

Creating Custom Excel Spreadsheets with Built-in Autofilters Using PROC REPORT and ODS EXCEL

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Abstract

Spreadsheets have become one of the most popular and successful data tools ever created, with current estimates showing more than 750 million Excel users worldwide. Their widespread adoption can be attributed to simplicity and ease of use, which make them accessible to a broad audience. Over time, additional features have expanded the functionality and value of spreadsheets, including collaborative capabilities, customization, data manipulation, visualization techniques, mobile accessibility, automation of repetitive tasks, integration with other software, advanced data analysis, and filtering capabilities.

This paper focuses on one of these features: filtering with autofilters. Autofilters allow users to quickly find data of interest by making selections from lists of text, numeric, or date values. An example application will be presented that demonstrates how to create a custom Excel spreadsheet with built-in autofilters using the SAS® Output Delivery System (ODS) Excel destination and the REPORT procedure.

Introduction

Custom autofilters in Excel allow users to efficiently find, display, or hide specific text, numeric, or date values. By leveraging the SAS® Output Delivery System (ODS) Excel destination and the REPORT procedure, users can create Excel spreadsheets directly from SAS datasets with built-in autofilter functionality. These spreadsheets can include one or multiple columns as autofilters. Once a column is filtered, additional columns can be used to further refine the displayed results, enabling dynamic, multi-level data exploration. This paper presents a step-by-step approach for creating custom Excel spreadsheets with built-in autofilters using the SAS ODS Excel destination in combination with the REPORT procedure, providing users with a practical method for interactive, Excel-ready reporting.

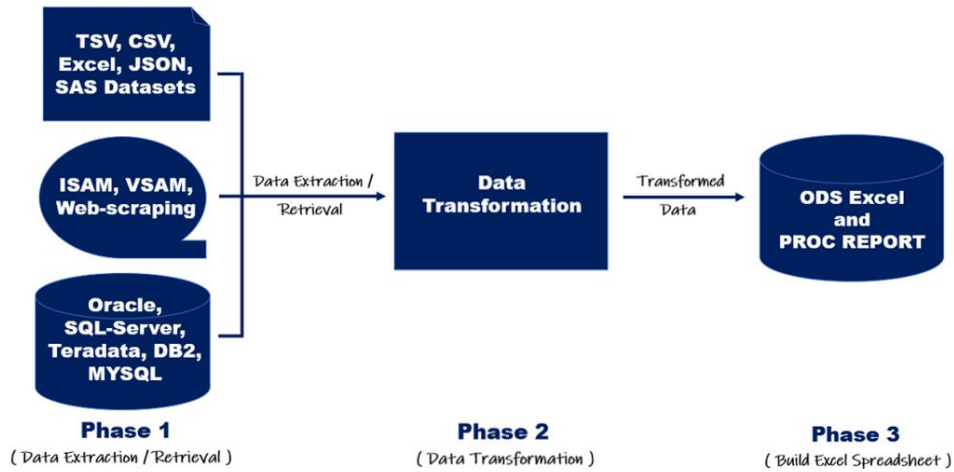
Data Set Used in Examples

To provide readers with the ability to reproduce and experiment with the examples presented in this paper, I chose to use the HEART data set from the SASHELP library. This data set was selected because it possesses many of the characteristics of data sets/database tables and consists of 5,209 observations and 17 variables, illustrated below.

