

Introduction to PowerWorld Simulator: Interface and Common Tools



I3: Model Explorer and Case Information Displays



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Model Explorer



- Encapsulates most Case Information Displays
- Provides means of navigating through almost all of the data in the model
- Available from a few places
 - Case Information Ribbon Tab
 - Tools Ribbon Tab
 -  – Quick Access Toolbar



Model Explorer



Recent Tabs

Explore Pane

Fields Pane

Object Types with no data grayed-out

Toolbar

Filterbar

Note: The options available on the Case Information right-click local menu are also available on the Case Information Toolbar directly above the display

Search Toolbar

The screenshot shows the Model Explorer application window. The left pane (Explore Pane) displays a tree view of object types, with some items grayed-out. The main pane (Fields Pane) displays a table of generator records. The top of the window features a 'Recent Tabs' bar with tabs for Gen Records, Interfaces, Zones, Areas, Switched Shunts, Loads, Branches State, and Buses. Below the tabs is a toolbar with icons for various actions. A filterbar is located below the toolbar, showing a dropdown menu for 'Generator' and a search field. The main table displays columns for Number of Bus, Name of Bus, ID, Status, Gen MW, Gen Mvar, Set Volt, AGC, AVR, Min MW, Max MW, Min Mvar, Max Mvar, and Cost Mod. A right-click context menu is open over the table, showing options like Show Dialog..., Display/Column Options..., Find..., Search for Text..., Delete, Generator records, Plot, Geographic Data View, Set/Toggle/Columns, Copy/Paste/Send, Save As, Load, Advanced Filter..., Advanced Sort..., Define Expression..., Refresh Display, and Help (F1). The bottom of the window features a search toolbar with a search field and a search button.

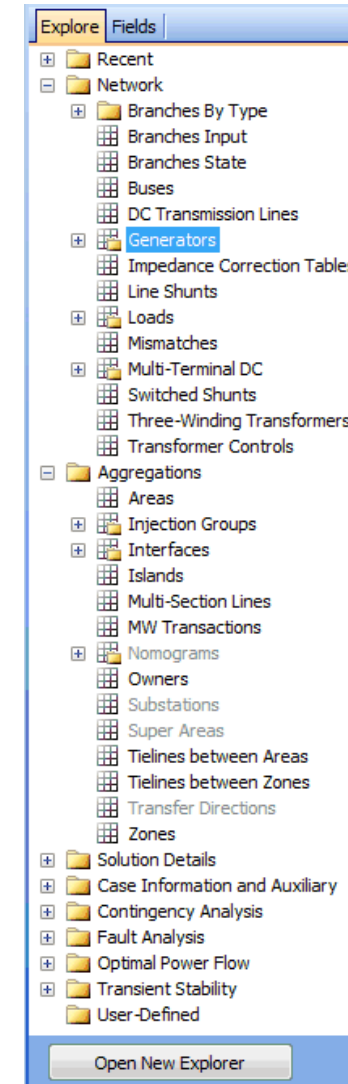
Number of Bus	Name of Bus	ID	Status	Gen MW	Gen Mvar	Set Volt	AGC	AVR	Min MW	Max MW	Min Mvar	Max Mvar	Cost Mod
5	10318 SJUAN_G1	1	Closed	360.00	6.28	1.02500	NO	YES	0.00	360.00	-121.00	173.20	None
6	10319 SJUAN_G2	1	Closed	350.00	5.73	1.02500	NO	YES	0.00	360.00	-118.00	168.00	None
7	10320 SJUAN_G3	1	Closed	544.00	9.39	1.02500	NO	YES	0.00	544.00	-183.00	261.70	None
8	10321 SJUAN_G4	1	Closed	490.34	9.22	1.02500	NO	YES	0.00	544.00			
9	10394 LEF_G1	1	Closed	124.30	0.00	1.02600	NO	NO	56.90	250.00			
10	10395 LEF_G2	1	Closed	124.30	0.00	1.02600	NO	NO	56.90	250.00			
11	10396 LEF_S1	1	Open										
12	10415 LVGT	1	Open										
13	10485 AFTONG	1	Open										
14	10486 AFTONG	1	Open										
15	10491 LRDSBGG1	1	Open										
16	10492 LRDSBRG2	1	Open										
17	10903 VEF	1	Open										
18	10995 ARGONNEG	1	Closed										
19	10997 LONEMS	1	Open										
20	11010 AMRAD	1	Closed										
21	11051 COPPER_G	1	Open										
22	11112 NEWMANG1	1	Open										
23	11113 NEWMANG2	1	Open										
24	11114 NEWMANG3	1	Closed										
25	11115 NEWMN4G1	1	Closed										
26	11116 NEWMN4G2	1	Closed										
27	11117 NEWMN4S1	1	Closed										
28	11133 RIOGD_G6	1	Open										
29	11134 RIOGD_G7	1	Open										
30	11135 RIOGD_G8	1	Closed										
31	11208 NEWMN5G1	1	Open										
32	11209 NEWMN5G2	1	Open										
33	11261 NEWMN5S1	1	Open										
34	12020 CLAPHAM	1	Closed	0.00	8.02	1.02000	NO	YES	0.00	0.00			
35	12058 PEGS1	1	Closed	208.80	-8.15	1.03700	NO	YES	0.00	230.00			
36	12063 ROSEBUD	s1	Closed	-36.42	0.79	1.02000	NO	YES	0.00	0.00			



Model Explorer: Explore Pane



- Explore Pane: The Explore Pane contains a hierarchical list of most of the objects contained in the power system model
 - Ten Primary Folders, with only Network and Aggregations folder expanded by Default
 - Network Folder
 - physical devices
 - Aggregations Folder
 - groupings of physical objects

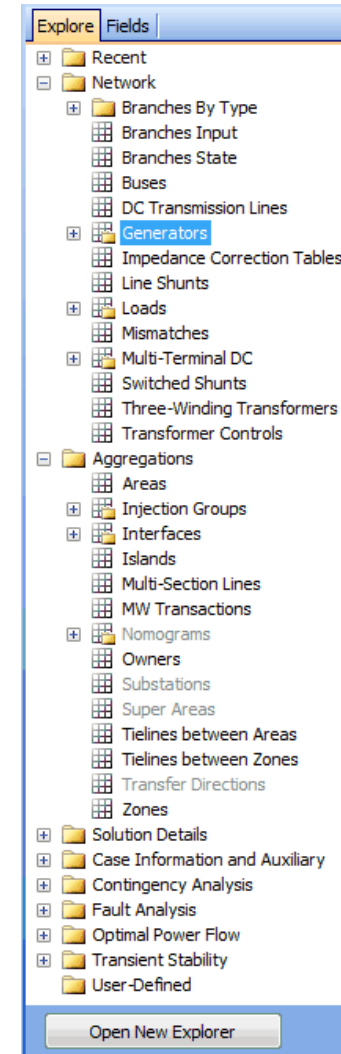




Model Explorer: Explore Pane Tips



- Grayed out entries indicate that objects of that type are not presently defined in model
- To open a new separate Model Explorer Window
 - Hold down the CTRL key and then left-click on an entry in the Explore Pane
 - Or just click the button **Open New Explorer**





Model Explorer



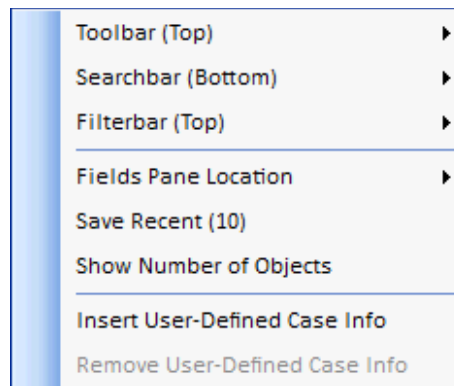
- Fields Pane
 - Provides access to all the potential fields available to show on the active case information display
 - Similar to the Display/Column Options
- Recent Tabs
 - List of the most recently viewed case information displays
 - Easier to manage than multiple windows
 - Kind of like “tabbed browsing”



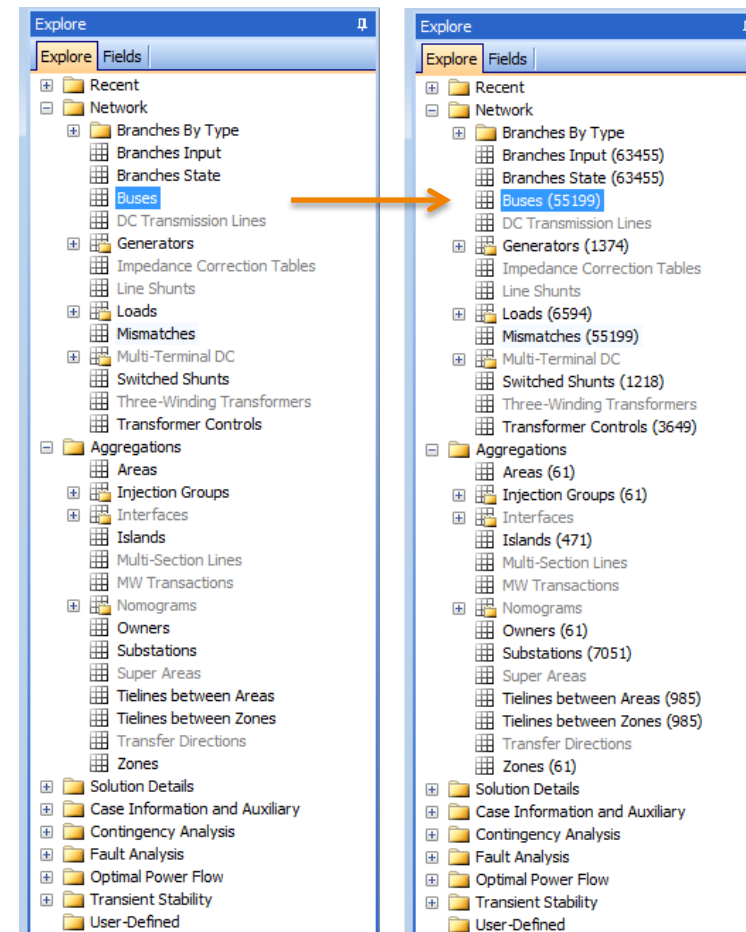
Model Explorer Options



- To access options, right-click on
 - Explore Pane
 - Fields Pane
 - Recent Tabs
 - Toolbar
 - Searchbar
 - Filterbar
- Options available
 - Specify location of Toolbar, Searchbar, and Filterbar
 - Specify location of the Fields Pane
 - Specify the number of Recent Tabs to maintain
 - Show Number of Objects
 - Insert User-Defined Case Information displays (discussed later)



Show Number of Objects



Fields Pane Location



Toolbar (Top)	▶
Searchbar (Bottom)	▶
Filterbar (Top)	▶
Fields Pane Location	☒ Tab with Explore
Save Recent (10)	
Show Number of Objects	
Insert User-Defined Case Info	
Remove User-Defined Case Info	
	Left Side
	Right Side

Tab with Explore

Number	Name	Area Name	Nom kV	PU Volt	Volt (kV)	Angle (Deg)	Load MW	Load
5	10007 ALLISON#	NEW MEXICO	115.00	1.03246	118.732	-44.02		
6	10008 ALLISON	NEW MEXICO	13.80	0.98365	13.574	-47.00	6.58	
7	10009 ALLISONT	NEW MEXICO	115.00	1.03453	118.971	-43.98		
8	10010 AMBROSIA	NEW MEXICO	115.00	1.04289	119.932	-48.47		
9	10011 AMBROSIA	NEW MEXICO	230.00	1.02619	236.023	-47.42		
10	10012 ANDERSON	NEW MEXICO	115.00	1.02963	118.408	-63.25		
11	10013 ANDERSON	NEW MEXICO	12.50	1.00065	12.508	-65.50	3.72	
12	10014 ARNO	NEW MEXICO	46.00	0.98799	45.447	-65.64		
13	10015 ARNO_1	NEW MEXICO	12.50	0.99179	12.397	-68.17	12.86	
14	10016 ARRIBA	NEW MEXICO	115.00	1.04694	120.398	-58.36		

Left Side

Number	Name	Area Name	Nom
5	10007 ALLISON#	NEW MEXICO	115
6	10008 ALLISON	NEW MEXICO	13
7	10009 ALLISONT	NEW MEXICO	115
8	10010 AMBROSIA	NEW MEXICO	115
9	10011 AMBROSIA	NEW MEXICO	230
10	10012 ANDERSON	NEW MEXICO	115
11	10013 ANDERSON	NEW MEXICO	12
12	10014 ARNO	NEW MEXICO	46
13	10015 ARNO_1	NEW MEXICO	12
14	10016 ARRIBA	NEW MEXICO	115

Right Side

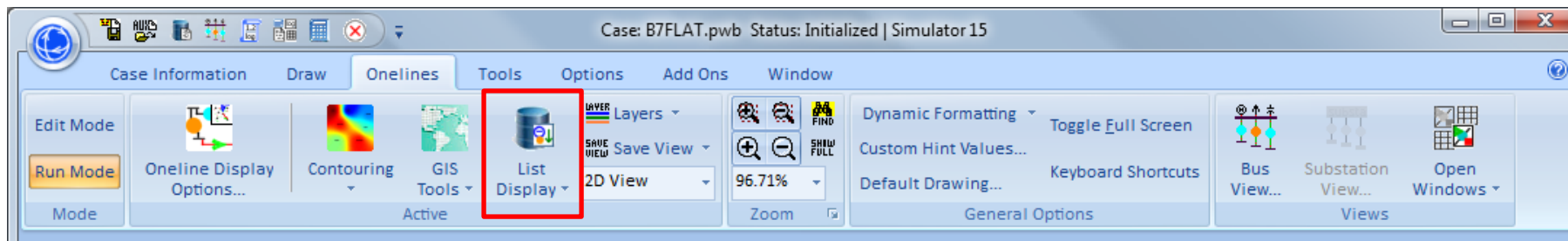
Number	Name	Area Name	Nom kV	PU Volt
5	10007 ALLISON#	NEW MEXICO	115.00	1.03246
6	10008 ALLISON	NEW MEXICO	13.80	0.98365
7	10009 ALLISONT	NEW MEXICO	115.00	1.03453
8	10010 AMBROSIA	NEW MEXICO	115.00	1.04289
9	10011 AMBROSIA	NEW MEXICO	230.00	1.02619
10	10012 ANDERSON	NEW MEXICO	115.00	1.02963
11	10013 ANDERSON	NEW MEXICO	12.50	1.00065
12	10014 ARNO	NEW MEXICO	46.00	0.98799
13	10015 ARNO_1	NEW MEXICO	12.50	0.99179
14	10016 ARRIBA	NEW MEXICO	115.00	1.04694



Display Explorer



- Very similar to the Model Explorer
- Contains case information displays for one-line display objects
- Provides means of navigating through data contained on a one-line in tabular form
- Available from the **Onelines** ribbon tab → **Active** ribbon group → **List Display** menu → **All Display Objects** option



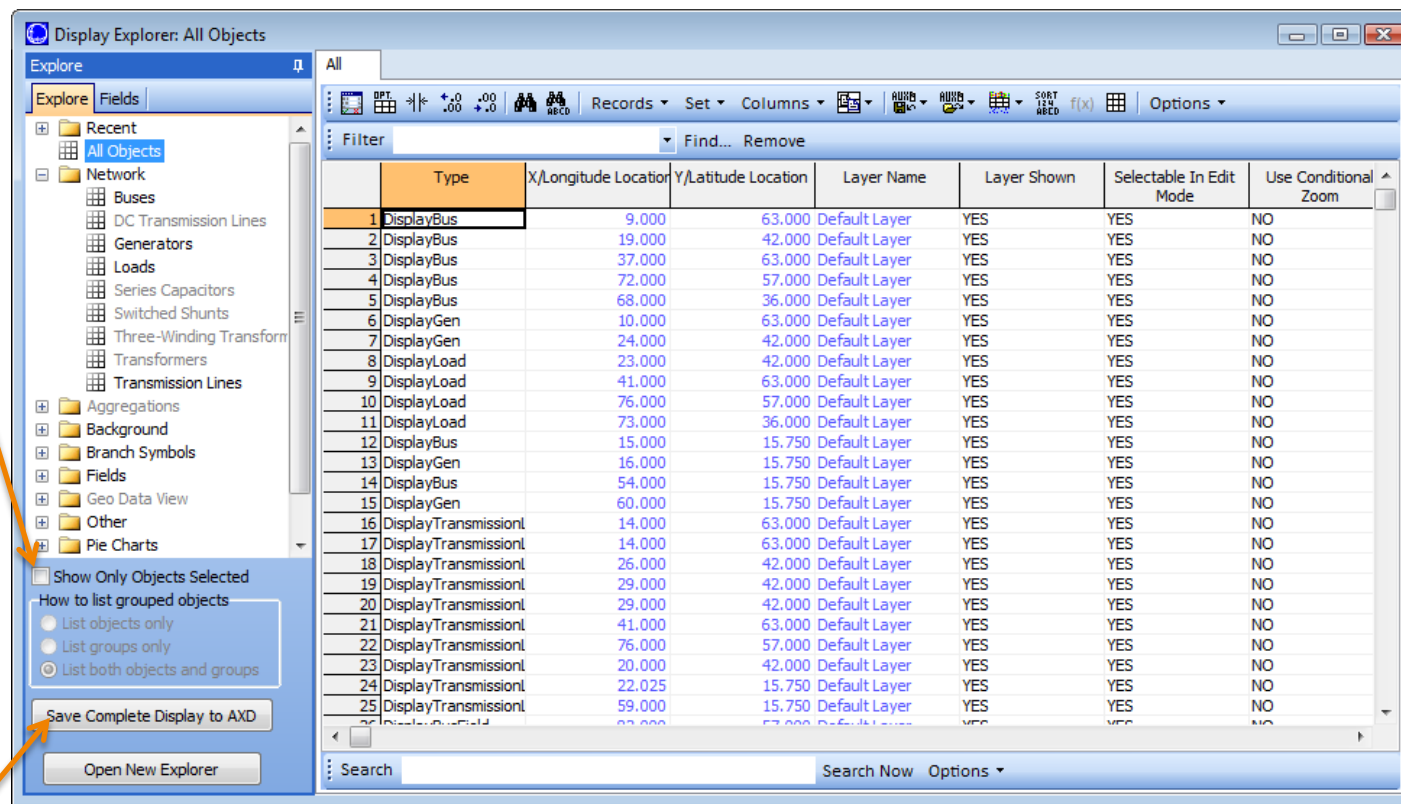


Display Explorer



List only selected online objects

Same structure as Model Explorer



Save online to display auxiliary file

Case Information Displays



- Case Information Displays show the power system model data and results in tabular format
- Case information displays show information about
 - buses
 - generators
 - lines/transformers
 - loads
 - areas, zones
 - and everything else

