

CONTROL SCHEMATIC

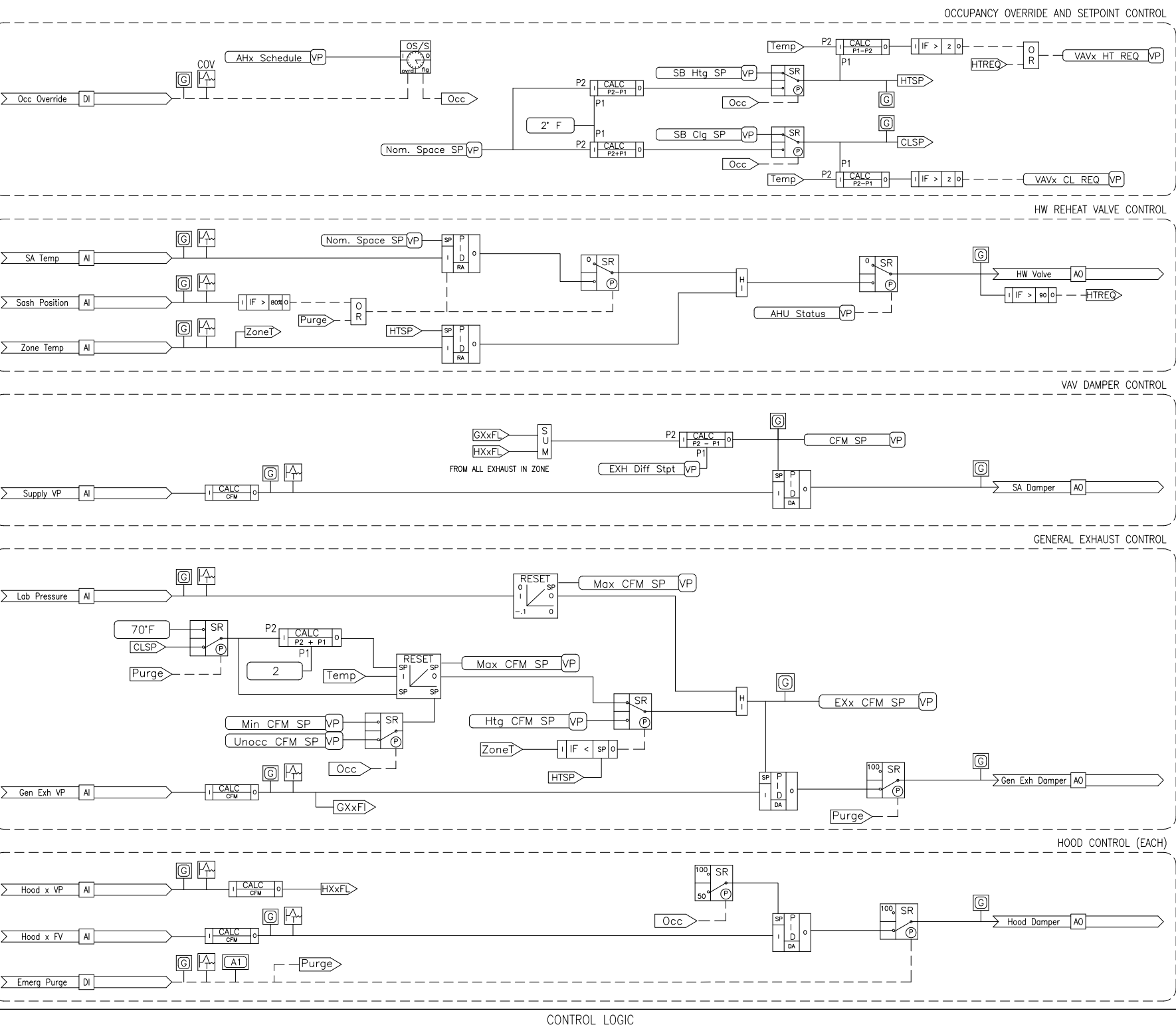
POINTS LIST

POINT NAME	POINT DESCRIPTOR	POINT TYPE				REMARKS
		DI	AI	DO	AO	
LABxx.SAVP	LABx Supply VP		1			
LABxx.DMPR	LABx Sup Damper				1	
LABxx.HWLV	LABx HW Valve				1	
LABxx.SAT	LABx SA Temp		1			
LABxx.OCCOVRD	LABx Occ Override	1				
LABxx.ZONET	LABx Zone Temp		1			
LABxx.GXVP	LABx Gen Ex VP		1			
LABxx.GXDMP	LABx GX Damper				1	
LABxx.HXVP	LABx Hood VP		1			
LABxx.HXDMP	LABx Hood Damper				1	
LABxx.PRESS	LABx Zone Press		1			
LABxx.HXV	LABx HX Face Vel		1			
LABxx.PURGE	LABx Emerg Purge	1				
LABxx.SASH	LABx Sash Position		1			
TOTALS		2	8	0	4	

BILL OF MATERIAL

DESIG	QTY	MODEL NO.	DESCRIPTION
TS 1	1		Temp Sensor, Zone
TS 2	1		Temp Sensor, Duct
V1	1		Valve Actuator
D1, 2, 3	3		Damper Actuator
DPT2	1		Zone Differential Pressure

Developed in Association with
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CONTROL LOGIC

NOTES

- Provide with temperature display and communications port.
- Pressure monitoring relative to "normal" building zones immediately outside controlled critical area.
- Provide digital interface to the control system for diagnostic point information. Make all physical points available to the BAS through the network interface connection.

NETWORK INTERFACE POINT LIST

POINT	POINT DESCRIPTOR	POINT TYPE		UNITS
		READ	WRITE	
HOODxx.FV	Face Velocity	Y		fpm
HOODxx.FV-SP	Face Velocity Setpoint	Y	Y	fpm
HOODxx.D-C	Damper Command	Y		%
HOODxx.LOC-E-OVRD	Local Emergency Override	Y		ON/OFF
HOODxx.REM-E-OVRD	Remote Emergency Override	Y	Y	ON/OFF
HOODxx.A-F	Airflow	Y		cfm
HOODxx.SASH	Sash Position	Y		%
HOODxx.A-F-SP	Airflow Setpoint	Y		cfm
HOODxx.A-F-ALA-H-SP	Airflow Hi Alarm Setpoint	Y	Y	cfm
