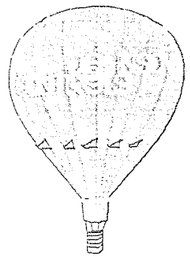
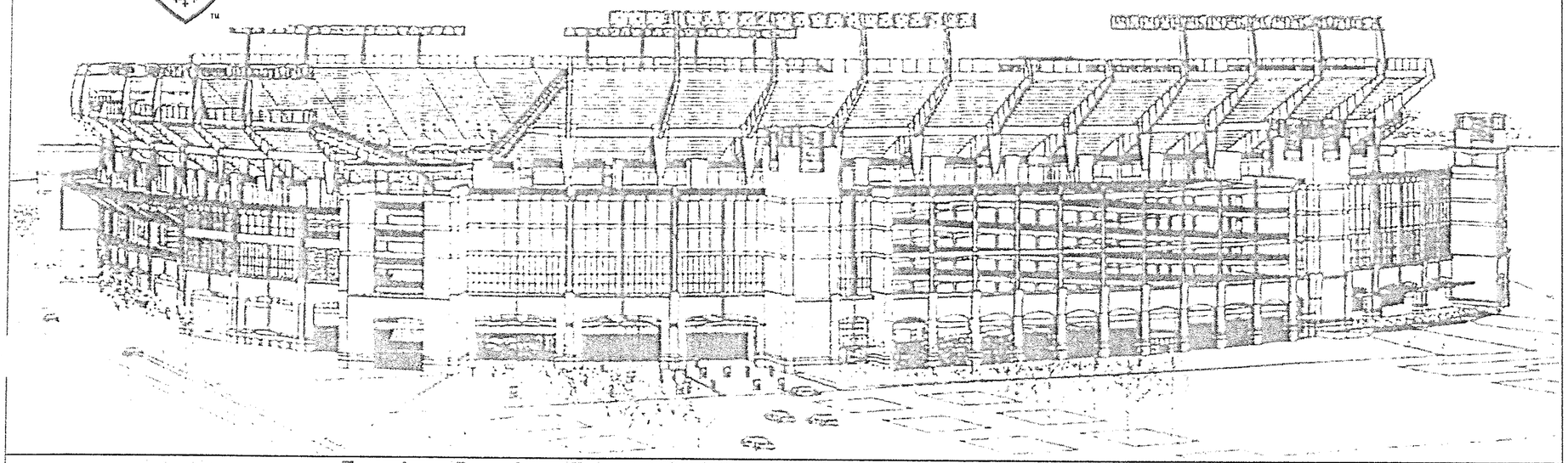
BALTIMORE NFL STADIUM AT CAMDEN YARDS

HOME OF THE BALTIMORE RAVENS





JOHNSON CONTROLS

Creating a better climate for business.

- [x] Environmental Control System
- [x] Building Automation System
- [ ] Fire Management System
- [ ] Security System
- [ ] Lighting Services
- [ ] Telecommunication System
- [ ] Integrated Motor Control Center
- [ ] Air and Water Systems Balancing
- [ ] Instrumentation System Installation
- [ ] Building Operations Management
- [ ] Energy Conservation Control
- [ ] Custom Programmed Maintenance

Automatic Temperature Controls
Heating
Air Conditioning
Air Filters
Water Treatment
Coil Cleaning
Control Center
Fire Management
Security Management
Sound and Communication
Programmed Clocks
Contract Operations
Time-Shared Automated Building Service
Refrigeration
Electrical Equipment
Emergency Generator / Lighting Equipment
Industrial Controls / Recording / Indication Equipment

T A B L E O F C O N T E N T S

NOTE: ALL AHU/HVU EQUIPMENT TO HAVE ONE (1) DISCHARGE AIR THERMOMETER

T-2100-202 (-40TO160F)

REVISION INFORMATION

NUMBER

DATE 07/18/00

TIME 12:01 PM

FILE NAME TITLERV1.vsd

PROJECT

BALTIMORE NFL STADIUM
AT CAMDEN YARDS
HOME OF THE BALTIMORE RAVENS

ARCHITECT
HELLMUTH, OBATA, KASSABAUM, P.C.
323 WEST 8TH STREET, SUITE 700
KANSAS CITY, MISSOURI 64105

ENGINEER
ROSS MURPHY FINKELSTEIN, INC.
190 WEST OSTEND STREET
BALTIMORE, MARYLAND 21230

USER DEFINED
S.E. - J. D. PRUSAK
P.M. - W. J. THOMPSON
A.E. - R. T. SCHLOTTERBECK

CONTRACTOR
THE POOLE & KENT COMPANY
4530 HOLLINS FERRY ROAD
BALTIMORE, MARYLAND 21227

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

JOHNSON CONTROLS
Systems & Services Division

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, Maryland 21152
TEL: 410-584-1160
FAX: 410-472-4928

BL-6559

SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DATE	CONTRACT NUMBER
JDP	WJT	RTS	0915/97	7052-0098

QUAD 'A' | QUAD 'B'

UPPER CONCOURSE ROOF

UPPER CONCOURSE
- ENCLOSURE EN-EXH AS-VAV110-1 (120VAC Power) (TYPICAL OF 1)
- ENCLOSURE EN-EXH AS-VAV110-1 (120VAC Power) (TYPICAL OF 1)

UPPER SUITE LEVEL
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FCU TC-9102-0332 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FCU TC-9102-0332 (120VAC Power) (TYPICAL OF XX)

LOWER SUITE LEVEL
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FCU TC-9102-0332 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-FCU TC-9102-0332 (120VAC Power) (TYPICAL OF XX)

CLUB LEVEL
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-MAU-2A AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-MAU-2B AS-UNT111-101 (120VAC Power)

N1 TRUNK

N2 TRUNK

PRESS LEVEL
- ENCLOSURE EN-ELEC-A AS-VAV110-1 (120VAC Power) (TYPICAL OF 2)
- ENCLOSURE EN-AHU-1 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-NCM-1 NU-NCM350-1 (120VAC Power)
- ENCLOSURE EN-FPVAV AS-VAV111-1 (120VAC Power) (TYPICAL OF XX)
- ENCLOSURE EN-ELEC-B AS-VAV110-1 (120VAC Power) (TYPICAL OF 2)
- ENCLOSURE EN-RHC-XX AS-UNT110-101 (120VAC Power)
- ENCLOSURE EN-AHU-2 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-NCM-2 NU-NCM350-1 (120VAC Power)

N1 TRUNK TO QUAD C NCM-3

TO POINTS IN HEAT TRACE PANEL HT-MCA

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

TO POINTS IN HEAT TRACE PANEL HT-MCB

- ENCLOSURE EN-AHU-26 AS-UNT111-101 (120VAC Power)

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

MAIN CONCOURSE
- ENCLOSURE EN-ELEC-S AS-VAV110-1 (120VAC Power) (TYPICAL OF 6)
- ENCLOSURE EN-HVU-7 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-10 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-5 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-AHU-10 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-11 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-9 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-AHU-17 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-RHC-XX AS-UNT110-101 (TYPICAL OF 4) (120VAC Power)
- ENCLOSURE EN-HVU-12 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-AHU-18 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-AHU-11 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-AHU-12 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-AHU-13 AS-AHU103-300 (120VAC Power)
- ENCLOSURE EN-AHU-14 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-6 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-AHU-16 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-AHU-15 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-13 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-RHC-XX AS-UNT110-101 (TYPICAL OF 4) (120VAC Power)
- ENCLOSURE EN-DOM DX-9100-8454 (120VAC Power)
- ENCLOSURE EN-HEATING DX-9100-8454 (120VAC Power)
- AIR COMP AC-1
- ENCLOSURE EN-AHU-19 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-COOLING DX-9100-8454 (120VAC Power)
- ENCLOSURE EN-HVU-1 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-2 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-3 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-4 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-HVU-8 AS-UNT111-101 (120VAC Power)
- ENCLOSURE EN-NCM-5 NU-NCM350-1 (120VAC Power)

SERVICE LEVEL

BILL OF MATERIALS

Estimate: networka/b 70520098.pre

Desig.	Qty	Part #	Description
Panel Devices:			
NCM-1,2,5	3	EN-EWC22-0	UNIV PKG MOD,F/NCM-30C
	3	NU-NCM350-1	NETWORK CTRL, ETHERNET

N1 TRUNK CABLE = TO BE IN STRUCTURED WIRING SYSTEM SUPPLIED BY JOB ELECTRICIAN

N2 TRUNK CABLE = 3 CONDUCTOR #18AWG SHIELDED TWISTED WIRE SOLID OR STRANDED BELDON OR EQUAL

FIELD POINT WIRING TO BE 2 OR 3 CONDUCTOR #18AWG SHIELDED TWISTED WIRE SOLID OR STRANDED BELDON OR EQUAL

REVISION INFORMATION	Drawing Title
NUMBER	METASYS CONFIGURATION QUAD A & B
DATE 07/18/00	
TIME 11:59 AM	Project Title
	BALTIMORE NFL STADIUM AT CAMDEN YARDS
FILE NAME NETWORK1.vsd	BALTIMORE, MARYLAND

AS-BUILT					7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY
Sales Engineer JDP	Project Manager WJT	Application Engineer RTS	DRAWN BY RTS DATE 7/24/97		APPROVED BY DATE	

JOHNSON CONTROLS
Systems & Services Division

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, Md 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-00A

QUAD 'C' | QUAD 'D'

UPPER CONCOURSE ROOF

UPPER CONCOURSE

ENCLOSURE EN-EXH AS-VAV110-1 — 120VAC Power (TYPICAL OF XX)

UPPER SUITE LEVEL

ENCLOSURE EN-DPS AS-VAV111-1 — 120VAC Power
ENCLOSURE EN-FPVAV AS-VAV111-1 — 120VAC Power (TYPICAL OF XX)
ENCLOSURE EN-FCU TC-9102-0332 — 120VAC Power (TYPICAL OF XX)

LOWER SUITE LEVEL

ENCLOSURE EN-FPVAV AS-VAV111-1 — 120VAC Power (TYPICAL OF XX)
ENCLOSURE EN-FCU TC-9102-0332 — 120VAC Power (TYPICAL OF XX)

CLUB LEVEL

ENCLOSURE EN-FPVAV AS-VAV111-1 — 120VAC Power (TYPICAL OF XX)
ENCLOSURE EN-MAU-2C AS-UNT111-101 — 120VAC Power
ENCLOSURE EN-MAU-2D AS-UNT111-101 — 120VAC Power

N1 TRUNK TO QUAD B NCM-2

N1 TRUNK

N2 TRUNK

PRESS LEVEL

AIR COMP AC-2

ENCLOSURE EN-ELEC-C AS-VAV110-1 — 120VAC Power (TYPICAL OF 2)
ENCLOSURE EN-FPVAV AS-VAV111-1 — 120VAC Power
ENCLOSURE EN-AHU-9 AS-AHU103-300 — 120VAC Power
ENCLOSURE EN-DPS-3 AS-VAV111-1 — 120VAC Power (TYPICAL OF XX)
ENCLOSURE EN-AHU-3 AS-AHU103-300 — 120VAC Power
ENCLOSURE EN-NCM-3 NU-NCM350-1 — 120VAC Power
ENCLOSURE EN-NCM-4 NU-NCM350-1 — 120VAC Power
ENCLOSURE EN-AHU-4 AS-AHU103-300 — 120VAC Power
ENCLOSURE EN-DPS-4 AS-VAV111-1 — 120VAC Power
ENCLOSURE EN-ELEC-D AS-VAV110-1 — 120VAC Power (TYPICAL OF 2)

AIR COMP AC-3

TO POINTS IN HEAT TRACE PANEL HT-MCC

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

ENCLOSURE EN-AHU-24 AS-UNT111-101 — 120VAC Power

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

ENCLOSURE EN-AHU-25 AS-UNT111-101 — 120VAC Power

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

TO POINTS IN HEAT TRACE PANEL HT-MCD

TO POINTS FOR TOILET EXH FANS AND CAB UNIT HTRS

MAIN CONCOURSE

TO N1 TRUNK ABOVE

120VAC POWER — PTR-1

120VAC POWER — WS-1

120VAC POWER

THIS EQUIPMENT LOCATED AS DIRECTED

SERVICE LEVEL

BILL OF MATERIALS

Estimate: networkc/d 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
PTR-1	1	EPS-C-11280	EPSON FX-870 9-PIN 8K 342/68CPS
WS-1	1	CPQ-A-15315	Deskpro 2000 5/166MMX,2.1GB,/16MB
	1	WS-SWOPMI-0	PMI, NEW
	1	WS-SWOPMI-SCS	PMI, NEW,SUBSCRIPTION
Panel Devices:			
NCM-3,4	2	EN-EWC22-0	UNIV PKG MOD,F/NCM-350
	2	NU-NCM350-1	NETWORK CTRL, ETHERNET+

N1 TRUNK CABLE = TO BE IN STRUCTURED WIRING SYSTEM SUPPLIED BY JOB ELECTRICIAN

N2 TRUNK CABLE = 3 CONDUCTOR #18AWG SHIELDED TWISTED WIRE SOLID OR STRANDED BELDON OR EQUAL

FIELD POINT WIRING TO BE 2 OR 3 CONDUCTOR #18AWG SHIELDED TWISTED WIRE SOLID OR STRANDED BELDON OR EQUAL

REVISION INFORMATION						
NUMBER						
DATE 07/18/00	AS-BUILT				7/18/00	CME
TIME 12:02 PM	REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
FILE NAME NETWORK2.vsd	Sales Engineer JDP	Project Manager WJT	Application Engineer RTS	DRAWN BY RTS DATE 7/24/97	APPROVED BY	DATE

Drawing Title: METASYS CONFIGURATION QUAD C & D

Project Title: BALTIMORE NFL STADIUM AT CAMDEN YARDS

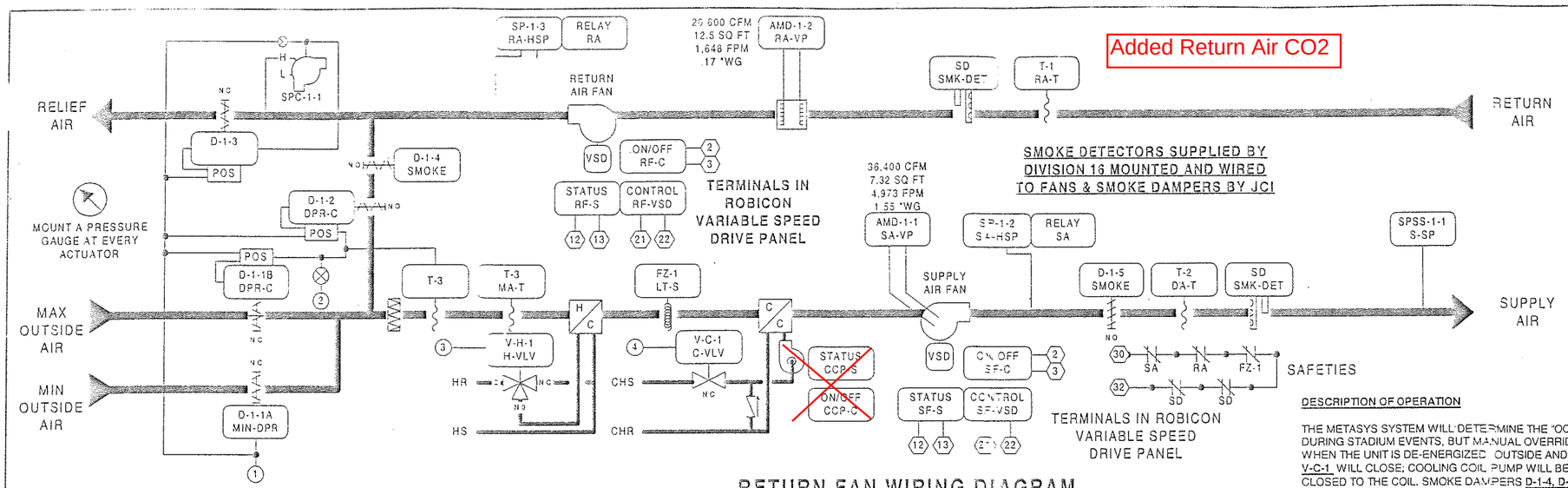
BALTIMORE, MARYLAND

JOHNSON CONTROLS — Systems & Services Division

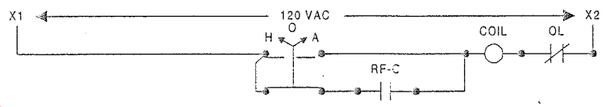
Branch Information: Johnson Controls, Inc. 60 Loveton Circle Sparks, Md 21152

CONTRACT NUMBER: 7052-0098

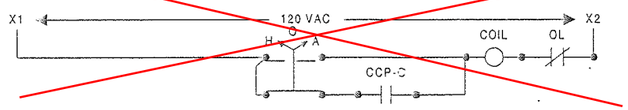
DRAWING NUMBER: BL-6559-00B



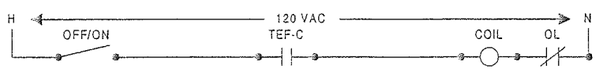
RETURN FAN WIRING DIAGRAM

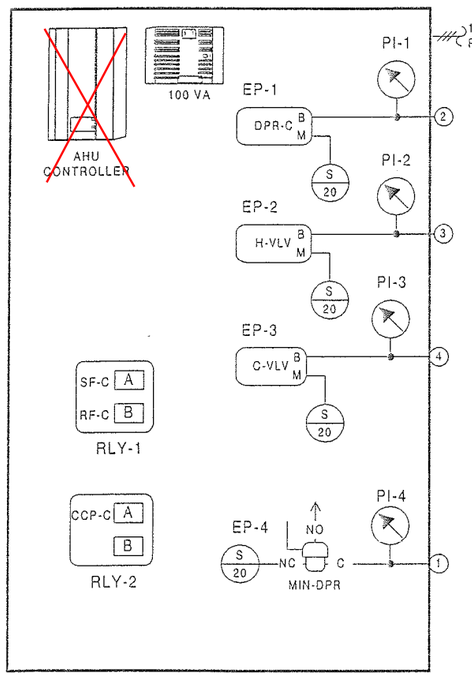


COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM



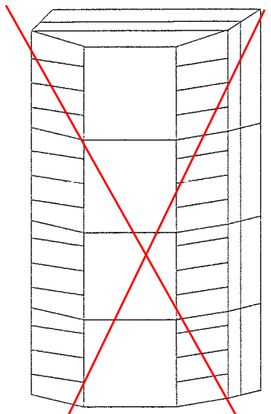


SEE BL-6559-01A FOR MORE WIRING DETAILS

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-A10	ROOF	RPUCA	13	UP CONCOURSE
TEF-A11	ROOF	RPUCA	17	UP CONCOURSE
TEF-A12	ROOF	RPUCA	21	UP CONCOURSE
TEF-A15	ROOF	RPUCA	9	UP CONCOURSE
TEF-A16	ROOF	STARTER		ROOF
TEF-A23	CLUB LEVEL	RP2CLA	11	CLUB LEVEL

CONTROLLED FROM MAU PANEL - UPPER CONCOURSE BO3

USE (3) PD-109-51 & (3) PD-101-35 AT (3) PANEL/STARTER LOCATIONS



ENCLOSURE EN-AHU-1
AS-AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-1/N2 ADD = 1

BILL OF MATERIALS

Estimate: ahu-1 7252/0068 pre

Desig.	Qty	Part #	Description
Field Devices:			
D-1-1A,D-1-1B,D-1-2,D-1-3	4	---	SEE DAMPER SCHEDULE
DPR-C	3	D-3153-1	DMPR ACT,8-15#,W/PILOT
DPR-C,MIN-DPR	2	D-3153-2	DMPR ACT,8-15#
	5	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-1	1	A70HA-1C	STAT,DL,20°,EL,MAN. RE 55F
H-VLV,C-VLV	2	--	SEE VALVE SCHEDULE
MA-T,DA-T,RA-T	3	TE-6316P-1	SENS,T-NI,0.0K,17' BMG
RA-VP	1	DPT-2641-2	XDUCR DP 0/0.25" 4-20ma
S-SP	1	DPT-2641-7	XDUCR DP 0/10.0" 4-20ma
SA-HSP,RA-HSP	2	AFS-460	DUCT AIR FLOW HIGH STATIC P
SA-VP	1	DPT-2641-5	XDUCR DP 0/2.5" 4-20ma
SPC-1-1	1	R-317-1	CNTRLR DP,0.05-1"WG
T-3	1	T-3610-1201	STAT,LOW VOL ,3° ADJ, DCT
TEP	3	BZ-1000-11	ENCL,4-5/8X 5-1/8 H 3-3/8
	3	PD-101-35	RLY BASE,3PDT,11PIN 10A
	3	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
EN-AHU-1	1	AS-AHU103-300	AHU TERM BD IN ENCL
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKEN
EP-1,2,3	3	EP-3000-4	XDUCR,EP,4-20ma,HI VEL
EP-4	1	V11HGA-100	3-W SOLENOID,N/CV,24 VAC
PI-1,2,3,4	4	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC
SA,RA	2	PD-101-35	RLY BASE,3PDT,11PIN 10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED OUTSIDE AND RELIEF AIR DAMPERS D-1-1A, D-1-1B, D-1-3 AND COOLING COIL VALVE V-C-1 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-1-2 WILL BE OPEN AND HEATING COIL VALVE V-H-1 WILL BE CLOSED TO THE COIL. SMOKE DAMPERS D-1-4, D-1-5 WILL REMAIN OPEN UNDER CONTROL OF SMOKE DETECTION SYSTEM.

WARM-UP MODE - SUPPLY AND RETURN FANS WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-1 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-1-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-1-1A, D-1-1B AND RELIEF AIR DAMPER D-1-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY AND RETURN FANS WILL BE RUNNING, RETURN AIR DAMPER D-1-2 IS OPEN. MINIMUM OUTSIDE AIR DAMPER D-1-1A WILL OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FORTY-FIVE (45F) MODULATE V-H-1 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, T-2 WILL GRADUALLY MODULATE DAMPERS D-1-1B OPEN WHILE SIMULTANEOUSLY CLOSING D-1-2. STATIC PRESSURE CONTROLLER SPC-1-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-1-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-3, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE T-2 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-1 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND RETURN FANS AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-1-1A WILL OPEN. OUTSIDE DAMPER D-1-1B AND RETURN DAMPER D-1-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), MAXIMUM OUTSIDE AIR DAMPERS D-1-1B WILL CLOSE, OPENING RETURN AIR DAMPER D-1-2. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-1-1B AND D-1-2 AND CHILLED WATER VALVE V-C-1 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-1 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND RETURN FANS AND CLOSE ALL SYSTEM DAMPERS.

FAN CONTROL - SYSTEM STATIC PRESSURE SENSING STATION SPSS-1-1 THROUGH A STATIC PRESSURE TRANSMITTER AND THE METASYS CONTROLLER WILL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN ITS SETTING. ON A RISE IN STATIC AS SENSED BY SPSS-1-1 THE SUPPLY FAN DRIVE WILL GRADUALLY MODULATE FAN SPEED TO ITS MINIMUM POSITION TO MAINTAIN ITS SETTING. HIGH LIMIT STATIC PRESSURE CONTROLLER SPC-1-2 WHICH WILL OVERRIDE SPSS-1-1 TO PREVENT THE DISCHARGE FROM RISING ABOVE IT'S SET POINT. SUPPLY DUCT AIR MONITORING STATION AMD-1-1 AND RETURN DUCT AIR MONITORING STATION AMD-1-2 THROUGH VELOCITY PRESSURE TRANSMITTERS WILL SEND SIGNALS TO THE METASYS CONTROLLER WHICH WILL COMPARE TOTAL SUPPLY AND RETURN AIR QUANTITIES AND MODULATE THE RETURN VARIABLE SPEED DRIVE BASED ON SETPOINT TO SYNCHRONIZE RETURN FAN VOLUME WITH THE SUPPLY FAN VOLUME SO AS TO MAINTAIN CONSTANT MINIMUM BALANCED OUTSIDE AIR FLOW. DIFFERENTIAL WILL BE REDUCED TO ZERO (0) (NO OUTSIDE AIR) DURING WARM-UP AND UNOCCUPIED MODES OF OPERATION. MANUALLY RESET HIGH LIMIT STATIC PRESSURE CONTROLLERS SPC-1-2 AND SPC-1-3 WILL STOP THEIR RESPECTIVE SUPPLY AND RETURN FANS WHENEVER THEIR SETTING IS REACHED. ALL FANS WILL BE REQUIRED TO BE MANUALLY RESTARTED IF DE-ENERGIZED BY STATIC PRESSURE CONTROLS. SUPPLY FANS WILL BE MANUALLY CONTROLLED USING A BY-PASS STARTER IF THEIR RESPECTIVE VARIABLE FREQUENCY FAN DRIVE FAILS.

TOILET EXHAUST FANS TEF-A10,A11,A12,A15,A16,A23 - THE FAN STARTS WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:17 PM
FILE NAME AHU-1.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-1
CLUB/SUITES QUAD A

PRESS LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/25/97	BY DATE

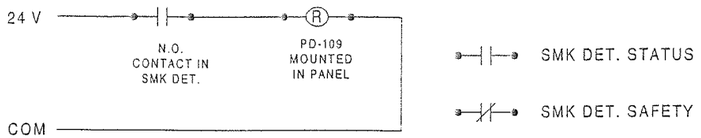
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

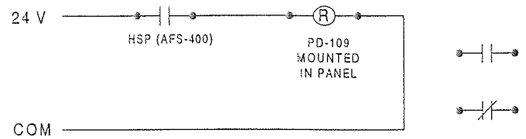
DRAWING NUMBER BL-6559-01

TYPICAL FOR ALL AHU'S, HVU'S, AND MAU'S



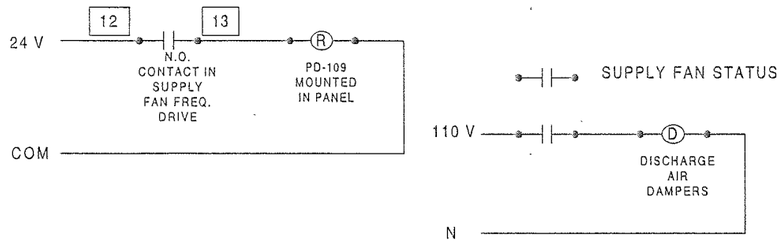
SMK DUCT DETECTOR IN SUPPLY USED FOR SYSTEM

TYPICAL FOR AHU-1,2,3,4



SAME APPLICATION ON BOTH SUPPLY AND RETURN FANS

TYPICAL FOR AHU-1,2,3,4



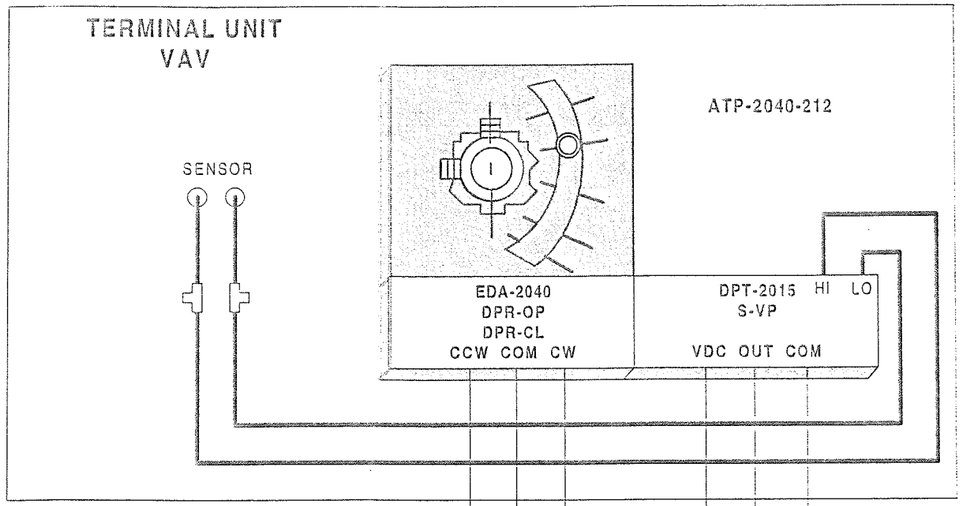
REVISION INFORMATION	Drawing Title						
NUMBER	WIRING DETAILS	AS-BUILT				7/18/00	CME
DATE 07/18/00		REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
TIME 02:07 PM	Project Title	Sales Engineer JDP / Project Manager WJT / Application Engineer RTS	DRAWN BY CME DATE 7/18/00	APPROVED BY DATE	Branch Information	CONTRACT NUMBER	
FILE NAME Miscahu.vsd	BALTIMORE NFL STADIUM AT CAMDEN YARDS BALTIMORE, MARYLAND	JOHNSON CONTROLS Systems & Services Division	Johnson Controls, Inc. 60 Loveton Circle Sparks, Md 21152			7052-0098	
						DRAWING NUMBER BL-6559-01A	

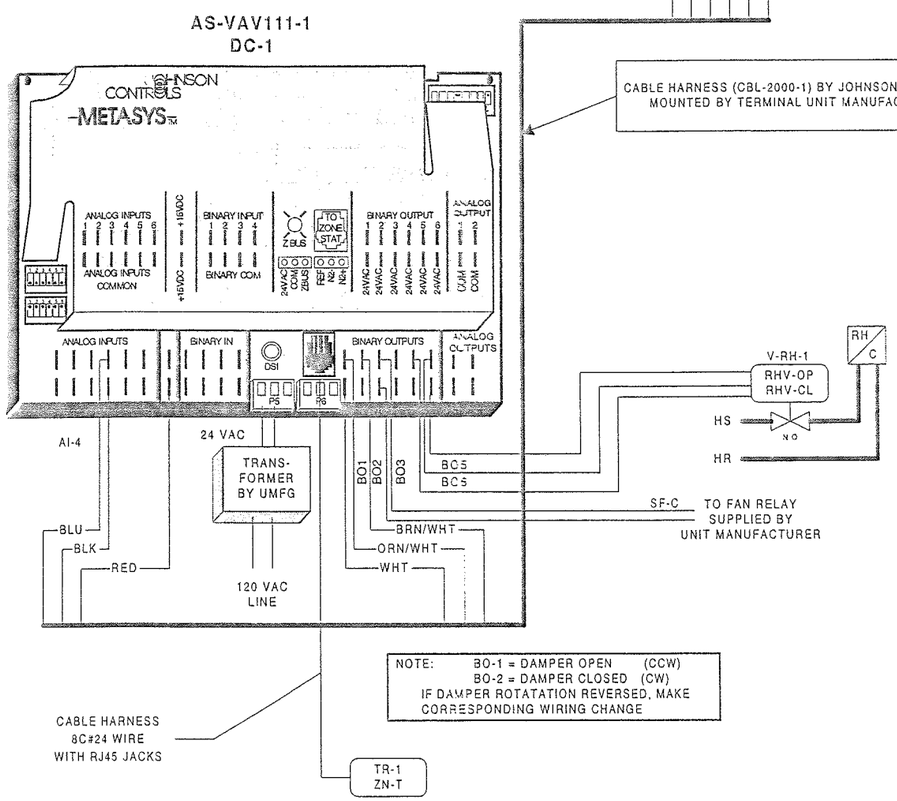
Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-1				AHU						EN-AHU-1	Press Lev MER A		M.3-09												Power to Controller
		AHU-1	*			AHU	1					EN-AHU-1	Press Lev MER A	0	M.3-09												N2 Trunk
	BO-1	AHU-1	MIN-DPR	Min OA Damper Control	Closed Open	AHU	1	1	BO-1		BO#,24V	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-1			V11HGA-100			2-8	2-Wire	SAV-24VAC		A50	
	BO-2	AHU-1	SF-C	Supply Fan Control	Off On	AHU	1	1	BO-2	RLY	BO#,24V,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-2	3/18	A,COILS,COM	RELAY-A	COM,NO		2-4	See starter detail	Starter (NO)		A53	
	BO-3	AHU-1	RF-C	Return Fan Control	Off On	AHU	1	1	BO-3	RLY	BO#,24V,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-3	3/18	B,COILS,COM	RELAY-B	COM,NO		2-4	See starter detail	Starter (NO)		A53	
	BO-4	AHU-1	CCP-C	Clg Coil Pump 1 Control	Off On	AHU	1	1	BO-4	RLY	BO#,24V,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-4	3/18	A,COILS,COM	RELAY-A	COM,NO		2-4	See starter detail	Starter (NO)		A53	
	BO-5	AHU-1	TEF-C	Toilet Exh Fan Control	Off On	AHU	1	1	BO-5		BO#,24V	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-5			PD-109-51			2-5	Device dependent	24VAC OUT		A50	
	BO-6	AHU-1				AHU	1	1	BO-6			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-6											
	BO-7	AHU-1				AHU	1	1	BO-7			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-7											
	BO-8	AHU-1				AHU	1	1	BO-8			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-8											
	BO-9	AHU-1				AHU	1	1	BO-9			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-9											
	BO-10	AHU-1				AHU	1	1	BO-10			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BO-10											
	AO-1	AHU-1	DPR-C	Damper Control	% Open	AHU	1	1	AO-1		AO#,AOCOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1-4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-1	H-VLV	Heating Coil Valve	% Open	AHU	1	1	AO-2		AO#,AOCOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1-4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-1	C-VLV	Clg Coil Valve	% Open	AHU	1	1	AO-3		AO#,AOCOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1-4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-1	SF-VSD	Sup Fan Var Spd Drive	%	AHU	1	1	AO-4		AO#,AOCOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-4						2-5	Device dependent	0-20mA OUT		A21	
	AO-5	AHU-1	RF-VSD	Ret Fan Var Spd Drive	%	AHU	1	1	AO-5		AO#,AOCOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-5						2-5	Device dependent	0-20mA OUT		A21	
	AO-6	AHU-1				AHU	1	1	AO-6			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AO-6											
	BI-1	AHU-1	SF-S	Supply Fan Status	Off On	AHU	1	1	BI-1		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-1						2-22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-1	RF-S	Return Fan Status	Off On	AHU	1	1	BI-2		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-2						2-22	Device dependent	Aux Contact (NO)		A40	
	BI-3	AHU-1	SMK-DET	Smoke Detectors	Normal Alarm	AHU	1	1	BI-3		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-3						2-22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-1	LT-S	Low Temperature Stat	Normal Alarm	AHU	1	1	BI-4		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-4						2-22	NO,M1	A70 (NC)		A41	
	BI-5	AHU-1	CCP-S	Clg Coil Pump 1 Status	Off On	AHU	1	1	BI-5		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-5						2-22	Device dependent	Aux Contact (NO)		A40	
	BI-6	AHU-1	SA-HSP	Supply Air Static Press	Normal Alarm	AHU	1	1	BI-6		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-6						2-22	Device dependent	AFS-460 & Relay		A40	
	BI-7	AHU-1	RA-HSP	Return Air Static Press	Normal Alarm	AHU	1	1	BI-7		BI#,BICOM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-7						2-22	Device dependent	AFS-460 & Relay		A40	
	BI-8	AHU-1				AHU	1	1	BI-8			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-BI-8											
	AI-1	AHU-1	RA-VP	Return Air Vel Pressure	In. Wg	AHU	1	1	AI-1		AI#,+VDC	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-1						2-3	-,+	DPT-2641		A2	
	AI-2	AHU-1	RA-T	Return Air Temperature	Deg F	AHU	1	1	AI-2		AI#,AICM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-2						2-3	2-Wire	TE-6316P-1		A4	
	AI-3	AHU-1	DA-T	Disch Air Temperature	Deg F	AHU	1	1	AI-3		AI#,AICM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-3						2-3	2-Wire	TE-6316P-1		A4	
	AI-4	AHU-1	MA-T	Mixed Air Temperature	Deg F	AHU	1	1	AI-4		AI#,AICM	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-4						2-3	2-Wire	TE-6316P-1		A4	
	AI-5	AHU-1				AHU	1	1	AI-5			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-5											
	AI-6	AHU-1				AHU	1	1	AI-6			EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-6											
	AI-7	AHU-1	S-SP	Supply Static Pressure	In. Wg	AHU	1	1	AI-7		AI#,+VDC	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-7						2-3	-,+	DPT-2641		A2	
	AI-8	AHU-1	S-VP	Supply Vel Pressure	In. Wg	AHU	1	1	AI-8		AI#,+VDC	EN-AHU-1	Press Lev MER A	0	M.3-09	AH-1-AI-8						2-3	-,+	DPT-2641		A2	

