

sample

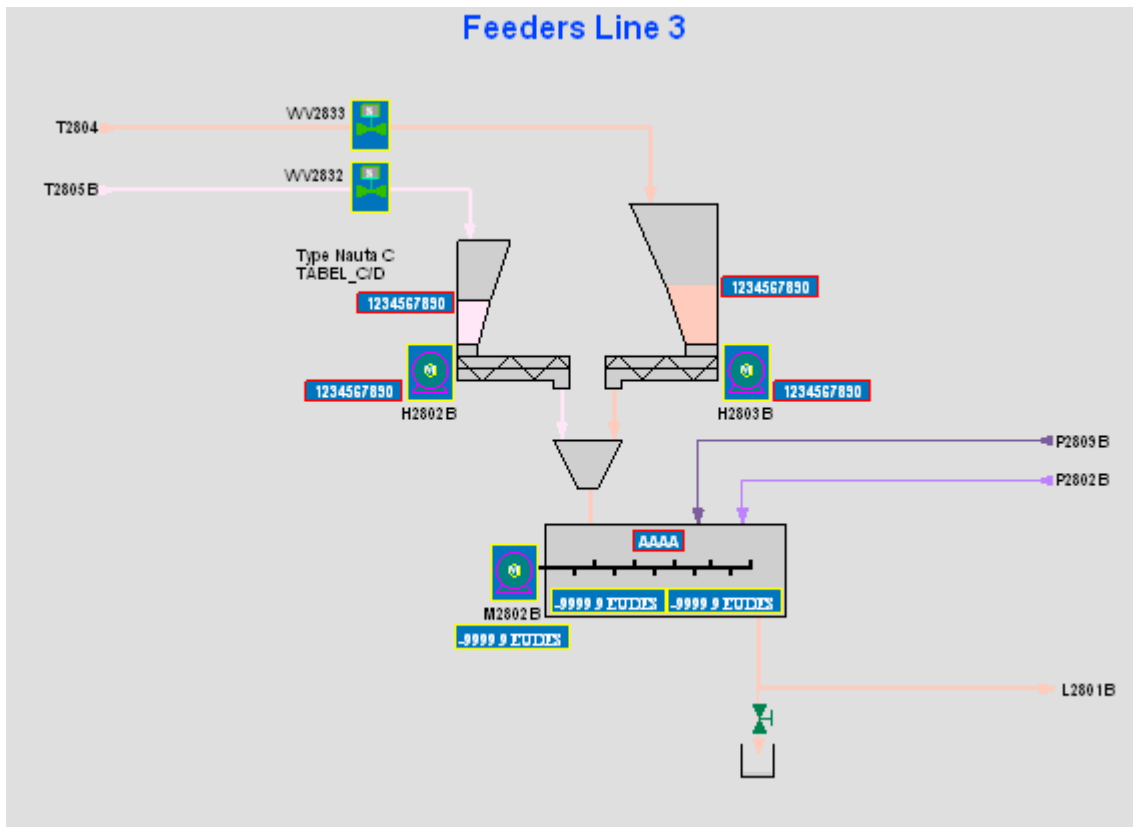
Display Design Guidelines

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1. General Description of a GUS display

1.1 An example of a GUS process display :



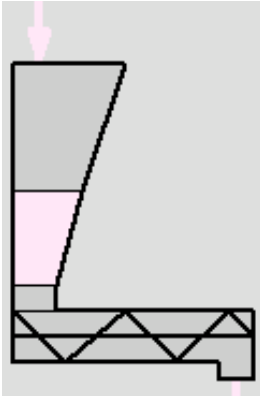
- Whereas the 'US Picture Editor' used to work with 'subpictures', the GUS display editor now uses 'embedded displays', which provide basically the same functionality. Therefore, the terms 'subpicture' and 'embedded display' may appear concurrently, but should be interpreted as one and the same GUS embedded display object.
- A GUS process display is 1140 pixels wide by 830 pixels high.