Model Explorer:

Generator Case Information Display



Model Explorer: Generators

Explore Fields

- Recent
- Network
 - Branches By Type
 - Branches Input
 - Branches State
 - Buses
 - DC Transmission Lines
 - Generators**
 - Impedance Correction Tables
 - Line Shunts
- Loads
- Mismatches
- Multi-Terminal DC
- Switched Shunts
- Three-Winding Transformers
- Transformer Controls
- Aggregations
- Solution Details
- Case Information and Auxiliary
- Contingency Analysis
- Fault Analysis
- Optimal Power Flow
- Transient Stability
- User-Defined

Open New Explorer

Gen Records Interfaces Zones Areas Switched Shunts Loads Branches State Buses

Records Geo Set Columns f(x) Options

Filter Advanced Generator Find... Remove

	Number of Bus	Name of Bus	ID	Status	Gen MW	Gen Mvar	Set Volt	AGC	AVR	Min MW	Max MW	Min Mvar	Max Mvar	Cost Model	Part. Factor
5	10318	SJUAN_G1	1	Closed	360.00	6.28	1.02500	NO	YES	0.00	360.00	-121.00	173.20	None	360.00
6	10319	SJUAN_G2	1	Closed	350.00	5.73	1.02500	NO	YES	0.00	350.00	-118.00	168.00	None	350.00
7	10320	SJUAN_G3	1	Closed	544.00	9.39	1.02500	NO	YES	0.00	544.00	-183.00	261.70	None	544.00
8	10321	SJUAN_G4	1	Closed	490.34	9.22	1.02500	NO	YES	0.00	544.00	-183.00	261.30	None	544.00
9	10394	LEF_G1	1	Closed	124.30	0.00	1.02600	NO	NO	56.90	150.00	0.00	0.00	None	150.00
10	10395	LEF_G2	1	Closed	124.30	0.00	1.02600	NO	NO	56.90	150.00	0.00	0.00	None	150.00
11	10396	LEF_S1	1	Open	0.00	0.00	1.00620	NO	YES	46.70	300.00	-125.00	267.50	None	300.00
12	10415	LVGT	1	Open	0.00	0.00	1.00000	NO	YES	0.00	20.00	-8.70	10.50	None	20.00
13	10485	AFTONS	1	Open	0.00	0.00	1.04300	NO	YES	46.00	110.00	-63.00	94.00	None	110.00
14	10486	AFTONG	1	Open	0.00	0.00	1.03835	NO	YES	75.00	149.00	-85.00	142.00	None	149.00
15	10491	LRDSBGG1	1	Open	0.00	0.00	1.05000	NO	YES	10.00	36.00	-23.00	36.00	None	36.00
16	10492	LRDSBRG2	1	Open	0.00	0.00	1.05000	NO	YES	10.00	36.00	-23.00	36.00	None	36.00
17	10903	VEF	1	Open	0.00	0.00	1.00000	NO	NO	0.00	143.00	0.00	0.00	None	143.00
18	10995	ARGONNEG	1	Closed	5.00	-2.50	1.05000	NO	NO	0.00	90.00	-2.50	-2.50	None	90.00
19	10997	LONEMS	1	Open	0.00	0.00	1.05000	NO	YES	0.00	240.00	-10.00	10.00	None	240.00
20	11010	AMRAD	1	Closed	0.00	-10.01	1.03200	NO	YES	0.00	0.00	-50.00	25.00	None	0.00
21	11051	COPPER_G	1	Open	0.00	0.00	0.99211	NO	YES	3.00	69.00	-33.00	70.30	None	69.00
22	11112	NEWMANG1	1	Open	0.00	0.00	1.00240	NO	YES	25.00	77.00	-38.40	68.00	None	77.00
23	11113	NEWMANG2	1	Open	0.00	0.00	1.00240	NO	YES	28.00	80.00	-45.50	67.30	None	80.00
24	11114	NEWMANG3	1	Closed	58.18	5.55	1.00700	NO	YES	30.00	101.00	-58.70	76.80	None	101.00
25	11115	NEWMN4G1	1	Closed	58.00	4.35	1.00700	NO	YES	7.00	73.00	-33.60	38.80	None	73.00
26	11116	NEWMN4G2	1	Closed	58.00	3.68	1.00700	NO	YES	7.00	74.00	-33.60	38.80	None	74.00
27	11117	NEWMN4S1	1	Closed	64.00	5.13	1.00700	NO	YES	38.00	75.00	-58.00	72.90	None	75.00
28	11133	RIOGD_G6	1	Open	0.00	0.00	1.02381	NO	YES	18.00	48.00	-27.50	41.70	None	48.00
29	11134	RIOGD_G7	1	Open	0.00	0.00	1.02381	NO	YES	18.00	48.00	-27.50	41.70	None	48.00

Search Search Now Options

Case Information Displays



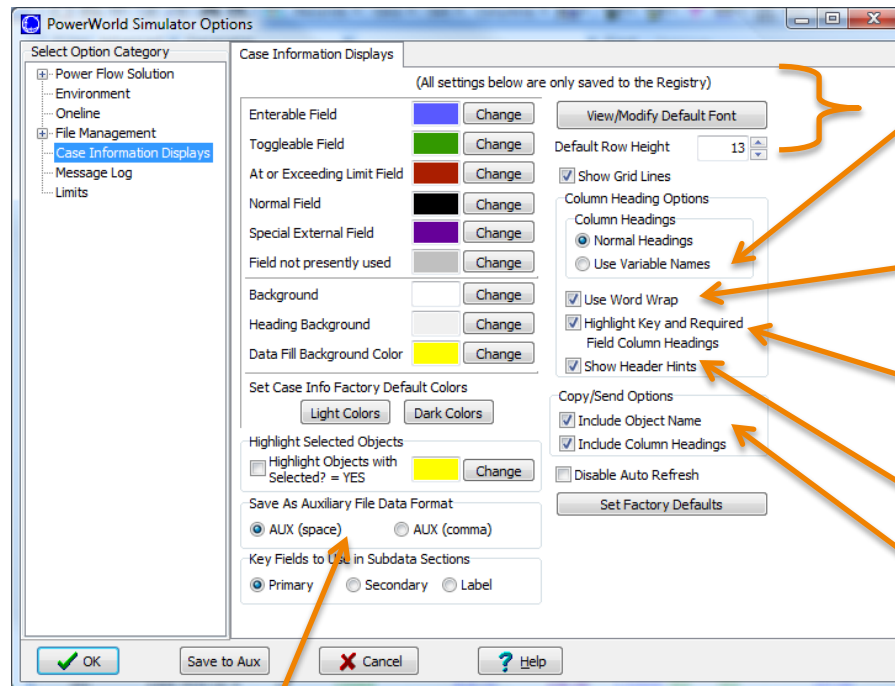
- Most case information displays can be opened from the Model Explorer
 - Case info displays also are integrated into many Simulator dialogs.
- Case Information Features
 - Find, Search For Text
 - Sorting
 - Filtering
 - Copy/Paste to/from a spreadsheet
 - Column Contouring
 - Column/Row Metrics
 - Etc...
- User-Defined Case Info Displays
- Custom Case Info Display
 - Show different fields, change colors
 - Create entire custom workbooks showing specific information

Case Information Displays Options



- From the **Options** ribbon tab select **Simulator Options...**
- Go to **Case Information Displays** page

Use *Normal Headings* or *Variable Names*
See “Auxiliary File Data Sections” for description of Variable Names



Default Font and Row Height
for all case info displays

Word Wrap long column headings

Highlight the column headings of object key fields
(yellow) and required fields for new records (green).

Hints explain field when mouse
floats over column heading.

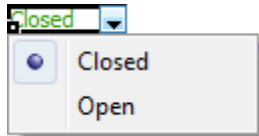
Options when using the Copy
and Send local menu options

When saving an AUX file DATA Section, this delimiter is used

Color Schemes



- Field Colors
 - Enterable Field
 - Fields that you can edit directly on the case info display
 - Toggleable Field
 - Double-click to change the value, or click the button to view and select from the available toggle choices
 - Special External Field
 - Fields that cannot be entered inside Simulator, but can via Paste from Excel or AUX file read
 - Field not presently used: data is not applicable, e.g. when a generator is open and all the fields appear gray
 - Normal and At or Exceeding Limit are self-explanatory
- Background Colors
 - Background and Heading Background are self-explanatory
 - Data Fill Background: when filling in data to be the same as other data



Default Case Information Light Color Scheme



Heading Background

Heading Key Field

Heading Req'd Field

Toggleable Field

Enterable Field

At Limit Field

Field not presently used

Normal Text

Background

Data Fill Background

	Number of Bus	Name of Bus	ID	Status	Gen MW	Gen Mvar	Set Volt	AGC	AVR	Min MW	Max MW
19	501	HOMER C1	1	Closed	620.00	-0.15	1.00000	YES	YES	300.00	620.00
20	502	HOMER C2	1	Closed	614.00	71.33	1.00000	YES	YES	300.00	614.00
21	503	HOMER C3	1	Closed	650.00	76.71	1.00000	YES	YES	300.00	650.00
22	1277	PORT2GEN	H	Closed	122.00	4.32	1.00000	YES	YES	50.00	122.00
23	1277	PORT2GEN	L	Closed	122.00	4.32	1.00000	YES	YES	50.00	122.00
24	1283	TMI 1GEN	1	Closed	786.00	176.33	1.00000	YES	YES	786.00	786.00
25	2051	ATLANTIC	1	Closed	0.00	224.86	1.03000	YES	YES	0.00	0.00
26	2095	O C GEN	1	Closed	619.00	208.00	1.03500	YES	YES	619.00	619.00
27	2351	BRUNER 1	H	Closed	161.00	-22.87	1.03000	YES	YES	69.00	161.00
28	2351	BRUNER 1	L	Closed	161.00	-22.87	1.03000	YES	YES	69.00	161.00
29	2352	BRUNER 2	H	Closed	189.00	-27.46	1.03000	YES	YES	70.00	189.00
30	2352	BRUNER 2	L	Closed	189.00	-27.46	1.03000	YES	YES	70.00	189.00
31	2353	BRUNER 3	1	Closed	735.00	223.19	1.03000	YES	YES	433.00	735.00
32	2364	MONTUR 1	1	Closed	745.00	209.14	1.03900	YES	YES	356.00	745.00
33	2365	MONTUR 2	1	Closed	745.00	192.32	1.03900	YES	YES	455.00	745.00
34	2368	MTN CK 3	1	Closed	815.72	227.48	1.02600	YES	YES	157.00	820.00
35	2369	MTN CK 4	1	Closed	815.72	236.08	1.02600	YES	YES	157.00	820.00
36	2382	SUSQ 1	1	Closed	1106.00	84.93	1.03000	YES	YES	1090.00	1106.00
37	3349	CHSTR 7-9	1	Open	0.00	0.00	0.97500	YES	YES	13.00	13.00
38	3349	CHSTR 7-9	2	Open	0.00	0.00	0.97500	YES	YES	13.00	13.00

Default Case Information Dark Color Scheme



Diagram illustrating the Default Case Information Dark Color Scheme for a software interface, showing various field types and their corresponding visual styles.

Field Types and Visual Styles:

- Heading Background:** Grey background for the header row.
- Heading Key Field:** Yellow background for the key field (ID).
- Heading Req'd Field:** Light green background for the required field (Status).
- Toggleable Field:** Dark grey background for toggleable fields (e.g., AGC, AVR).
- Enterable Field:** Teal background for enterable fields (e.g., Min MW, Max MW).
- At Limit Field:** Red text for fields at a limit (e.g., Min MW, Max MW).
- Field not presently used:** Grey background for fields not presently used (e.g., CHSTR.7-9).
- Normal Text:** Standard text color and font.
- Background:** Dark grey background for the data rows.
- Data Fill Background:** Yellow background for the data fill area.

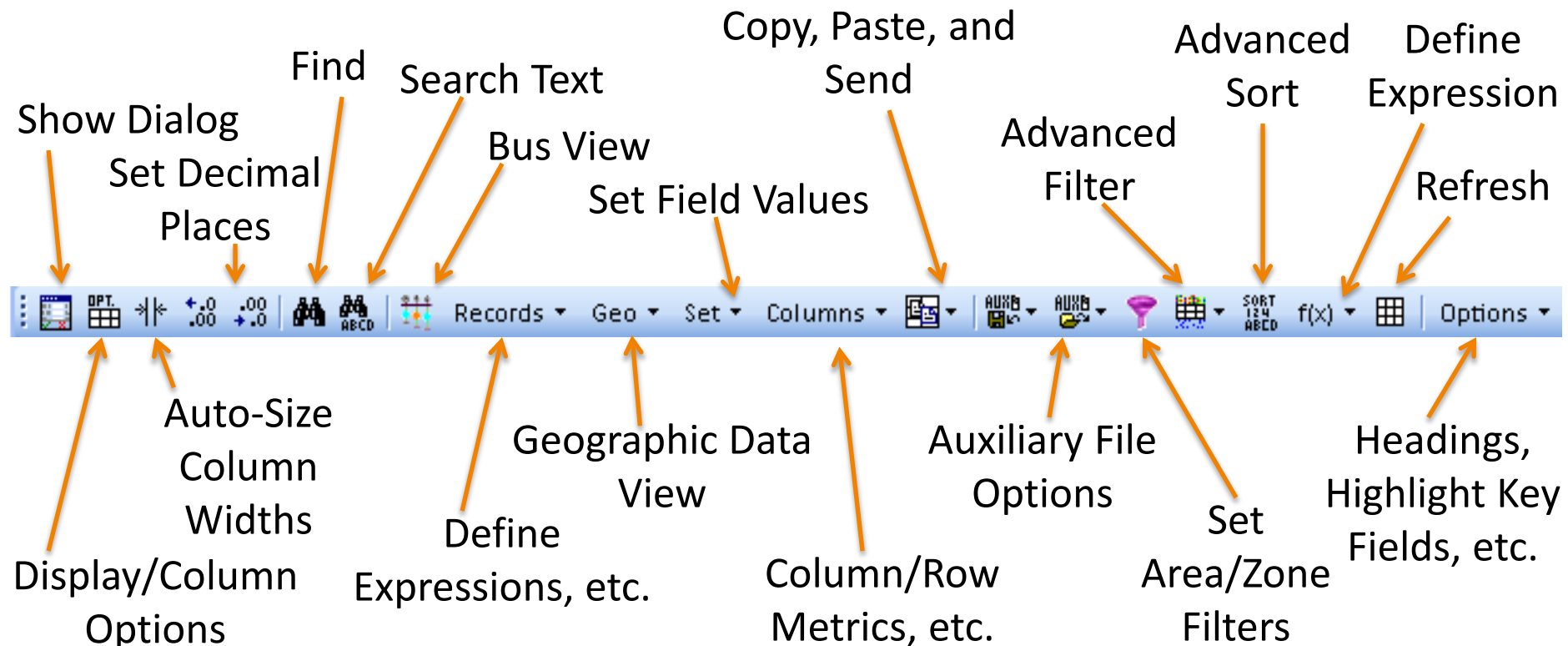
Table Data (Gen Records):

	Number of Bus	Name of Bus	ID	Status	Gen MW	Gen Mvar	Set Volt	AGC	AVR	Min MW	Max MW
24	1283	TMI 1GEN	1	Closed	786.00	176.33	1.00000	YES	YES	786.00	786.00
25	2051	ATLANTIC	1	Closed	0.00	224.86	1.03000	YES	YES	0.00	0.00
26	2095	O C GEN	1	Closed	619.00	208.00	1.03500	YES	YES	619.00	619.00
27	2351	BRUNER 1	H	Closed	161.00	-22.87	1.03000	YES	YES	69.00	161.00
28	2351	BRUNER 1	L	Closed	161.00	-22.87	1.03000	YES	YES	69.00	161.00
29	2352	BRUNER 2	H	Closed	189.00	-27.46	1.03000	YES	YES	70.00	189.00
30	2352	BRUNER 2	L	Closed	189.00	-27.46	1.03000	YES	YES	70.00	189.00
31	2353	BRUNER 3	1	Closed	735.00	223.19	1.03000	YES	YES	433.00	735.00
32	2364	MONTUR 1	1	Closed	745.00	209.14	1.03900	YES	YES	356.00	745.00
33	2365	MONTUR 2	1	Closed	745.00	192.32	1.03900	YES	YES	455.00	745.00
34	2368	MTN CK 3	1	Closed	815.72	227.48	1.02600	YES	YES	157.00	820.00
35	2369	MTN CK 4	1	Closed	815.72	236.08	1.02600	YES	YES	157.00	820.00
36	2382	SUSQ 1	1	Closed	1096.00	84.93	1.03000	YES	YES	1090.00	1106.00
37	3349	CHSTR.7-9	1	Open	0.00	0.00	0.97500	YES	YES	13.00	13.00
38	3349	CHSTR.7-9	2	Open	0.00	0.00	0.97500	YES	YES	13.00	13.00

Case Information Toolbar



- Many common Case Information Display actions are available from the Case Information Toolbar
- By default, this toolbar is visible with all case information displays





Show Dialog



- Bring up any object's dialog by choosing **Show Dialog**.
- Example:
 - Generator

The screenshot shows the 'Generator Options' dialog box. It has a title bar with a close button. The dialog is divided into several sections. At the top, there are search fields for 'Bus Number' (2351), 'Bus Name' (BRUNER 1), 'ID' (L), and 'Area Name' (EAST EQ). There are also 'Find By Number', 'Find By Name', and 'Find ...' buttons. To the right, there are radio buttons for 'Status' (Open and Closed, with Closed selected), a 'Fuel Type' dropdown (Unknown), and a 'Unit Type' dropdown (UN (Unknown)). Below these are tabs for 'Power and Voltage Control', 'Costs', 'Fault Parameters', 'Owner, Area, Zone, Sub', 'Custom', and 'Stability'. The 'Power and Voltage Control' tab is active. It contains sections for 'Power Control' (MW Output: 161.000, Min. MW Output: 69.000, Max. MW Output: 161.000, with checkboxes for 'Available for AGC' and 'Enforce MW Limits'), 'Voltage Control' (Mvar Output: -22.871, Min Mvars: -55.000, Max Mvars: 87.346, with checkboxes for 'Available for AVR' and 'Use Capability Curve'), and 'Wind Control Mode' (Mode: None, Power Factor: 1.0000). There are also fields for 'Regulated Bus Number' (2351), 'SetPoint Voltage' (1.0300), and 'Remote Reg %' (25.0). At the bottom, there is a table with columns for MW, Min Mvar, and Max Mvar. The table has 10 columns and 3 rows. The first column is labeled 'MW', 'Min Mvar', and 'Max Mvar' respectively. The first row has a blue header. The bottom of the dialog has buttons for 'OK', 'Save', 'Delete', 'Cancel', and 'Help'.