BILL OF MATERIALS

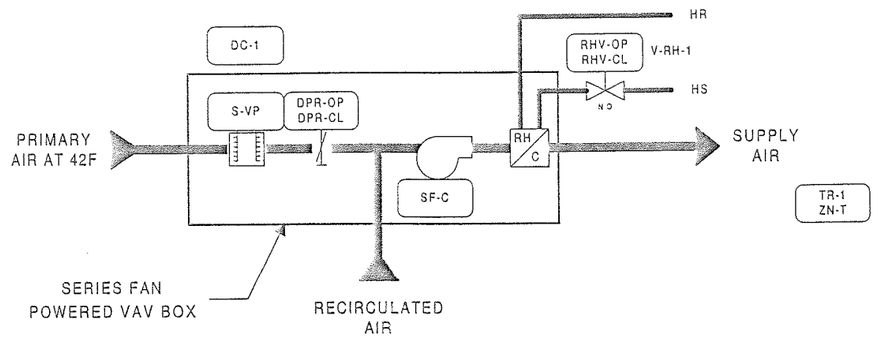
Estimate: quad a vavbox 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	46	AS-VAV110-1	VAV 6AI,4BI,5BO,8K
V-RH-1	46	--	SEE VALVE SCHEDULE
VAV	46	ATP-2040-212	ACT,2MIN+1.5"DP,1/2"CPLG
ZN-T	30	TE-6410W-1000	MSTAT,NI,BCE,JACK





SERIES FAN POWERED VARIABLE AIR VOLUME (VAV) WITH REHEAT COIL



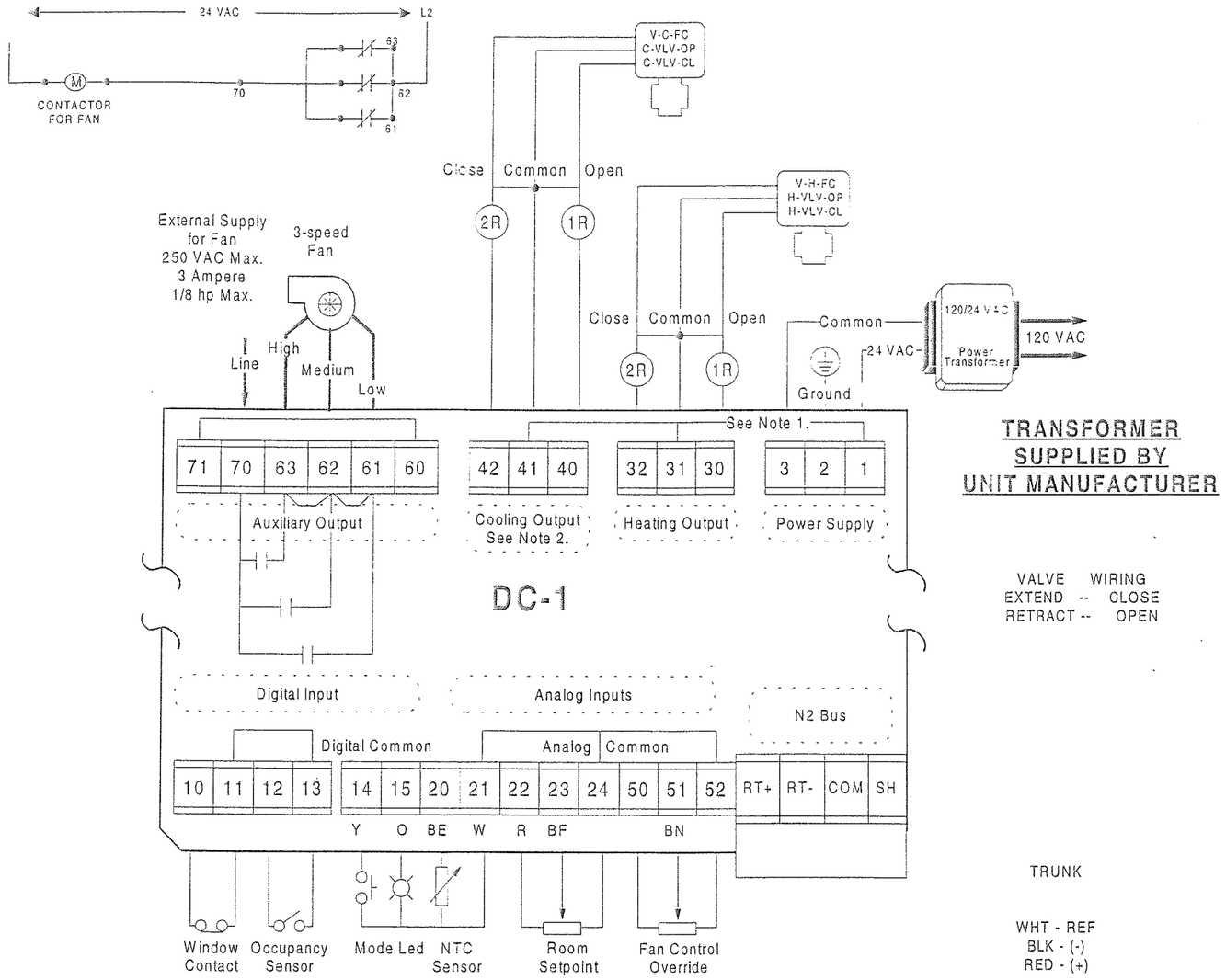
NOTE: VAV CONTROLLER (AS-VAV111-1) DAMPER ACTUATOR & DIFFERENTIAL PRESSURE TRANSMITTER (ATP-2040-212) ARE FACTORY MOUNTED BY TITUS

DESCRIPTION OF OPERATION

PRIMARY AIR VALVE WILL OPEN TO THEIR MINIMUM POSITION AND TERMINAL UNIT FAN WILL START AND RUN CONTINUOUSLY WHENEVER AIR HANDLING UNIT IS RUNNING. TERMINAL UNIT FANS WILL START THIRTY (30) SECONDS BEFORE OPENING OF AIR VALVES TO PREVENT BACK SPINNING OF FAN. FANS WILL ALSO BE OPERATED AS DEFINED IN THE UNOCCUPIED MODES. PRIMARY AIR VALVES WILL BE CLOSED DURING UNOCCUPIED HEATING MODE. ROOM SENSOR TR-1 WILL ON A RISE IN TEMPERATURE GRADUALLY MODULATE REHEAT COIL VALVE V-RH-1 CLOSED AND ON A CONTINUED RISE WILL GRADUALLY MODULATE PRIMARY AIR VALVE FROM IT'S MINIMUM TO MAXIMUM SETTING TO MAINTAIN IT'S SETTING OF SEVENTY-FIVE (75F). ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. DURING OPERATION OF THE WARM-UP MODE ALL PRIMARY AIR VALVES OPEN TO THEIR MAXIMUM POSITION AND TERMINAL FANS START TO PERMIT FULL AIR FLOW TO THE SPACES. REHEAT COIL VALVE V-RH-1 IS MODULATED IN RESPONSE TO ROOM SENSOR TO MAINTAIN SPACE TEMPERATURE.

REVISION INFORMATION	IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THERIN CONTAINED, IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHERS, FOR ANY PURPOSE, EXCEPT WITH THE WRITTEN PERMISSION OF JOHNSON CONTROLS, INC. AND FURTHER AGREES TO SURRENDER SAME TO JOHNSON CONTROLS, INC. UPON DEMAND.	DRAWING TITLE: FAN POWERED TERMINAL REHEAT UNITS QUAD A					
NUMBER						AS-BUILT	7/18/00	CME
DATE: 07/18/00						REFERENCE DRAWING / NO / REVISION-LOCATION / ECN / DATE / BY		
TIME: 02:18 PM						Sales Engineer: JDP; Project Manager: WJT; Application Engineer: RTS; DRAWN: BY RTS DATE 08/25/97; APPROVED: BY DATE		
		PROJECT TITLE: BALTIMORE NFL STADIUM AT CAMDEN YARDS BALTIMORE, MARYLAND	JOHNSON CONTROLS Controls Group	Branch Information: Johnson Controls, Inc. 60 Loveton Circle Sparks, MD 21152	CONTRACT NUMBER: 7052-0098			
FILE NAME: VAVBOX-A.vsd	COPYRIGHT JOHNSON CONTROLS, INC. 19nn				DRAWING NUMBER: BL-6559-02			

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FP-VAV-A					VAV						EN-FPVAV	At VAVBOX														Power to Controller
		FP-VAV-A					VAV	1	X				EN-FPVAV	At VAVBOX	0													N2 Trunk
	AI-1	FP-VAV-A	ZN-T	Zone Temperature	Deg F		VAV	1	X	AI-1		PHONE JACK	EN-FPVAV	At VAVBOX	0		FP-x-AI-1						5/25	PHONE JACK	Metastat-Ph Jack		U2	
	AI-2	FP-VAV-A					VAV	1	X	AI-2			EN-FPVAV	At VAVBOX	0		FP-x-AI-2											
	AI-3	FP-VAV-A					VAV	1	X	AI-3			EN-FPVAV	At VAVBOX	0		FP-x-AI-3											
	AI-4	FP-VAV-A	S-VP	Supply Vel Pressure	In. Wg		VAV	1	X	AI-4		AI#,AICM,+15VDC	EN-FPVAV	At VAVBOX	0		FP-x-AI-4						5/18	OUT,COM,+VDC	DPT-2000		U9	
	AI-5	FP-VAV-A					VAV	1	X	AI-5			EN-FPVAV	At VAVBOX	0		FP-x-AI-5											
	AI-6	FP-VAV-A					VAV	1	X	AI-6			EN-FPVAV	At VAVBOX	0		FP-x-AI-6											
	BI-1	FP-VAV-A					VAV	1	X	BI-1			EN-FPVAV	At VAVBOX	0		FP-x-BI-1											
	BI-2	FP-VAV-A					VAV	1	X	BI-2			EN-FPVAV	At VAVBOX	0		FP-x-BI-2											
	BI-3	FP-VAV-A					VAV	1	X	BI-3			EN-FPVAV	At VAVBOX	0		FP-x-BI-3											
	BI-4	FP-VAV-A					VAV	1	X	BI-4			EN-FPVAV	At VAVBOX	0		FP-x-BI-4											
	BO-1	FP-VAV-A	DPR-OP	Damper Open	Off	On	VAV	1	X	BO-1		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FP-x-BO-1						5/18	CW,CCW,COM	EDA-2040		U54	
	BO-2	FP-VAV-A	DPR-CL	Damper Close	Off	On	VAV	1	X	BO-2		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FP-x-BO-2						5/18	CW,CCW,COM	EDA-2040		U54	
	BO-3	FP-VAV-A	SF-C	Supply Fan Control	Off	On	VAV	1	X	BO-3		BO#,24VAC	EN-FPVAV	At VAVBOX	0		FP-x-BO-3	2/18	COIL	RELAY	NO,COM		5/14	See starter detail	Starter (NO)		U51	
	BO-4	FP-VAV-A					VAV	1	X	BO-4			EN-FPVAV	At VAVBOX	0		FP-x-BO-4											
	BO-5	FP-VAV-A	RHV-OP	Reheat Valve Open	Off	On	VAV	1	X	BO-5		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FP-x-BO-5						5/18	BLK,RED,WHT	VA-7150		U58	
	BO-6	FP-VAV-A	RHV-CL	Reheat Valve Close	Off	On	VAV	1	X	BO-6		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FP-x-BO-6						5/18	BLK,RED,WHT	VA-7150		U58	
	AO-1	FP-VAV-A					VAV	1	X	AO-1			EN-FPVAV	At VAVBOX	0		FP-x-AO-1											
	AO-2	FP-VAV-A					VAV	1	X	AO-2			EN-FPVAV	At VAVBOX	0		FP-x-AO-2											



TRANSFORMER SUPPLIED BY UNIT MANUFACTURER

VALVE WIRING
EXTEND -- CLOSE
RETRACT -- OPEN

TRUNK

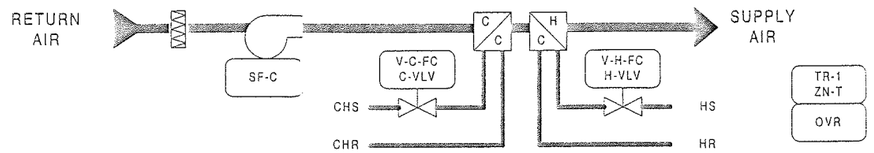
WHT - REF
BLK - (-)
RED - (+)

Note 1: For PAT, DAT, and On-Off outputs, terminals 1, 31, and 41 are internally connected.

BILL OF MATERIALS

Estimate: quad a fcu 7C520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	27	TC-9102-0332	FAN CONT3-SPEED 2-STG H/C
V-H-FC, V-C-FC	54	--	SEE VALVE SCHEDULE
ZN-T	27	TM-9161-5002	MSTAT F/TC-9100 55-85F FSC



NOTE: FCU CONTROLLER (TC-9102-0322) ARE FACTORY MOUNTED BY TRANE

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODE GENERALLY OCCURS DURING THE NORMAL WORK WEEK AND STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON INDIVIDUAL UNITS WILL FREQUENTLY BE REQUIRED. SUITE OWNERS WILL HAVE THE ABILITY TO UTILIZE SUITES FOR PRIVATE FUNCTIONS AT ANYTIME. WHEN FAN COIL UNITS ARE DE-ENERGIZED, COOLING COIL VALVE V-C-FC AND HEATING COIL VALVE V-H-FC WILL BE CLOSED TO COILS.

OCCUPIED MODE - FAN COIL UNIT SUPPLY FAN WILL BE STARTED THROUGH ITS FAN SPEED SWITCH AND RUN CONTINUOUSLY. STARTING OF THE FAN COIL UNIT WILL INITIATE THE START OF THE RELATED EXHAUST FAN. THE EXHAUST AIR VOLUME INDUCES THE NATURAL VENTILATION OF THE SUITE AND MUST THEREFORE BE ENERGIZED WHENEVER THE SUITE IS OCCUPIED. ROOM SENSOR TR-1 WILL MODULATE HEATING COIL VALVE V-H-FC AND COOLING COIL VALVE V-C-FC IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F).

UNOCCUPIED MODE - ROOM SENSOR TR-1 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F) ACTIVATE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), FAN COIL UNIT WILL BE DE-ENERGIZED AND HEATING COIL VALVE WILL CLOSE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:34 PM
FILE NAME FANCOILA.vsd

DRAWING TITLE
SUITE FAN COIL UNITS

QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer JDP | Project Manager WJT | Application Engineer RTS | DRAWN BY RTS DATE 08/28/97 | APPROVED BY DATE

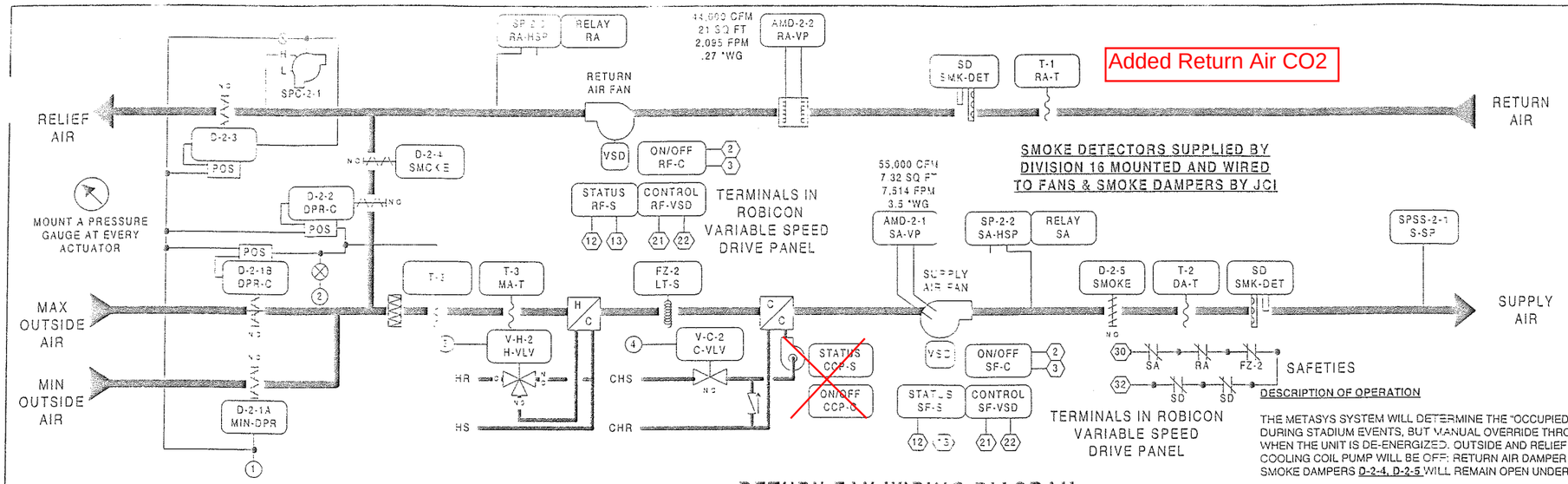
JOHNSON CONTROLS
Controls Group

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

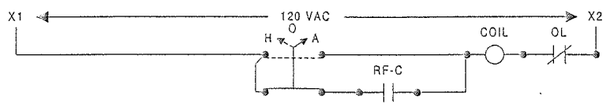
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-03

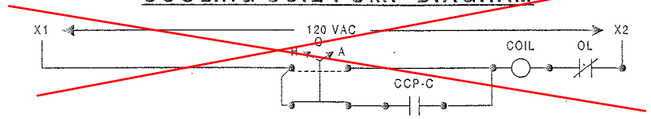
Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bav/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FCU-A					TEC						EN-FCU	At FCU														Power to Controller
		FCU-A	*				TEC	1	Y				EN-FCU	At FCU	0													N2 Trunk
	BO-1	FCU-A	H-VLV-OP	Htg Valve Open	Off	On	TEC	1	Y	BO-1		32,31/COM.30	EN-FCU	At FCU	0		FC-x-BO-1						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-2	FCU-A	H-VLV-CL	Htg Valve Close	Off	On	TEC	1	Y	BO-2		32,31/COM.30	EN-FCU	At FCU	0		FC-x-BO-2						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-3	FCU-A	C-VLV-OP	Clg Valve Open	Off	On	TEC	1	Y	BO-3		42,41/COM.40	EN-FCU	At FCU	0		FC-x-BO-3						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-4	FCU-A	C-VLV-CL	Clg Valve Close	Off	On	TEC	1	Y	BO-4		42,41/COM.40	EN-FCU	At FCU	0		FC-x-BO-4						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-5	FCU-A	F-SPD-1	Fan (Speed 1)	Off	On	TEC	1	Y	BO-5		71,70 LINE,63,62,6	EN-FCU	At FCU	0		FC-x-BO-5						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-6	FCU-A	F-SPD-2	Fan (Speed 2)	Off	On	TEC	1	Y	BO-6		71,70 LINE,63,62,6	EN-FCU	At FCU	0		FC-x-BO-6						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-7	FCU-A	F-SPD-3	Fan (Speed 3)	Off	On	TEC	1	Y	BO-7		71,70 LINE,63,62,6	EN-FCU	At FCU	0		FC-x-BO-7						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BI-1	FCU-A					TEC	1	Y	BI-1			EN-FCU	At FCU	0		FC-x-BI-1											
	BI-2	FCU-A					TEC	1	Y	BI-2			EN-FCU	At FCU	0		FC-x-BI-2											
	BI-3	FCU-A					TEC	1	Y	BI-3			EN-FCU	At FCU	0		FC-x-BI-3											
	AI-1	FCU-A	ZN-T	Zone Temperature	Deg F		TEC	1	Y	AI-1		14 MODE,15 LED,	EN-FCU	At FCU	0		FC-x-AI-1						3/22	14 MODE,15 LED,	TM-9100 (Mode & LED)			
	AI-2	FCU-A	ZN-SET	Zone Temp Set Point	Deg F		TEC	1	Y	AI-2		22,23,21/24	EN-FCU	At FCU	0		FC-x-AI-2						3/22	22,23,21/24	TM-9100 (Setpoint)			
	AI-4	FCU-A	OVR	Fan Override	Lo-Md-Hi		TEC	1	Y	AI-4		51,21/24	EN-FCU	At FCU	0		FC-x-AI-4						2/22	51,21/24	TM-9100 (Fan Override)			



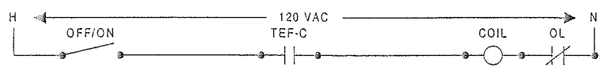
RETURN FAN WIRING DIAGRAM



COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM

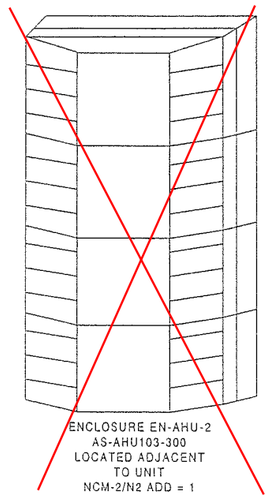


FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B14	ROOF	STARTER		ROOF
TEF-B15	ROOF	RPUCB	17	UP CONCOURSE
TEF-B16	ROOF	RPUCB	13	UP CONCOURSE
TEF-B17	ROOF	STARTER		ROOF
TEF-B25	CLUB LEVEL	RP2CLB	11	CLUB LEVEL

CONTROLLED FROM MAU PANEL - UPPER CONCOURSE B03

USE (4) PD-109-51 & (4) PD-101-35 AT (4) PANEL/STARTER LOCATIONS

SEE BL-6559-01A FOR ADDITIONAL WIRING DETAIL



ENCLOSURE EN-AHU-2
AS-AHU103-300
LOCATED ADJACENT TO UNIT
NCM-2/N2 ADD = 1

BILL OF MATERIALS

Estimate: ahu-2 70520098.pre

Dwsig.	Qty	Part #	Description
Field Devices:			
D-2-1A,D-2-1B5 D-2-2,D-2-3	---		SEE DAMPER SCHEDULE
DPR-C	3	D-3153-1	DMPR ACT,8-12#,N/PILOT
DPR-C,MIN-DPR2	5	D-3153-3	DMPR ACT,8-12#
	5	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-2	1	A70HA-12	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
MA-T,DA-T, RA-T	3	TE-6314P-1	SENS,T-Ni,1.1K,17' AVG
RA-VP	1	DPT-2641-3	XDUCR DP 0.1.5" 4-20ma
S-SP	1	DPT-2641-7	XDUCR DP 0 10.0" 4-20ma
SA-HSP,RA-HSP2	2	AFS-150	DUCT AIR FLOW HIGH STATIC
SA-VP	1	DPT-2641-6	XDUCR DP 0 5.0" 4-20ma
SPC-2-1	1	R-317-1	CNTRLR DP,0.15-1"WG
T-3	1	T-3613-1001	STAT,LOW VOL ,3' AVG, DCT
TEP	4	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	4	PD-101-35	RLY BASE,3PDT,11PIN,10A
	4	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
EN-AHU-2	1	AS-AHU103-300	AHU TERM BD IN ENC35
	1	EN-EXP101-0	UNIV PKG MOD CVR & BACKBN
EP-1,2,3	3	EP-3000-4	XDUCR,EP,4-20ma,HI VOL
EP-4	1	V11HGA-100	1-W SOLENOID N/OV,24 VAC
PI-1,2,3,4	4	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY202-0	RELAY; 2SPDT 5 AMP 240VAC
SA,RA	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-2-1A, D-2-1B, D-2-3 AND COOLING COIL VALVE V-C-2 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-2-2 WILL BE OPEN AND HEATING COIL VALVE V-H-2 WILL BE CLOSED TO THE COIL. SMOKE DAMPERS D-2-4, D-2-5 WILL REMAIN OPEN UNDER CONTROL OF SMOKE DETECTION SYSTEM.

WARM-UP MODE - SUPPLY AND RETURN FANS WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-2 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-2-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-2-1A, D-2-1B AND RELIEF AIR DAMPER D-2-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY AND RETURN FANS WILL BE RUNNING, RETURN AIR DAMPER D-2-2 IS OPEN. MINIMUM OUTSIDE AIR DAMPER D-2-1A WILL OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FORTY-FIVE (45F) MODULATE V-H-2 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, T-2 WILL GRADUALLY MODULATE DAMPERS D-2-1B OPEN WHILE SIMULTANEOUSLY CLOSING D-2-2. STATIC PRESSURE CONTROLLER SPC-2-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-2-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-3, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE T-2 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-2 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND RETURN FANS AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-2-1A WILL OPEN. OUTSIDE DAMPER D-2-1B AND RETURN DAMPER D-2-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), MAXIMUM OUTSIDE AIR DAMPERS D-2-1B WILL CLOSE, OPENING RETURN AIR DAMPER D-2-2. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-2-1B AND D-2-2 AND CHILLED WATER VALVE V-C-2 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-2 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND RETURN FANS AND CLOSE ALL SYSTEM DAMPERS.

FAN CONTROL - SYSTEM STATIC PRESSURE SENSING STATION SPSS-2-1 THROUGH A STATIC PRESSURE TRANSMITTER AND THE METASYS CONTROLLER WILL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN ITS SETTING. ON A RISE IN STATIC AS SENSED BY SPSS-2-1 THE SUPPLY FAN DRIVE WILL GRADUALLY MODULATE FAN SPEED TO ITS MINIMUM POSITION TO MAINTAIN ITS SETTING. HIGH LIMIT STATIC PRESSURE CONTROLLER SPC-2-2 WHICH WILL OVERRIDE SPSS-2-1 TO PREVENT THE DISCHARGE FROM RISING ABOVE IT'S SET POINT. SUPPLY DUCT AIR MONITORING STATION AMD-2-1 AND RETURN DUCT AIR MONITORING STATION AMD-2-2 THROUGH VELOCITY PRESSURE TRANSMITTERS WILL SEND SIGNALS TO THE METASYS CONTROLLER WHICH WILL COMPARE TOTAL SUPPLY AND RETURN AIR QUANTITIES AND MODULATE RETURN FAN VARIABLE SPEED DRIVE BASED ON SETPOINT TO SYNCHRONIZE RETURN FAN VOLUME WITH THE SUPPLY FAN VOLUME SO AS TO MAINTAIN CONSTANT MINIMUM BALANCED OUTSIDE AIR FLOW. DIFFERENTIAL WILL BE REDUCED TO ZERO (0) (NO OUTSIDE AIR) DURING WARM-UP AND UNOCCUPIED MODES OF OPERATION. MANUALLY RESET HIGH LIMIT STATIC PRESSURE CONTROLLERS SPC-2-2 AND SPC-2-3 WILL STOP THEIR RESPECTIVE SUPPLY AND RETURN FANS WHENEVER THEIR SETTING IS REACHED. ALL FANS WILL BE REQUIRED TO BE MANUALLY RESTARTED IF DE-ENERGIZED BY STATIC PRESSURE CONTROLS. SUPPLY FANS WILL BE MANUALLY CONTROLLED USING A BY-PASS STARTER IF THEIR RESPECTIVE VARIABLE FREQUENCY FAN DRIVE FAILS.

