MicroTech II® Unit Controls
For Maverick II™ Commercial Packaged Rooftop Systems

Models MPS030A – 050A
30 to 50 Tons
R-410A Refrigerant

McQuay®
Air Conditioning

Contents

Introduction

This manual provides information regarding the MicroTech II® control system used in the McQuay Commercial Packaged Rooftop Unit model MPS product line. It specifically describes the operation and programmable options for units with constant air volume (CAV) control and variable air volume (VAV) control.

Agency Listed

Note – LonMark and the LonMark Logo are managed, granted, and used by LonMark International under a license granted by Echelon Corporation.

For installation and startup instructions and general information regarding a particular rooftop unit, refer to the applicable model-specific installation and maintenance manual.

NOTICE

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user is required to correct the interference at his own expense. **McQuay International disclaims any liability resulting from any interference or for the correction thereof.**

⚠ WARNING

Electric shock hazard. Can cause personal injury or equipment damage. This equipment must be properly grounded. Connections and service to the MicroTech II control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

⚠ WARNING

Excessive moisture in the control panel can cause hazardous working conditions and improper equipment operation. When servicing this equipment during rainy weather, the electrical components in the main control panel must be protected from the rain.

> ## ⚠ CAUTION
>
> **Extreme temperature hazard. Can cause damage to system components.**
> The MicroTech II controller is designed to operate in ambient temperatures
> from -20°F to 125°F. It can be stored in ambient temperatures from -40°F to
> 140°F. It is designed to be stored and operated in relative humidity up to 95%
> (non-condensing).

> ## ⚠ CAUTION
>
> **Static sensitive components. A static discharge while handling
> electronic circuit boards can cause damage to the components.**
> Discharge any static electrical charge by touching the bare metal inside the
> main control panel before performing any service work. Never unplug any
> cables, circuit board terminal blocks, relay modules, or power plugs while
> power is applied to the panel.

Keypad Functions

The keypad consists of 6 keys to control the navigation of the cursor through the menus.

Figure 1: Keypad Controls

Menu (≡) – pressing this key at any location within the menu structure (other than Edit mode)
will bring you to the beginning of the system menu. While in Edit mode, pressing it twice will
bring you to the system menu.

Up (↑) – moves the cursor up the menu structure.

Down (↓) – moves the cursor down the menu structure.

Right (→) – moves the menu structure to the next available menu to the right.

Left (←) – moves the menu structure to the next available menu to the left.

Enter (↵) – pressing this key will allow the entry into a menu structure for editing. Pressing
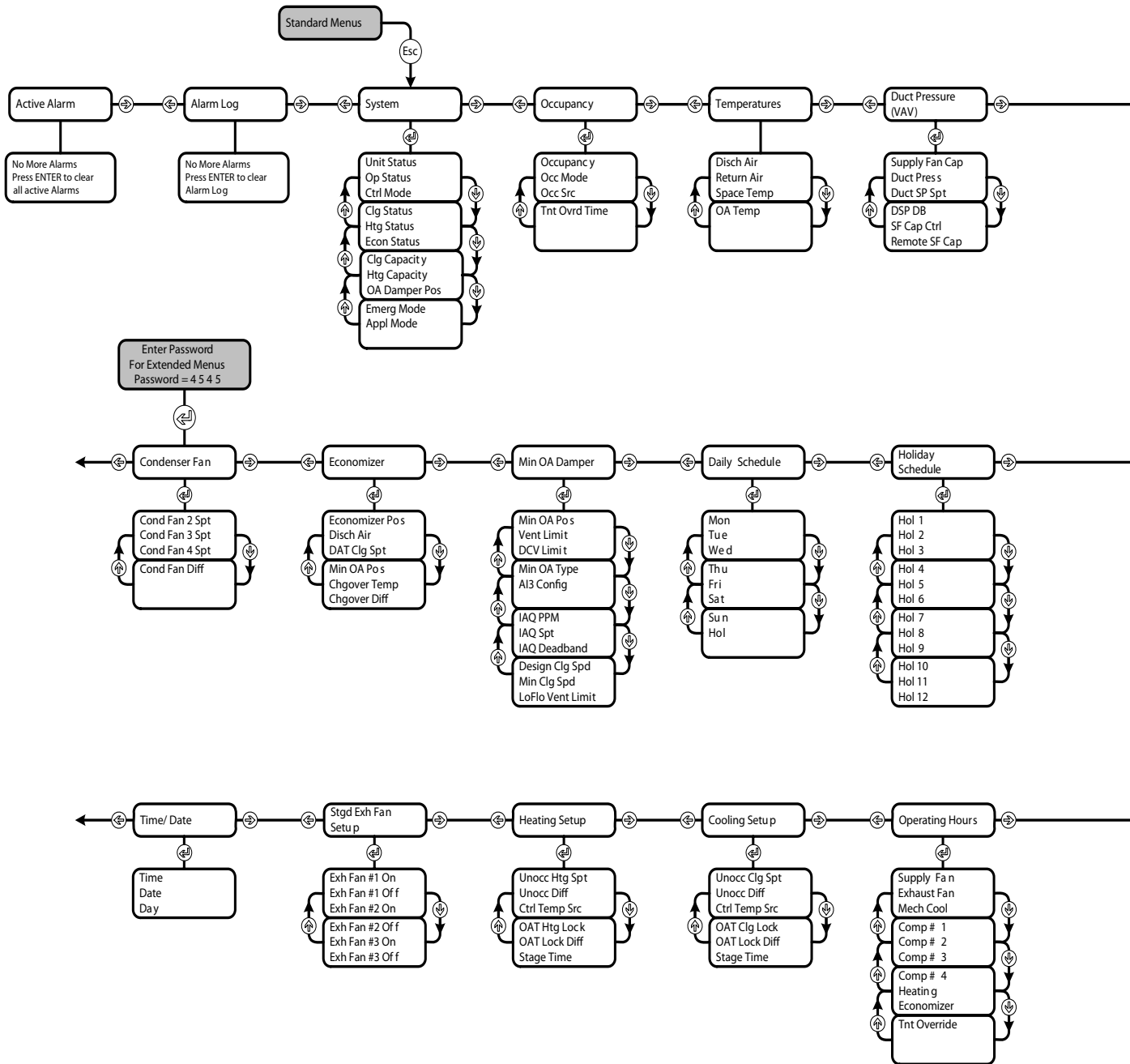this key after a field edit will also save the changed input value.
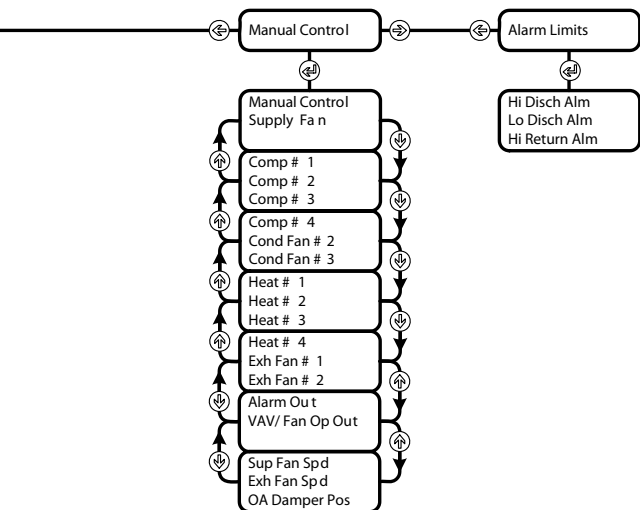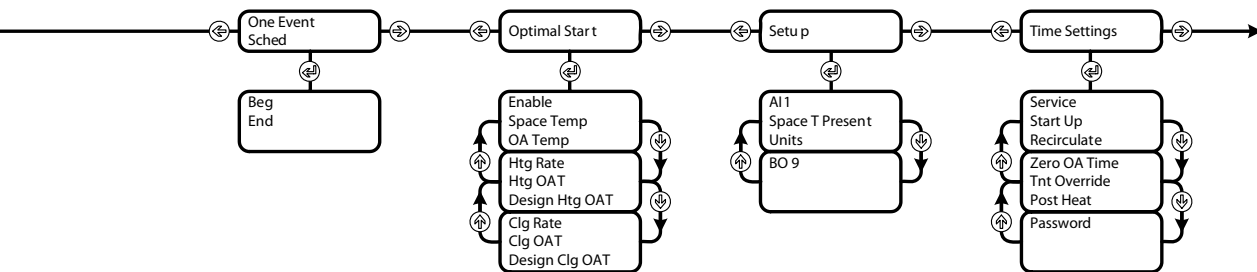
Keypad/Display Menu Structure

The following is a description of each menu and menu item within the rooftop MicroTech II menu structure. Tables are included which show every menu, item, and field in the menu structure of the program. These menus and items can all be displayed with the keypad/display.

The keypad display menus are divided into two sections. The first section is the standard menus which do not require a password to gain access. The second section is the extended menus which do require a password ("4545", see Figure 2) to gain access.

Figure 2: Keypad/Display Menu Structure

Bldg Pressure

Exh Fan Cap
Bldg Pres s
Bldg SP Sp t

BSP DB
EF Cap Ctrl
Remote EF Cap

Stgd Exh Fans
(CAV)

Exh Fan Cap

Heating

Control Temp
Heating Spt
Heating DB

Heating Type
Heating Cap

Min DAT Ctrl (VAV only)
Min DAT Limit (CAV only)
Min DAT Spt
Occ Heating (CAV only)

Disch Air (Modulating only)
DAT Mtg Spt (Mod. only)
DAT Htg DB (Mod. only)

Zone Cooling
(CAV)

Control Temp
Cooling Spt
Cooling DB

Min DAT Sp t

Disch Cooling
(VAV)

Disch Air
DAT Clg Spt
Clg Reset

DAT Clg DB

Control Temp
Chgover Sp t
Chgover DB

One Event
Sched

Beg
End

Optimal Star t

Enable
Space Temp
OA Temp

Htg Rate
Htg OAT
Design Htg OAT

Clg Rate
Clg OAT
Design Clg OAT

Setu p

AI 1
Space T Present
Units

BO 9

Time Settings

Service
Start Up
Recirculate

Zero OA Time
Tnt Override
Post Heat

Password

Manual Control

Manual Control
Supply Fa n

Comp # 1
Comp # 2
Comp # 3

Comp # 4
Cond Fan # 2
Cond Fan # 3

Heat # 1
Heat # 2
Heat # 3

Heat # 4
Exh Fan # 1
Exh Fan # 2

Alarm Ou t
VAV/ Fan Op Out

Sup Fan Spd
Exh Fan Spd
OA Damper Pos

Alarm Limits

Hi Disch Alm
Lo Disch Alm
Hi Return Alm

Notes

1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.

2. Hit Return to scroll through changeable variable on the current page .

3. When no alarm is active, hitting the menu key when curser is at page header will return you to the System page. When any alarm is active, hitting the menu key will return you to the alarm page.

4. Hitting the menu key when curser is not at page header will return you to the top of that page.

Menu Summary

Table 1 lists basic unit operating status and control set point parameters. The "Range" column in the table lists all possible values for each item. The factory settings for the adjustable parameters are shown in the "Default" column.

Table 1: Menu Summary

Menu	Menu Item	Default	Range
Active Alarm			
Alarm Log			
System	Unit Status=	-	Off Startup Recirc Fan Only Min DAT Heating Econo Cooling
	Op Status=	-	Off Unocc Unocc Op Tnt Ovrd Occ Op Off Net Off Alm Off Man Off Man Ctrl Off Emerg
	Ctrl Mode=	Off	Off Auto Heat Only Cool Only Fan Only
	Clg Status=	-	Enabled Off Man Off Net Off Alm Off Amb
	Htg Status=	-	Enabled None Off Man Of Net Off Amb
	Econo Status=	-	Enabled None Off Man Off Net Off Amb
	Clg Capacity=	-	0 - 100%
	Htg Capacity=	-	0 - 100%
	OA Damper Pos=	-	0 - 100%
	Emerg Mode=		Normal Shutdown
	Appl Mode=	Heat/Cool	Off Heat Only Cool Only Fan Only Heat/Cool

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Occupancy	Occupancy=	-	Occ Unocc Tnt Ovrd
	Occ Mode=	Auto	Auto Occ Unocc Tnt Ovrd
	Occ Src=		Int Sched Tstat Remote Sw Network Occ Mode
	Tnt Ovrd Time=	0 min	0 - 300
Temperatures	Disch Air=	-	-45 - 212
	Return Air=	-	-45 - 212
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212
Duct Pressure	Supply Fan Cap=	-	0 - 100
	Duct Press=	-	0 - 5
	DuctSP Spt=	1.00IWC	.20 - 4.00
	DSP DB=	0.1IWC	.02 - .400
	SF Cap Ctrl=	DuctPres	DuctPres Speed
	Remote SF Cap=	25%	25 - 100
Bldg Pressure (Exh Fan Ctrl=VFD)	Exh Fan Cap=	-	0 - 100
	Bldg Press=	-	-.25 - .25
	BldgSp Spt=	.050IWC	-.250 - .250
	BSP DB=	.010IWC	.001 - .100
	EF Cap Ctrl=	Bldg Pres	Bldg Pres Speed
	Remote EF Cap=	25%	25 - 100
StgdExh Fans (Exh Fan Ctrl=Stgd)	Exh Fan Cap=	-	0 - 100
Heating (Any Heat)	Control Temp=	-	-45 - 212
	Heating Spt=	70°F	32 - 100
	Heating DB	2.0°F	1.0 - 9.9
	Heating Type=		None
			2 Stg
			4 Stg
			ModLoGas
			ModHiGas
	Min DAT Ctrl=(VAV Only)	No	No/Yes
	Min DAT Limit=(CAV Only)	55°F	32 - 99.9
	Max DAT Spt=	105°F	50.0 - 120.0
	Occ Heating=(VAV Only)	Always	MWU/Always
Mod Gas	Disch Air=		
	DAT Htg Spt=	100°F	0.0 - 120.0
	DAT Htg DB=	2.0°F	1.0 - 9.9
Zone Cooling (CAV)	Control Temp=	-	-45 - 212
	Cooling Spt=	75.0°F	40.0 - 99.0
	Cooling DB=	2.0°F	1.0 - 9.9
	Min DAT Setpt=	55.0°F	40.0 - 99.0

Menu Summary

Menu	Menu Item	Default	Range
Discharge Cooling (VAV)	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Clg Reset=	None	None Network Space Return OAT Airflow Ext mA Ext V
	DAT Clg DB=	2.0°F	1.0 - 9.9
	Min Clg Spt=	55.0°F	50.0 - 99.0
	Min Clg Spt @	0.0	0.0 - 100.0
	Max Clg Spt=	65.0°F	50.0 - 99.0
	Max Clg Spt @	100.0	0.0 - 100.0
	Control Temp=	-	-45 - 212
	Chgover Spt=	75.0°F	32.0 - 99.0
	Chgover DB=	2.0°F	1.0 - 9.9
Condenser Fans	Cond Fan 2 Spt=	-	0 - 104
	Cond Fan 3 Spt=	-	0 - 104
	Cond Fan 4 Spt=	-	0 - 104
	Cond Fan Diff=	5.0°F	5 - 20
Economizer (Automatic or CAV)	Economizer Pos=	-	0 - 100
	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Min OA Pos=	-	0 - 100
	Chgover Temp=	60°F	32.0 - 99.0
	Chgover Diff=	10.0°F	5 - 20
Min OA Damper	Min OA Pos=	-	0 - 100
	Vent Limit=	20%	1 - 99
	DCV Limit=	10%	1 - 99
	Min OA Type=	None	None Network External IAQ
	xx.x% @ DCV Limit	0	0 - 100
	xx.x% @ Vent Limit	100	0 - 100
	Ext Percent =	-	0 - 100
	0% @ xx V/mA	4 mA	0 - 20
	100% @ xx V/mA	20 mA	0 - 20
	xxxx PPM @ DCV Limit	800	0 - 9999
	xxxx PPM @ Vent Limit	1000	0 - 9999
	xxxx PPM @ xx V/mA	0 4mA	0 - 9999
	xxxx PPM @ xx v/mA	2000 20mA	0 - 9999
	Min Clg Spd=	40%	1 - 99
	LoFlo Vent Limit=	30%	1 - 99
Daily Schedule	Mon=	00:00 - 00:00	00:00 - 23:59
	Tue=	00:00 - 00:00	00:00 - 23:59
	Wed=	00:00 - 00:00	00:00 - 23:59
	Thu=	00:00 - 00:00	00:00 - 23:59
	Fri=	00:00 - 00:00	00:00 - 23:59
	Sat=	00:00 - 00:00	00:00 - 23:59
	Sun=	00:00 - 00:00	00:00 - 23:59
	Hol=	00:00 - 00:00	00:00 - 23:59

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Holiday Schedule	Hol 1=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 2=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 3=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 4=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 5=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 6=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 7=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 8=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 9=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 10=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 11=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 12=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 13=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 14=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 15=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 16=	NA 00 - NA 00	Jan-Dec 0-31
One Event Sched	Beg=	NA 00 @ 00:00	Jan-Dec 00:00 - 23:59
	End=	NA 00 @ 00:00	Jan-Dec 00:00 - 23:59
Optimal Start	Enable=	No	No/Yes
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212
	Htg Rate=	.400	.000 - .999
	Htg OAT=	35°F	-40 - 60
	Design Htg OAT=	0°F	-40 - 60
	Clg Rate=	.400	.000 - .999
	Clg OAT=	85°F	60 - 140
	Design Clg OAT=	95°F	60 - 140
Setup	AI1=	RAT	None RAT SpaceSpt
	Space T Present=	Yes	No Yes
	Units=	English	English Metric
	B09=	Fan Op Output	Fan Op Output VAV Output
Time Settings	Service=	0 min	0 - 240
	Start Up=	180 sec	0 - 240
	Recirculate=	180 sec	120 - 3600
	Zero OA Time=	90 min	0 - 240
	Tnt Override=	120 min	0 - 300
	Post Heat=	0 sec	0 - 180
	Password=	15 min	5 - 60
Time/Date	Time=	-	00:00 - 23:59
	Date=	-	Jan-Dec 0-31 2000-2009
	Day=	-	Sunday - Saturday
StgdExh Fan Setup	Exh Fan # 1 On=	40%	0 - 99
	Exh Fan # 1 Off=	30%	0 - 99
	Exh Fan # 2 On=	55%	0 - 99
	Exh Fan # 2 Off=	40%	0 - 99
	Exh Fan # 3 On=	70%	0 - 99
	Exh Fan # 3 Off=	50%	0 - 99

Menu Summary

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Heating Setup	Unocc Htg Spt=	55.0°F	32.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Htg Lock=	2.0°F	1.0 - 99.0
	OAT Lock Diff		
	Stage Time=	5 min	4 - 60
Cooling Setup	Unocc Clg Spt=	55.0°F	32.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Clg Lock=	2.0°F	1.0 - 99.0
	OAT Lock Diff=		
	Stage Time=	5 min	4 - 60
Operating Hours	Supply Fan=	000,000	0 - 999999
	Exhaust Fan=	000,000	0 - 999999
	Mech Cool=	000,000	0 - 999999
	Comp # 1 =	000,000	0 - 999999
	Comp # 2 =	000,000	0 - 999999
	Comp # 3 =	000,000	0 - 999999
	Comp # 4 =	000,000	0 - 999999
	Heating=	000,000	0 - 999999
	Economizer=	000,000	0 - 999999
	Tnt Override=	000,000	0 - 999999

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Manual Control	Manual Ctrl=	Off	On Off
	Supply Fan=	Off	On Off
	Comp # 1 =	Off	On Off
	Comp # 2 =	Off	On Off
	Comp # 3 =	Off	On Off
	Comp # 4 =	Off	On Off
	Cond Fan # 2 =	Off	On Off
	Cond Fan # 3 =	Off	On Off
	Heat # 1 =	Off	On Off
	Heat # 2 =	Off	On Off
	Heat # 3 =	Off	On Off
	Heat # 4 =	Off	On Off
	Exh Fan # 1 =	Off	On Off
	Exh Fan # 2 =	Off	On Off
	Alarm Out=	Off	On Off
	Vav/Fan Op Out=	Off	On Off
	Sup Fan Spd=	0.0%	0.0 - 100.0
	Exh Fan Spd=	0.0%	0.0 - 100.0
	OA Damper Pos=	0.0%	0.0 - 100.0
	Htg Mod VLV	0	0.0 - 100.0
Alarm Limits	Hi Disch Alm=	170	90 - 250
	Lo Disch Alm=	40	20 - 50
	Hi Return Alm=	120	90 - 150

Standard Menu Structure

The Standard Menus are menu items that control the unit's day to day operation. The menus provide information about the units operation and its control parameters.

