

Development of Systems Design for National Household Surveys

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DEVELOPMENT OF SYSTEM DESIGN FOR NATIONAL HOUSEHOLD SURVEYS.

Report from a short-term mission to Harare, Zimbabwe,
12th - 28th January 1988.

By

Birgitta Lagerlöf

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DEVELOPMENT OF SYSTEM DESIGN FOR NATIONAL HOUSEHOLD SURVEYS

- report from a short-term mission to Harare, Zimbabwe,
12th - 28th January 1988.

1 Terms of reference

The terms of reference for this mission are enclosed to this report as Annex 1. In short the objectives of the mission were

- to make a comprehensive documentation of the course in systems design for the total processing of the ICDS

- to make some general proposals for the standardized system design for NHSCP data

2 Contacts

Counterparts were

Ass dir Jambwa; head of EDP unit
Mr Govore; EDP-specialist
Mr Mapeta; subject matter specialist

I also had several discussions with the team leader Mr Arvidsson, the technical expert Mr Brolenius, Statistics Sweden, and Mr Backlund, Statistics Sweden, who was here for a short-term mission too.

3 Background

In August 1987 Professor Bo Sundgren and I gave a course in systems development and systems architecture in connection with statistical data processing. One proposal, in our report, was that we would make a documentation of for example the Intercensal Demographic Survey, ICDS. The documentation would cover all steps in the systems development methodology, infological as well as datalogical, and go down to the level of a systems flow in terms of elementary functions to be realized by software packages like SAS.

The purpose with the documentation would be to show practically how to make a systems design and documentation for a statistical survey.

4 Systems design for the total processing of the ICDS

The systems documentation for the ICDS is enclosed as Annex 2.

The design of the system has been discussed and worked out during fruitful meetings with my counterparts and the team leader Mr. A. Arvidsson. We have been using the questionnaires, the tabulation plan, the coding and editing manual and interviewer's manual and worked through them carefully in order to make a correct documentation.

The design is based on the systems development methodology used at Statistics Sweden, which in short means:

- infological modeling
- simple data structures (flat files and/or relational tables)
- data processing in terms of simple functions and user-friendly languages

The documentation contains:

1 Verbal description from REALITY ANALYSIS

Here we have written shortly about

- Aim and function
- Relations to other systems
- Confidentiality and security

It hasn't been possible to give a Timetable for production yet, but it ought to be added later.

2 Descriptions from the INFOLOGICAL ANALYSIS (The contents oriented descriptions)

This is the phase where we have spent most of our time and talking. We made a complete documentation of

- Object system ; object graph and descriptions of every object
- Variable descriptions for each object

(The variable descriptions will need to be updated with stratum and serial number)

- Information needs

(In this part the tabulation plan is translated into a more strict language)

A chapter about the statistical quality will be added later by the team leader.

3 Descriptions from the DATALOGICAL ANALYSIS (The technique-oriented descriptions)

- Overview

which contains

- . the transformation from objects to flat files
- . an overview systems flow for all the production steps

- Systems flow

Because of too many unknown facts it wasn't possible to give a complete detailed systems flow. The flow given here illustrates how to break down the overview systems flow into simple functions.

The systems flow ought to be completed later.

- Archiving

- Record descriptions

The record descriptions have been worked out by Mr Govore. The descriptions for the tabulation files will be added later on.

- Lists and pictures - Layouts (not in the report)

Tabulation plan. Error lists which will be worked out later on.

- Forms (Questionnaires etc)

- EDP processes

Many of the EDP processes are self describing within the systems flow and don't need to be described here. But this part is not complete yet.

- Data entry (not in the report)

Instructions are not worked out yet. They are dependent of which software will be used for the data entry. The VAX computer has just been installed and Mr Brolenius is trying to find out if the software DATATRIEVE could be used for the data entry.

- Manual processes (not in the report)

Coding and editing manual and other instructions for the different manual processes.

4 General proposals for the standardized system design for NHSCP data

My opinion is that the documentation work with the ICDS should be completed and finalized while working on the survey. It should also be completed with programs used for the processing. Thorough documentation of the ICDS will then serve as a manual for other systems.

I also suggest that the software SAS should be used for the processes except for the data entry. Since SAS is a quite complex software package, it is important that the SAS courses are carefully tailored to cover the most urgent needs of CSO. Therefore I think that the first SAS courses should cover the different types of simple functions and programs needed in ICDS. On my request, Mr Backlund has described in a paper how simple functions, needed for data manipulation (sort, select, aggregate match ...), can be translated into SAS procedures. This paper is enclosed to my report as Annex 3. In the future some additional SAS modules could be bought to cover the data entry as well. Mr Backlund has written a paper on this topic too.

STATISTICS SWEDEN
A Arvidsson
/termbl/

87-11-11

TERMS OF REFERENCE

DEVELOPMENT OF SYSTEM DESIGN FOR NATIONAL HOUSEHOLD SURVEYS

Background

One of the major bottle-necks in the production process at the CSO has been the EDP-processing of collected data. In order to eliminate this a lot of actions have been taken. A re-organisation of the office meaning the establishment of an EDP-unit is one action. Another is the installation of an own mini-computer, allowing the CSO to have direct control over a greater part of the EDP processing.

Other parts in this process are the formulation of a EDP-policy for CSO and the creation of a standardized systems design for the processing of the surveys within the National Household Survey Capability Programme, NHSCP.

As an initial phase in creating a standardized systems design a course in systems development was given August 1987. (SYSTEMS DEVELOPMENT IN THE CENTRAL STATISTICAL OFFICE OF ZIMBABWE. REPOT FROM A COURSE GIVEN DURING A MISSION TO HARARE. ZIMSTAT 1987:13). The course included basic concepts in system design, documentation, software tools, statistical information systems etc. Except from these theoretical parts practical parts were included using the Labour Force Survey (LFS) and the Intercensal Demographic Survey (ICDS) as case studies.

The coming surveys included in the NHSCP are expected to be processed in the VAX system and it has been decided that the first survey, will be the ICDS, starting with data entry around February 1988. The tabulation of the LFS, stored in the Jet-network, is under consideration to be made in the VAX-system.

To prepare for this processing there is a need for assistance from Statistics Sweden in creating a total systems design for the processing of the ICDS. The development of this system design has to take into account the need for a standardized design as well as the new computer configuration.

