# GASWorkS™ 10.0 Example   *Trace Routine*

Summary

In this example, an existing model will be used to demonstrate the use of the GASWorkS trace features. The Trace routine will be used to determine the extent of the system served by a supply node, and work with attribute valve isolation areas. The model used with this example consists of a grided network containing two supply nodes and several attribute valves.
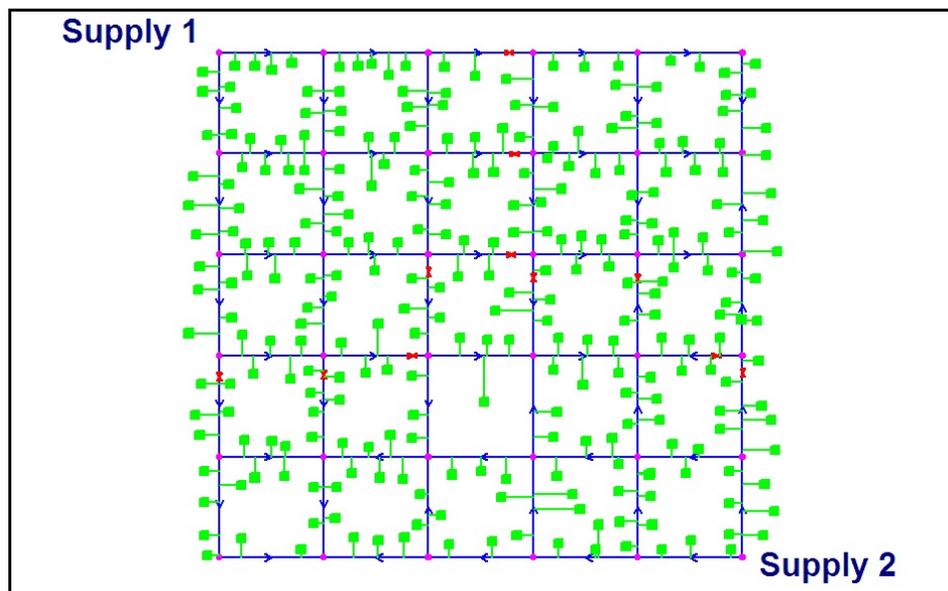
Steps

The following assumes that GASWorkS has already been started. If a model is already open, close it by selecting the *Close* menu item from the *File* menu list. Use the following procedure to work this example...

1) Open The Existing Model

● From the *File* menu list, select the *Open* menu item. The File Selection screen will be displayed. Use the *Drives* and *Directories* lists to navigate to the directory containing the desired file - **tracing example.hdr**. Select the file, then select the *Continue* command button.

● The Graphic Data Interface (GDI) Window will be displayed. *Note* - If the GDI Window is not automatically displayed, select the *View/Edit* menu item from the *Graphics* menu list to display the GDI Window.

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● Resize the GDI Window using the *Maximize GDI Window* icon from the *GDI Window Controls Toolbar*.
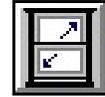
● Zoom the GDI Image to fill the GDI Display using the *Zoom To Fit* icon from the lower-left corner of the GDI Window.

2) Solve The Model

Has the model been solved? Select the *Solve* icon from the lower-right corner of the GDI Window. The Solution Data screen will be displayed. Review the solution parameters, then select the *Solve* command button. The Solution Log will be displayed. Review the results, then select the *Close* command button to close the log.
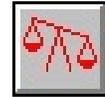
Note - If the flow arrows are not displayed, select the *Display Flow Arrows* icon from the *Display Controls Toolbar*.
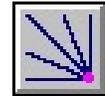
Note - If the customer symbols are displayed, select the *Display Customer Symbols* icon from the *Customer Commands Toolbar*.

3) Trace All Directions

● Select the *Trace* icon from the *Utility Commands Toolbar*.

    ● The Trace Specifications screen will be displayed. Set the following values:

        Trace Style = **Trace All Directions**
        Start Trace At = **A Node**
        Trace Highlight Color = **Red**   (Click in the color box. The Color Palette will be displayed. Select the color Red, then select the *OK* command button.)