1.2 Engineering Background information:

- Due to the introduction of the new GUS workstation on an NT platform, the available colorset has been enhanced from 16 on the US to (practical) 128+ colors on the GUS. This added degree of freedom towards customized displays makes choosing the right color somewhat harder than it used to be, since one now also needs to consider contrast ratio's with the background and the equipment color definitions etc...

2. Functional Description of static object functionality

2.1 Static Process equipment / Process lines:



Process Equipment may be built up with several objects in order to construct the global object. The most commonly visible object characteristics can be defined as follows:

The object is outlined with a 2 pixel wide black line (color Index 128)
The object is filled with a solid pattern grey (color Index 116)

If a static level must be symbolized, it has to have the same color as the product it holds.

Product lines can be 2 pixels wide or 4 pixels wide for the main process flow lines.

An arrow shall indicate the general process flow.

Product lines shall not cross each other. One of the lines must be

interrupted a couple of pixels prior to touching the other line.

2.2 Static text :

The title, which is located on the top of the display, is centered across the display, and is formatted 'Arial Bold 24 points, GUS color index 61 (marine blue).

All rotating equipment, diverter valves and large equipment shall have their process equipment numbers on the display, formatted as : 'Arial Bold 12 points, GUS color index 128 (black).

Static text, which can be selected by the operator upon sequence interaction, is underlined.


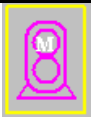

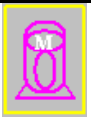



Engineering units should have a distinct color.

2.3 Static equipment :

Valves pumps of other instruments for which no DCS tag is present, but still need to be represented on the display, should get the same color as defined for static process equipment.

3. Functional Description of the dynamic object functionality

3.1 Rotating equipment : Pumps / Blowers / Motors / Rotary Valves

						
Centrifugal pump	Rotating Pump	Stroke Pump	Rotating Blower	Generic motor	Generic motor	Rotary Valve

The above presented subs all behave in a similar fashion, and are therefor grouped as such.

Equipment normal behavior :

RUNNING	The outline color will become green; the fillcolor will become green .
STOPPED	The outline color will become white, the fillcolor will be set to the Background color.
Selected	A selected device (= visible in faceplate) will receive a blue colored background.

Equipment abnormal behavior:

MOVING	When a device is in a state transition, it will be colored gray.
BADPV	When the PV is not a valid state, the valve will be colored magenta.
ALARMING	When there is a Feedback time-out configured or an uncommanded change is detected, the box which outlines the device will appear, in the color for which the alarm priority was configured Unacknowledged alarms will blink, acknowledged alarms will remain in a steady state.

State indicator behavior:

This state indicator is only visible for Digital composite points, which can be manipulated by the operator (i.e. they have one or more DO's configured to the Dig Comp point).




This indicator will show the following states:

B	Bad State or Point Inactive; this can occur when the point is inactive or when DI's Bad
O	Output Problem (Initman) ; this can occur when the DO's are inactive
R	Redtag = ON; this indicates an operator lock-out to modify the state from the DCS (maintenance)
I	an Interlock is active on this point
P	the point is currently under program control.

Specific behavior:

At display run time, the rotating device subpictures will detect the presence of DO's (NODOPTS > 0). If DO's are present, the valve can be manipulated from the TDC, so the State Indicator will be visible. If no DO's are present, the valve is not controllable by the operator, therefor, the State Indicator will disappear.

3.2 Digital valves: 3 Way valves / Diverter Valves / Solenoid Valves

		
3 Way valves (TDC access / LocalControl = True / False	Diverter valves (TDC access / LocalControl = True / False	Solenoid Valves (TDC access / LocalControl = True / False

The above presented subs all behave in a similar fashion, and are therefor grouped as such.