TOILET EXHAUST FANS TEF-B14,B15,B16,B17,B25 - THE FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	02:37 PM
FILE NAME	AHU-2.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-2
CLUB/SUITES QUAD B

PRESS LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION/LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08-25-97	BY DATE

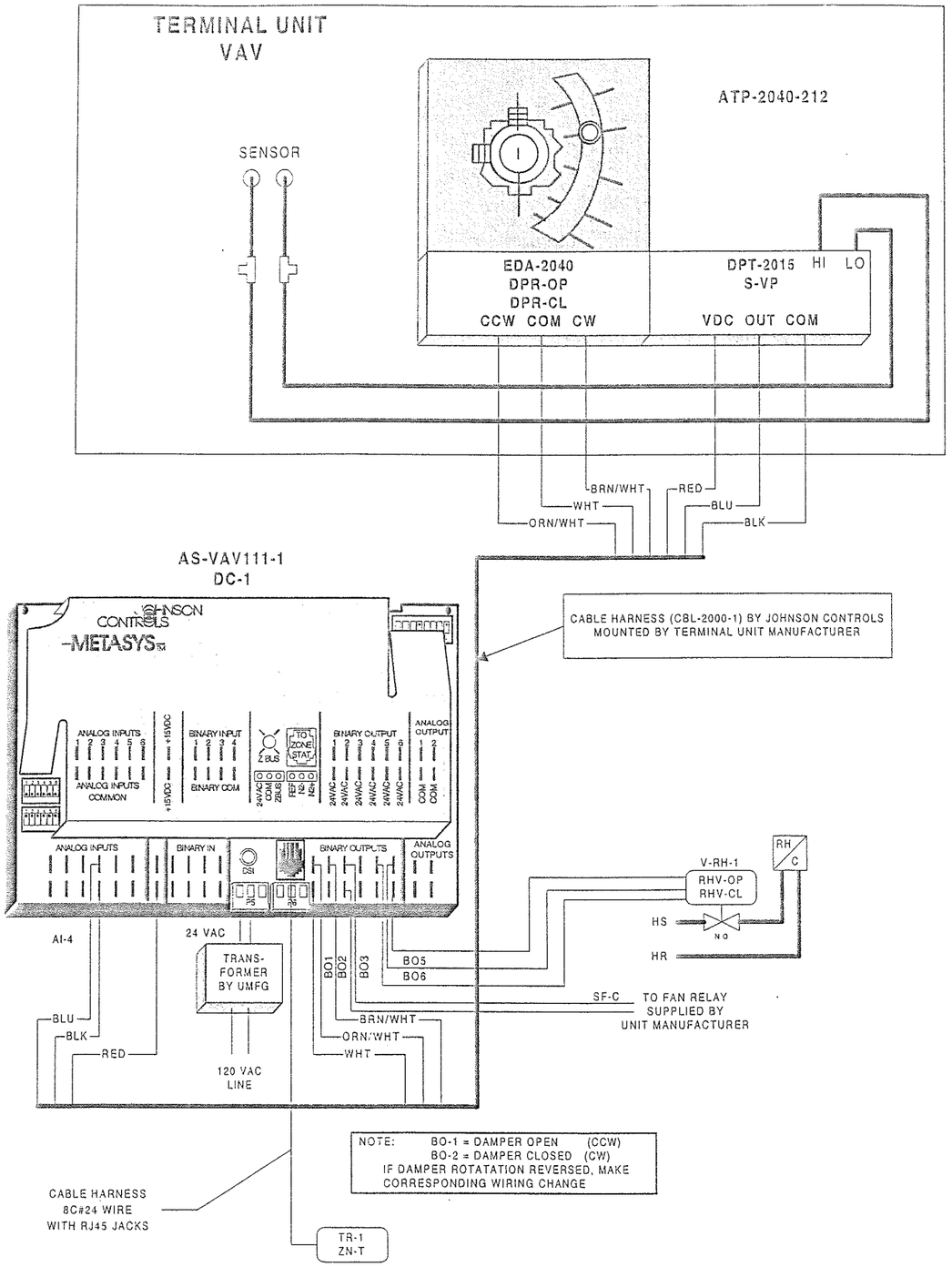
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-04

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
																											Power to Controller
		AHU-2				AHU						EN-AHU-2	Press Lev MER B		M.3-10												N2 Trunk
		AHU-2	*			AHU	1	1				EN-AHU-2	Press Lev MER B	0	M.3-10												
	BO-1	AHU-2	MIN-DPR	Min OA Damper Control	Closed Open	AHU	1	1	BO-1		BO#,24V	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-1			V11HGA-100			2/18	2-Wire	SAV-24VAC		A50	
	BO-2	AHU-2	SF-C	Supply Fan Control	Off On	AHU	1	1	BO-2	RLY	BO#,24V,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-2	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-3	AHU-2	RF-C	Return Fan Control	Off On	AHU	1	1	BO-3	RLY	BO#,24V,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-3	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-2	CCP-C	Clg Coil Pump 2 Control	Off On	AHU	1	1	BO-4	RLY	BO#,24V,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-4	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-5	AHU-2	TEF-C	Toilet Exh Fan Control	Off On	AHU	1	1	BO-5		BO#,24V	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-5			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-6	AHU-2				AHU	1	1	BO-6			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-6											
	BO-7	AHU-2				AHU	1	1	BO-7			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-7											
	BO-8	AHU-2				AHU	1	1	BO-8			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-8											
	BO-9	AHU-2				AHU	1	1	BO-9			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-9											
	BO-10	AHU-2				AHU	1	1	BO-10			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BO-10											
	AO-1	AHU-2	DPR-C	Damper Control	% Open	AHU	1	1	AO-1		AO#,AOCOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-2	H-VLV	Heating Coil Valve	% Open	AHU	1	1	AO-2		AO#,AOCOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-2	C-VLV	Clg Coil Valve	% Open	AHU	1	1	AO-3		AO#,AOCOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-2	SF-VSD	Sup Fan Var Spd Drive	%	AHU	1	1	AO-4		AO#,AOCOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-4						2/18	Device dependent	0-20mA OUT		A21	
	AO-5	AHU-2	RF-VSD	Ret Fan Var Spd Drive	%	AHU	1	1	AO-5		AO#,AOCOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-5						2/18	Device dependent	0-20mA OUT		A21	
	AO-6	AHU-2				AHU	1	1	AO-6			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AO-6											
	BI-1	AHU-2	SF-S	Supply Fan Status	Off On	AHU	1	1	BI-1		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-2	RF-S	Return Fan Status	Off On	AHU	1	1	BI-2		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-2						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-3	AHU-2	SMK-DET	Smoke Detectors	Normal Alarm	AHU	1	1	BI-3		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-3						2/22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-2	LT-S	Low Temperature Stat	Normal Alarm	AHU	1	1	BI-4		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-4						2/22	NO,M1	A70 (NC)		A41	
	BI-5	AHU-2	CCP-S	Clg Coil Pump 2 Status	Off On	AHU	1	1	BI-5		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-5						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-6	AHU-2	SA-HSP	Supply Air Static Press	Normal Alarm	AHU	1	1	BI-6		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-6						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-7	AHU-2	RA-HSP	Return Air Static Press	Normal Alarm	AHU	1	1	BI-7		BI#,BICOM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-7						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-8	AHU-2				AHU	1	1	BI-8			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-BI-8											
	AI-1	AHU-2	RA-VP	Return Air Vel Pressure	In. Wg	AHU	1	1	AI-1		AI#,+VDC	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-1						2/18	-,+	DPT-2641		A2	
	AI-2	AHU-2	RA-T	Return Air Temperature	Deg F	AHU	1	1	AI-2		AI#,AICM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-2						2/18	2-Wire	TE-6316P-1		A4	
	AI-3	AHU-2	OA-T	Disch Air Temperature	Deg F	AHU	1	1	AI-3		AI#,AICM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-3						2/18	2-Wire	TE-6316P-1		A4	
	AI-4	AHU-2	MA-T	Mixed Air Temperature	Deg F	AHU	1	1	AI-4		AI#,AICM	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-4											
	AI-5	AHU-2				AHU	1	1	AI-5			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-5											
	AI-6	AHU-2				AHU	1	1	AI-6			EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-6						2/18	-,+	DPT-2641		A2	
	AI-7	AHU-2	S-SP	Supply Static Pressure	In. Wg	AHU	1	1	AI-7		AI#,+VDC	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-7						2/18	-,+	DPT-2641		A2	
	AI-8	AHU-2	S-VP	Supply Vel Pressure	In. Wg	AHU	1	1	AI-8		AI#,+VDC	EN-AHU-2	Press Lev MER B	0	M.3-10	AH-1-AI-8											

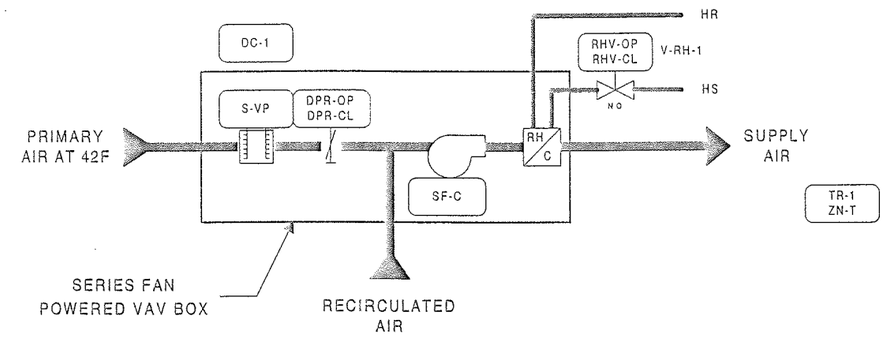


BILL OF MATERIALS

Estimate: quad b vavbox 70520098 pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	53	AS-VAV110-1	VAV 6RL,4BI,8BO,8K
V-RH-1	53	--	SEE VALVE SCHEDULE
VAV	53	ATP-2040-212	ACT,2MIN+1.5"DP,1/2"CPLG
ZN-T	35	TE-6410W-1000	MSTAT,NT,BOX,JACK

SERIES FAN POWERED VARIABLE AIR VOLUME (VAV) WITH REHEAT COIL



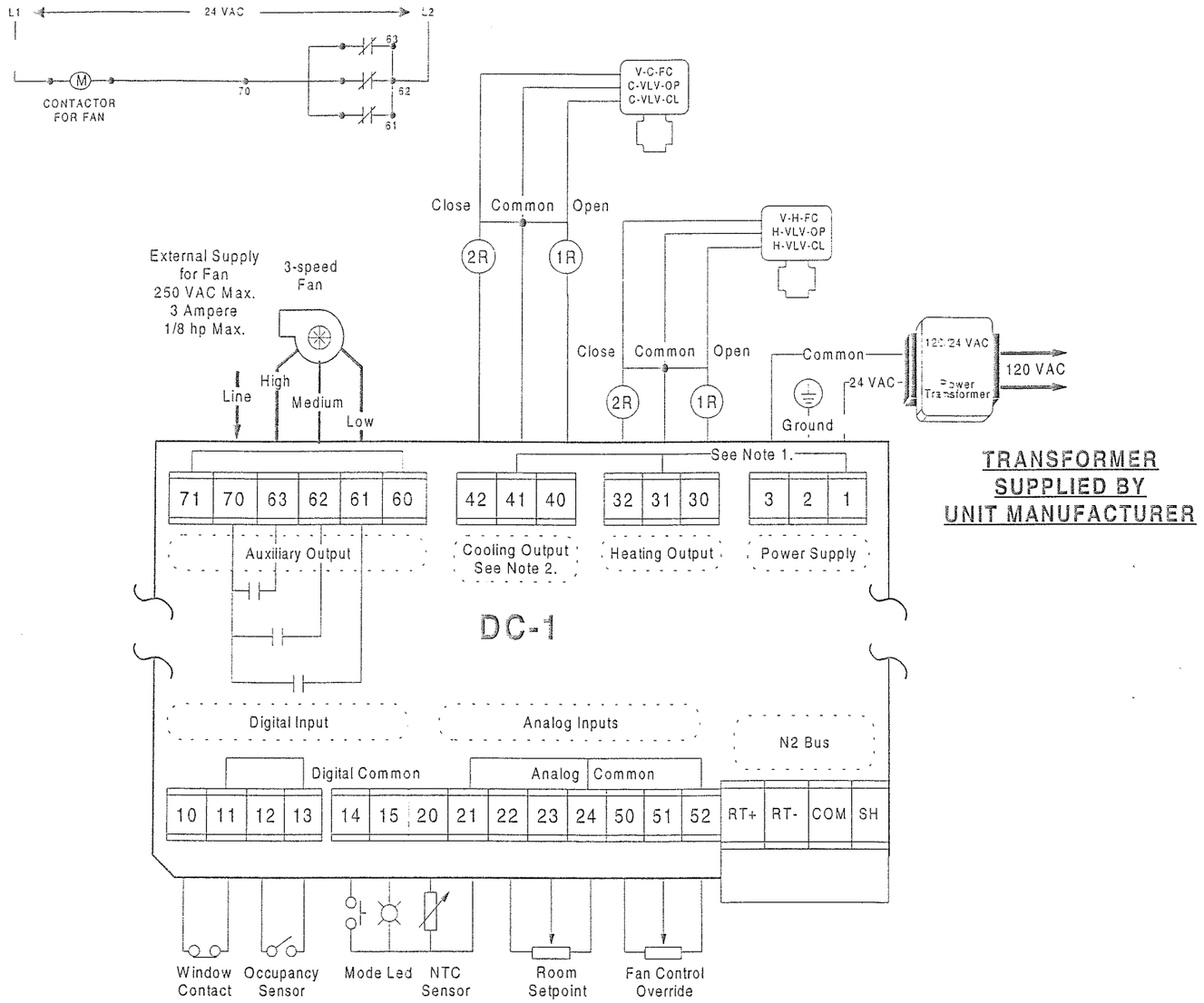
NOTE: VAV CONTROLLER (AS-VAV111-1) DAMPER ACTUATOR & DIFFERENTIAL PRESSURE TRANSMITTER (ATP-2040-212) ARE FACTORY MOUNTED BY TITUS

DESCRIPTION OF OPERATION

PRIMARY AIR VALVE WILL OPEN TO THEIR MINIMUM POSITION AND TERMINAL UNIT FAN WILL START AND RUN CONTINUOUSLY WHENEVER AIR HANDLING UNIT IS RUNNING. TERMINAL UNIT FANS WILL START THIRTY (30) SECONDS BEFORE OPENING OF AIR VALVES TO PREVENT BACK SPINNING OF FAN. FANS WILL ALSO BE OPERATED AS DEFINED IN THE UNOCCUPIED MODES. PRIMARY AIR VALVES WILL BE CLOSED DURING UNOCCUPIED HEATING MODE. ROOM SENSOR TR-1 WILL ON A RISE IN TEMPERATURE GRADUALLY MODULATE REHEAT COIL VALVE V-RH-1 CLOSED AND ON A CONTINUED RISE WILL GRADUALLY MODULATE PRIMARY AIR VALVE FROM IT'S MINIMUM TO MAXIMUM SETTING TO MAINTAIN IT'S SETTING OF SEVENTY-FIVE (75F). ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. DURING OPERATION OF THE WARM-UP MODE ALL PRIMARY AIR VALVES OPEN TO THEIR MAXIMUM POSITION AND TERMINAL FANS START TO PERMIT FULL AIR FLOW TO THE SPACES. REHEAT COIL VALVE V-RH-1 IS MODULATED IN RESPONSE TO ROOM SENSOR TO MAINTAIN SPACE TEMPERATURE.

REVISION INFORMATION	IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THERIN CONTAINED, IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHERS, FOR ANY PURPOSE, EXCEPT WITH THE WRITTEN PERMISSION OF JOHNSON CONTROLS, INC. AND FURTHER AGREES TO SURRENDER SAME TO JOHNSON CONTROLS, INC. UPON DEMAND.	DRAWING TITLE: FAN POWERED TERMINAL REHEAT UNITS QUAD B					
NUMBER							
DATE: 07/18/00					AS-BUILT	7/18/00	CME
TIME: 02:39 PM					REFERENCE DRAWING / NO. / REVISION-LOCATION / ECN / DATE / BY		
					Sales Engineer: JDP; Project Manager: WJT; Application Engineer: RTS; DRAWN: BY RTS DATE 03/26/97; APPROVED: BY DATE		
FILE NAME: VAVBOX-B.vsd	COPYRIGHT JOHNSON CONTROLS, INC. 19nn	PROJECT TITLE: BALTIMORE NFL STADIUM AT CAMDEN YARDS BALTIMORE, MARYLAND	JOHNSON CONTROLS Controls Group	Branch Information: Johnson Controls, Inc. 60 Loveton Circle Sparks, MD 21152	CONTRACT NUMBER: 7052-0098	DRAWING NUMBER: BL-6559-05	

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FP-VAV-B					VAV						EN-FPVAV	At VAVBOX														Power to Controller
		FP-VAV-B	*				VAV	1	X				EN-FPVAV	At VAVBOX	0													N2 Trunk
	AI-1	FP-VAV-B	ZN-T	Zone Temperature	Deg F		VAV	1	X	AI-1		PHONE JACK	EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-1						8/26	PHONE JACK	Metastat-Ph Jack		U2	
	AI-2	FP-VAV-B					VAV	1	X	AI-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-2											
	AI-3	FP-VAV-B					VAV	1	X	AI-3			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-3											
	AI-4	FP-VAV-B	S-VP	Supply Vel Pressure	In. Wg		VAV	1	X	AI-4		AI#,AICM,+15VDC	EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-4						3/18	OUT,COM,+VDC	DPT-2000		U9	
	AI-5	FP-VAV-B					VAV	1	X	AI-5			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-5											
	AI-6	FP-VAV-B					VAV	1	X	AI-6			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-6											
	BI-1	FP-VAV-B					VAV	1	X	BI-1			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-1											
	BI-2	FP-VAV-B					VAV	1	X	BI-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-2											
	BI-3	FP-VAV-B					VAV	1	X	BI-3			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-3											
	BI-4	FP-VAV-B					VAV	1	X	BI-4			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-4											
	BO-1	FP-VAV-B	DPR-OP	Damper Open	Off	On	VAV	1	X	BO-1		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-1						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-2	FP-VAV-B	DPR-CL	Damper Close	Off	On	VAV	1	X	BO-2		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-2						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-3	FP-VAV-B	SF-C	Supply Fan Control	Off	On	VAV	1	X	BO-3		BO#,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-3	2/18	COIL	RELAY	NO,COM		2/14	See starter detail	Starter (NO)		U51	
	BO-4	FP-VAV-B					VAV	1	X	BO-4			EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-4						3/18	BLK,RED,WHT	VA-7150		U58	
	BO-5	FP-VAV-B	RHV-OP	Reheat Valve Open	Off	On	VAV	1	X	BO-5		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-5						3/18	BLK,RED,WHT	VA-7150		U58	
	BO-6	FP-VAV-B	RHV-CL	Reheat Valve Close	Off	On	VAV	1	X	BO-6		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-6											
	AO-1	FP-VAV-B					VAV	1	X	AO-1			EN-FPVAV	At VAVBOX	0		FPVAV-x-AO-1											
	AO-2	FP-VAV-B					VAV	1	X	AO-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-AO-2											



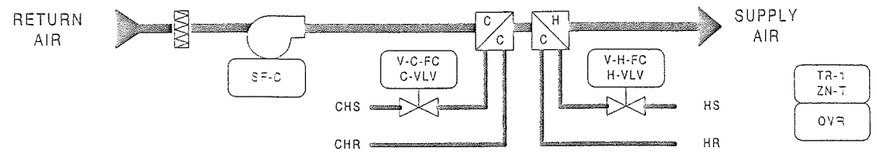
TRANSFORMER SUPPLIED BY UNIT MANUFACTURER

Note 1: For PAT, DAT, and On-Off outputs, terminals 1, 31, and 41 are internally connected.

BILL OF MATERIALS

Estimate: quad b fcu 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	27	TC-9102-0332	FAN CONT3-SPEED 2-STG H/C
V-H-FC, V-C-FC	54	--	SEE VALVE SCHEDULE
ZN-T	27	TM-9161-5002	MSTAT F/TC-9100 55-85F FSC



NOTE: FCU CONTROLLER (TC-9102-0322) ARE FACTORY MOUNTED BY TRANE

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODE GENERALLY OCCURS DURING THE NORMAL WORK WEEK AND STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON INDIVIDUAL UNITS WILL FREQUENTLY BE REQUIRED. SUITE OWNERS WILL HAVE THE ABILITY TO UTILIZE SUITES FOR PRIVATE FUNCTIONS AT ANYTIME. WHEN FAN COIL UNITS ARE DE-ENERGIZED, COOLING COIL VALVE **V-C-FC** AND HEATING COIL VALVE **V-H-FC** WILL BE CLOSED TO COILS.

OCCUPIED MODE - FAN COIL UNIT SUPPLY FAN WILL BE STARTED THROUGH ITS FAN SPEED SWITCH AND RUN CONTINUOUSLY. STARTING OF THE FAN COIL UNIT WILL INITIATE THE START OF THE RELATED EXHAUST FAN. THE EXHAUST AIR VOLUME INDUCES THE NATURAL VENTILATION OF THE SUITE AND MUST THEREFORE BE ENERGIZED WHENEVER THE SUITE IS OCCUPIED. ROOM SENSOR **TR-1** WILL MODULATE HEATING COIL VALVE **V-H-FC** AND COOLING COIL VALVE **V-C-FC** IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F).

UNOCCUPIED MODE - ROOM SENSOR **TR-1** WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F) ACTIVATE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), FAN COIL UNIT WILL BE DE-ENERGIZED AND HEATING COIL VALVE WILL CLOSE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:43 PM
FILE NAME FANCOILB.vsd

DRAWING TITLE
SUITE FAN COIL UNITS

QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS
DRAWN: BY RTS DATE 8/28/97
APPROVED: BY DATE

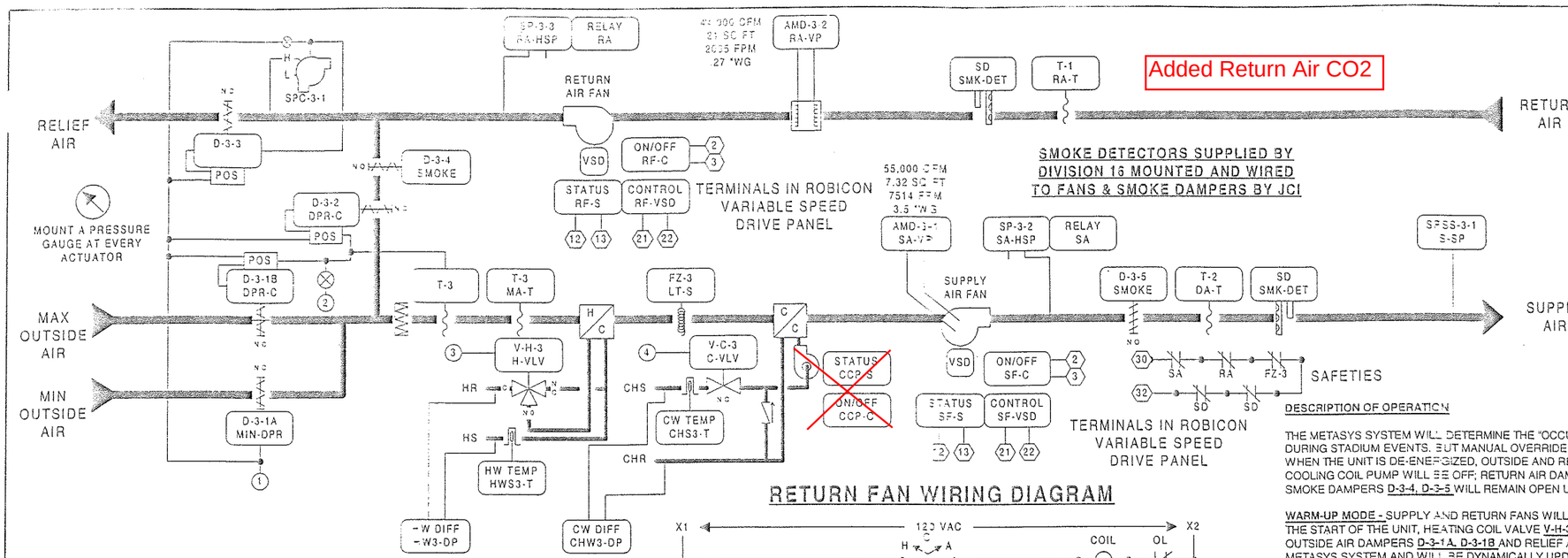
JOHNSON CONTROLS
Controls Group

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-06

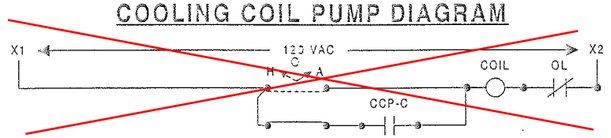
Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FCU-B				TC						EN-FCU	At FCU														Power to Controller
		FCU-B	*			TC		1	Y			EN-FCU	At FCU	0													N2 Trunk
	BO-1	FCU-B	H-VLV-OP	Htg Valve Open	Off On	TC		1	Y	BO-1	32,31/COM,30	EN-FCU	At FCU	0		FCU-x-BO-1						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-2	FCU-B	H-VLV-CL	Htg Valve Close	Off On	TC		1	Y	BO-2	32,31/COM,30	EN-FCU	At FCU	0		FCU-x-BO-2						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-3	FCU-B	C-VLV-OP	Clg Valve Open	Off On	TC		1	Y	BO-3	42,41/COM,40	EN-FCU	At FCU	0		FCU-x-BO-3						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-4	FCU-B	C-VLV-CL	Clg Valve Close	Off On	TC		1	Y	BO-4	42,41/COM,40	EN-FCU	At FCU	0		FCU-x-BO-4						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-5	FCU-B	F-SPD-1	Fan (Speed 1)	Off On	TC		1	Y	BO-5	71,70 LINE/63,62,6	EN-FCU	At FCU	0		FCU-x-BO-5						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-6	FCU-B	F-SPD-2	Fan (Speed 2)	Off On	TC		1	Y	BO-6	71,70 LINE/63,62,6	EN-FCU	At FCU	0		FCU-x-BO-6						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-7	FCU-B	F-SPD-3	Fan (Speed 3)	Off On	TC		1	Y	BO-7	71,70 LINE/63,62,6	EN-FCU	At FCU	0		FCU-x-BO-7						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BI-1	FCU-B				TC		1	Y	BI-1		EN-FCU	At FCU	0		FCU-x-BI-1											
	BI-2	FCU-B				TC		1	Y	BI-2		EN-FCU	At FCU	0		FCU-x-BI-2											
	BI-3	FCU-B				TC		1	Y	BI-3		EN-FCU	At FCU	0		FCU-x-BI-3											
	AI-1	FCU-B	ZN-T	Zone Temperature	Deg F	TC		1	Y	AI-1	14 MODE,15 LED,	EN-FCU	At FCU	0		FCU-x-AI-1						3/22	14 MODE,15 LED,	TM-9100 (Mode & LED)			
	AI-2	FCU-B	ZN-SET	Zone Temp Set Point	Deg F	TC		1	Y	AI-2	22,23,21/24	EN-FCU	At FCU	0		FCU-x-AI-2						3/22	22,23,21/24	TM-9100 (Setpoint)			
	AI-4	FCU-B	OVR	Fan Override	Lo-Md-H	TC		1	Y	AI-4	51,21/24	EN-FCU	At FCU	0		FCU-x-AI-4						2/22	51,21/24	TM-9100 (Fan Override)			



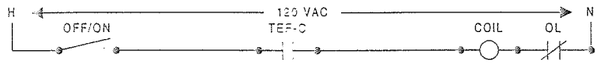
NOTE: HW & CW TEMPS & DIFF PRESSURE (4) POINTS ARE IN ENCLOSURE EN-DPS-3 AS-VAV111-1 (NCM-3/N2 ADD = 2)

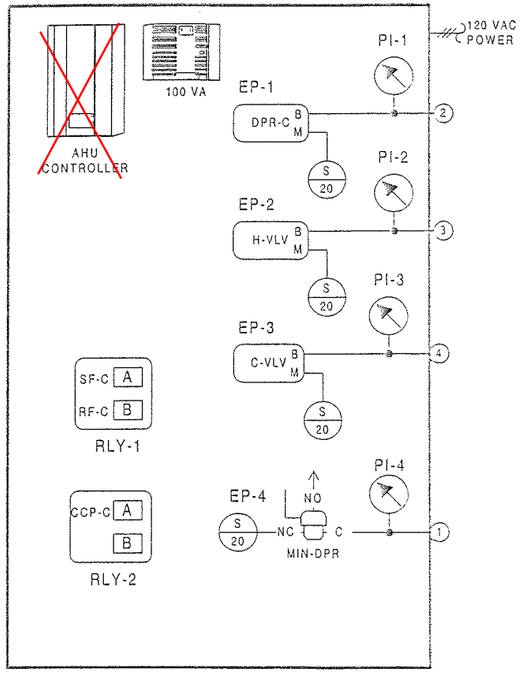
RETURN FAN WIRING DIAGRAM

COOLING COIL PUMP DIAGRAM

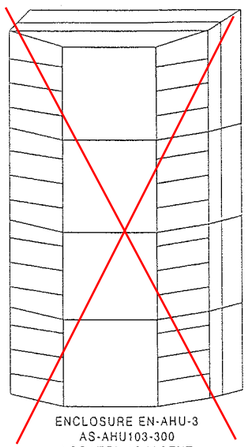


TOILET EXHAUST FAN DIAGRAM





SEE BL-6559-01A FOR ADDITIONAL WIRING DETAIL



ENCLOSURE EN-AHU-3
AS-AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-3/N2 ADD = 1

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-C6	ROOF	STARTER		UP CONCOURSE
TEF-C7	ROOF	RPUCC	15	UP CONCOURSE
TEF-C8	ROOF	RPUCC	19	UP CONCOURSE
TEF-C9	ROOF	STARTER		UP CONCOURSE
TEF-C14	CLUB LEVEL	RP2CLC	11	CLUB LEVEL

CONTROLLED FROM MAU PANEL - UPPER CONCOURSE B03

USE (4) PD-109-51 & (4) PD-101-35
AT (4) PANEL/STARTER LOCATIONS

BILL OF MATERIALS

Estimate: ahu-3 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-3-1A,D-3-1BS	---		SEE DAMPER SCHEDULE
D-3-2,D-3-3			
DPR-C	3	D-3153-1	DMPR ACT,8-13#,W/PILOT
DPR-C,MIN-DPR2	2	D-3153-2	DMPR ACT,8-13#
	5	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-3	1	A70HA-1C	STAT,LL,20°,EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
HW3-DP,CW3-DP2	1	C-252	DELTA TRANS RCS/HALP
HWS3-T,CHS3-T2	2	TE-631AP-1	SENS,T-Ni,0.1%,F/WZ1000-5
	2	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
MA-T,DA-T,	3	TE-6315P-1	SENS,T-Ni,0.1%,17' AVG
RA-T			
RA-VP	1	DPT-2641-3	XDUCR DP 0/0.5" 4-20ma
S-SP	1	DPT-2641-7	XDUCR DP 0/10.0" 4-20ma
SA-HSP,RA-HSP2	2	AFS-160	DUCT AIR FLOW HIGH STATIC
SA-VP	1	DPT-2641-5	XDUCR DP 0/5.0" 4-20ma
SPC-3-1	1	R-317-1	CNTRLR DP,0.05-1"WG
T-3	1	T-3610-1001	STAT,LOW VOL,3' AVG, DCT
TEF	4	BZ-1000-11	ENCL,14-5/8X 5-1/8 X 3-3/8
	4	PD-101-35	RLY BASE,3PDT,11PIN,10A
	4	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
EN-AHU-3	1	AS-AHU103-300	AHU TERM BD IN ENC35
	1	EN-EXP101-0	UNIV EXP MOD,CVR & BACKBN
EP-1,2,3	3	EP-3000-4	XDUCR EP,4-20ma,HI VOL
EP-4	1	V11HGA-100	3-W SOLENOID,N/OV,24 VAC
PI-1,2,3,4	4	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY302-0	RELAY, 11PDT 5 AMP 240VAC
SA,RA	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS. BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-3-1A, D-3-1B, D-3-3 AND COOLING COIL VALVE V-C-3 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-3-2 WILL BE OPEN AND HEATING COIL VALVE V-H-3 WILL BE CLOSED TO THE COIL. SMOKE DAMPERS D-3-4, D-3-5 WILL REMAIN OPEN UNDER CONTROL OF SMOKE DETECTION SYSTEM.

WARM-UP MODE - SUPPLY AND RETURN FANS WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-3 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-3-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-3-1A, D-3-1B AND RELIEF AIR DAMPER D-3-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY AND RETURN FANS WILL BE RUNNING, RETURN AIR DAMPER D-3-2 IS OPEN, MINIMUM OUTSIDE AIR DAMPER D-3-1A WILL OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FORTY-FIVE (45F) MODULATE V-H-3 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, T-2 WILL GRADUALLY MODULATE DAMPERS D-3-1B OPEN WHILE SIMULTANEOUSLY CLOSING D-3-2. STATIC PRESSURE CONTROLLER SPC-3-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-3-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-3, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE T-2 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-3 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND RETURN FANS AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-3-1A WILL OPEN. OUTSIDE DAMPER D-3-1B AND RETURN DAMPER D-3-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), MAXIMUM OUTSIDE AIR DAMPERS D-3-1B WILL CLOSE, OPENING RETURN AIR DAMPER D-3-2. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-3-1B AND D-3-2 AND CHILLED WATER VALVE V-C-3 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-3 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND RETURN FANS AND CLOSE ALL SYSTEM DAMPERS.

FAN CONTROL - SYSTEM STATIC PRESSURE SENSING STATION SPSS-3-1 THROUGH A STATIC PRESSURE TRANSMITTER AND THE METASYS CONTROLLER WILL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN ITS SETTING. ON A RISE IN STATIC AS SENSED BY SPSS-3-1 THE SUPPLY FAN DRIVE WILL GRADUALLY MODULATE FAN SPEED TO ITS MINIMUM POSITION TO MAINTAIN ITS SETTING. HIGH LIMIT STATIC PRESSURE CONTROLLER SPC-3-2 WHICH WILL OVERRIDE SPSS-3-1 TO PREVENT THE DISCHARGE FROM RISING ABOVE IT'S SET POINT. SUPPLY DUCT AIR MONITORING STATION AMD-3-1 AND RETURN DUCT AIR MONITORING STATION AMD-3-2 THROUGH VELOCITY PRESSURE TRANSMITTERS WILL SEND SIGNALS TO THE METASYS CONTROLLER WHICH WILL COMPARE TOTAL SUPPLY AND RETURN AIR QUANTITIES AND MODULATE THE RETURN FAN VARIABLE FREQUENCY DRIVE BASED ON SETPOINT TO SYNCHRONIZE RETURN FAN VOLUME WITH THE SUPPLY FAN VOLUME SO AS TO MAINTAIN CONSTANT MINIMUM BALANCED OUTSIDE AIR FLOW. DIFFERENTIAL WILL BE REDUCED TO ZERO (0) (NO OUTSIDE AIR) DURING WARM-UP AND UNOCCUPIED MODES OF OPERATION. MANUALLY RESET HIGH LIMIT STATIC PRESSURE CONTROLLERS SPC-3-2 AND SPC-3-3 WILL STOP THEIR RESPECTIVE SUPPLY AND RETURN FANS WHENEVER THEIR SETTING IS REACHED. ALL FANS WILL BE REQUIRED TO BE MANUALLY RESTARTED IF DE-ENERGIZED BY STATIC PRESSURE CONTROLS. SUPPLY FANS WILL BE MANUALLY CONTROLLED USING A BY-PASS STARTER IF THEIR RESPECTIVE VARIABLE FREQUENCY FAN DRIVE FAILS.

