# GRAPHICS

- Graphics files shall follow Caltech Controls Graphic Standards.
- Graphics files shall be placed on the BMS Supervisor in a folder provided and assigned by Caltech Controls. Figure 1 below shows the folder to use for a Building 16 graphics file.

E D	
	assets
	_dead
	_equipment
	_home
	Bldg_03
	Bldg_05
	Bldg_06
	Bldg_08
	Bldg_10
	Bldg_123
	Bldg_124
	Bldg_126
	Bldg_127
	Bldg_133
<b>.</b>	Bldg_14
	Bldg_15
	Bldg_16
	_content
	avs
	_layout.px
	AHU.px
	CHX.px
	FC.px
	HX.px
	Meter_BTU_CHW.px
	Meter_Electric.px
	Schedules.px
	Summary.px
	Tu_AB.px
	tu_RHC.px
	tu_VAV.px
	VFD.px
ф.	Bldg_17

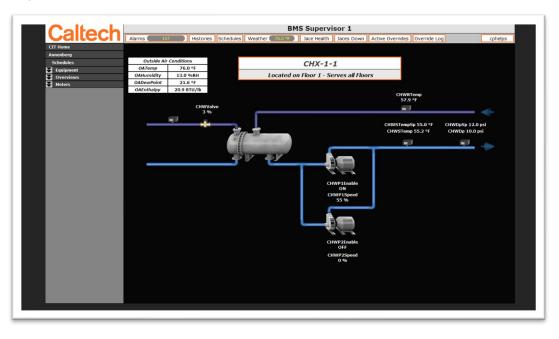
# Figure 1 – Building 16 Graphics File Folder

• Graphics files shall use native Tridium Graphics Libraries if needed.



Figure 2 – Tridium Graphics Libraries

• Graphics pages are build using a framework that provides three areas: page header, left side navigation, and content area.



### Figure 3 - Graphics Framework with Equipment Content

• The graphic page header is common to all pages.

					BM	S Supervi	sor 1			
Alarms	176	Histories	Schedules	Weather	75.0 °F	Jace Health	Jaces Down	Active Overrides	Override Log	cphelps

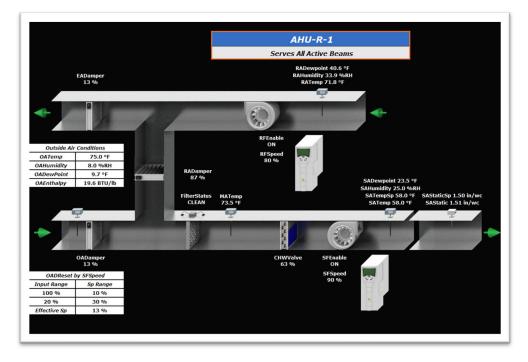
#### Figure 4 - Graphics Page Header

• The graphic left side navigation is unique to each building and may include, but not limited to the following drop down groupings: Equipment, Floors, Overviews, and Meters.



Figure 5 - Graphics Left Side Navigation

• The graphic content area of a Graphic Framework page refers to an equipment template or custom content.



### Figure 6 - Graphics Equipment Content

• Equipment graphics files shall use Caltech equipment templates if possible.

Nav	8	_equipment	
🔄 🍪 💿 My Network	-	Name	Туре
₽	<b></b>	🛅 distech	Directo
e i es		🛅 talon	Directo
🕀 🧰 email		_blank.px	PxFile
Graphics		ahu_cv_100oa_cc_2hc_2sf.px	PxFile
🖽 🛅 history		ahu_cv_sf_cc_hc.px	PxFile
Ф 🧰 httpd		ahu_cv_sf_cc_hc_100oa_ef.px	PxFile
🖶 🧰 nav		ahu_cv_sf_rf_cc_hc_econ.px	PxFile
⊨ <b>D</b> px		ahu_vv_100oa_2sf_2cc_2hc.px	PxFile
⊕ 🗀 _assets ⊕ 🗀 _dead		ahu_vv_100oa_cc_2sf_2hc_2humidifer.px	PxFile
		ahu_vv_100oa_cc_hc_2iso_2sf_humidifer.px	PxFile
🕀 🛅 _home		ahu_vv_100oa_hc_cc_2sf_humidifer.px	PxFile
🕂 🛅 Bldg_03		ahu_vv_2sf_2cc_2hc_100oa.px	PxFile
🕀 🛅 Bldg_05	$\equiv$	ahu_vv_2sf_cc_hc_100oa.px	PxFile
⊕ 🔁 Bldg_06		ahu_vv_2sf_cc_hc_100oa_humidifer.px	PxFile
⊕ 🗀 Bldg_08 ⊕ 🗀 Bldg 10		ahu_vv_cc_100oa_2hc_2sf_2humidifer.px	PxFile
Bldg_10		ahu_vv_cc_2sf.px	PxFile
		B abu wy econ be co sf ny	DyFile

### Figure 7 - Equipment Templates File Location

- Equipment templates and custom content shall be sized to 1200 by 800 pixels.
- Custom content background images if used shall be sized to 1200 by 800 pixels.