MW	Min Mvar	Max Mvar							

Display/Column Options

Column Options

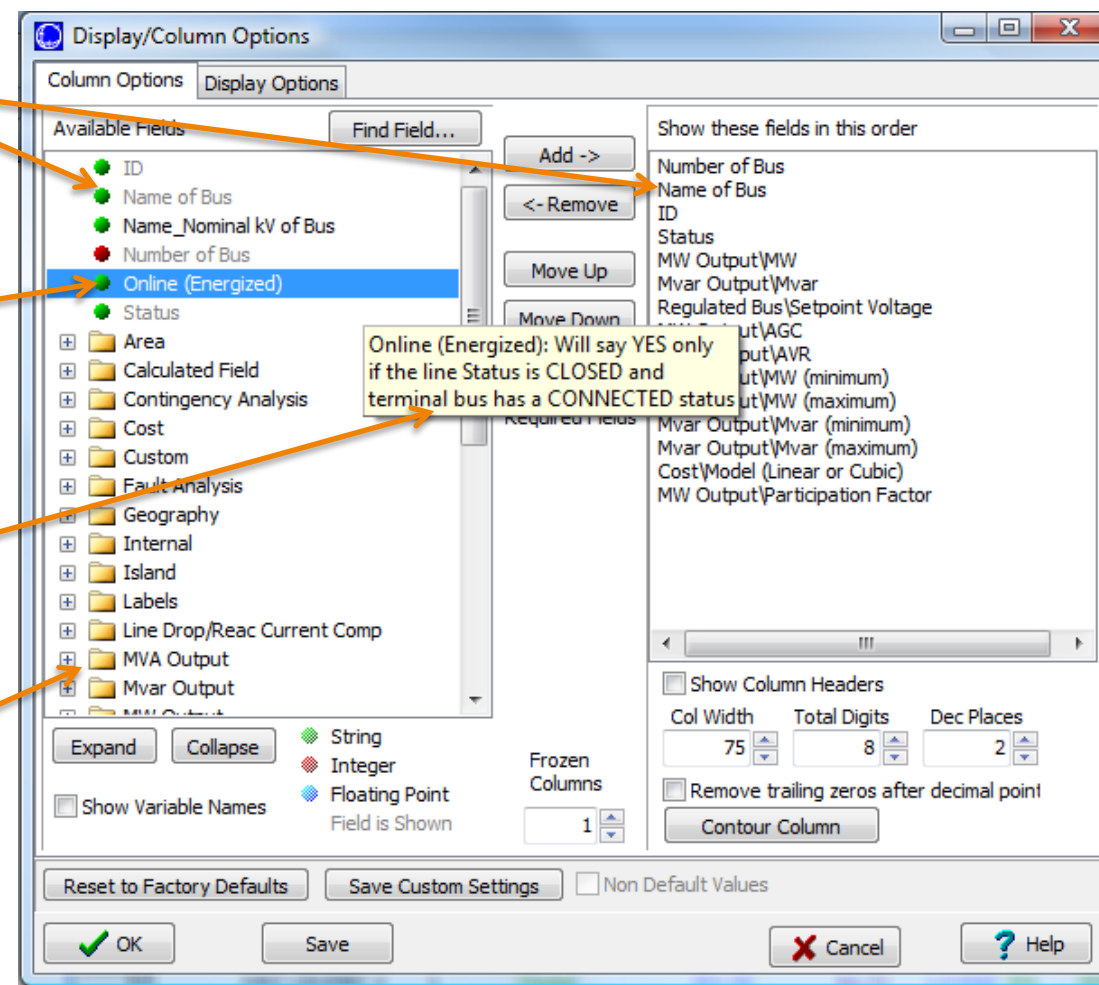


Gray text means the field is already shown

Colored Dots represent the field type

Hints automatically appear giving a description of the field

Fields organized by folder



Display/Column Options

Column Options



- Choose fields from the **Available Fields** list. Then left-click and drag into the **Show these fields in this order** list

Also can click the **Add →** or **← Remove** Buttons to modify the fields shown

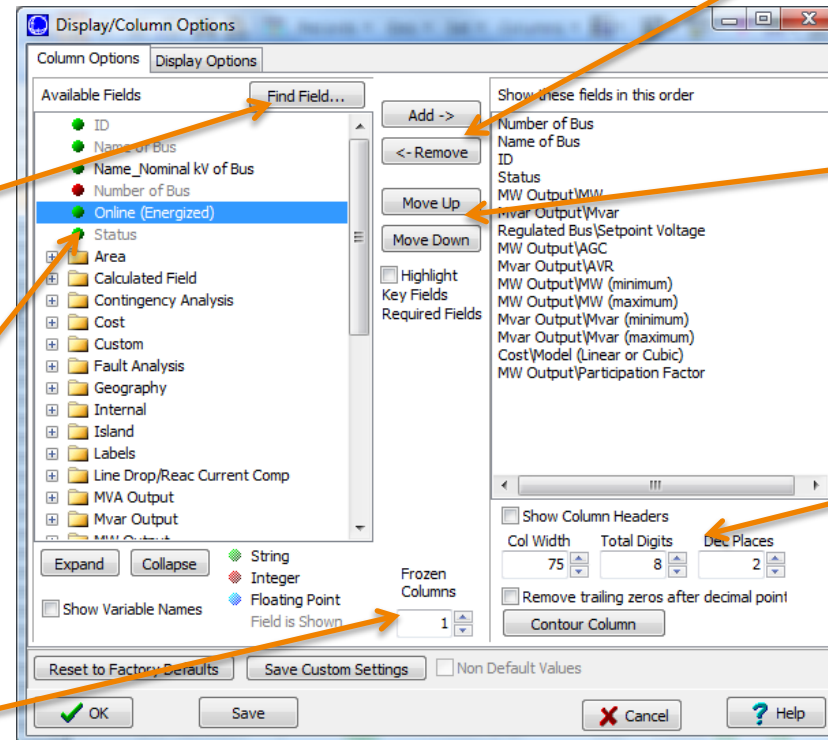
Use a wildcard find for a particular field

Fields grayed out if already in display

Number of frozen columns

Click **Move Up** and **Move Down** to change the order of the columns

Change attributes of the display columns. Also, use toolbar buttons

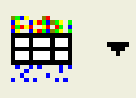


Display/Column Options

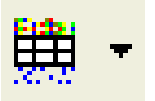
Display Options



Will disable the area/zone filtering for a single case info display. Also available via a toolbar button

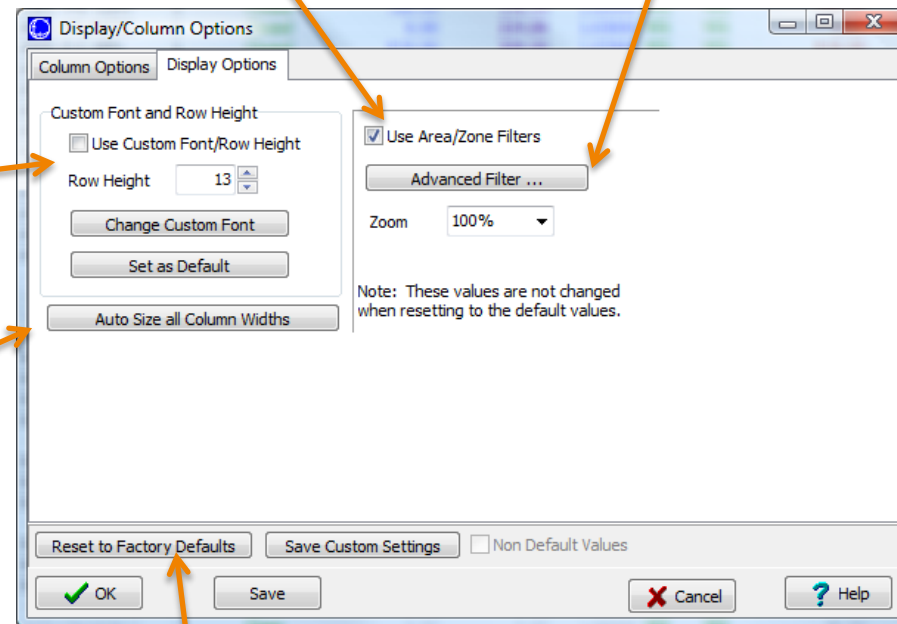


Define a custom filter. Also available via a toolbar button



Change custom fonts and row heights

Auto resize all column widths. Also available via a toolbar button



Reset all values to default

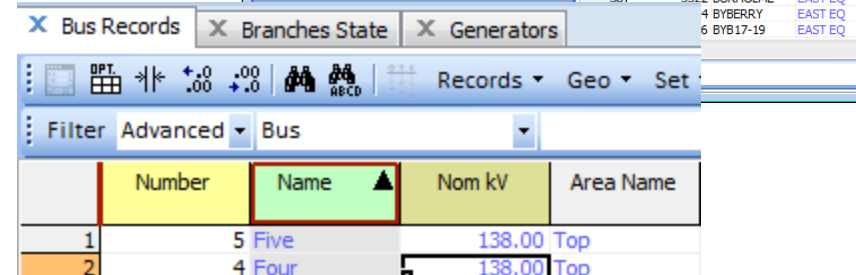
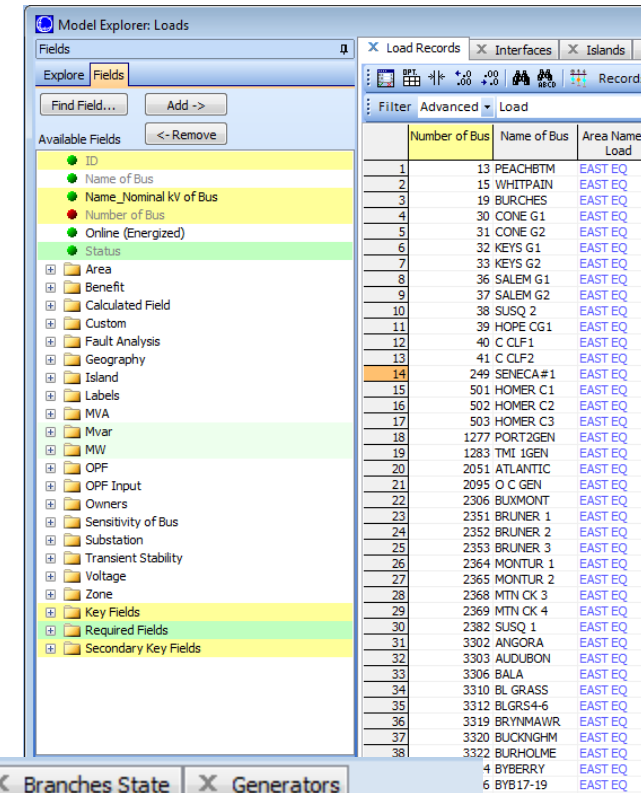


Alternative Display/Column Options

Model Explorer: Fields Pane



- Fields Pane: Directly modify the columns shown by dragging from the Fields Pane onto the case information display
 - Location of new field is highlighted by a **red** line
- Also, CTRL Left-Click at the top of columns to reorder them on any case information display
 - Column being moved is highlighted by **red** box
 - Location being moved to is highlighted by a **red** line





Find...



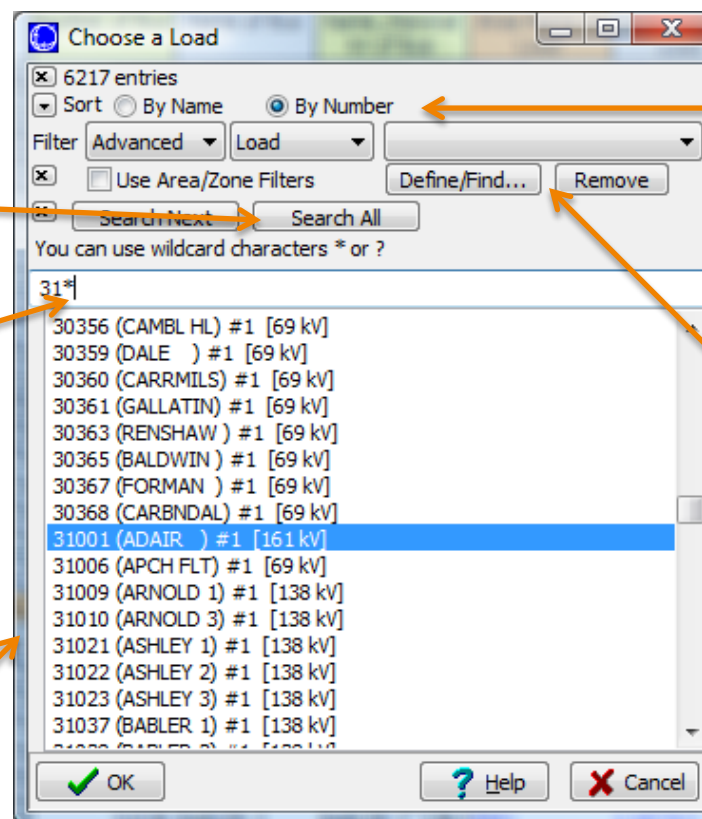
- Use wildcard searches to find an object

Brings up a dialog list of all objects that meet the wildcard string

Wildcard string. Use:

- * - several unknown characters
- ? - a single unknown character

A list of all the objects



Sort List by name or number

Filter the List



Example Wildcard Searches



- On both the Find and Search for Text Dialogs, you can use wildcard searching
 - * several unknown characters
 - ? a single unknown character
- * Examples
 - *pw* would find “abcpw123”, “pw123”, and “abcpw”
 - pw* would only find “pw123”
 - *pw would only find “abcpw”
- ? Examples
 - ?pw* would find “apw123” and “apw”
 - ?pw* would NOT find “abcpw123”



Search for Text...



- Search through the text shown on the case information display for a particular string
- Feature can also be accessed directly on the Search Toolbar at the bottom of the Model Explorer



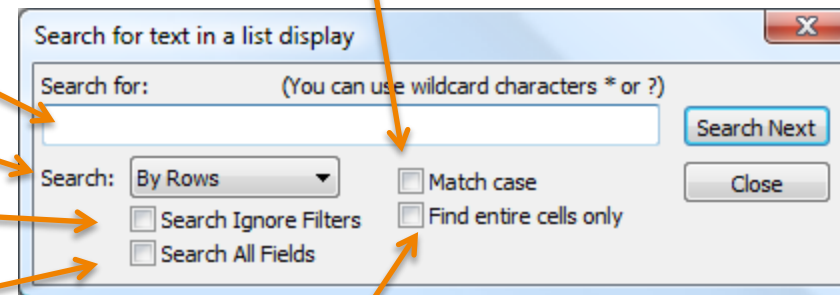
Enter Search String

Match upper/lower case letters

Search by columns or rows

Search records filtered out

Search fields not displayed



Only search if entire cell matches



Search for Text Options



- Search Ignore Filters
 - Choose this option to search through all records of the object type shown on the case information display regardless of the present filtering applied
 - If the text is found outside of the presently shown objects, then you will be prompted to remove filtering
- Search All Fields
 - Choose this option to search through all fields of the object type shown on the case information display regardless of the presently shown fields
 - If the text is found in a field not presently shown, then you will be prompted to show the column

Records Menu



- Contains a list of actions related to the specific kinds of records displayed in the case information display
- Common choices available here
 - **Insert** and **Delete**: to insert and delete objects
 - **Bus View** and **Substation View**
 - **Area/Zone/Owner/DataMaintainer Filters**
 - **Pan to Object on Online** – choose to pan to a display object that represents the active row
- Typical other choices
 - Special choices for each particular record type
 - Automatically creating objects from the selection

Define Expression

- To open the Custom Expression Dialog, select the **f(x)** toolbar menu and choose **Define Expression...**
- Then click **New** to make a new expression

Define Custom Expressions

Custom Expression

Click New to define a new expression

New Save Delete Add Column...

Expression Name

x1=	Choose a Field	Find...	Field
x2=	Choose a Field	Find...	Field
x3=	Choose a Field	Find...	Field
x4=	Choose a Field	Find...	Field
x5=	Choose a Field	Find...	Field
x6=	Choose a Field	Find...	Field
x7=	Choose a Field	Find...	Field
x8=	Choose a Field	Find...	Field

function (x1, x2, x3, x4, x5, x6, x7, x8) =

OK Help Cancel



Creating a Custom Expression



Specify the field(s)
used in the expression

Write the expression as a
function of x1, x2, ...