Objectives of the mission

The following will be the objectives for the mission:

- to make a comprehensive documentation of the course in systems design giving a system design for the total processing of the ICDS
- to make some general proposals for the standardized system design for processing of NHSCP data

The consultant is also expected to assist in the formulation of terms of reference for a mission on review of the production system for the agricultural statistics.

Time schedule and counterparts

The mission is to be carried out by Mrs Birgitta Lagerloef during January 11th to January 29th. The counterparts will be Ass dir Jambwa and Mr Govore.

SYSTEMS DOCUMENTATION

SYSTEM/SUBSYSTEM	NR	SUBSYSTEM	HEADING
ICDS R1 1987	S001	A	

ISSUED BY	DATE	DOC.OBJ	VERSION	PAGE
B Lagerloef	88-01-27			

Responsible for - subject matter: Mr Mapeta
 - EDP-system: Mr Jambwa, Mr Govore

REALITY ANALYSIS	1	VERBAL DESCRIPTION
	1.1	Aim and function
	1.2	Dividing into subsystems
	1.3	Relations to other systems
	1.4	Confidentiality and security
	1.5	Timetable for production
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	2.2	Variable descriptions
	2.3	Dynamic of the object system
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DATALOGICAL ANALYSIS	3	DATALOGICAL MODEL
	3.1	Overview
	3.2	Systems flow
	3.3	Archiving
	4	DATA DESCRIPTIONS
	4.1	Record descriptions
	4.2	Lists and pictures - Layouts
	4.3	Forms (Questionnaires etc)
	5	PROCESS DESCRIPTIONS
	5.1	EDP processes
	5.2	Data entry
	5.3	Manual processes
PHYSICAL REALIZATION	6	OPERATING INSTRUCTIONS
	6.1	General instructions
	6.2	Operating instructions
	6.3	Operating orders

1.1 AIM AND FUNCTION

The Intercensal Demographic Survey 1st round, ICDS, is an enumeration of households in selected areas, to gather data on demographic characteristics of the population. The ICDS is carried out within the National Survey Capability Programme, NHSCP.

The aim of the ICDS is

- (i) To update the sampling frame and design currently used in Household Surveys.
- (ii) To provide a basis for updating statistics on population and on demographic and socio-economic variables in relation to the 1982 census.
- (iii) To serve as a pilot study for the 1992 census.

1.3 RELATION TO OTHER SYSTEMS.

(i) The 1982 census provides the sampling frame.

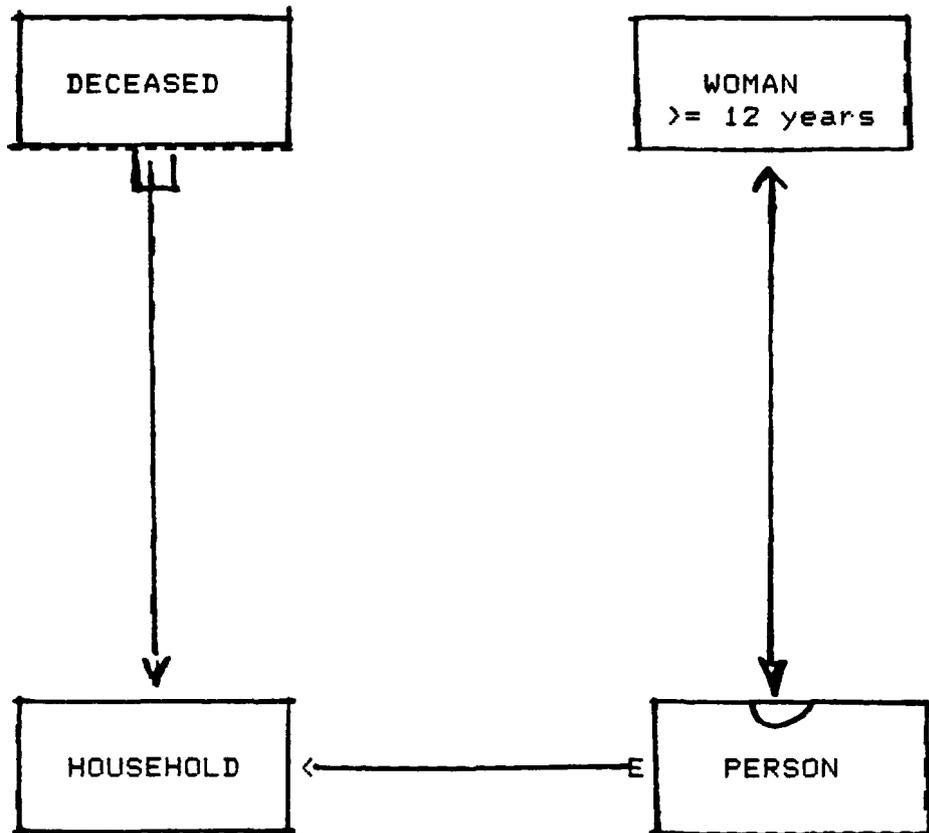
(ii) ICDS provides the following-

- an update to statistics and projections based on the 1982 census.
- the basis for updating the sample frame for other modules of the NHSCP.
- sample / subsample for the forthcoming and more detailed ICDS ROUND2.
- serves as a pilot study for the 1992 census.

1.4 CONFIDENTIALITY AND SECURITY.

Information obtained from the survey is confidential and will only be used to compile statistics which will be published in an aggregated form. No information on individuals / specific households can be divulged. Questionnaires are not to be left lying around where unauthorized persons may have access to them. Movement of the questionnaires is to be strictly controlled.

2.1 OBJECT SYSTEM, OBJECT GRAPH



2.1 OBJECT SYSTEM , OBJECT DESCRIPTION

OBJECT GROUP: HOUSEHOLD

Identifying variables: HID (AREA, DIVISION, SUBDIV, EANR, HHNR)

Object group definition: A household is a group of persons who
----- normally live and eat together.
Visitors are excluded.
(For more information see Interviewer's
manual page 4.)

Important variables: Derived variables - SOH (size of household),
----- STRATUM (communal/commercial/urban),
AREA

Method of data collection: Sample survey using standardized
----- questionnaires filled in by
enumerators

Related groups of objects:

PERSON
DECEASED

Foreign key:

HID
HID

2.1 OBJECT SYSTEM , OBJECT DESCRIPTION

OBJECT GROUP: PERSON

Identifying variables: HID, PID

Object group definition: The person is a usual member of the
----- household or a visitor last night.
(For more information see Interviewer's
manual page 4.)