        Highlight Customers = **Unselect** (Uncheck)
        Reset Feature Colors Before Tracing = **Unselect** (Uncheck)
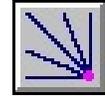
    ● Select the *Trace* command button.

    ● For the *Starting Node*, select any node in the system. If everything is connected, the trace should color the entire system red. Are all of the pipes colored red?

● Restore the original colors by typing **RESET** on the GDI Command Line and press the *Enter* key. This command will cause the original feature colors to be restored.

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4) Trace Upstream From A Node

● Select the *Trace* icon from the *Utility Commands Toolbar*.

> ● The Trace Specifications screen will be displayed. Set the following values:

> > Trace Style = **Trace Upstream**
> > Start Trace At = **A Node**
> > Trace Highlight Color = **Red**

> ● Select the *Trace* command button.

> ● For the *Starting Node*, select one of the interior nodes (perhaps **Node 150**). The pipes feeding into (supplying) the node will be colored red. The trace should extend back to at least one of the supply nodes. Review the direction of the flow arrows - does the highlighted path look correct? All of the highlighted pipes should be feeding towards the selected starting node.

● Restore the original colors by typing **RESET** on the GDI Command Line and press the *Enter* key.

5) Trace Downstream From A Node

● Select the *Trace* icon from the *Utility Commands Toolbar*.

> ● The Trace Specifications screen will be displayed. Set the following values:

> > Trace Style = **Trace Downstream**
> > Start Trace At = **A Node**
> > Trace Highlight Color = **Red**

> ● Select the *Trace* command button.

> ● For the *Starting Node*, select one of the supply nodes (perhaps **Supply 2**/**Node 55**). The pipes feeding from (being supplied by) the selected node will be colored "Red". The trace should extend out to all of the pipes and nodes supplied from the selected starting node. Review the direction of the flow arrows - does the highlighted path look correct? All of the highlighted pipes should be feeding from the selected starting node.

Trace from the other supply node.

> ● Select the *Trace* icon from the *Utility Commands Toolbar*.

● The Trace Specifications screen will be displayed. Set the following values:

> Trace Style = **Trace Downstream**
> Start Trace At = **A Node**
> Trace Highlight Color = **Green** (Click in the color box. The Color Palette will be displayed. Select the color Green, then select the *OK* command button.)

● Select the *Trace* command button.

● For the *Starting Node*, select the other supply node (**Supply 1/Node 5**). The pipes feeding from (being supplied by) the node, will be colored "Green". The trace should extend out to all of the pipes and nodes supplied from the selected starting node. Review the direction of the flow arrows - does the highlighted path look correct? All of the highlighted pipes should be feeding from the selected starting node. Notice how a portion of the previously highlighted path (colored "Red") has been overwritten by the current trace (colored "Green"). This occurs where mixing of the two supply streams occurs - unfortunately the Trace routine has no means of mixing the trace colors so the color from the latest trace is imposed on the common path.

● Restore the original colors by typing **RESET** on the GDI Command Line and press the *Enter* key.

6) Trace The Pipes In An Isolation Area

● Select the *Trace* icon from the *Utility Commands Toolbar*.

● The Trace Specifications screen will be displayed. Set the following values:

> Trace Style = **Trace To Any Valves**
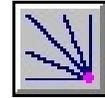> Start Trace At = **A Node**
> Trace Highlight Color = **Red** (Click in the color box. The Color Palette will be displayed. Select the color Red, then select the *OK* command button.)

● Select the *Trace* command button.

● For the *Starting Node*, select the node in the northeast corner (**Node 30**). All of the pipes connected to this node will be highlighted until a valve node, regulator, closed pipe, or compressor is encountered. The trace should define the isolation area associated with the selected starting node. Review the highlighted pipes - does it look like the area is properly highlighted?

Trace another area (there is intended to be three separate isolation areas).