Equipment normal behavior:

OPEN	The outline color will become green; the fillcolor will become green
CLOSED	The outline color will become white, the fillcolor will be set to the Background color
Selected	A selected device (= visible in faceplate) will receive a blue colored background

Equipment abnormal behavior:

MOVING	When a valve is in a state transition, is will be colored gray
BADPV	When the PV is not a valid state, the valve will be colored magenta
ALARMING	When there is a Feedback time-out configured or an uncommanded change is detected, the box which outlines the valve will appear, in the color for which the alarm priority was configured. Unacknowledged alarms will blink, acknowledged alarms will remain in a steady state.

State indicator behavior:

This state indicator is only visible for Digital composite points, which can be manipulated by the operator (i.e. they have one or more DO's configured to the Dig Comp point).



This indicator will show the following states:

B	Bad State or Point Inactive; this can occur when the point is inactive or when DI's Bad
O	Output Problem (Initman) ; this can occur when the DO's are inactive
R	Redtag = ON; this indicates an operator lock-out to modify the state from the DCS (maintenance)
I	an Interlock is active on this point
P	the point is currently under program control.

Specific behavior:

At display run time, the valve subpictures will detect the presence of DO's (NODOPTS > 0). If DO's are present, the valve can be manipulated from the TDC, so the cap with the State Indicator will be visible. If no DO's are present, the valve is not controllable by the operator, therefor, the cap and State Indicator will disappear. Based on a display parameter (LocalControl = True/False), the valve will show only the body of the valve (LocalControl = False), or it will show the body and a local valve positioner (LocalControl = True)

3.3 Digital Alarms

	
Tagname Alarm Indicator (e.g. TAHH, THH) Derived from actual tagname	Random Text Indicator (e.g. OVERDRUK!)

Normal behavior:

If the digital point is not in alarm, the alarm indicator will not be visible.


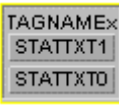
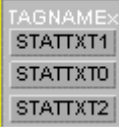

Abnormal behavior:

BADPV Whenever a BADPV is present, the box will come up in magenta.

Alarm behavior:

ALARMING The text will appear in white full, and the text outline will be colored with the color representing the alarm priority.
Unacknowledged alarms will appear blinking, acknowledged alarms will appear steady state.

3.4 Digital Status / Command state boxes

	2 State box, showing actual PV state by a pushed button, and the commanded OP state by the lamp symbol.
	2 State box, showing an the state or command
	3 State box, showing an the state or command
	2 State box, showing the main state as being active or inactive.

3.5 Indication values / Controller values

-9999.9 EUDES

-999.9 °C

-9999.9 EUDES

Normal behavior:

PV The process value will be shown in bright white. The format matches the configured PVFORMAT.

EU The engineering unit will be shown in bright white.
A maximum of 5 characters is reserved for the engineering unit.
In case a 1 or 2 character EU is needed (e.g. 'C'), an additional subpicture may be made available to preserve display space in crowded displays.

Selected A selected indicator (= visible in faceplate) will receive a blue colored background

Abnormal Behavior:

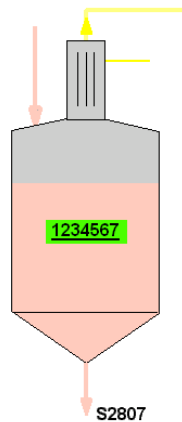
BADPV When the PV is not a valid state, the value will be colored magenta. The value displayed will be the LASTPV value of the point (when present). If the LASTPV is not available or BAD as well (e.g. box numeric or inactive AI), then the value will be substituted with '????'.

ALARMING When there is an alarm configured, the box which outlines the value will appear, in the color for which the alarm priority was configured

Object specifics:

In the display builder (display engineering mode), a controller value and an indicator value are distinctively recognized by the outline, which is yellow for indicators, and red/orange for controllers.

For levels, the static equipment object is filled with the product color for animation.