Important variables: SEX, AGE, MARSTAT, ETHNIC, USMEM, RELTH,
----- and all other variables

Method of data collection: Sample survey using standardized
----- questionnaires filled in by
enumerators

Related groups of objects:

HOUSEHOLD
WOMAN >= 12 years

Foreign key:

HID
HID, PID

2.1 OBJECT SYSTEM , OBJECT DESCRIPTION

OBJECT GROUP: DECEASED

Identifying variables: HID, DID

Object group definition: The deceased who was a usual member of
----- the household during the last twelve
months.

Important variables: SEXD, AGED

Method of data collection: Sample survey using standardized
----- questionnaires filled in by
enumerators

Related groups of objects:

HOUSEHOLD

Foreign key:

HID

2.1 OBJECT SYSTEM , OBJECT DESCRIPTION

OBJECT GROUP: WOMAN >= 12 years

Identifying variables: HID, PID

Object group definition: Every women >= 12 who is a usual member
----- of the household or a visitor last night.

Important variables: number of children born

Method of data collection: Sample survey using standardized
----- questionnaires filled in by
enumerators

Related groups of objects:

PERSON

Foreign key:

HID, PID

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: HOUSEHOLD

NAME OF VARIABLE	DESCRIPTION/ROLE	VALUES, CODES etc
HID	Household identification	
AREA	Administrative area (see codes for PERSON.PLBIRTH)	000-999
DIVISION	Division	
	pos 1	0-6
	pos 2	0-9
SUBDIV	Subdivision	01-33
EANR	E. A. number	
	pos 1	0-7
	pos 2	0-9
HHNR	Household number	0001-9999
INTD	Day of actual interview (18/8 - 17/9 ??)	01-31
INTM	Month of actual interview	08-09

DERIVED VARIABLES:

SOH	Size of household = number of persons excluding visitors	01-40
-----	---	-------

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: PERSON

1 (2)

NAME OF VARIABLE	DESCRIPTION/ROLE	VALUES, CODES etc
HID	Household identification	
AREA	Administrative area (see codes for PERSON.PLBIRTH)	000-999
DIVISION	Division	
	pos 1	0-6
	pos 2	0-9
SUBDIV	Subdivision	01-33
EANR	E. A. number	
	pos 1	0-7
	os 2	0-9
HHNR	Household number	0001-9999
PID	Serial number which identifies person within the household	01-40
USMEM	Usual members of the household	
	Present last night	= 1
	Absent last night	= 2
	Visitors	= 3
RELTH	Relationship to head of household	
	Head	= 1
	Spouse	= 2
	Son / Daughter	= 3
	Son / Daughter-in-law	= 4
	Mother / Father-in law	= 5
	Other relative	= 6
	Not related	= 7
SEX	Sex	
	Male	= 1
	Female	= 2
AGEM	Age in months if AGE < 1 Number of months above AGE if 1 <= AGE <= 4 00 if AGE >= 5 (see Interviewer's manual page 10)	00-11
AGE	Age at last birthday in years	00-99
PLBIRTH	Place of birth (State district if born in Zimbabwe. State country if born outside Zimbabwe. See Coding and editing manual.)	000-999
CITSHIP	Citizenship	
	Zimbabwe	= 1
	Mozambique	= 2
	Malawi	= 3
	Zambia	= 4
	Other African	= 5
	Other non-African	= 6

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: PERSON

2(2)

NAME OF VARIABLE	DESCRIPTION/ROLE	VALUES, CODES etc
RESID	Previous place of residence if the person has changed his/her place of residence in the last twelve months. (see codes for PERSON.PLBIRTH)	000-999
ETHNIC	Ethnic group	Black = 1 White = 2 Coloured = 3 Asian = 4 Other = 5
MARSTAT	Marital status	Never married = 1 Married = 2 Divorced/separated = 3 Widowed = 4
SCHOOL	School attendance	At school = 1 Left school = 2 Never attended = 3
HLEVAC	Highest level of academic education completed	Grade 0 = 00 Grade 1 = 01 Grade 2 = 02 Grade 3 = 03 Grade 4 = 04 Grade 5 = 05 Grade 6 = 06 Grade 7 = 07 Form 1 = 08 Form 2 = 09 Form 3 = 10 Form 4 = 11 Form 5 / M Level = 12 A Level = 13 Graduate/Undergraduate = 14
VOCTR	Further vocational training in years	0-9
WORK	Main kind of work last twelve months	01-99
NOWORK	Reason for not working	Unemployed = 1 Retired / Pensioner = 2 Home duties = 3 Sick = 4 Handicapped = 5 Attending school = 6 Other = 7

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: WOMAN >= 12 years 1(2)

NAME OF VARIABLE	DESCRIPTION/ROLE	VALUES, CODES etc
HID	Household identification	
AREA	Administrative area (see codes for PERSON.PLBIRTH)	000-999
DIVISION	Division	
	pos 1	0-6
	pos 2	0-9
SUBDIV	Subdivision	01-33
EANR	E. A. number	
	pos 1	0-7
	os 2	0-9
HHNR	Household number	0001-9999
PID	Serial number which identifies person within the household	01-40
WOMAN	Who is the respondent woman	Concerned = 1 Proxy = 2
PREG	Have you ever been pregnant	Yes = 1 No = 2
AGEP	Age at first pregnancy	12-49,bb
BIRTHLC	Have you ever given birth to a live child	Yes = 1 No = 2 If never pregnant = b
AGELC	Age at first live birth	15-49,bb
	Number of children of your own living in this household:	
BOYSIH	- Sons	0-9
GIRLSIH	- Daughters	0-9
	Number of children of your own living elsewhere:	
BOYSE	- Sons	0-9
GIRLSE	- Daughters	0-9
	Have you ever given birth to a child who later died:	
BOYSD	- Sons	0-9
GIRLSD	- Daughters	0-9
	Total number of children ever born:	
BOYSTOT	- Sons	0-9
GIRLSTOT	- Daughters	0-9

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: WOMAN >= 12 years 2(2)

