

Practical ODS: What the manual doesn't tell you

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My stance on ODS

- ODS is the biggest change to SAS since I've been a user
- ODS is a good thing
- ODS is flexible, but...
 - ODS is complex
 - The learning curve is steep
 - It's worth the effort

Why is ODS a good thing?

- I provide information, ODS provides format
- At least six full study reports, all within ODS.

An Example

Adverse Events by Subject

Center	Subject	Age (years)	Sex	Race	First dose	Last dose
29	748029301	30	Male	Caucasian	17MAY2000	18OCT2000

Two tables on one page

Event Start Date	Event Stop Date	Day	Week	Duration (days)	Adverse event	Preferred Term	Severity ^a	Serious	Study Drug Related?	Action ^b
17MAY2000	17MAY2000	1	1	1	Vascular Access Thrombosed	Thrombosis Vascular Access	01	No	No	88
07JUN2000	21JUN2000	22	4	15	Bilateral Leg Pain When Walking	Pain Limb	01	No	No	01
04AUG2000	07AUG2000	80	12	4	Hypertension	Hypertension	01	No	No	07
22SEP2000	13OCT2000	129	19	22	Hypertension	Hypertension	01	No	Yes	07 88
06OCT2000	06OCT2000	143	21	1	Cephalea	Headache	01	No	No	01

Text wrapping
(while maintaining pagination)

Note: . indicates missing

Different fonts

a - Severity: 01=Mild, 02=Moderate, 03=Severe, 04=Life Threatening, 05=Fatal

b - Action: 01=None, 04=Hospitalised, 05=Removed from study, 07=Medication taken, 08=Transfusion performed, 88=Other

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Page numbering

Comparisons

- Non-ODS: 250 lines in driver, 14500 lines generated
- ODS v8.2: 49 lines in driver, 8500 lines total
- ODS v9: circa 70 lines in total (estimate)
- Savings of effort and cost are obvious

How to implement an ODS solution

- Identify style attributes
- Subscripts, superscripts and other special characters
- Handle table layout
- Deal with pagination

Identify style attributes

- Use the style_popup tagset
- For V8, download from SAS website
- For V9, supplied with default installation

```
ODS MARKUP TYPE=style_popup  
            FILE='style_popup.htm'  
            STYLE SHEET='style_popup.css';  
<your output code>  
ODS MARKUP CLOSE;
```

[Output](#) [Code](#)

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Inline formatting

- Independent of destination
- Limited scope (but is expanding)
- Somewhat awkward to use in non-trivial cases
- Documentation is poor or non-existent
- Works with ODS ESCAPECHARACTER
 - Don't use “\” on Windows or in RTF

Inline formatting commands

Version	Command	Result
V8	<code>^{\text{super} <text>}</code>	Superscript
	<code>^{\text{sub} <text>}</code>	Subscript
	<code>^{\text{dagger}}</code>	†
	<code>^S={<style def>}</code>	Sets style attributes
V9	<code>^{\text{thispage}}</code>	Current page number
	<code>^{\text{lastpage}}</code>	Number of pages
	<code>^{\text{pageof}}</code>	“<x> of <y>”

Some examples

```
TITLE1 "E=mc^{super 2}";  
FOOTNOTE1 J=R "Page ^{pageof}";
```

```
DATA Class (DROP=Name);  
  LENGTH NameText $ 50;  
  SET SASHELP.Class;  
  IF Sex EQ "F" THEN NameText =  
    "^S={FOREGROUND=cxFFAAAA}" || Name;  
  ELSE  
    NameText = "^S={FOREGROUND=BLUE FONT_STYLE=Italic}" ||  
    Name;  
RUN;
```

[Code](#) [Output](#)

Other Symbols

- Use hex code (SAS/GRAPH V6 Vol 1 p165)
 - Depends on font and character map. Not recommended.
- Copy-and-paste from word processor
 - Depends on font (and character map?). Not recommended.
- Use ^S={} to change font to (eg) GREEK.
 - Reset to original font with another ^S={}
 - Unwieldy. Probably needs a longer copy of original variable.
- For RTF, use \u control word
 - Again, may need a longer copy of original variable.

The \u RTF control word

Syntax: \uc<n>\u<code> <alt>

Where <n> is the length of <alt>

<code> is the Unicode character code for your symbol (in decimal). See www.unicode.org/charts
<alt> Alternate text for display if <code> is not supported by the reader

```
DoseText = PUT(Dose, BEST.) || '\uc2\u924 mcg';
```

Obvious candidate for macro wrapping

Don't forget to set the PROTECTSPECIALCHARS style attribute to OFF.

