otherwise adequately accommodated by three columns may therefore greatly assist us to coax the machine to deliver the data we want.

Two other considerations call for comment when it is necessary to call in an *ad hoc* code. One is that it may be possible to economize column space by incorporating information of more than one type in the same *niche*, as for instance sex and date of birth in the Personnel Specification Code of Hogben, Johnstone, and Cross (1948). The other issue worth mentioning is that a code for general use should be foolproof for the user, with respect both to explicit specification of the attribute and to its *niche* (column number or numbers) in the record. The following entry in the *Midland Region Medical Codes* of the United Birmingham Hospitals illustrates both desiderata. As for the foregoing occupation code the precise form of the column specification in the record itself appears above the instructions for coding:

Patient's Birth Rank (Code J)

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Note.—If the individual is one of a pair of live-born twins or one of triplets, etc., it may not be possible to ascertain the actual *order of delivery*. When (and *only* when) unable to do so, count as the elder the one whose first name comes first alphabetically (e.g. Martha before Mary, and Jack before James).

Question	Answer	Code No.
Are you the first born child of your mother?	I don't know	0
	Yes	1
	No	(see below)
How many live-born children, living or deceased, had your mother before your birth?	I don't know	0
	One	2
	Two	3
	Three	4
	Four	5
	Five	6
	Six	7
	Seven	8
	Over Seven	9

A department which has constant use for recording data of a particular class may find the labour of preparing *ad hoc* codes worth while; but it is not a task to undertake lightly. A third approach to the problem of coding economically is therefore worthy of consideration. Where the record calls for the specification of cognate attributes, it may be possible and it is most straightforward to work with simple dichotomies and trichotomies laid out hierarchically as in the foregoing illustrations from an *Obstetric Record*. There is, however, a procedure which involves no difficulty and is, as far as we know, novel. Consider the following situation. The psychiatric field-worker wishes to record the patient's demeanour in an interview under the headings:

A. *insolent*, B. *aloof*, C. *excited*, D. *ingratiating*, E. *angry*, F. *listless*, G. *impatient*, H. *restless*, J. *normal*.

It goes without saying that this is not an exhaustive and exclusive classification, since a person may be

insolent, angry, and excited in the same context. In fact the *n* attributes we are looking for in a given context may be such that an individual may have 0, 1, 2, 3 . . . or *n* of them. We can, of course, regard each with its opposite and doubtful as one item of an exhaustive exclusive set of three; but it would then be wasteful of column space to allocate one column to each. On the other hand, the entire assemblage constitutes an exhaustive and exclusive set of enumerable combinations, viz:

$${}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n = (1 + 1)^n = 2^n$$

Thus there will be at most 64 items of an exhaustive exclusive set of six attributes, and at most 512 of nine attributes, and 8,192 of thirteen attributes. This means that one 2-column code will suffice for five or six attributes, one 3-column code for seven, eight, or nine attributes, and one 4-column code for ten, eleven, twelve, or thirteen attributes. Thus we may lay out the appropriate record for the situation envisaged above for three consecutive columns (here 17–19):

17–19 Patient's Demeanour
(Ring appropriate letters)

Universal 3-cipher code		

A *insolent*
B *aloof*
C *excited*

D *ingratiating*
E *angry*
F *listless*

G *impatient*
H *restless*
J *normal*

The most simple plan for the construction of such a code is as follows for, say, five attributes A–E:

None		00	BC	only	10	BCD	only	22
A	only	01	BD	"	11	BCE	"	23
B	"	02	BE	"	12	BDE	"	24
C	"	03	CD	"	13	CDE	"	25
D	"	04	CE	"	14	ABCD	"	26
E	"	05	DE	"	15	ABCE	"	27
AB	"	06	ABC	"	16	ABDE	"	28
AC	"	07	ABD	"	17	ACDE	"	29
AD	"	08	ABE	"	18	BCDE	"	30
AE	"	09	ACD	"	19	ABCDE	"	31
			ACE	"	20			
			ADE	"	21			

The instructions for the sort whether by hand or machine will then be:

None 00

all A 01, 06–09, 16–21, 26–29, 31

all B 02, 06, 10–12, 16–18, 22–24, 26–28, 30–31,
etc.

all AB 06, 16–18, 26–28, 31

all DE 15, 21, 24–25, 28–31
etc.

all ABCD 26, 31

all BCDE 30–31,
etc.

all ABC 16, 26–27, 31

all BCD 22, 26, 30–31
etc.

all ABCDE 31

all Singles 01–05

all Doubles 06–15

all Triplets 16–25

all Quadruplets 26–30

If the combinations and code numbers are laid out according to the foregoing sequential plan it is easy to check the list.