 NAME OF VARIABLE DESCRIPTION/ROLE VALUES, CODES etc

BIRTHL	When did you have your last live birth		
BDAYL	Day		01-31
BMONTHL	Month		01-12
BYEARL	Year		00-87
		If BIRTHLC = 2	= bbbbbb
SEXC	Sex of last live birth	Male	= 1
		Female	= 2
		If BIRTHLC = 2	= b
ALIVE	Is this child still alive	Alive	= 1
		Dead	= 2
		If BIRTHLC = 2	= b

2.2 VARIABLE DESCRIPTION

OBJECT GROUP: DECEASED

NAME OF VARIABLE	DESCRIPTION/ROLE	VALUES, CODES etc
------------------	------------------	-------------------

HID	Household identification (see HOUSEHOLD)	
DID	Serial number which identifies person deceased within the household during the last twelve months	01-12
RELTHD	Relationship to head of household (see PERSON.RELTH)	1-7
PLACED	Where did the deceased usually reside (same codes as PERSON.PLBIRTH)	000-999
SEXD	Sex	Male = 1 Female = 2
DATEB	Date of birth	
DAYB	Day	01-31
MONTHB	Month	01-12
YEARB	Year	00-87
DATED	Date of death (18/8-87 - 17/8-88)	
DAYD	Day	01-31
MONTHD	Month	01-12
YEARD	Year	00-87

DREIVED VARIABLES:

AGED	Age at death : YEARD - YEARB	00-87
AGEMD	For infants only:	00-23
	If AGED = 0: MONTHD - MONTHB	
	If AGED = 1: MONTHD + (12 - MONTHB)	
	If AGED > 1: 0	

2.4 INFORMATION NEEDS

1.00 Total population.

Nr	OBJECTS	for OBJECT with	give	by
1.01	PERSON, HOUSEHOLD (SOH)	for PERSON with USMEM = 1,2 and	give number	by AGE (gr) * SOH (gr) * SEX
1.01.1		STRATUM=0		
1.01.2		STRATUM=4		
1.02-04	PERSON	for PERSON	give number	by AGE (gr) * (see below) * SEX
1.02				MAR: TAT
1.03				ETHNIC
1.04				CITSHIP
1.05	PERSON	for PERSON	give number	by AGE * ETHNIC * SEX

2.4 INFORMATION NEEDS

2.00 Household characteristics.

Nr	OBJECTS	for OBJECT with	give	by
2.01	PERSON, HOUSEHOLD (SOH)	for PERSON with RELTH = 1	give number	by AGE (gr) * SOH (gr) * SEX
		and		
2.01.1		STRATUM=0		
2.01.2		STRATUM=4		
2.02-07	PERSON	for PERSON with RELTH = 1	give number	by AGE (gr) * (see below) * SEX
2.02				MARSTAT
2.03				ETHNIC
2.04				CITSHIP
2.05				SCHOOL
		and		
2.05.1		STRATUM=0		
2.05.2		STRATUM=4		
2,06				HLEVAC (gr)
		and		
2.06.1		STRATUM=0		
2.06.2		STRATUM=4		
2.07				WORK (gr)
		and		
2.07.1		STRATUM=0		
2.07.2		STRATUM=4		
2.1	PERSON	for PERSON	give number	by AGE (gr) * RELTH * SEX
2.2-4	PERSON	for PERSON with USMEM = 1,2	give number	by AGE (gr) * (see below) * SEX
2.2				ETHNIC
2.3				CITSHIP
2.4				MARSTAT

2.4 INFORMATION NEEDS

3.0 Migration

Table nr	OBJECTS	for OBJECT with	give	by
3.1	PERSON	for PERSON with	give number	by AREA (0-7, 1st digit) * PLBIRTH (0-7, 1st digit)
3.1.1		STRATUM = 0		
3.1.2		STRATUM = 4		
3.1.3		SEX = 1		
3.1.4		SEX = 2		
3.2.0		ETHNIC = 1		
3.2.1		ETHNIC = 2		
3.2.2		ETHNIC = 4		
3.2.3		ETHNIC = 3		
3.3	PERSON	for PERSON with	give number	by AREA (0-7, 1st digit) * RESID (0-7, 1st digit)
3.3.1		SEX = 1		
3.3.2		SEX = 2		
3.4	PERSON	for PERSON with HLEVAC = 00	give number	by AREA (0-7, 1st digit) * PLBIRTH (0-7, 1st digit)
3.4.1		HLEVAC = 01-07		
3.4.2		HLEVAC = 08-09		
3.4.3		HLEVAC = 10-11		
3.4.4		HLEVAC = 12-13		
3.4.5		HLEVAC = 14		

2.4 INFORMATION NEEDS

4.0 Education

Table nr	OBJECTS	for OBJECT with	give	by
4.1	PERSON	for PERSON	give number	by AGE (gr) * SCHOOL * SEX
		with		
4.1.1		STRATUM = 0		
4.1.2		STRATUM = 4		
4.2	PERSON	for PERSON	give number	by AGE (gr) * HLEVAC (gr) * SEX
		with		
4.2.1		STRATUM = 0		
4.2.2		STRATUM = 4		
4.3		ETHNIC = 1		
4.3.1		ETHNIC = 2		
4.3.2		ETHNIC = 4		
4.3.3		ETHNIC = 3		
4.4	ö PERSON	for PERSON	give number	by HLEVAC (gr) * AGE * CITSHIP
	ö	with		
	ö	SEX = 1		
???	ö	with		
	ö			
4.4.1ö		SEX = 2		
4.4	PERSON	for PERSON	give number	by HLEVAC (gr) * SCHOOL * SEX

2.4 INFORMATION NEEDS

5.0 Activity Status

Table nr	OBJECTS	for OBJECT with	give	by
5.1	PERSON	for PERSON with AGE >= 10 and WORK = 00-98	give number	by WORK * AGE (gr) * SEX
5.1.1		STRATUM = 0		
5.1.2		STRATUM = 4		
5.2		ETHNIC = 1		
5.2.1		ETHNIC = 2		
5.2.2		ETHNIC = 3		
5.2.3		ETHNIC = 4		
5.3	PERSON	for PERSON with AGE >= 10 and WORK = 00-98	give number	by WORK * CITSHIP * SEX
5.4	PERSON	for PERSON with AGE >= 10 and WORK = 00-98	give number	by WORK * HLEVAC (gr) * SEX
5.4.1		STRATUM = 0		
5.4.2		STRATUM = 4		
5.5	PERSON	for PERSON with AGE >= 10 and NOWORK = 1-7	give number	by NOWORK * AGE (gr) * SEX
5.5.1		STRATUM = 0		
5.5.2		STRATUM = 4		
5.6	PERSON	for PERSON with AGE >= 10 and NOWORK = 1-7	give number	by NOWORK * ETHNIC * SEX