3.6 Control valves



Normal behavior:

OPEN	The valve is considered open if it's OP exceeds 1% The outline color will become green; the fillcolor will become green
CLOSED	The valve is considered closed if it's OP is smaller than or equal to 1% The outline color will become white, the fillcolor will be set to the Background color
OP / EU	The OP color is yellow. The EU (%) is green.
Selected	A selected device (= visible in faceplate) will receive a blue colored background

Abnormal Behavior:

BADPV	A BADPV of the controller will not be visible on the control valve itself, however, if BADPVPR is configured for the valve, the box outline will behave as mentioned here below..
ALARMING	When there is an alarm configured, the box which outlines the value will appear, in the color for which the alarm priority was configured

State indicator behavior:

This state indicator will indicate the MODE of the controller, and it's background (for the cap) will indicate the normal mode NMODE, should the MODE be different from it's NMODE. The MODE indicator will be overwritten with state information, which prohibits regular use of the controller:
E.g. Assume the controller is in manual, while NMODE = AUTO: An M will be shown with a cyan background.

States:

O	Output Problem (Initman or BADOCFL)
R	Redtag = ON; this indicates an operator lock-out to modify the state from the DCS (maintenance)
S	The controller is forced in shutdown

Modes:

M	Manual
A	Auto
C	Cascade
B	Backup Cascade

3.7 Sequence status indicators

SeqName : Status

These symbols are used to clarify the state of a sequence to the operator. Typically, the string in the box is build up from a Sequence string clarifying the sequence representation, and a string, which is derived and updated by the sequence itself.

Example: 'SEQ2801 : Conveying is active'

3.8 Equipment selection

1234567

Equipment numbers, which can be selected by the operator, are visualized as underlined equipment numbers. This symbol interacts with sequences which allow operator selection of certain equipment, such as fan selection or blower selection in the conveying sequences.

Equipment which has effectively been selected and confirmed by the sequence, is shown in green, as defined by registry entry EquipmentSelect

For source and destination selections of storage bins, a difference in color is made between a selected PP1 bin, and a selected PP2 bin. These colors are also present in the registry as PP1Select and PP2Select.

3.9 Bin data

LotNumber
LotType
LotWeight

For all storage bins, basically 3 parameters are available to the operator: The lot number, lot type and the weight of the product which is stored in the bin.

As no supporting code exists for the PP1 storage bins, clicking the bin data object allows the operator to enter these parameters manually.

For PP2 silo's the weight can be modified, as this is sometimes required when trucks unload a certain amount of product.

The same object is also used for the blenders, but on these, no data can be modified.

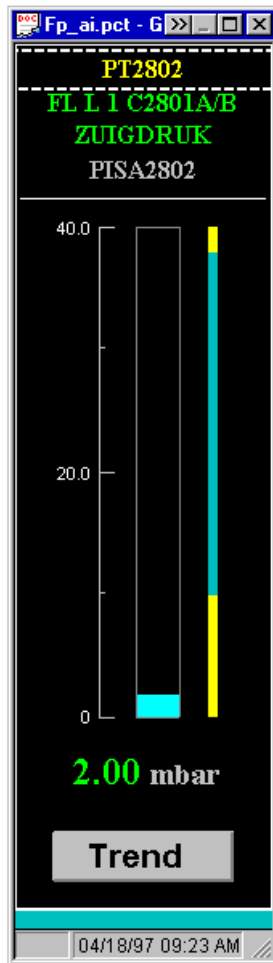
3.10 Bin status

...

This object mostly found in conjunction with the bin data object described above, shows in which mode the bin is currently in. The text shown is derived from the bin status array in the HPM.

3.11 Faceplates

Analog Input Point Faceplate



The upper part of the faceplate displays the general information for the point.

Tagname	If any of these 3 get clicked upon,
Point Descriptor	the point detail of the corresponding tag
Keyword	will be called up in the Native Window.

The cyan bar indicates the Process Value (PV).