HOODxx.A-F-ALA-L-SP	Airflow Lo Alarm Setpoint	Y	Y	cfm
HOODxx.A-F-ALA-H	Airflow Hi Alarm	Y		ON/OFF
HOODxx.A-F-ALA-L	Airflow Lo Alarm	Y		ON/OFF
HOODxx.OCC	Occupancy	Y	Y	ON/OFF

LOGIC VARIABLES

BINARY	ANALOG	DESCRIPTION	#
Occ		ON WHEN OCCUPIED MODE IS ACTIVE	5
HTREQ		ON WHEN HW VALVE REQUESTS HEAT	2
PURGE		ON WHEN EMERGENCY PURGE IS ACTIVE	3
ZoneT		VARIABLE VALUE OF CURRENT ZONE TEMPERATURE	5
HxFL		VARIABLE CALCULATED VALUE OF HOOD EXHAUST (CFM) FOR BOX x	2
GxFL		VARIABLE CALCULATED VALUE OF GENERAL EXHAUST (CFM) FOR EXHAUST x	2
HTSP		VARIABLE VALUE OF ACTIVE HEATING SETPOINT	3
CLSP		VARIABLE VALUE OF ACTIVE COOLING SETPOINT	2

SEQUENCE OF OPERATION

General: The BAS shall control the air systems in the zone including the general exhaust box (GX), the supply air reheat box (SA) and the hood exhaust (HX). Generally, the flow setpoints on the boxes shall be coordinated and the system shall be controlled to utilize the minimum airflow necessary to maintain the minimum allowable air change rate and shall maintain a negative pressure in the room by maintaining the supply flow less than the exhaust.

Space Temperature Control: During periods of occupied operation (space is occupied or scheduled to be occupied) the operator may adjust the Normal (72F adj.) setpoint. Occupants may further adjust the Normal setpoint via the local sensor setpoint adjustment (the range of adjustment shall be configurable via the BAS, initially +/-2F). The BAS shall automatically apply an offset for cooling and heating set points during occupied periods as follows:

- Space cooling setpoint shall be the Normal space temperature setpoint plus 2F (adj.).
- Space heating setpoint shall be the Normal space temperature setpoint minus 2F (adj.).