[Code](#)

[Output](#)

[Macro](#)

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Table layout: general approach

- Custom templates of little use
 - Not all data in a single object (eg LS means and N's)
- Use ODS OUTPUT to collect required objects
- Use data step to MERGE and modify
- Output from PROC REPORT

Table layout: specifics

- The most useful ODS features are:
 - CELLWIDTH style attribute
 - <attribute>=<format name> construct
 - COMPUTE BEFORE <var>; LINE; ENDCOMP;
 - Often with DEFINE/ORDER NOPRINT;
 - CALL DEFINE (_COL_, 'FORMAT',...);
 - Often with DEFINE/NOPRINT;
 - INDENT= and LEFTMARGIN= style attributes
 - RTF Specific alternative for V8

Example: A demography table

Summary of demography

	Control		Low		Medium		High	
	N	%	N	%	N	%	N	%
Sex								
Male	7	(26%)	5	(29%)	4	(22%)	8	(21%)
Female	19	(73%)	12	(70%)	14	(77%)	29	(78%)
Smoking status								
Current smoker	6	(23%)	5	(29%)	7	(38%)	14	(37%)
Ex-smoker	6	(46%)	0		3	(16%)	4	(10%)
Non-smoker	16	(61%)	10	(58%)	8	(44%)	19	(51%)
Duration of disease (years)								
N	26		17		18		37	
Mean	10.42		9.14		10.53		10.88	
SD	7.576		7.936		7.593		7.861	
Min	0.1		0.8		1.7		0.5	
Max	29.1		27.8		29.6		29.6	
Median	9.51		6.97		8.73		8.53	

Output file: demog.rtf (Created: 16MAR2005 08:32)

Decimal
alignment

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Output

Code

Data

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Pagination: an overview

“[SAS] thought that users would be using the RTF destination [to] get their output into RTF and then edit the file using Microsoft Word” (Sandy McNeil, SUGI 27)

- Pagination is difficult
 - SAS avoids the issue and delegates to Word
- Titles (footnotes) in section headers (footers)
- Creates problems when importing to master documents
- Looks wrong for small tables

Pagination: possible strategies

- Do nothing
 - Undesirable for reasons mentioned (and more)
- Use BODYTITLE
 - Bug with interaction with NODATE in V8
 - Workaround possible
 - TITLES on every page, but no FOOTNOTES
 - Bug in V8, fixed in V9: TITLES have gone!
 - Works (after a fashion) for single page tables
- Do it yourself

The problem with proportional fonts

- Counting characters doesn't work
 - The quick brown fox
 - THE QUICK BROWN FOX
 - The quick brown fox
- Even order may be important
 - if
 - fi

What's needed in a solution?

- Require knowledge of:
 - Font
 - Point size
 - Column width
 - Text to be printed
 - Wrapping strategy

Possible approaches to manual pagination

- SAS solution is complex.
 - Unlikely to be generic (is it possible?)
- The Windows API and Java RTE contain the necessary functions
- Interface with SAS using
 - Text file
 - DDE
 - SCL
 - SAS/TOOLKIT (C language)
 - JAVAOBJ (V9 only)

Handling TITLEs and FOOTNOTEs

- Adopt the simplest solution
 - Use SAS default behaviour
 - Post process with VBA
 - Other languages possible
 - Integral to SAS job
- Code is generic and high-level
 - Easy to validate

An example

Listing of protocol violations

Treatment	Subject	Visit(s) or CRF module	Details	Comment	Major?	Measurement		
						Row height (cm)	Space remaining (cm)	Row lines (lines)
Placebo	001-024	DAY 21	NO ECG PRESENT FOR DAY 21 (13/09/04) BUT REPEATED (15/09/04).		No	0.9	8.1	2
	001-029	ALL VISITS TO DAY 28	ALL VISITS WERE 7 DAYS OUTSIDE THE SCHEDULE AS STUDY WAS LATE ARRIVING AT SITE.		No	1.3	6.8	3
		DAY 32	DAY 32 WAS PERFORMED 3 DAYS AFTER DAY 28, IT WAS IN AGREEMENT WITH PATIENT AND *****.		No	1.3	5.4	3
	001-031	DAY 32	DAY 32 WAS PERFORMED 3 DAYS AFTER DAY 28, IT WAS IN AGREEMENT WITH PATIENT AND *****.		No	1.3	4.1	3
		ECG DATA	ECG WAS REPEATED AFTER 14 DAYS NOT 7.		No	0.6	3.6	1
	002-003	DAY 1	ADDITIONAL LAB SAMPLES WERE TAKEN AT DAY 1, REFER TO FILENOTE 003.		No	0.9	2.6	2
	002-007	DAY 1	ADDITIONAL LAB SAMPLES WERE TAKEN AT DAY 1, REFER TO FILENOTE 005.		No	0.9	1.7	2
	002-022	DAY 1	ADDITIONAL LAB SAMPLES WERE TAKEN AT DAY 1, REFER TO FILENOTE 010.		No	0.9	0.7	2

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Program: violations.sas

Output: violations.rtf(16MAR2005 10:24)

Data

Code

Output

The future

- DOCUMENT support for REPORT
- Expansion of inline formatting
 - Remove need for destination specific code
- RTF destination as a usable tagset
 - Huge scope for customisation
 - TITLE statements appear within body of table
 - Cell-level control of borders
- Automatic book marking and hyper linking

The End

- Thanks to clients for permission to use their data
- Examples and slides available
 - E-mail me: john@isc-ltd.co.uk

Thanks for listening