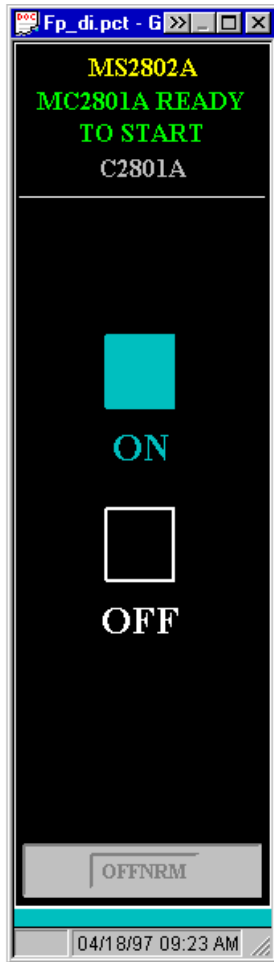
To the left of the PV, the scale is visible, marked by the PVEUHI and PVEULO parameters.

To the right of the PV, an alarm bar is visible. In this alarm bar, the green represents the normal operating range (between PVHITP and PVLOTP). In case a PVHITP alarm is configured, the part above the PVHITP will be colored in the alarm priority color corresponding to the PVHIPR (in this case yellow, corresponding to a LOW priority alarm). If no alarms are configured, the bar will be green from the PVEUHI to PVEULO range.

Here, the PV is shown in numerical format, including the Engineering Unit.

This button is optional, and could act as a trend callup button.

Digital Input Point Faceplate



The upper part of the faceplate displays the general information for the point.

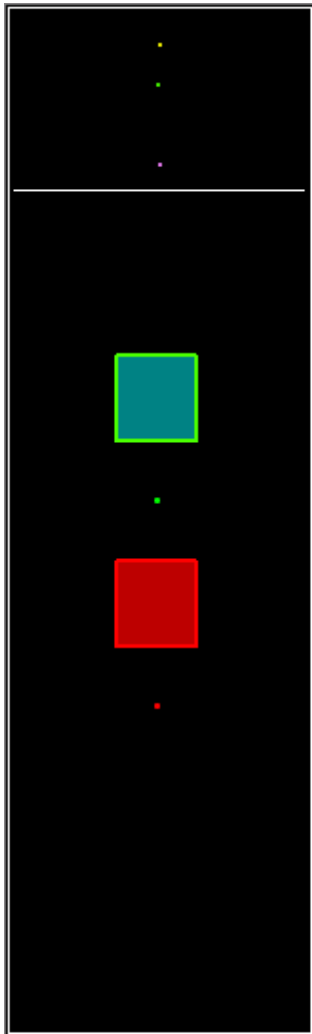
Tagname	If any of these 3 get clicked upon,
Point Descriptor	the point detail of the corresponding tag
Keyword	will be called up in the Native Window.

The upper box represents STATE 1 and is colored based on the point configuration parameters BOXCLR(1)

The lower box represents STATE 0 and is colored based on the point configuration parameters BOXCLR(0)

If the point is configured with an OFF NORMAL alarm, this box will highlight yellow if the state is in the off normal state.

Flag Point Faceplate



The upper parts of the faceplate displays the general information for the point.

Tagname
Point Descriptor
Keyword

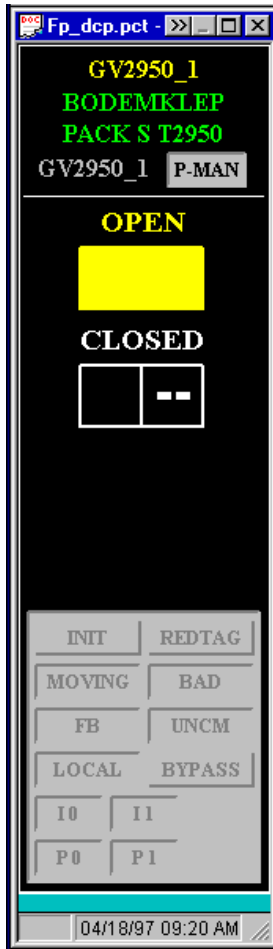
If any of these 3 get clicked upon,
the point detail of the corresponding tag
will be called up in the Native Window.