Status	DeathCause	AgeCHDdiag	Sex	AgeAtStart	Height	Weight	Diastolic	Systolic	MRW	Smoking	AgeAtDeath	Cholesterol	Chol_Status	BP_Status	Weight_Status	Smoking_Status
Dead	Other	.	Female	29	62.50	140	78	124	121	0	55	.	.	Normal	Overweight	Non-smoker
Dead	Cancer	.	Female	41	59.75	194	92	144	183	0	57	181	Desirable	High	Overweight	Non-smoker
Alive	.	.	Female	57	62.25	132	90	170	114	10	.	250	High	High	Overweight	Moderate (6-15)
Alive	.	.	Female	39	65.75	158	80	128	123	0	.	242	High	Normal	Overweight	Non-smoker
Alive	.	.	Male	42	66.00	156	76	110	116	20	.	281	High	Optimal	Overweight	Heavy (16-25)
Alive	.	.	Female	58	61.75	131	92	176	117	0	.	196	Desirable	High	Overweight	Non-smoker
Alive	.	.	Female	36	64.75	136	80	112	110	15	.	196	Desirable	Normal	Overweight	Moderate (6-15)
Dead	Other	.	Male	53	65.50	130	80	114	99	0	77	276	High	Normal	Normal	Non-smoker
Alive	.	.	Male	35	71.00	194	68	132	124	0	.	211	Borderline	Normal	Overweight	Non-smoker
Dead	Cerebral Vascular Disease	.	Male	52	62.50	129	78	124	106	5	82	284	High	Normal	Normal	Light (1-5)
Alive	.	.	Male	39	66.25	179	76	128	133	30	.	225	Borderline	Normal	Overweight	Very Heavy (> 25)
Alive	.	.	57 Male	33	64.25	151	68	108	118	0	.	221	Borderline	Optimal	Overweight	Non-smoker
Alive	.	.	55 Male	33	70.00	174	90	142	114	0	.	188	Desirable	High	Overweight	Non-smoker
Alive	.	.	79 Male	57	67.25	165	76	128	118	15	.	.	.	Normal	Overweight	Moderate (6-15)
Alive	.	.	66 Male	44	69.00	155	90	130	105	30	.	292	High	High	Normal	Very Heavy (> 25)
Alive	.	.	Female	37	64.50	134	76	120	108	10	.	196	Desirable	Normal	Normal	Moderate (6-15)
Alive	.	.	Male	40	66.25	151	72	132	112	30	.	192	Desirable	Normal	Overweight	Very Heavy (> 25)
Dead	Cancer	.	56 Male	56	67.25	122	72	120	87	15	72	194	Desirable	Normal	Underweight	Moderate (6-15)
Alive	.	.	Female	42	67.75	162	96	138	119	1	.	200	Borderline	High	Overweight	Light (1-5)
Dead	Coronary Heart Disease	.	74 Male	46	66.50	157	84	142	116	30	76	233	Borderline	High	Overweight	Very Heavy (> 25)
Alive	.	.	Female	37	66.25	148	78	110	112	15	.	192	Desirable	Optimal	Overweight	Moderate (6-15)
Alive	.	.	Female	45	64.00	147	74	120	119	5	.	209	Borderline	Normal	Overweight	Light (1-5)
Alive	.	.	Female	59	65.75	156	74	156	122	0	.	200	Borderline	High	Overweight	Non-smoker
Alive	.	.	Female	36	63.75	122	84	132	102	0	.	184	Desirable	Normal	Normal	Non-smoker
Alive	.	.	Female	50	67.50	185	88	150	136	15	.	228	Borderline	High	Overweight	Moderate (6-15)
Alive	.	.	Female	35	66.00	123	76	132	93	0	.	150	Desirable	Normal	Normal	Non-smoker
Alive	.	.	Male	42	72.25	182	78	136	113	0	.	221	Borderline	Normal	Overweight	Non-smoker
Dead	Coronary Heart Disease	.	71 Female	49	60.50	153	110	196	140	5	73	221	Borderline	High	Overweight	Light (1-5)

The Extract, Transform, and Load (ETL) Process

The extract, transform, and load (ETL) process involves moving / migrating data from various sources to an Excel spreadsheet. The best way to understand how ETL works is to examine what happens in each phase of the process. The ETL process and its three phases are displayed in the figure below.



Combining the Power of ODS Excel and PROC REPORT

The example code, below, shows a SORT procedure, an ODS Excel, and the REPORT procedure to create a basic Excel spreadsheet.

Code:

```

/* Extract, Transform, and Load (ETL) Processing */
PROC SORT DATA=SASHELP.HEART OUT=WORK.HEART_Sorted ;
  BY Status Sex ;
RUN ;

/* ODS EXCEL Destination without Autofilters */
ODS EXCEL FILE="c:/Custom Heart Spreadsheet.xlsx"
  OPTIONS(sheet_name="Custom Heart Spreadsheet"
    sheet_interval="none"
    frozen_headers="1"
    frozen_rowheaders="7") ;

/* Custom Layout with PROC REPORT */
PROC REPORT DATA=WORK.HEART_sorted ;
  COLUMNS Status DeathCause Sex Chol_Status BP_Status Weight_Status Smoking_Status
    Height Weight Diastolic Systolic MRW Smoking AgeAtDeath Cholesterol ;
  DEFINE Sex          / DISPLAY CENTER ;
  DEFINE Height       / DISPLAY CENTER ;
  DEFINE Weight       / DISPLAY CENTER ;
  DEFINE Diastolic    / DISPLAY CENTER ;
  DEFINE Systolic     / DISPLAY CENTER ;
  DEFINE MRW          / DISPLAY CENTER ;
  DEFINE Smoking      / DISPLAY CENTER ;
  DEFINE AgeAtDeath   / DISPLAY CENTER ;
  DEFINE Cholesterol  / DISPLAY CENTER ;
RUN ;

/* Close ODS EXCEL Destination */
ODS EXCEL CLOSE ;