Let $S_r = ({}^nC_0 + {}^nC_1 + {}^nC_2 \dots {}^nC_r)$.

Then we shall assign:

None 0; Singles $S_0 \dots (S_1 - 1)$; Doubles $S_1 \dots (S_2 - 1)$

and generally for r -fold combinations from

$$S_{r-1} \dots (S_r - 1).$$

Such a code embraces a taxonomy which is exclusive and exhaustive, allowing for the possibility that an individual might have none of the attributes A-E or that he might have all of them. Since the specification of the meaning of A, B ... etc. is explicit on the record, one code like the above will suffice for any set of n attributes, regardless of their designation in a particular niche. Hence we may speak of a code of this type as a universal code.

This does not mean that it overrides the need for an *ad hoc* code when the number of attributes is larger than, say, three. Its special usefulness will be for situations in which a set of cognate attributes is neither exclusive nor exhaustive. For the convenience of others we here append two codes, one for five or six attributes, and one for seven, eight, or nine attributes. We have prepared for use a 4-column code for ten to thirteen attributes, but it is too bulky to include here.

For samples of complete pre-designed medical documents, we refer the reader to the recent publication of Hogben and Sim (1953).

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APPENDIX

CODE I

Attributes: ABCDEF

None 00	AF 11	ABC 22	BCE 33	ABCF 44	BDEF 55
A 01	BC 12	ABD 23	BCF 34	ABDE 45	CDEF 56
B 02	BD 13	ABE 24	BDE 35	ABDF 46	ABCDE 57
C 03	BE 14	ABF 25	BDF 36	ABEF 47	ABCDEF 58
D 04	BF 15	ACD 26	BEF 37	ACDE 48	ABCEF 59
E 05	CD 16	ACE 27	CDE 38	ACDF 49	ABDEF 60
F 06	CE 17	ACF 28	CDF 39	ACEF 50	ACDEF 61
AB 07	CF 18	ADE 29	CEF 40	ADEF 51	BCDEF 62
AC 08	DE 19	ADF 30	DEF 41	BCDE 52	ABCDEF 63
AD 09	DF 20	AEF 31	ABCD 42	BCDF 53	
AE 10	EF 21	BCD 32	ABCE 43	BCEF 54	