Figure 3: Keypad Standard Menu Structure

Standard Menus
Esc

Active Alarm ⇨ ⇦ Alarm Log ⇨ ⇦ System ⇨

No More Alarms
Press ENTER to clear
all active Alarms

No More Alarms
Press ENTER to clear
Alarm Log

Unit Status
Op Status
Ctrl Mode

Clg Status
Htg Status
Econ Status

Clg Capacity
Htg Capacity
OA Damper Pos

Emerg Mode
Appl Mode

⇦ Bldg Pressure ⇨ ⇦ Stgd Exh Fans (CAV) ⇨ ⇦ Heating ⇨

Exh Fan Cap
Bldg Press
Bldg SP Spt

BSP DB
EF Cap Ctrl
Remote EF Cap

Exh Fan Cap

Control Temp
Heating Spt
Heating DB

Heating Type
Heating Cap

Min DAT Ctrl (VAV only)
Min DAT Limit (CAV only)
Min DAT Spt
Occ Heating (CAV only)

Disch Air (Modulating only)
DAT Mtg Spt (Mod. only)
DAT Htg DB (Mod. only)

Occupancy → Temperatures → Duct Pressure (VAV) →

Occupancy
Occ Mode
Occ Src
Tnt Ovrd Time

Disch Air
Return Air
Space Temp
OA Temp

Supply Fan Cap
Duct Press
Duct SP Spt
DSP DB
SF Cap Ctrl
Remote SF Cap

Zone Cooling (CAV) → Disch Cooling (VAV) →

Control Temp
Cooling Spt
Cooling DB
Min DAT Spt

Disch Air
DAT Clg Spt
Clg Reset
DAT Clg DB
Control Temp
Chgover Spt
Chgover DB

Notes
1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.
2. Hit Return ⏎ to scroll through changeable variable on the current page .
3. When no alarm is active, hitting the menu key when curser is at page header will return you to the System page. When any alarm is active, hitting the menu key will return you to the alarm page.
4. Hitting the menu key when curser is not at page header will return you to the top of that page.

Standard Menu Structure

System Menu

The "System" menu provides a summary of basic unit status and control items. This menu summarizes the current operating state of the unit, giving the operating state the unit is in, along with the current capacity level of that operating state.

Table 2: System Menu

Menu	Menu Item	Default	Range
System	Unit Status=	-	Off Startup Recirc Fan Only Min Dat Heating Econo Cooling
	Op Status=		Off Unocc Unocc Op Tnt Ovrde Occ Op Off Net Off Alrm Off Man Off Man Ctrl Off Emerg
	Ctrl Mode=	Off	Off Auto Heat/Cool Cool Only Fan Only
	Clg Status=	-	Enabled Off Man Off Net Off Alm Off Amb
	Htg Status=	-	Enabled None Off Man Of Net Off Amb
	Econo Status=	-	Enabled None Off Man Off Net Off Amb
	Clg Capacity=	-	0 - 100%
	Htg Capacity=	-	0 - 100%
	OA Damper Pos=	-	0 - 100%
	Emerg Mode=	Normal	Normal Shutdown
	Appl Mode=	Off Heat Only Cool Only Fan Only Heat/Cool	

UnitStatus= is a status only item which indicates the state of operation in which the unit is currently operating. The unit can be in any of the operating states shown in Figure 4.

Figure 4: State Diagram
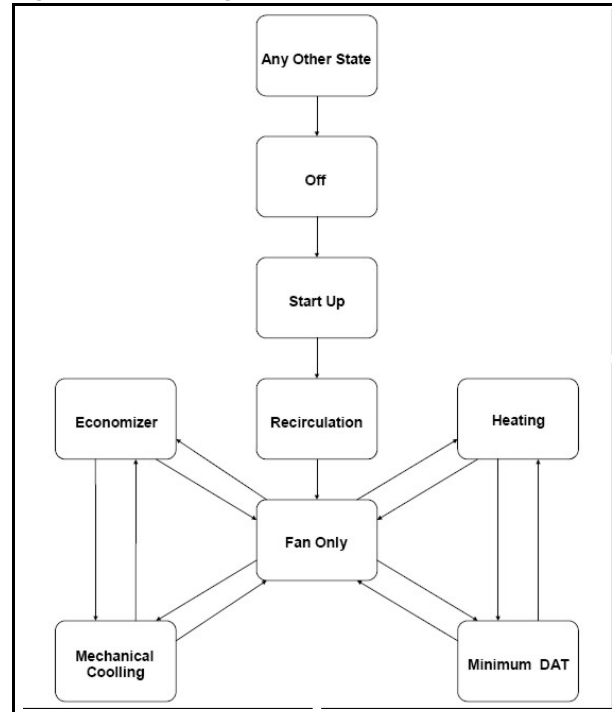
The transition from any operating state to another is also graphically represented in this figure. With a "start up" command from an Off State the unit will always go into the "Start Up" state of operation for 3 minutes. Next, it will transition into the "Recirculation" state of operation for another 3 minutes before finally going into the Fan Only state of operation. Then, based on sensor inputs it will go into any of the 4 remaining states of operation - heating, cooling, economizer, or minimum discharge air heating.

OpStatus= is a status only item which indicates the operating status of the unit. This menu item will indicate why the unit is running or why the unit is off.

Ctrl Mode= is an adjustable item which allows the unit to be set for off, auto heating/cooling operation, cooling only, heating only, and fan only.

Clg Status= is a status only item which indicates whether or not cooling (economizer and/or mechanical) is currently allowed. If cooling is disabled, the reason is indicated.

Htg Status= is a status only item which indicates whether or not heating is currently allowed. If heating is disabled, the reason is indicated.

EconoStatus= is a status only item which indicates whether or not the economizer is enabled

Clg Capacity= is a status only item which indicates the percentage of the unit maximum cooling capacity currently operating.

Htg Capacity= is a status only item which indicates the percentage of the unit maximum heating capacity currently operating.

OA Damper Pos= is a status only item which indicates the percentage that the outdoor damper is currently open.

EmergMode= is a status only item which indicates if the unit was shut down in an emergency situation.

Appl Mode= is a network adjustable item which indicates that the unit is set for network off, cooling only, heating only, fan only or auto heating/cooling operation via a network signal. This item has no affect on the unit operation unless the Ctrl Mode= item is set to "Auto."

Standard Menu Structure

Occupancy

Menus in the Occupancy menu contain status and control items that relate to unit occupied/unoccupied operation.

Table 3: Occupancy Menu

Menu	Menu Item	Default	Range
Occupancy	Occupancy=	-	Occ Unocc Tnt Ovrd
	Occ Mode=	Auto	Auto Occ Unocc Tnt Ovrd
	Occ Src=		Int Sched Tstat Remote Sw Network Occ Mode
	Tnt Ovrde Time=	120min	0 - 300

Occupancy= is a status only item which indicates whether the unit is currently in an occupied, unoccupied, or tenant override mode of operation.

OccMode= is an adjustable item which allows the unit to be set for manual occupied or unoccupied operation, automatic operation based on a time schedule input or manual bypass operation.

OccSrc= is a status only item which indicates the input source or function that is responsible for setting the Occupancy= parameter to "Occ".

Tnt Ovrd= is a status only item which indicates the amount of time remaining for unit operation since the tenant override button was activated.

Temperatures

Menus in the Temperatures menu contain unit temperature status information.

Table 4: Temperatures Menu

Menu	Menu Item	Default	Range
Temperatures	Disch Air=	-	-45 - 212
	Return Air=	-	-45 - 212
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212

Disch Air = is a status only item which displays the current temperature reading from the unit's discharge air temperature sensor (DAT). This sensor is standard on all units.

Return Air= is a status only item which displays the current temperature reading from the unit's return air temperature sensor (RAT). This sensor is standard on all units.

Space Temp= is a status only item which displays the current space (or zone) temperature reading from the optional unit space air temperature sensor input.

If an optional space temperature sensor is not installed, the SpaceT Present= item in the Setup menu should be set to "No" to disable the alarm function associated with an open circuit at the space temperature sensor input.

OA Temp= is a status only item which displays the current temperature reading from the unit mounted outdoor air temperature sensor. This sensor is standard on all units.

Standard Menu Structure

Duct Pressure

The Duct Pressure menu provides a summary of the duct pressure items and parameters associated with variable air volume (VAV) fan control units. This menu is only available on VAV units. The supply air fan speed in controlled by a VFD that is mounted in the control cabinet. The control parameter for the fan speed is the duct static pressure setpoint. If the duct static pressure is below the duct static pressure setpoint by more than ½ the deadband, the fan speed will increase. Likewise if the duct static pressure is above the duct static pressure setpoint by more than ½ the deadband the fan speed will decrease. Example - if the duct static pressure setpoint is 1.2" and the deadband is 0.1", the duct static pressure must reach 1.14 before the fan will increase in speed.

Table 5: Duct Pressure Menu

Menu	Menu Item	Default	Range
Duct Pressure	Supply Fan Cap=	-	0 - 100
	Duct Press=	-	0 - 5
	DuctSP Spt=	1.00IWC	.20 - 4.00
	DSP DB=	0.1IWC	.02 - .400
	SF Cap Ctrl=	DuctPres	DuctPres Speed
	Remote SF Cap=	25%	25 - 100

Supply Fan Cap= is a status only item which indicates the capacity of the supply air fan.

Duct Press= is a status only item which indicates the current pressure of the supply air ductwork. The duct pressure is measured at the location in which the duct static pressure tap was field installed. This device is not factory installed.

Duct SP Spt= is an adjustable item which sets the duct static pressure set point used for controlling the VFD for the supply air fan. The VFD is modulated to maintain the duct pressure at this value.

DSP Db= is an adjustable item which sets a dead band around the DuctSP Spt= parameter. No duct static pressure control action is taken when the current duct static pressure input is within this dead band.

SF CAP Ctrl= is an adjustable parameter to control supply air fan by duct pressure or by a percentage of supply air fan speed from 25% to 100%. The speed option is only used with a building automation system.

Remote SF Cap= is an adjustable item for setting the supply fan speed by the keypad or by a network control signal.

Bldg Pressure

The Building Pressure menu provides a summary of the control parameters for the exhaust fans. This menu is only available on units with exhaust fans. The building pressure control application can be on CAV or VAV units.

Table 6: Bldg Pressure Menu

Menu	Menu Item	Default	Range
Bldg Pressure (Exh Fan Ctrl=VFD)	Exh Fan Cap=	-	0 - 100
	Bldg Press=	-	-.25 - .25
	BldgSp Spt=	.050IWC	-.250 - .250
	BSP DB=	.010IWC	.001 - .100
	EF Cap Ctrl=	Bldg Pres	Bldg Pres Speed
	Remote EF Cap=	25%	25 - 100

Exh Fan Cap= is a status only item which indicates the capacity of the exhaust air fans.

Bldg Press= is a status only item which indicates the building static pressure at the building static pressure sensor location.

Bldg SP Spt= is an adjustable item which sets the building static pressure set point used for controlling the exhaust fan VFD. The Exhaust fan VFD is modulated to maintain the building static pressure sensor input at this set point.

BSP DB= is an adjustable item which sets a dead band around the BldgSP Spt= parameter. No building static pressure control action is taken when the current building static pressure input is within this dead band.

EF Cap Ctrl= is an adjustable parameter to control how the exhaust fans are to be controlled. The exhaust fans can be controlled by the building pressure or by a percentage of exhaust air fan speed from 25% to 100%. The speed option is only used with a building automation system.

Remote EF Cap= is an adjustable item for setting the exhaust fan speed by the keypad or by a network control signal.

Stgd Exh Fans

The Staged Exhaust Fans menu provides a summary of the control parameters for the exhaust fans. The staged exhaust fan control is only available on constant volume (CAV) units. The capacity of the exhaust fans are controlled by the position of the economizer dampers. As the OA damper position is increased the exhaust fans will stage up increasing in exhaust airflow capacity.

Table 7: Stgd Exh Fans Menu

Menu	Menu Item	Default	Range
Stgd Exh Fans (Exh Fan Ctrl=Stgd)	Exh Fan Cap=	-	0 - 100

Exh Fan Cap= is a status only menu to indicate the capacity of the exhaust air fans.

Standard Menu Structure

Heating

The Heating menu provides a summary of the control parameters for units with heating. The unit's heating mode of operation is controlled by the control temperature and the heating setpoint temperature. The unit goes into the heating mode of operation by analyzing the control temperature. The control temperature can be either the return temperature or the space temperature. The return temperature is typically used for VAV units and the space temperature is typically used for CAV units. The unit goes into the heating mode of operation when the control temperature (return or space temperature) is below the heating setpoint by more than ½ the deadband. Example - If the heating setpoint is 68.0°F and the deadband is 1.0°F, the unit will not go into the heating mode of operation until the control temperature reaches 67.4°F. When this occurs the heating mode of operation will begin and the 1st stage of heating operation will start. The next stage up/down will take place after 4 minutes. This "4 minutes" is called the stage timer. The gas heat module will continue to stage up as long as the control temperature is below the heating setpoint by more than ½ the heating setpoint deadband. The unit will stage down if the maximum discharge air temperature is reached. Units with one gas valve have 2 stages of heating and units with two gas valves have 4 stages of heating.

Table 8: Heating Menu

Menu	Menu Item	Default	Range
Heating (Any Heat)	Control Temp=	-	-45 - 212
	Heating Spt=	70°F	32 - 100
	Heating DB	2.0°F	1.0 - 9.9
	Heating Type=		None
			2 Stg
			4 Stg
			ModLoGas
			ModHiGas
	Min DAT Ctrl (VAV Only)=	No	No/Yes
	Min DAT Limit (CAV Only)=	55°F	32 - 99.9
	Max DAT Spt=	105°F	50.0 - 120.0
	Occ Heating (VAV Only)=	Always	MWU/Always
Mod Gas	Disch Air=		
	DAT Htg Spt=	100°F	0.0 - 120.0
	DAT Htg DB=	2.0°F	1.0 - 9.9

Control Temp= is a status only item which indicates what the current control temperature is.

Heating Spt= is an adjustable item which sets the temperature in which the unit will go into the heating mode of operation.

Heating DB= is an adjustable item which sets a deadband around the Heating Spt= parameter. No heating control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint.

Heating Type= is a status only item. 1) 2 Stg - is the low heat option with a single furnace. The furnace uses a two stage gas valve. 2) 4 Stg - is the high heat option with dual furnaces. Each furnace uses a two stage valve. 3) ModLoGas - is the modulating low heat option with a single furnace. The furnace uses a 25 - 100% modulating valve.4) ModHiGas - is the modulating high heat option with dual furnaces. One furnace uses a 25 -100% modulating valve and the other uses a 2 stage valve.

Min DAT Ctrl (VAV Only)= is an adjustable item which sets the minimum that the discharge air temperature can be. If the minimum is reached, the unit will stage up

Min DAT Limit (CAV Only)= is an adjustable item which sets the temperature on CAV units in which the heating mode of operation will start if the DAT reaches this temperature.

Max DAT Spt= is an adjustable item which sets the maximum that the discharge air temperature can be. If this maximum is reached then the unit will stage down.

Occ Heating (VAV Only)= is an adjustable item which allows a morning warm-up (MWU) cycle or an Always heating mode cycle for the heating mode of operation. If MWU is used the unit will only go into heating during the initial morning warm-up cycle. If Always is selected the unit can go into the heating mode of operation any time of the day.

Disch Air= is a measurement of the temperature at the discharge air sensor during the heating mode. It is used for modulating gas heat only.

DAT Htg Spt= is an adjustable item which sets the temperature of the discharge air when the unit is in heating mode. It is used for modulating gas heat only.

DAT Htg DB= is an adjustable item which sets a deadband around the DAT Htg Spt= parameter. No heating control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint. It is used for modulating gas heat only.

Zone Cooling

The Zone Cooling menu provides a summary of the cooling control parameters for units with constant air volume control only. These units are equipped with the space comfort control (SCC) software.

The unit's cooling mode of operation is controlled by the control temperature and the cooling setpoint. The control temperature for a CAV unit is typically the space temperature. A space temperature sensor must be field installed into the occupied space and connected to the unit controller. The unit goes into the cooling mode of operation when the control temperature (space temperature) is above the cooling setpoint by more than ½ the deadband. Example - the cooling setpoint is set to 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the space sensor reaches 70.6°F. When this takes place the cooling mode of operation will begin and the 1st stage of compressor operation will start. The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the cooling setpoint temperature within the deadband. When a compressor stage turns on, the next compressor stage up or down will not take place for the next 4 minutes. This "4 minutes" is called the stage time. Reference the Cooling Setup menu for the adjustable stage time value. When a cooling stage is initiated no further operation will take place within the stage timer limit. In the above example the unit will stage down or turn off the cooling mode of operation when the cooling setpoint reaches 69.4°F.

Table 9: Zone Cooling Menu

Menu	Menu Item	Default	Range
Zone Cooling (CAV)	Control Temp=	-	-45 - 212
	Cooling Spt=	75.0°F	32.0 - 99.0
	Cooling DB=	2.0°F	1.0 - 9.9
	Min DAT Spt=	55.0°F	40.0 - 99.0

Control Temp= is a status only item which indicates what the current control temperature is.

Cooling Spt= is an adjustable item which sets the temperature in which the unit will go into the cooling mode of operation.

Cooling DB= is an adjustable item which sets a deadband around the Cooling Spt= parameter. No cooling control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint temperature.

Min DAT Spt= is an adjustable item which sets the minimum discharge air temperature allowed when the unit is in zone cooling. When the unit is in zone cooling the staging of compressors is controlled by the Cooling setpoint, 75°F. The unit controller is also analyzing the discharge air temperature and will not allow operation below the Min DAT Spt.

Standard Menu Structure

Disch Cooling

The Discharge Cooling menu provides a summary to the cooling control parameters for units with variable air volume (VAV) control. These units are equipped with the discharge air control (DAC) software.

The unit's cooling mode of operation is controlled by the control temperature, the change over temperature and the discharge air temperature. The unit goes into the cooling mode of operation by analyzing the control temperature. The control temperature for a VAV system is the return temperature. The unit goes into the cooling mode of operation when the control temperature (return temperature) is above the change-over setpoint by more than ½ the deadband. Example - If the change over temperature is 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the return temperature reaches 70.6°F. When this takes place the cooling mode of operation will begin and the 1st stage of compressor operation will start. The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the discharge air temperature setpoint within the deadband. When a compressor stage turns on, the next compressor stage up or down will not take place for the next 4 minutes. This "4 minutes" is called the stage timer. When a cooling stage is initiated no further operation will take place within the stage timer limit. Reference the Cooling Setup menu for the adjustable stage time value. In the above example the unit will stage down or turn off the cooling mode of operation when the return temperature reaches 69.4°F.

Table 10: Disch Cooling Menu

Menu	Menu Item	Default	Range
Discharge Cooling (VAV)	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Control Temp=		
	Chgover Spt=	75.0°F	32.0 - 99.0
	Chgover DB=	2.0°F	1.0 - 9.9
	Clg Reset=	None	None Network Space Return OAT Airflow Ext mA Ext V
	DAT Clg DB=	2.0°F	1.0 - 9.9
	Min Clg Spt=	80.0°F	50.0 - 99.0
	Min Clg Spt @	0.0	0.0 - 100.0
	Max Clg Spt=	65.0°F	50.0 - 99.0
	Max Clg Spt @	35.0	0.0 - 100.0

Disch Air= is a status only item which indicates what the current discharge air temperature is.