Choose Add
Column... as a
quick way to add
the column to
the Case Info
Display

Operators Available in Custom Expressions



- Details available in Help files

()	>=	COS	CSCH	LOG
!	<=	TAN	ASINH	LOG2
%	<>	ASIN	ACOSH	LOG10
^	NOT	ACOS	ATANH	CEIL
*	AND	ATAN	ACOTH	RND
/	OR	SEC	ASECH	INT
\	XOR	CSC	ACSCH	SGN
MOD	EQV	COT	ABS	SQR
+	IMP	SINH	EXP	
-	IIF	COSH	EXP2	
>	MIN	TANH	EXP10	
<	MAX	COTH		
==	SIN	SECH		

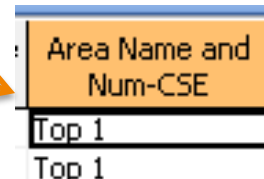


f(x) ▾

Define String Expression



- Select the **f(x)** toolbar menu, choose **Define String Expression...**, and click **New**
- Can concatenate strings with the **+** operator
- Convert numeric fields to strings with **Str** function
- Example: Area Name and Number



Define Custom String Expressions

Custom Expression: Custom\Expression 1 (Bus)

New Save Delete Add Column...

Expression Name: Area Name and Num

x1= Area\Name	Find...	Field
x2= Area\Number	Find...	Field
x3= Choose a Field	Find...	Field
x4= Choose a Field	Find...	Field
x5= Choose a Field	Find...	Field
x6= Choose a Field	Find...	Field
x7= Choose a Field	Find...	Field
x8= Choose a Field	Find...	Field

function (x1, x2, x3, x4, x5, x6, x7, x8) =

x1+""+str(x2,1,0)

OK Help Cancel

Geo Menu



- Geo Menu provides access to options related to the automatic creation of Geographic Data Views.
 - There must be latitude/longitude information populated in either the bus records or the substation records for this to work.
 - This will be discussed more in the Advanced Visualization Section later in the training.

Set Menu



- Set Menu contains options for changing values in the presently selected column
 - **Toggle All YES, NO, Closed, Open, etc...**
 - **Set All Value to...**
 - Choose this option to set all values in the active column to a particular value. A dialog will appear allowing you to specify the value to which to set the values.
 - **Set All Values to Field...**
 - Choose this option to set all values in the active column to the values in another column.
 - For example, you may change the voltage set-point of a generator to be equal to the terminal voltage of the generator. A dialog will appear asking you to choose the field.
- Actions only apply to objects presently being shown on the display – *Filtering is important*

Set Values to Field... Another Way

Enter Data from Another Field



- When typing, append the @ symbol to copy data from another field
- Fields must be identified with Variable Names (See Auxiliary File Format: DATA Section topic for description of Variable Names)
- Example: Type **@BusPUVolt** into the generator setpoint voltage and it will change the setpoint to the terminal voltage.
- This also works in auxiliary files or when pasting from Excel
 - Note: When entering in Excel, you may need to add a single quote (') before the @ symbol

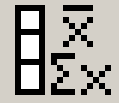
	Number of Bus	Name of Bus	ID	Status	Gen MW	Gen Mvar	PU Volt of Bus	Set Volt	AGC
1	30	CONE G1	H	Closed	445.00	226.73	1.050	@BusPUVolt	ES
2	30	CONE G1	L	Closed	405.00	205.60	1.050	1.05000	ES
3	31	CONE G2	H	Closed	445.00	-21.00	0.970	0.96671	YES
4	31	CONE G2	L	Closed	405.00	-19.00	0.970	0.96671	YES
5	32	KEYS G1	H	Closed	433.00	5.00	0.959	0.95862	YES
6	32	KEYS G1	L	Closed	417.00	4.57	0.959	0.95862	YES
7	33	KEYS G2	H	Closed	433.00	5.05	0.959	0.95877	YES
8	33	KEYS G2	L	Closed	417.00	4.62	0.959	0.95877	YES
9	34	PCHBTM 2	1	Closed	1093.00	193.91	1.010	1.01000	YES
10	35	PCHBTM 3	1	Closed	1093.00	194.50	1.010	1.01000	YES

Value will be set
to 1.05 on enter

Columns Menu



- Several options generally available
 - **Select Columns** and **Select Rows**
 - **Get Column Metrics** and **Get Row Metrics**
 - Get statistical information about the data shown
 - **Contour Columns**
 - Color the background of the cells in the column
 - **Plot Columns**
 - Show a plot of the data in the columns



Get Column/Row Metrics



- Available under the **Columns** toolbar menu
- Choose to get the statistical information about the column/row you click (only for those values that are presently displayed)
 - Sum
 - Average
 - Variance
 - Standard Deviation
 - Maximum
 - Minimum
 - Total Items
 - Total Non-Zero Items

The screenshot shows the 'Grid Metrics' dialog box with the following details:

- Start Column:** 10, **End Column:** 10, **Start Row:** 1, **End Row:** 7
- Treatment of blank cells:** ☒ Treat blank cells as zero, ☐ Ignore blank cells for calculation
- ☐ Use Absolute Values, ☐ Use Excluded Values to Limit Range
- Excluded Values:** Exclude If <= 0.00, Exclude If >= 0.00
- Metrics:** Column/Row ID: The metrics for Column Gen MW
- Sum:** 767.94, **Range (Max - Min):** 200.650
- Average:** 109.705823, **Maximum:** 200.65
- Variance:** 6353.646415, **Maximum Row,Col:** 7, 10
- STD Deviation:** 79.709764, ☒ Pan to Maximum Row,Col
- Total Items:** 7, **Minimum:** 0.00
- Total Nonzeros:** 5, **Minimum Row,Col:** 3, 10
- Total Zeros:** 2, ☒ Pan to Minimum Row,Col
- Buttons:** Close, Update Metrics (highlighted), Cancel

Contour Column

- To open the Contour Column Dialog, select the **Columns** toolbar menu and choose **Contour Column...**

Column being contoured

Choose your color map

Choose the fields to use
for the contouring
(normally the same as the
column being contoured)

The screenshot shows the 'Contour Column' dialog box for the column 'Voltage\Per Unit Magnitude'. The 'Custom Color Map' tab is active. The 'Color Map' section shows 'Blue=low, Red=High' selected, with a 'Reverse Color Map Colors' checkbox and a 'Brightness' slider. The 'Choose a Field to Color By' section has 'Use cell values directly' selected. The 'Values' section includes checkboxes for 'Use absolute value' and 'Ignore Above Max', and input fields for 'Maximum' (1.0500 pu), 'Break High' (1.0371 pu), 'Nominal' (1.0242 pu), 'Break Low' (1.0084 pu), and 'Minimum' (0.9927 pu). A color key is shown next to these values. The 'Color Key' section has 'Draw Color Key' checked, and a 'Title' field. The 'Entry Labels' section has 'Dec.Pts.' set to 0 and 'Scalar' set to 1.0000. The 'Calculate Values' button is visible. The dialog has 'OK', 'Remove', 'Cancel', and 'Help' buttons at the bottom.

Choose how
the values map
to colors

Options
regarding the
Color Key

Example Display with Contoured Columns

Model Explorer: Generators

Explore Fields

Recent

Network

- Branches By Type
 - Branches Input
 - Branches State
 - Buses
 - DC Transmission Lines
- Impedance Correction Tables
- Line Shunts
- Loads
- Mismatches
- Multi-Terminal DC
- Switched Shunts
- Three-Winding Transformers
- Transformer Controls

Aggregations

- Areas
- Injection Groups

Interfaces

- Islands
- Multi-Section Lines
- MW Transactions

Nomograms

Owners

- Substations
- Super Areas
- Tie Lines between Areas
- Tie Lines between Zones
- Transfer Directions
- Zones

Solution Details

- Case Information and Auxiliary
- Contingency Analysis
- Fault Analysis
- Optimal Power Flow
- Transient Stability
- User-Defined

Open New Explorer

Gen Records

Filter Advanced Generator

Find... Remove

	Number	Name	ID	Status	Gen MW	Gen Mvar	Set Volt	AGC	AVR	Min MW	Max MW	Min Mvar
1	30	CONE G1	H	Closed	445.00	226.73	1.050	1.05000	YES	YES	262.00	445.00
2	30	CONE G1	L	Closed	405.00	205.60	1.050	1.05000	YES	YES	238.00	405.00
3	31	CONE G2	H	Closed	445.00	-21.00	0.970	0.96671	YES	YES	262.00	445.00
4	31	CONE G2	L	Closed	405.00	-19.00	0.970	0.96671	YES	YES	238.00	405.00
5	32	KEYS G1	H	Closed	433.00	5.00	0.959	0.95862	YES	YES	262.00	433.00
6	32	KEYS G1	L	Closed	417.00	4.57	0.959	0.95862	YES	YES	238.00	417.00
7	33	KEYS G2	H	Closed	433.00	5.05	0.959	0.95877	YES	YES	262.00	433.00
8	33	KEYS G2	L	Closed	417.00	4.62	0.959	0.95877	YES	YES	238.00	417.00
9	34	PCHBTM 2	1	Closed	1093.00	193.91	1.010	1.01000	YES	YES	1093.00	1093.00
10	35	PCHBTM 3	1	Closed	1093.00	194.50	1.010	1.01000	YES	YES	1093.00	1093.00
11	36	SALEM G1	1	Closed	1106.00	550.00	1.032	1.07310	YES	YES	1086.00	1106.00
12	37	SALEM G2	1	Closed	1118.58	257.53	1.005	1.00514	YES	YES	1086.00	1124.00
13	38	SUSQ 2	1	Closed	1110.00	64.34	0.993	0.99263	YES	YES	1094.00	1110.00
14	39	HOPE CG1	1	Closed	1031.00	2.10	0.970	0.96984	YES	YES	1031.00	1031.00
15	40	C CLF1	1	Closed	844.00	6.49	0.969	0.96860	YES	YES	835.00	844.00
16	41	C CLF2	1	Closed	840.00	62.46	0.976	0.97619	YES	YES	837.00	840.00
17	42	LIMERCK2	1	Closed	1115.00	98.22	1.010	1.01000	YES	YES	1115.00	1115.00
18	249	SENECA#1	1	Closed	210.00	62.64	1.052	1.05200	YES	YES	84.00	210.00
19	501	HOMER C1	1	Closed	620.00	-0.15	1.000	1.00000	YES	YES	300.00	620.00
20	502	HOMER C2	1	Closed	614.00	71.33	1.000	1.00000	YES	YES	300.00	614.00
21	503	HOMER C3	1	Closed	650.00	76.71	1.000	1.00000	YES	YES	300.00	650.00
22	1277	PORT2GEN	H	Closed	122.00	4.32	1.000	1.00000	YES	YES	50.00	122.00
23	1277	PORT2GEN	L	Closed	122.00	4.32	1.000	1.00000	YES	YES	50.00	122.00
24	1283	TMI 1GEN	1	Closed	786.00	176.33	1.000	1.00000	YES	YES	786.00	786.00
25	2051	ATLANTIC	1	Closed	0.00	224.86	1.030	1.03000	YES	YES	0.00	0.00
26	2095	O C GEN	1	Closed	619.00	208.00	1.020	1.03500	YES	YES	619.00	619.00
27	2351	BRUNER 1	H	Closed	161.00	-22.87	1.030	1.03000	YES	YES	69.00	161.00
28	2351	BRUNER 1	L	Closed	161.00	-22.87	1.030	1.03000	YES	YES	69.00	161.00
29	2352	BRUNER 2	H	Closed	189.00	-27.46	1.030	1.03000	YES	YES	70.00	189.00
30	2352	BRUNER 2	L	Closed	189.00	-27.46	1.030	1.03000	YES	YES	70.00	189.00
31	2353	BRUNER 3	1	Closed	735.00	223.19	1.030	1.03000	YES	YES	433.00	735.00
32	2364	MONTUR 1	1	Closed	745.00	209.14	1.039	1.03900	YES	YES	356.00	745.00
33	2365	MONTUR 2	1	Closed	745.00	192.32	1.039	1.03900	YES	YES	455.00	745.00
34	2368	MTN CK 3	1	Closed	815.22	227.48	1.026	1.02600	YES	YES	157.00	820.00
35	2369	MTN CK 4	1	Closed	815.22	236.08	1.026	1.02600	YES	YES	157.00	820.00
36	2382	SUSQ 1	1	Closed	1106.00	84.93	1.030	1.03000	YES	YES	1090.00	1106.00
37	3349	CHSTR7-9	1	Open	0.00	0.00	0.974	0.97500	YES	YES	13.00	13.00
38	3349	CHSTR7-9	2	Open	0.00	0.00	0.974	0.97500	YES	YES	13.00	13.00
39	3349	CHSTR7-9	3	Open	0.00	0.00	0.974	0.97500	YES	YES	13.00	13.00
40	3357	CONOW7	1	Open	0.00	0.00	0.980	0.99500	YES	YES	36.00	36.00
41	3360	CONOW1,2	1	Closed	36.00	9.98	1.000	1.00000	YES	YES	36.00	36.00

Search Search Now Options ▾

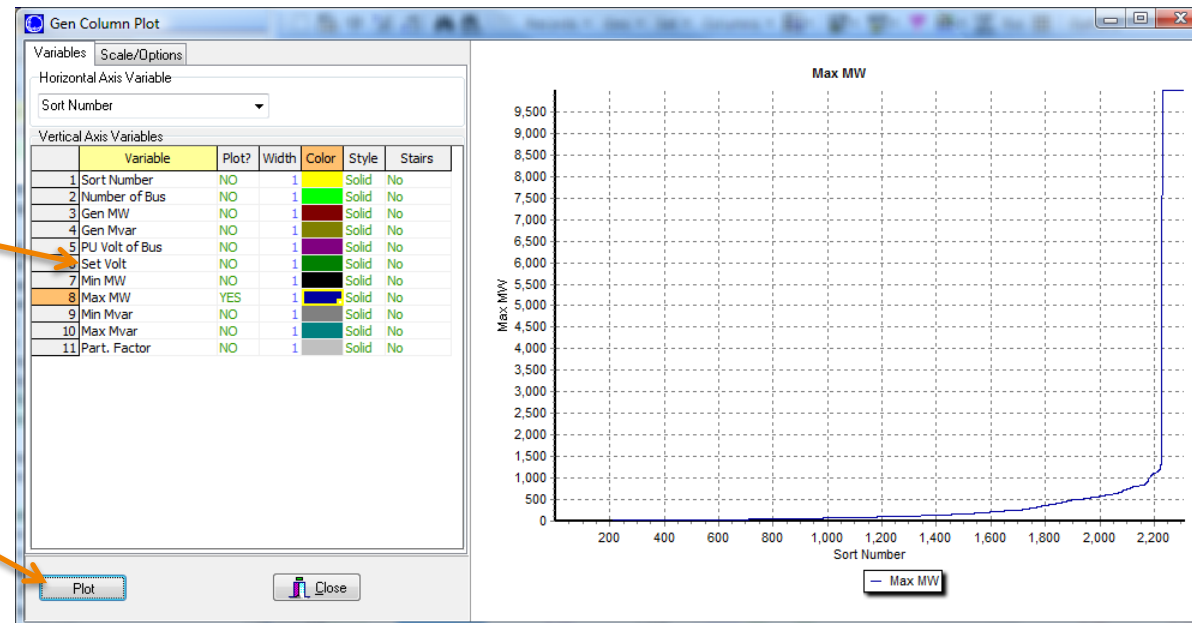


Plot Columns

- Choose the Plot Columns option to allow yourself to plot any column that is presently shown on the case information display
- An example using generator Maximum MW outputs is shown below

Set options

Click **Plot** to
update plots





Area/Zone/Owner/DataMaintainer Filtering



- Area/Zone/Owner/DataMaintainer Filtering is a GLOBAL setting
 - They apply to **all** case information displays
- Use Area/Zone/Owner/DataMaintainer Filtering to limit what is shown in Case Information Displays to only those elements whose:
 - Area is set to be shown
 - AND**
 - Zone is set to be shown
 - AND**
 - Owner is set to be shown



Area/Zone/Owner/DataMaintainer Filters



Toggle the Shown field

DataMaintainer is not used by default. If checked, then DataMaintainer must also be Shown for object to display.

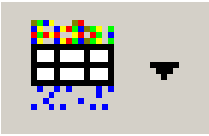
Area/Zone/Owner/DataMaintainer Filters

Set all Area/Zone/Owner/DataMaintainer Filters to Yes ☐ Use Data Maintainers Filtering on Case Information Displays Close

Areas Zones Owners Data Maintainers

Records Geo Set Columns

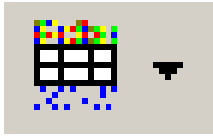
	Area Num	Area Name	Shown	# of Buses	Min Bus Num	Max Bus Num
1	11	Upstate South Carolina	NO	499	11001	11499
2	13	New Jersey	NO	1807	13001	14807
3	15	Virginia	YES	1488	15001	16488
4	17	Maine	NO	628	17001	17628
5	19	Midlands South Carolina	NO	385	19001	19385
6	21	Maryland	NO	1120	21001	22120
7	23	Connecticut	YES	780	23001	23780
8	25	Piedmont North Carolina	NO	934	25001	25934
9	27	Northern New York	NO	518	27001	27518
10	29	Central Pennsylvania	NO	1078	29001	30078
11	31	Lowcountry South Carolina	NO	420	31001	31420
12	33	North Carolina Mountains	NO	539	33001	33539



Advanced Filtering



- Click on the **Advanced Filter** toolbar button and choose **Advanced Filter...**
- When you open this dialog, the default is to see filters that have been defined for the type of object you are trying to filter (e.g. Bus, Generator, Interface, etc...).
- Note: When choosing the field to filter against, use the **Find...** button
 - Many locations in Simulator have a drop-down list of fields to choose from
 - Lists can have 100s of entries and are difficult to navigate
 - Use the **Find...** button to make it easier



Advanced Filter Dialog



Filter By will be discussed shortly
(Advanced or Device)

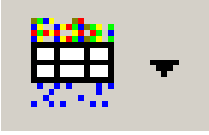
Type of object being filtered

Logical Comparator

Condition(s)

Use the **Find...** buttons

Click to delete a condition



Advanced Filtering



- Some objects allow the use of filters defined for related objects
 - Change **Select Filter Type** to select/define filters for related objects
 - Example: Use bus filter for nominal voltages greater than 138 kV to filter generators
- No Maximum Amount of Conditions
 - Choose the field, then the comparator, then the values to compare the field to.
 - Fields are the same as those available for Case Info
- You can optionally “pre-filter” using the Area/Zone/Owner/DataMaintainer Filters



Advanced Filter



- Logical Comparison specifies the filter logic.
 - Comparison applies across ALL conditions
 - AND – filter is met if ALL conditions are met
 - OR – filter is met if ANY condition is met
 - NOT AND – filter is NOT met if and only if ALL conditions are met
 - NOT OR – filter is NOT met if and only if ANY condition is met
- Other advanced options
 - Absolute value (ABS) compare for numeric conditions
 - Case Sensitive compare for string conditions
 - Field-to-field comparisons
 - Using another filter as a filter condition
- An Advanced Filter Toolbar is also available for quickly selecting and applying filters





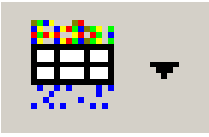
Field-To-Field Comparisons



- Users have the option to include Field-To-Field comparisons

Click the **Find** Button to choose another field to compare to instead of a constant value.