The upper box represents STATE 1 and is colored based on the point
configuration parameters BOXCLR(1)

The lower box represents STATE 0 and is colored based on the point
configuration parameters BOXCLR(0)

Basically, the main content of the Flag faceplate is identical to the Digital Input faceplate, however, the states of the Flag faceplate can be manipulated by the operator, whereas this is not possible with the Digital Input faceplate.

Digital Composite Point Faceplate



The upper parts of the faceplate displays the general information for the point.

Tagname	If any of these 3 get clicked upon,
Point Descriptor	the point detail of the corresponding tag
Keyword	will be called up in the Native Window.

The current mode attribute (if Program) and mode are displayed in the status box, which can be accessed by the Operator to change the operating mode attribute of the point.

The upper box represents STATE 1 and is colored based on the point configuration parameters BOXCLR(1)

The middle box represents STATE 0 and is colored based on the point configuration parameters BOXCLR(0)

The bottom box represents STATE 2 and is colored based on the point configuration parameters BOXCLR(2). If the number of states is 2, this box will be blanked out.

The bottom area shows some of the most common status parameters of the digital composite points:

Initman / Inactive: Outputs are inaccessible or point is inactive

Redtag: Output frozen for maintenance

Moving: equipment traveling (transition state)

Bad: Bad PV status

Feedback alarm: response too late, causing an alarm after FBTIME seconds

Uncommanded change alarm, PV changed without DCS request

Local indicator: Device in local control

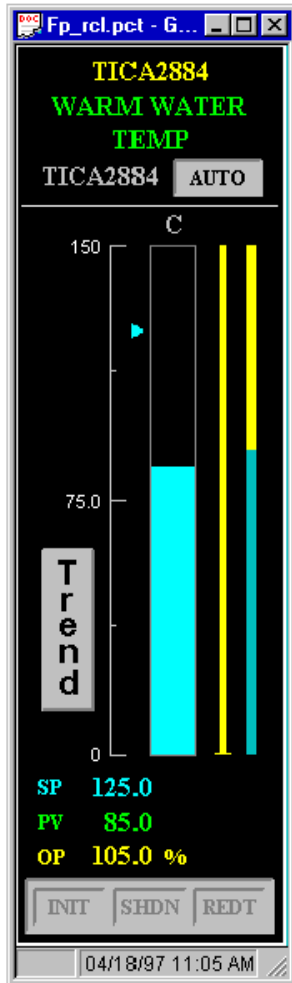
Interlock bypass: accessible by operator to toggle bypass (only if OROPT

= ON)

Interlocks: Condition forces certain state, could be overwritten with BYPASS

Permissive: Prevents certain state to be selected, could be overwritten with BYPASS

Regulatory Control Point Faceplate



The upper parts of the faceplate displays the general information for the point.

Tagname	If any of these 3 get clicked upon,
Point Descriptor	the point detail of the corresponding tag
Keyword	will be called up in the Native Window.

The current mode attribute (if Program) and mode are displayed in the status box, which can be accessed by the Operator to change the operating mode attribute of the point.

The engineering unit is visible on top.

The cyan bar indicates the Process Value (PV).

To the left of the PV, the scale is visible, marked by the PVEUHI and PVEULO parameters.

In-between the PV and the scale, the arrow symbolizes the SP

Right next to the cyan bar, a thin yellow bar indicates the controller OP

To the right of the OP, an alarm bar is visible. In this alarm bar, the green represents the normal operating range (between PVHITP and PVLOTP). In case a PVHITP alarm is configured, the part above the PVHITP will be colored in the alarm priority color corresponding to the PVHIPR (in this case yellow, corresponding to a LOW priority alarm). If no alarms are configured, the bar will be green from the PVEUHI to PVEULO range.