DAT Clg Spt= is an adjustable item which sets the temperature that the DAT should be maintained at when it is in the cooling mode of operation.

DAT Clg DB= is an adjustable item which sets a deadband around the DAT Clg Spt. No cooling control action (staging up or down) is taken when the DAT is within this deadband around the setpoint temperature.

Control Temp= is a status only item which indicates what the current control temperature is.

Chgover Spt= is an adjustable parameter that puts the unit into the cooling mode of operation.

Chgover DB= is an adjustable item which sets a deadband around the ChgoverSpt.

Clg Reset= is an adjustable item that allows the DAT to be reset based on one of the selected parameters. The setpoint is modulated between a minimum and maximum value at the respective conditions.

Figure 5 graphically shows the cooling reset operation. Example, The normal DAT cooling setpoint is 55.0°F. The cooling reset scheme is set to airflow. The unit is to adjust the DAT from 55.0°F to 65.0°F. When the unit is at 35% of the design airflow the discharge temperature is to be 65.0°F. When the unit is at 80% of its airflow the DAT is to be 55.0°F. This example would give the following inputs.
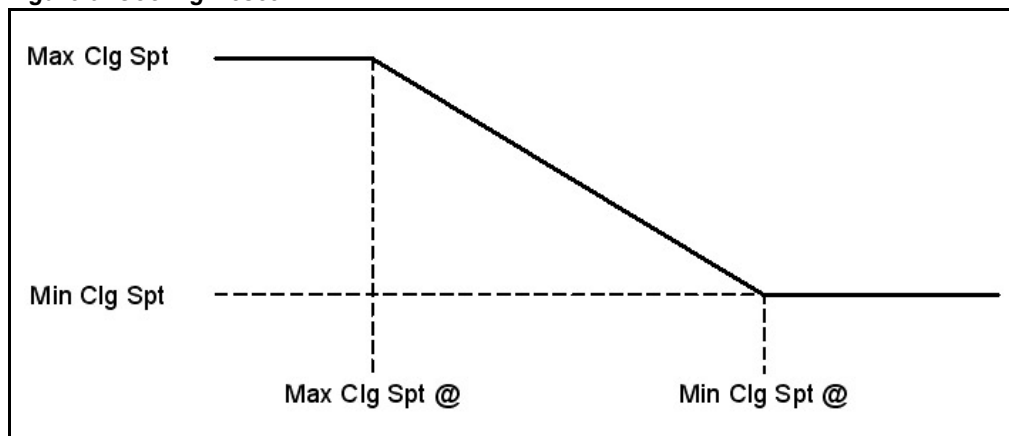
Min Clg Spt = 55.0°F

Min Clg Spt @ = 80%

Max Clg Spt = 65.0°F

Max Clg Spt @ = 35%

Based on the above, the unit will have a discharge air temperature setpoint of 55.0°F from 80% to 100% of the airflow.

Figure 5: Cooling Reset

Alarms

Alarms are divided into three categories - Warnings, Problems, and Faults. These categories are prioritized with the Warnings being the least important and Faults being of the highest importance. When a unit enters into a fault alarm, the unit shuts down and requires a manual reset before the unit will start again. Fault alarms do not have an automatic reset to them.

Table 11: Alarms Menu

Menu	Alarm
Alarm Faults	Emergency Off=
	Control T Fail=
	Disch Sensor=
	Duct Hi Limit=
	Hi Return Tmp=
	Hi Disch Tmp=
	Lo Disch Tmp=
	Fan Fail=
Alarm Problems	OAT Sensor=
	Space Sensor=
	Return Sensor=
	Hi Pres-Ckt1=
	Hi Pres-Skt2=
	Lo Pres-Ckt1=
	Lo Pres-Ckt2=
Alarm Warning	Dirty Filter=

Alarm Out Faults

When the unit controller receives a fault alarm the unit responds by shutting down.

Emergency Off= is a notification that the unit has been shut down on emergency. This is done by a network communication or an external device. The external emergency off input is on TB2 at terminals 105 and 106. The return air smoke detector is on TB2 at terminals 104 and 105 and the supply air smoke detectors is on TB2 at terminals 103 and 104. All three external inputs are wired into the digital input ID1 on the unit controller which controls this alarm.

Control T Fail= is a notification that both the return air temperature and space temperature sensor are shorted or opened.

Disch Sensor= is a notification that the discharge air temperature sensor (DAT) has shorted or opened. Alarm will clear when the DAT sensor is replaced.

Duct Hi Limit= is a notification that the duct high limit (DHL) switch has tripped indicating that the duct static pressure has reached its maximum of 3.5" wc. Check all supply air ductwork dampers to confirm they are open.

Hi Return Tmp= is a notification that the RAT sensor has indicated a return air temperature equal to that set up for the HiReturnAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Hi Disch Tmp= is a notification that the DAT sensor has indicated a discharge air temperature equal to that set up for the HiDischAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Lo Disch Tmp= is a notification that the DAT sensor has indicated a discharge air temperature equal to that set up for the LowDischAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Fan Fail= is a notification that the proof of airflow switch (PC7) has not indicated any airflow. This can be caused by the belts being broken on the supply air fan. On CAV units, if the airflow switch is open, the unit will gat a fan fail alarm. On VAV units, the fan fail alarm will occur if the PC7 switch is open and the duct static pressure (as measured by SPS1) is less than 1/2 of the setpoint. The duct static setpoint is "DuctSP SPT=" found in Table 5 on page 20. The PC7 switch is factory set a differential pressure of 0.25" ± 0.05".

Alarm Problems

Problem alarms will alter the unit operation by shutting down or a portion of its operation.

OAT Sensor= is a notification that the outdoor air temperature sensor (OAT) has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Space Sensor= is a notification that the space temperature sensor has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Return Sensor= is a notification that the return air temperature sensor (RAT) has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Hi Pres-Ckt1= is a notification that the high refrigerant pressure switch has tripped and that the refrigerant pressure has exceeded 650 psi. This alarm will require a manual reset at the first condition of the alarm. This alarm is not an automatic reset.

Hi Pres-Ckt2= is a notification that the high refrigerant pressure switch has tripped and that the refrigerant pressure has exceeded 650 psi. This alarm will require a manual reset at the first condition of the alarm. This alarm is not an automatic reset.

Lo Pres-Ckt1= is a notification that the low refrigerant pressure switch has tripped and the unit could be low on refrigerant. This alarm will deactivate compressor circuit number 1 and require a manual reset after 3 attempts have been made in 24 hrs.

Lo Pres-Ckt2= is a notification that the low refrigerant pressure switch has tripped and the unit could be low on refrigerant. This alarm will deactivate compressor circuit number 2 and require a manual reset after 3 attempts have been made in 24 hrs.

Alarm Warning

Warnings will only give a notification and will not shut the unit operation down.

Dirty Filter= is a notification that the dirty filter switch has tripped and the filters need to be changed.

Extended Menus

Extended Menus

The Extended Menus are menu items that are used to set up the unit for its HVAC application. They are also used in servicing the rooftop equipment.

Password

Accessing the Extended Menus requires the operator to enter the four-digit password "4545", (see Figure 6) using the keypad buttons located on the controller interface.

Figure 6: Keypad Extended Menu Structure
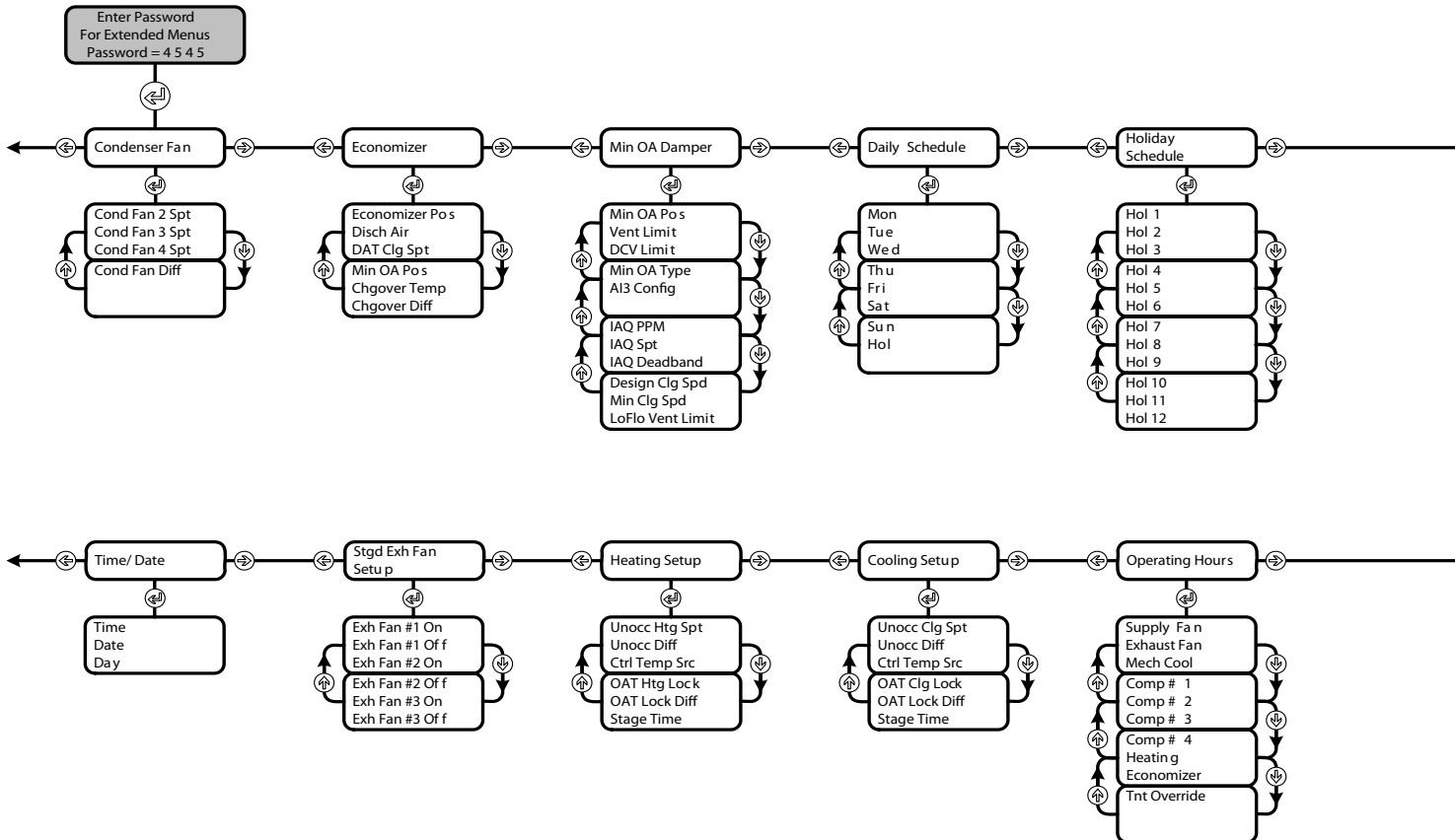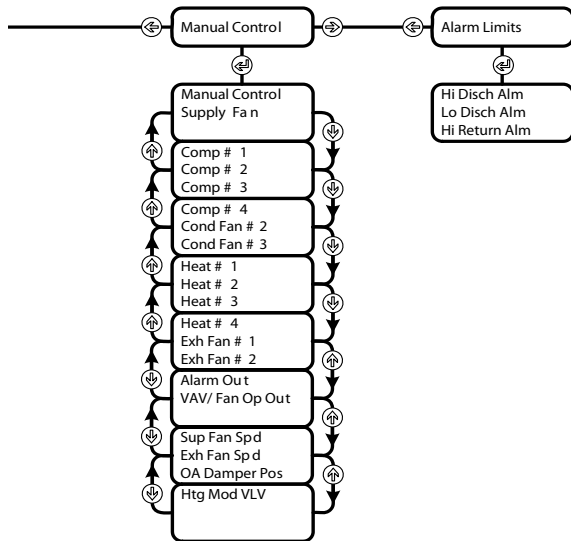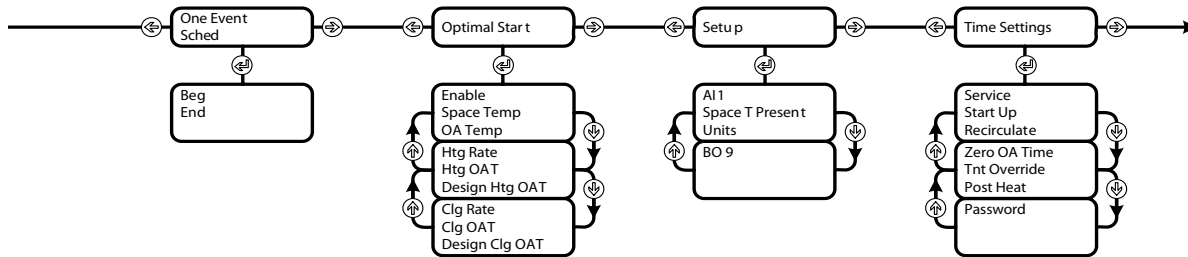
```
One Event          Optimal Start      Setup              Time Settings
Sched

Beg               Enable             AI1               Service
End               Space Temp         Space T Present    Start Up
                  OA Temp            Units             Recirculate

                  Htg Rate           BO 9              Zero OA Time
                  Htg OAT                              Tnt Override
                  Design Htg OAT                       Post Heat

                  Clg Rate                             Password
                  Clg OAT
                  Design Clg OAT
```

```
Manual Control     Alarm Limits

Manual Control     Hi Disch Alm
Supply Fan         Lo Disch Alm
                   Hi Return Alm
Comp # 1
Comp # 2
Comp # 3

Comp # 4
Cond Fan # 2
Cond Fan # 3

Heat # 1
Heat # 2
Heat # 3

Heat # 4
Exh Fan # 1
Exh Fan # 2

Alarm Out
VAV/ Fan Op Out

Sup Fan Spd
Exh Fan Spd
OA Damper Pos

Htg Mod VLV
```

Notes

1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.
2. Hit Return to scroll through changeable variable on the current page.
3. When no alarm is active, hitting Escape when curser is at page header will return you to the System page. When any alarm is active, hitting Escape will return you to the alarm page.
4. Hitting Escape when curser is not at page header will return you to the top of that page.

Extended Menus

Condenser Fans

The Condenser Fan menu is used to set up the turning on and off of the condenser fans. The condenser fans are controlled by the outdoor air temperature. When compressor operation starts condenser fan #1 always comes on.

Table 12: System Summary Menus

Menu	Menu Item	Default				Range
		030A	035A	040A	050A	
Condenser Fan	Cond Fan 2 Spt=	55	50	45	35	0 - 104
	Cond Fan 3 Spt=	80	80	60	55	0 - 104
	Cond Fan 4 Spt=	n/a	n/a	80	80	0 - 104

Cond Fan 2 Spt= is an adjustable item that turns condenser fan number 2 on when the outdoor temperature reaches this setpoint.

Cond Fan 3 Spt= is an adjustable item that turns condenser fan number 3 on when the outdoor temperature reaches this setpoint.

Cond Fan 4 Spt= is an adjustable item that turns condenser fan number 4 on when the outdoor temperature reaches this setpoint. Not all units have four condenser fans.

Cond Fan Diff= is an adjustable item that sets the temperature differential with respect to the setpoint.

Economizer

The Economizer menu is used to set up the airside economizer operation.

Table 13: Economizer Menu

Menu	Menu Item	Default	Range
Economizer (Automatic or CAV)	Economizer Pos=	-	0 - 100
	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	40.0 - 99.0
	Min OA Pos=	-	0 - 100
	Chgover Temp=	60°F	32.0 - 99.0
	Chgover Diff=	2.0°F	1 - 10

Economizer Pos= is a status only item that is used to indicate percentage that the economizer dampers are open.

Disch Air= is a status only item that indicates the current discharge air temperature.

DAT Clg Spt= is an adjustable item which sets the temperature that the DAT should be maintained at.

Min OA Pos= is a status only item which indicates the current minimum position of the outdoor air damper (see "Min OA Damper" on page 31).

Chgover Temp= is an adjustable item which sets the OA dry bulb temperature at which the units changes over to the economizer operation.

Chgover Diff= is an adjustable item which sets the temperature differential with respect to the Chgover Temp.

Min OA Damper

The Min OA Damper menu is used to set up the minimum damper position.

Figure 7 shows a graphical explanation of the control parameters. When a reset scheme is used (Min OA type=) the OA damper position can be reset, or the damper can be closed to a position not lower than the Demand Control Ventilation outdoor air damper position profile.

Figure 7: Damper Position vs. Fan Speed Chart
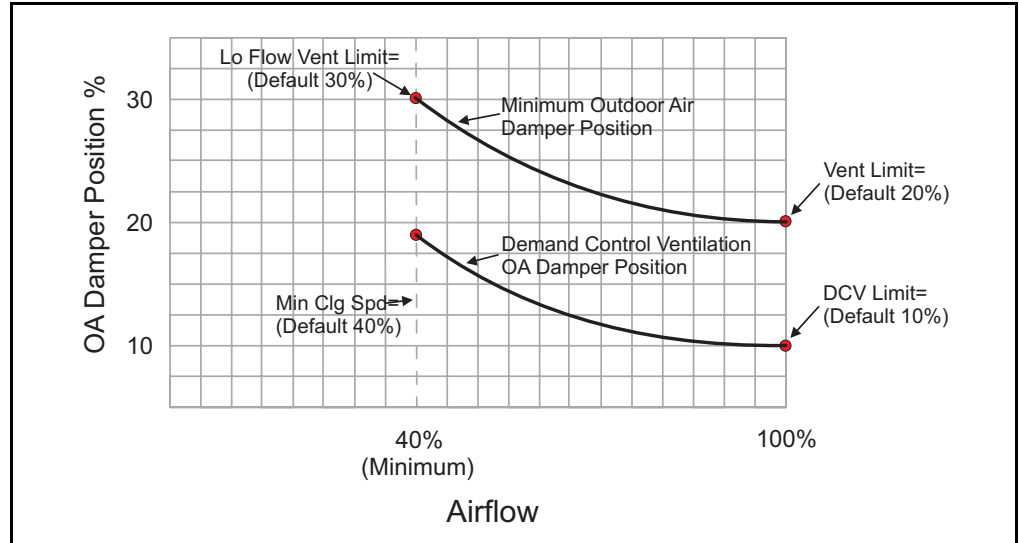
Table 14: Min OA Damper Menu

Menu	Menu Item	Default	Range
Min OA Damper	Min OA Pos=	-	0 - 100
	Vent Limit=	20%	1 - 99
	DCV Limit=	10%	1 - 99
	Min OA Type=	None	None Network External IAQ
	XXX% @ DCV Limit=	0	0 - 100
	XXX% @ Vent Limit=	100	0 - 100
	Ext Percent=	-	0 - 100
	0% @ XX V/mA	4 mA	0 - 20 V/mA
	100% @ XX V/mA	100%	1 - 100
	Min Clg Spd=	40%	1 - 99
	LoFlo Vent Limit=	30%	1 - 99

Min OA Pos= is a status only item which indicates the current minimum position of the outdoor damper. This value does not go above a value called the Ventilation Limit and does not go below a value called the Demand Control Ventilation Limit.

On CAV units the Ventilation Limit and the Demand Control Ventilation Limit are fixed values set equal to the Vent Limit= and DCV Limit= parameters.

On VAV units the OA Damper Position increases from the Vent Limit= value to the LoFloVent Limit= value as the VFD speed goes from 100% down to the Min Clg Spd= value. The Demand Control Ventilation Limit in this is determined by the Ventilation Limit X DVC Limit=/Vent Limit=.