2.4 INFORMATION NEEDS

5.0 Activity Status

Table nr	OBJECTS	for OBJECT with	give	by
5.7	PERSON	for PERSON with WORK = 00-98 or NOWORK = 1	give number	by WORK * AGE (gr) * SEX
		and		
5.7.1		STRATUM = 0		
5.7.2		STRATUM = 4		

2.4 INFORMATION NEEDS

6.0 Mortality

Table nr	OBJECTS	for OBJECT with	give	by
6.1	DECEASED	for DECEASED with	give number	by AGED (gr) * SEXD
6.1.1		STRATUM = 0		
6.1.2		STRATUM = 4		
6.2	DECEASED	for DECEASED	give number	by AGED (gr) * YEARD (gr) * MONTHD (gr) * SEXD
6.3	DECEASED	for DECEASED	give number	by AGED (gr) * PLACED (0-7, 1st digit) * SEXD
6.4	DECEASED	for DECEASED with AGEMD = 00-12	give number	by AGEMD (gr) * YEARD (gr) * MONTHD (gr) * SEXD
		and		
6.4.1		STRATUM = 0		
6.4.2		STRATUM = 4		
6.5	ö DECEASED ö ???	for DECEASED	give number	by DATEB (gr) * YEARD (gr) * MONTHD (gr) * SEXD
6.5	DECEASED	for DECEASED	give number	by AGED (gr) * PLACED (0-7, 1st digit) * SEXD
6.6	DECEASED	for DECEASED	give number	by AGED (gr) * YEARD (gr) * MONTHD (gr) * SEXD

2.4 INFORMATION NEEDS

7.0 Fertility

Table nr	OBJECTS	for OBJECT with	give	by
7.1	WOMAN >= 12 years, PERSON (AGE)	for WOMAN >= 12 years with	give number, sum BOYSTOT, sum GIRLSTOT,	by AGE (gr)
7.1.1		STRATUM = 0		
7.1.2		STRATUM = 4		
7.2	WOMAN >= 12 years, PERSON (AGE)	for WOMAN >= 12 years with	give sum BOYSTOT, sum GIRLSTOT, sum (BOYSTOT-BOYSD), sum (GIRLSTOT-GIRLSD)	by AGE (gr)
7.2.1		STRATUM = 0		
7.2.2		STRATUM = 4		
7.3	WOMAN >= 12 years	for WOMAN >= 12 years	give number, sum BOYSTOT, sum GIRLSTOT, sum (BOYSTOT-BOYSD), sum (GIRLSTOT-GIRLSD)	by AGELC
7.4	WOMAN >= 12 years, PERSON (AGE)	for WOMAN >= 12 years	give number	by AGE (gr) * (BOYSTOT+ GIRLSTOT) (gr)
7.5	this table is included in 7.4 (number of children ever born = 0)			
7.6	WOMAN >= 12 years, PERSON (AGE<HLEVAC)	for WOMAN >= 12 years	give number, sum (BOYSTOT+ GIRLSTOT), sum (BOYSTOT-BOYSD) + (GIRLSTOT-GIRLSD)	by AGE (gr) * HLEVAC (gr)
		with		
7.6.1		STRATUM = 0		
7.6.2		STRATUM = 4		

2.4 INFORMATION NEEDS

7.0 - 9.1 Fertility

Table nr	OBJECTS	for OBJECT with	give	by
7.7	WOMAN >= 12 years, PERSON (WORK)	for WOMAN >= 12 years	give sum BOYSTOT, sum GIRLSTOT, sum (BOYSTOT-BOYSD), sum (GIRLSTOT-GIRLSD)	by WORK
		with		
7.7.1		STRATUM = 0		
7.7.2		STRATUM = 4		
7.8	WOMAN >= 12 years, PERSON (AGE,WORK)	for WOMAN >= 12 years	give sum (BOYSTOT+GIRLSTOT), sum (BOYSTOT-BOYSD) + (GIRLSTOT-GIRLSD)	by WORK (gr) * AGE (gr)
		with		
7.8.1		STRATUM = 0		
7.8.2		STRATUM = 4		
7.9	WOMAN >= 12 years, PERSON (AGE,SCHOOL)	for WOMAN >= 12 years	give sum (BOYSTOT+GIRLSTOT), sum (BOYSTOT-BOYSD) + (GIRLSTOT-GIRLSD)	by AGE (gr) * SCHOOL
		with		
7.9.1		STRATUM = 0		
7.9.2		STRATUM = 4		

2.4 INFORMATION NEEDS

7.0 - 9.1 Fertility

Table nr	OBJECTS	for OBJECT with	give	by
8.0	WOMAN >= 12 years	for WOMAN >= 12 years with (BYEARL = 86 and BMONTH >= 08) or (BYEARL = 87 and BMONTH <= 08) and	give number	by BYEARL (gr) * BMONTHL (gr) * SEXC
8.0.1		STRATUM = 0		
8.0.2		STRATUM = 4		
9.1	WOMAN >= 12 years, PERSON (AGE)	for WOMAN >= 12 years with ALIVE = 1	give number	by AGE (gr) * SEXC

3.1 OVERVIEW

OBJECT -> FLAT FILES

OBJECT	F L A T F I L E S		
	excluding derived variables	including derived variables	tabulation files
HOUSEHOLD		HOUSE	
PERSON	PERSON		PERSONH
DECEASED	DECE	DEC	
WOMAN >= 12 years	WOMAN		WOMANP

3.1 OVERVIEW

PRODUCTION STEPS.