• Custom content background images if used shall be place at the lowest level of the Px file's Widget Tree on a layer named bgLayer and locked.

• INdV	PINYXMI Version= 1.0 encoding= UTF-0 72
	<pre><!-- Niagara Presentation XML--></pre>
🔒 📚 💿 🎯 My Network	<pre> <pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre>
🕀 🧰 nav	<import></import>
	<pre><module name="baja"></module></pre>
e assets	<pre><module name="bajaui"></module></pre>
	<module name="converters"></module>
🖶 🧰 _dead	<pre><module name="gx"></module></pre>
equipment	<module name="kitPx"></module>
🖶 🧰 _home	
🖶 🧰 Bldg_03	<lavers></lavers>
🕀 🧰 Bldg_05	<laver name="bgLayer" status="locked"></laver>
🕀 🧰 Bldg_06	
🕀 🧰 Bldg_08	<pre><content></content></pre>
🕀 🧰 Bldg_10	<canvaspane background="black" viewsize="1200.0,800.0"></canvaspane>
🕀 🧰 Bldg_123	
🕀 🧰 Bldg_124	<label image="file:^px/Bldg 20/ content/Floor/Floor B1 B.png"></label>
🖻 🧰 Bldg_126	<layertag layername="bgLayer" name="LayerTag"></layertag>
🕀 🧰 Bldg_127	
🕀 🧰 Bldg_133	
⊕ in Bldg_14	<boundlabel box<="" font="bold 11.0pt Verdana" layout="105.0,460.0,60.0,20.0" td=""></boundlabel>
Bldg_15	<boundlabelbinding format="%out.value%" ord="station: slot:/Drivers/NiagaraNetwork/SC20 6/pd&lt;/p&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td&gt;⊕  Bldg_16&lt;/td&gt;&lt;td&gt;&lt;ObjectToString name=" text"=""></boundlabelbinding>
Bldg_17	
Bldg 18	<pre><wsannotation name="wsAnnotation" value="2,2,8"></wsannotation></pre>
🖻 🧰 Bldg_20	
e Content	<boundlabel box<="" font="bold 11.0pt Verdana" layout="125.0,595.0,60.0,20.0" p=""></boundlabel>
@ _navs	<boundlabelbinding <="" format="&amp;out value&amp;" ord="station: slot:/Drivers/NiagaraNetwork/SC20 6/pd&lt;/p&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td&gt;ayout.px&lt;/td&gt;&lt;td&gt;(ObjectToCtring name=" taxt"="" td=""></boundlabelbinding>

### Figure 8 – Custom Content File Text showing bgLayer Locked and View Size

• Custom content Px files if used shall be place in the related buildings content folder.

Nav	8	_content			
🛚 🤹 💿 🞑 My Network	-	Name 🗠	Туре	Size	Modified
		🛅 Floor	Directory		08-Jun-20 1:00 PM PDT
🖶 🧰 Bldg_20 🖶 🫅 Bldg_21		Floor_1.px	PxFile	1 KB	08-Jun-20 10:49 AM PDT
⊕		Floor_2.px	PxFile	1 KB	08-Jun-20 10:49 AM PDT
Bldg_23		Floor_B1.px	PxFile	1 KB	08-Jun-20 10:49 AM PDT
₽ 🖨 Bldg_24		Floor_B2.px	PxFile	1 KB	01-Dec-20 5:14 PM PST
🕫 🛅 _content		Floor_G.px	PxFile	1 KB	08-Jun-20 10:50 AM PDT
🖻 🧰 _navs		Floor_R.px	PxFile	1 KB	08-Jun-20 10:50 AM PDT
	11				

#### Figure 9 - Custom Content File Folder

- Custom background images if used shall be place in a folder under the related buildings content folder and the folder name shall match the Custom content Px file name.
- Graphics Px file names follow the form "name.px" and shall start with a letter and may only include the following characters (A-Z, a-z, 0-9, underscore).

• Graphics Px files shall be attached to a component Niagara Point Folder as a PxView.