The trend button is optional.

Here, the SP, PV and OP are shown in numerical format

When SP or OP is clicked, 4 buttons become visible to step SP/OP up or down.

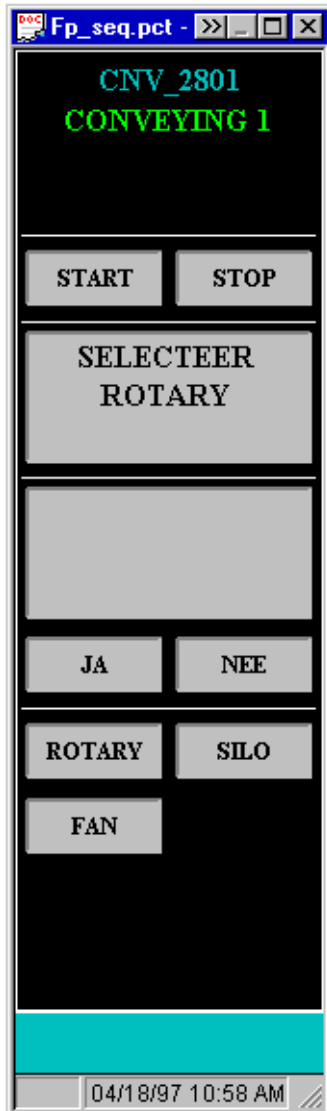
The following status boxes represent some of the commonly used status parameters:

Initman / Inactive: Outputs are inaccessible or point is inactive

Controller Shutdown: Forces the controller to SAFEOP and MAN mode.

Redtag: Output frozen for maintenance

Process Module Point Faceplate



The upper part of the faceplate displays the general information for the point.

Tagname
Point Descriptor

If any of these get clicked upon, the point detail of the corresponding tag will be called up in the Native Window.

The tagname will be colored GREEN is the sequence is running as expected, and it will be colored RED when the sequence is inactive or when it failed.

The Start / Stop buttons are use to initiate START / STOP requests to sequences which typically need to be started and/or stopped by the operator.

This message Box informs the operator of which action the sequence is expecting the operator to perform.

This question Box indicates to the operator that the sequence is expecting a reply form the operator button by means of the YES / NO buttons right below

YES / NO buttons to answer the question which is visible in the question box.

This section hold 4 function buttons, which interface with the 4 sequence options which, can be available to perform certain activities.

If less than 4 options are present, the options, which are not in use, are invisible to the operator.

4. Appendix A: GUS Display Object Naming Conventions

In order to improve overall readability of the object's code, the following subset of Microsoft® proposed object-naming conventions are adapted to enforce a good engineering standardization practice.

The display object naming conventions are to be considered by the designers, as they are good engineering practice, and will simplify future maintenance.

Object	Prefix	Example
checkbox	chk	chkReadOnly
command button	cmd	cmdCancel
combobox	cbo	cboPointList
line	lin	linVertical
option button	opt	optAlarmInhibit
picture box	pic	picSomething
text box	txt	txtStatus
listbox	lst	lstControlModes

In addition to these Object Naming Conventions, the following Honeywell object naming conventions can be applied in addition to the above ones.

Object	Prefix	Example
rectangle	rec	recAlarm
ellipse	eli	eliBody
polygon	pol	polLeg1
bezier curve	bez	bezWhatever
arc	arc	arcActuator
bitmap	bmp	bmpHooter
object group	grp	grpSelect
trend	trd	trd8Channel
script file attached	Sc	ScrecAlarm

Objects that have a script attached, should be preceded with the Sc prefix, so that one can easily identify the Objects in the Object list which contain Display Builder Scripts.