Check the box for **Enable Field to Field Comparisons**



Using a Filter as a Condition

X AND (Y OR Z)



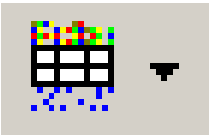
- As described, filters are very flexible, however you cannot create the comparison
 - *X and (Y or Z)*
- In order to do this you must first create a filter that represents “Y or Z”

Result = X and (Y or Z)

B = (Y or Z)

Result = X and B

- Then create a second filter which uses this filter as a condition
 - Check the box **Use Another Filter** under the list of fields for the condition
 - This changes the dialog to have choices of meets filter or not meets filter



Using a Filter as a Condition X AND (Y OR Z)



- Note: you must be careful to avoid circular references

Check Box “Use Another Filter”

Advanced Filters for Gen

Filter By: **Advanced** Select Filter Type: **Bus** Generator will meet the advanced filter if the terminal bus meets the filter

Filter Name:

Save Save As Rename Delete

☐ Pre-filter using Area/Zone/Owner Filters ☒ Enabled (normally checked) Logical Comparison: ☒ AND ☐ OR ☐ Not AND ☐ Not OR

Condition 1: ☒ Find... meets filter ☒ Use Another Filter

Condition 2: ☒ Find... greater than ☐ ABS Find ☐ Use Another Filter

Add >> Delete ... ☒ Enable Field to Field Comparisons

Filter Remove Help Cancel

Specify the name of the other filter

Advanced Filtering: Across Object Types

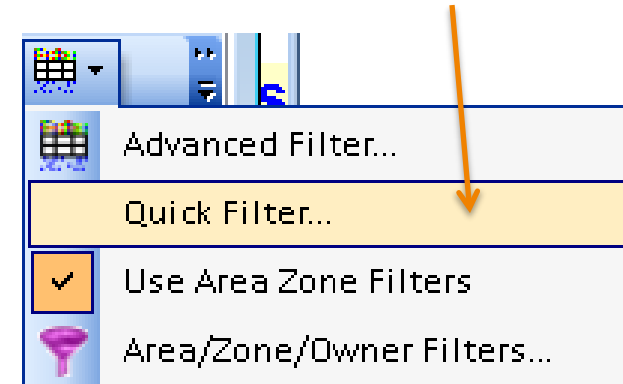


- Use advanced filters across object types
 - For example: define a Bus filter and then use this bus filter on a generator, load, or switched shunt object
 - If the object being filtered contains more than one of the filter object type, then OR is assumed.
 - If a bus object uses an area filter, the bus meets the filter if the area of the bus meets the filter
 - If an area object uses a bus filter, the area meets the filter if ANY single bus in the area meets the filter

Quick Filter



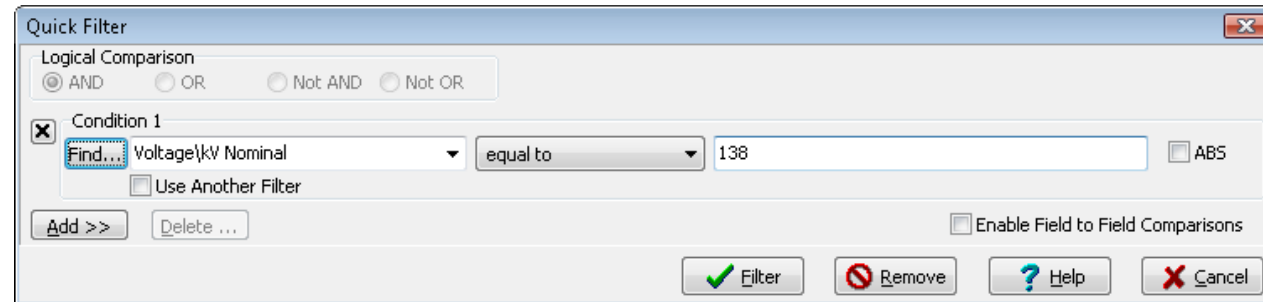
- Filters may also be quickly created and applied without saving the filter name
- Choose **Quick Filter...** from the **Advanced Filter dropdown** or **Filterbar**



Quick Filter



- Quick Filters are created just like Advanced Filters

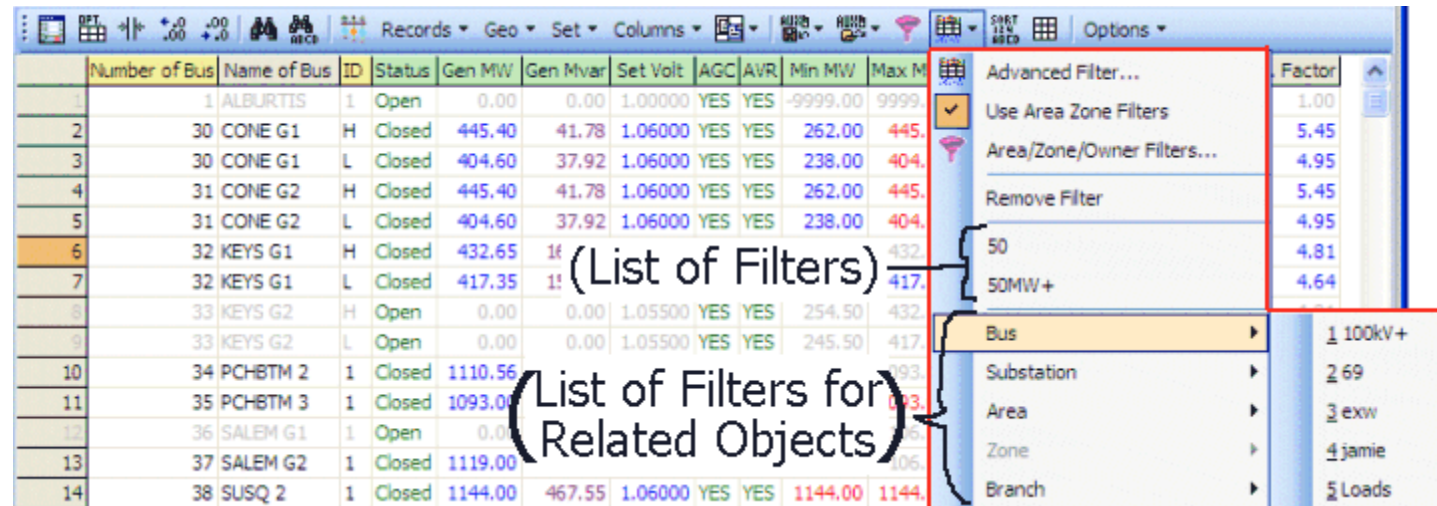


- Condition 1** will default to the field and value of the presently selected cell in the **Case Info Display**
 - Subsequent selection of **Quick Filter** with different cell selections can be used to add conditions
- If not saved, Quick Filters are lost when another Advanced or Quick Filter is created or applied
 - To save a Quick Filter, open the **Advanced Filter Dialog** while the Quick Filter is applied, then click **Save** or **Save As**

Case Information Toolbar : Filters Menu



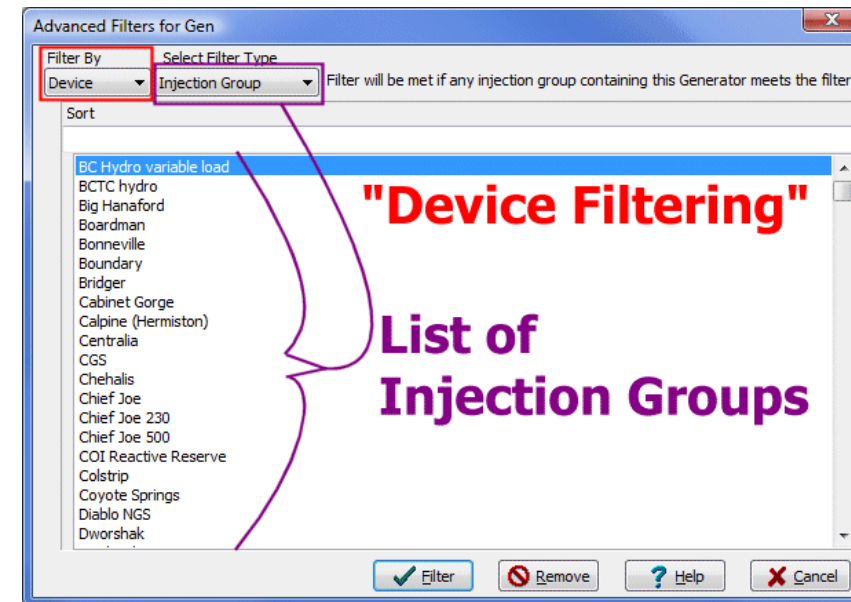
- Provides access to the old Advanced Filter... button and Area/Zone/Owner/DataMaintainer Filters
- Also provides submenu access to advanced filters defined for related object types



Advanced Filtering : Device Filtering



- Filter By = Device
- Directly use one of the power system model objects as a filter
- Relationship between the object types will determine filter action
 - Use an injection group as a device filter on a list of generators
 - Result will be to only show the generators in the injection group



Case Information Filterbar

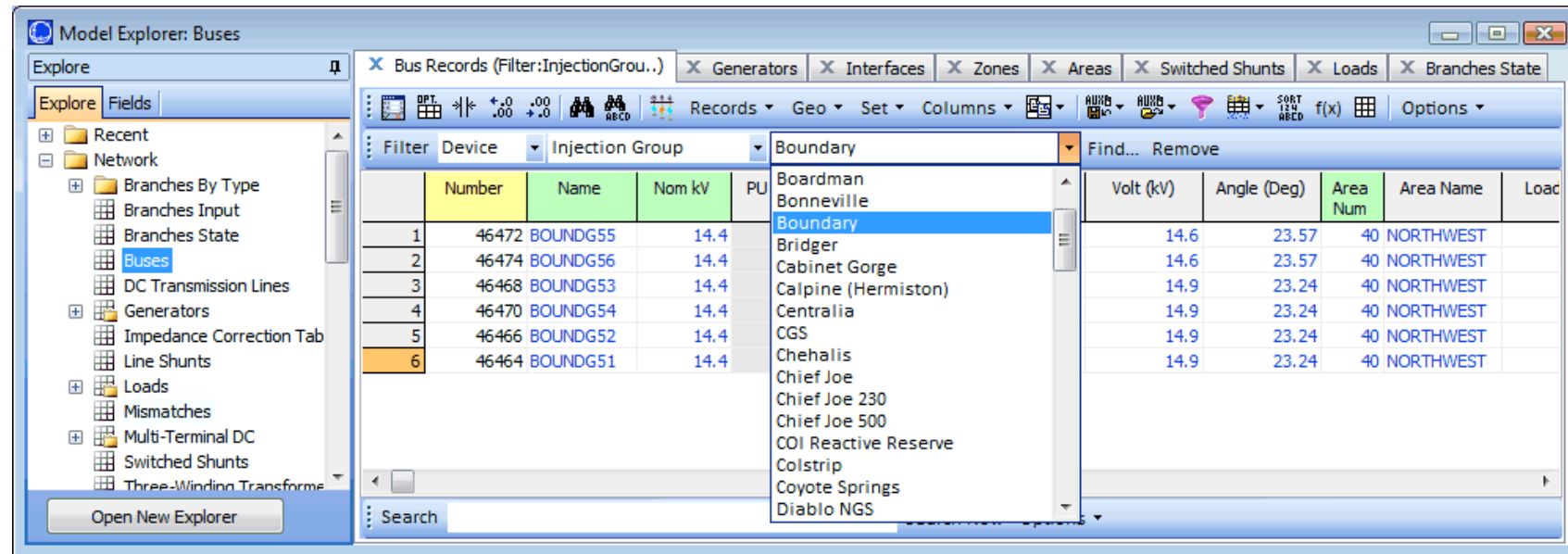


- Shown Directly above the case information display on the Model Explorer
 - Not shown by default in other locations
 - To show, right-click on case info toolbar to choose Filterbar>Top
- **Filter By** and **Filter Type** → same as drop-down on filter dialog
- **List of Filters** or **List of Devices**
 - For Advanced Filters, this will be a list of presently defined filters
 - For Device Filters, this will be a list of the devices of the type
 - If more than 1,000 entries in drop-down, then drop-down will behave like clicking the **Find..** Button instead
- **Find...** button → will open the Advanced Filter dialog
- **Remove** button → will remove filtering from the case info

Filterbar Example: Device Filtering



- Use Injection Group as a Device Filter on a list of buses
 - Get a list of the terminal buses for all generator, loads, and shunts in the injection group



Filterbar Example: Advanced Filtering



- Use the advanced filter for a branch on a list of buses
 - Get a list of terminal buses of the branches which meet the advanced filter

Model Explorer: Buses

Explore Fields

Recent Network

Branches By Type

Branches Input

Branches State

Buses

DC Transmission Lines

Generators

Impedance Correction Tab

Line Shunts

Loads

Mismatches

Multi-Terminal DC

Switched Shunts

Three-Winding Transformer

Open New Explorer

Bus Records (Filter: <Branch>NW EHV...)

Generators Interfaces Zones Areas Switched Shunts Loads Branches

Records Geo Set Columns

Filter Advanced Branch

NW EHV lines

Find... Remove

Number	Name	Nom kV	PU	Volt (kV)	Angle (Deg)	Area Num	Area Name	L
1	60192 LADD	230.0		0.0	0.00	60	IDAHO	
2	48365 RITZVILL	115.0		107.8	-26.23	40	NORTHWEST	
3	47073 RALSTONB	115.0	0.949	109.2	-25.65	40	NORTHWEST	
4	48457 WASHTUNA	115.0	0.949	109.2	-25.72	40	NORTHWEST	
5	48221 MARENGO	115.0	0.949	109.1	-25.68	40	NORTHWEST	
6	47025 DELIGHT	115.0	0.950	109.3	-25.66	40	NORTHWEST	
7	48187 LIND	115.0	0.951	109.4	-25.48	40	NORTHWEST	
8	40060 ASHE F	230.0	0.960	220.7	-19.44	40	NORTHWEST	
9	48375 ROXBORO	115.0	0.962	110.7	-24.68	40	NORTHWEST	
10	60241 BURMID11	500.0	0.963	481.3	-60.00	40	NORTHWEST	

Search Search Now Options

Simple Sorting



- To sort a column, left-click on the column heading. Click again to sort in the opposite direction
- SHIFT + Left-Click will sort by Absolute Value

Sorted Descending by Gen MW

Note: Arrow showing sort direction

	Number	Name	Area Name	Nom kV	PU Volt	Volt (kV)	Angle (Deg)	Load MW	Load Mvar	Gen MW ▼	Gen Mvar	Switched Shunts Mvar	Act G Sh MW ▲
1	14931	PALOVRD1	ARIZONA	24.00	1.00652	24.157	-40.10	61.76	46.36	1382.00	354.38		0.
2	14933	PALOVRD3	ARIZONA	24.00	1.00651	24.156	-40.08	61.76	46.36	1382.00	354.38		0.
3	14932	PALOVRD2	ARIZONA	24.00	1.00642	24.154	-40.19	61.76	46.36	1379.00	354.38		0.
4	36412	DIABLO 2	PG AND E	25.00	1.03000	25.750	-50.82	47.40	9.62	1200.00	-20.62		0.
5	36411	DIABLO 1	PG AND E	25.00	1.03000	25.750	-51.15	47.40	9.62	1180.00	-34.56		0.
6	40063	CGS	NORTHWEST	25.00	0.99601	24.900	-10.30	54.55	37.49	1155.00	-152.83		0.
7	24110	S.ONOFR3	SOCALIF	22.00	0.97937	21.546	-69.92			1080.00	127.08		0.