	AHU_B1_3_SF1 © Description		r #20 {ok} @ def	
My Network	E		a {ok} @ def	
🖽 📾 RO24_2	📤 🖽 🔘 Model	Ye7Lw {	(ok) @ def	
🖽 🖬 RO24_3	🗉 🔘 Unit		_3-SF1VFD {ok} @ def	
🛡 📾 RO24_4	🗉 🖲 Alarm	No {ok}		
□ □ SC20_1	🖽 🐵 Current	3.7 A {o		
⊕ ♣ Alarm Source Info ⊕ ₱ Client Connection	E OCBus	641.0 V		
Elent Connection	🗉 💿 Energy	746 kW-		
B Points	🗉 🖲 ManualContro			
B P menu	E  Power	1.3 kW		
DeceHeath	🗉 💿 Runtime	14243 h		
I JaceRes	E Speed	67 % {c		
🖶 🔯 Floor_B1	🗉 🖲 Temp	111.2 %		
AHU_B1_3_SF1VFD	Voltage     System	231.3 V Px View		
Description		PX VIEW		
🕀 🔘 Make	Icon		module://icons/x16/spiral.png	
⊕ © Model ⊕ © Unit	Required I	Permissions	r »	
🕀 🖲 Alarm	🗆 🔘 Media		workbench 💌 WbPxMedia 💌 🔞 •	
Current     DCBus	D O Px File		file:^px/Bldg 20/VFD.px	<u>۰</u>

Figure 10 - Building 20 Component PXView

- The graphic navigation links shall point at component PxViews and not the file location.
- Cross linking custom content to another building graphics folders or content is not allowed.

# SCHEDULES

• Schedules shall be placed on the BMS Supervisor in a folder assigned by Caltech Controls.

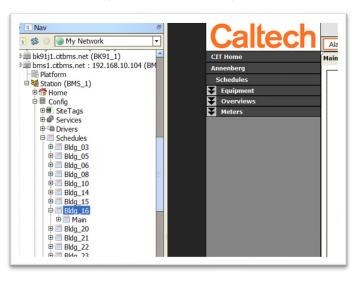


Figure 11 - Building 16 Schedule Folder

• Schedules shall be imported into Jaces as needed.

* Nav é	Databas	Database							
🖓 🛸 💿 My Network 🔽	Name	Туре	Supervisor Id	State	Status	Last Success			
an162.2 cd/ms.net : 192.168.16.2 (AN1 ■ Platform ■ Staton (AN16_2) ■ Confg ■ Co	Man	Enum Schedule	sbt:/Schedules/Bidg_16/Schedule_1	Idle	{ok}	01-Dec-20 5:35 PM PST			

# Figure 12 - Building 16 Schedule Import into Jace

• Schedules shall be use by reference if possible.

Station (AN16_2)	Calendar_2 calendar 2	
🖻 🚰 Home	Schedule_1 schedule 1	
e Config	Schedule_2 schedule 2	
⊕ @ Services ⊡ @ Drivers	Schedule_3 schedule 3	
WiagaraNetwork	Schedule_4 schedule 4	
D ConNetwork	Schedule 5 schedule 5	
B Local Lon Device	Schedule 6 schedule 6	
Der Floor R	Schedule 7 schedule 7	
B AHU R 1	Schedule 8 schedule 8	
He Alarm Source Info	Suredue_o Suredue o	
Device Data	12 Add	_
🖽 💿 Points	all vin	
Bcp Parameters	Name Object Type Object Instance Supervisor Ord Data Type Enabled Execution Time	-
🕀 🚾 Schedules	Schedule_1 schedule 1 station:  slot:/Dri true 5mins {Sun Mon Tue Wed Thu Fri Sat }	
🖶 🐻 Node Object 🕀 🐻 Program		1
⊕-7 nciCb01_124 ⊕-7 nciCn01_07 ⊕-7 nciCn08_14	Image: Name         Schedule 1           Image: Object Type         schedule	
⊕ 🗇 nciCn15_21	Object Instance 1	
⊕ G Floor_3 ⊕ G Floor_2	O Supervisor Ord station:  slot:/Drivers/NiagaraNetwork/BMS 1/schedules/Main	
E FreezeProtection		
SecondFloorLogic	O Data Type	
ThirdFloorLogic	© Enabled © true 💌	
	Interval 00000h 05m 00s [] [1ms - +inf]	
⊕ == Files	Execution Time Interval      Time Of Day     Start Time 12:00:00 AM PST End Time 11:59:59 PM PST	_
History		-
ar25j1.citbms.net (AR25_1)	Days Of Week 🗹 Sun 🗹 Mon 🗹 Tue 🗹 Wed 🗹 Thu 🗹 Fri 🗹 Sat	
at61j1.ctbms.net (AT61_1)		
	OK Cancel	
av99j1.citbms.net (AV99_1) bac3j1.citbms.net (BAC3_1)	OK Calicei	

Figure 13 - Building 16 Schedule Reference

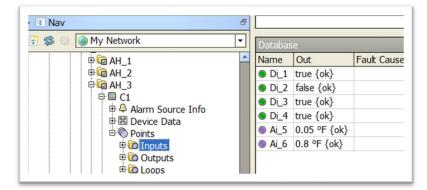
# POINTS

• Points names shall be named per Caltech Point Naming Standard.