5. Appendix B: GUS Base set of Subpictures

This list gives an overview of the most frequently used subpictures in the project. As the number of subpictures created for various (sometimes unique) representations is rather large, those special subs, which have been derived from this base set, are not documented with descriptions or details.

Subpicture Name	Description	Details
ACtl6Eu5.pct	Control Indication with Engineering Unit	6 Characters for value, 5 for Engineering Unit
AInd6Eu5.pct	Analog Indication with Engineering Unit	6 Characters for value, 5 for Engineering Unit
BRotCtlHor.pct	Blower, Rotating, Control, Horizontal	PV animates the valve based on DCP point
BRotIndHor.pct	Blower, Rotating, Indication, Horizontal	PV animates the valve based on DI point
BRotOutHor.pct	Blower, Rotating, Output, Horizontal	OP animates the valve based on DCP point. This sub to be used when DCP has no inputs.
BRotStaHor.pct	Blower, Rotating, Static, Horizontal	Static representation
PCenCtlLR.pct PCenCtlRL.pct PCenIndLR.pct PCenIndRL.pct PCenOutLR.pct PCenOutRL.pct PCenStaLR.pct PCenStaRL.pct	Pump/Blower, Centrifugal, Control, Horizontal Pump/Blower, Centrifugal, Indication, Horizontal Pump/Blower, Centrifugal, Output, Horizontal Pump/Blower, Centrifugal, Static, Horizontal	PV animates the valve based on DCP point PV animates the valve based on DI point OP animates the valve based on DCP point. This sub to be used when DCP has no inputs. Static representation
PStrCtlLR.pct PStrCtlRL.pct PStrIndLR.pct PStrIndRL.pct PStrOutLR.pct PStrOutRL.pct PStrStaLR.pct PStrStaRL.pct	Pump, Stroke, Control, Horizontal Pump, Stroke, Indication, Horizontal Pump, Stroke, Output, Horizontal Pump, Stroke, Static, Horizontal	PV animates the valve based on DCP point PV animates the valve based on DI point OP animates the valve based on DCP point. This sub to be used when DCP has no inputs. Static representation
PRotCtlHor.pct PRotIndHor.pct PRotOutHor.pct	Pump, Rotating, Control, Horizontal Pump, Rotating, Indication, Horizontal Pump, Rotating, Output, Horizontal	PV animates the valve based on DCP point PV animates the valve based on DI point

Subpicture Name	Description	Details
PRotStaHor.pct	PRotStaHor.pct	OP animates the valve based on DCP point. This sub to be used when DCP has no inputs. Static representation
V3WayCtlHor.pct	Valve, 3 way, Control, Horizontal	PV animates the valve based on DCP point Common Left / ST0 Right / ST1 Bottom
VDivCtlHor.pct	Valve, diverter, Control, Horizontal	PV animates the valve based on DCP point Common Left / ST0 Through / ST1 Divert
VRegCtlHor.pct VRegCtlVer.pct VRegStaHor.pct VRegStaVer.pct	Valve, Regulating, Control, Horizontal Valve, Regulating, Control, Vertical Valve, Regulating, Static, Horizontal Valve, Regulating, Static, Vertical	Static Representation
VSolCtlHor.pct VSolCtlVer.pct VSolIndHor.pct VSolIndVer.pct VSolOutHor.pct VSolOutVer.pct VSolStaHor.pct VSolStaVer.pct	Valve, Solenoid, Control, Horizontal Valve, Solenoid, Control, Vertical Valve, Solenoid, Indication, Horizontal Valve, Solenoid, Indication, Vertical Valve, Solenoid, Output, Horizontal Valve, Solenoid, Output, Vertical Valve, Solenoid, Static, Horizontal Valve, Solenoid, Static, Vertical	PV animates the valve based on DCP point PV animates the valve based on DI point OP animates the valve based on DCP point. This sub to be used when DCP has no inputs. Static representation

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