When the Min OA Type= parameter is set to "None" the Min OA Pos= value is set to the Ventilation Limit. If Min OA Type= is set to Network, External or IAQ, the Min OA Pos= varies between the Ventilation Limit and the Demand Control Ventilation Limit as the reset signal varies from its maximum to minimum value.

Extended Menus

Vent Limit= is an adjustable item that sets the value of the Ventilation Limit on a CAV unit or when a VAV unit is at 100% discharge fan speed.

DCV Limit= is an adjustable item that sets the value of the Demand Control Ventilation Limit on a CAV unit or when a VAV unit is at 100% discharge fan speed. This item is only used when the "Min OA type=" is set to something other than "None".

Min OA Type= is an adjustable item that sets the type of minimum OA damper position reset to be used. When this is set to "None" the Min OA Pos= parameter is set to the Ventilation Limit. When this is set to "Network", "External" or "IAQ" then the Min OA Pos= parameter varies from the Ventilation Limit down to the Demand Control Ventilation Limit as the reset signal goes from its maximum to minimum value.

XXX % @ DCV Limit= is an adjustable item used when Min OA Type= is set to "External" to define at what percent of the field input signal the Min OA Pos= is to be at the Demand Control Ventilation Limit value.

XXX % @ Vent Limit= is an adjustable item used when Min OA Type= is set to "External" to define at what percent of the field input signal the Min OA Pos= is to be at the Ventilation Limit value.

Ext Percent= is a status only item that indicates what percent the field signal currently is between the minimum and maximum value when Min OA Type= is set to "External".

0 % @ XX V/mA= is an adjustable item that sets the minimum DC voltage or mA value of the field signal used when Min OA Type= is set to "External".

100 % @ XX V/mA= is an adjustable item that sets the maximum DC voltage or mA value of the field signal used when Min OA Type= is set to "External".

XXXX PPM @ DCV Limit= is an adjustable item used when Min OA Type= is set to "IAQ" to define at what PPM value the Min OA Pos= is to be at the Demand Control Ventilation Limit value.

XXXX PPM @ Vent Limit= is an adjustable item used when Min OA Type= is set to "IAQ" to define at what PPM value the Min OA Pos= is to be at the Ventilation Limit value.

IAQ PPM= is a status only item which indicates the current reading from the CO_2 sensor.

XXXX PPM @ XX V/mA= is an adjustable item that sets the minimum PPM value and the minimum DC voltage or mA value of the CO_2 sensor used when Min OA Type= is set to "IAQ".

XXXX PPM @ XX V/mA= is an adjustable item that sets the maximum PPM value and the maximum DC voltage or mA value of the CO_2 sensor used when Min OA Type= is set to "IAQ".

Min Clg Spd= is an adjustable item that sets the discharge fan speed on a VAV unit at which the Ventilation Limit reaches the LoFloVent= value.

LoFlo Vent Limit= is an adjustable item that sets the maximum value for the Ventilation Limit on a VAV unit.

Daily Schedule

The Daily Schedule sets the start and stop times for each of the days of the week. One start and one stop time can be set for each day.

Table 15: Daily Schedule Menu

Menu	Menu Item	Default	Range
Daily Schedule	Mon=	00:00 - 00:00	00:00 - 23:59
	Tue=	00:00 - 00:00	00:00 - 23:59
	Wed=	00:00 - 00:00	00:00 - 23:59
	Thu=	00:00 - 00:00	00:00 - 23:59
	Fri=	00:00 - 00:00	00:00 - 23:59
	Sat=	00:00 - 00:00	00:00 - 23:59
	Sun=	00:00 - 00:00	00:00 - 23:59
	Hol=	00:00 - 00:00	00:00 - 23:59

Holiday Schedule

The Holiday Schedule is used to set the start and stop times for up to 16 different holidays.

Table 16: Holiday Schedule Menu

Menu	Menu Item	Default	Range
Holiday Schedule	Hol 1=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 2=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 3=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 4=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 5=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 6=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 7=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 8=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 9=	NA 00 - N A00	Jan-Dec 0-31
	Hol 10=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 11=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 12=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 13=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 14=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 15=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 16=	NA 00 - NA 00	Jan-Dec 0-31

To enter a 1-day holiday, the start date and the end date must both be entered as the same day. For example: To enter a holiday of July 4th, the date must be entered as "Jul 04 - Jul 04". If both the start and end dates are not entered, the unit will not recognize the holiday.

The start and stop times for the holidays must be entered at the daily schedule menu (Table 16). All 16 holidays will follow the start and stop times as indicated in the daily schedule for "hol=".

Extended Menus

One Event Sched

The One Event Schedule is used to set the start and stop times for one event.

Table 17: One Event Sched Menu

Menu	Menu Item	Default	Range
One Event Sched	Beg=	NA 00 @ 00:00	Jan-Dec 00:00-23:59
	End=	NA 00 @ 00:00	Jan-Dec 00:00-23:59

Optimal Start

The Optimal Start menu is used to set up the unit so it starts at the most efficient time before building occupancy.

Table 18: Optimal Start Menu

Menu	Menu Item	Default	Range
Optimal Start	Enable=	No	No/Yes
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212
	Htg Rate=	.400	.000 - .999
	Htg OAT=	35°F	-40 - 60
	Design Htg OAT=	0°F	-40 - 60
	Clg Rate=	.400	.000 - .999
	Clg OAT=	85°F	60 - 140
	Design Clg OAT=	95°F	60 - 140

Enable= is an adjustable item that turns on the optimal start feature. Setting the value to yes will activate this function.

Space Temp= is a status only item that indicates the current space temperature. A space temperature sensor must be connected to the unit controller for this feature to function. Refer to "Space Sensor" on page 49.

OA Temp= is a status only item that indicates the current outdoor air temperature.

Htg Rate= is an adjustable item that sets the rate of temperature rise in degrees per minute when the unit was last started optimally in heating.

Htg OAT= is an adjustable item that sets the outdoor air temperature when the unit was last started optimally in heating.

Design Htg OAT= is an adjustable item that sets the outdoor air temperature at which the heating system could just hold the load. Rate of temperature rise would equal zero.

Clg Rate= is an adjustable item that sets the rate of temperature drop in degrees per minute when the unit last started optimally in cooling.

Clg OAT= is an adjustable item that sets the outdoor air temperature when the unit was last started optimally in cooling.

Design Clg OAT= is an adjustable item that sets the outdoor air temperature at which the cooling system could just hold the load. Rate of temperature rise would equal zero.

Setup

Table 19: Setup Menu

Menu	Menu Item	Default	Range
Setup	AI1=	RAT	None RAT SpaceSpt
	Space T Present=	Yes	No Yes
	Units=	English	English Metric
	B09=	Fan Op Output	Fan Op Output VAV Output

AI1= is an adjustable item to indicate what analog input B1 is being used for, a return air temperature sensor (RAT) or an adjustable space sensor setpoint. If a space senor is connected to the unit but it does not have an adjustable setpoint adjustment knob this item should be set to none. This connection is made at TB2 terminal 108.

Space T Present= is an adjustable item to indicate if a space sensor is connected to the unit controller.

Units= is an adjustable item to indicate if the unit is to display English or Metric units of measure.

B09= is an adjustable item to configure binary output B09. This output can be configured for a fan operation output or a VAV box output.

Time Settings

Table 20: Time Settings Menu

Menu	Menu Item	Default	Range
Time Settings	Service=	0 min	0 - 240
	Start Up=	180 sec	0 - 240
	Recirculate=	180 sec	120 - 3600
	Zero OA Time=	90 min	0 - 240
	Tnt Override=	120 min	0 - 300
	Post Heat=	0 sec	0 - 180
	Password=	15 min	5 - 60

Service= is an adjustable item that sets the amount of time the unit can operate in manual control.

Startup= is an adjustable item that sets the time in seconds that the unit will perform its startup operation.

Recirculate= is an adjustable item that sets the time in seconds that the unit operates with only the fan, recirculating the building air.

Zero OA Time= is an adjustable item that sets the time in minutes that the outdoor air damper stays at a zero position upon unit start up.

Tnt Override= is an adjustable item that sets the amount of time that the unit will go into operation when the tenant override button is activated on the space sensor.

Post Heat= is an adjustable item that sets the amount of time in seconds for the post heat operation.

Password= is an adjustable item that sets the amount of time in minutes that the unit will stay in the extended menus.

Extended Menus

Time/Date

Table 21: Time/Date Menu

Menu	Menu Item	Default	Range
Time/Date	Time=	-	00:00 - 23:59
	Date=	-	Jan-Dec 0-31 2000-2009
	Day=	-	Sunday - Saturday

Time= is an adjustable item that sets the current time.

Date= is an adjustable item that sets the current date.

Day= is an adjustable item that sets the current day of the week.

Stgd Exh Fan Setup

The Stgd Exh Fan Setup is used to setup the operation of the exhaust fans for a CAV application. This menu is used to select at what OA damper position each of the exhaust fans will turn on and off.

Table 22: Stgd Exh Fan Setup Menu

Menu	Menu Item	Default	Range
StgdExh Fan Setup	Exh Fan # 1 On=	40%	0 - 99
	Exh Fan # 1 Off=	30%	0 - 99
	Exh Fan # 2 On=	55%	0 - 99
	Exh Fan # 2 Off=	40%	0 - 99
	Exh Fan # 3 On=	70%	0 - 99
	Exh Fan # 3 Off=	50%	0 - 99

Exh Fan #1 On= is an adjustable item that turns on exhaust fan #1 based on the economizer position.

Exh Fan #1 Off= is an adjustable item that turns off exhaust fan #1 based on the economizer damper position.

Exh Fan #2 On= is an adjustable item that turns on exhaust fan #2 based on the economizer damper position.

Exh Fan #2 Off= is an adjustable item that turn off exhaust fan #2 based on the economizer damper position.

Exh Fan #3 On= is an adjustable item that turns on exhaust fan #3 based on the economizer damper position.

Exh Fan #3 Off= is an adjustable item that turn off exhaust fan #3 based on the economizer damper position.

Heating Setup

The Heating Setup menu is used to configure the heating operation of the unit.

Table 23: Heating Setup Menu

Menu	Menu Item	Default	Range
Heating Setup	Unocc Htg Spt=	55.0°F	55.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Htg Lock=	60.0°F	1.0 - 99.0
	OAT Lock Diff=	3.0°F	1.0 - 9.9
	Stage Time=	4 min	4 - 60

Unocc Htg Spt= is an adjustable item that sets the temperature of the space sensor at which the heating operation will begin when the building is unoccupied. The optional space sensor must be connected to the unit for this function to operate.

Unocc Diff= is an adjustable item that sets the temperature differential for the setpoint. When the space temperature goes above the Unocc Htg Spt plus the Unocc Diff, the unit will transition out of the heating mode of operation.

CtrlTemp Src= is an adjustable item that sets the heating operation control source to either the space temperature sensor or the return air temperature sensor.

OAT Htg Lock= is an adjustable item that sets the maximum outdoor air temperature allowed for the heating mode of operation to take place.

OAT Lock Diff= is an adjustable item that sets the temperature differential for the OAT Htg Lock setpoint.

Stage Time= is an adjustable item that sets the timer between each of the heating stages. The unit will not stage up or down until this time has passed.

Extended Menus

Cooling Setup

The Cooling setup menus is used to configure the cooling operation of the unit.

Table 24: Cooling Setup Menu

Menu	Menu Item	Default	Range
Cooling Setup	Unocc Clg Spt=	55°F	55.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Clg Lock=	55.0°F	1.0 - 99.0
	OAT Lock Diff=	2.0°F	1.0 - 9.9
	Stage Time=	4 min	4 - 60

Unocc Clg Spt= is an adjustable item that sets the temperature of the space sensor at which the cooling operation will begin when the building is unoccupied. The optional space sensor must be connected to the unit for this function to operate.

Unocc Diff= is an adjustable item that sets the temperature differential for the setpoint. When the space temperature falls below the Unocc Clg Spt minus the Unocc Diff, the unit will go out of the cooling mode of operation.

CtrlTemp Src= is an adjustable item that sets the cooling operation control source to either the space temperature sensor or the return air temperature sensor.

OAT Clg Lock= is an adjustable item that sets the minimum outdoor air temperature allowed for the cooling mode of operation to take place.

OAT Lock Diff= is an adjustable item that sets the temperature differential for the OAT Clg Lock setpoint.

Stage Time= is an adjustable item that sets the timer between each of the cooling stages. The unit will not stage up or down until this time has passed.

Operating Hours

The Operating Hours menu gives a summary of the hours of operation for each of the supply fan, exhaust fan compressors, heating and economizer operation.

Table 25: Operating Hours Menu

Menu	Menu Item	Default	Range
Operating Hours	Supply Fan=	000,000	0 - 999,999
	Exhaust Fan=	000,000	0 - 999,999
	Mech Cool=	000,000	0 - 999,999
	Comp # 1=	000,000	0 - 999,999
	Comp # 2=	000,000	0 - 999,999
	Comp # 3=	000,000	0 - 999,999
	Comp # 4=	000,000	0 - 999,999
	Heating=	000,000	0 - 999,999
	Economizer=	000,000	0 - 999,999
	Tnt Override=	000,000	0 - 999,999

Supply Fan= is a status item which gives the number of hours the supply fan has operated.

Exhaust Fan= is a status item which gives the number of hours the exhaust fans have operated.

Mech Cool= is a status item which gives the number of hours that mechanical cooling has operated.

Comp #1= is a status item which gives the number of hours that compressor #1 has operated.

Comp #2= is a status item which gives the number of hours that compressor #2 has operated.

Comp #3= is a status item which gives the number of hours that compressor #3 has operated.

Comp #4= is a status item which give the number of hours that compressor #4 has operated

Heating= is a status item which gives the number of hours that the heating mode has operated.

Economizer= is a status item which gives the number of hours that the economizer has operated.

Tnt Override= is a status item which gives the number of hours that the unit has operated in the Tenant Override mode of operation.

Extended Menus

Manual Control

The manual control of operation is a function that is used for operating the unit during a service call only. The unit must not be operated in this mode for any extended period of time.

⚠ WARNING
Unit damage may occur when operating in manual control mode. Run in this condition by an experienced technician only.

⚠ WARNING
Operating the unit in manual control can cause personal injury or equipment damage. Manual control operation must only be performed by personnel that are knowledgeable in the operation of the equipment.

Table 26: Manual Control Menu

Menu	Menu Item	Default	Range
Manual Control	Manual Ctrl=	Off	On Off
	Supply Fan=	Off	On Off
	Comp # 1=	Off	On Off
	Comp # 2=	Off	On Off
	Comp # 3=	Off	On Off
	Comp # 4=	Off	On Off
	Cond Fan # 2=	Off	On Off
	Cond Fan # 3=	Off	On Off
	Cond Fan # 4=	Off	On Off
	Heat # 1=	Off	On Off
	Heat # 2=	Off	On Off
	Heat # 3=	Off	On Off
	Heat # 4=	Off	On Off
	Exh Fan # 1=	Off	On Off
	Exh Fan # 2=	Off	On Off
	Alarm Out=	Off	On Off
	Vav/Fan Op Out=	Off	On Off
	Sup Fan Spd=	0.0%	0.0 - 100.0
	Exh Fan Spd=	0.0%	0.0 - 100.0
	OA Damper=	0.0%	0.0 - 100.0
	Htg Mod VLV=	0.0%	0.0 - 100.0

Manual Ctrl= is an adjustable item that puts the unit into manual control. Major components of the unit are turned on and off by this control. The units normal control sequence are overridden in this state and can cause the unit to go into alarm.

Supply Fan= is an adjustable item that turns on the supply fan.

Note: Turning on any one of the following compressors will automatically turn on condenser fan #1. Other condenser fans must be manually turned on to control the head pressure of the unit. Refrigerant gauges must be connected to the unit for observation of the head pressure in the manual control mode of operation. **Additional condenser fans must be turned on to maintain the head pressure.**

Comp # 1= is an adjustable item that turns on compressor #1.

Comp # 2= is an adjustable item that turns on compressor #2.

Comp # 3= is an adjustable item that turns on compressor #3.

Comp # 4= is an adjustable item that turns on compressor # 4 if unit has one.

Cond Fan # 2= is an adjustable item that turns on the condenser fan #2.

Cond Fan # 3= is an adjustable item that turns on the condenser fan #3.

Cond Fan # 4= is an adjustable item that turns on the condenser fan #4 if unit has one.

Heat # 1= is an adjustable item that turns on the first stage of heat.

Heat # 2= is an adjustable item that turns on the second stage of heat.

Heat # 3= is an adjustable item that turns on the third stage of heat.

Heat # 4= is an adjustable item that turns on the fourth stage of heat.

Exh Fan # 1= is an adjustable item that turns on the first stage of exhaust fans.

Exh Fan # 2= is an adjustable item that turns on the second stage of exhaust fans.

Sup Fan Spd= is an adjustable item only on VAV units that sets the speed of the supply air fan.

Exh Fan Spd= is an adjustable item for units with building pressure control (VFD on the exhaust fans) that sets the speed of the exhaust fans.

OA Damper Pos= is an adjustable item that sets the position of the outdoor damper.

Htg Mod VLV= is an adjustable item that allows the valve to be adjusted from its minimum open position to its full open position.

Alarm Limits

The Alarm Limits menu is used to set the limits of the discharge air temperature sensor and the return air temperature sensor.

Table 27: Alarm Limits Menu

Menu	Menu Item	Default	Range
Alarm Limits	Hi Disch Alm=	170.0°F	90 - 250
	Lo Disch Alm=	40.0°F	20 - 50
	Hi Return Alm=	120.0°F	90 - 150

Hi Disch Alm= is an adjustable item that sets the high temperature limit for the DAT sensor. When the discharge air temperature sensor reaches this set point the unit will go into the high discharge air alarm.

Lo Disch Alm= is an adjustable item that sets the low temperature limit for the DAT sensor. When the discharge air temperature sensor reaches this set point the unit will go into the low discharge air alarm.

Hi Return Alm= is an adjustable item that sets the high temperature limit for the return air temperature. When the RAT sensor reaches this set point the unit will go into the high return air temperature alarm.

Controller

Controller

This section of the manual describes the MicroTech II Controller components, input/output configurations, field wiring options and requirements, and service procedures.

⚠ NOTICE
This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it can interfere with radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference; in which case users will be required to correct the interference at their own expense. McQuay International disclaims any liability resulting from any interference or for the correction thereof.

⚠ WARNING
Electric shock hazard. Can cause personal injury or equipment damage. This equipment must be properly grounded. Connections and service to the MicroTech II control panel must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

⚠ WARNING
Excessive moisture in the control panel can cause hazardous working conditions and improper equipment operation. Protect the electrical components in the main control panel from precipitation.

⚠ CAUTION
Extreme temperature can damage system components. This MicroTech II controller is designed to operate in ambient temperatures from –40°F to 158°F. It can be stored in ambient temperatures from –65°F to 176°F. The controller is designed to operate in a 10% to 90% RH (noncondensing) and be stored in a 5% to 95% RH (noncondensing) environment.

⚠ CAUTION
Static sensitive components. A static discharge while handling electronic circuit boards can damage components. Discharge any static electrical charge by touching the bare metal inside the main control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, relay modules, or power plugs while power is applied to the panel.

⚠ CAUTION
To prevent possible unit damage, before removing power to the controller, pump down compressor.

General Description

The MicroTech II Controller for Maverick Commercial Packaged Units is microprocessor-based and designed to provide sophisticated control of McQuay Maverick rooftop units. In addition to providing normal temperature, static pressure, and ventilation control, the controller can provide alarm monitoring and alarm-specific component shutdown if critical system conditions occur.

The operator can access temperatures, pressures, operating states, alarm messages, control parameters, and schedules with a 6-key keypad and a 4-line by 20-character display. The controller includes password protection against unauthorized or accidental control parameter changes.