TOILET EXHAUST FANS TEF-C6,C7,C8,C9,C14 - THE FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:48 PM
FILE NAME AHU-3.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-3
CLUB/SUITES QUAD C

PRESS LEVEL QUAD C

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION/LOCATION	ECN	DATE	BY

State Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/28/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

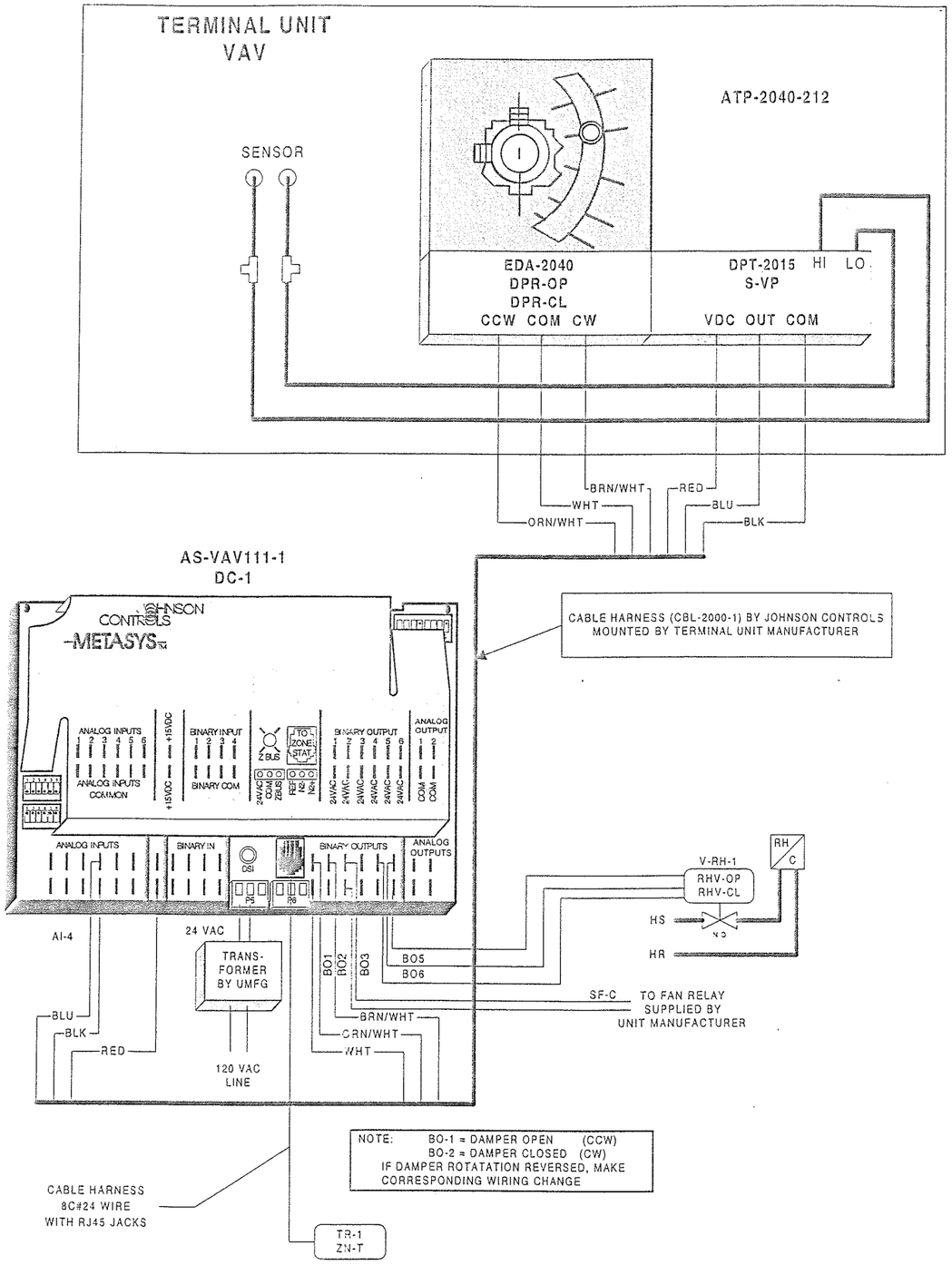
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-07

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-3				AHU						EN-AHU-3	Press Lev MER C		M,3-11												Power to Controller
		AHU-3	*			AHU	1	1				EN-AHU-3	Press Lev MER C	0	M,3-11												N2 Trunk
	BO-1	AHU-3	MIN-DPR	Min OA Damper Control	Closed Open	AHU	1	1	BO-1		BO#,24V	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-1			V11HGA-100			2/18	2-Wire	SAV-24VAC		A50	
	BO-2	AHU-3	SF-C	Supply Fan Control	Off On	AHU	1	1	BO-2	RLY	BO#,24V,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-2	3/18	A,COILS.COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-3	AHU-3	RF-C	Return Fan Control	Off On	AHU	1	1	BO-3	RLY	BO#,24V,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-3	3/18	B,COILS.COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-3	CCP-C	Clg Coil Pump 3 Control	Off On	AHU	1	1	BO-4	RLY	BO#,24V,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-4	3/18	A,COILS.COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-5	AHU-3	TEF-C	Toilet Exh Fan Control	Off On	AHU	1	1	BO-5		BO#,24V	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-5			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-6	AHU-3				AHU	1	1	BO-6			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-6											
	BO-7	AHU-3				AHU	1	1	BO-7			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-7											
	BO-8	AHU-3				AHU	1	1	BO-8			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-8											
	BO-9	AHU-3				AHU	1	1	BO-9			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-9											
	BO-10	AHU-3				AHU	1	1	BO-10			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BO-10											
	AO-1	AHU-3	DPR-C	Damper Control	% Open	AHU	1	1	AO-1		AO#,ACCOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-3	H-VLV	Heating Coil Valve	% Open	AHU	1	1	AO-2		AO#,ACCOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-3	C-VLV	Clg Coil Valve	% Open	AHU	1	1	AO-3		AO#,ACCOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-3	SF-VSD	Sup Fan Var Spd Drive	%	AHU	1	1	AO-4		AO#,ACCOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-4						2/18	Device dependent	0-20mA OUT		A21	
	AO-5	AHU-3	RF-VSD	Ret Fan Var Spd Drive	%	AHU	1	1	AO-5		AO#,ACCOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-5						2/18	Device dependent	0-20mA OUT		A21	
	AO-6	AHU-3				AHU	1	1	AO-6			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AO-6											
	BI-1	AHU-3	SF-S	Supply Fan Status	Off On	AHU	1	1	BI-1		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-3	RF-S	Return Fan Status	Off On	AHU	1	1	BI-2		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-2						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-3	AHU-3	SMK-DET	Smoke Detectors	Normal Alarm	AHU	1	1	BI-3		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-3						2/22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-3	LT-S	Low Temperature Stat	Normal Alarm	AHU	1	1	BI-4		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-4						2/22	NO,M1	A70 (NC)		A41	
	BI-5	AHU-3	CCP-S	Clg Coil Pump 3 Status	Off On	AHU	1	1	BI-5		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-5						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-6	AHU-3	SA-HSP	Supply Air Static Press	Normal Alarm	AHU	1	1	BI-6		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-6						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-7	AHU-3	RA-HSP	Return Air Static Press	Normal Alarm	AHU	1	1	BI-7		BI#,BICOM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-7						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-8	AHU-3				AHU	1	1	BI-8			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-BI-8											
	AI-1	AHU-3	RA-VP	Return Air Vel Pressure	In. Wg	AHU	1	1	AI-1		AI#,+VDC	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-1						2/18	-,+	DPT-2641		A2	
	AI-2	AHU-3	RA-T	Return Air Temperature	Deg F	AHU	1	1	AI-2		AI#,AICM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-2						2/18	2-Wire	TE-6316P-1		A4	
	AI-3	AHU-3	DA-T	Disch Air Temperature	Deg F	AHU	1	1	AI-3		AI#,AICM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-3						2/18	2-Wire	TE-6316P-1		A4	
	AI-4	AHU-3	MA-T	Mixed Air Temperature	Deg F	AHU	1	1	AI-4		AI#,AICM	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-4						2/18	2-Wire	TE-6316P-1		A4	
	AI-5	AHU-3				AHU	1	1	AI-5			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-5											
	AI-6	AHU-3				AHU	1	1	AI-6			EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-6											
	AI-7	AHU-3	S-SP	Supply Static Pressure	In. Wg	AHU	1	1	AI-7		AI#,+VDC	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-7						2/18	-,+	DPT-2641		A2	
	AI-8	AHU-3	S-VP	Supply Vel Pressure	In. Wg	AHU	1	1	AI-8		AI#,+VDC	EN-AHU-3	Press Lev MER C	0	M,3-11	AH-1-AI-8						2/18	-,+	DPT-2641		A2	

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HEATING				VAV						EN-DPS-3	Press Lev MER C														Power to Controller
		HEATING				VAV	1	2				EN-DPS-3	Press Lev MER C	0													N2 Trunk
	AI-1	HEATING	HWS3-T	HW Sup Temp At AHU-3	Deg F	VAV	1	2	AI-1		AI#,AICM	EN-DPS-3	Press Lev MER C	0		DPS-2-AI-1						2/18	2-Wire	TE-631AP-1		U1	
	AI-2	HEATING	HW3-DP	HW Diff Press At AHU-3	PSI	VAV	1	2	AI-2		AI#,AICM,+15VDC	EN-DPS-3	Press Lev MER C	0		DPS-2-AI-2						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-3	COOLING	CHS3-T	CW Sup Temp At AHU-3	Deg F	VAV	1	2	AI-3		AI#,AICM	EN-DPS-3	Press Lev MER C	0		DPS-2-AI-3						2/18	2-Wire	TE-631AP-1		U1	
	AI-4	COOLING	CHW3-DP	CW Diff Press At AHU-3	PSI	VAV	1	2	AI-4		AI#,AICM,+15VDC	EN-DPS-3	Press Lev MER C	0		DPS-2-AI-4						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-5	HEATING				VAV	1	2	AI-5			EN-DPS-3	Press Lev MER C	0		DPS-2-AI-5											
	AI-6	HEATING				VAV	1	2	AI-6			EN-DPS-3	Press Lev MER C	0		DPS-2-AI-6											
	BI-1	HEATING				VAV	1	2	BI-1			EN-DPS-3	Press Lev MER C	0		DPS-2-BI-1											
	BI-2	HEATING				VAV	1	2	BI-2			EN-DPS-3	Press Lev MER C	0		DPS-2-BI-2											
	BI-3	HEATING				VAV	1	2	BI-3			EN-DPS-3	Press Lev MER C	0		DPS-2-BI-3											
	BI-4	HEATING				VAV	1	2	BI-4			EN-DPS-3	Press Lev MER C	0		DPS-2-BI-4											
	BO-1	HEATING				VAV	1	2	BO-1			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-1											
	BO-2	HEATING				VAV	1	2	BO-2			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-2											
	BO-3	HEATING				VAV	1	2	BO-3			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-3											
	BO-4	HEATING				VAV	1	2	BO-4			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-4											
	BO-5	HEATING				VAV	1	2	BO-5			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-5											
	BO-6	HEATING				VAV	1	2	BO-6			EN-DPS-3	Press Lev MER C	0		DPS-2-BO-6											
	AO-1	HEATING				VAV	1	2	AO-1			EN-DPS-3	Press Lev MER C	0		DPS-2-AO-1											
	AO-2	HEATING				VAV	1	2	AO-2			EN-DPS-3	Press Lev MER C	0		DPS-2-AO-2											

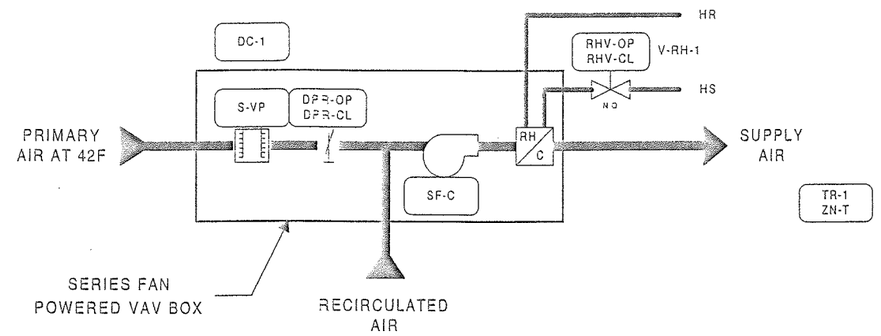


BILL OF MATERIALS

Estimate: quad c vavbox 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	60	AS-VAV110-1	VAV 6AI,4BI,8BO,8K
V-RH-1	60	--	SEE VALVE SCHEDULE
VAV	60	ATP-2040-212	ACT 2MIN+1.5"DP,1/2"CPLG
ZN-T	38	TE-6410W-1000	MSTAT,NI,BOX,JACK

SERIES FAN POWERED VARIABLE AIR VOLUME (VAV) WITH REHEAT COIL



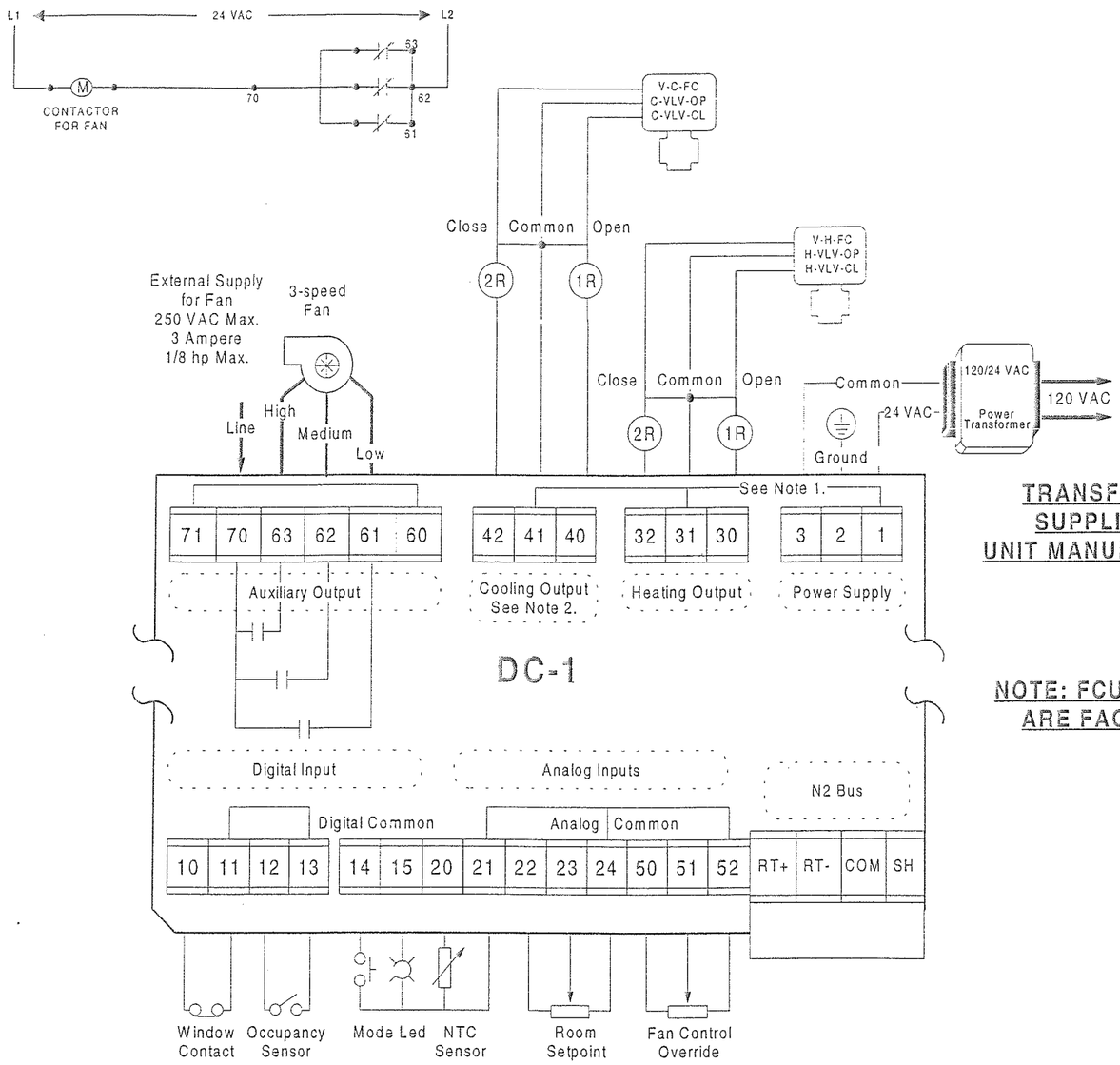
NOTE: VAV CONTROLLER (AS-VAV111-1) DAMPER ACTUATOR & DIFFERENTIAL PRESSURE TRANSMITTER (ATP-2040-212) ARE FACTORY MOUNTED BY TITUS

DESCRIPTION OF OPERATION

PRIMARY AIR VALVE WILL OPEN TO THEIR MINIMUM POSITION AND TERMINAL UNIT FAN WILL START AND RUN CONTINUOUSLY WHENEVER AIR HANDLING UNIT IS RUNNING. TERMINAL UNIT FANS WILL START THIRTY (30) SECONDS BEFORE OPENING OF AIR VALVES TO PREVENT BACK SPINNING OF FAN. FANS WILL ALSO BE OPERATED AS DEFINED IN THE UNOCCUPIED MODES. PRIMARY AIR VALVES WILL BE CLOSED DURING UNOCCUPIED HEATING MODE. ROOM SENSOR TR-1 WILL ON A RISE IN TEMPERATURE GRADUALLY MODULATE REHEAT COIL VALVE V-RH-1 CLOSED AND ON A CONTINUED RISE WILL GRADUALLY MODULATE PRIMARY AIR VALVE FROM IT'S MINIMUM TO MAXIMUM SETTING TO MAINTAIN IT'S SETTING OF SEVENTY-FIVE (75F). ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. DURING OPERATION OF THE WARM-UP MODE ALL PRIMARY AIR VALVES OPEN TO THEIR MAXIMUM POSITION AND TERMINAL FANS START TO PERMIT FULL AIR FLOW TO THE SPACES. REHEAT COIL VALVE V-RH-1 IS MODULATED IN RESPONSE TO ROOM SENSOR TO MAINTAIN SPACE TEMPERATURE.

REVISION INFORMATION	IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THERIN CONTAINED, IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHERS, FOR ANY PURPOSE, EXCEPT WITH THE WRITTEN PERMISSION OF JOHNSON CONTROLS, INC. AND FURTHER AGREES TO SURRENDER SAME TO JOHNSON CONTROLS, INC. UPON DEMAND.	DRAWING TITLE: FAN POWERED TERMINAL REHEAT UNITS; QUAD C					
NUMBER				AS-BUILT			7/18/00	CME
DATE: 07/18/00		REFERENCE DRAWING	NO.	REVISION LOCATION	ECN	DATE	BY	
TIME: 02:50 PM		Sales Engineer: JDP	Project Manager: WJT	Application Engineer: RTS	DRAWN: BY RTS DATE 08/28/97	APPROVED: BY	DATE	
FILE NAME: VAVBOX-C.vsd	COPYRIGHT JOHNSON CONTROLS, INC. 19nn	PROJECT TITLE: BALTIMORE NFL STADIUM AT CAMDEN YARDS; BALTIMORE, MARYLAND	JOHNSON CONTROLS Controls Group	Branch Information: Johnson Controls, Inc. 60 Loveton Circle Sparks, MD 21152	CONTRACT NUMBER: 7052-0098	DRAWING NUMBER: BL-6559-08		

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FP-VAV-C				VAV						EN-FPVAV	AtVAVBOX														Power to Controller
		FP-VAV-C	*			VAV	1	X				EN-FPVAV	AtVAVBOX	0													N2 Trunk
	AI-1	FP-VAV-C	ZN-T	Zone Temperature	Deg F	VAV	1	X	AI-1		PHONE JACK	EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-1						8/26	PHONE JACK	Metastat-Ph Jack		U2	
	AI-2	FP-VAV-C				VAV	1	X	AI-2			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-2											
	AI-3	FP-VAV-C				VAV	1	X	AI-3			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-3											
	AI-4	FP-VAV-C	S-VP	Supply Vel Pressure	in. Wg	VAV	1	X	AI-4		AI#,AICM,+15VDC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-4						3/18	OUT,COM,+VDC	DPT-2000		U9	
	AI-5	FP-VAV-C				VAV	1	X	AI-5			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-5											
	AI-6	FP-VAV-C				VAV	1	X	AI-6			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AI-6											
	BI-1	FP-VAV-C				VAV	1	X	BI-1			EN-FPVAV	AtVAVBOX	0		FPVAV-x-BI-1											
	BI-2	FP-VAV-C				VAV	1	X	BI-2			EN-FPVAV	AtVAVBOX	0		FPVAV-x-BI-2											
	BI-3	FP-VAV-C				VAV	1	X	BI-3			EN-FPVAV	AtVAVBOX	0		FPVAV-x-BI-3											
	BI-4	FP-VAV-C				VAV	1	X	BI-4			EN-FPVAV	AtVAVBOX	0		FPVAV-x-BI-4											
	BO-1	FP-VAV-C	DPR-OP	Damper Open	Off On	VAV	1	X	BO-1		BO-a,BO-b,24VAC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-1						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-2	FP-VAV-C	DPR-CL	Damper Close	Off On	VAV	1	X	BO-2		BO-a,BO-b,24VAC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-2						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-3	FP-VAV-C	SF-C	Supply Fan Control	Off On	VAV	1	X	BO-3		BO#,24VAC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-3	2/18	COIL	RELAY	NO,CCM		2/14	See starter detail	Starter (NO)		U51	
	BO-4	FP-VAV-C				VAV	1	X	BO-4			EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-4											
	BO-5	FP-VAV-C	RHV-OP	Reheat Valve Open	Off On	VAV	1	X	BO-5		BO-a,BO-b,24VAC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-5						3/18	BLK,RED,WHT	VA-7150		U58	
	BO-6	FP-VAV-C	RHV-CL	Reheat Valve Close	Off On	VAV	1	X	BO-6		BO-a,BO-b,24VAC	EN-FPVAV	AtVAVBOX	0		FPVAV-x-BO-6						3/18	BLK,RED,WHT	VA-7150		U58	
	AO-1	FP-VAV-C				VAV	1	X	AO-1			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AO-1											
	AO-2	FP-VAV-C				VAV	1	X	AO-2			EN-FPVAV	AtVAVBOX	0		FPVAV-x-AO-2											



Note 1: For PAT, DAT, and On-Off outputs, terminals 1, 31, and 41 are internally connected.

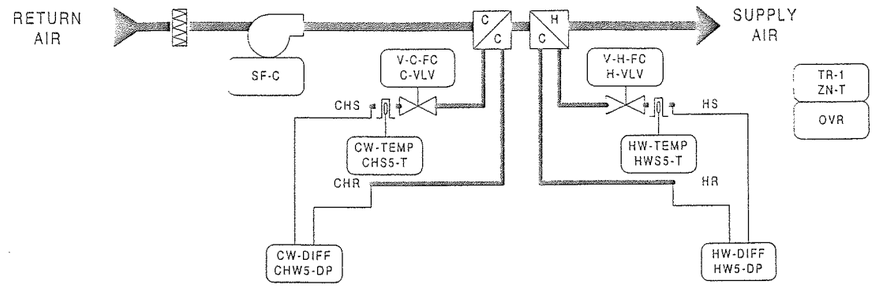
TRANSFORMER SUPPLIED BY UNIT MANUFACTURER

NOTE: FCU CONTROLLER (TC-9102-0322) ARE FACTORY MOUNTED BY TRANE

BILL OF MATERIALS

Estimate: quad c fcu 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	27	TC-9102-0332	FAN CONT3-SPEED 2-STG H/C
HWS-DP, CHWS-DP	2	C-252	DELTA TRANS ROB/HALP
HWS5-T, CHS5-T	2	TE-631AP-1	SENS,T-Ni,0.1%,F/WZ1000-5
	2	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
V-H-FC, V-C-FC	54	--	SEE VALVE SCHEDULE
ZN-T	27	TM-9161-5002	MSTAT F/TC-9100 55-85F FSC



NOTE: HW & CW TEMPS & DIFF PRESSURE (4) POINTS ARE IN ENCLOSURE EN-DPS AS-VAV111-1 (NCM-3/N2 ADD = 3) LOCATE ON UPPER SUITE LEVEL

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODE GENERALLY OCCURS DURING THE NORMAL WORK WEEK AND STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON INDIVIDUAL UNITS WILL FREQUENTLY BE REQUIRED. SUITE OWNERS WILL HAVE THE ABILITY TO UTILIZE SUITES FOR PRIVATE FUNCTIONS AT ANYTIME. WHEN FAN COIL UNITS ARE DE-ENERGIZED, COOLING COIL VALVE V-C-FC AND HEATING COIL VALVE V-H-FC WILL BE CLOSED TO COILS.

OCCUPIED MODE - FAN COIL UNIT SUPPLY FAN WILL BE STARTED THROUGH ITS FAN SPEED SWITCH AND RUN CONTINUOUSLY. STARTING OF THE FAN COIL UNIT WILL INITIATE THE START OF THE RELATED EXHAUST FAN. THE EXHAUST AIR VOLUME INDUCES THE NATURAL VENTILATION OF THE SUITE AND MUST THEREFORE BE ENERGIZED WHENEVER THE SUITE IS OCCUPIED. ROOM SENSOR TR-1 WILL MODULATE HEATING COIL VALVE V-H-FC AND COOLING COIL VALVE V-C-FC IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F).

UNOCCUPIED MODE - ROOM SENSOR TR-1 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F) ACTIVATE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), FAN COIL UNIT WILL BE DE-ENERGIZED AND HEATING COIL VALVE WILL CLOSE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:04 PM
FILE NAME FANCOILC.vsd

DRAWING TITLE
SUITE FAN COIL UNITS

QUAD C

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/28/97	BY DATE

JOHNSON CONTROLS
Controls Group

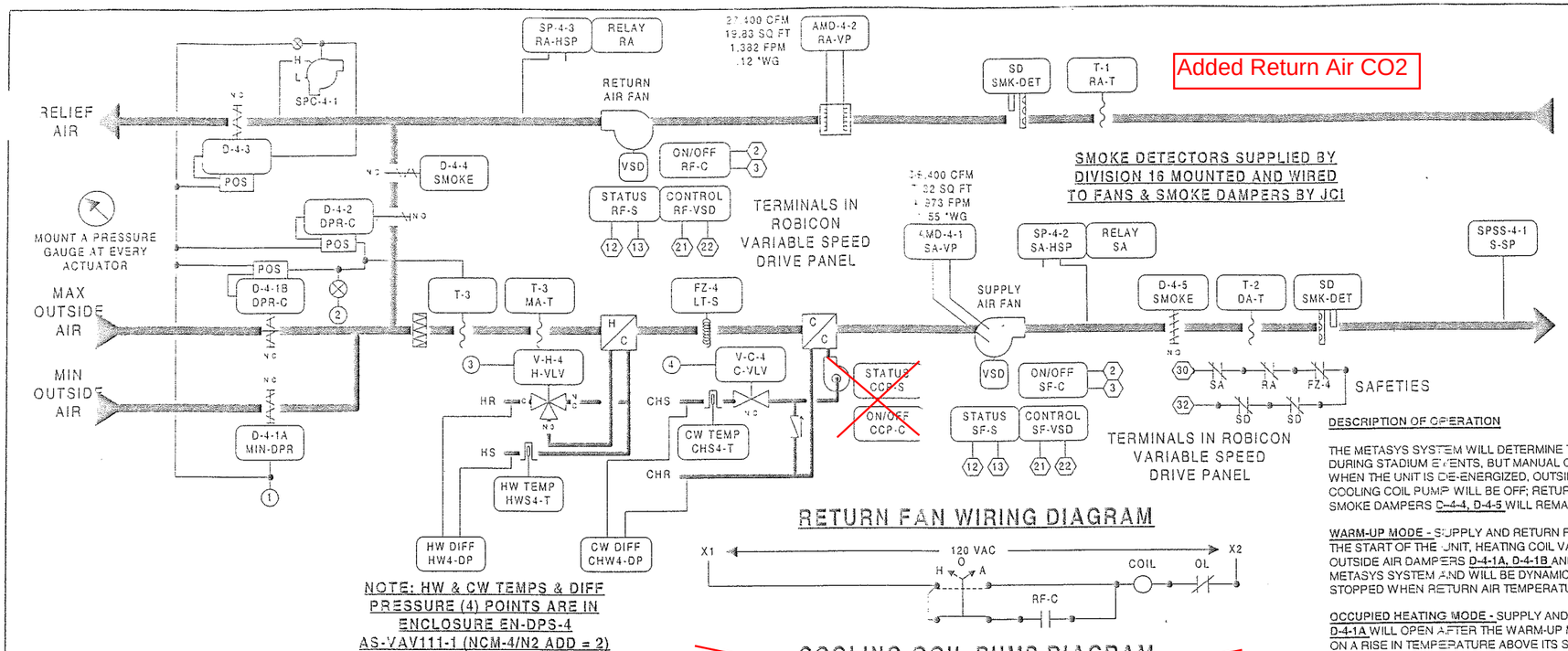
Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-09

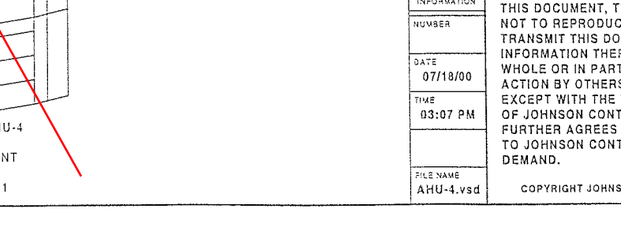
Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FCU-C					TC						EN-FCU	AHU														Power to Controller
		FCU-C	*				TC	1	Y				EN-FCU	AHU	0													N2 Trunk
	BO-1	FCU-C	H-VLV-OP	Htg Valve Open	Off	On	TC	1	Y	BO-1		32,31/COM,30	EN-FCU	AHU	0		FCU-x-BO-1						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-2	FCU-C	H-VLV-CL	Htg Valve Close	Off	On	TC	1	Y	BO-2		32,31/COM,30	EN-FCU	AHU	0		FCU-x-BO-2						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-3	FCU-C	C-VLV-OP	Clg Valve Open	Off	On	TC	1	Y	BO-3		42,41/COM,40	EN-FCU	AHU	0		FCU-x-BO-3						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-4	FCU-C	C-VLV-CL	Clg Valve Close	Off	On	TC	1	Y	BO-4		42,41/COM,40	EN-FCU	AHU	0		FCU-x-BO-4						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-5	FCU-C	F-SPD-1	Fan (Speed 1)	Off	On	TC	1	Y	BO-5		71,70 LINE/63,62,6	EN-FCU	AHU	0		FCU-x-BO-5						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-6	FCU-C	F-SPD-2	Fan (Speed 2)	Off	On	TC	1	Y	BO-6		71,70 LINE/63,62,6	EN-FCU	AHU	0		FCU-x-BO-6						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-7	FCU-C	F-SPD-3	Fan (Speed 3)	Off	On	TC	1	Y	BO-7		71,70 LINE/63,62,6	EN-FCU	AHU	0		FCU-x-BO-7						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BI-1	FCU-C					TC	1	Y	BI-1			EN-FCU	AHU	0		FCU-x-BI-1											
	BI-2	FCU-C					TC	1	Y	BI-2			EN-FCU	AHU	0		FCU-x-BI-2											
	BI-3	FCU-C					TC	1	Y	BI-3			EN-FCU	AHU	0		FCU-x-BI-3											
	AI-1	FCU-C	ZN-T	Zone Temperature	Deg F		TC	1	Y	AI-1		14 MODE,15 LED,2	EN-FCU	AHU	0		FCU-x-AI-1						3/22	14 MODE,15 LED	TM-9100 (Mode & LED)			
	AI-2	FCU-C	ZN-SET	Zone Temp Set Point	Deg F		TC	1	Y	AI-2		22,23,21/24	EN-FCU	AHU	0		FCU-x-AI-2						3/22	22,23,21/24	TM-9100 (Setpoint)			
	AI-4	FCU-C	OVR	Fan Override	Lo-Md-Hi		TC	1	Y	AI-4		51,21/24	EN-FCU	AHU	0		FCU-x-AI-4						2/22	51,21/24	TM-9100 (Fan Override)			

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bav/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HEATING				VAV						EN-DPS	Upper Suite Level														Power to Controller
		HEATING	*			VAV	1	3				EN-DPS	Upper Suite Level	0													N2 Trunk
	AI-1	HEATING	HWS5-T	HW Sup Temp At FCU	Deg F	VAV	1	3	AI-1		AI#,AICM	EN-DPS	Upper Suite Level	0		DPS-3-AI-1						2/18	2-Wire	TE-631AP-1		U1	
	AI-2	HEATING	HW5-DP	HW Diff Press At FCU	PSI	VAV	1	3	AI-2		AI#,AICM,+15VDC	EN-DPS	Upper Suite Level	0		DPS-3-AI-2						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-3	COOLING	CHS5-T	CW Sup Temp At FCU	Deg F	VAV	1	3	AI-3		AI#,AICM	EN-DPS	Upper Suite Level	0		DPS-3-AI-3						2/18	2-Wire	TE-631AP-1		U1	
	AI-4	COOLING	CHW5-DP	CW Diff Press At FCU	PSI	VAV	1	3	AI-4		AI#,AICM,+15VDC	EN-DPS	Upper Suite Level	0		DPS-3-AI-4						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-5	HEATING				VAV	1	3	AI-5			EN-DPS	Upper Suite Level	0		DPS-3-AI-5											
	AI-6	HEATING				VAV	1	3	AI-6			EN-DPS	Upper Suite Level	0		DPS-3-AI-6											
	BI-1	HEATING				VAV	1	3	BI-1			EN-DPS	Upper Suite Level	0		DPS-3-BI-1											
	BI-2	HEATING				VAV	1	3	BI-2			EN-DPS	Upper Suite Level	0		DPS-3-BI-2											
	BI-3	HEATING				VAV	1	3	BI-3			EN-DPS	Upper Suite Level	0		DPS-3-BI-3											
	BI-4	HEATING				VAV	1	3	BI-4			EN-DPS	Upper Suite Level	0		DPS-3-BI-4											
	BO-1	HEATING				VAV	1	3	BO-1			EN-DPS	Upper Suite Level	0		DPS-3-BO-1											
	BO-2	HEATING				VAV	1	3	BO-2			EN-DPS	Upper Suite Level	0		DPS-3-BO-2											
	BO-3	HEATING				VAV	1	3	BO-3			EN-DPS	Upper Suite Level	0		DPS-3-BO-3											
	BO-4	HEATING				VAV	1	3	BO-4			EN-DPS	Upper Suite Level	0		DPS-3-BO-4											
	BO-5	HEATING				VAV	1	3	BO-5			EN-DPS	Upper Suite Level	0		DPS-3-BO-5											
	BO-6	HEATING				VAV	1	3	BO-6			EN-DPS	Upper Suite Level	0		DPS-3-BO-6											
	AO-1	HEATING				VAV	1	3	AO-1			EN-DPS	Upper Suite Level	0		DPS-3-AO-1											
	AO-2	HEATING				VAV	1	3	AO-2			EN-DPS	Upper Suite Level	0		DPS-3-AO-2											

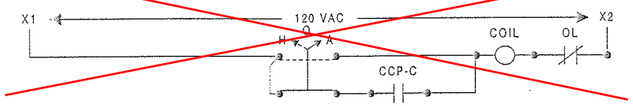


NOTE: HW & CW TEMPS & DIFF PRESSURE (4) POINTS ARE IN ENCLOSURE EN-DPS-4 AS-VAV111-1 (NCM-4/N2 ADD = 2)

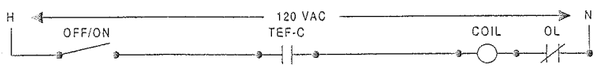
RETURN FAN WIRING DIAGRAM

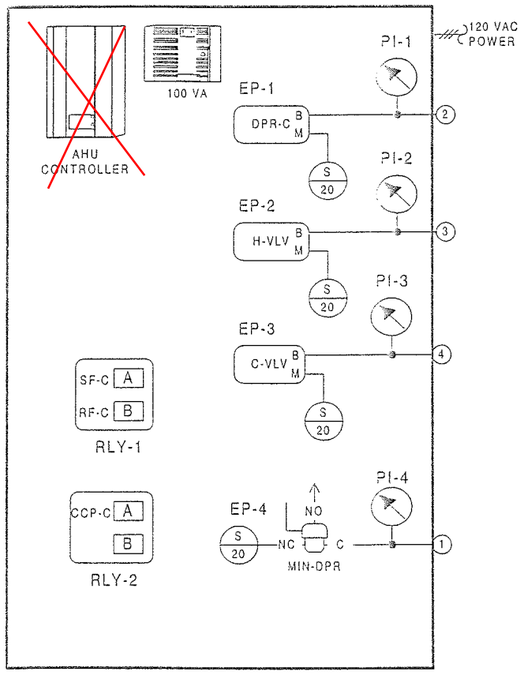


COOLING COIL PUMP DIAGRAM

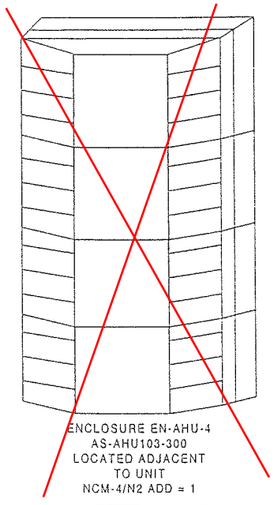


TOILET EXHAUST FAN DIAGRAM





SEE BL-6559-01A FOR ADDITIONAL WIRING DETAIL



ENCLOSURE EN-AHU-4
AS-AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-4/N2 ADD = 1

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-D6	ROOF	STARTER		UP CONCOURSE
TEF-D7	ROOF	RPUCD	21	UP CONCOURSE
TEF-D8	ROOF	RPUCD	11	UP CONCOURSE
TEF-D9	ROOF	RPUCD	17	UP CONCOURSE
TEF-D11	ROOF	RPUCD	7	UP CONCOURSE
TEF-D15	CLUB LEVEL	RP2CLD	11	CLUB LEVEL
TEF-D17	UPPER SUITE	RPUSC	33	UPPER SUITE

CONTROLLED FROM MAU PANEL LOCATED ON UPPER CONCOURSE

USE (5) PD-109-51 & (5) PD-101-35
AT (5) PANEL/STARTER LOCATIONS

STILL IN MATERIALS

70520098.pre

Design	Qty	Part #	Description
Field Devices:			
D-4-1A,D-4-1B1 D-4-2,D-4-3	---		SEE DAMPER SCHEDULE
DPR-C	3	D-3153-1	DMPR ACT,8-13#,M/PILOT
DPR-C,MIN-DPR2	5	D-3153-2	DMPR ACT,8-13#
	5	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-4	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
HW4-DP,CW4-DP2	2	C-252	DELTA TRANS RCB/HALP
HWS4-T,CHS4-T2	2	TE-631AP-1	SENS,T-Ni,0.1%,F/WZ1000-5
	2	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
MA-T,DA-T, RA-T	3	TE-631SP-1	SENS,T-Ni,0.1%,17' AVG
RA-VP	1	DPT-2641-2	XDUCR DP 0/0.25" 4-20ma
S-SP	1	DPT-2641-7	XDUCR DP 0/10.0" 4-20ma
SA-HSP,RA-HSP2	2	AFS-160	DUCT AIR FLOW HIGH STATIC
SA-VP	1	DPT-2641-5	XDUCR DP 0/2.5" 4-20ma
SPC-4-1	1	R-317-1	CNTRLR DP,0.05-1"WG
T-3	1	T-3610-1001	STAT,LOW VOL ,8' AVG, DCT
TEF	5	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	5	PD-101-35	RLY BASE,3PDT,11PIN,10A
	5	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
EN-AHU-4	1	AS-AHU103-300	AHU TERM BD IN ENC35
	1	EN-EXP101-0	CNTRLR PKG MOD,CVR & BACKBN
EP-1,2,3	3	EP-2000-4	XDUCR,EP,4-20ma,HI VOL
EP-4	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3,4	4	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY: 2SPDT 5 AMP 240VAC
SA,RA	2	PD-131-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNCCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-4-1A, D-4-1B, D-4-3 AND COOLING COIL VALVE V-C-4 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-4-2 WILL BE OPEN AND HEATING COIL VALVE V-H-4 WILL BE CLOSED TO THE COIL. SMOKE DAMPERS D-4-4, D-4-5 WILL REMAIN OPEN UNDER CONTROL OF SMOKE DETECTION SYSTEM.