	PERSON	0	DECE	0	WOMAN	0
		---		---		---
SORTING ON						
HID, PID/ DID		---		---		---
	PERSON	0	DECE	0	WOMAN	0
		---		---		---
CHECKING FOR						
DUPLICATES AND		---		---		---
MARKING ALL DUPLICATES						
	PERSON	0	DECE	0	WOMAN	0

	PERSON	0

STRUCTURE CONTROL		
to control that every		---
household has got exactly		
one head of household		
Mark all the members in		
households without heads.		
	PERSON	0

	PERSON	0	0	DECE
	(HOUSEHOLD)			

STRUCTURE CONTROL				
to control that all		---		
DECEASED belong to a				
household in the survey.		---		
Mark noncorresponding				
records				
		0	DECE	

3.1 OVERVIEW

PRODUCTION STEPS.

```

                PERSON 0          0 WOMAN
                (female >= 12) |          |
                -----
STRUCTURE CONTROL
to control that every
WOMAN corresponds to a
female PERSON >= 12 years
and that every female
PERSON >= 12 years corresponds
to a WOMAN.
Mark noncorresponding records.
                |          |
                |          |
                |          |
                |          |
                PERSON 0          0 WOMAN

```

```

                PERSON 0          DECE 0          WOMAN 0
                |          |          |
                |          |          |
                ---
CREATING OF FREQUENCY-
TABLES ( per variable) |          |          |
                ---
                |          |          |
                ---
                Frequency-tables |          |          |
                | | -          | | -          | | -
                -          -          -

```

```

                PERSON 0          DECE 0          WOMAN 0
                |          |          |
                |          |          |
                ---
(A50 - A56)
EDITING AND CORRECTION |          |          |
WITHIN FILES          ---
                |          |          |
                ---
                Error lists |          |          |
                incl duplicates, | | -          | | -
                structure errors -          -
                |          |          |
                ---
Correction            |          |          |
                ---

```


3.1 OVERVIEW

PRODUCTION STEPS.

	PERSONH	0	PERSON (or PERSONH)	0
TABULATION including grouping of variables and sometimes deriving of new variables				
		---		---
		---		---
Tables	1.01	---	1.02-1.05	---
	1.01.1		2.02-2.07	
	1.01.2	-	2.1-2.4	-
	2.01	-	3.1-3.4.4	-
	2.01.1		4.1-4.5	
	2.01.2		5.1-5.7.2	

	WOMANP	0	DEC	0
TABULATION including grouping of variables and sometimes deriving of new variables				
		---		---
		---		---
		---		---
Tables	7.1-7.9		6.1-6.7	
		-		-
		-		-

3.2 SYSTEMS FLOW

PROCESS	FUNCTION /PROGRAM	RECORD-DESCR.	SYSTEMS FLOW	DESCRIPTION
		PERSON	o ---	
A60	SELECT AGGREGATE		 ---	Select USMEM = 1,2 Aggregate by HID to get SOH
		HOUSE	o 	
		PERSON	o ----- 	
A62	JOIN PROJECT		--- ---	Join PERSON, HOUSE where HID=HID. Project to get PERSONH
		PERSONH	o 	
A64	SELECT PROJECT		--- ---	Select PERSON with SEX=2 and AGE>=12. Project to record- description incl just variables needed
		&PW	o 	Females >=12 years
		WOMAN	o ----- 	
A66	OJOIN		--- ---	Join &PW,WOMAN where HID,PID= HID,PID. Create a record for every record in &PW completed with - WOMAN-variables; if corresponding - blanks; else
		WOMANP	o 	All females >= 12
A68	DEFINE		--- ---	If PREG = blank: Create WOMANP- records like those with PREG=2
		WOMANP	o	

3.2 SYSTEMS FLOW

PROCESS	FUNCTION /PROGRAM	RECORD- DESCR.	SYSTEMS FLOW	DESCRIPTION
		DECE	o	
A70	DEFINE		---	Derive AGED, AGEMD
				(see variable-
			---	description)
		DEC	o	

3.3 ARCHIVING

The common rule is to archive the cleaned flat files after the editing and correction processes. In this system, that would mean that the files PERSON and DECE should be archived after being corrected. But if it seems possible that the tabulationfiles will be used for more tabulation including the derived variables it could be wiser to save PERSONH.A62 and DEC.A70.

Since the WOMAN-file probably isn't complete after the editing processes I recommend you to save WOMANP.A68 (= WOMANP coming from process A68).

My recommendation from what I believe today (27/1-88) is:

Archive PERSONH.A62 DEC.A70 WOMANP.A68

4.1

Record description for HOUSEHOLD - including derived variables

Field	Position	Bytes	Type	Dec	Comments
HID	1 - 13	13	C	0	Household identity
AREA	1 - 3	3	C	0	Admin. area
DIVISION	4 - 5	2	C	0	Division
SUBDIV	6 - 7	2	C	0	Subdivision
EANR	8 - 9	2	C	0	E.A. Number
HHNR	10 - 13	4	C	0	Household Number

--- HID is made up of AREA, DIVISION, EANR and HHNR -----

INTD	14 - 15	2	C	0	Day of interview
INTM	16 - 17	2	C	0	Month of interview
STRATUM	18	1	C	0	Stratum
SRN	19 - 23	5	C	0	Serial number
SOH	24 - 25	2	N	0	Size of household

4.1

Record description for PERSON - excluding derived variables

Field	Position	Bytes	Type	Dec	Comments
HID	1 - 13	13	C	0	Household identity
AREA	1 - 3	3	C	0	Admin. area
DIVISION	4 - 5	2	C	0	Division
SUBDIV	6 - 7	2	C	0	Subdivision
EANR	8 - 9	2	C	0	E. A. Number
HHNR	10 - 13	4	C	0	Household Number

--- HID is made up of AREA, DIVISION, EANR and HHNR -----

INTD	14 - 15	2	C	0	Day of interview
INTM	16 - 17	2	C	0	Month of interview
STRATUM	18	1	C	0	Stratum
SRN	19 - 23	5	C	0	Serial number
PID	24 - 25	2	C	0	Person number
USMEM	26	1	C	0	Usual members
RELTH	27	1	C	0	Relation to head
SEX	28	1	C	0	SEX (M=1, F=2)
AGE	29				Age- last birthday
MONTHS	29 - 30	2	N	0	Months
YEARS	31 - 32	2	N	0	Years
PLBIRTH	33 - 35	3	C	0	Place of birth
CITSHIP	36	1	C	0	Citizenship
RESID	37 - 39	3	C	0	Previous place of residence
ETHNIC	40	1	C	0	Ethnic group
MARSTAT	41	1	C	0	Marital status
SCHOOL	42	1	C	0	School attendance
HLEVAC	43 - 44	2	C	0	Level of education
VOCTR	45	1	N	0	Vocational train.
WORK	46 - 47	2	C	0	Main kind of work
NOWORK	48	1	C	0	Reason for not working