CODE II

Attributes: ABCDEFLMN

None 000	DF 032	AEF 064	CDF 096	FMN 128	ACFL 160
A 001	DL 033	AEL 065	CDL 097	LMN 129	ACFM 161
B 002	DM 034	AEM 066	CDM 098	ABCD 130	ACFN 162
C 003	DN 035	AEN 067	CDN 099	ABCE 131	ACLM 163
D 004	EF 036	AFL 068	CEF 100	ABCF 132	ACLN 164
E 005	EL 037	AFM 069	CEM 101	ABCL 133	ACMN 165
F 006	EM 038	AFN 070	CEN 102	ABCM 134	ADEF 166
L 007	EN 039	ALM 071	CFL 103	ABCN 135	ADEL 167
M 008	FL 040	ALN 072	CFM 104	ABDE 136	ADEM 168
N 009	FM 041	AMN 073	CFN 105	ABDF 137	ADEN 169
AB 010	FN 042	BCD 074	CFD 106	ABDL 138	ADFL 170
AC 011	LM 043	BCE 075	CLM 107	ABDM 139	ADFM 171
AD 012	LN 044	BCF 076	CLN 108	ABDN 140	ADFN 172
AE 013	MN 045	BCM 077	CMN 109	ABEF 141	ADLM 173
AF 014	ABC 046	BCN 078	DEF 110	ABEL 142	ADLN 174
AL 015	ABD 047	BCD 079	DEL 111	ABEM 143	ADMN 175
AM 016	ABE 048	BDE 080	DEM 112	ABEN 144	AEDL 176
AN 017	ABF 049	BDF 081	DEN 113	ABFL 145	AEDM 177
BC 018	ABM 050	BDM 082	DFL 114	ABFM 146	AEDN 178
BD 019	ABN 051	BDM 083	DFM 115	ABFN 147	AELM 179
BE 020	ACD 052	BDN 084	DFN 116	ABLM 148	AELN 180
BF 021	ACE 053	BEF 085	DLM 117	ABLN 149	AEMN 181
BL 022	ACF 054	BEL 086	DLN 118	ABMN 150	AFML 182
BM 023	ACG 055	BEM 087	DMN 119	ACDE 151	AFLN 183
BN 024	ACL 056	BEN 088	EFL 120	ACDF 152	AFMN 184
CD 025	ACM 057	BFL 089	EFM 121	ACDL 153	ALMN 185
CE 026	ACN 058	BFM 090	EFN 122	ACDM 154	BCDE 186
CF 027	ADE 059	BFN 091	ELM 123	ACDN 155	BCDF 187
CL 028	ADF 060	BLM 092	ELN 124	ACEF 156	BCDL 188
CM 029	ADL 061	BLN 093	ELM 125	ACEL 157	BCDM 189
CN 030	ADM 062	BMN 094	FLM 126	ACEM 158	BCDN 190
DE 031	ADN 063	CDE 095	FLN 127	ACEN 159	BCEF 191