WARM-UP MODE - SUPPLY AND RETURN FANS WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-4 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-4-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-4-1A, D-4-1B AND RELIEF AIR DAMPER D-4-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY AND RETURN FANS WILL BE RUNNING, RETURN AIR DAMPER D-4-2 IS OPEN. MINIMUM OUTSIDE AIR DAMPER D-4-1A WILL OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FORTY-FIVE (45F) MODULATE V-H-4 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, T-2 WILL GRADUALLY MODULATE DAMPERS D-4-1B OPEN WHILE SIMULTANEOUSLY CLOSING D-4-2. STATIC PRESSURE CONTROLLER SPC-4-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-4-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-3, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE T-2 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-4 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND RETURN FANS AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-4-1A WILL OPEN. OUTSIDE DAMPER D-4-1B AND RETURN DAMPER D-4-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), MAXIMUM OUTSIDE AIR DAMPERS D-4-1B WILL CLOSE, OPENING RETURN AIR DAMPER D-4-2. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-4-1B AND D-4-2 AND CHILLED WATER VALVE V-C-1 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-4 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND RETURN FANS AND CLOSE ALL SYSTEM DAMPERS.

FAN CONTROL - SYSTEM STATIC PRESSURE SENSING STATION SPSS-4-1 THROUGH A STATIC PRESSURE TRANSMITTER AND THE METASYS CONTROLLER WILL MODULATE THE SUPPLY FAN VARIABLE FREQUENCY DRIVE TO MAINTAIN ITS SETTING. ON A RISE IN STATIC AS SENSED BY SPSS-4-1 THE SUPPLY FAN DRIVE WILL GRADUALLY MODULATE FAN SPEED TO ITS MINIMUM POSITION TO MAINTAIN ITS SETTING. HIGH LIMIT STATIC PRESSURE CONTROLLER SPC-4-2 WHICH WILL OVERRIDE SPSS-4-1 TO PREVENT THE DISCHARGE FROM RISING ABOVE IT'S SET POINT. SUPPLY DUCT AIR MONITORING STATION AMD-4-1 AND RETURN DUCT AIR MONITORING STATION AMD-4-2 THROUGH VELOCITY PRESSURE TRANSMITTERS WILL SEND SIGNALS TO THE METASYS CONTROLLER WHICH WILL COMPARE TOTAL SUPPLY AND RETURN AIR QUANTITIES AND MODULATE THE RETURN FAN VARIABLE FREQUENCY DRIVE BASED ON SETPOINT TO SYNCHRONIZE RETURN FAN VOLUME WITH THE SUPPLY FAN VOLUME SO AS TO MAINTAIN CONSTANT MINIMUM BALANCED OUTSIDE AIR FLOW. DIFFERENTIAL WILL BE REDUCED TO ZERO (0) (NO OUTSIDE AIR) DURING WARM-UP AND UNOCCUPIED MODES OF OPERATION. MANUALLY RESET HIGH LIMIT STATIC PRESSURE CONTROLLERS SPC-4-2 AND SPC-4-3 WILL STOP THEIR RESPECTIVE SUPPLY AND RETURN FANS WHENEVER THEIR SETTING IS REACHED. ALL FANS WILL BE REQUIRED TO BE MANUALLY RESTARTED IF DE-ENERGIZED BY STATIC PRESSURE CONTROLS. SUPPLY FANS WILL BE MANUALLY CONTROLLED USING A BY-PASS STARTER IF THEIR RESPECTIVE VARIABLE FREQUENCY FAN DRIVE FAILS.

TOILET EXHAUST FANS TEF-D6,D7,D8,D9,D11,D15,D17 - THE FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:07 PM
FILE NAME	AHU-4.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-4
CLUB/SUITES QUAD D

PRESS LEVEL QUAD D

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REV & DESCRIPTION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/25/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

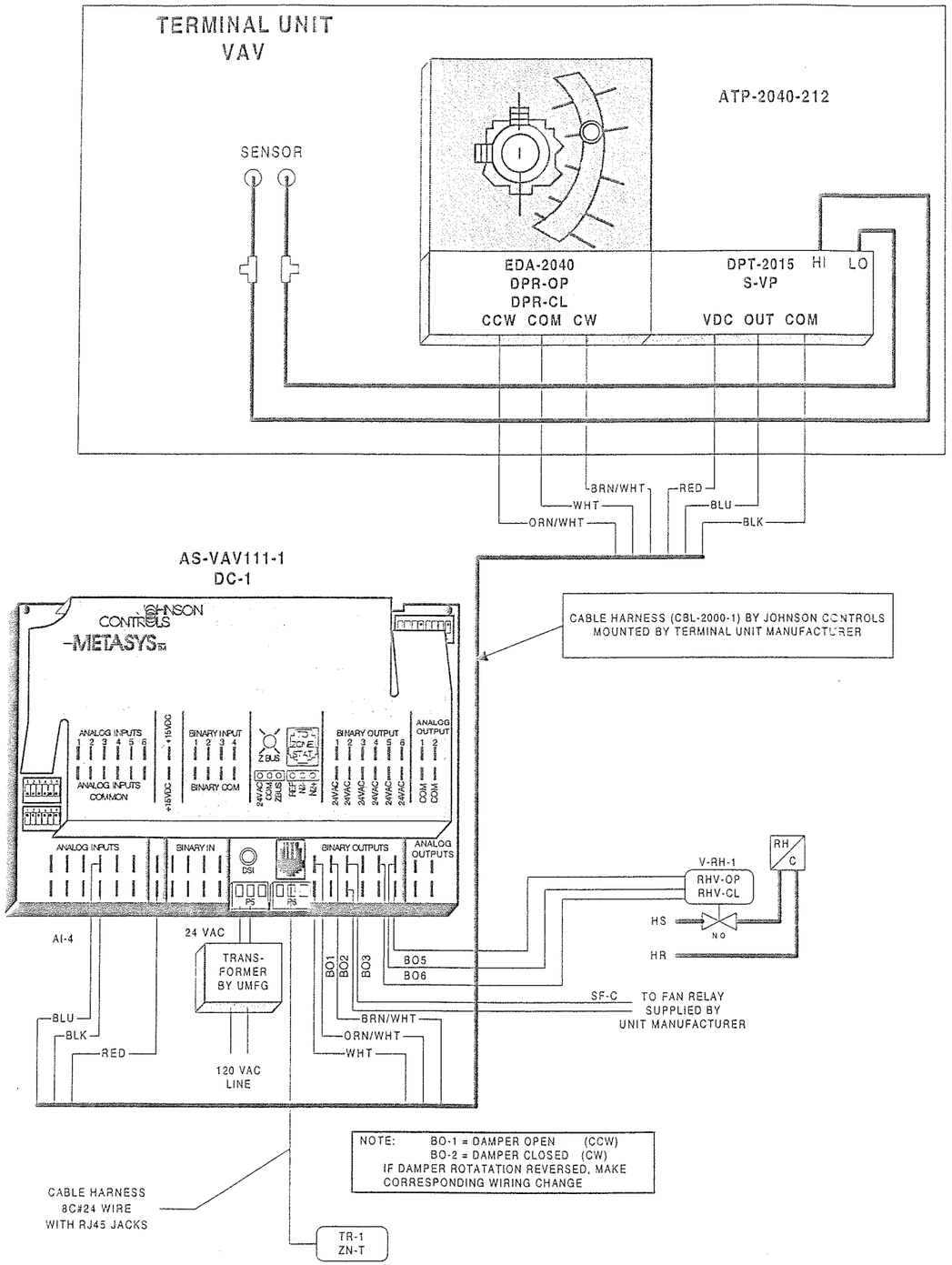
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-10

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-4					AHU						EN-AHU-4	Press Lev MER D		M.3-12												Power to Controller
		AHU-4	*				AHU		1	1			EN-AHU-4	Press Lev MER D	0	M.3-12												N2 Trunk
	BO-1	AHU-4	MIN-DPR	Min OA Damper Control	Closed	Open	AHU		1	BO-1		BO#,24V	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-1			V11HGA-100			2/18	2-Wire	SAV-24VAC		A50	
	BO-2	AHU-4	SF-C	Supply Fan Control	Off	On	AHU		1	BO-2	RLY	BO#,24V,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-2	3/18	A,CCILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-3	AHU-4	RF-C	Return Fan Control	Off	On	AHU		1	BO-3	RLY	BO#,24V,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-3	3/18	B,CCILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-4	CCP-C	Clg Coil Pump Control	Off	On	AHU		1	BO-4	RLY	BO#,24V,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-4	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-5	AHU-4	TEF-C	Toilet Exh Fan Control	Off	On	AHU		1	BO-5		BO#,24V	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-5			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-6	AHU-4					AHU		1	BO-6			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-6											
	BO-7	AHU-4					AHU		1	BO-7			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-7											
	BO-8	AHU-4					AHU		1	BO-8			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-8											
	BO-9	AHU-4					AHU		1	BO-9			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-9											
	BO-10	AHU-4					AHU		1	BO-10			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BO-10											
	AO-1	AHU-4	DPR-C	Damper Control	% Open		AHU		1	AO-1		AO#,AOCOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-4	H-VLV	Heating Coil Valve	% Open		AHU		1	AO-2		AO#,AOCOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-4	C-VLV	Clg Coil Valve	% Open		AHU		1	AO-3		AO#,AOCOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-4	SF-VSD	Sup Fan Var Spd Drive	%		AHU		1	AO-4		AO#,AOCOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-4						2/18	Device dependent	0-20mA OUT		A21	
	AO-5	AHU-4	RF-VSD	Ret Fan Var Spd Drive	%		AHU		1	AO-5		AO#,AOCOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-5						2/18	Device dependent	0-20mA OUT		A21	
	AO-6	AHU-4					AHU		1	AO-6			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AO-6											
	BI-1	AHU-4	SF-S	Supply Fan Status	Off	On	AHU		1	BI-1		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-4	RF-S	Return Fan Status	Off	On	AHU		1	BI-2		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-2						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-3	AHU-4	SMK-DET	Smoke Detectors	Normal	Alarm	AHU		1	BI-3		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-3						2/22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-4	LT-S	Low Temperature Stat	Normal	Alarm	AHU		1	BI-4		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-4						2/22	NO,M1	A70 (NC)		A41	
	BI-5	AHU-4	CCP-S	Clg Coil Pump Status	Off	On	AHU		1	BI-5		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-5						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-6	AHU-4	SA-HSP	Supply Air Static Press	Normal	Alarm	AHU		1	BI-6		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-6						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-7	AHU-4	RA-HSP	Return Air Static Press	Normal	Alarm	AHU		1	BI-7		BI#,BICOM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-7						2/22	Device dependent	AFS-460 & Relay		A40	
	BI-8	AHU-4					AHU		1	BI-8			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-BI-8											
	AI-1	AHU-4	RA-VP	Return Air Vel Pressure	In. Wg		AHU		1	AI-1		AI#,+VDC	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-1						2/18	-,+	DPT-2641		A2	
	AI-2	AHU-4	RA-T	Return Air Temperature	Deg F		AHU		1	AI-2		AI#,AICM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-2						2/18	2-Wire	TE-6316P-1		A4	
	AI-3	AHU-4	OA-T	Disch Air Temperature	Deg F		AHU		1	AI-3		AI#,AICM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-3						2/18	2-Wire	TE-6316P-1		A4	
	AI-4	AHU-4	MA-T	Mixed Air Temperature	Deg F		AHU		1	AI-4		AI#,AICM	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-4						2/18	2-Wire	TE-6316P-1		A4	
	AI-5	AHU-4					AHU		1	AI-5			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-5											
	AI-6	AHU-4					AHU		1	AI-6			EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-6											
	AI-7	AHU-4	S-SP	Supply Static Pressure	In. Wg		AHU		1	AI-7		AI#,+VDC	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-7						2/18	-,+	DPT-2641		A2	
	AI-8	AHU-4	S-VP	Supply Vel Pressure	In. Wg		AHU		1	AI-8		AI#,+VDC	EN-AHU-4	Press Lev MER D	0	M.3-12	AH-1-AI-8						2/18	-,+	DPT-2641		A2	

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HEATING				VAV						EN-DPS-4	Press Lav MER D														Power to Controller
		HEATING	*			VAV	1	2				EN-DPS-4	Press Lav MER D	0													N2 Trunk
	AI-1	HEATING	HWS4-T	HW Sup Temp At AHU-4	Deg F	VAV	1	2	AI-1		AI#,AICM	EN-DPS-4	Press Lav MER D	0		DPS-2-AI-1						2/18	2-Wire	TE-631AP-1		U1	
	AI-2	HEATING	HW4-DP	HW Diff Press At AHU-4	PSI	VAV	1	2	AI-2		AI#,AICM,+15VDC	EN-DPS-4	Press Lav MER D	0		DPS-2-AI-2						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-3	COOLING	CHS4-T	CW Sup Temp At AHU-4	Deg F	VAV	1	2	AI-3		AI#,AICM	EN-DPS-4	Press Lav MER D	0		DPS-2-AI-3						2/18	2-Wire	TE-631AP-1		U1	
	AI-4	COOLING	CHW4-DP	CW Diff Press At AHU-4	PSI	VAV	1	2	AI-4		AI#,AICM,+15VDC	EN-DPS-4	Press Lav MER D	0		DPS-2-AI-4						3/18	Device dependent	Rob/Hal 252C		U5	4-20ma with 500 OHM Resistor
	AI-5	HEATING				VAV	1	2	AI-5			EN-DPS-4	Press Lav MER D	0		DPS-2-AI-5											
	AI-6	HEATING				VAV	1	2	AI-6			EN-DPS-4	Press Lav MER D	0		DPS-2-AI-6											
	BI-1	HEATING				VAV	1	2	BI-1			EN-DPS-4	Press Lav MER D	0		DPS-2-BI-1											
	BI-2	HEATING				VAV	1	2	BI-2			EN-DPS-4	Press Lav MER D	0		DPS-2-BI-2											
	BI-3	HEATING				VAV	1	2	BI-3			EN-DPS-4	Press Lav MER D	0		DPS-2-BI-3											
	BI-4	HEATING				VAV	1	2	BI-4			EN-DPS-4	Press Lav MER D	0		DPS-2-BI-4											
	BO-1	HEATING				VAV	1	2	BO-1			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-1											
	BO-2	HEATING				VAV	1	2	BO-2			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-2											
	BO-3	HEATING				VAV	1	2	BO-3			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-3											
	BO-4	HEATING				VAV	1	2	BO-4			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-4											
	BO-5	HEATING				VAV	1	2	BO-5			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-5											
	BO-6	HEATING				VAV	1	2	BO-6			EN-DPS-4	Press Lav MER D	0		DPS-2-BO-6											
	AO-1	HEATING				VAV	1	2	AO-1			EN-DPS-4	Press Lav MER D	0		DPS-2-AO-1											
	AO-2	HEATING				VAV	1	2	AO-2			EN-DPS-4	Press Lav MER D	0		DPS-2-AO-2											

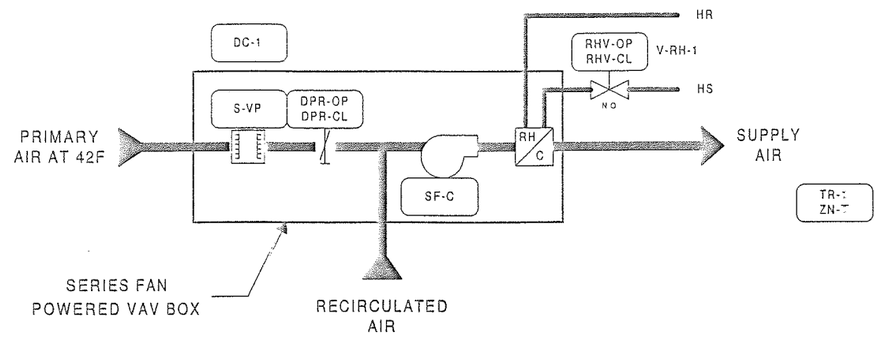


BILL OF MATERIALS

Estimate: quad d vavbox 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	46	AS-VAV110-1	VAV 6AI,4BI,8BO,8K
V-RH-1	46	--	SEE VALVE SCHEDULE
VAV	46	ATP-2040-212	ACT,2MIN+1.5"DP,1/2"CPLG
ZN-T	28	TE-6410W-1000	MSTAT,NI,BOX,JACK

SERIES FAN POWERED VARIABLE AIR VOLUME (VAV) WITH REHEAT COIL



NOTE: VAV CONTROLLER (AS-VAV111-1) DAMPER ACTUATOR & DIFFERENTIAL PRESSURE TRANSMITTER (ATP-2040-212) ARE FACTORY MOUNTED BY TITUS

DESCRIPTION OF OPERATION

PRIMARY AIR VALVE WILL OPEN TO THEIR MINIMUM POSITION AND TERMINAL UNIT FAN WILL START AND RUN CONTINUOUSLY WHENEVER AIR HANDLING UNIT IS RUNNING. TERMINAL UNIT FANS WILL START THIRTY (30) SECONDS BEFORE OPENING OF AIR VALVES TO PREVENT BACK SPINNING OF FAN. FANS WILL ALSO BE OPERATED AS DEFINED IN THE UNOCCUPIED MODES. PRIMARY AIR VALVES WILL BE CLOSED DURING UNOCCUPIED HEATING MODE. ROOM SENSOR TR-1 WILL ON A RISE IN TEMPERATURE GRADUALLY MODULATE REHEAT COIL VALVE V-RH-1 CLOSED AND ON A CONTINUED RISE WILL GRADUALLY MODULATE PRIMARY AIR VALVE FROM IT'S MINIMUM TO MAXIMUM SETTING TO MAINTAIN IT'S SETTING OF SEVENTY-FIVE (75F). ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. DURING OPERATION OF THE WARM-UP MODE ALL PRIMARY AIR VALVES OPEN TO THEIR MAXIMUM POSITION AND TERMINAL FANS START TO PERMIT FULL AIR FLOW TO THE SPACES. REHEAT COIL VALVE V-RH-1 IS MODULATED IN RESPONSE TO ROOM SENSOR TO MAINTAIN SPACE TEMPERATURE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:54 PM
FILE NAME VAVBOX-D.vsd

DRAWING TITLE
FAN POWERED TERMINAL
REHEAT UNITS

QUAD D

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/28/97	BY DATE

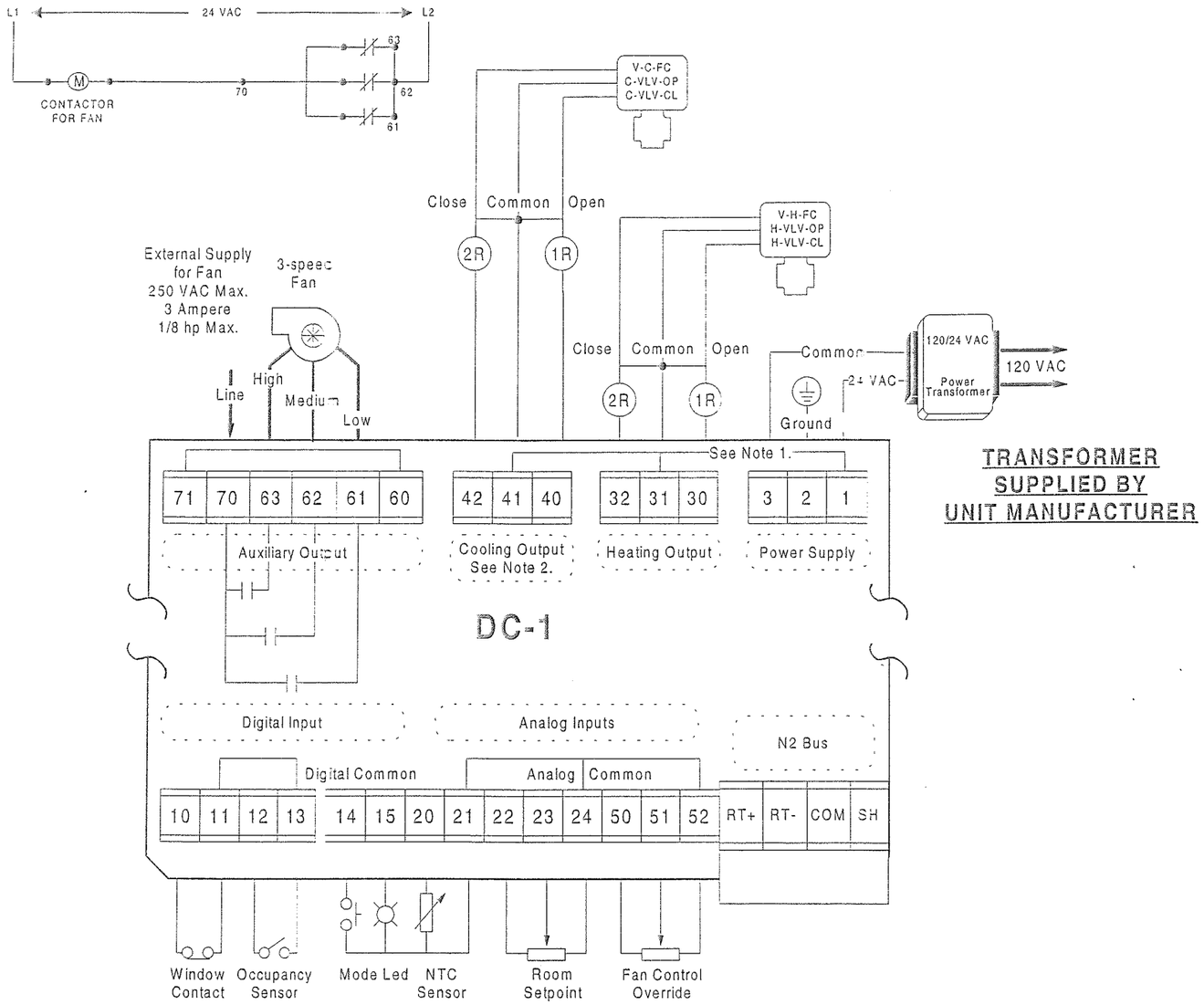
JOHNSON CONTROLS
Controls Group

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-11

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FP-VAV-D					VAV						EN-FPV-xV	At VAVBOX														Power to Controller
		FP-VAV-D	*				VAV	1		X1			EN-FPV-xV	At VAVBOX	0													N2 Trunk
	AI-1	FP-VAV-D	ZN-T	Zone Temperature		Deg F	VAV	1		X:AI-1		PHONE JACK	EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-1						8/26	PHONE JACK	Metastat-Ph Jack		U2	
	AI-2	FP-VAV-D					VAV	1		X:AI-2			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-2											
	AI-3	FP-VAV-D					VAV	1		X:AI-3			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-3											
	AI-4	FP-VAV-D	S-VP	Supply Vel Pressure		In. Wg	VAV	1		X:AI-4		AI#,AICM,+15VDC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-4						3/18	OUT,COM,+VDC	DPT-2000		U9	
	AI-5	FP-VAV-D					VAV	1		X:AI-5			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-5											
	AI-6	FP-VAV-D					VAV	1		X:AI-6			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AI-6											
	BI-1	FP-VAV-D					VAV	1		X:BI-1			EN-FPV-xV	At VAVBOX	0		FPVAV-x-BI-1											
	BI-2	FP-VAV-D					VAV	1		X:BI-2			EN-FPV-xV	At VAVBOX	0		FPVAV-x-BI-2											
	BI-3	FP-VAV-D					VAV	1		X:BI-3			EN-FPV-xV	At VAVBOX	0		FPVAV-x-BI-3											
	BI-4	FP-VAV-D					VAV	1		X:BI-4			EN-FPV-xV	At VAVBOX	0		FPVAV-x-BI-4											
	BO-1	FP-VAV-D	DPR-OP	Damper Open	Off	On	VAV	1		X:BO-1		BO-a,BO-b,24VAC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-1						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-2	FP-VAV-D	DPR-CL	Damper Close	Off	On	VAV	1		X:BO-2		BO-a,BO-b,24VAC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-2						3/18	CW,CCW,COM	EDA-2040		U54	
	BO-3	FP-VAV-D	SF-C	Supply Fan Control	Off	On	VAV	1		X:BO-3		BO#,24VAC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-3/2/18	COIL	RELAY	NC,.COM			2/14	See starter detail	Starter (NO)		U51	
	BO-4	FP-VAV-D					VAV	1		X:BO-4			EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-4											
	BO-5	FP-VAV-D	RHV-OP	Reheat Valve Open	Off	On	VAV	1		X:BO-5		BO-a,BO-b,24VAC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-5						3/18	BLK,RED,WHT	VA-7150		U58	
	BO-6	FP-VAV-D	RHV-CL	Reheat Valve Close	Off	On	VAV	1		X:BO-6		BO-a,BO-b,24VAC	EN-FPV-xV	At VAVBOX	0		FPVAV-x-BO-6						3/18	BLK,RED,WHT	VA-7150		U58	
	AO-1	FP-VAV-D					VAV	1		X:AO-1			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AO-1											
	AO-2	FP-VAV-D					VAV	1		X:AO-2			EN-FPV-xV	At VAVBOX	0		FPVAV-x-AO-2											



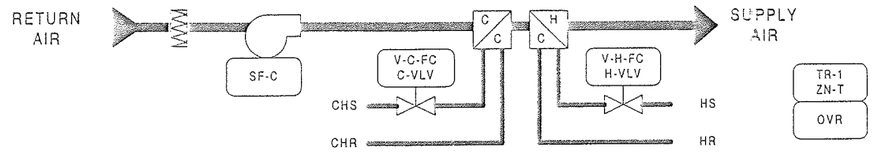
TRANSFORMER SUPPLIED BY UNIT MANUFACTURER

Note 1: For PAT, DAT, and On-Off outputs, terminals 1, 31, and 41 are internally connected.

BILL OF MATERIALS

Estimate: quad d fcu 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	27	TC-9102-0332	FAN CONT3-SPEED 2-STG H/C
V-H-FC, V-C-FC	54	--	SEE VALVE SCHEDULE
ZN-T	27	TM-9161-5002	MSTAT F/TC-9100 55-85F FSC



NOTE: FCU CONTROLLER (TC-9102-0322) ARE FACTORY MOUNTED BY TRANE

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODE GENERALLY OCCURS DURING THE NORMAL WORK WEEK AND STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON INDIVIDUAL UNITS WILL FREQUENTLY BE REQUIRED. SUITE OWNERS WILL HAVE THE ABILITY TO UTILIZE SUITES FOR PRIVATE FUNCTIONS AT ANYTIME. WHEN FAN COIL UNITS ARE DE-ENERGIZED, COOLING COIL VALVE V-C-FC AND HEATING COIL VALVE V-H-FC WILL BE CLOSED TO COILS.

OCCUPIED MODE - FAN COIL UNIT SUPPLY FAN WILL BE STARTED THROUGH ITS FAN SPEED SWITCH AND RUN CONTINUOUSLY. STARTING OF THE FAN COIL UNIT WILL INITIATE THE START OF THE RELATED EXHAUST FAN. THE EXHAUST AIR VOLUME INDUCES THE NATURAL VENTILATION OF THE SUITE AND MUST THEREFORE BE ENERGIZED WHENEVER THE SUITE IS OCCUPIED. ROOM SENSOR TR-1 WILL MODULATE HEATING COIL VALVE V-H-FC AND COOLING COIL VALVE V-C-FC IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F).