A	ß	C C	U	E	P	6	н	1	)	KI	M	N	U	P	Q
Description	Name	Туре	Required	Device	Points Tags	Point Type	Point Precision	Units	Alarm	Alarm Priority	Operational Trend Operational Trend COV or Interval Time	Operational Trend Capacity	Operational Trend System Tag	Display on Graphic	
Equipment Naming															
Typical Naming	SAV1		Required		equip, vav, ahuRef, singleDuct, hotWaterReheat										
Typical Display Name	VVS_B201_1		Required												
Hardware I/O Points															
Air Flow Diff Pressure	AirFlowDP	AI	Required	DP Transducer connected to flow sensor		Numeric	3	"WC							
Discharge Air Temperature	DATemp	AI	Required	Discharge Air Temperature Sensor	discharge, air, temp, sensor	Numeric	1	°F	х	4 )	( 15 min	192	hvac	х	
Damper	Damper	AO	Required	Damper	air, damper, cmd	Numeric	0	%		3	( 15 min	192	hvac	X	
Hot Water Valve	HWValve	AO	Required	Hot Water Valve	reheat, water, valve, cmd	Numeric	0	%		3	( 15 min	192	hvac	x	
Space Temperature	SpaceTemp	AI - See Note 1	Required	Space Temperature Sensor	zone, air, temp, sensor	Numeric	1	°F	х	3 3	< 15 min	192	hvac	X	
Local Occupancy Override	OccOvrd	DI - See Note 1	If Applicable	Local Occupancy Override		Boolean	NA			3	COV	60	hvac	X	
Occupancy Sensor	OccSensor	DI - See Note 1	If Applicable	Occupancy Sensor		Boolean	NA			3	COV	60	hvac	X	
Space Temp Setpoint Adjustment	TempLocalSp	AI - See Note 1		Space Temp Setpoint Adjustment		Numeric		°F			( 15 min	192	hvac		
Space CO2 level	SpaceCO2	AI - See Note 1	If Applicable	Space CO2 level	zone, air, co2, sensor	Numeric	0	PPM	X	4 )	( 15 min	192	hvac	X	
Space Humidity	SpaceHumidity	AI - See Note 1	If Applicable	Space Humidity	zone, air,humidity, sensor	Numeric	0	%RH	x	4 )	< 15 min	192	hvac	x	
		Note 1 - These p	oints may all	eside on ComSensor											
Software Points															
	Description		Required			String	NA	NA						X	
	Unit		Required			String	NA	NA						X	

### Figure 14 - Caltech Points List for a VAV

• Point names shall not have the point type or channel imbedded in the name.



### Figure 15 - Disallowed Point Naming

- The length of point names shall be no greater than 21 characters.
- Point names shall start with a letter and may only include the following characters (A-Z, a-z, 0-9, underscore).
- Point Display Names shall follow the same naming rules as point names.

- Points facets shall be set to display units per Caltech Point Naming Standard.
- Points facets shall be set to display precision per Caltech Point Naming Standard.

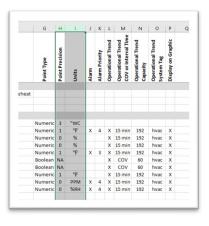


Figure 16 - Caltech Point Naming Units / Precision Details

# HISTORIES

- Histories extensions shall be placed directly on equipment points in JACES.
- Histories type, size, and system tag shall be assign per Caltech Point Naming Standard.

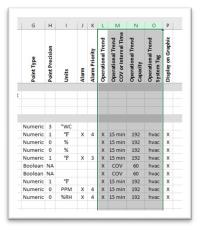


Figure 17 - Caltech Point Naming History Details

• History extension names shall use the default Tridium Naming for Caltech Standard Histories.