Record description for DECEASED - excluding derived variables

Field	Position	Bytes	Type	Dec	Comments
HID	1 - 13	13	C	0	Household identity
AREA	1 - 3	3	C	0	Admin. area
DIVISION	4 - 5	2	C	0	Division
SUBDIV	6 - 7	2	C	0	Subdivision
EANR	8 - 9	2	C	0	E.A. Number
HHNR	10 - 13	4	C	0	Household Number

--- HID is made up of AREA, DIVISION, EANR and HHNR -----

INTD	14 - 15	2	C	0	Day of interview
INTM	16 - 17	2	C	0	Month of interview
STRATUM	18	1	C	0	Stratum
SRN	19 - 23	5	C	0	Serial number
DID	24 - 25	2	C	0	Deceased's serial number
RELTHD	26	1	C	0	Relation to head
PLACED	27 - 29	3	C	0	Place of residence
SEXD	30	1	C	0	Sex (M=1, F=2)
DATEB	31				Date of birth
DAYB	31 - 32	2	C	0	Day
MONTHB	33 - 34	2	N	0	Month
YEARB	35 - 36	2	N	0	Year
DATED	37				Date of death
DAYD	37 - 38	2	C	0	Day
MONTHD	39 - 40	2	N	0	Month
YEARD	41 - 42	2	N	0	Year

4.1

Record description for DECEASED - including derived variables

Field	Position	Bytes	Type	Dec	Comments
HID	1 - 13	13	C	0	Household identity
AREA	1 - 3	3	C	0	Admin. area
DIVISION	4 - 5	2	C	0	Division
SUBDIV	6 - 7	2	C	0	Subdivision
EANR	8 - 9	2	C	0	E.A. Number
HHNR	10 - 13	4	C	0	Household Number

--- HID is made up of AREA, DIVISION, EANR and HHNR -----

INTD	14 - 15	2	C	0	Day of interview
INTM	16 - 17	2	C	0	Month of interview
STRATUM	18	1	C	0	Stratum
SRN	19 - 23	5	C	0	Serial number
DID	24 - 25	2	C	0	Deceased's serial number
RELTHD	26	1	C	0	Relation to head
PLACED	27 - 29	3	C	0	Place of residence
SEXD	30	1	C	0	Sex (M=1,F=2)
DATEB	31				Date of birth
DAYB	31 - 32	2	C	0	Day
MONTHB	33 - 34	2	N	0	Month
YEARB	35 - 36	2	N	0	Year
DATED	37				Date of death
DAYD	37 - 38	2	C	0	Day
MONTHD	39 - 40	2	N	0	Month
YEARD	41 - 42	2	N	0	Year
AGED	43 - 44	2	N	0	Age at death in years
AGEMD	45 - 46	2	N	0	Age at death in months

Record description for WOMEN >= 12 YEARS

Field	Position	Bytes	Type	Dec	Comments
HID	1 - 13	13	C	0	Household identity
AREA	1 - 3	3	C	0	Admin. area
DIVISION	4 - 5	2	C	0	Division
SUBDIV	6 - 7	2	C	0	Subdivision
EANR	8 - 9	2	C	0	E. A. Number
HHNR	10 - 13	4	C	0	Household Number
--- HID is made up of AREA, DIVISION, EANR and HHNR -----					
INTD	14 - 15	2	C	0	Day of interview
INTM	16 - 17	2	C	0	Month of interview
STRATUM	18	1	C	0	Stratum
SRN	19 - 23	5	C	0	Serial number
PID	24 - 25	2	C	0	Person number
WOMAN	26	1	C	0	Respondent
PREG	27	1	C	0	Ever pregnant
AGEP	28 - 29	2	N	0	Age at 1st pregnancy
BIRTHLC	30	1	C	0	Birth - live child
AGELC	31 - 32	2	N	0	Age at 1st live birth
BOYSIH	33	1	N	0	Sons in household
GIRLSIH	34	1	N	0	Daughters in household
BOYSE	35	1	N	0	Sons elsewhere
GIRLSE	36	1	N	0	Daughters elsewhere
BOYSD	37	1	N	0	Sons deceased
GIRLSD	38	1	N	0	Daughters deceased
BOYSTOT	39	1	N	0	Sons - total born
GIRLSTOT	40	1	N	0	Daughters - total number born
BIRTHL	41				Last live birth
BDAYL	41 - 42	2	C	0	Day
BMONTHL	43 - 44	2	C	0	Month
BYEARL	45 - 46	2	C	0	Year
SEXC	47	1	C	0	Sex of last live birth
ALIVE	48	1	C	0	Child still alive

Survey number		Round number	Administrative area			Division		Sub-division		E.A. number		Segment number	Sub-sample	Household number				Day of actual interview		Month of actual interview	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	2	1																			

23 Number of deaths in this household in the last twelve months

23

CHARACTERISTICS OF THE DECEASED

Record type	Serial No.	Name of deceased	Relationship to head of household	Where did the deceased usually reside?			Sex Male=1 Female=2	When was the deceased born			Day, month and year of death									
				Name of district or town				Office use only			Day	Month	Year	Day	Month	Year				
24	25 26		27		28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
2	01																			
	02																			
	03																			
	04																			
	05																			
	06																			

FERTILITY CHARACTERISTICS

FOR WOMEN AGED 12 YEARS AND OVER (The questions to be answered by the woman concerned if present)

Record type	Serial no. As per column 24, 25 of Record type 1	Who is the respondent woman Concerned=1 Proxy=2	Have you ever been pregnant Yes=1 No=2	Age at first pregnancy	Have you ever given birth to a live child Yes=1 No=2	Age at first live birth	Number of children of your own living in this household		Number of children of your own living elsewhere		Have you ever given birth to a child who later died		Total number of children ever born		LAST LIVE BIRTH			Sex of last live birth Male=1 Female=2	Is this child still alive Alive=1 Dead=2			
							Sons	Daughters	Sons	Daughters	Sons	Daughters	Sons	Daughters	When did you have your last live birth							
							33	34	35	36	37	38	39	40	Day	Month	Year					
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
3																						

5.1 EDP PROCESSES

PROCESS A50

Input: PERSON sorted on HID,PID

Output: Error lists including duplicates and structure errors

Editing rules:

If SCHOOL = 3 then HLEVAC = 00
If WORK = 01-98 then NOWORK = b
If WORK = bb then NOWORK = 1-7
If RELTH = 1 then AGE > 15
If RELTH = 3 then AGE < 40
If RELTH = 5 then AGE > 30