UNOCCUPIED MODE - ROOM SENSOR TR-1 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F) ACTIVATE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), FAN COIL UNIT WILL BE DE-ENERGIZED AND HEATING COIL VALVE WILL CLOSE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:03 PM
FILE NAME FANCOILD.vsd

DRAWING TITLE
SUITE FAN COIL UNITS

QUAD D

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 08/28/97	BY DATE

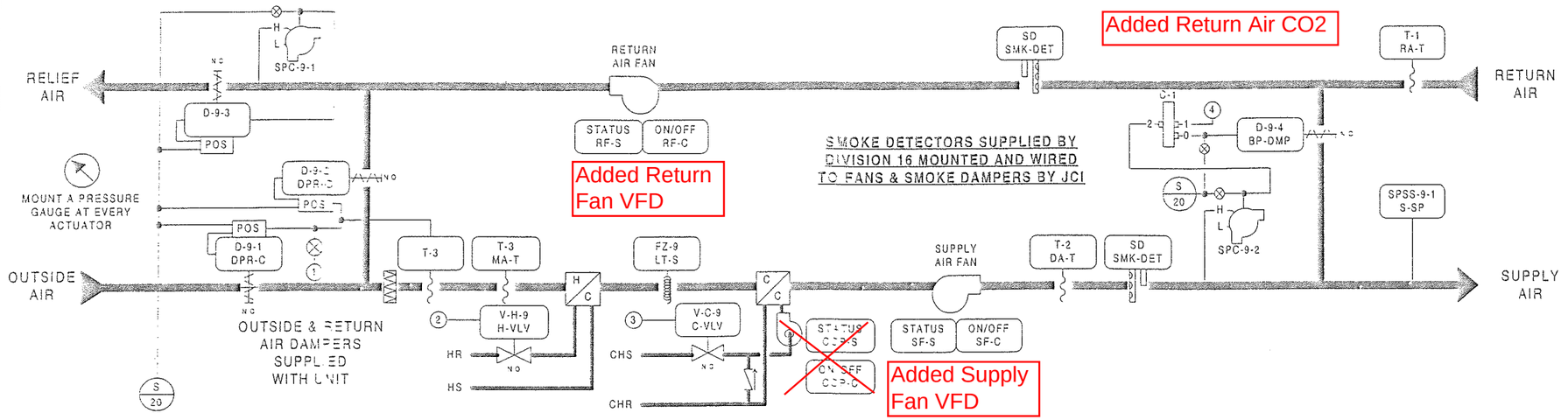
JOHNSON CONTROLS
Controls Group

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-12

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FCU-D					TC						EN-FCU	At FCU														Power to Controller
		FCU-D	*				TC	1		Y			EN-FCU	At FCU	0													N2 Trunk
	BO-1	FCU-D	H-VLV-OP	Htg Valve Open	Off	On	TC	1		Y	BO-1	32,31/COM,30	EN-FCU	At FCU	0		FCU-x-BO-1						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-2	FCU-D	H-VLV-CL	Htg Valve Close	Off	On	TC	1		Y	BO-2	32,31/COM,30	EN-FCU	At FCU	0		FCU-x-BO-2						3/18	BLK,WHT,RED	VA-7150 (Heating)			
	BO-3	FCU-D	C-VLV-OP	Clg Valve Open	Off	On	TC	1		Y	BO-3	42,41/COM,40	EN-FCU	At FCU	0		FCU-x-BO-3						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-4	FCU-D	C-VLV-CL	Clg Valve Close	Off	On	TC	1		Y	BO-4	42,41/COM,40	EN-FCU	At FCU	0		FCU-x-BO-4						3/18	BLK,WHT,RED	VA-7150 (Cooling)			
	BO-5	FCU-D	F-SPD-1	Fan (Speed 1)	Off	On	TC	1		Y	BO-5	71,70 LINE/63,62,61	EN-FCU	At FCU	0		FCU-x-BO-5						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-6	FCU-D	F-SPD-2	Fan (Speed 2)	Off	On	TC	1		Y	BO-6	71,70 LINE/63,62,61	EN-FCU	At FCU	0		FCU-x-BO-6						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BO-7	FCU-D	F-SPD-3	Fan (Speed 3)	Off	On	TC	1		Y	BO-7	71,70 LINE/63,62,61	EN-FCU	At FCU	0		FCU-x-BO-7						4/14	HI,MED,LOW,NEU	Starter Coil (3 spd fan)			
	BI-1	FCU-D					TC	1		Y	BI-1		EN-FCU	At FCU	0		FCU-x-BI-1											
	BI-2	FCU-D					TC	1		Y	BI-2		EN-FCU	At FCU	0		FCU-x-BI-2											
	BI-3	FCU-D					TC	1		Y	BI-3		EN-FCU	At FCU	0		FCU-x-BI-3											
	AI-1	FCU-D	ZN-T	Zone Temperature	Deg F		TC	1		Y	AI-1	14 MODE,15 LED,2	EN-FCU	At FCU	0		FCU-x-AI-1						3/22	14 MODE,15 LED	TM-9100 (Mode & LED)			
	AI-2	FCU-D	ZN-SET	Zone Temp Set Point	Deg F		TC	1		Y	AI-2	22,23,21/24	EN-FCU	At FCU	0		FCU-x-AI-2						3/22	22,23,21/24	TM-9100 (Setpoint)			
	AI-4	FCU-D	OVR	Fan Override	Lo-Md-Hi		TC	1		Y	AI-4	51,21/24	EN-FCU	At FCU	0		FCU-x-AI-4						2/22	51,21/24	TM-9100 (Fan Override)			

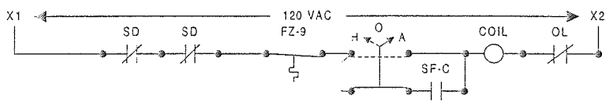


BILL OF MATERIALS

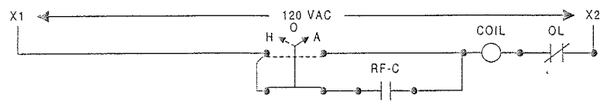
Estimate: ahu-9 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
C-1	1	C-5226-3	SIGNAL TRANSMITTER
D-9-1, D-9-2, D-9-3	3	---	SEE DAMPER SCHEDULE
DPR-C	3	D-3153-1	DMPR ACT, 8-13#, W/PILOT
	3	G-2010-11	GAGE, 2", 0-30 PSIG, STEM
FZ-9	1	A70HA-1C	STAT, LL, 20', SL, MAN, 15/55F
H-VLV, C-VLV	1	--	SEE VALVE SCHEDULE
MA-T, DA-T, RA-T	3	TE-6316P-1	SENS, T-Ni, 0.1%, 17' AVG
SPC-9-1	1	R-317-1	CNTRLR DP, 0.05-1"WG
SPC-9-2	1	R-317-7	CNTRLR DP, 0.6-12"WG
T-3	1	T-3610-1001	STAT, LOW VOL, 8' AVG, DCT
TEF-C5	1	BZ-1000-11	ENCL, 4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE, 3PDT, 11PIN, 10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
EN-AHU-9	1	AS-AHU103-300	AHU TERM BD IN ENC35
	1	EN-EXP101-0	UNIV PKG MOD, CVR & BACKEN
EP-1, 2, 3, 4	4	EP-8000-4	XDUCR, EP, 4-20ma, HI VOL
PI-1, 2, 3, 4	4	G-2010-11	GAGE, 2", 0-30 PSIG, STEM
RLY-1, 2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

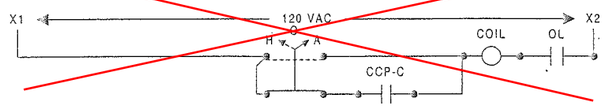
SUPPLY FAN WIRING DIAGRAM



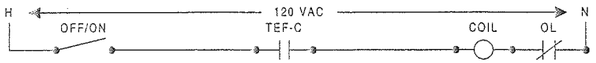
RETURN FAN WIRING DIAGRAM

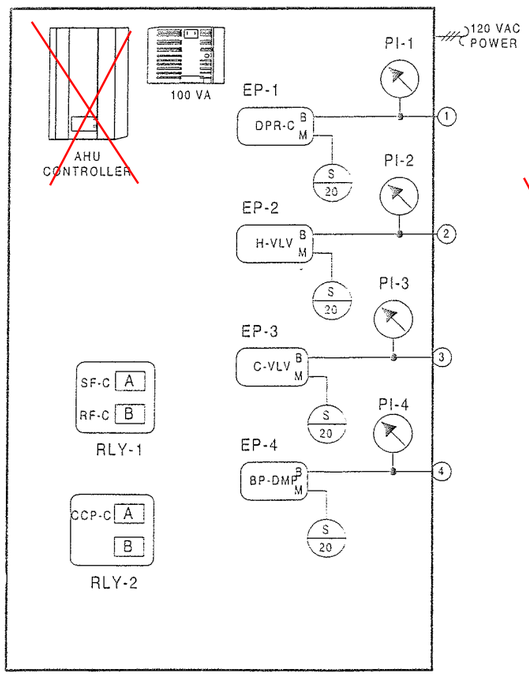


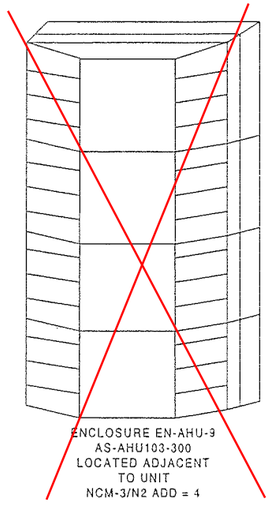
COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM







FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-C5	PRESS LEV	PRPPRC	63	PRESS LEV

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-9-1, D-9-3 AND COOLING COIL VALVE V-C-9 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-9-2 WILL BE OPEN AND HEATING COIL VALVE V-H-9 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY AND RETURN FANS WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-9 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-9-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-9-1, AND RELIEF AIR DAMPER D-9-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY AND RETURN FANS WILL BE RUNNING, RETURN AIR DAMPER D-9-2 IS OPEN. OUTSIDE AIR DAMPER D-9-1 WILL OPEN ITS MINIMUM OPEN POSITION AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FORTY-FIVE (45F) MODULATE V-H-9 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, T-2 WILL GRADUALLY MODULATE DAMPER D-9-1 OPEN WHILE SIMULTANEOUSLY CLOSING D-9-2. STATIC PRESSURE CONTROLLER SPC-9-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-9-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-3, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE T-2 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-9 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND RETURN FANS AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-9-1 AND RETURN DAMPER D-9-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), OUTSIDE AIR DAMPERS D-9-1 WILL CLOSE, OPENING RETURN AIR DAMPER D-9-2. DISCHARGE SENSOR T-2, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-9-1 AND D-9-2 AND CHILLED WATER VALVE V-C-9 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-9 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND RETURN FANS AND CLOSE ALL SYSTEM DAMPERS.

FAN CONTROL - SYSTEM STATIC PRESSURE SENSING STATION SPSS-9-1 THROUGH A STATIC PRESSURE TRANSMITTER AND THE METASYS CONTROLLER WILL MODULATE THE BYPASS DAMPER D-9-4 TO MAINTAIN ITS SETTING. ON A RISE IN STATIC AS SENSED BY SPSS-9-1 DAMPER D-9-4 WILL GRADUALLY MODULATE OPEN TO ITS MAXIMUM POSITION TO MAINTAIN ITS SETTING. HIGH LIMIT STATIC PRESSURE CONTROLLER SPC-9-2 WHICH WILL OVERRIDE SPSS-9-1 AND OPEN D-9-4 TO PREVENT THE DISCHARGE FROM RISING ABOVE IT'S SET POINT.

TOILET EXHAUST FAN TEF-C5 - THE FAN WILL START WHEN AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:08 PM
FILE NAME AHU-9.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-9
PRESS LEVEL QUAD B & C

PRESS LEVEL QUAD C

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 08/29/97 | APPROVED: BY DATE

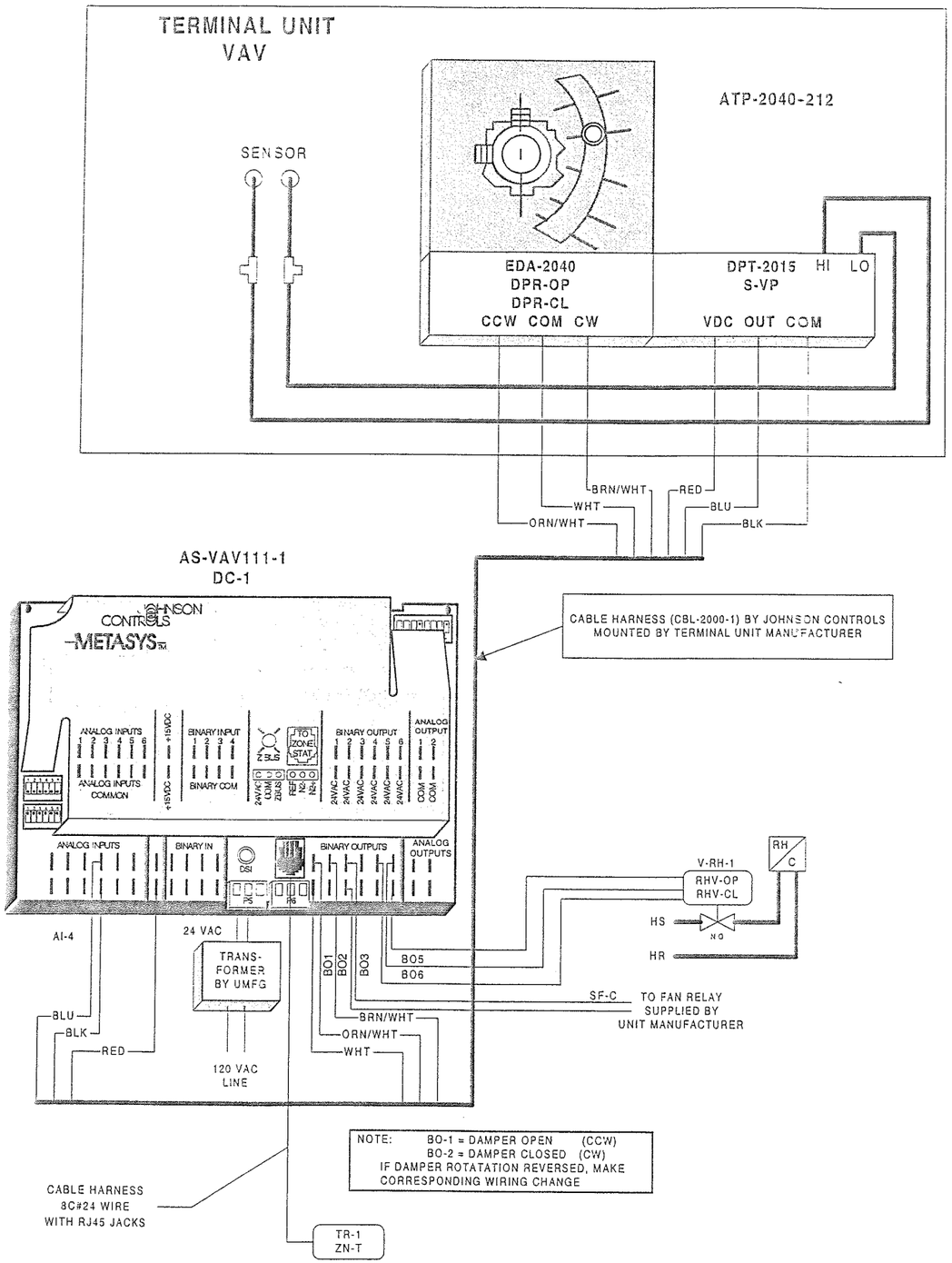
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-13

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-9					AHU						EN-AHU-9	Press Level MER		M,3-13												
		AHU-9					AHU	1	4				EN-AHU-9	Press Level MER	0	M,3-13												Power to Controller
	BO-1	AHU-9	SF-C	Supply Fan Control	Off	On	AHU	1	4	BO-1	RLY	BO#,24V,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-1	3/18	A,COILS,COM	RELAY-A	COM,NO						N2 Trunk
	BO-2	AHU-9	RF-C	Return Fan Control	Off	On	AHU	1	4	BO-2	RLY	BO#,24V,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-2	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-3	AHU-9					AHU	1	4	BO-3			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-3											
	BO-4	AHU-9	CCP-C	Clg Coil Pump 9 Control	Off	On	AHU	1	4	BO-4	RLY	BO#,24V,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-4	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-5	AHU-9	TEF5-C	Toilet Exh Fan 05 Control	Off	On	AHU	1	4	BO-5		BO#,24V	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-5						2/18	Device dependent	24VAC OUT		A50	
	BO-6	AHU-9					AHU	1	4	BO-6			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-6											
	BO-7	AHU-9					AHU	1	4	BO-7			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-7											
	BO-8	AHU-9					AHU	1	4	BO-8			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-8											
	BO-9	AHU-9					AHU	1	4	BO-9			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-9											
	BO-10	AHU-9					AHU	1	4	BO-10			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BO-10											
	AO-1	AHU-9	DPR-C	Damper Control	% Open		AHU	1	4	AO-1		AO#,AOCOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-9	H-VLV	Heating Coil Valve	% Open		AHU	1	4	AO-2		AO#,AOCOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-9	C-VLV	Clg Coil Valve	% Open		AHU	1	4	AO-3		AO#,AOCOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-9	BP-DMP	Bypass Damper	% Open		AHU	1	4	AO-4		AO#,AOCOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-4	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-5	AHU-9					AHU	1	4	AO-5			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-5											
	AO-6	AHU-9					AHU	1	4	AO-6			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AO-6											
	BI-1	AHU-9	SF-S	Supply Fan Status	Off	On	AHU	1	4	BI-1		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-9	RF-S	Return Fan Status	Off	On	AHU	1	4	BI-2		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-2						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-3	AHU-9	SMK-DET	Smoke Detectors	Normal	Alarm	AHU	1	4	BI-3		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-3						2/22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-9	LT-S	Low Temperature Stat	Normal	Alarm	AHU	1	4	BI-4		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-4						2/22	NO,M1	A70 (NC)		A41	
	BI-5	AHU-9	CCP-S	Clg Coil Pump 9 Status	Off	On	AHU	1	4	BI-5		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-5						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-6	AHU-9	SA-HSP	Supply Air Static Press	Normal	Alarm	AHU	1	4	BI-6		BI#,BICOM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-6						2/22	Device dependent	Contact (NO)		A40	
	BI-7	AHU-9					AHU	1	4	BI-7			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-7											
	BI-8	AHU-9					AHU	1	4	BI-8			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-BI-8											
	AI-1	AHU-9					AHU	1	4	AI-1			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-1											
	AI-2	AHU-9	RA-T	Return Air Temperature	Deg F		AHU	1	4	AI-2		AI#,AICM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-2						2/18	2-Wire	TE-6315P-1		A4	
	AI-3	AHU-9	DA-T	Disch Air Temperature	Deg F		AHU	1	4	AI-3		AI#,AICM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-3						2/18	2-Wire	TE-6315P-1		A4	
	AI-4	AHU-9	MA-T	Mixed Air Temperature	Deg F		AHU	1	4	AI-4		AI#,AICM	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-4						2/18	2-Wire	TE-6315P-1		A4	
	AI-5	AHU-9					AHU	1	4	AI-5			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-5											
	AI-6	AHU-9					AHU	1	4	AI-6			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-6											
	AI-7	AHU-9	S-SP	Supply Static Pressure	In. Wg		AHU	1	4	AI-7		AI#,+VDC	EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-7						2/18	-,+	DPT-2641		A2	
	AI-8	AHU-9					AHU	1	4	AI-8			EN-AHU-9	Press Level MER	0	M,3-13	AHU-9-4-AI-8											

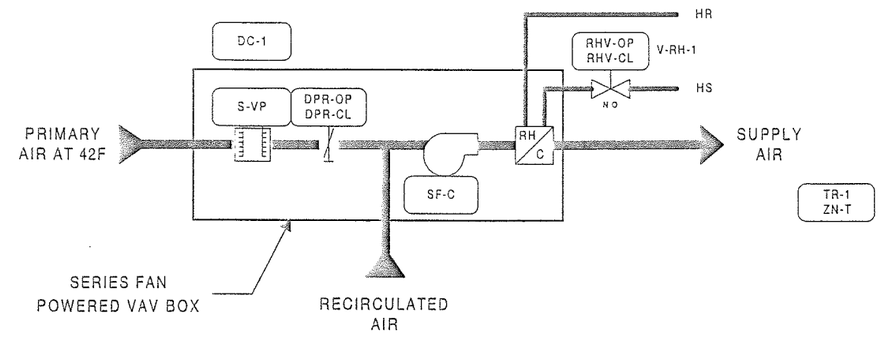


BILL OF MATERIALS

Estimate: ahu-9 vavbox 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DC-1	30	AS-VAV110-1	VAV 6AI,4BI,8BO,8K
V-RH-1	30	--	SEE VALVE SCHEDULE
VAV	30	ATP-2040-212	ACT,2MIN+1.5"DP,1/2"CPLG
ZN-T	21	TE-6410W-1000	MSTAT,NI,BOX,JACK

SERIES FAN POWERED VARIABLE AIR VOLUME (VAV) WITH REHEAT COIL



NOTE: VAV CONTROLLER (AS-VAV111-1) DAMPER ACTUATOR & DIFFERENTIAL PRESSURE TRANSMITTER (ATP-2040-212) ARE FACTORY MOUNTED BY TITUS

DESCRIPTION OF OPERATION

PRIMARY AIR VALVE WILL OPEN TO THEIR MINIMUM POSITION AND TERMINAL UNIT FAN WILL START AND RUN CONTINUOUSLY WHENEVER AIR HANDLING UNIT IS RUNNING. TERMINAL UNIT FANS WILL START THIRTY (30) SECONDS BEFORE OPENING OF AIR VALVES TO PREVENT BACK SPINNING OF FAN. FANS WILL ALSO BE OPERATED AS DEFINED IN THE UNOCCUPIED MODES. PRIMARY AIR VALVES WILL BE CLOSED DURING UNOCCUPIED HEATING MODE. ROOM SENSOR TR-1 WILL ON A RISE IN TEMPERATURE GRADUALLY MODULATE REHEAT COIL VALVE V-RH-1 CLOSED AND ON A CONTINUED RISE WILL GRADUALLY MODULATE PRIMARY AIR VALVE FROM IT'S MINIMUM TO MAXIMUM SETTING TO MAINTAIN IT'S SETTING OF SEVENTY-FIVE (75F). ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. DURING OPERATION OF THE WARM-UP MODE ALL PRIMARY AIR VALVES OPEN TO THEIR MAXIMUM POSITION AND TERMINAL FANS START TO PERMIT FULL AIR FLOW TO THE SPACES. REHEAT COIL VALVE V-RH-1 IS MODULATED IN RESPONSE TO ROOM SENSOR TO MAINTAIN SPACE TEMPERATURE.

AS-BUILT							7/18/00	CME
REFERENCE DRAWING		NO.	REVISION-LOCATION			ECN	DATE	BY
Sales Engineer: JDP	Project Manager: WJT	Application Engineer: RTS	DRAWN: BY RTS DATE 08/28/97		APPROVED: BY	DATE		

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 02:54 PM
FILE NAME VAVBOX-E.vsd

DRAWING TITLE
FAN POWERED TERMINAL REHEAT UNITS

QUAD C PRESS LEVEL

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

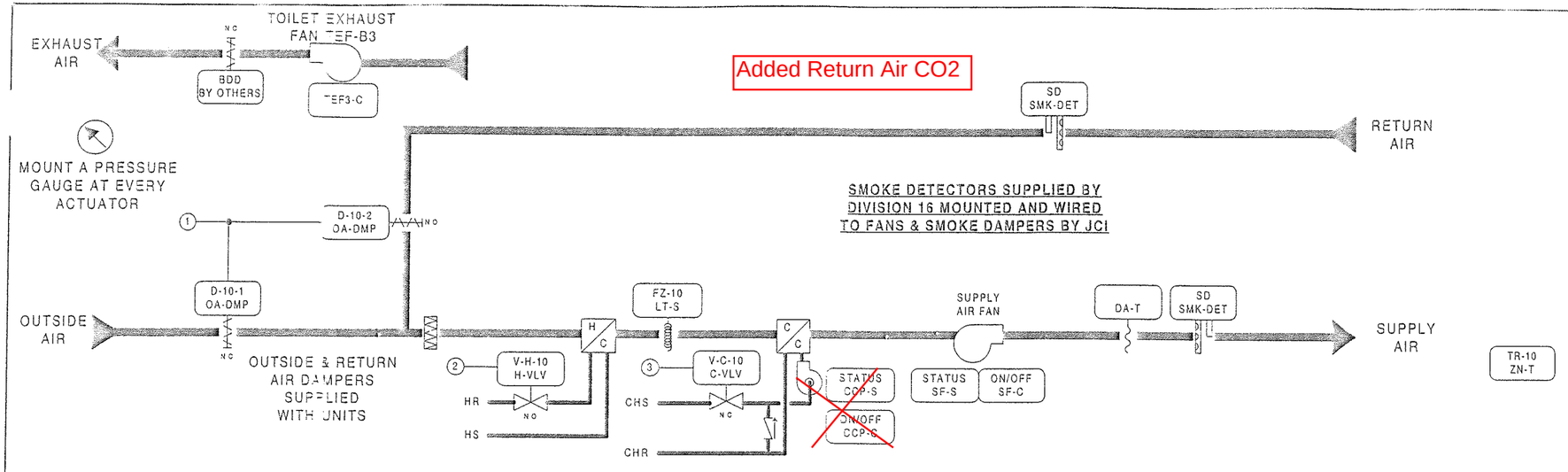
JOHNSON CONTROLS
Controls Group

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-14

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expandact ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		FP-VAV-C9					VAV						EN-FPVAV	At VAVBOX														Power to Controller
		FP-VAV-C9					VAV	1		Z			EN-FPVAV	At VAVBOX	0													N2 Trunk
	AI-1	FP-VAV-C9	ZN-T	Zone Temperature	Deg F		VAV	1		Z AI-1		PHONE JACK	EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-1					8/26	PHONE JACK	Metastat-Ph Jack		U2	
	AI-2	FP-VAV-C9					VAV	1		Z AI-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-2										
	AI-3	FP-VAV-C9					VAV	1		Z AI-3			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-3										
	AI-4	FP-VAV-C9	S-VP	Supply Vel Pressure	In. Wg		VAV	1		Z AI-4		AI#,AICM,+15VDC	EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-4					3/18	OUT,COM,+VDC	DPT-2000		U9	
	AI-5	FP-VAV-C9					VAV	1		Z AI-5			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-5										
	AI-6	FP-VAV-C9					VAV	1		Z AI-6			EN-FPVAV	At VAVBOX	0		FPVAV-x-AI-6										
	BI-1	FP-VAV-C9					VAV	1		Z BI-1			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-1										
	BI-2	FP-VAV-C9					VAV	1		Z BI-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-2										
	BI-3	FP-VAV-C9					VAV	1		Z BI-3			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-3										
	BI-4	FP-VAV-C9					VAV	1		Z BI-4			EN-FPVAV	At VAVBOX	0		FPVAV-x-BI-4										
	BO-1	FP-VAV-C9	DPR-OP	Damper Open	Off	On	VAV	1		Z BO-1		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-1					3/18	CW,CCW,COM	EDA-2040		U54	
	BO-2	FP-VAV-C9	DPR-CL	Damper Close	Off	On	VAV	1		Z BO-2		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-2					3/18	CW,CCW,COM	EDA-2040		U54	
	BO-3	FP-VAV-C9	SF-C	Supply Fan Control	Off	On	VAV	1		Z BO-3		BO#,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-3	2/18	COIL	RELAY	NO,COM	2/14	See starter detail	Starter (NO)		U51	
	BO-4	FP-VAV-C9					VAV	1		Z BO-4			EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-4										
	BO-5	FP-VAV-C9	RHV-OP	Reheat Valve Open	Off	On	VAV	1		Z BO-5		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-5					3/18	BLK,RED,WHT	VA-7150		U58	
	BO-6	FP-VAV-C9	RHV-CL	Reheat Valve Close	Off	On	VAV	1		Z BO-6		BO-a,BO-b,24VAC	EN-FPVAV	At VAVBOX	0		FPVAV-x-BO-6					3/18	BLK,RED,WHT	VA-7150		U58	
	AO-1	FP-VAV-C9					VAV	1		Z AO-1			EN-FPVAV	At VAVBOX	0		FPVAV-x-AO-1										
	AO-2	FP-VAV-C9					VAV	1		Z AO-2			EN-FPVAV	At VAVBOX	0		FPVAV-x-AO-2										

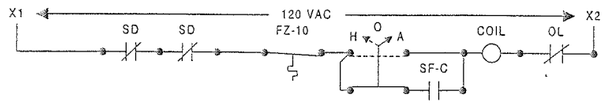


BILL OF MATERIALS

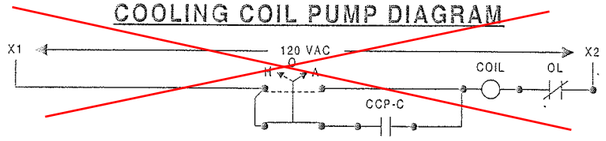
Estimate ahu-10 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
FZ-10	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
TEF-B3	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-10	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

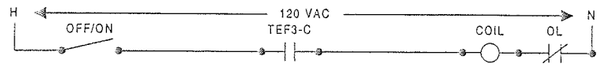
SUPPLY FAN WIRING DIAGRAM



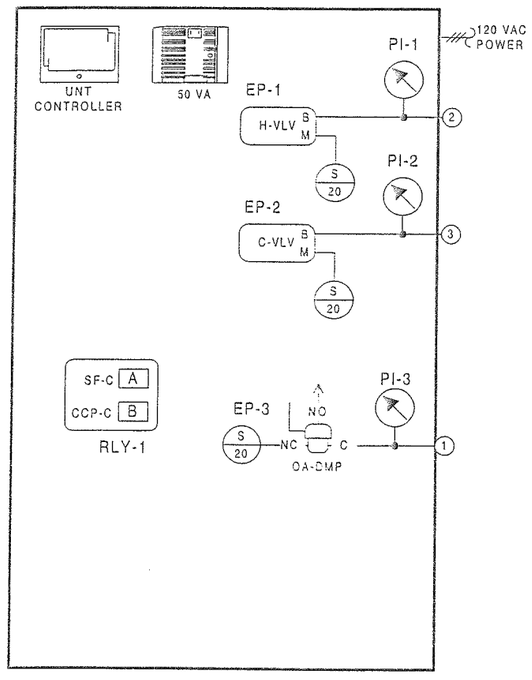
COOLING COIL PUMP DIAGRAM

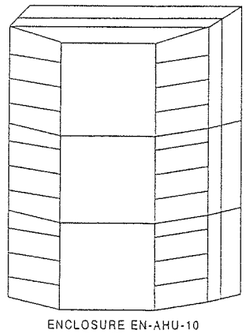


TOILET EXHAUST FAN DIAGRAM



FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B3	M CONCOURSE	STARTER		M CONCOURSE





ENCLOSURE EN-AHU-10
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 1

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-10-1, AND COOLING COIL VALVE V-C-10 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-10-2 WILL BE OPEN AND HEATING COIL VALVE V-H-10 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-10 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-10-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-10-1 CLOSED. EXHAUST FAN TEF-B3 WILL BE OFF AND EXHAUST AIR DAMPER D-10-3 (BDD) WILL BE CLOSED DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-10 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-10-2 WILL CLOSE, OUTSIDE AIR DAMPER D-10-1 WILL OPEN AND EXHAUST FAN TEF-B3 WILL START AND RUN CONTINUOUSLY CAUSING EXHAUST AIR DAMPER D-10-3 (BDD) TO OPEN AFTER THE WARM-UP MODE IS STOPPED. ROOM SENSOR TR-10 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF EVENTY-FIVE (75F) MODULATE V-H-10 CLOSED TO THE HEATING COIL. COOLING COIL VALVE V-C-10 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-10, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND EXHAUST FAN TEF-B3 AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-10-1 AND EXHAUST AIR DAMPER D-10-3 (BDD) WILL OPEN. ROOM SENSOR TR-10 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL MODULATE CHILLED WATER VALVE V-C-10 TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F). THE HEATING COIL VALVE V-H-10 WILL BE CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B3 - THE FAN WILL START WHEN THE AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:09 PM
FILE NAME AHU-10.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-10
GAME DAY SERVICES

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/02/97	BY DATE

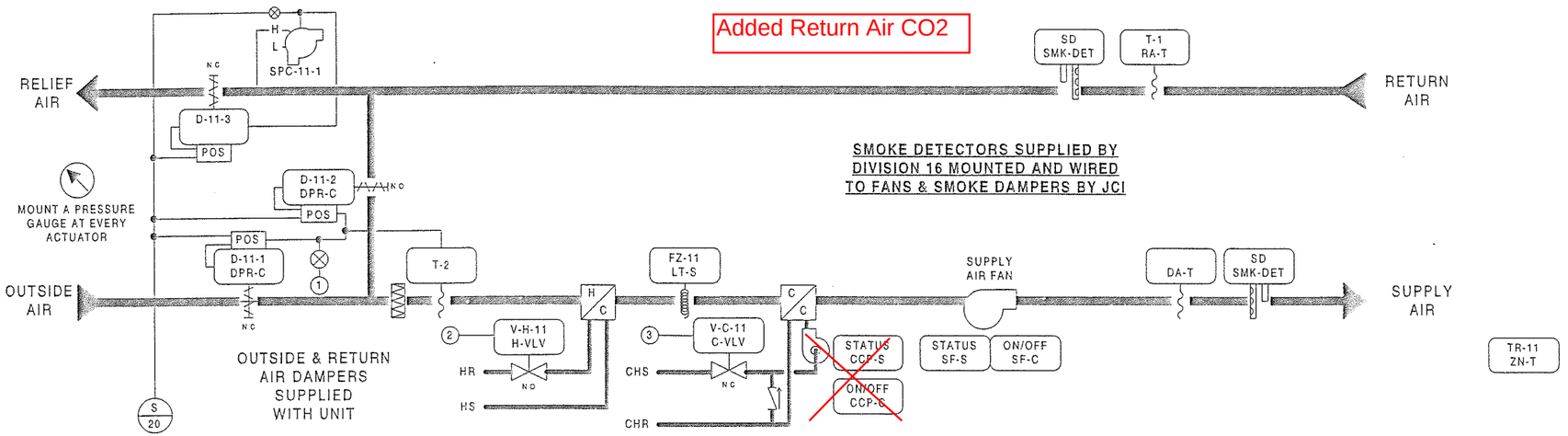
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-15

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-10					UNT						EN-AHU10	Service Level B		M.2-01B												
		AHU-10	*				UNT	1	1				EN-AHU10	Service Level B		0 M.2-01B												N2 Trunk
	AI-1	AHU-10	DA-T	Disch Air Temperature	Deg F		UNT	1	1	AI-1		AI#,AICM	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-1						2/18	2-Wire	TE-6315P-1		U1	
	AI-2	AHU-10					UNT	1	1	AI-2			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-2											
	AI-3	AHU-10					UNT	1	1	AI-3			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-3											
	AI-4	AHU-10	ZN-T	Zone Temperature	Deg F		UNT	1	1	AI-4		PHONE JACK	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-4						8/26	TE-6410W-1000	TE-6410-		U2	
	AI-5	AHU-10					UNT	1	1	AI-5			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-5											
	AI-6	AHU-10					UNT	1	1	AI-6			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AI-6											
	BI-1	AHU-10	SF-S	Supply Fan Status	Off	On	UNT	1	1	BI-1		BI#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-10	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	1	BI-2		BI#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-10	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	1	BI-3		BI#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-10	CCP-S	Clg Coil Pump 10 Status	Off	On	UNT	1	1	BI-4		BI#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-10	SF-C	Supply Fan Control	Off	On	UNT	1	1	BO-1	RLY	BO#,24V,COM	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-10	TEF3-C	Toilet Exh Fan B3 Cntrl	Off	On	UNT	1	1	BO-2		BO#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	AHU-10	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	1	BO-3		BO#,24VAC	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-3			V11H3A-100			2/18	2-Wire	SAV-24VAC (sw lo)		U51	
	BO-4	AHU-10	CCP-C	Clg Coil Pump 10 Control	Off	On	UNT	1	1	BO-4	RLY	BO#,24V,COM	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-10					UNT	1	1	BO-5			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-5											
	BO-6	AHU-10					UNT	1	1	BO-6			EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-BO-6											
	AO-1	AHU-10	H-VLV	Heating Coil Valve	% Open		UNT	1	1	AO-1		AO#,AOCM,24VA	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-10	C-VLV	Cooling Coil Valve	% Open		UNT	1	1	AO-2		AO#,AOCM,24VA	EN-AHU10	Service Level B		0 M.2-01B	AHU10-1-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