During periods of unoccupied operation (space is scheduled unoccupied) the operator may adjust Setback heating (50F adj.), and Setback cooling (85F adj.) setpoints. The BAS will prevent the operator from entering a Setback heating setpoint higher than the Space heating setpoint OR entering a Setback cooling setpoint lower than the Space cooling setpoint.

Occupancy Override: Occupancy override shall be initiated at the local zone sensor. Unit shall change to the occupied mode for a period of 2 hours (adj.) whenever the override button is depressed then released and reset to normal operation at the end of the period or whenever the override button is held for more than 5 seconds (adj.).

Zone Exhaust Flow Set Point: The BAS shall continuously calculate a zone exhaust flow set point based on the temperature in the zone. This set point shall be reset between maximum and minimum volume settings to maintain space temperature cooling setpoint with a 2F (adj.) reset range. Zone exhaust volume set point shall remain at the minimum volume setting whenever space temperature is below the cooling throttling range.

- Minimum Volume Set Point shall be as scheduled on the drawings during the normal period and shall be reduced to the minimum allowable air change rate during the setback period.

Hood Exhaust Control: The hood exhaust box shall be controlled to maintain the minimum allowable safe operating conditions established by Environmental Health and Safety (EHS). Actuators shall be capable of, and loop shall be tuned to stabilize (variations less than 10 FPM above/below set point) within 5 seconds. Whenever the emergency purge is activated at the hood, the box shall go fully open. The flow through the box shall continuously be determined by direct measurement or by correlation to a calibrated venturi valve. Acceptable methods of face velocity determination include the following, however in any case acceptable performance throughout the sash travel shall be the responsibility of the contractor and hood manufacturer:

- Differential pressure sensing through the wall of the hood provided the hood manufacturer positions and mounts the sensor in a location with valid readings through full sash travel.
- Sash position sensing correlated to a box flow setting.
- Airfoil averaging DP sensor positioned at the bottom of the face.

Hydronic Reheat: BAS shall modulate the N.C. Zone reheat coil valve per the higher of:

- A PI loop to maintain space temperature heating setpoint as defined above with a 2F throttling range. Valve shall be closed whenever the parent AHU is off.
- A PI loop to maintain supply air temperature at normal zone setpoint as defined above whenever the hood sash is more than 80% open (adj.) or the emergency purge mode is active.

Hood Monitoring Interface: The BAS shall continuously monitor the face velocity of the hood and provide a local indication of this value and hood status. Alarm conditions shall be set up for +/- 30% of the active face velocity set point. Local visual and audible indication of unsafe conditions shall be enunciated. Include a silence button and emergency purge button.

General Exhaust Box Control: The BAS shall control the damper via PID loop to maintain the GX volume set point. This set point shall be equal to the zone exhaust flow set point minus the hood exhaust flow. Upon indication of emergency purge mode the exhaust damper shall go fully open.

Supply Box Control: The BAS shall modulate the damper on the supply box to maintain the supply flow set point. The supply flow set point shall equal the sum of all respective exhausts in the zone served, minus an offset value which shall be determined as follows:

- It shall be fixed at the differential scheduled on the drawings and/or as refined by the balancing contractor.
- It shall be reset between adjustable limits based on sensed room differential pressure. This loop shall be a slow "check and bump" or dynamic proportional loop both with a no adjustment dead band.

Emergency Purge Button: The emergency purge button shall be located adjacent to all exits, when depressed the BAS will start emergency purge mode for the zone. This mode shall remain active until manually reset by the operator via the graphic interface.

UNIVERSITY OF VIRGINIA
 FACILITIES MANAGEMENT

HVAC CONTROLS STANDARDS

Eng	DMC
Drawn	DMC
Chkd	HJN
Appd	---
Issued	8/4/11
Job No.	10080
Scale	N/A
Proj Code	

STANDARD

LAB FLOW TRACKING WITH HOOD

18 OF 30 SHEET NUMBER

C-2.7

DWG NUMBER