🖁 💿 My Network	-	Status	{ok}
DeccCmd	-	Fault Cause	
OccStatus		Senabled	© true ▼
CoolDemand     SoolDemand     SoolDemandCmd     SoolDemandCmd		Active Period	Days of week Z Sun Z Mon Z Tue Z Wed Z Thu Z Fri Z Sat Time Range 12:00:00 AM PST: to 12:00:00 AM PST:
HeatDemandCmd     AirFlow		Active	© true
e Proxy Ext		O History Name	%parent.parent.parent.name% %parent.name @
With the second se		History Config     O Id	Interval: 15mins, Record Type: nurr /CA17_1/VAV_301_AirFlow
AirFlowCoolMinSp     AirFlowMaxSp		Source	station: slot:/Drivers/LonNetwork3/Floor 3/VAV 301
AirFlowMinSp		O Time Zone	America/Los_Angeles (-8/-7)
AirFlowHeatMaxSp		Record Type	history NumericTrendRecord 6
AirFlowHeatMinSp     AirFlowSp		Capacity	Record Count   192 [0 - max] records
🖻 🌑 DATemp		G Ful Policy	Rol V
DamperCmd     OmperPos		O Interval	regular +00000h 15m 00s
DamperPos     HWValve	E.	- Interior	
HWValveCmd		System Tags	hvac
SpaceTemp		valueFacets	min=0 cfm,max=65534 cfm,precision=0 cfm,units=cfm » 6 •
<ul> <li>SpaceTempCoolSp</li> <li>SpaceTempHeatSp</li> </ul>		minRolloverValue	🗹 nul 0.00
SpaceTempSp		maxRolloverValue	Inul 0.00
SpaceTempSpCmd		oprecision	32 bit
TempLocalSp     TempLocalSpEnable		O Last Record	03-Dec-2020 08:46 AM PST Hidden 163.15
⊕ ● TempLocaMaxSp		O O Interval	00000h 15m 00s [[1ms - +inf]
🕀 🌑 TempLocalMinSp			32 bt
TempUnoccCoolSp			
TempStandbyCoolSp     TempOccCoolSp		Min Rollover Value	✓ null 0.00
PempOccCoosp     PempOccHeatSp		Max Rollover Value	I null 0,00

#### Figure 18 – Numeric History Extension Detail

• History names shall be build using Baja Format and hard coding (FAT fingering) is not allowed.

BooleanCov (Bool	ean Cov History Ext)
🗆 🔘 Status	{ok}
🗆 🔘 Fault Cause	
🗆 🔘 Enabled	© true ▼
□ ◎ Active Period	Days of week ♥ Sun ♥ Mon ♥ Tue ♥ Wed ♥ Thu ♥ Fri ♥ Sat Time Range 12:00:00 AM PST to 12:00:00 AM PST
C O Active	
🗆 🔘 History Name	<pre>%parent.parent.name% %parent.name</pre>
□ ○ History Config □ ○ Id □ ○ Source	Interval: irregular, Record Type: boc /AN16_2/AHU_R_1_SFStatus station: slot:/Drivers/LonNetwork/Floor R/AHU R 1/

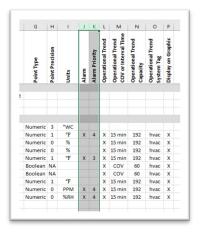
## Figure 19 - History Naming using Baja Format

• The resulting history names shall start with a letter and may only include the following characters (A-Z, a-z, 0-9, underscore).

# ALARMS

- Alarms extensions shall be placed directly on equipment status points in JACES.
- Alarms from load devices shall be suppressed when the source equipment is down or in fault.

• Alarms shall be assigned Alarm Classes per Caltech Point Naming Standard.



### Figure 20 - Caltech Point Naming Alarm Details

• Alarm Source Names shall be build using Baja Format and hard coding (FAT fingering) is not allowed.

🛛 📟 Alarm Inhibit	false {ok} *
🗆 🔍 Inhibit Time	00000h 00m 00s [0ms - +inf]
🗆 🔘 Alarm State	Normal
🗆 🔍 Time Delay	00000h 05m 00s + [0ms - +inf]
🗆 🔍 Time Delay To Normal	00000h 00m 00s + [0ms - +inf]
🗆 🔘 Alarm Enable	🗹 toOffnormal 🔲 toFault
🗉 🔘 To Offnormal Times	Alarm Timestamps
🗉 🔘 To Fault Times	Alarm Timestamps
🗆 🔍 Time In Current State	+00988h 33m 56s
Source Name	<pre>%parent.parent.parent.displayName</pre>
	() ()

### Figure 21 - Alarm Source Name using Baja Format

- The resulting Alarm Source shall start with a letter and may only include the following characters (A-Z, a-z, 0-9, underscore, /). The forward slash is to be used to form a file path layout (i.e. AHU\_1/SATemp).
- No Alarm Extensions that appears in the Alarm Ext Manager view shall have an Alarm Class set to Default Alarm Class.

# WIRE SHEET LOGIC PAGES

- Wire sheet logic shall not be used except where no other options are present.
- Wire sheet logic pages shall be layout to fit on one screen for easy viewing.
- Inputs and Set Points shall be place on the left side of page.
- Outputs shall be place on right side of page.
- Logic shall be layout to reduce wire connections from crossing.

- HX\_R1
   WHSTReset

   Numeric Writable
   Numeric Writable

   Out
   58.0 (ck) © 15

   Infis
   0.0 (ck) © def

   Infis
   - (null)

   Outer Writable
   Outer 152.0 °F (ck) © 16

   Infis
   - (null)

   Outer Writable
   Outer 160.00 (ck) © def

   Infis
   - (null)

   Outer Writable
   Outer 160.00 (ck) © def

   Infis
   - (null)

   Outer Writable
   Outer 160.00 (ck) © def

   Infis
   - (null)

   Outer High Limit 140.00 (ck) © def

   Infis
   - (null)

   Sphine
   Numeric Writable

   Numeric Writable
   Outer High Limit 140.00 (ck) © def

   Infis
   - (null)
- Each page should do one thing as imply by the page name (i.e. HWSTempReset).