This MicroTech II controller is capable of complete, stand-alone rooftop unit control, or it can be incorporated into a building-wide network using an optional plug-in communication module. Available communication modules include BACnet®/IP, BACnet MS/TP, BACnet Ethernet, LONMARK® Space Comfort Controller (SCC) and LONMARK Discharge Air Controller (DAC).

Control Panel

The unit control panel's main component is the controller as indicated in Figure 8. The controller along with the ancillary components of contactors, switches, motor protectors, and miscellaneous control items make up the complete unit control panel.

Controller

Figure 8: Control Panel Layout and Description
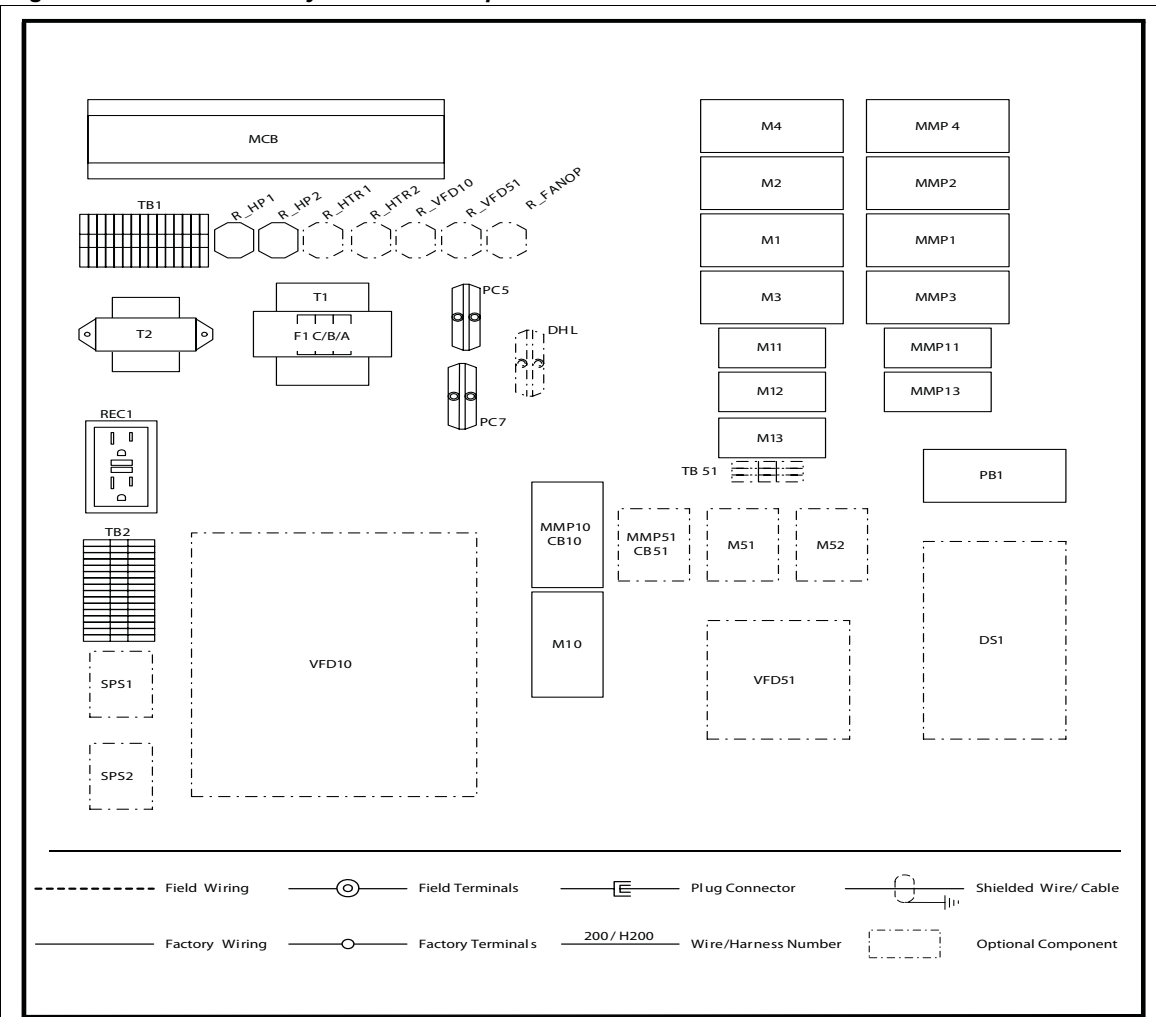
ID	Description
AC T3	Actuator Motor, Economizer
AHL	Auxiliary Hi-Limit Switch, Gas Heat, Manual Reset
CB10	Circuit Breaker, Supply Fan
CB51	Circuit Breaker, Exhaust Fan(s)
CCH1 - 4	Crank case Heater
DAT	Temperature Sensor, Discharge Air
DHL	Duct Hi-Limit, Switch
DS 1	Disconnect Switch
F1A, B	Fuse, Control Circuit Transformer (T1), Primary
F1C	Fuse, Control Circuit Transformer (T1), Secondary
HL	Hi-Limit Switch, Gas Heat
HP1, 2	Hi-Pressure Switch, Refrigeration Circuits 1, 2
LP1, 2	Low-Pressure Switch, Refrigeration Circuits 1, 2
M1 - 4	Contactor, Compressors
M10	Contactor, Supply Fan
M11 - 13	Contactor, Condenser Fans
M51, 52	Contactor, Exhaust Fans
MCB	Microprocessor Circuit Board
MJ	Mechanical Jumper
MMP1 - 4	Manual Motor Protector, Compressors
MMP10	Manual Motor Protector, Supply Fan
MMP11 - 13	Manual Motor Protector, Condenser Fans
MMP51	Motor Protector, Exhaust Fan(s)

ID	Description
OAE	Enthalpy Sensor, Outside Air
OAT	Temperature Sensor, Outside Air
PB1	Power Block, Power Distribution
PC5	Pressure Control, Dirty Filter Switch
PC7	Pressure Control, Proof Airflow Switch
R _HP1, 2	Relay, High Pressure Switch, Circuits 1 & 2
R _HTR 1, 2	Relay, Heater stages 1 & 2
R _FANOP	Relay, Fan Operation
R _VFD10	Relay, VFD Enable, Supply Fan
R _VFD51	Relay, VFD Enable, Exhaust Fans
RAE	Enthalpy Sensor, Return Air
RAT	Temperature Sensor, Return Air
REC1	Receptical, GFCI
SPS1	Static Pressure Sensors, Duct
SPS2	Static Pressure Sensors, Building
T1	Transformer, Main Control (Line/115VAC)
T2	Transformer, Control Input (115/24VAC)
TB1	Terminal Block, Internal Distribution
TB2	Terminal Block, Field
TB51	Terminal Block, Exhaust Fan Distribution
VFD10	Variable Frequency Drive, Supply Fan
VFD51	Variable Frequency Drive, Exhaust Fans

Unit Controller

The unit controller is made up of the integral keypad with LED display, digital inputs, digital outputs, analog inputs, and analog outputs. The MPS equipment has either a large or a medium unit controller depending if the rooftop unit has gas heat and a VAV application or not. The difference between a large and a small unit controller is the number of inputs and outputs it has. See Figure 9 for details on the unit controller.

Figure 9: Unit Controller
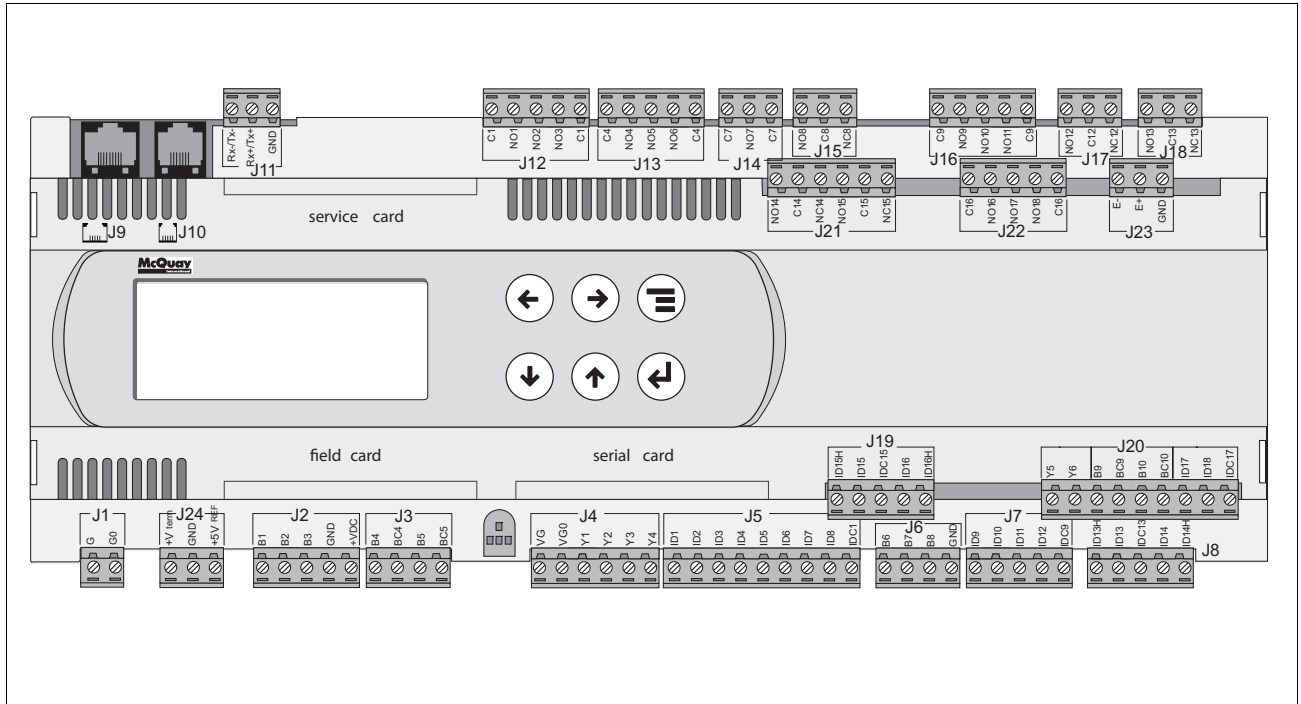
Analog Input

The unit controller receives up to 8 analog inputs. The sensors are described as follows:

Table 28: Analog Input

Controller Input	Description
B1	Return air temperature sensor/Space setpoint adjustment
B2	Space temperature sensor
B3	Outdoor air damper reset
B4	Discharge air temperature sensor
B5	Outdoor air temperature sensor
B6	Duct static pressure sensor
B7	Building static pressure sensor
B8	Remote discharge air temperature setpoint adjustment. Field installed

Controller

Binary Inputs

The unit controller receives up to 9 binary inputs. The device description is as follows:

Table 29: Binary Input

Controller Input	Description
ID1	Remote start/stop
ID2	Emergency stop
ID3	Proof of airflow switch
ID4	Comparative enthalpy switch
ID5	Dirty filter switch
ID6	Low pressure switch, circuit 1
ID7	High pressure switch, circuit 1, 2
ID8	Low pressure switch, circuit 2
ID9	Duct high limit switch

Fan Control

The supply air fan is controlled by the NO1 output. This output is wired in with the fan interlock and relay R_VFD10 for VAV units and relay M10 for CAV applications.

The exhaust fans are controlled by the NO3 output for building pressure control applications. This output is wired to relay R_VFD51. For CAV applications with staged control the exhaust fans are controlled by outputs NO3 and NO10. These outputs are wired to relays M51 and M52 respectively.

Compressor Control

The compressors are controlled by the following outputs:

Table 30: Binary Output

Controller Output	Description
NO6	Compressor 1
NO7	Compressor 2
NO12	Compressor 3
NO13	Compressor 4 (040A - 050A units)

These outputs are wired to relays M1 ~ M4 for compressor control.

Power Supply Terminals

Transformer T2 supplies 24 V (ac) power to the unit controller and connects at terminal G and GO. The analog input power supply is also supplied by T2 and is connected at VG and VGO.

Communication Modules

In systems that require networking, one of the following communication modules can be installed on the unit controller:

- BACnet/IP or BACnet Ethernet
- BACnet MS/TP
- LonWorks, Space Comfort Control (SCC)
- LonWorks, Discharge Air Control (DAC)

BACnet/IP or BACnet Ethernet

The BACnet/IP or BACnet Ethernet communication module is designed to be an add on module to the unit controller. The MicroTech II unit controller meets the requirements of ANSI/ASHRAE 135-2001 standard.

BACnet MS/TP

The BACnet MS/TP communication module is designed to be an add-on module to the unit controller. The MicroTech II unit controller meets the requirements of ANSI/ASHRAE 135-2001 standard for BACnet Master Slave/Token Passing protocol.

LonWorks SCC

The LonWorks communication module is designed to be an add-on module to the unit controller. The SCC module supports the LonMark Space Comfort Controller functional number 8504.

LonWorks DAC

The LonWorks communication module is designed to be an add-on module to the unit controller. The DAC module supports the LonMark Discharge Air Controller functional number 8610.

The installation of each of the above communication modules is further explained in each of the respective Engineering and Data (ED) documents.

Keypad/Display

The keypad display shown in Figure 1 is the operator interface to the unit controller. The keypad has 6 function keys that provide the navigation. The display is a 4 line display with each line made up of 20 characters. All operating conditions, system alarms, control parameters, and schedules can be monitored from the keypad/display.

Temperature Sensors

The MicroTech II controller uses passive negative temperature coefficient (NTC) thermistors. These sensors vary their input resistance to the controller as the temperature changes.

Pressure Transducers

The MicroTech II controller uses 0 to 5" wc, 4-20 mA static pressure transducers for measuring duct static pressure. If building static pressure control is provided, a –0.25" wc to 0.25" wc, 4-20 mA static pressure transducer is used.

Actuators

The actuators are controlled by an analog signal from the unit controller.

Spring-return actuators are used for the 0 - 30% outdoor air and economizer dampers. The mixing dampers are normally closed to the outside air.

Variable Frequency Drives (VFDs)

When controlling the supply air fan or the exhaust fans with a variable frequency drive, the MicroTech II controller uses an analog output signals to modulate the drive speed.

Field Wiring

Field Output Signal

The following output signals may be available for field connections to a suitable device.

- Remote Alarm Output
- Fan Interlock
- VAV Box Output

The Remote Alarm Output and Fan Operation Output are available on all units. The VAV Box Output is available only on VAV units.

Remote Alarm Output

The remote alarm output, dry contact NO8, closes when the unit controller has an active alarm. To use this signal wire a field supplied 24 V (ac) relay/contact across terminals 120 and 122 on TB2. This and additional wiring information can be seen on the output wiring schematics at line number 334.

Fan Interlock

The output terminal on the unit controller, NO1, is energized when the supply fan is on. This output is wired to TB2 at terminals 118 and 119. All units should have a mechanical jumper (MJ118) installed at these terminals. This output supplies 115 V (ac) to these terminals. A fan interlock switch can be installed at this location to control the start of the fan. This and additional wiring information can be seen on the output wiring schematics at line number 303.

VAV Box Output/Fan Operation Output

This output is designed to coordinate the unit operation with VAV box control. The output terminal on the unit controller, NO9, is energized and provides 24 V (ac) to the relay R_FANOP. The normally open contacts of this relay are wired to TB2 at terminals 124 and 125. This and additional wiring information can be seen on the output wiring schematics at line number 336.

Field Input Signal

The following field supplied input devices may be integrated with the unit's operation by the unit controller.

- Return and/or Supply Air Smoke Detectors
- External Time Clock
- External Discharge Air Temperature Reset Signal

Smoke Detectors

Field installed smoke detectors in the return air ductwork or the supply air ductwork can be coordinated with the units operation through the unit controller's binary input, ID2. This input in wired to TB2 and the supply air smoke detector can be wired between terminals 103 and 104 and the return air smoke detector can be wired between terminals 104 and 105. The T2 transformer supplies 24 V (ac) across each of these terminals and a dry set of contacts can be wired to these terminals respectively. This and additional wiring information can be seen on the input wiring schematics at line number 217.

External Time Clock

An external time clock can control the units occupied and unoccupied cycles by wiring it to the unit controller. A dry set of contacts can be wired between terminals 101 and 102 on TB2. The T2 transformer supplies 24 V (ac) across these contacts. This and additional wiring information can be seen on the input wiring schematics at line number 215.

External Discharge Air Temperature Reset

An external device on VAV units can reset the discharge air temperature. The input on the unit controller is at B8 and is wired to terminals 112 and 113 on TB2. The control signal can be 0-10 V (dc) or a 0-20 mA. The unit controller must be set up for the correct control signal under the Discharge Cooling menu. See table 10 on page 19 for further discussions. When this option is used the DAT can be reset between the minimum and maximum cooling set points as configured at the Discharge Cooling menu. Example, for a 0-10 V (dc) control signal the controller configuration would be as follows for a discharge air temperature reset scheme between 55.0°F and 65.0°F.

Clg Reset = Ext V

Min Clg Spt = 55.0°F

Min Clg Spt @ = 0 (0 V (dc))

Max Clg Spt = 65.0°F

Max Clg Spt @ = 10 (10 V (dc))

The above setting will vary the discharge air temperature setpoint between 55.0 - 65.0°F with a control signal of 0 - 10 V (dc)).