- ● Select the *Trace* icon from the *Utility Commands Toolbar*.

   - ● The Trace Specifications screen will be displayed. Set the following values:

        Trace Style = **Trace To Any Valves**
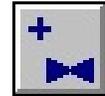   Start Trace At = **A Node**
        Trace Highlight Color = **Green**   (Click in the color box. The Color Palette will be displayed. Select the color Green, then select the *OK* command button.)

   - ● Select the *Trace* command button.

   - ● For the *Starting Node*, select the node in the southeast corner (**Supply 2**/**Node 55**). All of the pipes connected to this node will be highlighted until a valve node, regulator, closed pipe, or compressor is encountered. The trace should define the isolation area associated with the selected starting node. Review the highlighted pipes - does it look like the area is properly highlighted?

It looks like an attribute valve is missing - the remainder of the system is entirely highlighted. Do you see where the attribute valve should be? Try placing an attribute valve on the pipe segment between Node 145 and Node 150.

- ● Select the *Add Attribute Valve* icon from the *Attribute Valve Commands Toolbar*. Select the pipe segment between **Node 145** and **Node 150** by left-clicking on the pipe. For the Attribute Valve Location click on a point near one end of the selected pipe segment. For the *Attribute Valve Number*, press the *Enter* key to accept the default value.

Retrace the isolation areas to check our work.

- ● Select the *Trace* icon from the *Utility Commands Toolbar*.

   - ● The Trace Specifications screen will be displayed. Set the following values:

        Trace Style = **Trace To Any Valves**
        Start Trace At = **A Node**
        Trace Highlight Color = **Blue**   (Click in the color box. The Color Palette will be displayed. Select the color Blue, then select the *OK* command button.)

   - ● Select the *Trace* command button.

● For the *Starting Node*, select the node in the southeast corner (**Supply 2**/**Node 55**). All of the pipes connected to this node will be highlighted until a valve node, regulator, closed pipe, or compressor is encountered. The trace should define the isolation area associated with the selected starting node. Review the highlighted pipes - does it look like the area is properly highlighted?

● Restore the original colors by typing **RESET** on the GDI Command Line and press the *Enter* key.

7) Create A Trace Results File

● Select the *Trace* icon from the *Utility Commands Toolbar*.

● The Trace Specifications screen will be displayed. Set the following values:

Trace Style = **Trace To Any Valves**
Start Trace At = **A Node**
Trace Highlight Color = **Red**   (Click in the color box. The Color Palette will be displayed. Select the color Red, then select the *OK* command button.)

Create A Trace Results File = **Select** (Check)
Report Summary Of Features Along Route = **Select** (Check)

● Select the *Trace* command button.

● The File Selection screen will be displayed. Enter a *Filename* for the Trace Results, then select the *Continue* command button.

● For the *Starting Node*, select the node in the northwest corner (**Supply 1**/**Node 5**). All of the pipes connected to this node will be highlighted until a valve node, regulator, closed off pipe, or compressor is encountered. The trace should define the isolation area associated with the selected starting node. Review the highlighted pipes - does it look like the area is properly highlighted?

● The Trace Results will be displayed. Review the results, then select the *Close* command button.

Notes & Considerations

● If customers are included in the model, they can be included in the Trace Results depending on the options selected.

● The model used in this example contained several attribute valves. Attribute valves are different from hydraulic (flow element) valves. Hydraulic valves are included in the pressure and flow calculations, whereas attribute valves are only considered during the Trace routine. The inclusion of attribute valves is useful for designing and analyzing valve placement strategies.

● Only two attribute valves may be attached to one pipe segment. Regardless of their placement along the pipe, one attribute valve is always considered a downstream valve and one is considered an upstream valve. During the Trace routine when the *Trace To Valves* option is used, a pipe may or may not be colored depending on the location of the encountered valve. If a pipe is encountered during the trace by the To Node end, and an attribute valve is only placed on the From Node end, the pipe will be colored. However, if the pipe has an attribute valve on the To Node end, the pipe will not be colored.