### Figure 22 - Wiresheet Logic for HWSTempReset

• Page/Folder deep shall be limited.

# GFX PROGRAMMING (DISTECH)

- All programming used shall be open and non-proprietary.
- Hardware points shall be managed using the Excel XpressgfxPoints Add-in provided by Distech.

		EC-ghiProgram	Parts Management Add In																					
	۰ ا × ۷ ۶۰ د	D	£	F	н		J	к	L	м	N	0	R	s	T	U	v	W	×	Y	AB	AC	AD	
D	ISTEC	11																						
	ONTRO																							
0.	UNIKO	LS																						
	Project Name:								Project Number:															
	Controller Name: Controller Description:					_			Units: Neuron Id	us		-												
	Model Number:	ECL 6x0				_			recurso ka			-												
		1		Poi	int Type	-				_		-ir			Ca	missioni	ing .	-		_	_	Rat	646	-
Point	Point	Display		AL C	AD N	DO	Signal						Field			Software			Sign Off	_	Signal	Signal	Output	
Index	Name S/Status	Name	Description	11 4			lype	Part Number	Detail	Rev	Comments	Install	Tem	P.1.P.	Test	Gib	Prog	Braphic	Client	Dete	Min	Mex	Min	
-	DFSEADUS						Digital Digital		-			-	-	-	-			-				_	_	-
	SASRetic			12.00			9-10V		-			1	-	-	-			-			0	32	0	-
4	SAHumidity			13			0-10V											-			0		0	
	SATemp						10K Type II																	
	Matemp			0.000			10K Type II																	
	RAC02			12.38			0-10V		-												0	10	0	
	RAMamidity			1.1			0-10V		-			-	-	-	-			_			0	10	0	-
3	OAHumidity			123			10CType II 4-20 mA		-			-	-	-		_				-	4	20	0	-
10	OATemp			1.1	-		4-20 TA					+	-	-	-	-		-	-			20		
12	CALCUP.			-			1 10/14		-			-	-	-	-			_			-			-
	OMIOW			10.00			0-10V		-			-	-								0	10	0	3
	SAFIOW			0.100			4-20mA					1			-						4	20	0	
	HighStaticSar						Digital																	
	filterStatus			100	-		Digital		-			-	_	-							-		_	1
01	S/Enable REErable			1000			Digital		+	_		-	-	-	-			-						-
	SPSceed			-			Digital 0-10V	-	-			-	-					-				10		
04	M/Speed			100	10.0		0-10V	-	-			-	-	-				-			0	10		
	OrWValw						0-10V	-	-			1						_			0	10		
	EADemper						0-10V					1									0	30		
	OADompor						0 10V														0	30		
	RJDsmper				100		0-10V														0	10		
09								-	-			-	-	-				_						
0307									-			-	-	-				_						



• Programs shall be started by using the export feature of the Excel XpressgfxPoints Add-in.

		Uni	211 -21		
Export to EC-gfxProg	Iram			?	$\times$
Select Sheets to Export	Export Settings Sheet AHU-R-1	File	sh Controle\_	Status Pending	
		Export	Export & Close	Close	

### Figure 24 - Export to EC-gfxProgram Dialog

• Program logic shall be added to new programming sheets for each functional group (i.e. Fan Control, SATemp Control, Damper Control and so on).

	ome Drawing View	Tools				AHU-F
Copy Cut Paste	Undo     ⊕     Duplicate       ●     Redo     ∰     Select All       □     Delete     ✓     Auto Increment	Find Replace Object Object	Add Build	Send	Work Start	Generate Deb V Round Debug Stop Clear Debug V
Clipboard	Editing	📓 Fan Control 🗙	SATemp C	Project ontrol 🗙 📷 Damper Contr	rol 🗙 📑 TNR 🗙	Debugging

### Figure 25 - GFX Programming Page Tabs

• Program sheets shall be arranged in Project tree by level of important.

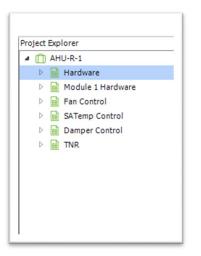


Figure 26 - GFX Project Explorer

• Input Tags and Set Points shall be place on the left side of page.