```

Results:

Status	Cause of Death	Sex	Cholesterol Status	Blood Pressure Status	Weight Status	Smoking Status	Height	Weight	Diastolic	Systolic	Metropolitan Relative Weight	Smoking	Age at Death	Cholesterol
Alive		Female	High	High	Overweight	Moderate (6-15)	62.25	132	90	170	114	10	.	250
Alive		Female	High	Normal	Overweight	Non-smoker	65.75	158	80	128	123	0	.	242
Alive		Female	Desirable	High	Overweight	Non-smoker	61.75	131	92	178	117	0	.	196
Alive		Female	Desirable	Normal	Overweight	Moderate (6-15)	64.75	136	80	112	110	15	.	196
Alive		Female	Desirable	Normal	Overweight	Moderate (6-15)	64.5	134	76	120	108	10	.	196
Alive		Female	Borderline	High	Overweight	Light (1-5)	67.75	162	96	138	119	1	.	200
Alive		Female	Desirable	Optimal	Overweight	Moderate (6-15)	66.25	148	78	110	112	15	.	192
Alive		Female	Borderline	Normal	Overweight	Light (1-5)	64	147	74	120	119	5	.	209
Alive		Female	Borderline	High	Overweight	Non-smoker	65.75	156	74	156	122	0	.	200
Alive		Female	Desirable	Normal	Normal	Non-smoker	63.75	122	84	132	102	0	.	184
Alive		Female	Borderline	High	Overweight	Moderate (6-15)	67.5	185	88	150	136	15	.	228
Alive		Female	Desirable	Normal	Normal	Non-smoker	66	123	76	132	93	0	.	150
Alive		Female	Desirable	Optimal	Overweight	Non-smoker	61.75	139	72	116	124	0	.	194
Alive		Female	High	Optimal	Normal	Moderate (6-15)	62	114	78	112	98	15	.	267
Alive		Female	Desirable	Normal	Overweight	Non-smoker	63	144	80	120	120	0	.	196
Alive		Female	Borderline	High	Overweight	Light (1-5)	63.25	144	94	154	120	5	.	225
Alive		Female	Desirable	Normal	Normal	Non-smoker	63.75	120	80	130	100	0	.	161
Alive		Female	Borderline	Optimal	Normal	Non-smoker	62	117	72	112	101	0	.	226
Alive		Female	Borderline	Normal	Overweight	Non-smoker	62	140	70	130	121	0	.	209
Alive		Female	Borderline	High	Overweight	Non-smoker	64.5	145	88	146	117	0	.	209
Alive		Female	High	Normal	Normal	Very Heavy (> 25)	68.75	136	86	134	97	30	.	286
Alive		Female	Borderline	Optimal	Normal	Moderate (6-15)	65.25	137	74	114	107	10	.	202
Alive		Female	High	High	Overweight	Non-smoker	64.5	157	78	154	127	0	.	242
Alive		Female	Borderline	Optimal	Overweight	Non-smoker	62.75	148	72	110	128	0	.	226
Alive		Female	Borderline	High	Overweight	Non-smoker	61.5	129	110	165	115	0	.	228
Alive		Female	Normal	Normal	Normal	Non-smoker	66.5	142	86	136	108	.	.	228
Alive		Female	High	High	Overweight	Non-smoker	61.5	148	90	168	132	0	.	267
Alive		Female	High	High	Overweight	Non-smoker	63.5	154	84	152	128	0	.	280
Alive		Female	Borderline	Normal	Normal	Non-smoker	60	115	68	122	106	0	.	228
Alive		Female	High	High	Normal	Non-smoker	60.5	117	78	154	107	0	.	305
Alive		Female	High	Normal	Overweight	Light (1-5)	64.25	144	78	124	116	5	.	271
Alive		Female	Desirable	Normal	Overweight	Moderate (6-15)	60.25	143	68	128	131	10	.	198
Alive		Female	Borderline	Optimal	Overweight	Non-smoker	60.5	145	78	112	133	0	.	200
Alive		Female	High	Optimal	Normal	Non-smoker	63.5	125	62	116	104	0	.	261
Alive		Female	High	High	Overweight	Non-smoker	62	135	82	144	116	0	.	339