Absolute Value Sort

Click here to remove sorting

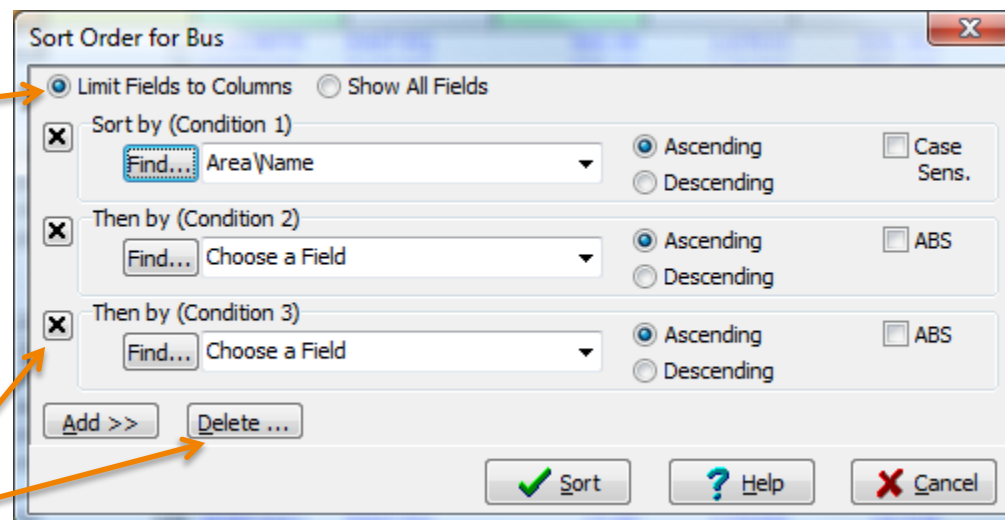
	Number	Name	Area Name	Nom kV	PU Volt	Volt (kV)	Angle (Deg)	Load MW	Load Mvar	Gen MW	Gen Mvar ▼	Switched Shunts Mvar	Act G Sh MW ▲
1	14932	PALOVRD2	ARIZONA	24.00	1.00642	24.154	-40.19	61.76	46.36	1379.00	354.38		0
2	14931	PALOVRD1	ARIZONA	24.00	1.00652	24.157	-40.10	61.76	46.36	1382.00	354.38		0
3	14933	PALOVRD3	ARIZONA	24.00	1.00651	24.156	-40.08	61.76	46.36	1382.00	354.38		0
4	30000	PTSB 7	PG AND E	20.00	1.05000	21.000	-62.54	16.10	3.27	710.00	214.61		0
5	26040	INTERM2G	LADWP	26.00	1.03668	26.954	-54.44	53.00	40.00	950.00	188.81		0
6	26039	INTERM1G	LADWP	26.00	1.03668	26.954	-54.44	53.00	40.00	950.00	188.81		0
7	40063	CGS	NORTHWEST	25.00	0.99601	24.900	-10.30	54.55	37.49	1155.00	-152.83		0

Advanced Sorting



- Click on the **Advanced Sort** toolbar button to open the Advanced Sorting Dialog

Check to Limit the Fields available to sort by to those which are shown on the list display



Click to delete condition

Advanced Sorting



- Choose the sort order you desire
- Can be either ascending or descending
- No Maximum Amount of sort conditions
- Other advanced options
 - Absolute value (ABS) compare for numeric conditions
 - Case Sensitive compare for string conditions



Save As



- Save As
 - Auxiliary File...
 - This will save **ALL** information shown in the present case information display as a DATA section in an auxiliary file
 - **ALL** fields being displayed will be saved
 - Auxiliary File (only selected records)...
 - Same as previous, but
 - **Only Selected** records will be saved
 - Again **ALL** fields being displayed will be saved
 - Auxiliary File (only selected records/columns)
 - Same as previous, but
 - **Only Selected** records will be saved
 - **Only Selected** fields will be saved



Save As



- Auxiliary File with Options...
 - Option to save **ALL** information shown, only **Selected Records**, or only **Selected Records and Columns**
 - Option to use **Number, Name and Nominal kV**, or **Label** as unique object identifier
 - Options to save related object SubData as Data (**Extra Data**) or as SubData with each object (**SUBDATA**), or to omit (**Do Not Save**)
 - Option to use a named **Auxiliary Export Format** to save objects of the selected type

The dialog box 'Save Auxiliary File With Options' contains the following sections:

- What to Save:** Radio buttons for 'Save All' (selected), 'Save Selected Records', and 'Save Selected Records and Columns'.
- Which identifiers would you like to use for identifying objects in SUBDATA and within fields in the extra DATA sections?:** Radio buttons for 'Identifiers' (selected), 'Name and Nominal kV', and 'Label (Use Number if no label)'.
- Use Auxiliary Export Format:** A checkbox that is currently unchecked. A note below it states: 'Note: This option will only select the fields from the Aux Export Format of the selected object'.
- Choose AUX Export Format Description:** A dropdown menu with a 'Define Formats' button below it.
- Save Options Table:**

	Do Not Save	Extra Data	SUBDATA
Cost Curves	☐	☒	☐
ReactiveCapability	☐	☒	☐

Buttons: OK, Cancel



Save As



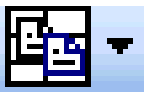
- Save As
 - CSV (Comma delimited)...
 - This will save **ALL** information shown in the present case information display in a comma-separated value (CSV) text file
 - The first line of text will be the object type
 - The second line of text will be the list of the displayed fields
 - The rest will be values of all displayed fields for all objects shown, separated by commas
 - CSV (only selected records/columns)...
 - Same as previous but **Only Selected** Records and columns will be saved
 - HTML...
 - This will save the case info as an HTML file
 - Other formats (depending on the display)
 - Some case information displays have other formats available. Often these are formats from older versions of Simulator.



Load



- Load
 - Auxiliary File (any data)...
 - Will load all DATA sections from an auxiliary
 - Auxiliary File (only *specific* data)...
 - Will load only specific kinds of data from an auxiliary file.
 - Other formats (depending on the display)
 - Some case information displays have other formats available. Often these are formats from older versions of Simulator.



Copying from and Pasting to Case Information Displays



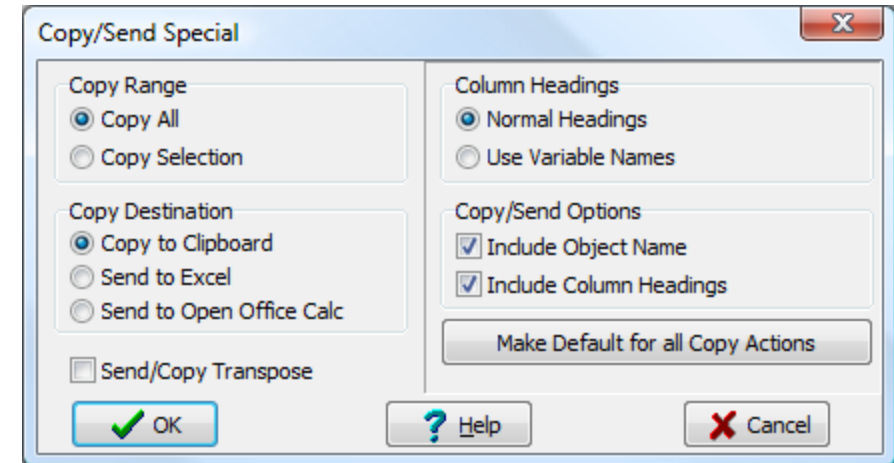
- There are five Copy/Send options
 - Copy All: copy all contents of display
 - Copy Selection: copy selection
 - Send All to Excel: send all contents directly to excel (this will open a session of Excel and populate a worksheet)
 - Send Selection to Excel: send only selection
 - Copy/Send Special

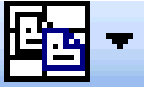


Copy/Send Special

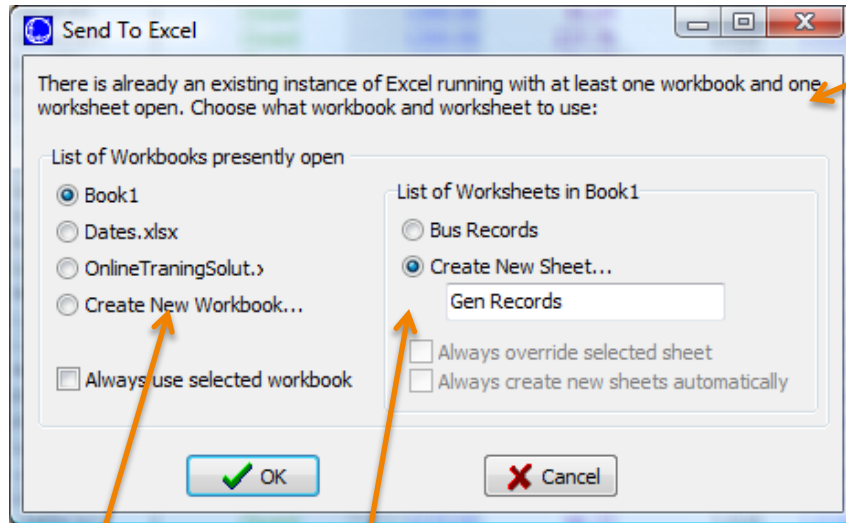


- Provides the same options as the other four Copy/Send options
- Allows you to specify whether to use the column headings from the case info display or variable names from the DATA section of the auxiliary file format.
- Allows you to specify whether to copy the two informational rows (described next).
- Send/Copy the transpose of the data will send/copy the column information to rows and the row information to columns.





Copy/Send to Excel



Dialog Occurs only if session of Excel is already running.

Cell A1 describes the kind of data

Select existing or new workbook and worksheet for sending data

	A	B	C	D	
1	Load Records				
2	Number of Bus	Name of Bus	ID	Name_Nominal kV of Bus	A
3	13	PEACHBTM	1	PEACHBTM_500.00	E
4	15	WHITPAIN	1	WHITPAIN_500.00	E
5	19	BURCHES	1	BURCHES_500.00	E
6	30	CONE G1	1	CONE G1_22.00	E
7	31	CONE G2	1	CONE G2_22.00	E
8	32	KEYS G1	1	KEYS G1_22.00	E

Row 2 describes which fields are being pasted

For Loads, *Number* and *ID* are the key fields

Description of Data: (Cell A1)



- The first entry in Cell A1 (highlighted) is a description of the data.
 - It is VERY important
 - Keep this description and DO NOT modify
 - When pasting back into the case information display, Simulator reads this line to find what kind of data is being pasted
 - Besides the string that is written by Simulator, you may also use the *Object Name* of the type of data being pasted. See DATA sections of the auxiliary file format for more information

Description of Fields: (Second Row in Table)



- The second row (highlighted) provides a list of the fields in the data.
 - Also VERY important
 - When pasting back into Simulator, the second row is used to determine what kind of fields are being pasted
 - Note that if Simulator does not recognize a field heading, it ignores this field in the paste
 - You may alternatively use the *Variable Names* from the DATA section of the auxiliary format

Data Record Key Fields



- Each kind of data record has a few columns that serve as *key fields* for Simulator.
 - Buses: *Number*
 - Lines: *From Number, To Number, and Circuit*
 - Loads: *Number* and *ID*
- If you want to paste data back into Simulator you **MUST** keep these columns intact.
- You can get a list of the key fields by choosing **Export Case Object Fields → Text File** from the Window ribbon tab.
 - The key fields will be denoted in this output with asterisks (*1*, *2*, and *3*)

Secondary Key Fields



- There are also secondary key fields
 - Often represent a combination of Name/Nominal kV for bus-related objects
 - The secondary key fields will be denoted in this output with asterisks (*A*, *B*, and *C*)
- When pasting into Simulator, we first look to see if the key fields are available. If they are not, then we look for the secondary key fields and use them instead.



Labels



- Unique identifier for an object of a particular type
- Refer to equipment in the model in a way unique to your organization
- Likely to change less frequently than bus numbers
- Can be used for pasting and updating
 - Label (for use in input from AUX or Paste)

Use the Spreadsheet



- You can now utilize the power of your spreadsheet in any manner you wish. Just make sure the final format of the spreadsheet meets the requirements of having the two header rows EXACTLY correct and keep the columns which represent the key.
- Outside of these requirements, you can delete and modify the columns and rows of the spreadsheet however you wish
- For example, you can change the reactive power component of all the loads and then read them back in to see how the voltages are affected

Select the Spreadsheet



- When you have completed your spreadsheet use and want to paste back into Simulator:
 - Select the entire spreadsheet (the easiest way to do this is to click on the top left square between the Row A and Column 1 headers).
 - Select **Copy**.
- You can alternatively select only part of the spreadsheet as long as you capture all of the required format.

Pasting into Simulator



- Go back to Simulator, click on the **Copy, Paste, and Send** toolbar menu and choose **Paste**
 - Note: if the clipboard format is not correct, then Simulator will disable the Paste option
- A few last notes: you can only paste values into the case information displays if the values are enterable. This means they will be displayed as **blue** (by default).

Pasting NEW objects



- You can also paste in new objects from the spreadsheet
- Be careful. You must provide all required data regarding the object.
- For instance, if you create a bus you should include an area number and a zone number.
- Required Fields can be highlighted in green by using the **Highlight Key/Required** fields options
 - In the Display/Column Options
 - In the heading caption of the case info display

Redundant Data



- Also, be careful about pasting redundant data. For example, in the Bus Records both voltage in *per unit* and voltage in *kV* are enterable, but they specify the same information.
- Make sure you only copy ONE of these columns into Simulator. Otherwise you may not get what you expect. Simulator will paste the information in twice, and whatever value was 2nd will show up

Example Redundant Data

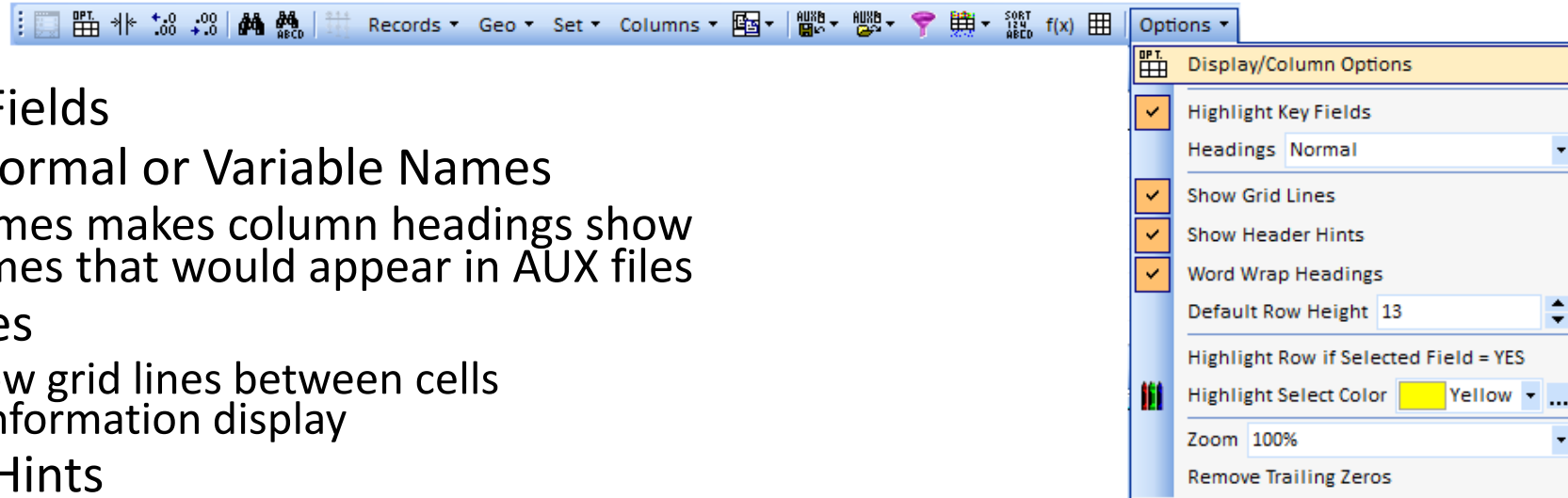


- Load Records represent an example of redundant data. The MW value is a function of the S MW, I MW and Z MW values
 - $MW = S\ MW + I\ MW * V_{pu} + Z\ MW * V_{pu}^2$
- Thus if you do the following nothing happens because the S MW, I MW and Z MW columns get pasted in separately
 - Send All the display out to Excel
 - Modify the MW columns
 - Copy All and then paste back into Simulator

The screenshot shows the 'Model Explorer: Loads' window with the 'Load Records' tab selected. The table displays the following data:

	Number of Bus	Name of Bus	ID	Status	MW	Mvar	MVA	S MW	S Mvar	I MW	Z MW	Z Mvar
1	13	PEACHBTM	1	Closed	1402.12	0.00	1402.12	1402.12	0.00	0.000	0.000	0.000
2	15	WHITPAIN	1	Closed	1088.03	0.00	1088.03	1088.03	0.00	0.000	0.000	0.000
3	19	BURCHES	1	Closed	1329.77	0.00	1329.77	1329.77	0.00	0.000	0.000	0.000
4	30	CONE G1	1	Closed	216.44	30.80	218.62	216.44	30.80	0.000	0.000	0.000
5	31	CONE G2	1	Closed	203.21	23.04	204.51	203.21	23.04	0.000	0.000	0.000

Case Information Displays: Options Menu



- Highlight Key Fields
- Headings → Normal or Variable Names
 - Variable Names makes column headings show variable names that would appear in AUX files
- Show Grid Lines
 - Check to show grid lines between cells in the case information display
- Show Header Hints
 - When hovering mouse over the column heading, a hint appears describing the column
- Word Wrap Headings
- Default Row Height
- Highlight Row if Selected Field = YES
- Zoom Percentage → Change zoom on the active case information
- Remove Trailing Zeros → Check to not show trailing zeros

Case Information Displays: Options Menu



- Highlight Key Fields (and Required Fields)

	Number	Name	Area Name	Nom kV	PU Volt	Volt (kV)	Angle (Deg)	Load MW	Load Mvar
1	10000	12ST_TAP	NEW MEXICO	46.00	1.00469	46.216	-58.98		
2	10004	ALCAZAR	NEW MEXICO	115.00	1.04056	119.664	-63.89		
3	10005	ALCAZAR	NEW MEXICO	12.50	0.99951	12.494	-70.14	16.12	0.51
4	10006	ALIRE_T	NEW MEXICO	46.00	0.98259	45.199	-62.76	1.92	1.58

	Number	Name	Area Name	Nom kV	PU Volt	Volt (kV)	Angle (Deg)	Load MW	Load Mvar
1	10000	12ST_TAP	NEW MEXICO	46.00	1.00469	46.216	-58.98		
2	10004	ALCAZAR	NEW MEXICO	115.00	1.04056	119.664	-63.89		
3	10005	ALCAZAR	NEW MEXICO	12.50	0.99951	12.494	-70.14	16.12	0.51
4	10006	ALIRE_T	NEW MEXICO	46.00	0.98259	45.199	-62.76	1.92	1.58

- Heading: Variable Names

Options ▾

Display/Column Options

Highlight Key Fields

Normal

Variable Names

Headings

Normal

Show Grid Lines

	BusNum(*)	BusName(*)	AreaName	BusNomVolt(*)	BusPUVolt	BusKVolt	BusAngle	BusLoadMW	BusLoadMVR
1	10000	12ST_TAP	NEW MEXICO	46.00	1.00469	46.216	-58.98		
2	10004	ALCAZAR	NEW MEXICO	115.00	1.04056	119.664	-63.89		
3	10005	ALCAZAR	NEW MEXICO	12.50	0.99951	12.494	-70.14	16.12	0.51
4	10006	ALIRE_T	NEW MEXICO	46.00	0.98259	45.199	-62.76	1.92	1.58