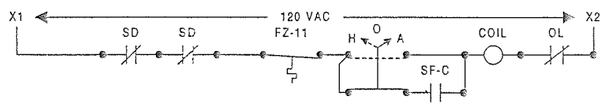


BILL OF MATERIALS

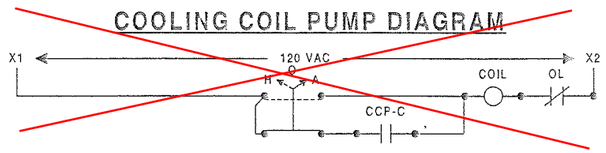
Estimate: ahu-11 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
DPR-C	3	D-3153-1	DMPR ACT,8-13#,W/PILOT
	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-11	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
SPC-11-1	1	P-317-1	CNTRLR DP,0.05-1"WG
T-2	1	T-3610-1001	STAT,LOW VOL ,8' AVG, DCT
TEF-B1	1	EZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-11	1	AS-AHU103-300	AHU TERM BD IN EWC35
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2,3	3	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

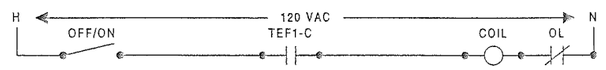
SUPPLY FAN WIRING DIAGRAM

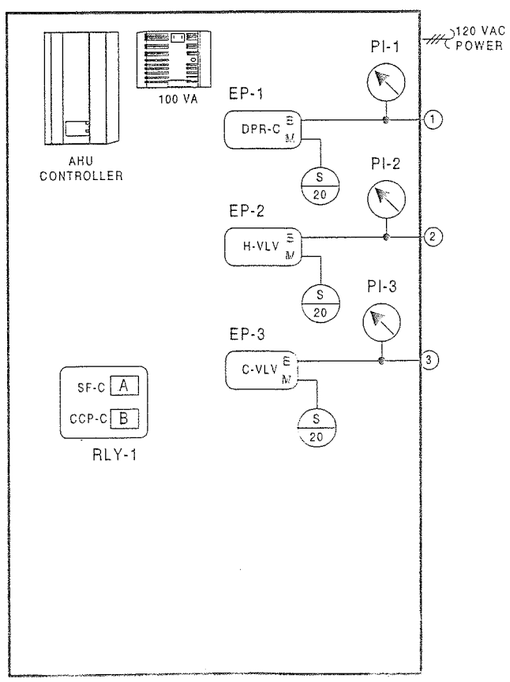


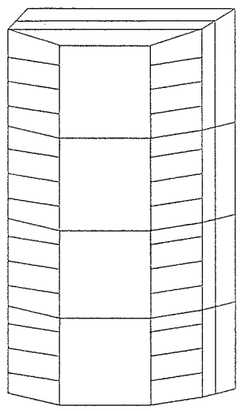
COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM







ENCLOSURE EN-AHU-11
AS-AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 2

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B1	SERVICE LEVEL	RP2SRB	51	SERVICE LEVEL

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-11-1, D-11-3 AND COOLING COIL VALVE V-C-11 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-11-2 WILL BE OPEN AND HEATING COIL VALVE V-H-11 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-11 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-11-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-11-1, AND RELIEF AIR DAMPER D-11-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-11-2 IS OPEN. OUTSIDE AIR DAMPER D-11-1 WILL OPEN ITS MINIMUM OPEN POSITION AFTER THE WARM-UP MODE IS STOPPED. ROOM SENSOR TR-11, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-11 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, TR-11 WILL GRADUALLY MODULATE DAMPER D-11-1 OPEN WHILE SIMULTANEOUSLY CLOSING D-11-2. STATIC PRESSURE CONTROLLER SPC-11-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-11-3 TO MAINTAIN IT'S SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-2, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE TR-11 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-11 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-11 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50) ACTIVATE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY FAN AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-11-1 AND RETURN DAMPER D-11-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), OUTSIDE AIR DAMPERS D-11-1 WILL CLOSE, OPENING RETURN AIR DAMPER D-11-2. ROOM SENSOR TR-11, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-11-1 AND D-11-2 AND CHILLED WATER VALVE V-C-11 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-11 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY FAN AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B1 - FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:10 PM
FILE NAME AHU-11.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-11
STADIUM OPERATIONS

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION/LOCATION	ECN	DATE	BY

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/02/97 | APPROVED: BY | DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-0559-16

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-11					AHU						EN-AHU11	Service Level B		M.2-01B												Power to Controller
		AHU-11	*				AHU	1	2				EN-AHU11	Service Level B	0	M.2-01B												N2 Trunk
	BO-1	AHU-11	SF-C	Supply Fan Control	Off	On	AHU	1	2	BO-1	RLY	BO#,24V,BICOM,	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-1	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-2	AHU-11	TEF1-C	Toilet Exh Fan B1 Control	Off	On	AHU	1	2	BO-2		BO#,24V	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-2			PD-105-51			2/18	Device dependent	24VAC OUT		A50	
	BO-3	AHU-11	CCP-C	Clg Coil Pump 11 Control	Off	On	AHU	1	2	BO-3	RLY	BO#,24V,BICOM,	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-3	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-11					AHU	1	2	BO-4			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-4											
	BO-5	AHU-11					AHU	1	2	BO-5			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-5											
	BO-6	AHU-11					AHU	1	2	BO-6			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-6											
	BO-7	AHU-11					AHU	1	2	BO-7			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-7											
	BO-8	AHU-11					AHU	1	2	BO-8			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-8											
	BO-9	AHU-11					AHU	1	2	BO-9			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-9											
	BO-10	AHU-11					AHU	1	2	BO-10			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BO-10											
	AO-1	AHU-11	DPR-C	Damper Control	% Open		AHU	1	2	AO-1		AO#,AOCOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-11	H-VLV	Heating Coil Valve	% Open		AHU	1	2	AO-2		AO#,AOCOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-11	C-VLV	Cooling Coil Valve	% Open		AHU	1	2	AO-3		AO#,AOCOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-11					AHU	1	2	AO-4			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-4											
	AO-5	AHU-11					AHU	1	2	AO-5			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-5											
	AO-6	AHU-11					AHU	1	2	AO-6			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AO-6											
	BI-1	AHU-11	SF-S	Supply Fan Status	Off	On	AHU	1	2	BI-1		BI#,BICOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-11	SMK-DET	Smoke Detectors	Normal	Alarm	AHU	1	2	BI-2		BI#,BICOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-2						2/22	Device dependent	Contact (NO)		A40	
	BI-3	AHU-11	LT-S	Low Temperature Stat	Normal	Alarm	AHU	1	2	BI-3		BI#,BICOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-3						2/22	Device dependent	Contact (NO)		A40	
	BI-4	AHU-11	CCP-S	Clg Coil Pump 11 Status	Off	On	AHU	1	2	BI-4		BI#,BICOM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-4						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-5	AHU-11					AHU	1	2	BI-5			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-5											
	BI-6	AHU-11					AHU	1	2	BI-6			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-6											
	BI-7	AHU-11					AHU	1	2	BI-7			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-7											
	BI-8	AHU-11					AHU	1	2	BI-8			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-BI-8											
	AI-1	AHU-11	DA-T	Disch Air Temperature	Deg F		AHU	1	2	AI-1		AI#,AICM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-1						2/18	2-Wire	TE-6315P-1		A4	
	AI-2	AHU-11	RA-T	Return Air Temperature	Deg F		AHU	1	2	AI-2		AI#,AICM	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-2						2/18	2-Wire	TE-6315P-1		A4	
	AI-3	AHU-11					AHU	1	2	AI-3			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-3											
	AI-4	AHU-11	ZN-T	Zone Temperature	Deg F		AHU	1	2	AI-4		PHONE JACK	EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-4						8/26	PHONE JACK	TE-6410W-1000		A5	
	AI-5	AHU-11					AHU	1	2	AI-5			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-5											
	AI-6	AHU-11					AHU	1	2	AI-6			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-6											
	AI-7	AHU-11					AHU	1	2	AI-7			EN-AHU11	Service Level B	0	M.2-01B	AHU11-2-AI-7											
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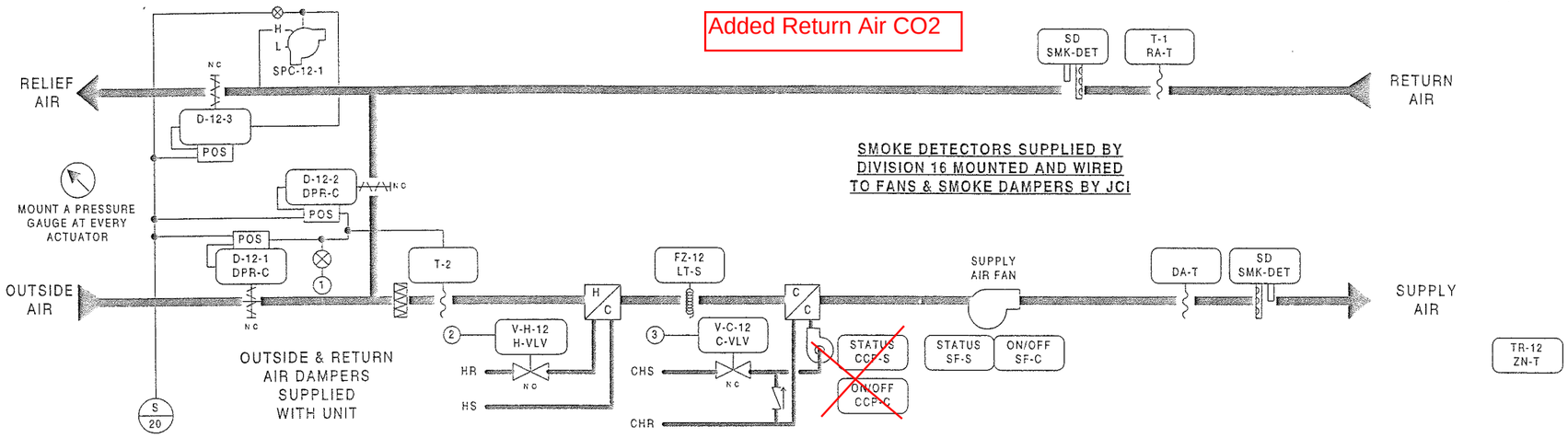
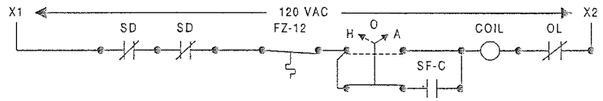


BILL OF MATERIALS

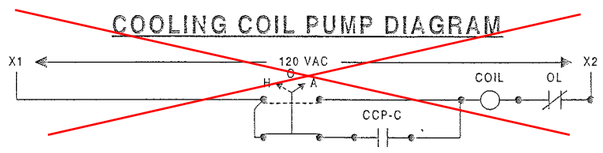
Estimate: ahu-12 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
DPR-C	3	D-3153-1	DMPR ACT,8-13#,W/PILOT
	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-12	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
SPC-12-1	1	R-317-1	CNTRLR DP,0.05-1"WG
T-2	1	T-3610-1001	STAT,LOW VOL ,8' AVG, DCT
TEF-B2	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-12	1	AS-AHU103-300	AHU TERM BD IN EWC35
	1	EN-EXP101-C	UNIV PKG MOD,CVR & BACKBN
EP-1,2,3	3	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-C	RELAY; 2SPDT 5 AMP 240VAC

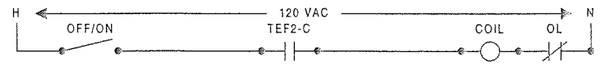
SUPPLY FAN WIRING DIAGRAM

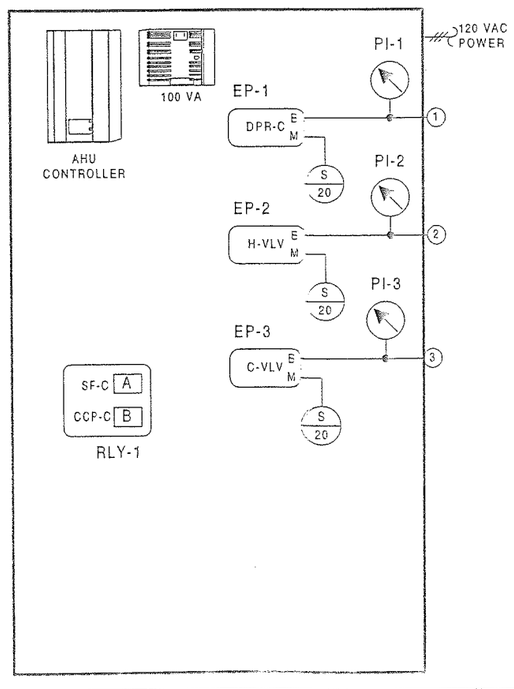


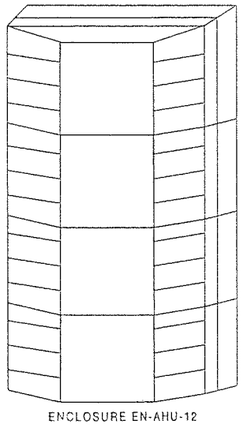
COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM







ENCLOSURE EN-AHU-12
AS-AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 3

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B2	SERVICE LEVEL	RP2SRB	53	SERVICE LEVEL

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-12-1, D-12-3 AND COOLING COIL VALVE V-C-12 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-12-2 WILL BE OPEN AND HEATING COIL VALVE V-H-12 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-12 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-12-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-12-1, AND RELIEF AIR DAMPER D-12-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-12-2 IS OPEN. OUTSIDE AIR DAMPER D-12-1 WILL OPEN ITS MINIMUM OPEN POSITION AFTER THE WARM-UP MODE IS STOPPED. ROOM SENSOR TR-12, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-12 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, TR-12 WILL GRADUALLY MODULATE DAMPER D-12-1 OPEN WHILE SIMULTANEOUSLY CLOSING D-12-2. STATIC PRESSURE CONTROLLER SPC-12-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-12-3 TO MAINTAIN ITS SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-2, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE TR-12 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-12 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-12 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50) ACTIVATE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY FAN AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-12-1 AND RETURN DAMPER D-12-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), OUTSIDE AIR DAMPERS D-12-1 WILL CLOSE, OPENING RETURN AIR DAMPER D-12-2. ROOM SENSOR TR-12, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-12-1 AND D-12-2 AND CHILLED WATER VALVE V-C-12 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-12 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY FAN AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B2 - FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:17 PM
FILE NAME AHU-12.VSD

DRAWING TITLE
AIR HANDLING UNIT AHU-12
BROADCAST MEDIA

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY

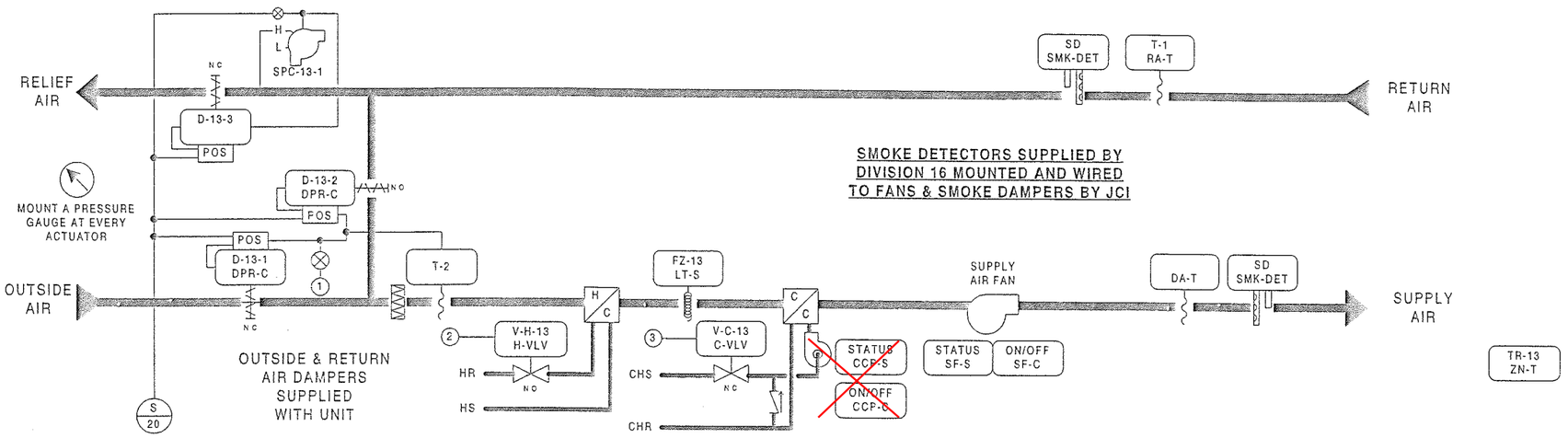
Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/02/97 | APPROVED: BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098
DRAWING NUMBER BL-6559-17

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bcy/Termina	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-12					AHU						EN-AHU12	Service Level B		M.2-01B												Power to Controller
		AHU-12	*				AHU	1	3				EN-AHU12	Service Level B		0 M.2-01B												N2 Trunk
	BO-1	AHU-12	SF-C	Supply Fan Control	Off	On	AHU	1	3	BO-1	RLY	BO#,24V,BICOM	EN-AHU12	Service Level B	-	0 M.2-01B	AHU12-3-BO-1	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-2	AHU-12	TEF2-C	Toilet Exh Fan B2 Control	Off	On	AHU	1	3	BO-2		BO#,24V	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-3	AHU-12	CCP-C	Clg Coil Pump 12 Control	Off	On	AHU	1	3	BO-3	RLY	BO#,24V,BICOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-3	3/18	B,COILS,COM	RELAY-E	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-12					AHU	1	3	BO-4			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-4											
	BO-5	AHU-12					AHU	1	3	BO-5			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-5											
	BO-6	AHU-12					AHU	1	3	BO-6			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-6											
	BO-7	AHU-12					AHU	1	3	BO-7			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-7											
	BO-8	AHU-12					AHU	1	3	BO-8			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-8											
	BO-9	AHU-12					AHU	1	3	BO-9			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-9											
	BO-10	AHU-12					AHU	1	3	BO-10			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BO-10											
	AO-1	AHU-12	DPR-C	Damper Control	% Open		AHU	1	3	AO-1		AO#,AOCOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-1	2/18	+,-	EP-B000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-12	H-VLV	Heating Coil Valve	% Open		AHU	1	3	AO-2		AO#,AOCOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-2	2/18	+,-	EP-B000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-12	C-VLV	Cooling Coil Valve	% Open		AHU	1	3	AO-3		AO#,AOCOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-3	2/18	+,-	EP-B000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-12					AHU	1	3	AO-4			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-4											
	AO-5	AHU-12					AHU	1	3	AO-5			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-5											
	AO-6	AHU-12					AHU	1	3	AO-6			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AO-6											
	BI-1	AHU-12	SF-S	Supply Fan Status	Off	On	AHU	1	3	BI-1		BI#,BICOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-12	SMK-DET	Smoke Detectors	Normal	Alarm	AHU	1	3	BI-2		BI#,BICOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-2						2/22	Device dependent	Contact (NO)		A40	
	BI-3	AHU-12	LT-S	Low Temperature Stat	Normal	Alarm	AHU	1	3	BI-3		BI#,BICOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-3						2/22	NO,M1	A70 (NC)		A41	
	BI-4	AHU-12	CCP-S	Clg Coil Pump 12 Status	Off	On	AHU	1	3	BI-4		BI#,BICOM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-4						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-5	AHU-12					AHU	1	3	BI-5			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-5											
	BI-6	AHU-12					AHU	1	3	BI-6			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-6											
	BI-7	AHU-12					AHU	1	3	BI-7			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-7											
	BI-8	AHU-12					AHU	1	3	BI-8			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-BI-8											
	AI-1	AHU-12	DA-T	Disch Air Temperature	Deg F		AHU	1	3	AI-1		AI#,AICM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-1						2/18	2-Wire	TE-6315P-1		A4	
	AI-2	AHU-12	RA-T	Return Air Temperature	Deg F		AHU	1	3	AI-2		AI#,AICM	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-2						2/18	2-Wire	TE-6315P-1		A4	
	AI-3	AHU-12					AHU	1	3	AI-3			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-3											
	AI-4	AHU-12	ZN-T	Zone Temperature	Deg F		AHU	1	3	AI-4		PHONE JACK	EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-4						8/26	PHONE JACK	TE-6410W-1000		A5	
	AI-5	AHU-12					AHU	1	3	AI-5			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-5											
	AI-6	AHU-12					AHU	1	3	AI-6			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-6											
	AI-7	AHU-12					AHU	1	3	AI-7			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-7											
	AI-8	AHU-12					AHU	1	3	AI-8			EN-AHU12	Service Level B		0 M.2-01B	AHU12-3-AI-8											

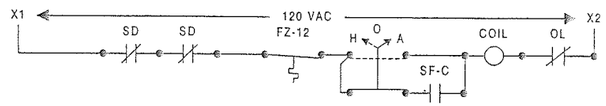


BILL OF MATERIALS

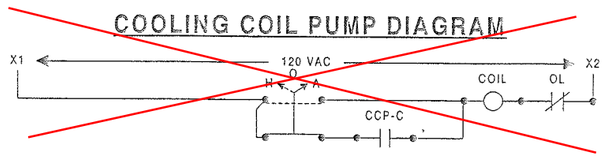
Estimate: ahu-13 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
DPR-C	3	D-3153-1	DMPR ACT,8-13#,W/PILOT
	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
FZ-13	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
SPC-13-1	1	P-317-1	CNTRLR DP,0.05-1"WG
T-2	1	T-3610-1001	STAT,LOW VOL ,8' AVG, DCT
TEF-B4,SEF-3 ,SEF-4	3	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	3	PD-101-35	RLY BASE,3PDT,11PIN,10A
	3	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-13	1	AS-AHU103-300	AHU TERM BD IN ENC35
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2,3	3	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

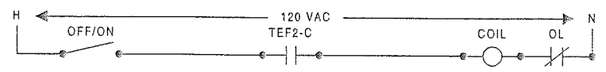
SUPPLY FAN WIRING DIAGRAM

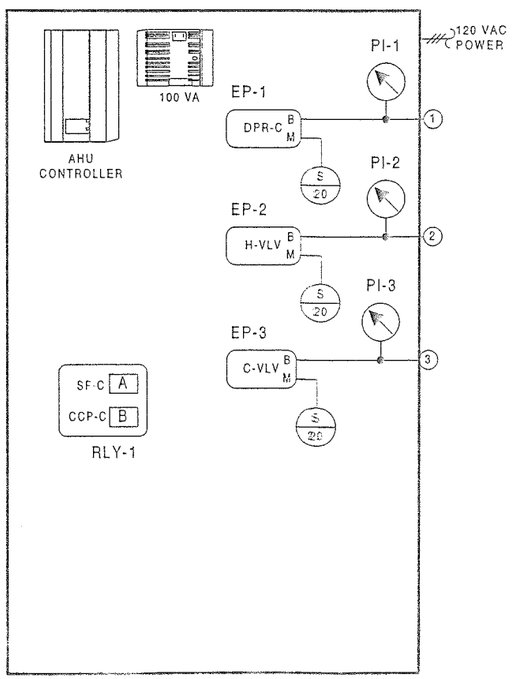


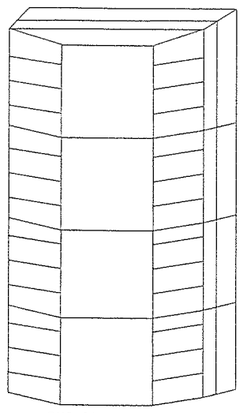
COOLING COIL PUMP DIAGRAM



TOILET EXHAUST FAN DIAGRAM







ENCLOSURE EN-AHU-13
AS AHU103-300
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 4

FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B4	SERVICE LEVEL	RP2SRB	45	SERVICE LEVEL
SEF-3	SERVICE LEVEL	STARTER		SERVICE LEVEL
SEF-4	SERVICE LEVEL	STARTER		SERVICE LEVEL

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AND RELIEF AIR DAMPERS D-13-1, D-13-3 AND COOLING COIL VALVE V-C-13 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-13-2 WILL BE OPEN AND HEATING COIL VALVE V-H-13 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-13 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-13-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPERS D-13-1, AND RELIEF AIR DAMPER D-13-3 CLOSED. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-13-2 IS OPEN. OUTSIDE AIR DAMPER D-13-1 WILL OPEN ITS MINIMUM OPEN POSITION AFTER THE WARM-UP MODE IS STOPPED. ROOM SENSOR TR-13, THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-13 CLOSED TO THE HEATING COIL. ON A FURTHER RISE, TR-13 WILL GRADUALLY MODULATE DAMPER D-13-1 OPEN WHILE SIMULTANEOUSLY CLOSING D-13-2. STATIC PRESSURE CONTROLLER SPC-13-1 LOCATED IN THE ENTERING SIDE OF THE RELIEF DAMPER WILL OVERRIDE THE CONTROL AND MODULATE D-13-3 TO MAINTAIN ITS SETTING TO ENSURE A POSITIVE BUILDING PRESSURE. LOW LIMIT THERMOSTAT T-2, SENSITIVE TO THE COLDEST SPOT IN THE AIR STREAM, WILL OVERRIDE TR-13 TO PREVENT MIXED AIR FROM FALLING BELOW ITS SETTING OF FORTY (40F). ON A FALL IN TEMPERATURE, THE REVERSE WILL OCCUR. COOLING COIL VALVE V-C-13 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-13 WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50) ACTIVATE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY FAN AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-13-1 AND RETURN DAMPER D-13-2 WILL, THROUGH THE METASYS SYSTEM CONTROL UNIT, BE UNDER FLOATING DRY BULB DIFFERENTIAL CONTROL WHICH WILL COMPARE THE TEMPERATURE OF THE RETURN AND OUTSIDE AIR STREAMS. THE OUTSIDE AIR WILL BE UTILIZED WHENEVER IT IS GREATER THAN SEVEN (7F) LESS THAN THE RETURN AIR TEMPERATURE. WHEN THE DIFFERENTIAL FALLS BELOW SEVEN (7F), OUTSIDE AIR DAMPERS D-13-1 WILL CLOSE, OPENING RETURN AIR DAMPER D-13-2. ROOM SENSOR TR-13, THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL IN SEQUENCE MODULATE OUTSIDE AND RETURN DAMPERS D-13-1 AND D-13-2 AND CHILLED WATER VALVE V-C-13 TO MAINTAIN ITS SETTING OF FORTY-FIVE (45F). HEATING COIL VALVE V-H-13 WILL REMAIN CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY FAN AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B4 - FAN WILL START WHEN THE AHU SUPPLY FAN IS STARTED AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

SMOKE EXHAUST FANS SEF-3,SEF-4 - LEAD FAN WILL START WHEN HVU-11, HVU-12 OR HVU-13 SUPPLY FANS ARE STARTED. SEE DRAWINGS FOR INDIVIDUAL HVU CONTROLS.

REVISION INFORMATION
NUMBER
DATE 07/16/00
TIME 03:15 PM
FILE NAME AHU-13.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-13
SECURITY

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION/LOCATION		ECN	DATE

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/02/97	BY DATE

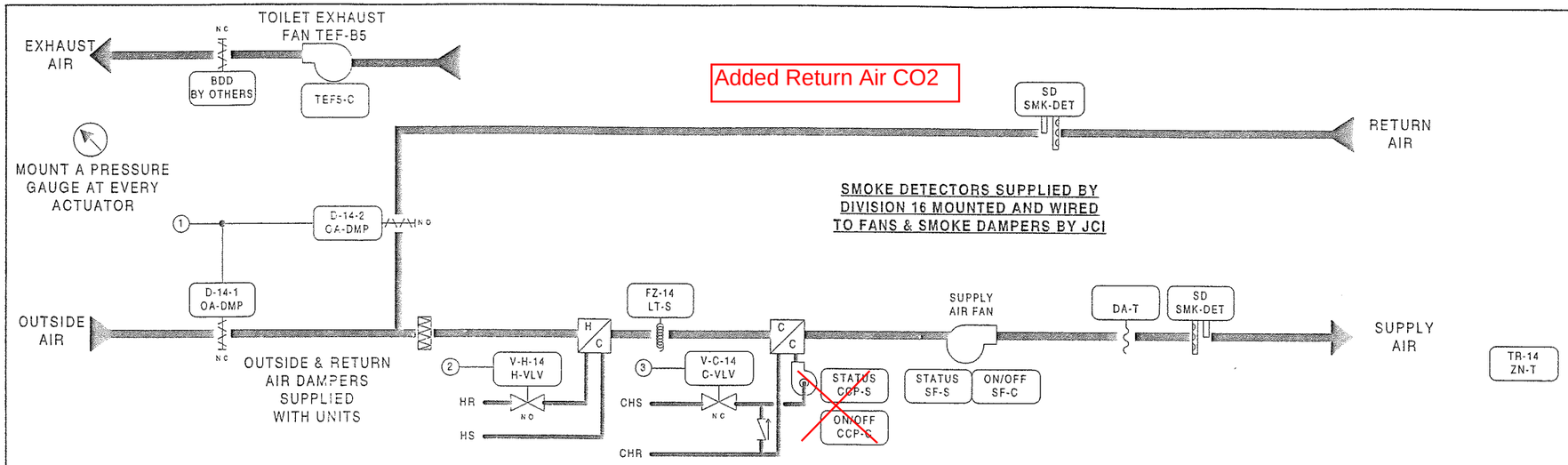
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-18

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-13					AHU						EN-AHU13	Service Level B		M.2-01B												Power to Controller
		AHU-13	*				AHU	1	4				EN-AHU13	Service Level B		0.M.2-01B												N2 Trunk
	BO-1	AHU-13	SF-C	Supply Fan Control	Off	On	AHU	1	4	BO-1	RLY	BO#,24V,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-1	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-2	AHU-13	TEF4-C	Toilet Exh Fan B4 Control	Off	On	AHU	1	4	BO-2		BO#,24V	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-3	AHU-13	CCP-C	Ctg Coil Pump 13 Control	Off	On	AHU	1	4	BO-3	RLY	BO#,24V,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-3	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		A53	
	BO-4	AHU-13	SEF3-C	Smoke Exh Fan 3 Control	Off	On	AHU	1	4	BO-4		BO#,24V	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-5	AHU-13	SEF4-C	Smoke Exh Fan 4 Control	Off	On	AHU	1	4	BO-5		BO#,24V	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-5			PD-109-51			2/18	Device dependent	24VAC OUT		A50	
	BO-6	AHU-13					AHU	1	4	BO-6			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-6											
	BO-7	AHU-13					AHU	1	4	BO-7			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-7											
	BO-8	AHU-13					AHU	1	4	BO-8			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-8											
	BO-9	AHU-13					AHU	1	4	BO-9			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-9											
	BO-10	AHU-13					AHU	1	4	BO-10			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BO-10											
	AO-1	AHU-13	DPR-C	Damper Control	% Open		AHU	1	4	AO-1		AO#,AOCOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-1	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-2	AHU-13	H-VLV	Heating Coil Valve	% Open		AHU	1	4	AO-2		AO#,AOCOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-2	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-3	AHU-13	C-VLV	Cooling Coil Valve	% Open		AHU	1	4	AO-3		AO#,AOCOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-3	2/18	+,-	EP-8000-4	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		A28	
	AO-4	AHU-13					AHU	1	4	AO-4			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-4											
	AO-5	AHU-13					AHU	1	4	AO-5			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-5											
	AO-6	AHU-13					AHU	1	4	AO-6			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AO-6											
	BI-1	AHU-13	SF-S	Supply Fan Status	Off	On	AHU	1	4	BI-1		BI#,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-1						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-2	AHU-13	SMK-DET	Smoke Detectors	Normal	Alarm	AHU	1	4	BI-2		BI#,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-2						2/22	Device dependent	Contact (NO)		A40	
	BI-3	AHU-13	LT-S	Low Temperature Stat	Normal	Alarm	AHU	1	4	BI-3		BI#,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-3						2/22	NO,M1	A70 (NC)		A41	
	BI-4	AHU-13	CCP-S	Ctg Coil Pump 13 Status	Off	On	AHU	1	4	BI-4		BI#,BICOM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-4						2/22	Device dependent	Aux Contact (NO)		A40	
	BI-5	AHU-13					AHU	1	4	BI-5			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-5											
	BI-6	AHU-13					AHU	1	4	BI-6			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-6											
	BI-7	AHU-13					AHU	1	4	BI-7			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-7											
	BI-8	AHU-13					AHU	1	4	BI-8			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-BI-8											
	AI-1	AHU-13	DA-T	Disch Air Temperature	Deg F		AHU	1	4	AI-1		AI#,AICM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-1						2/18	2-Wire	TE-6315P-1		A4	
	AI-2	AHU-13	RA-T	Return Air Temperature	Deg F		AHU	1	4	AI-2		AI#,AICM	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-2						2/18	2-Wire	TE-6315P-1		A4	
	AI-3	AHU-13					AHU	1	4	AI-3			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-3											
	AI-4	AHU-13	ZN-T	Zone Temperature	Deg F		AHU	1	4	AI-4		PHONE JACK	EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-4						8/26	PHONE JACK	TE-6410W-1000		A5	
	AI-5	AHU-13					AHU	1	4	AI-5			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-5											
	AI-6	AHU-13					AHU	1	4	AI-6			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-6											
	AI-7	AHU-13					AHU	1	4	AI-7			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-7											
	AI-8	AHU-13					AHU	1	4	AI-8			EN-AHU13	Service Level B		0.M.2-01B	AHU13-4-AI-8											

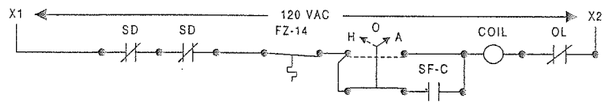


BILL OF MATERIALS

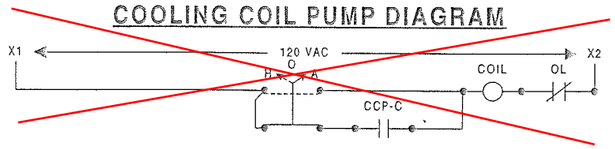
Estimate: ahu-14 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
FZ-14	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
TEF-B5	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	PLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-14	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKEN
EP-1,2	2	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
PLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