		Cooling Enable		
SystemEnable		CoolingEnable Bolean Value 3 Input Output		
		Cooling Control		
SATemp SATempSp CoolingEnable EconoEnable	Cooling/ID Pot Log 2 Front Output Stability Feedback Erability	Collstages Analog Stages Pock a Colput Fade s Colput	Economizer Romerc Value 1 Pour Output	CoolingPID  CoolingPID Economicer
CoolingPtD EconoEnable		Grittvalve Grittoff Select		OfWValve
		<b>P</b> sychrometrics		
SAHumidity SATemp		SA Dew Point Dew Point           Humidity         1 to           Temp         0	SADewpoint Numeric Value 12 Input Output	
RAHumidity RATemp		RA Dev Point Dev Font           Hundity         0           Temp         0	RADewpoint Numeric Value 13 Input Output	
OAHumidity OATemp		OA Devr Point     Devr Point     Humidhy a      Cutput     Temp	OADewpoint Numeric Value 14 Input Output	

## Figure 27 - GFX Programming Logic

- Outputs tags shall be place on right side of page.
- Logic shall be layout to reduce wire connections from crossing.
- Custom Blocks are permitted if used to improves the readability of the resulting code.

			zer Enable		
		DamperEnable	e IMP IMP		
OAHumidity		OutsideAirHum	<ul> <li>OutdoorEnthalpy</li> </ul>		OAEnthalpy (NV2)
OATemp	14.7 ps	OutsideAirTemp	IndoorEnthalpy     DamperEnable		RAEnthalpy (NV3)
RAHumidity	14.7 ps	RetHum	OutsideTempPerm	EconoEnable Boolean Value 4	
RATemp		RetTemp	couside reimprenin	Input Output	EconoEnable
AEnthalpyHighLimit (NC2)		OutsideEnthalpySp			
OATempHighLimit (NC3)		MaxOatSp			
SFStatus		Enable			
	Dual	Ventilatio Minimum Setpoin	on Control nt per CA Title 2	24 - 2016	
	Duall		nt per CA Title 2	24 - 2016	
SASascAD	Dual I	Minimum Setpoin	nt per CA Title 2		O4DMin5p
OADResetInMin (NVS)	Dual	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	OADMinSp
SAbascAD GARkesetOMn (N/S) GARkesetOMn (N/S)	Dual I	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	
OADResetInMin (NVS) OADResetInMax (NV6)	Dual I	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	
OADResetInMin (NVS) OADResetInMax (NV5) OADResetSpMax (NV7) OADResetSpMin (NV8)	Dual I	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	
OADResetInMin (NVS) OADResetInMax (NV6) OADResetSpMax (NV7)	Dual I	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	
OADResetInMin (NVS) OADResetInMax (NV5) OADResetSpMax (NV7) OADResetSpMin (NV8)	Dual I	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	— — — — — — — — — — — — — — — — — — —
OADResetInMin (NVS) OADResetInMax (NV6) OADResetSpMax (NV7) OADResetSpMin (NV8)	Dual l	Minimum Setpoin	nt per CA Title 2	OADMinSp Numeric Value 4	

# Figure 28 - GFX Custom Block

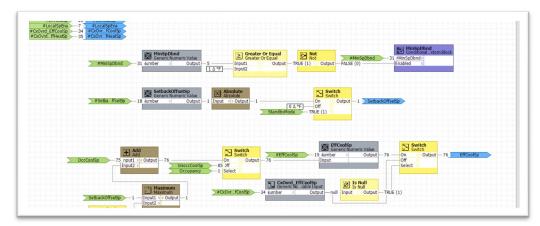
• Custom Blocks shall be limited in scope to related tasks and should do one thing as imply by the blocks name (i.e. PumpStaging).

• The nesting of Custom Blocks within Custom Blocks shall be limited to a depth of two from main programming page.

				E Reset	
> #OccCMaxSp	OccCoolFlowMaxSp Generic Numeric Value Number a Output	Less Than Less Than Input Output	# OccCMaxSp	#OccCoolFlowMaxSo	
	CccCoolFlowMinSp Generic Numeric Value				
	#Oct_Madg	Vumber I Output	Voct Nado Number I Octut Octut	Post Made     Occur	Food: Nakes     Unchar II 0000     Pood: 0000     Fooded II     Fooded II     Fooded II

# Figure 29 - Disallowed Custom Block Nesting - 4 Deep and still going

- All data shall be passed directly in and out of Custom Blocks.
- The use of more than one Generic Block within a Custom Block is not allowed.



### Figure 30 - Disallowed Generic Blocks

• The use of non-Distech Controls Toolboxes is not allowed.

• All hardware inputs without devices connected to them shall have their Signal Interpretation set to disconnected and then will be deleted from the code.

