

Using the SAS® BMDP® and SPSS® Interface Engines Under VMS
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Abstract:

This tutorial discusses the function and usage of the BMDP and SPSS engines under version 6.06 of SAS using the VMS operating system. The paper begins with an overview of the SAS Multiple Engine Architecture and the differences between interface and native engines. This is followed by detailed looks at the SPSS and BMDP engines with examples for read-only access to SPSS and BMDP system files, and conversion to permanent SAS data sets. All code used is included.

Introduction:

An engine is the SAS System's mechanism for reading from or writing to files. All data sets and libraries are accessed through engines. The default engine is the V606 engine. This engine is used unless another engine is specified. Additional engines are used by SAS to access different implementations of SAS data sets and data sets formatted by other software.

There are two major types of engines. The first of these is the native engine which can read or write to files that are formatted by the SAS System. These include compatibility engines to read or write to data sets created by older versions of SAS, a sequential engine to read tape files, and a transport engine to move SAS data sets, libraries, and catalogs from one host environment to another.

Interface engines read from files formatted by other software. The engine presents the data to SAS as if it were a SAS data set. SAS provides three of these engines for VMS: SPSS which reads SPSS Release 9, SPSS-X, and SPSS, version 4 system files and export files, OSIRIS which reads OSIRIS data files and dictionary files in EBCDIC format, and BMDP which provides read access to BMDP save files.

These interface engines are direct interfaces and differ from the interface view engines supported by SAS/ACCESS software. Interface view engines access an external database through the creation of an access descriptor that is used as the definition of the database table.

Both the interface and interface view engines allow you to use SAS procedures and program statements to process data stored in these files without converting them to a SAS data set, saving storage and maintenance costs, while still providing for conversion to a SAS data set if desired.

Using the BMDP Engine:

The BMDP interface engine allows you to read BMDP save files directly from a SAS program. In the following example, a BMDP save file is created using the acetest data set:

Figure 1: BMDP Program

```
/ INPUT Variables = 14.  
    Format='f4.0,3(f1.0),  
          10(f2.0)'.  
    File = 'ACETEST.DAT'.  
  
/ VARIABLE Names = ID, SEX,  
    AGE, GROUP, UNDEP,  
    PLAN, SOLV, EVAL,  
    TOTAL, BALL,  
    TRAIN, PATTERN,  
    BOAT, LOCK.  
  
/ SAVE File='acetest.sav'.  
    CODE=acetest.  
    NEW.  
  
/ PRINT Linesize=78.  
  
/ END
```

To read this BMDP save file, first you assign a LIBNAME statement that points to the file specifying the BMDP engine. Then request the data set in the procedure statement. Because the

example file contains a single save file, it is accessed with the _first_ file code. The form of this statement for this example is:

Figure 2: BMDP Engine

```
LIBNAME bmd BMDP 'acetest.sav';
Proc Print Data=bmd._first_;
Run;
```

The output is as follows:

Figure 3: Print File

```
Friday, March 1, 1991
ID SEX AGE GROUP UNDER PLAN SOLV EVAL

10 1 4 2 9 12 9 10
2 2 5 2 10 13 10 13
8 1 5 2 9 13 11 10
4 2 5 2 10 12 9 13
16 1 5 2 10 8 7 11
14 1 5 2 10 9 8 9
22 2 4 2 9 13 7 7
12 1 5 2 7 10 8 8
20 2 3 2 8 12 7 12
34 1 5 2 9 13 12 12
98 1 5 1 10 14 11 14
96 1 5 1 8 10 9 14
92 2 4 1 10 9 6 5
52 1 3 2 9 8 5 7
44 2 5 2 10 14 12 14
40 1 4 2 10 11 7 9
28 2 5 2 10 13 9 13
18 2 4 2 10 9 7 6
84 2 3 1 7 9 5 5
80 1 5 1 8 11 10 9

TOTAL BALL TRAIN PATTERN BOAT LOCK US

40 11 11 4 6 8 1
46 8 11 8 9 11 1
43 10 10 3 8 11 1
44 11 8 7 8 11 1
36 7 8 4 6 11 1
36 7 10 4 4 11 1
36 8 10 5 6 7 1
33 11 9 4 2 7 1
39 11 7 8 5 8 1
46 11 11 4 9 11 1
49 11 11 7 9 11 1
41 8 10 8 5 11 1
30 6 5 7 6 7 1
29 5 6 7 3 8 1
50 11 11 8 10 10 1
37 5 7 7 8 10 1
45 8 11 7 8 11 1
32 5 9 6 6 6 1
26 5 7 2 5 7 1
38 6 10 2 10 10 1
```