Space Sensor

CAV units may require the use of a space sensor. VAV units only require a space sensor if unoccupied heating and/or cooling is required. The space sensor be one of the two options:

1 Space sensor with tenant override.
2 Space sensor with tenant override and setpoint adjustment (for CAV units only).

The space senor with tenant override is connected to the unit at TB2 on terminals 109 and 110. The space sensor with tenant override and setpoint adjustment in connected to the unit at TB2 on terminals 108, 109, and 110. When the setpoint adjustment option is used the return air temperature sensor must be disconnected.
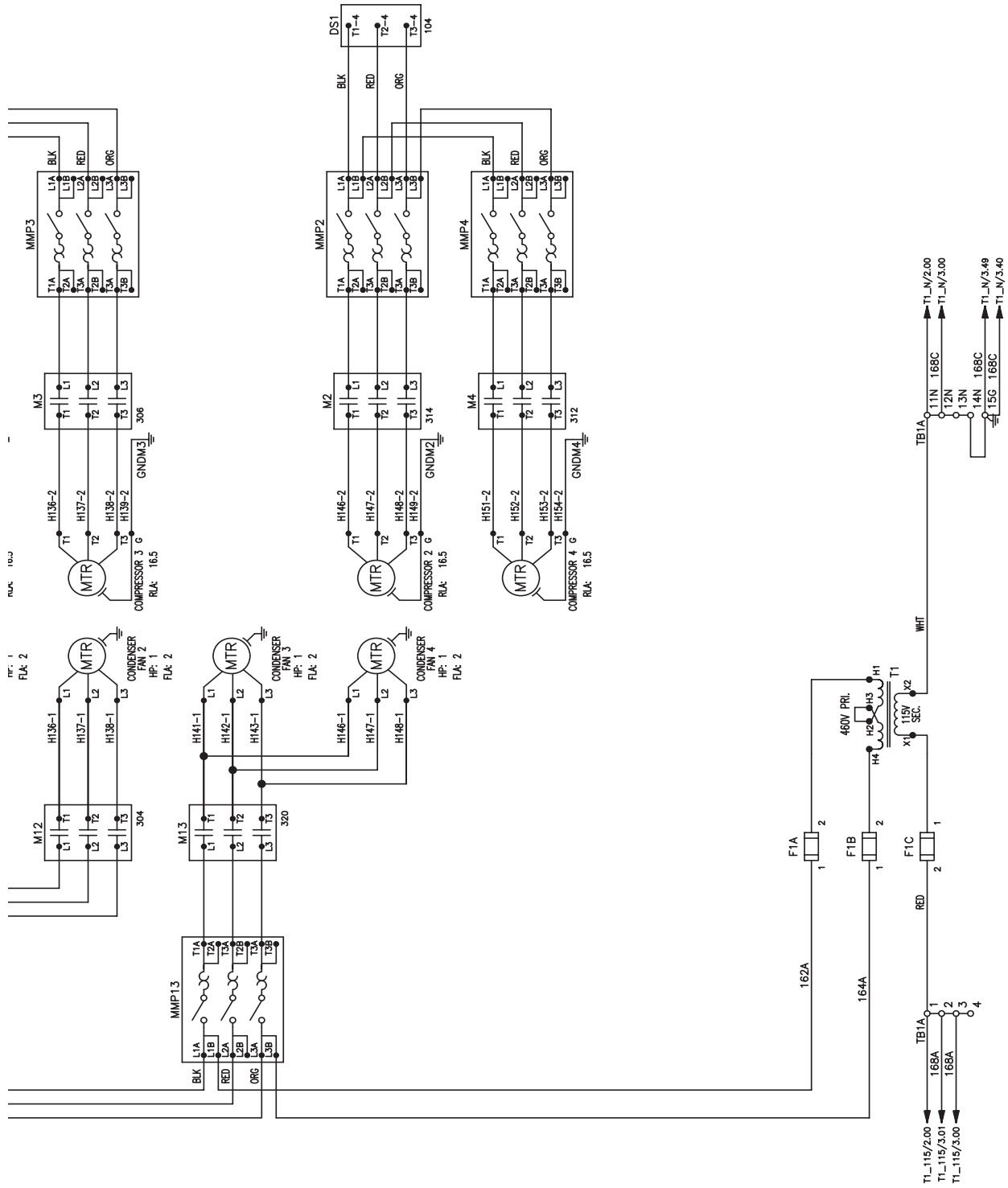
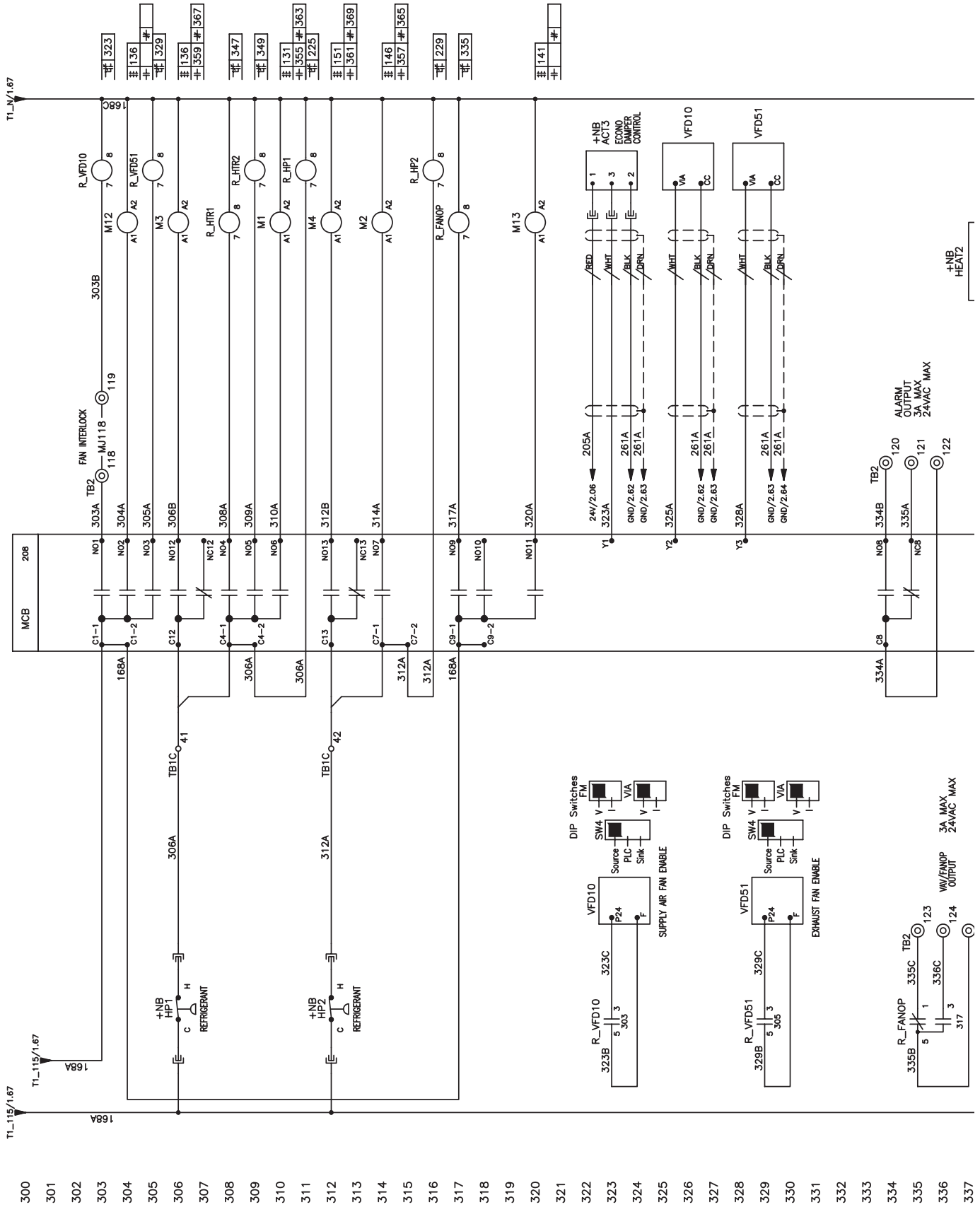# Field Wiring

Figure 10: VAV Power

Field Wiring

Figure 11: VAV Control—Inputs
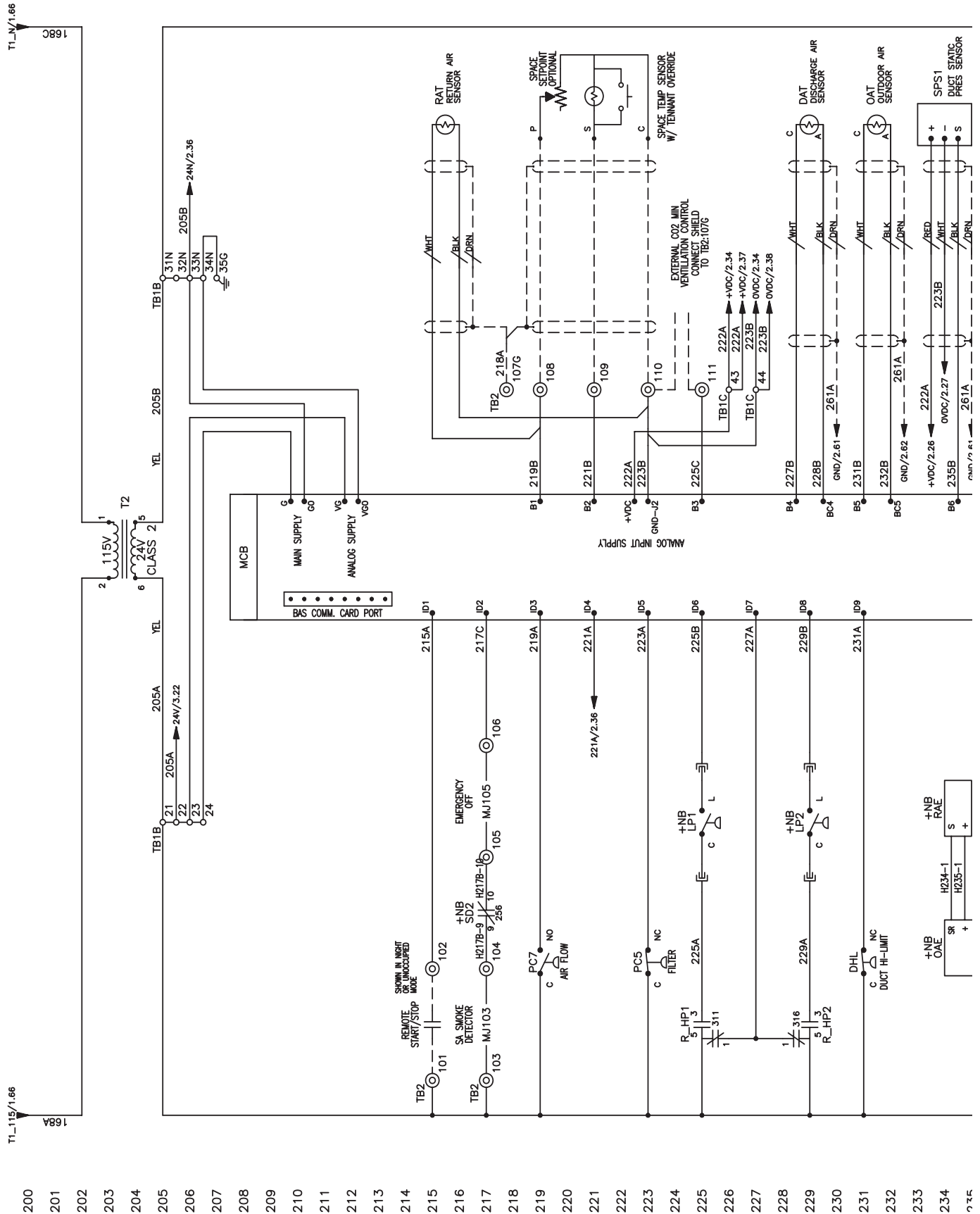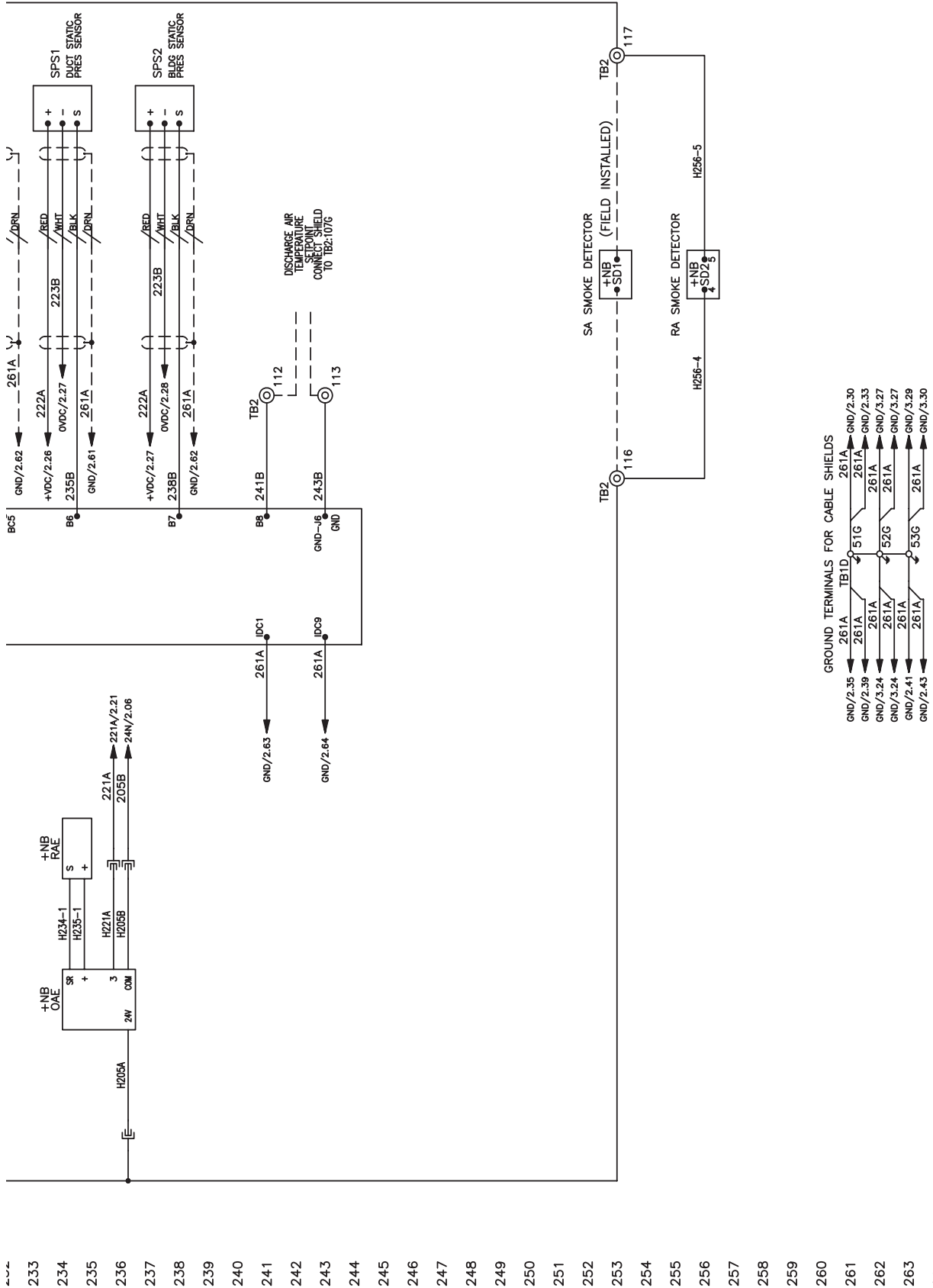
Field Wiring

Figure 12: VAV Control—Outputs
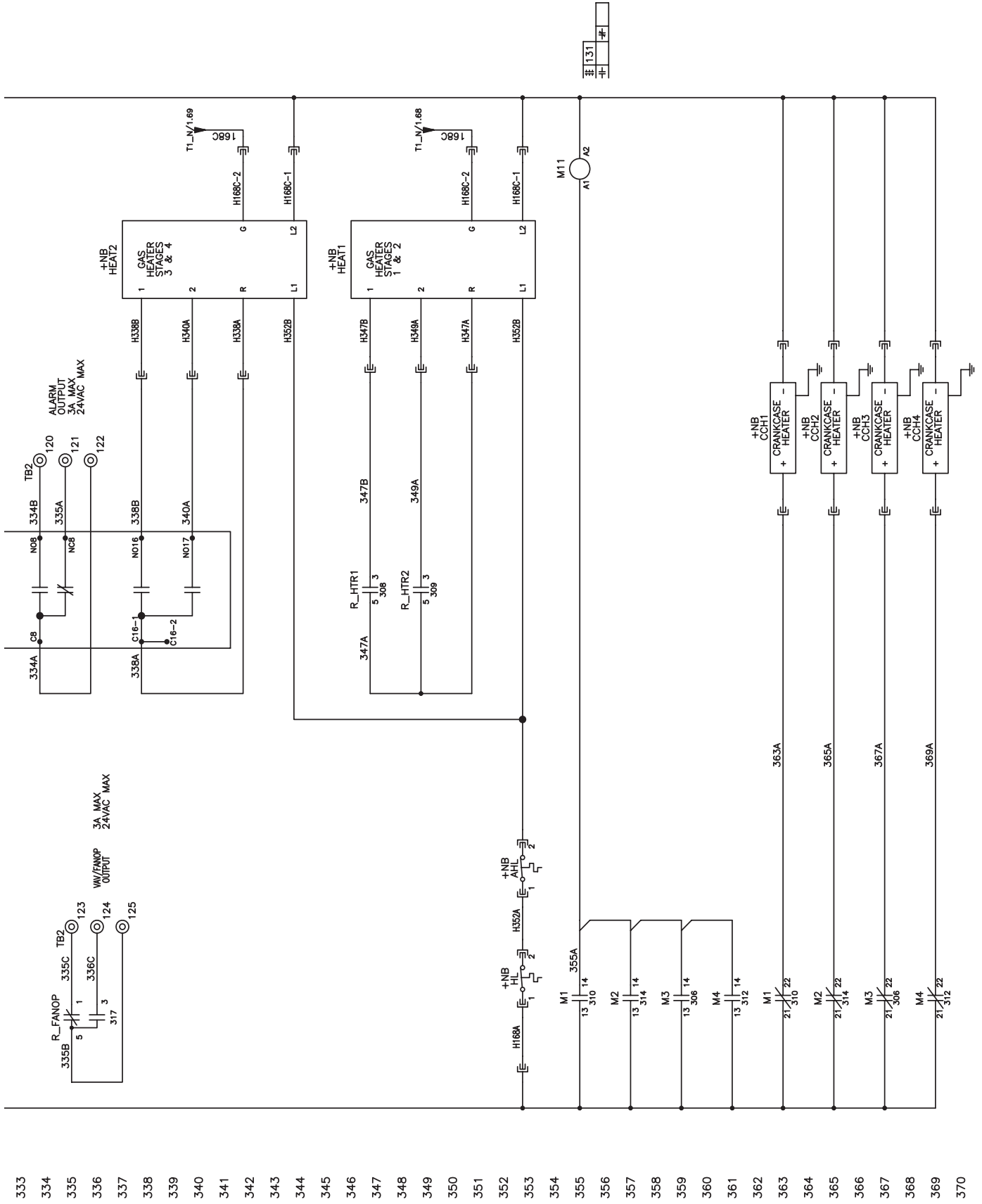
Field Wiring