Creating a Custom Spreadsheet with Autofilters

In the next example we'll examine how to create a "custom" Excel spreadsheet with built-in autofilter(s). The following techniques are specified and illustrated:

- ✓ Desired ETL processing (e.g., PROC SORT, PROC SQL, PROC TRANSPOSE, etc.)
- ✓ The ODS Excel destination with AUTOFILTER= sub-option(s)
- ✓ PROC REPORT to customize the layout of the spreadsheet content

Code:

```

/* Extract, Transform, and Load (ETL) Processing */
PROC SORT DATA=SASHELP.HEART OUT=WORK.HEART_sorted ;
  BY Status Sex ;
RUN ;

/* ODS EXCEL Destination with Autofilters and Options */
ODS EXCEL FILE="c:/Heart with Autofilters.xlsx"
  OPTIONS(sheet_name="Heart with Autofilters"
    sheet_interval="none"
    frozen_headers="1"
    frozen_rowheaders="7"
    autofilter="1-7") ;

/* Customize Spreadsheet Layout with PROC REPORT */
PROC REPORT DATA=WORK.HEART_sorted ;
  COLUMNS Status DeathCause Sex Chol_Status BP_Status Weight_Status Smoking_Status
    Height Weight Diastolic Systolic MRW Smoking AgeAtDeath Cholesterol ;
  DEFINE Sex / DISPLAY CENTER ;
  DEFINE Height / DISPLAY CENTER ;
  DEFINE Weight / DISPLAY CENTER ;
  DEFINE Diastolic / DISPLAY CENTER ;
  DEFINE Systolic / DISPLAY CENTER ;
  DEFINE MRW / DISPLAY CENTER ;

```

```

DEFINE Smoking          / DISPLAY CENTER ;
DEFINE AgeAtDeath      / DISPLAY CENTER ;
DEFINE Cholesterol     / DISPLAY CENTER ;
RUN ;

/* Close ODS EXCEL Destination */
ODS EXCEL CLOSE ;
    
```

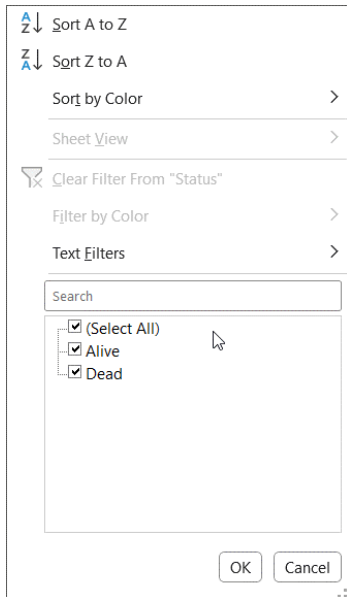
Results:

Stat	Cause of Death	Sex	Cholesterol Status	Blood Pressure Status	Weight Status	Smoking Status	Height	Weight	Diastolic	Systolic	Metropolitan Relative Weight	Smoking	Age at Death	Cholesterol
Alive		Female	High	High	Overweight	Moderate (6-15)	62.25	132	90	170	114	10	.	250
Alive		Female	High	Normal	Overweight	Non-smoker	65.75	158	80	128	123	0	.	242
Alive		Female	Desirable	High	Overweight	Non-smoker	61.75	131	92	176	117	0	.	196
Alive		Female	Desirable	Normal	Overweight	Moderate (6-15)	64.75	136	80	112	110	15	.	196
Alive		Female	Desirable	Normal	Normal	Moderate (6-15)	64.5	134	76	120	108	10	.	196
Alive		Female	Borderline	High	Overweight	Light (1-5)	67.75	162	96	138	119	1	.	200
Alive		Female	Desirable	Optimal	Overweight	Moderate (6-15)	66.25	148	78	110	112	15	.	192
Alive		Female	Borderline	Normal	Overweight	Light (1-5)	64	147	74	120	119	5	.	209
Alive		Female	Borderline	High	Overweight	Non-smoker	65.75	156	74	156	122	0	.	200
Alive		Female	Desirable	Normal	Normal	Non-smoker	63.75	122	84	132	102	0	.	184
Alive		Female	Borderline	High	Overweight	Moderate (6-15)	67.5	185	88	150	136	15	.	228
Alive		Female	Desirable	Normal	Normal	Non-smoker	66	123	76	132	93	0	.	150
Alive		Female	Desirable	Optimal	Overweight	Non-smoker	61.75	139	72	116	124	0	.	194
Alive		Female	High	Optimal	Normal	Moderate (6-15)	62	114	78	112	98	15	.	267
Alive		Female	Desirable	Normal	Overweight	Non-smoker	63	144	80	120	120	0	.	196
Alive		Female	Borderline	High	Overweight	Light (1-5)	63.25	144	94	154	120	5	.	225
Alive		Female	Desirable	Normal	Normal	Non-smoker	63.75	120	80	130	100	0	.	161
Alive		Female	Borderline	Optimal	Normal	Non-smoker	62	117	72	112	101	0	.	226
Alive		Female	Borderline	Normal	Overweight	Non-smoker	62	140	70	130	121	0	.	209
Alive		Female	Borderline	High	Overweight	Non-smoker	64.5	145	88	146	117	0	.	209
Alive		Female	High	Normal	Normal	Very Heavy (>25)	68.75	136	86	134	97	30	.	286
Alive		Female	Borderline	Optimal	Normal	Moderate (6-15)	65.25	137	74	114	107	10	.	202
Alive		Female	High	High	Overweight	Non-smoker	64.5	157	78	154	127	0	.	242
Alive		Female	Borderline	Optimal	Overweight	Non-smoker	62.75	148	72	110	128	0	.	226
Alive		Female	Borderline	High	Overweight	Non-smoker	61.5	129	110	165	115	0	.	228
Alive		Female	Normal	Normal	Normal	Normal	66.5	142	86	136	108	.	.	108
Alive		Female	High	High	Overweight	Non-smoker	61.5	148	90	168	132	0	.	267
Alive		Female	High	High	Overweight	Non-smoker	63.5	154	84	152	128	0	.	280
Alive		Female	Borderline	Normal	Normal	Non-smoker	60	115	68	122	106	0	.	228
Alive		Female	High	High	Normal	Non-smoker	60.5	117	78	154	107	0	.	305
Alive		Female	High	Normal	Overweight	Light (1-5)	64.25	144	78	124	116	5	.	271
Alive		Female	Desirable	Normal	Overweight	Moderate (6-15)	60.25	143	68	128	131	10	.	198
Alive		Female	Borderline	Optimal	Overweight	Non-smoker	60.5	145	78	112	133	0	.	200
Alive		Female	High	Optimal	Normal	Non-smoker	63.5	125	62	116	104	0	.	261
Alive		Female	High	High	Overweight	Non-smoker	62	135	82	144	116	0	.	339

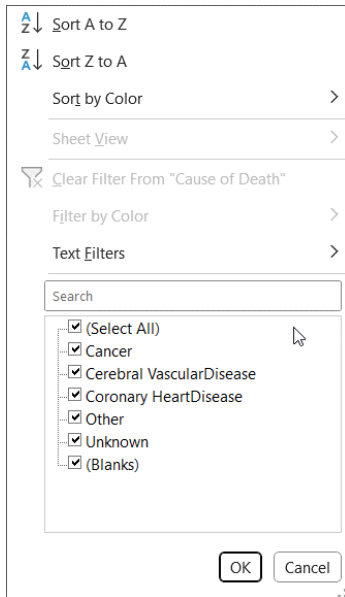
EXCEL Autofilters

The example code and results support seven “custom” built-in autofilters to filter (find, show, or hide) data from a list of values using the ODS EXCEL AUTOFILTER= keyword. Once the Excel spreadsheet is built and the app opened, you can individually activate the desired autofilter by clicking the “down” arrow associated with the selected filter. The following autofilters are available:

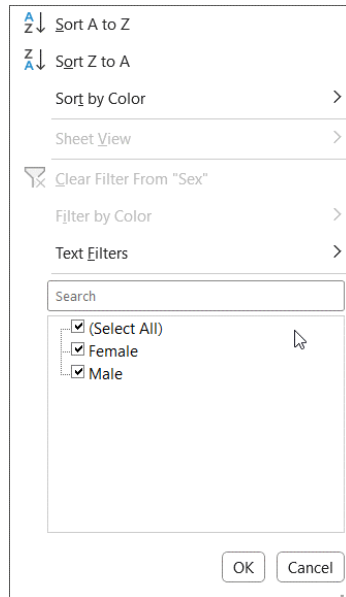
1. Status



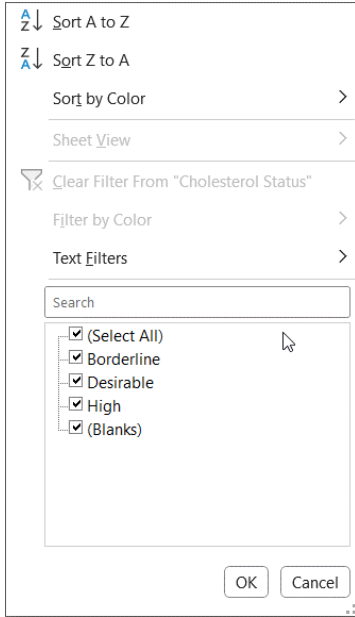
2. Cause of Death



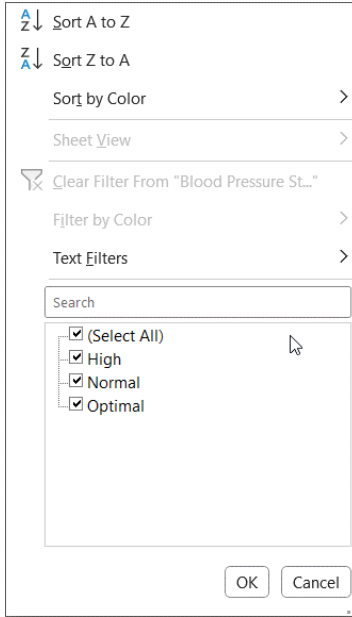
3. Sex



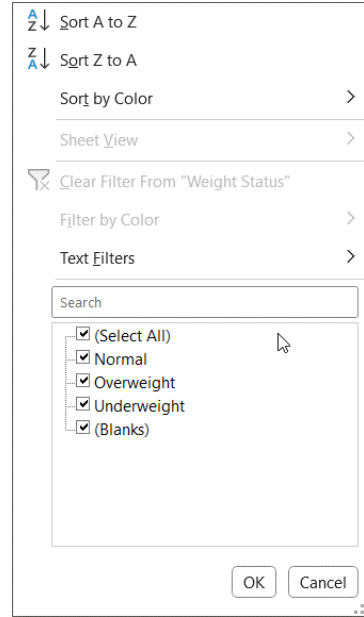
4. Cholesterol Status



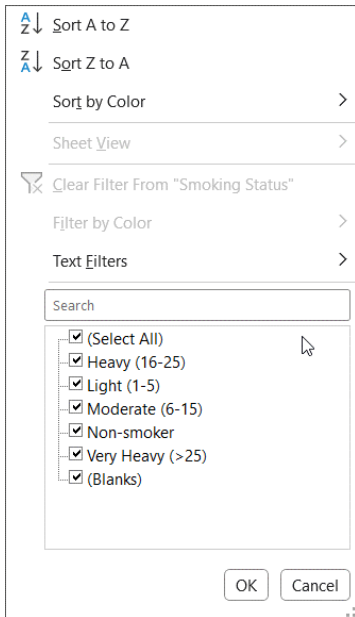
5. Blood Pressure Status



6. Weight Status



7. Smoking Status



Conclusion

The application of custom autofilters in Excel spreadsheets provides users with the ability to find, show, or hide text, numeric, and/or date values. This paper illustrated a step-by-step approach to building custom built-in autofilters in Excel spreadsheets. The contents of any SAS dataset can be sent to an Excel spreadsheet containing built-in autofilters that find, show, or hide text, numeric, and/or date values using the SAS Output Delivery System (ODS) Excel destination and the REPORT procedure. With the ability to specify one, two, or more column(s) or variable(s) to serve as autofilters in the resulting Excel spreadsheet, users have complete control in building powerful and flexible Excel spreadsheet applications.

References

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Kirk currently serves on the Western Users of SAS Software (WUSS) Executive Committee as the Open-Source Advocate and Coordinator, and he is actively engaged with multiple proprietary and open-source user groups and conference committees. As the author of several books, including the widely acclaimed [PROC SQL: Beyond the Basics Using SAS, Third Edition \(SAS Press, 2019\)](#), Kirk is an invited speaker, educator, keynote, mentor, and is the proud recipient of 29 "Best" contributed paper, hands-on workshop, and poster awards.

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