In this example, a print of the data set was performed. Any sequential procedure can be performed on this file without converting the file to a SAS data set.

If you do wish to convert the BMDP save file to a SAS data set, the syntax for the above example is as follows:

Figure 4: Proc Convert With BMDP

```
LIBNAME mine '[]';
FILENAME bmd 'acetest.sav';
Proc Convert BMDP=bmd
(code=acetest) out=mine.bmd;
```

A SAS data set called bmd.saseb\$data will be created. The CODE= option specifies the file code acetest as generated by the CODE= sentence in the / SAVE paragraph of the BMDP code. If there is only one save file and you do not know the CODE= value, you can refer to the member name as _FIRST_.

To check the file after conversion, you can run Proc Contents as follows:

Figure 5: Proc Contents

```
Libname mine '[]';
Proc contents data=mine.bmd;
Run;
```

Output is as illustrated in Figure 6.

The newly created SAS data set will retain the format of the BMDP save file with the following exceptions:

- * Non-trailing blanks and special characters in BMDP variable names are converted to underscores.
- * Subscripts in BMDP variable names become part of the SAS variable name with the parentheses omitted.
- * BMDP alphabetic variables become SAS character variables with a default length of 4.
- * BMDP category sentences (value labels) are not accepted by SAS.

Figure 6: Proc Contents Output

CONTENTS PROCEDURE				
Data Set Name: MINE.BMD				
Member Type: DATA				
Engine: V606				
Created: 12:27 Wed, Mar 6, 1991				
Last Modified: 12:27 Wed, Mar 6, 1991				
Data Set Type: DATA				
Label: 1-MAR-91 10:00:44				
Observations: 20				
Variables: 15				
Indexes: 0				
Observation Length: 60				
Deleted Observations: 0				
Compressed: NO				
-----Engine/Host Dependent Information-----				
Data Set Page Size: 11264				
Number of Data Set Pages: 1				
First Data Page: 1				
Max Obs per Page: 156				
Obs in First Data Page: 20				
Filename: BMD.SASEB\$DATA				
Disk Blocks Allocated: 24				
Alphabetic List of Variables and Attributes				
#	Variable	Type	Len	Pos
3	AGE	Num	4	8
10	BALL	Num	4	36
13	BOAT	Num	4	48
8	EVAL	Num	4	28
4	GROUP	Num	4	12
1	ID	Num	4	0
14	LOCK	Num	4	52
12	PATTERN	Num	4	44
6	PLAN	Num	4	20
2	SOLV	Num	4	4
9	TOTAL	Num	4	24
11	TRAIN	Num	4	40
5	UNDEF	Num	4	16
15	USE	Num	4	56

Caution: The previous translations could result in duplicate variable names if, for example, special characters are used in BMDP for unique names.

The following additional options are available on the CONVERT statement:

- * FIRSTOBS=*n* to specify the observation number of the first observation to convert.
- * OBS=*n* to specify the observation number of the last observation to convert.

Notes on the BMDP engine:

In order to use the BMDP engine under VMS the following usage patches must be applied: Z6061495 of 24JAN91 and Z6062206 of 24JAN91. These are available from Technical Support at SAS Institute.

Using the SPSS Engine:

The SPSS interface engine allows you to read SPSS system files directly

from the SAS program. The SAS system supports the native SPSS format as well as the export format. If the native format is used the files must have been created under VMS. If the export format is used, the SPSS system file can be created on any SPSS supported operating system and read by SAS under VMS. Both the native and export formats include all data, variable and value labels if specified, missing-value flags and the print formats for each variable.