Hardware IOs	Wireless Inputs	Network Vari	ables Int	ernal Variables	Variables
Refresh All	Refresh Selected	View Mode:	Used Only	- Quic	k Print
Number	Name			Туре	
Hardware Input 1	FilterDiffPress			Linear	
Hardware Input 2	SaTemp			Linear	
Hardware Input 3	MaTemp			Linear	
Hardware Input 4	RaTemp			Linear	
Hardware Input 5	StatPress			Linear	
Hardware Input 6	RaRelHum			Linear	
Hardware Input 7	SupFanAmps			Linear	
Hardware Input 8	RetFanAmps			Linear	
Hardware Input 9	UI 09			Disconnected	
Hardware Input 10	UI 10			Disconnected	
Hardware Input 11	UI 11			Disconnected	
Hardware Input 12	UI 12			Disconnected	
Hardware Output 1	OaDmprCmd			Analog 0 - 10 V	
Hardware Output 2	ChwVlvCmd			Analog 0 - 10 V	
Hardware Output 3	SupFanSpd			Analog 0 - 10 V	
Hardware Output 4	RetFanSpd			Analog 0 - 10 V	
Hardware Output 5	SupFanCmd			Digital	
Hardware Output 6	RetFanCmd			Digital	
Hardware Output 7	UO 07			Unassigned	
Hardware Output 8	UO 08			Unassigned	
Hardware Output 9	UO 09			Unassigned	
Hardware Output 10	UO 10			Unassigned	
Hardware Output 11	EaDmprCmd			Analog 0 - 10 V	
Hardware Output 12	RaDmprCmd			Analog 0 - 10 V	

# Figure 31 - Disconnected Hardware Inputs

• All hardware outputs without devices connected to them shall have their Signal Type set to

Unassigned and then will be deleted from the code.

Hardware IOs	Wireless Inputs	Network Vari	ables	Internal Varia	ables	Variable
Refresh All	Refresh Selected	View Mode:	Used Only	-	Quick	Print
Number 🔺	Name			Туре		
Hardware Input 1	FilterDiffPress			Linear		
Hardware Input 2	SaTemp			Linear		
Hardware Input 3	MaTemp			Linear		
Hardware Input 4	RaTemp			Linear		
Hardware Input 5	StatPress			Linear		
Hardware Input 6	RaRelHum			Linear		
Hardware Input 7	SupFanAmps			Linear		
Hardware Input 8	RetFanAmps			Linear		
Hardware Input 9	UI 09			Disconn	ected	
Hardware Input 10	UI 10			Disconn	ected	
Hardware Input 11	UI 11			Disconn	ected	
Hardware Input 12	UI 12			Disconn	ected	
Hardware Output 1	OaDmprCmd			Analog	0 - 10 V	
Hardware Output 2	ChwVlvCmd			Analog	0 - 10 V	
Hardware Output 3	SupFanSpd			Analog	0 - 10 V	
Hardware Output 4	RetFanSpd			Analog	0 - 10 V	
Hardware Output 5	SupFanCmd			Digital		
Hardware Output 6	RetFanCmd			Digital		
Hardware Output 7	UO 07			Unassig	ned	
Hardware Output 8	UO 08			Unassig	ned	
Hardware Output 9	UO 09			Unassig	ned	
Hardware Output 10	UO 10			Unassig	ned	
Hardware Output 11	EaDmprCmd			Analog	0 - 10 V	
Hardware Output 12	RaDmprCmd			Analog	0 - 10 V	

Figure 32 - Unassigned Hardware Outputs

• All unused resources shall be deleted from code.

pe filter here	Unused Resources	uate		? ×	
Dbject Val					
01					
Network V	Number	Name	Description	<u>^</u>	
Pid Loops	Numeric Constant 5	Numeric Constant 5			
Timers	Numeric Constant 6	Numeric Constant 6			
Calendars	Numeric Constant 7	Numeric Constant 7			
Chedules	Numeric Constant 8	Numeric Constant 8			
PT VAV	Numeric Constant 9	Numeric Constant 9			
	Numeric Constant 10	Numeric Constant 10			
System		Numeric Constant 11			
🗎 Wireless		Numeric Constant 12			
TInternal Va		Numeric Constant 13			
ComSenso		Numeric Constant 14			
Subnet Ext		Numeric Constant 15			
		Numeric Constant 16			
Configurati		Numeric Constant 17			
		Numeric Constant 18			
		Numeric Constant 19 Numeric Constant 20			
	Numeric Constant 20 Numeric Constant 21	Numeric Constant 20 Numeric Constant 21			
		Numeric Constant 21 Numeric Constant 22			
		Numeric Constant 22 Numeric Constant 23			
		Numeric Constant 23			
		Numeric Constant 25			
	Numaria Constant 26	Numorio Constant 20		~	
	Select All/None 36	3 items		Close	
		Sitems		Close	

### Figure 33 - Unused Resources

• Hardware Worksheets and GFX code files for every controller shall be included in Project O&M, on a readable digital format approved by Caltech Controls.