Figure 13: CAV Power
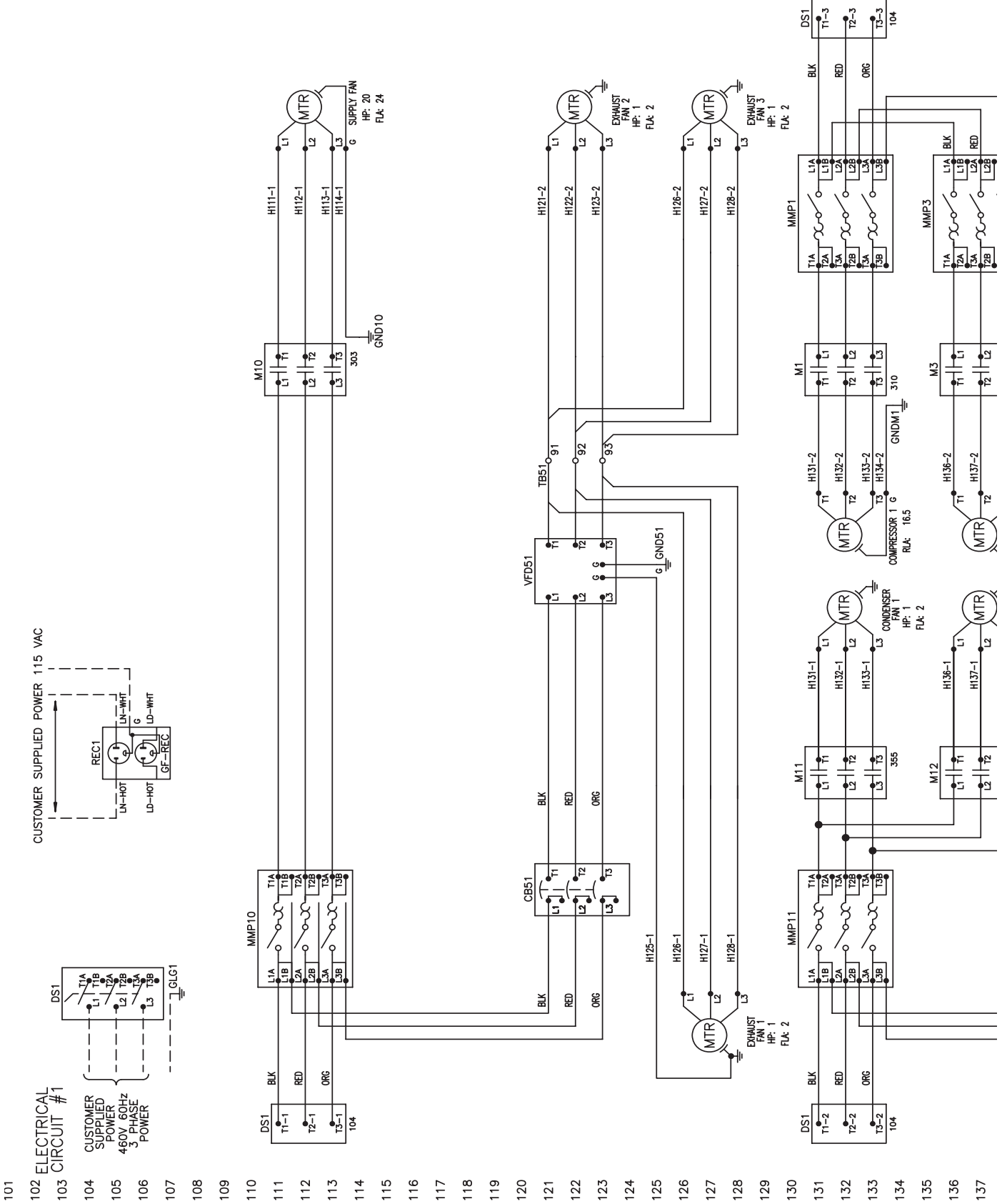
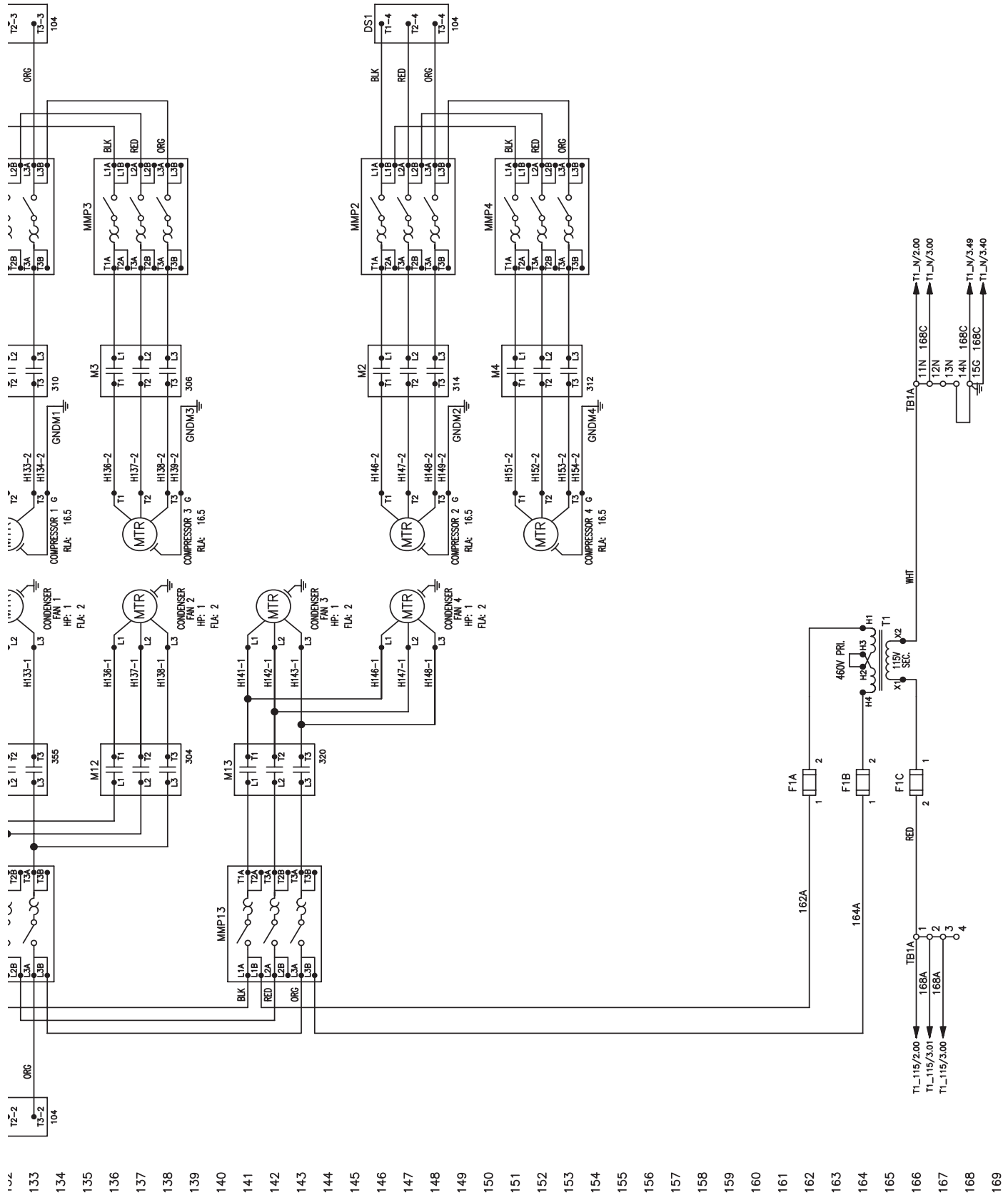*Figure 14: CAV Control—Inputs*
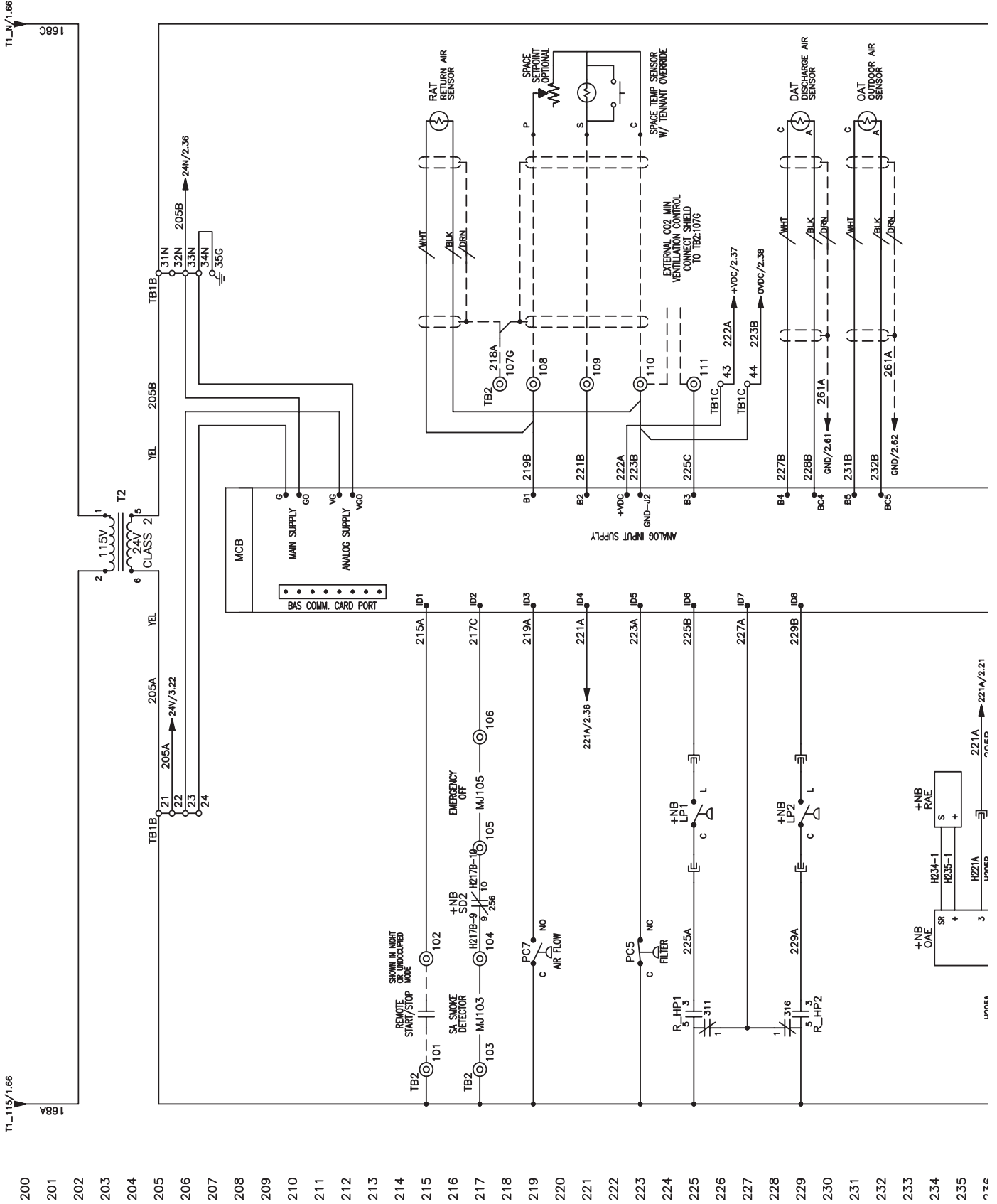
SPS2
BLDG STATIC
PRES SENSOR

+
−
S

RED
223B
WHT
BLK
DRN

222A
+VDC/2.27
238B
OVDC/2.28
GND/2.62
261A

B7

TB2 112

241B
B8

243B
GND
GND–J6

DISCHARGE AIR
TEMPERATURE
SETPOINT
CONNECT SHIELD
TO TB2:107G

113

IDC1
261A
GND/2.63

IDC9
261A
GND/2.64

H234–1
H235–1
S
+

H221A
H205B

SR
+
3
COM

221A
205B
221A/2.21
24N/2.06

2AV

H205A

SA SMOKE DETECTOR

(FIELD INSTALLED)

+NB
SD1

117
TB2

116
TB2

H256–4

RA SMOKE DETECTOR

+NB
SD2
5

H256–5

GROUND TERMINALS FOR CABLE SHIELDS

TB1D
261A
261A

51G
261A
261A
GND/2.30
GND/2.33

52G

53G
261A
GND/3.29
GND/3.30

261A
GND/2.39
261A
GND/3.24
261A
GND/3.24
261A
GND/2.41
261A
GND/2.43
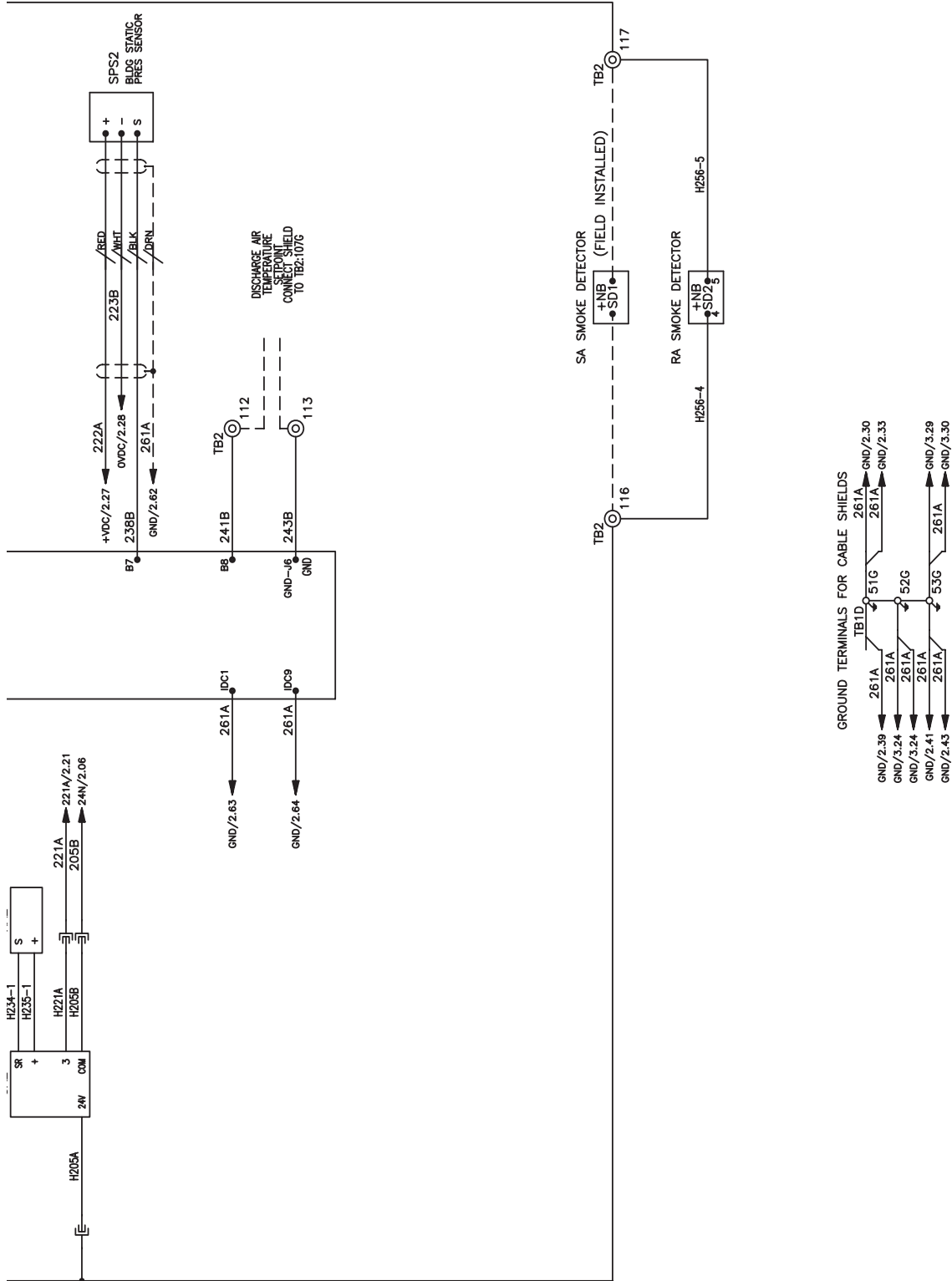
234
235
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270