In the following example, a SPSS system file is created from on-line data in an SPSS program run under SPSS release 4. The output is written to a native VMS file format rather than to the export format. The default extension for the native SPSS system file is *.spssxsav*. This program creates a file named *cor.spssxsav*:

Figure 7: SPSS Program

```

TITLE  WESTERN ELECTRIC STUDY
DATA LIST /CASEID 1-4 AGE 6-7
        DEP 9-11 EDUYR 13-14 HT 16-19
        WT 21-23
VARIABLE LABELS
CASEID 'CASE IDENTIFICATION
NUMBER'
AGE 'AGE AT ENTRY'
DEP 'AVERAGE DIASTOLIC BLOOD
PRESSURE'
EDUYR 'YEARS OF EDUCATION'
HT 'STATURE -- TO NEAREST 0.1
INCH'
WT 'BODY WEIGHT -- LBS'
LIST VARIABLES=ALL
BEGIN DATA
13 40 70 16 68.8 190
30 49 87 11 72.2 204
53 43 89 12 69.0 162
84 50 105 8 62.5 152
89 43 110 68.0 148
102 50 88 8 68.0 142
117 45 70 66.5 196
132 47 79 9 67.0 193
151 53 102 12 67.0 172
153 49 99 14 64.3 162
END DATA
SAVE OUTFILE=COR
FINISH

```

Like the BMDP save file, to read this file you must first issue a LIBNAME statement that specifies the use of the SPSS engine. The following example reads the SPSS system file we

created and prints the data set. Because SPSS system files do not have internal names you can refer to them by any member name. In this example `_first_` is used to be consistent with the BMDP example.

Figure 8: SPSS Engine

```
LIBNAME sps SPSS 'cor.spssx.sav';
Proc Print data=sps._first_;
Run;
```

If the libref `sps` had also been used as a fileref, then the filename could have been omitted on the LIBNAME statement because the physical file associated with the fileref would automatically be used.

Like the BMDP engine, there are no engine or host options available.

The output from this program is as follows:

Figure 9: Proc Print Output

The SAS System						
OBS	CASEID	AGE	DBP	EDUCA	HT	WT
1	13	40	70	16	68.8	190
2	30	49	87	11	72.2	204
3	53	43	89	12	69.0	162
4	84	50	105	8	62.5	152
5	89	43	110	.	68.0	148
6	102	50	88	8	68.0	142
7	117	48	70	.	66.5	196
8	132	47	79	9	67.0	193
9	151	53	102	12	67.0	172
10	153	49	99	14	64.5	142

If you wish to convert the SPSS system file to a SAS data set, you can use Proc Convert as in the BMDP example. Another option for conversion is the Datasets procedure, illustrated in the following example:

Figure 10: Proc Datasets Example

```
LIBNAME cor '[';
LIBNAME sps SPSS 'cor.spssx.sav';
Proc Datasets;
Contents data=sps._first_;
Copy in=sps mt=sps out=cor mt=data;
Run;
```

Two LIBNAME statements are needed for this conversion. Placing an engine name on a LIBNAME statement makes that libname specific to that engine. The `mt` option on the COPY statement changes the member type from SPSS on the input data set to type DATA (SAS dataset) on the output data set.

For more information contact Barbara Okerson, Academic Computer Services, Memphis State University, Memphis, Tennessee 38152.

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SAS is the registered trademark of SAS Institute Inc. of Cary, North Carolina.

SPSS is the registered trademark of SPSS Inc. of Chicago, Illinois.

References:

BMDP Statistical Software Manual, 1990 Revision, Vols. 1-2., 1990.

SAS Companion for the VMS Environment, Version 6, First Edition, 1990.

SAS Language: Reference, Version 6, First Edition, 1990.

SAS Procedures Guide, Version 6, Third Edition, 1990.

SPSS Reference Guide, 1990.