- Word Wrap Headings
- Show Header Hints
- Remove Trailing Zeros

var	Gen MW	Gen Mvar	Switched Shunts	Act G Shunt	Ac
		Mvar		MW	Mv
0.51					
58					0.00

Sum of the generator MW outputs at the bus

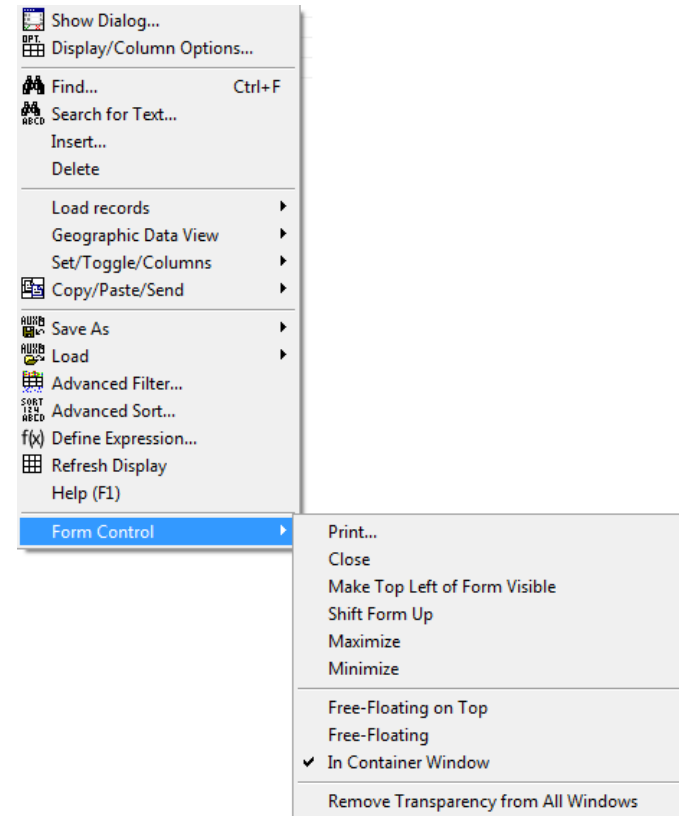
5	50774	ABF G1-2	1	Closed	2.50	0.10	0.98000	NO	YES	0.00	2.50	-2.00	2.00
6	50774	ABF G1-2	2	Closed	2.50	0.10	0.98000	NO	YES	0.00	2.50	-2.00	2.00
7	13300	ABIQUI12	1	Closed	8.00	4.52	1.01500	NO	YES	0.00	13.80	-8.30	8.30
5	50774	ABF G1-2	1	Closed	2.5	0.1	0.98	NO	YES	0	2.5	-2	2
6	50774	ABF G1-2	2	Closed	2.5	0.1	0.98	NO	YES	0	2.5	-2	2
7	13300	ABIQUI12	1	Closed	8	4.52	1.015	NO	YES	0	13.8	-8.3	8.3

Case Information Display

Local Menu



- Local menu can be opened by right-clicking on a case information display
- Most of the options and actions available are identical to the options available on the Case Information Toolbar
- Options on Local Menu not available on the Case Information Toolbar
 - Help
 - Form Control
 - Provides options for printing and showing the case information display



Case Information Display

Local Menu



Records Geo Set Columns Options												
Filter	Advanced	Load	Find...	Remove								
	Number of Bus	Name of Bus	ID	Status	MW	Mvar	MVA	S MW	S Mvar	I MW	Z MW	Z Mvar
1	13	PEACHBTM	1	Closed	1402.12	0.00	1402.12	1402.12	0.00	0.000	0.000	0.000
2	15	WHITPAIN	1	Closed	1088.03	0.00	1088.03	1088.03	0.00	0.000	0.000	0.000
3	19	BURCHES	1	Closed				1329.77	0.00	0.000	0.000	0.000
4	30	CONE G1	1	Closed				216.44	30.80	0.000	0.000	0.000
5	31	CONE G2	1	Closed				203.21	23.04	0.000	0.000	0.000
6	32	KEYS G1	1	Closed				251.96	120.25	0.000	0.000	0.000
7	33	KEYS G2	1	Closed				253.41	120.79	0.000	0.000	0.000
8	36	SALEM G1	1	Closed				220.01	219.77	0.000	0.000	0.000
9	37	SALEM G2	1	Closed				178.42	171.24	0.000	0.000	0.000
10	38	SUSQ 2	1	Closed				291.08	59.21	0.000	0.000	0.000
11	39	HOPE CG1	1	Closed				171.90	157.84	0.000	0.000	0.000
12	40	C CLF1	1	Closed				203.32	158.03	0.000	0.000	0.000
13	41	C CLF2	1	Closed				198.64	155.24	0.000	0.000	0.000
14	249	SENECA#1	1	Closed				127.91	12.55	0.000	0.000	0.000
15	501	HOMER C1	1	Closed				417.79	0.00	0.000	0.000	0.000
16	502	HOMER C2	1	Closed				341.87	46.63	0.000	0.000	0.000
17	503	HOMER C3	1	Closed				343.23	46.79	0.000	0.000	0.000
18	1277	PORT2GEN	1	Closed				90.36	0.00	0.000	0.000	0.000
19	1283	TMI 1GEN	1	Closed				620.40	287.10	0.000	0.000	0.000
20	2051	ATLANTIC	1	Closed				1719.67	0.00	0.000	0.000	0.000
21	2095	O C GEN	1	Closed				338.34	198.83	0.000	0.000	0.000
22	2306	BUXMONT	1	Closed				474.30	0.00	0.000	0.000	0.000
23	2351	BRUNER 1	1	Closed				189.32	0.00	0.000	0.000	0.000
24	2352	BRUNER 2	1	Closed				221.27	0.00	0.000	0.000	0.000
25	2353	BRUNER 3	1	Closed				514.10	153.13	0.000	0.000	0.000
26	2364	MONTUR 1	1	Closed				294.16	102.58	0.000	0.000	0.000
27	2365	MONTUR 2	1	Closed				296.00	99.13	0.000	0.000	0.000
28	2368	MTN CK 3	1	Closed				288.51	67.47	0.000	0.000	0.000
29	2369	MTN CK 4	1	Closed				290.95	70.30	0.000	0.000	0.000
30	2382	SUSQ 1	1	Closed				450.10	0.00	0.000	0.000	0.000
31	3302	ANGORA	1	Closed	42.68	17.01	45.94	42.68	17.01	0.000	0.000	0.000
32	3303	AUDUBON	1	Closed	14.11	-11.51	18.21	14.11	-11.51	0.000	0.000	0.000
33	3306	BALA	1	Closed	55.30	2.16	55.34	55.30	2.16	0.000	0.000	0.000



Custom Field Descriptions: Custom Floats, Integers, and String

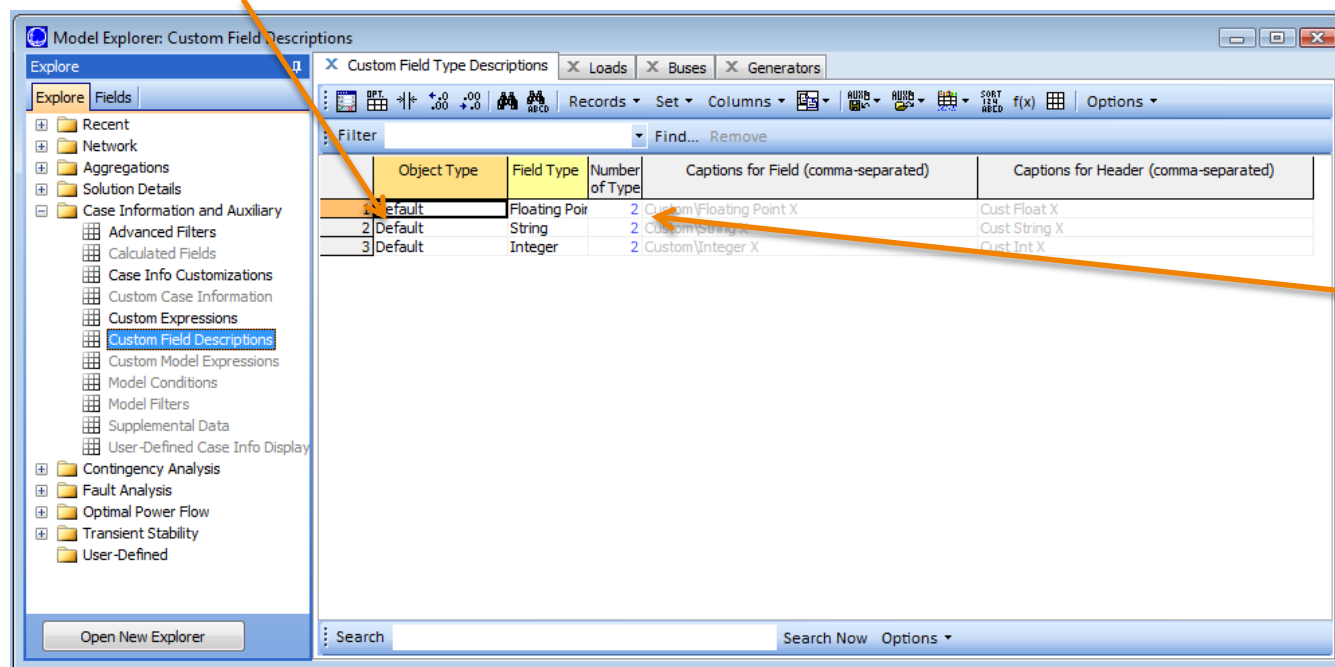


- In early versions of Simulator, the following were allowed with each object
 - 5 custom floating points
 - 5 custom strings
 - You could not give these fields their own name
- Simulator 13 and later allows
 - Any number of floating points
 - Any number of strings
 - Any number of integers
 - You can now give these fields names
- By default, Simulator is configured to allow
 - 2 custom floats, 2 integers, and 2 strings
 - Use Custom Field Descriptions to add more

Custom Field Descriptions: Custom Floats, Integers, and String

- Access these definitions on the Model Explorer Explore Pane under **Case Information and Auxiliary/Custom Field Descriptions**

Default object types are always listed

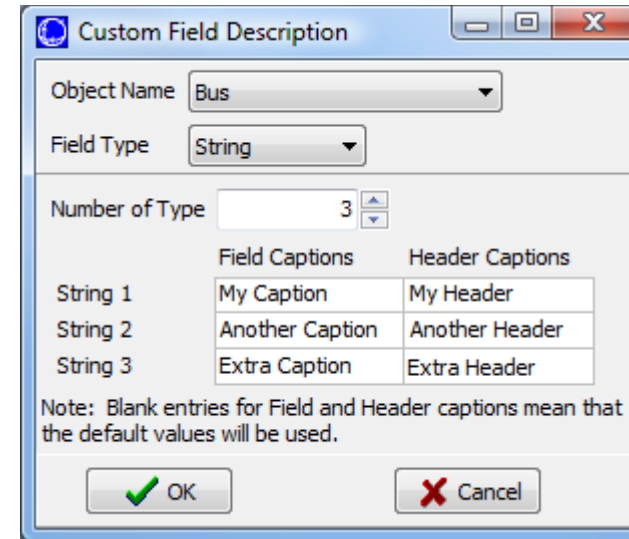


You can change the default number of fields directly here.



Custom Field Descriptions: Custom Floats, Integers, and String

- Right-Click and choose Insert
 - Choose the Object Type
 - Choose the Field Type
 - Choose the Number of Type
 - Define Field Captions
 - Define Header Captions

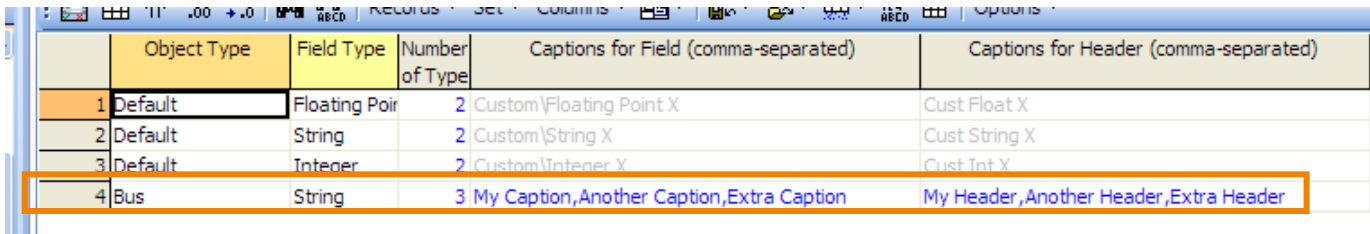


The dialog box is titled "Custom Field Description". It contains the following fields and controls:

- Object Name:** A dropdown menu with "Bus" selected.
- Field Type:** A dropdown menu with "String" selected.
- Number of Type:** A numeric input field with "3" entered.
- Field Captions:** A table with 3 rows and 1 column:

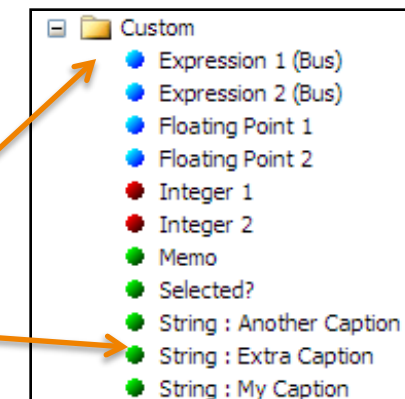
Field Captions
String 1
String 2
String 3
- Header Captions:** A table with 3 rows and 1 column:

Header Captions
String 1
String 2
String 3
- Note:** Blank entries for Field and Header captions mean that the default values will be used.
- Buttons:** "OK" (green checkmark) and "Cancel" (red X).



	Object Type	Field Type	Number of Type	Captions for Field (comma-separated)	Captions for Header (comma-separated)
1	Default	Floating Point	2	Custom\Floating Point X	Cust Float X
2	Default	String	2	Custom\String X	Cust String X
3	Default	Integer	2	Custom\Integer X	Cust Int X
4	Bus	String	3	My Caption,Another Caption,Extra Caption	My Header,Another Header,Extra Header

Folder View of Available Bus
Fields Becomes



Integration of Custom Fields into User Interface Dialogs

- Custom tab is available on information dialogs throughout
 - Access to Custom Fields, Memo, and Selected Field

Bus Options

Bus Number: 13 Find By Number Find ...

Bus Name: PEACHBTM Find By Name

Nominal Voltage: 500.0 kV

Labels ... no labels

	Number	Name
Area	39	EAST EQ
Zone	100	MAAC
Owner	1	1
Substation		

Bus Information Attached Devices Geography Custom Fault Parameters

To add new fields, see Custom Field Type Descriptions on the Model Explorer

Custom Fields Memo

☐ Selected?

Floating Points	Strings	Integers
Cust Float 1	My Header	Cust Int 1
Cust Float 2	Another Header	Cust Int 2
	Extra Header	

OK Save Delete Cancel

Load Options

Bus Number: 13 Find By Number Find ...

Bus Name: PEACHBTM Find By Name

ID: 1 Find ...

Labels ... no labels

	Number	Name
Area	39	EAST EQ
Zone	100	MAAC
Substation		
Owner	1	1

☒ Same Owner as Terminal Bus

Load Information OPF Load Dispatch Custom Stability

To add new fields, see Custom Field Type Descriptions on the Model Explorer

☐ Selected?

Floating Points	Strings	Integers
Cust Float 1	Cust String 1	Cust Int 1
Cust Float 2	Cust String 2	Cust Int 2

OK Save Delete Cancel Help



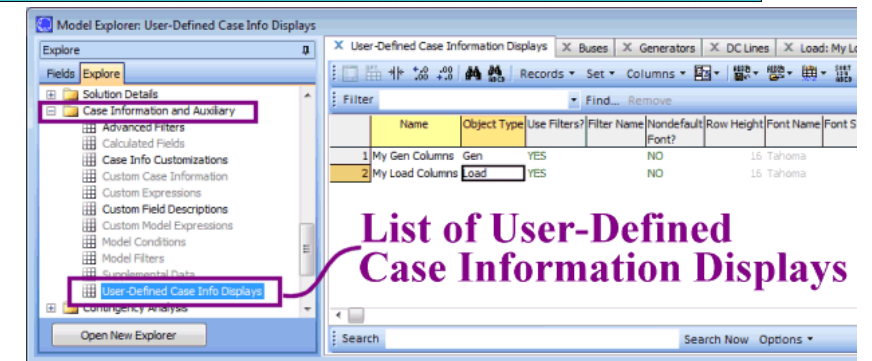
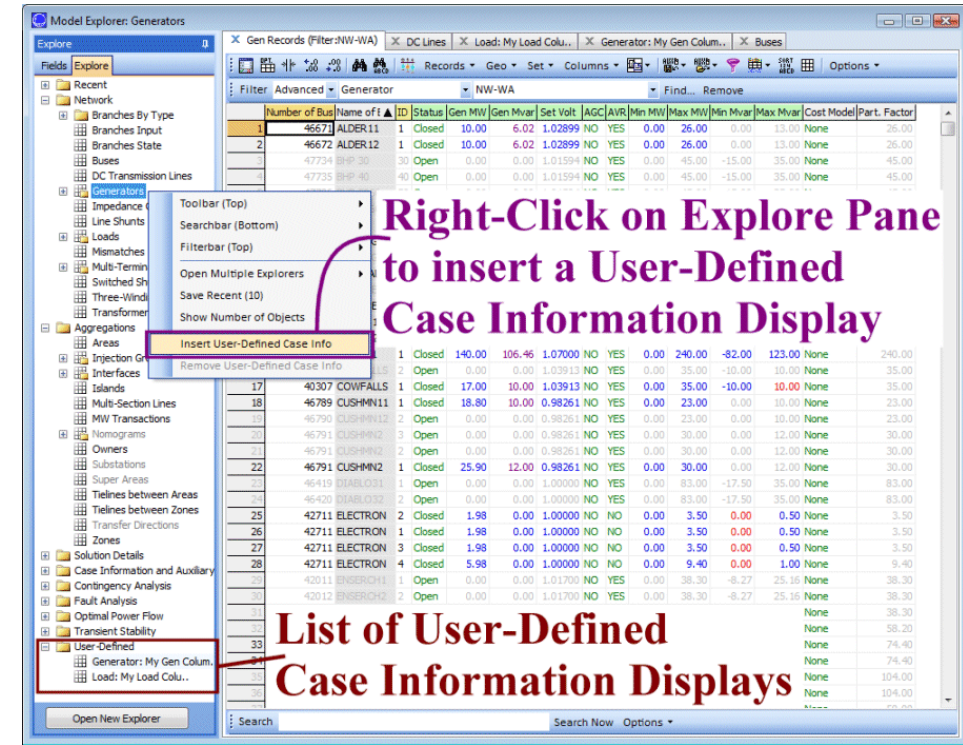
User-Defined Case Information Displays



- What's the motivation?
 - Normally, customizing the built-in case information displays is sufficient
 - However, it may be convenient to define one set of generator fields for studying voltage regulation problems and another set for MW-related studies
- User-Defined Case Information Displays provide this ability
 - Allow customization of columns, filters, sorting, etc... without requiring repeated customizations
 - Note: on user-defined case information displays, the various record-specific actions which often appear in the Records drop-down are not available

User-Defined Case Info Management

- Right-Click on Explore Pane to create User-Defined Case Infos
 - They show up under the **User-Defined** Folder of the Explore Pane
 - Customization is the same as other case info
 - Navigate to **Case Information and Auxiliary\User-Defined Case Info Displays** to save customization settings to AUX file
- User-Defined Case Infos can be made to display any object type, including various settings and options



Custom Case Info Displays

- Create spreadsheet-like case info displays with any type of information of interest
- Select Custom Case Information from the Model Explorer

The screenshot shows a spreadsheet titled "Default Custom Case Information" with columns A through E. The interface includes a toolbar at the bottom with buttons for "Rename Sheet", "New Sheet", "Delete Sheet", "Custom Case Info Mode", "Define Fields/Strings", "Change Field Data", "Show Fields Primary", "Show Fields Secondary", "Close", and "Help".