APPENDIX—*contd.*CODE II—*contd.*

BCEL	192	DEMN	246	ACDMN	300	BDFMN	354	ABDFLM	408	CDELMN	462
BCEM	193	DFLM	247	ACEFL	301	BDLMN	355	ABDFLN	409	CDFLMN	463
BCEN	194	DFLN	248	ACEFM	302	BEFLM	356	ABDFMN	410	CEFLMN	464
BCFL	195	DFMN	249	ACEFN	303	BEFLN	357	ABDLMN	411	DEFLMN	465
BCFM	196	DLMN	250	ACELM	304	BEFMN	358	ABEFLM	412	ABCDEFL	466
BCFN	197	EFLM	251	ACELN	305	BELMN	359	ABEFLN	413	ABCDEFM	467
BCLM	198	EFLN	252	ACEMN	306	BFLMN	360	ABEFMN	414	ABCDEFN	468
BCLN	199	EFMN	253	ACFLM	307	CDEFL	361	ABELMN	415	ABCDELM	469
BCMN	200	ELMN	254	ACFLN	308	CDEFM	362	ABFLMN	416	ABCDELN	470
BDEF	201	FLMN	255	ACFMN	309	CDEFN	363	ACDEFL	417	ABCDEM N	471
BDEL	202	ABCE	256	ACLMN	310	CDELM	364	ACDEFM	418	ABCDFLM	472
BDEM	203	ABCDF	257	ADEFL	311	CELN	365	ACDEFN	419	ABCDFLN	473
BDEN	204	ABCDL	258	ADEFM	312	CDEMN	366	ACDELM	420	ABCDFMN	474
BDFL	205	ABCDM	259	ADEFN	313	CDFLM	367	ACDELN	421	ABCDLMN	475
BDFM	206	ABCDN	260	ADELM	314	CDFLN	368	ACDEM N	422	ABCEFLM	476
BDFN	207	ABCEF	261	ADELN	315	CDFMN	369	ACDFLM	423	ABCEFLN	477
BDLM	208	ABCEL	262	ADEMN	316	CDLMN	370	ACDFLN	424	ABCEFMN	478
BDLN	209	ABCEM	263	ADFLM	317	CEFLM	371	ACDFMN	425	ABCELMN	479
BDMN	210	ABCE N	264	ADFLN	318	CEFLN	372	ACDFLN	426	ABCELMN	480
BEFL	211	ABCF L	265	ADFMN	319	CEFMN	373	ACEFLM	427	ABDEFLM	481
BEFM	212	ABCFM	266	ADLMN	320	CELMN	374	ACEFLN	428	ABDEFLN	482
BEFN	213	ABCFN	267	AEFLM	321	CFLMN	375	ACEFMN	429	ABDEFMN	483
BELM	214	ABCLM	268	AEFLN	322	DEFLM	376	ACELMN	430	ABDELMN	484
BELN	215	ABCLN	269	AEFMN	323	DEFLN	377	ACFLMN	431	ABDFLMN	485
BEMN	216	ABCMN	270	AELMN	324	DEFMN	378	ADEFLM	432	ABEFLMN	486
BFLM	217	ABDEF	271	AFLMN	325	DELMN	379	ADEFLN	433	ACDEFLM	487
BFLN	218	ABDEL	272	BCDEF	326	DFLMN	380	ADEFMN	434	ACDEFLN	488
BFMN	219	ABDEM	273	BCDEL	327	EFLMN	381	ADELMN	435	ACDEFMN	489
BLMN	220	ABDEN	274	BCDEM	328	ABCEFL	382	ADFLMN	436	ACDELMN	490
CDEF	221	ABDFL	275	BCDEN	329	AEFLMN	383	AEFLMN	437	ACDFLMN	491
CDEL	222	ABDFM	276	BCDFL	330	ABCEMN	384	BCDEFL	438	ACEFLMN	492
CDEM	223	ABDFN	277	BCDFM	331	ABCDEN	385	BCDEFLN	439	AEFLMN	493
CDEN	224	ABDLM	278	BCDFN	332	ABCDFL	386	BCDEFN	440	BCDEFLM	494
CDFL	225	ABDLN	279	BCDLM	333	ABCDFM	387	BCDELM	441	BCDEFLN	495
CDFM	226	ABDMN	280	BCDLN	334	ABCDFN	388	BCDELN	442	BCDEFMN	496
CDFN	227	ABEFL	281	BCDMN	335	ABCDLM	389	BCDEM N	443	BCDELMN	497
CDLM	228	ABEFM	282	BCEFL	336	ABCDLN	390	BCDFLM	444	BCDFLMN	498
CDLN	229	ABEFN	283	BCEFM	337	ABCDMN	391	BCDFLN	445	BCEFLMN	499
CDMN	230	ABELM	284	BCEFN	338	ABCEFL	392	BCDFMN	446	BDEFLMN	500
CEFL	231	ABELN	285	BCELM	339	ABCEFM	393	BCDLMN	447	CDEFLMN	501
CEFM	232	ABEMN	286	BCELN	340	ABCEFN	394	BCEFLM	448	ABCDEFLM	502
CEFN	233	ABFLM	287	BCEMN	341	ABCELM	395	BCEFLN	449	ABCDEF LN	503
CELM	234	ABFLN	288	BCFLM	342	ABCELN	396	BCEFMN	450	ABCDEFMN	504
CELN	235	ABFMN	289	BCFLN	343	ABCEMN	397	BCELMN	451	ABCDELMN	505
CEMN	236	ABLMN	290	BCFMN	344	ABCFLM	398	BCFLMN	452	ABCDFLMN	506
CFLM	237	ACDEF	291	BCLMN	345	ABCFLN	399	BDEFLM	453	ABCEFLMN	507
CFLN	238	ACDEL	292	BDEFL	346	ABCFMN	400	BDEFLN	454	ABDEFLMN	508
CFMN	239	ACDEM	293	BDEFM	347	ABCLMN	401	BDEFMN	455	ACDEFLMN	509
CLMN	240	ACDEN	294	BDEFL	348	ABDEFL	402	BDELMN	456	BCDEFLMN	510
DEFL	241	ACDFL	295	BDELM	349	ABDEFN	403	BEFLMN	457	ABCDEF LMN	511
DEFM	242	ACDFM	296	BDELN	350	ABDEFLN	404	BEFLN	458		
DEFN	243	ACDFN	297	BDEMN	351	ABDELM	405	CDEFLM	459		
DELM	244	ACDLM	298	BDFLM	352	ABDELN	406	CDEFLN	460		
DELN	245	ACDLN	299	BDFLN	353	ABDEMN	407	CDEFMN	461		