Print also on Error list:

- All records flagged as duplicates
- All records flagged as belonging to households without head of households
- All records (female >= 12years) flagged as having no corresponding woman in WOMAN-file

PROCESS A52

Input: DECE sorted on HID,DID

Output: Error lists including duplicates and structure errors

Editing rules:

YEARB <= YEARD

Print also on Error list:

- All records flagged as duplicates
- All records flagged as belonging to no household

5.1 EDP PROCESSES

PROCESS A54

Input: WOMAN sorted on HID,PID

Output: Error lists including duplicates and structure errors

Editing rules:

If PREG = 2 then AGEPC = bb

BIRTHLC = b,2

If PREG = 2 or BIRTHLC = 2 then AGEPC = bb
BOYSIH = 0
GIRLSIH = 0
BOYSE = 0
GIRLSE = 0
BOYSD = 0
GIRLSD = 0
BOYSTOT = 0
GIRLSTOT = 0
BIRTHL = bbbbbb
SEXC = b
ALIVE = b

If BIRTHLC = 1 or PREG = 1 then AGEPC >= 12 and < 50

If BIRTHLC = 1 then AGEPC >= 15 and < 50
BOYSTOT > 0 or GIRLSTOT > 0
BOYSIH + BOYSE + BOYSD = BOYSTOT
GIRLSIH + GIRLSE + GIRLSD = GIRLSTOT
BIRTHL > bbbbbb
SEXC = 1,2
ALIVE = 1,2

If SEXC = 1 and ALIVE = 1 then BOYSTOT > 0

If SEXC = 2 and ALIVE = 1 then GIRLSTOT > 0

If SEXC = 1 and ALIVE = 2 then BOYSD > 0

If SEXC = 2 and ALIVE = 2 then GIRLSD > 0

Print also on Error list:

- All records flagged as duplicates

- All records flagged as having no corresponding female PERSON
>= 12 years

DEFINE

```
DATA NEW;  
  SET OLD;  
  IF <expression> THEN DO;  
    <new variable> = <expression>;  
  END;
```

Note: The IF statement is optional. More than one statement within the DO END clause is allowed.

SORT

```
PROC SORT DATA=OLD OUT=NEW;  
  BY <list of variables>;
```

Note: When omitting the option OUT= the input SAS data set will be sorted and replace the not sorted. Optional is sorting descending on variables in the BY list.

FORMAT

Note: While SAS are storing data in its own format in libraries of SAS Data Sets, it is not necessary to change the internal format. If it is desired to write the data to an ordinary flat file this can easily be done using the PUT statement in the DATA step.

COLLAPSE

```
PROC SORT DATA=OLD;  
  BY <list of variables>;  
  
DATA NEW;  
  SET OLD;  
  BY <list of variables>;  
  IF FIRST.<last variable in BY list>;
```

Note: It is always possible to specify a sufficient list of variables which taken together must give an unique characteristic to the observation, thus enabling eliminating of duplicates.

THE BASE OPERATOR SYSTEM IN TERMS OF SAS

by Sten Bäcklund, Statistics Sweden

In the following I will try to outline the Base Operator System (BOS) in terms of SAS (Statistical Analysis System). Firstly, it has to be pointed out that while BOS refers to flat files, SAS refers to so called SAS Data Sets. The latter can be regarded as flat files but with some important distinctions:

- . they are organised in **observations** and **variables** instead of records and fields
- . they contain **metadata**, meaning information about the dataset itself

So let us see what the corresponding SAS statements could be for the different operators.

PROJECT

```
DATA NEW(KEEP=<list of variables>);
  SET OLD;
```

Note: An alternative is the statement (or option) DATA NEW(DROP=<list of variables>);

AGGREGATE

```
PROC SUMMARY DATA=OLD NWAY;
  CLASS <list of variables>;
  VAR <list of variables>;
  OUTPUT OUT=NEW
         N= SUM= MAX= MIN=
  ;
```

Note: In addition a lot of other statistics can be specified, i.e. the variance, standard deviation, range. Also aggregates on all possible crossings of CLASS-variables can be achieved by excluding the NWAY option in the PROC statement.

SELECT

```
DATA NEW;
  SET OLD;
  IF <restriction expression>;
```

UNION

```
DATA NEW;  
  SET OLD1 OLD2;  
  BY <list of variables>;  
  IF FIRST.<last variable in BY list>;
```

Note: The statements requires that the sets OLD1 and OLD2 are sorted on the variables in the BY list. This will ensure that these data sets are interleaved meaning that the resulting set NEW will contain all observations in those two sets but sorted. The IF statement removes duplicates.

JOIN

```
DATA NEW;  
  MERGE OLD1(IN=IN1) OLD2(IN=IN2);  
  BY <list of variables>;  
  IF IN1 & IN2;
```

Note: The statements requires that the sets OLD1 and OLD2 are sorted on the variables in the BY list. The boolean variables IN1 and IN2 are flags indicating if the observation created uses information from OLD1 or OLD2. The IF statement will then be true only if there is a match.

MINUS

```
DATA NEW;  
  MERGE OLD1(IN=IN1) OLD2(IN=IN2);  
  BY <list of variables>;  
  IF IN1 & ~IN2;
```

Note: Se the note for the JOIN operator.

OJOIN

```
DATA NEW;  
  MERGE OLD1(IN=IN1) OLD2(IN=IN2);  
  BY <list of variables>;
```

Note: Se the note for the JOIN operator. No flags are needed.

IMPORT

Note: The operator is not needed because SAS has its own internal format.

EXPORT

Note: The operator is not needed because SAS has its own internal format.

MDFILE

```
PROC DATASETS DDNAME=<SAS Data Library name>;  
  MODIFY OLD;  
  <statements>;
```

MDSHOW

```
PROC CONTENTS DATA=OLD HISTORY;
```

MDDELETE

```
PROC DATASETS DDNAME=<SAS Data Library name>;  
  DELETE OLD;
```

MDCOPY

```
DATA NEW;  
  SET OLD;
```

MDRENAME

```
PROC DATASETS DDNAME=<SAS Data Library name>;  
  RENAME OLD=NEW;
```

NOTE:

The Control Statements and the Service Statements in the Base Operation Description are not needed within the SAS system.

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