	A	B	C	D	E
1					
2					
3		Type to enter custom string			
4			Top	Gen 4 Area Name	
5		double-click on a cell to enter	95.0325 MW	Gen 4 MW	
6		a model field	YES	Gen 4 AGC Status	
7					
8					
9					

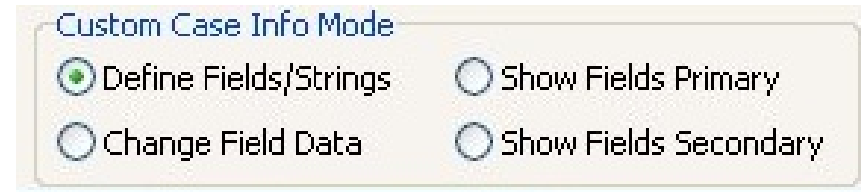




Custom Case Info Displays



- Sheets may be added, renamed, or deleted
- Four Modes
 - Define Fields/String
 - Change Field Data
 - Show Fields Primary
 - Show Fields Secondary
- Double-click in a cell to add data from case (while in any mode except Change Field Data)





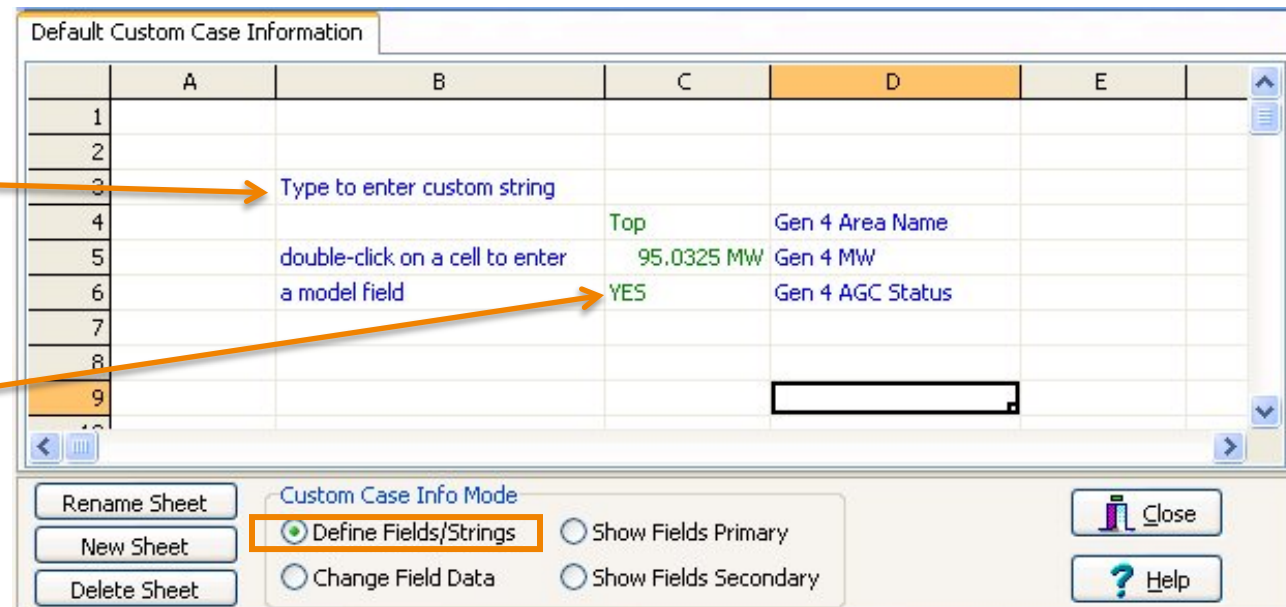
Define Fields/String Mode



- Plain Text Cell
 - type any text or numbers in a blank cell to create a plain text cell
 - Text color matches Enterable Field Color (blue by default)
- Model Field Cell
 - Double-click on cell to open a dialog to define the model field

Plain Text Cell

Model Field Cell

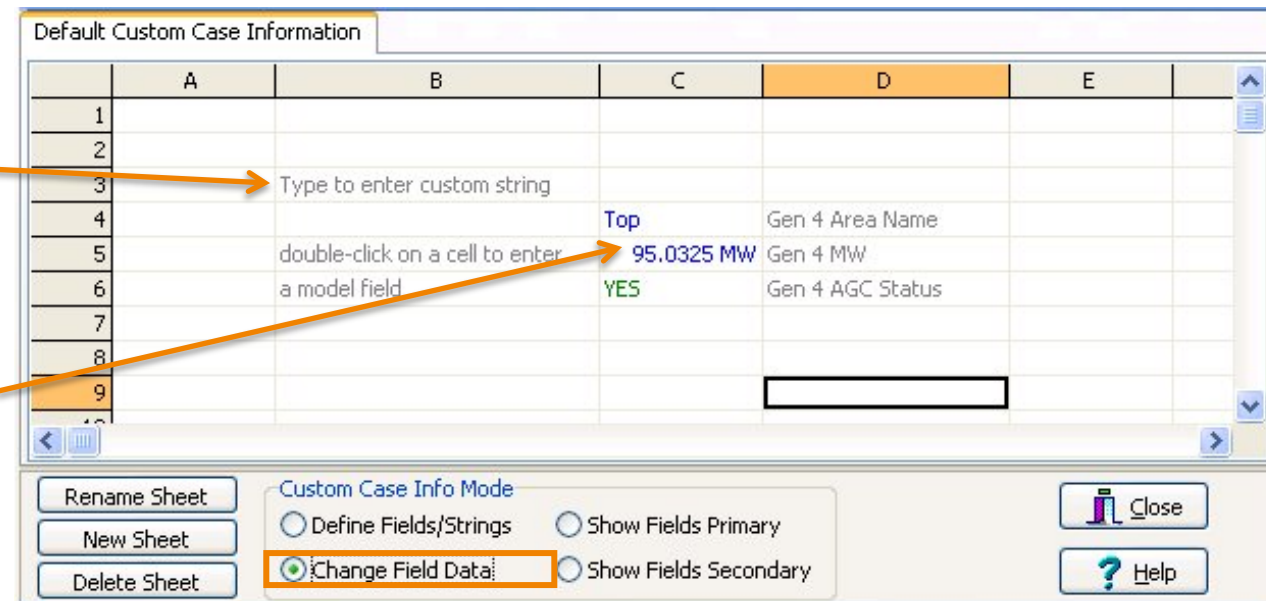


Change Field Data Mode

- Blank Cell and Plain Text Cell
 - May not be edited
 - Text color matches Field Not Presently Used Color (gray by default)
- Model Field Cell: behaves according to the field it represents (read-only, enterable, toggleable)

Plain Text Cell

Model Field Cells

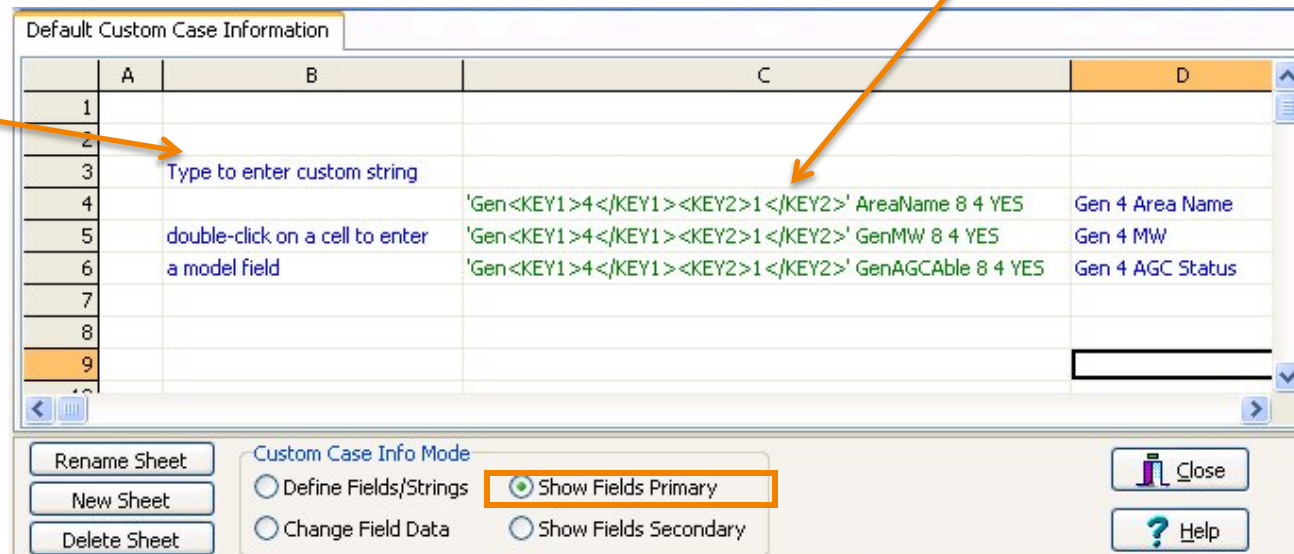


Show Fields Primary Mode

- Blank Cell and Plain Text Cell
 - Behave the same as in Define Fields/Strings Mode
- Model Field Cell
 - display string representation of Model Field link

Plain Text Cell

Model Field Cells

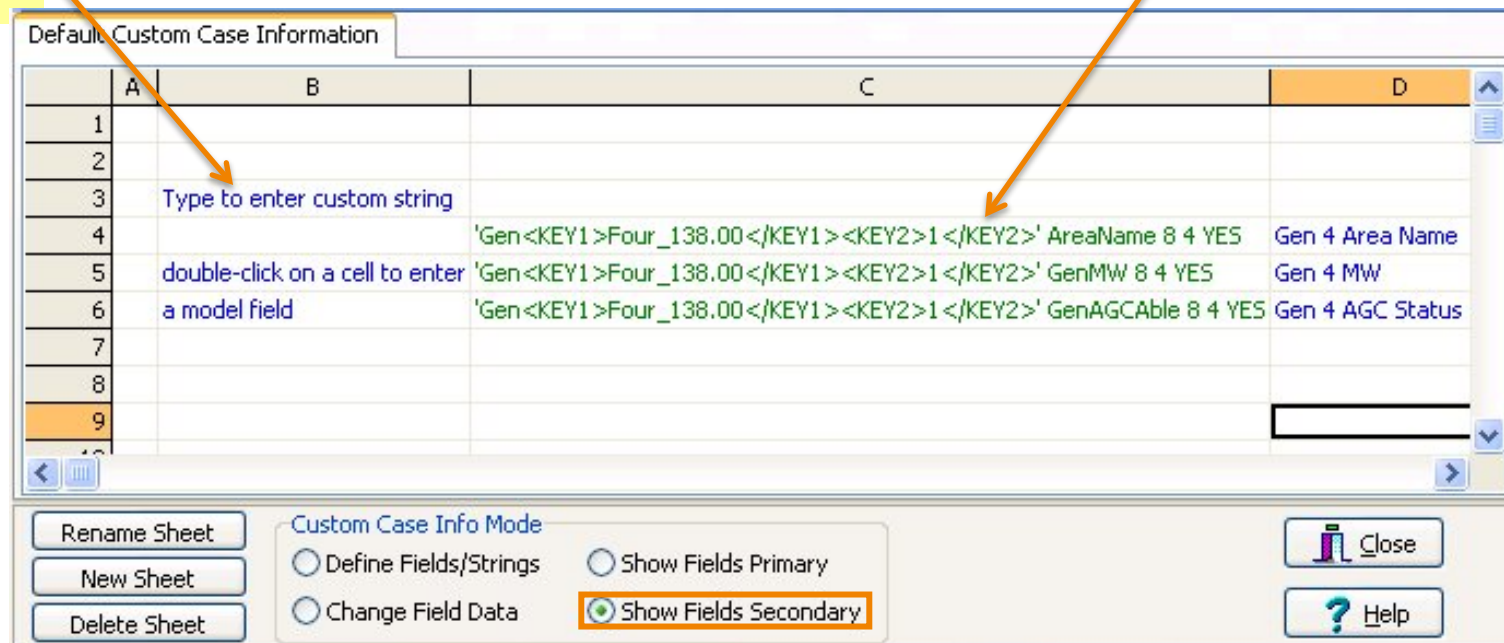


Show Fields Secondary Mode

- Similar to the Show Fields Primary Mode, except Model Field string uses secondary field representation (e.g. Name and Nom_kV for bus)

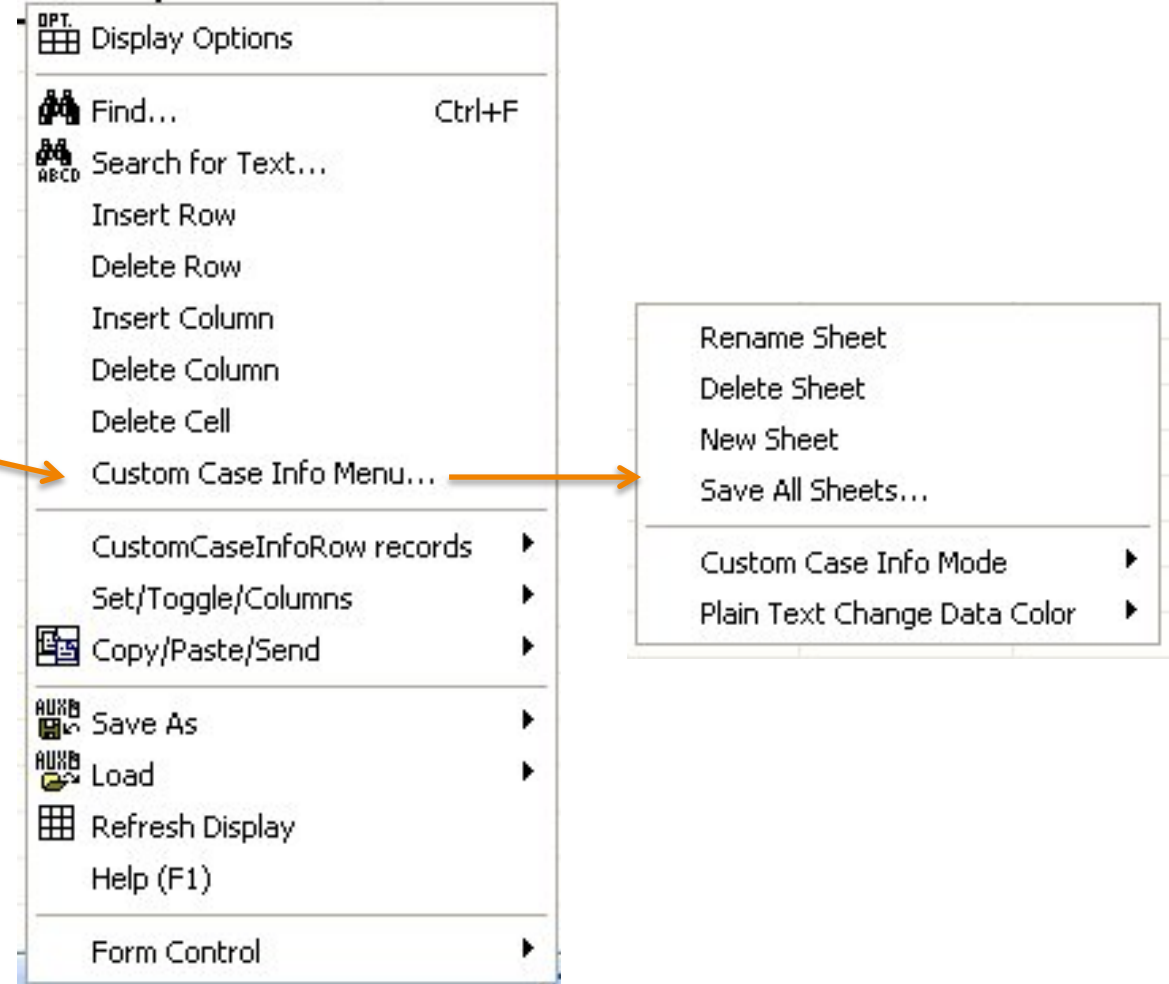
Plain Text Cell

Model Field Cells



Custom Case Info Display

- Local Menu
 - Contains “spreadsheet-like” commands for manipulating cells and workbooks
- Custom Case Info Menu
 - Switch mode or change appearance of display



Slide Intentionally Left Blank