Figure 15: CAV Control—Outputs (Staged)
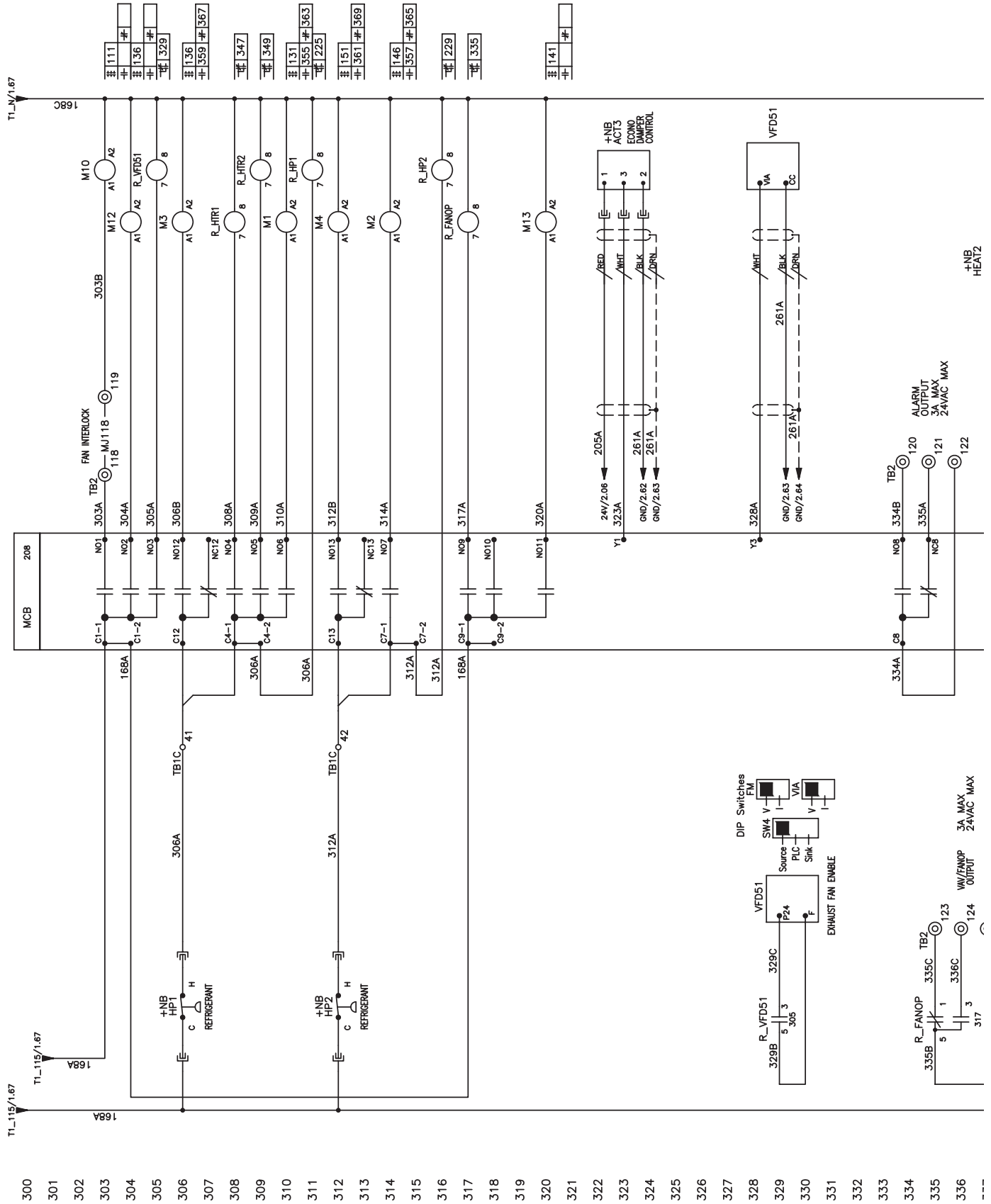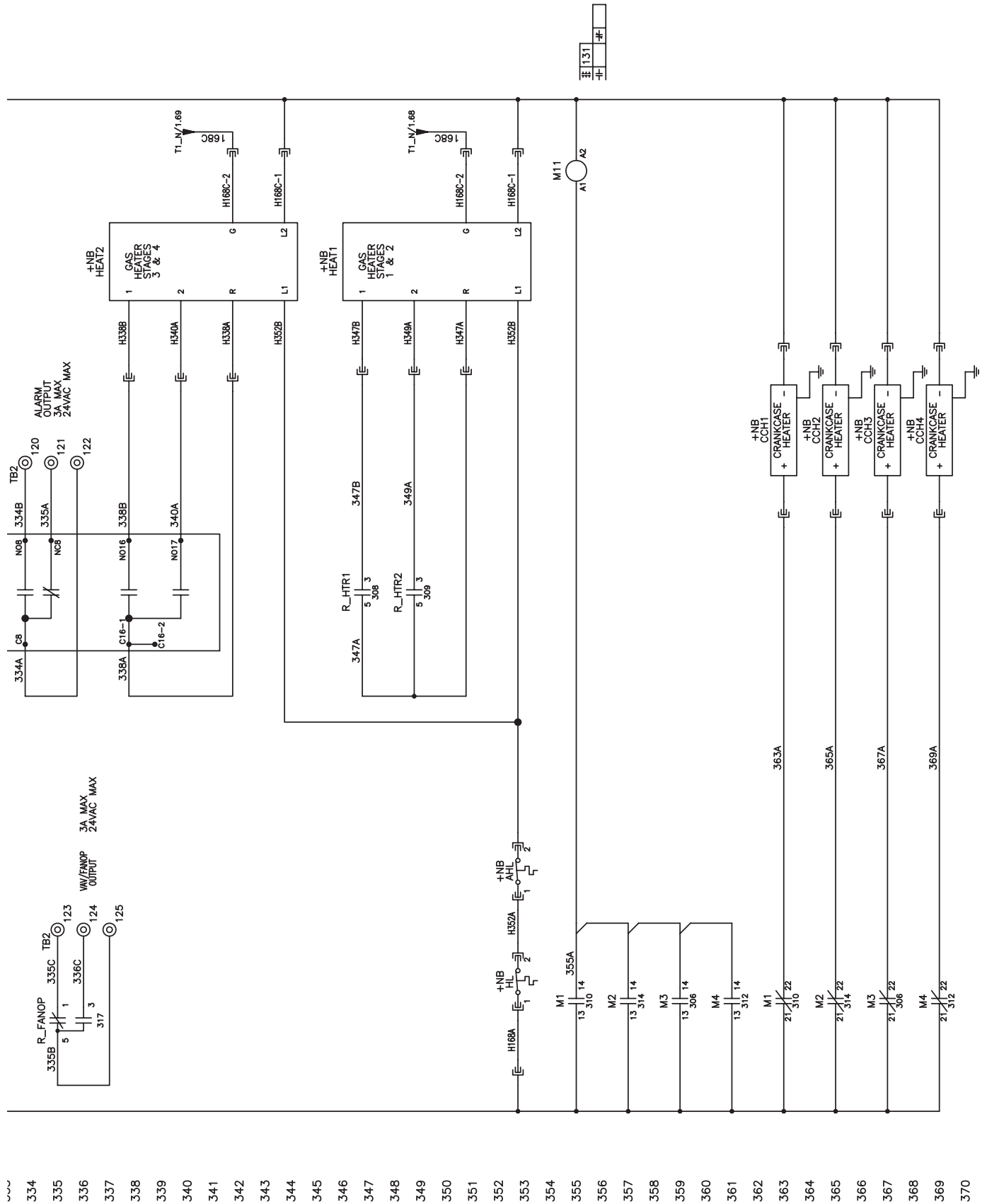
Figure 16: CAV Control—Outputs (Modulating)
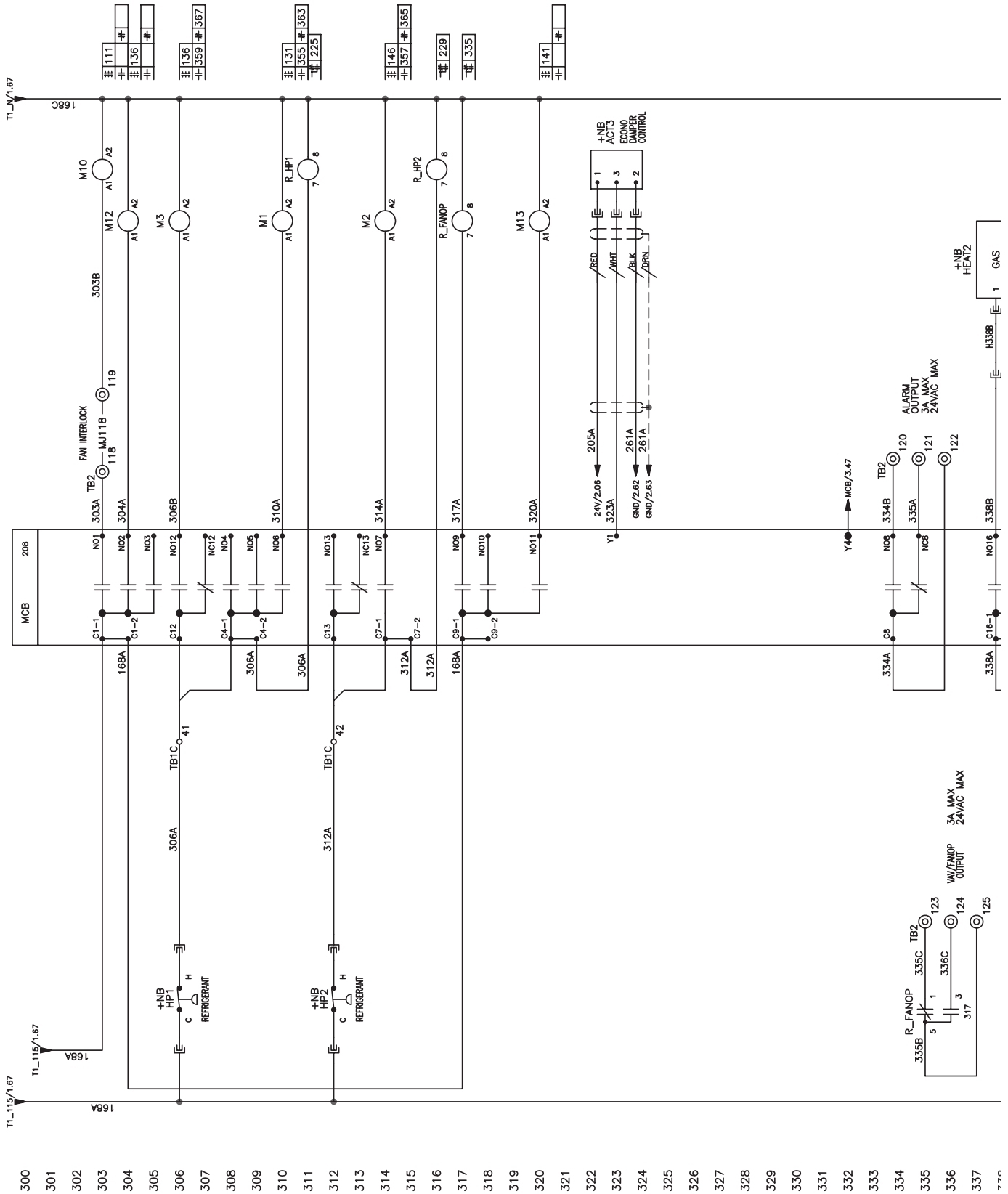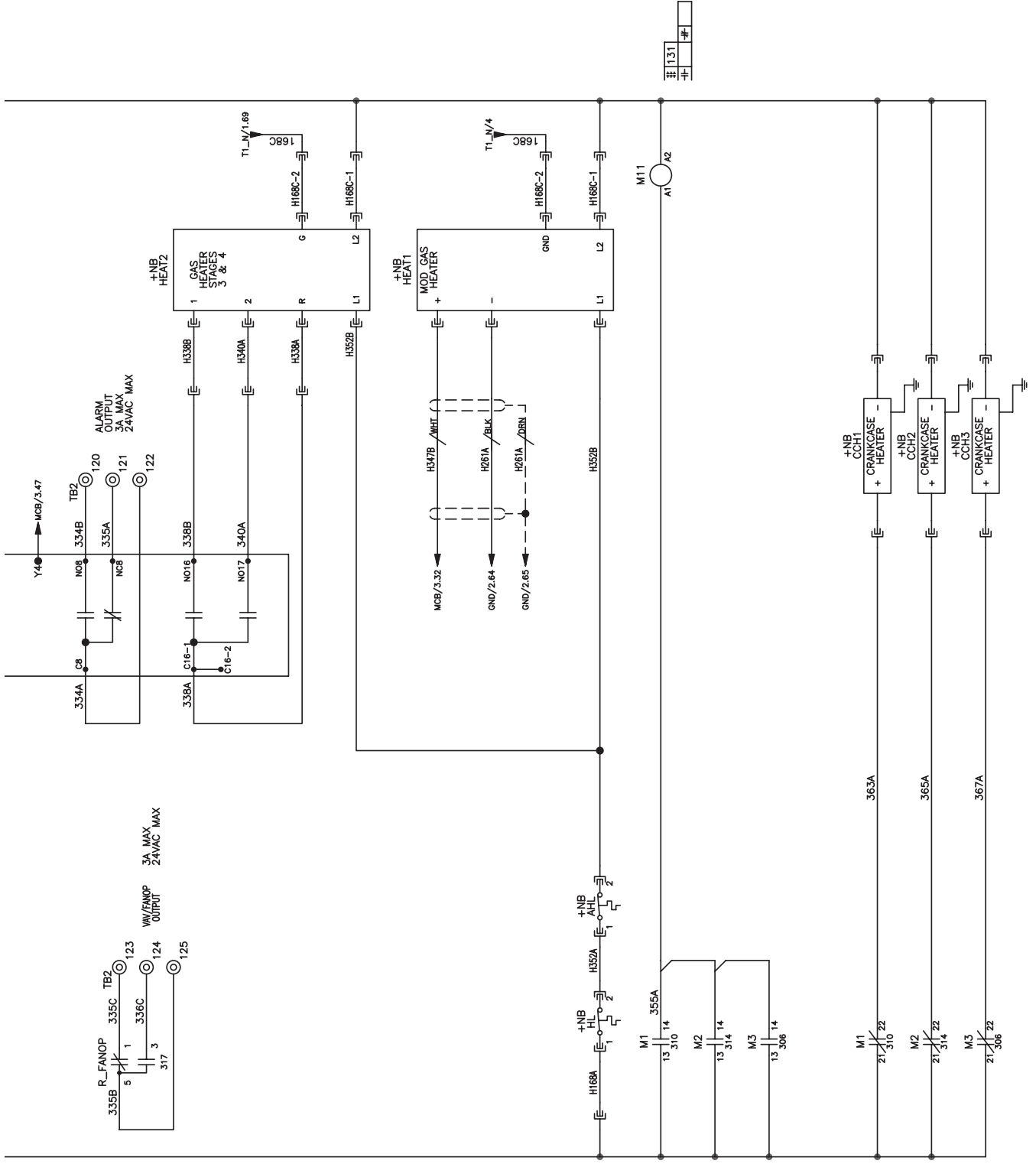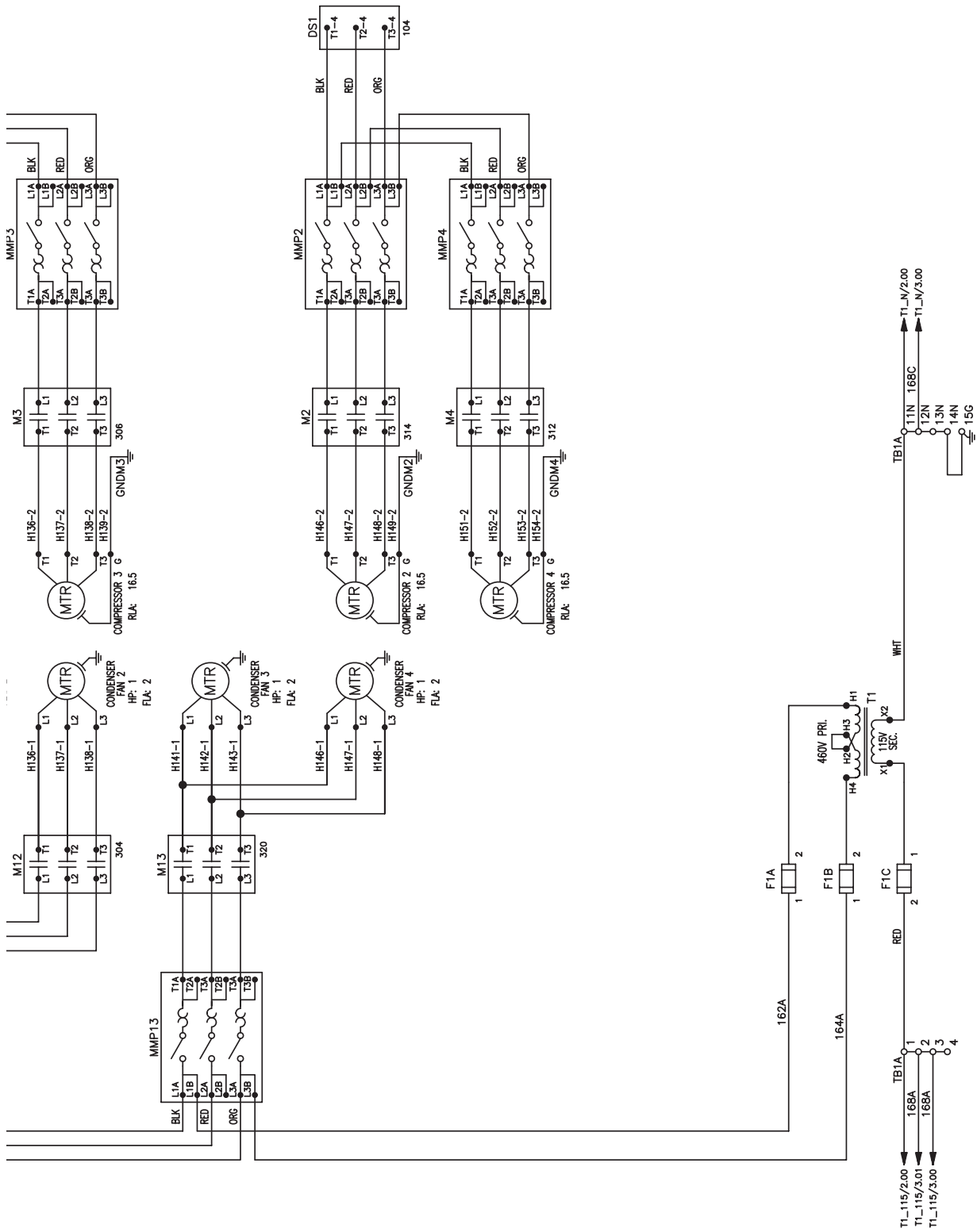
Figure 17: Electric Heat Option Power

Field Wiring

Figure 18: Electric Heat Option—Outputs
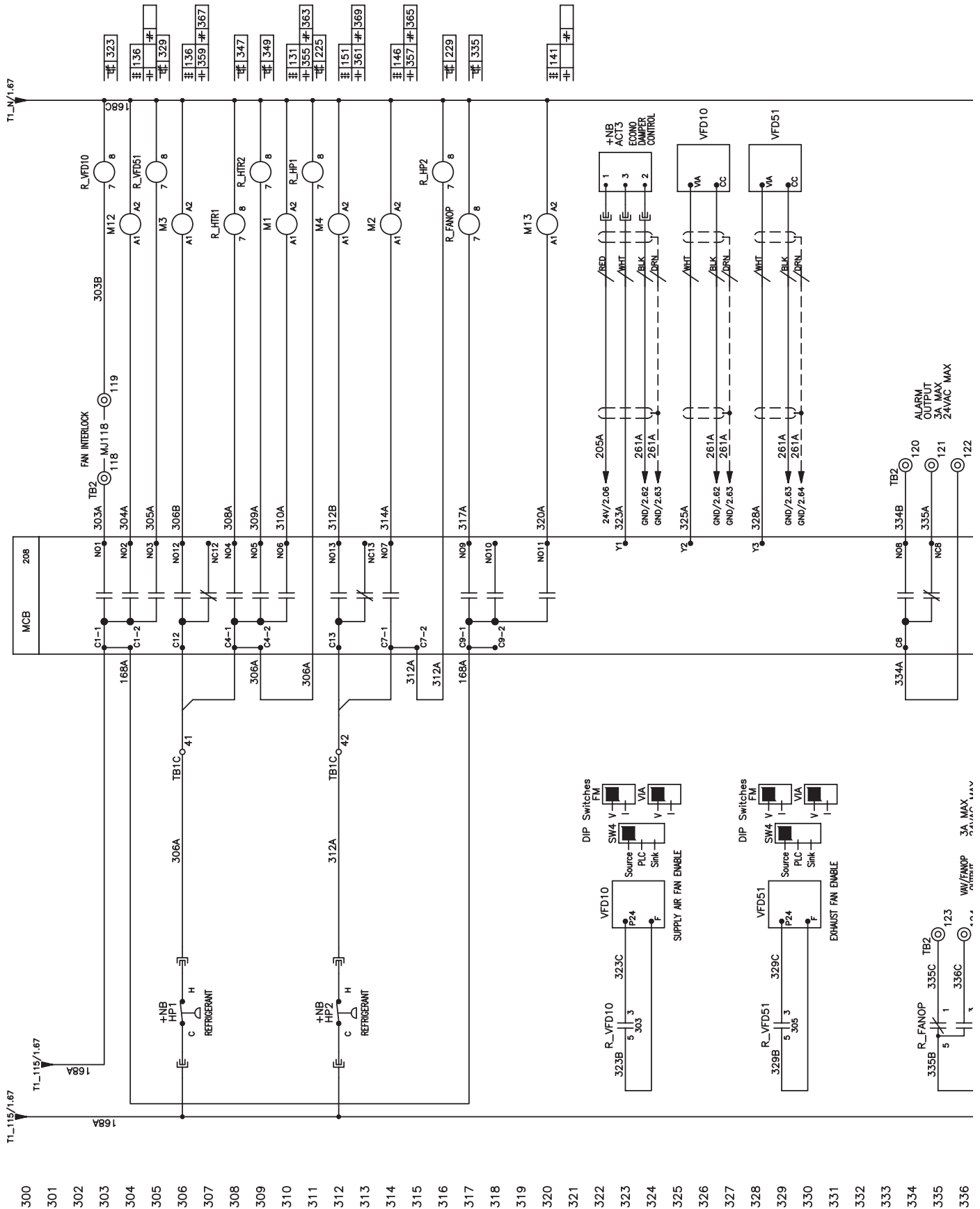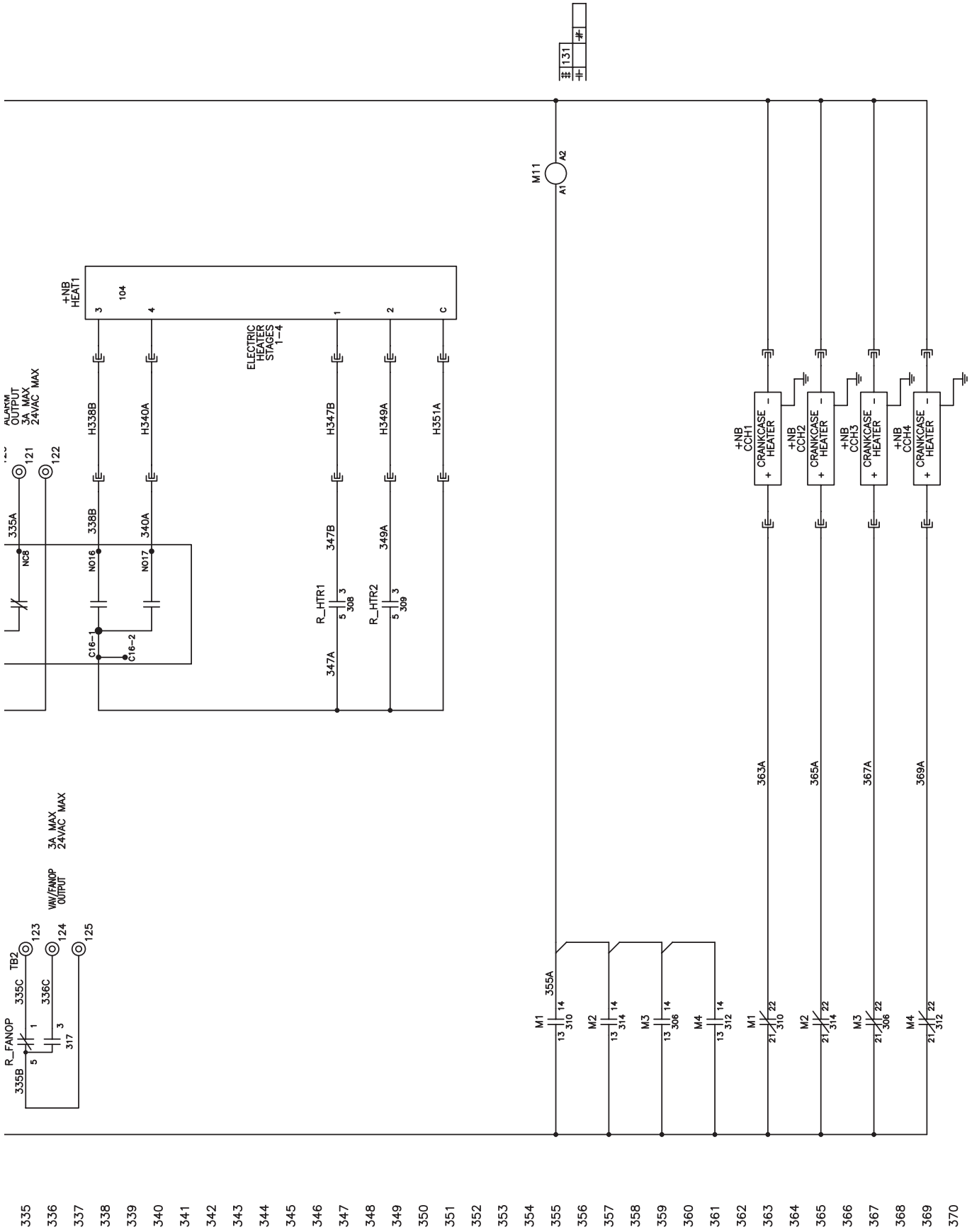
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