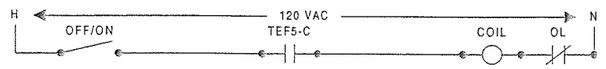
SUPPLY FAN WIRING DIAGRAM

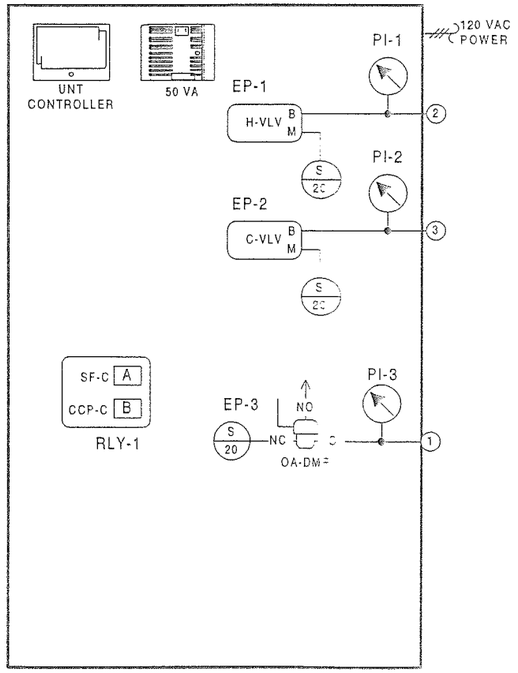


COOLING COIL PUMP DIAGRAM

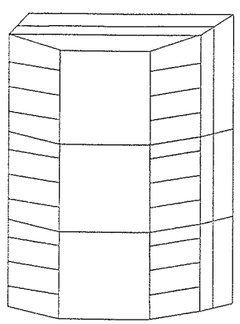


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B5	SERVICE LEVEL	STARTER		SERVICE LEVEL



ENCLOSURE EN-AHU-14
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 5

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-14-1, AND COOLING COIL VALVE V-C-14 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-14-2 WILL BE OPEN AND HEATING COIL VALVE V-H-14 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-14 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-14-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-14-1 CLOSED. EXHAUST FAN TEF-B5 WILL BE OFF AND EXHAUST AIR DAMPER D-14-3 (BDD) WILL BE CLOSED DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-14 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-14-2 WILL CLOSE. OUTSIDE AIR DAMPER D-14-1 WILL OPEN AND EXHAUST FAN TEF-B5 WILL START AND RUN CONTINUOUSLY CAUSING EXHAUST AIR DAMPER D-14-3 (BDD) TO OPEN AFTER THE WARM-UP MODE IS STOPPED. ROOM SENSOR TR-14 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-14 CLOSED TO THE HEATING COIL. COOLING COIL VALVE V-C-14 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-14, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND EXHAUST FAN TEF-B5 AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-14-1 AND EXHAUST AIR DAMPER D-14-3 (BDD) WILL OPEN. ROOM SENSOR TR-14 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL MODULATE CHILLED WATER VALVE V-C-14 TO MAINTAIN ITS SETTING OF SEVENTY -FIVE (75F). THE HEATING COIL VALVE V-H-14 WILL BE CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B5 - THE FAN WILL START WHEN THE AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:16 PM
FILE NAME AHU-14.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-14
OFFICIALS

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/03/97	BY DATE

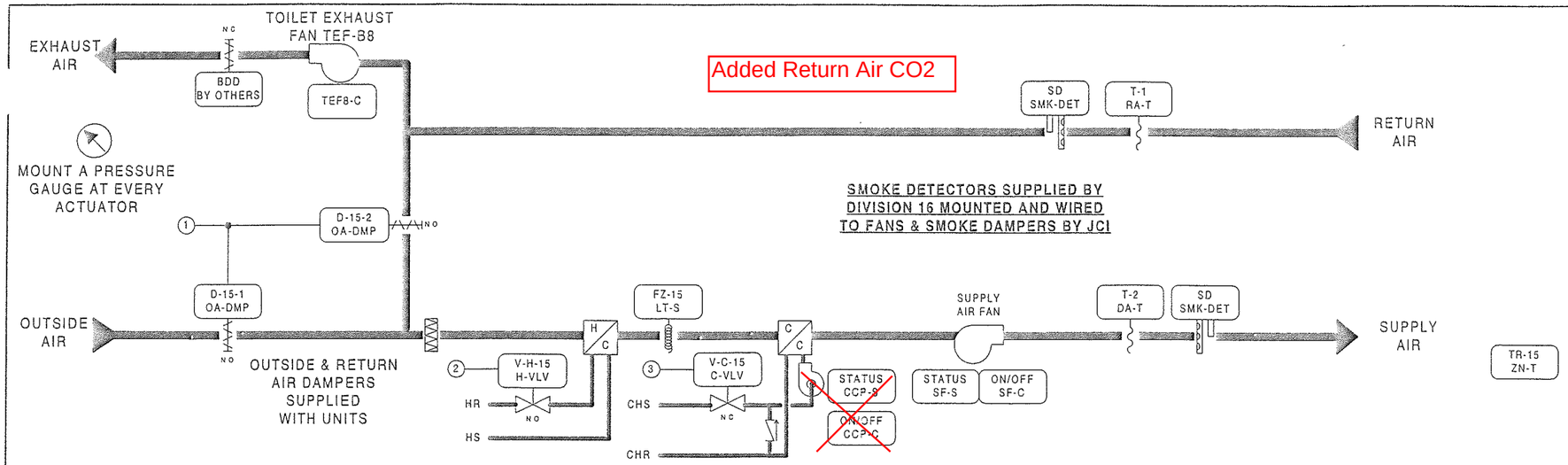
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-19

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Boy/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-14					UNT						EN-AHU14	Service Level B		M.2-01B												Power to Controller
		AHU-14	*				UNT	1	5				EN-AHU14	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	AHU-14	DA-T	Disch Air Temperature	Deg F		UNT	1	5	AI-1		AI#,AICM	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-1						2/18	2-Wire	TE-6315P-1		U1	
	AI-2	AHU-14					UNT	1	5	AI-2			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-2											
	AI-3	AHU-14					UNT	1	5	AI-3			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-3											
	AI-4	AHU-14	ZN-T	Zone Temperature	Deg F		UNT	1	5	AI-4		PHONE JACK	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-14					UNT	1	5	AI-5			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-5											
	AI-6	AHU-14					UNT	1	5	AI-6			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AI-6											
	BI-1	AHU-14	SF-S	Supply Fan Status	Off	On	UNT	1	5	BI-1		BI#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-14	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	5	BI-2		BI#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-14	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	5	BI-3		BI#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-14	CCP-S	Clg Coil Pump 14 Status	Off	On	UNT	1	5	BI-4		BI#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-14	SF-C	Supply Fan Control	Off	On	UNT	1	5	BO-1	IRLY	BO#,24V,COM	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-14	TEF5-C	Toilet Exh Fan B5 Control	Off	On	UNT	1	5	BO-2		BO#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	AHU-14	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	5	BO-3		BO#,24VAC	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-14	CCP-C	Clg Coil Pump 14 Control	Off	On	UNT	1	5	BO-4	IRLY	BO#,24V,COM	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-14					UNT	1	5	BO-5			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-5											
	BO-6	AHU-14					UNT	1	5	BO-6			EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-BO-6											
	AO-1	AHU-14	H-VLV	Heating Coil Valve	% Open		UNT	1	5	AO-1		AO#,AOCM,24V#	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-14	C-VLV	Cooling Coil Valve	% Open		UNT	1	5	AO-2		AO#,AOCM,24V#	EN-AHU14	Service Level B	0	M.2-01B	AHU14-5-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

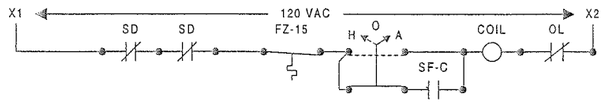


BILL OF MATERIALS

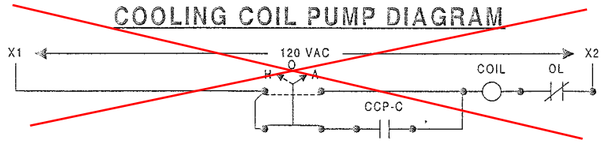
Estimate: ahu-15 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
FZ-15	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
TEF-B8	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-15	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-C	RELAY; 2SPDT 5 AMP 240VAC

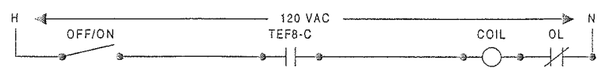
SUPPLY FAN WIRING DIAGRAM

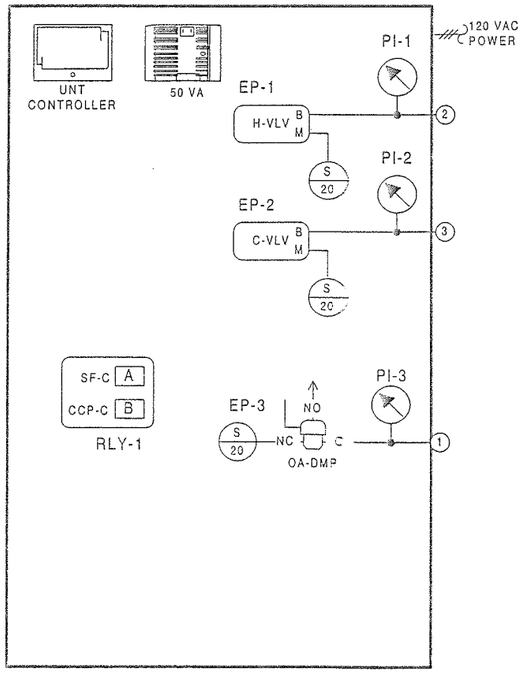


COOLING COIL PUMP DIAGRAM

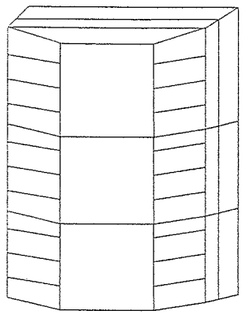


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B8	SERVICE LEVEL	STARTER		SERVICE LEVEL



ENCLOSURE EN-AHU-15
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 6

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-15-1, AND COOLING COIL VALVE V-C-15 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-15-2 WILL BE OPEN AND HEATING COIL VALVE V-H-15 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-15 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-15-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-15-1 CLOSED. EXHAUST FAN TEF-B8 WILL BE OFF AND EXHAUST AIR DAMPER D-15-3 (BDD) WILL BE CLOSED DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-15-2 WILL CLOSE. OUTSIDE AIR DAMPER D-15-1 WILL OPEN AND EXHAUST FAN TEF-B8 WILL START AND RUN CONTINUOUSLY CAUSING EXHAUST AIR DAMPER D-15-3 (BDD) TO OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL, ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FIFTY-FIVE (55F) MODULATE V-H-15 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. COOLING COIL VALVE V-C-15 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-15, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND EXHAUST FAN TEF-B8 AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-15-1 AND EXHAUST AIR DAMPER D-15-3 (BDD) WILL OPEN. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL MODULATE CHILLED WATER VALVE V-C-15 TO MAINTAIN ITS SETTING OF FIFTY-FIVE (55F). THE HEATING COIL VALVE V-H-15 WILL BE CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B8 - THE FAN WILL START WHEN THE AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:16 PM
FILE NAME AHU-15.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-15
VISITING LOCKER NO. 1

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION/LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/03/97	BY DATE

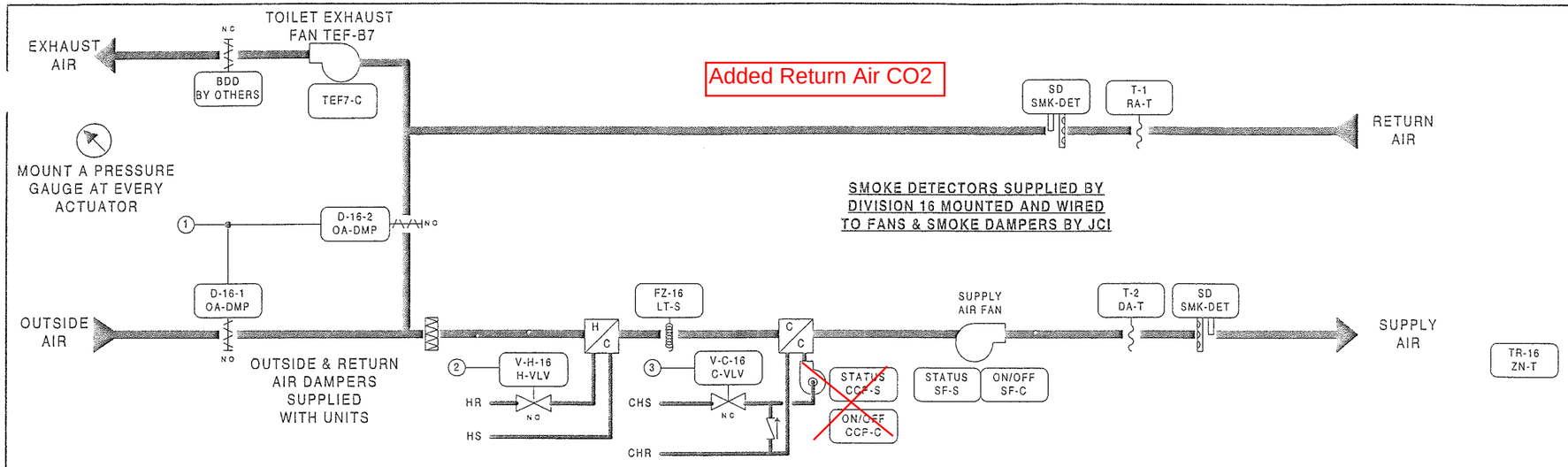
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
50 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-20

Full Spreadsheet		Software					Digital Controller Information						Panel Information						Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-15					UNT						EN-AHU15	Service Level B		M.2-01B												Power to Controller
		AHU-15	*				UNT	1	6				EN-AHU15	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	AHU-15	RA-T	Return Air Temperature	Deg F		UNT	1	6	AI-1		AI#,AICM	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-1						2/18	2-Wire	TE-6315P-1		U1	
	AI-2	AHU-15					UNT	1	6	AI-2			EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-2											
	AI-3	AHU-15	DA-T	Disch Air Temperature	Deg F		UNT	1	6	AI-3		AI#,AICM	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-3						2/18	2-Wire	TE-6315P-1		U1	
	AI-4	AHU-15	ZN-T	Zone Temperature	Deg F		UNT	1	6	AI-4		PHONE JACK	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-15					UNT	1	6	AI-5			EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-5											
	AI-6	AHU-15					UNT	1	6	AI-6			EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AI-6											
	BI-1	AHU-15	SF-S	Supply Fan Status	Off	On	UNT	1	6	BI-1		BI#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-15	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	6	BI-2		BI#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-15	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	6	BI-3		BI#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-15	CCP-S	Clg Coil Pump 15 Status	Off	On	UNT	1	6	BI-4		BI#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-15	SF-C	Supply Fan Control	Off	On	UNT	1	6	BO-1	RLY	BO#,24V,COM	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-15	TEF8-C	Toilet Exh Fan B8 Control	Off	On	UNT	1	6	BO-2		BO#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	AHU-15	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	6	BO-3		BO#,24VAC	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-15	CCP-C	Clg Coil Pump 15 Control	Off	On	UNT	1	6	BO-4	RLY	BO#,24V,COM	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-15					UNT	1	6	BO-5			EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-5											
	BO-6	AHU-15					UNT	1	6	BO-6			EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-BO-6											
	AO-1	AHU-15	H-VLV	Heating Coil Valve	% Open		UNT	1	6	AO-1		AO#,AOCM,24V	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-15	C-VLV	Cooling Coil Valve	% Open		UNT	1	6	AO-2		AO#,AOCM,24V	EN-AHU15	Service Level B	0	M.2-01B	AHU15-6-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

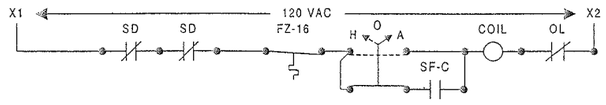


BILL OF MATERIALS

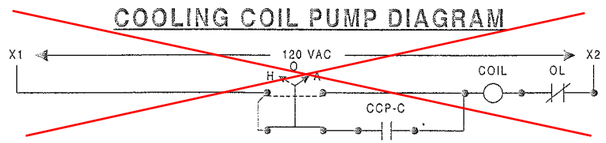
Estimate: ahu-16 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
FZ-16	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
TEF-B7	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-16	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

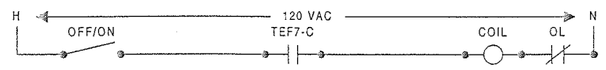
SUPPLY FAN WIRING DIAGRAM

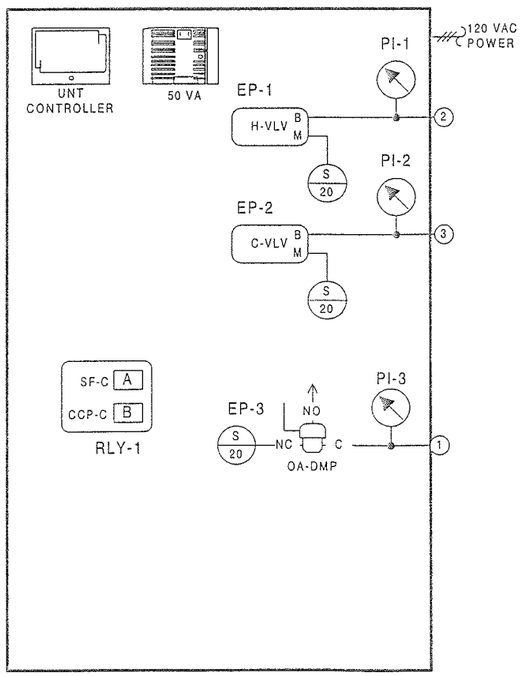


COOLING COIL PUMP DIAGRAM

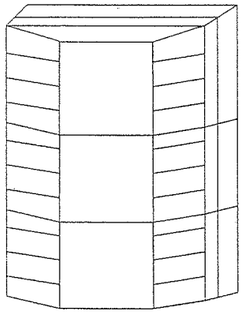


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B7	SERVICE LEVEL	STARTER		SERVICE LEVEL



ENCLOSURE EN-AHU-16
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 7

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-16-1, AND COOLING COIL VALVE V-C-16 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-16-2 WILL BE OPEN AND HEATING COIL VALVE V-H-16 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-16 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-16-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-16-1 CLOSED. EXHAUST FAN TEF-B7 WILL BE OFF AND EXHAUST AIR DAMPER D-16-3 (BDD) WILL BE CLOSED DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-16-2 WILL CLOSE. OUTSIDE AIR DAMPER D-16-1 WILL OPEN AND EXHAUST FAN TEF-B7 WILL START AND RUN CONTINUOUSLY CAUSING EXHAUST AIR DAMPER D-16-3 (BDD) TO OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FIFTY-FIVE (55F) MODULATE V-H-16 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. COOLING COIL VALVE V-C-16 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-16, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND EXHAUST FAN TEF-B7 AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-16-1 AND EXHAUST AIR DAMPER D-16-3 (BDD) WILL OPEN. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT WILL MODULATE CHILLED WATER VALVE V-C-16 TO MAINTAIN ITS SETTING OF FIFTY-FIVE (55F). THE HEATING COIL VALVE V-H-16 WILL BE CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B7 - THE FAN WILL START WHEN THE AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:17 PM
FILE NAME	AHU-16.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-16
VISITING LOCKER NO. 2

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

NO.	REVISION-LOCATION	ECN	DATE	BY
	AS-BUILT		7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
JDP	WJT	RTS	BY RTS	DATE 09/04/97	BY	DATE

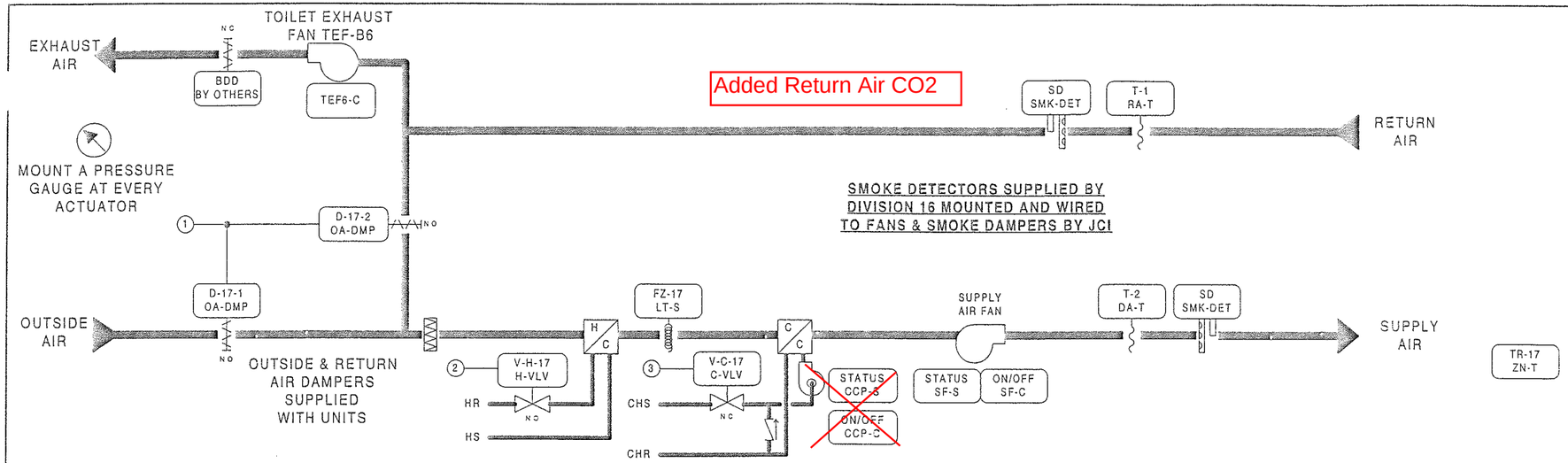
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
61 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-21

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-16					UNT						EN-AHU16	Service Level B		M.2-01B												Power to Controller
		AHU-16	*				UNT	1					EN-AHU16	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	AHU-16	RA-T	Return Air Temperature	Deg F		UNT	1	7	AI-1		AI#,AICM	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-1						2/18	2-Wire	TE-6315P-1		U1	
	AI-2	AHU-16					UNT	1	7	AI-2			EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-2											
	AI-3	AHU-16	DA-T	Disch Air Temperature	Deg F		UNT	1	7	AI-3		AI#,AICM	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-3						2/18	2-Wire	TE-6315P-1		U1	
	AI-4	AHU-16	ZN-T	Zone Temperature	Deg F		UNT	1	7	AI-4		PHONE JACK	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-16					UNT	1	7	AI-5			EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-5											
	AI-6	AHU-16					UNT	1	7	AI-6			EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AI-6											
	BI-1	AHU-16	SF-S	Supply Fan Status	Off	On	UNT	1	7	BI-1		BI#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-16	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	7	BI-2		BI#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-16	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	7	BI-3		BI#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-16	CCP-S	Clg Coil Pump 16 Status	Off	On	UNT	1	7	BI-4		BI#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-16	SF-C	Supply Fan Control	Off	On	UNT	1	7	BO-1	RLY	BO#,24V,COM	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-16	TEF7-C	Toilet Exh Fan B7 Control	Off	On	UNT	1	7	BO-2		BO#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	AHU-16	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	7	BO-3		BO#,24VAC	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-16	CCP-C	Clg Coil Pump 16 Control	Off	On	UNT	1	7	BO-4	RLY	BO#,24V,COM	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-16					UNT	1	7	BO-5			EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-5											
	BO-6	AHU-16					UNT	1	7	BO-6			EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-BO-6											
	AO-1	AHU-16	H-VLV	Heating Coil Valve	% Open		UNT	1	7	AO-1		AO#,AOCM,24V	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-16	C-VLV	Cooling Coil Valve	% Open		UNT	1	7	AO-2		AO#,AOCM,24V	EN-AHU16	Service Level B	0	M.2-01B	AHU16-7-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

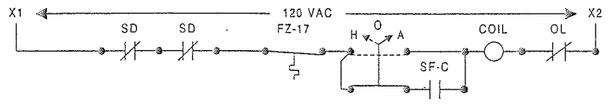


BILL OF MATERIALS

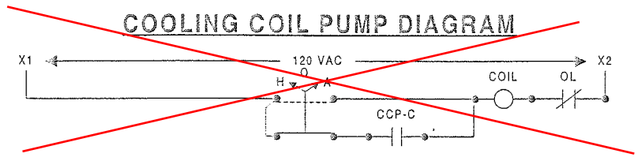
Estimate: ahu-17 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
DA-T,RA-T	2	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
FZ-17	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
TEF-B6	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-17	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKEN
EP-1,2	2	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

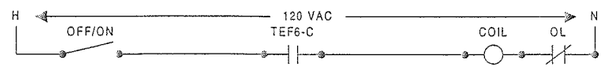
SUPPLY FAN WIRING DIAGRAM

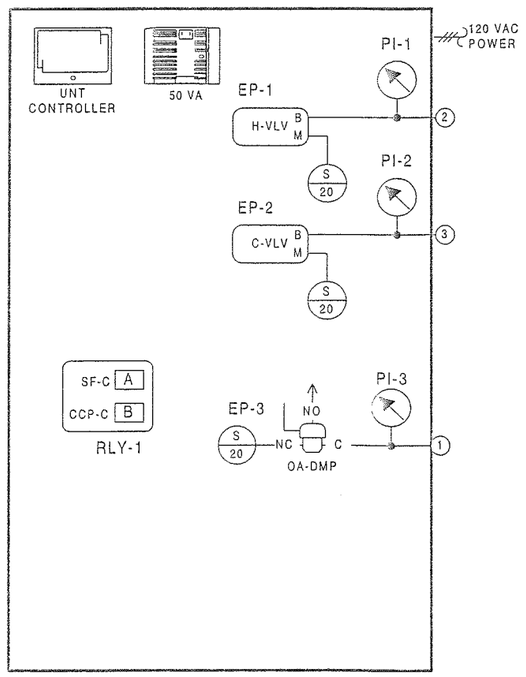


COOLING COIL PUMP DIAGRAM

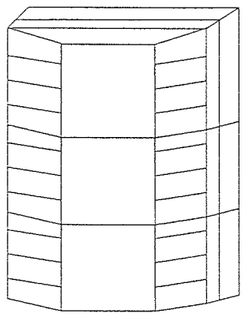


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	CIRCUIT	LOCATION
TEF-B6	M CONCOURSE	STARTER		M CONCOURSE



ENCLOSURE EN-AHU-17
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 8

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-17-1, AND COOLING COIL VALVE V-C-17 WILL CLOSE; COOLING COIL PUMP WILL BE OFF; RETURN AIR DAMPER D-17-2 WILL BE OPEN AND HEATING COIL VALVE V-H-17 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-17 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-17-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-17-1 CLOSED. EXHAUST FAN TEF-B6 WILL BE OFF AND EXHAUST AIR DAMPER D-17-3 (BDD) WILL BE CLOSED DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE RETURN AIR TEMPERATURE REACHES THE SETTING OF T-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-17-2 WILL CLOSE. OUTSIDE AIR DAMPER D-17-1 WILL OPEN AND EXHAUST FAN TEF-B6 WILL START AND RUN CONTINUOUSLY CAUSING EXHAUST AIR DAMPER D-17-3 (BDD) TO OPEN AFTER THE WARM-UP MODE IS STOPPED. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF FIFTY-FIVE (55F) MODULATE V-H-17 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED. COOLING COIL VALVE V-C-17 WILL BE CLOSED TO THE COIL AND COIL CIRCULATION PUMP WILL BE OFF DURING THE HEATING MODE.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-17, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED COOLING MODE - SUPPLY AND EXHAUST FAN TEF-B6 AND COOLING COIL CIRCULATING PUMP START AND RUN CONTINUOUSLY. OUTSIDE DAMPER D-17-1 AND EXHAUST AIR DAMPER D-17-3 (BDD) WILL OPEN. DISCHARGE AIR SENSOR T-2 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL MODULATE CHILLED WATER VALVE V-C-17 TO MAINTAIN ITS SETTING OF FIFTY-FIVE (55F). THE HEATING COIL VALVE V-H-17 WILL BE CLOSED TO THE COIL.

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND THE FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-B6 - THE FAN WILL START WHEN THE AHU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:13 PM
FILE NAME	AHU-17.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-17
HOME TEAM AREA

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION		ECN	DATE BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/04/97	BY DATE

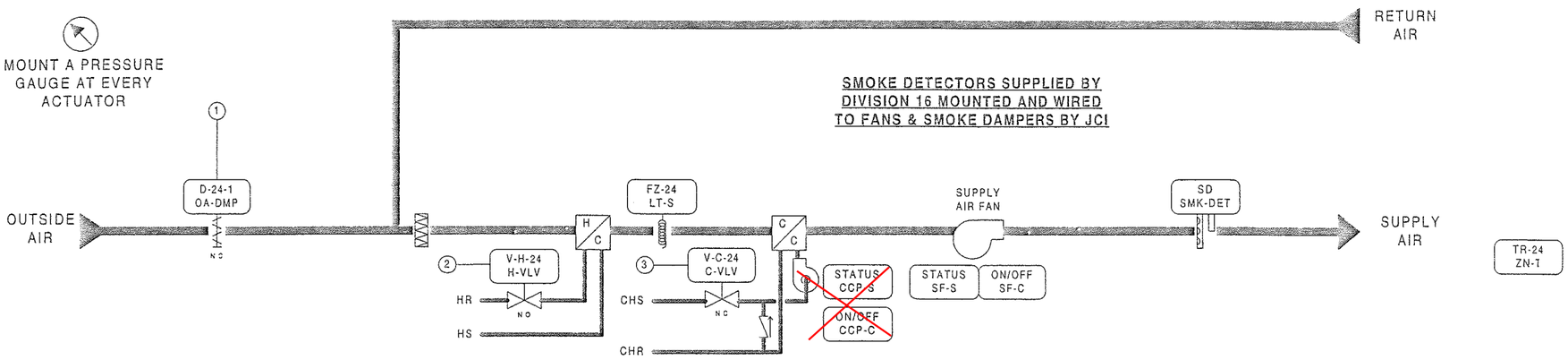
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

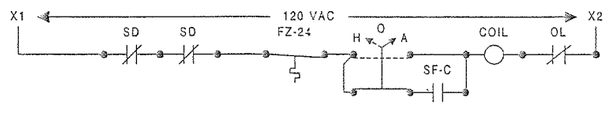
CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-22

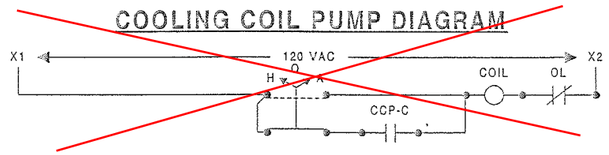
MOUNT A PRESSURE GAUGE AT EVERY ACTUATOR

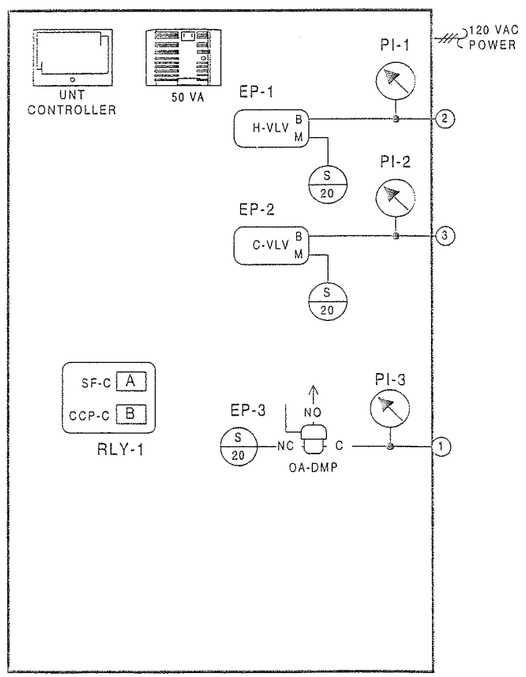


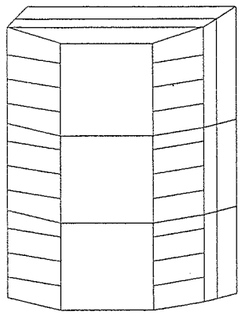
SUPPLY FAN WIRING DIAGRAM



COOLING COIL PUMP DIAGRAM







ENCLOSURE EN-AHU-24
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-3/N2 ADD = 5

BILL OF MATERIALS

Estimate: ahu-24 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-24-1	1	---	SEE DAMPER SCHEDULE
FZ-24	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-24	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0-10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; DSPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-24-1, AND COOLING COIL VALVE V-C-24 WILL CLOSE; COOLING COIL PUMP WILL BE OFF, AND HEATING COIL VALVE V-H-24 WILL BE CLOSED TO THE COIL.

OCCUPIED MODE - SUPPLY FAN WILL BE RUNNING, OUTSIDE AIR DAMPER D-24-1 WILL OPEN. ROOM SENSOR TR-24 THROUGH THE METASYS SYSTEM CONTROL UNIT WILL MODULATE HEATING COIL VALVE V-H-24 AND COOLING COIL VALVE V-C-24 IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F). COOLING COIL PUMP WILL START AND RUN CONTINUOUSLY WHENEVER THE COOLING COIL VALVE V-C-24 IS MODULATED OPEN.

UNOCCUPIED MODE - ROOM SENSOR TR-24, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED EXCEPT OUTSIDE AIR DAMPER D-24-1 WILL REMAIN CLOSED ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:25 PM
FILE NAME	AHU-24.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-24
TICKET OFFICE

MAIN CONSOURSE QUAD C

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-DESCRIPTION	EDR	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

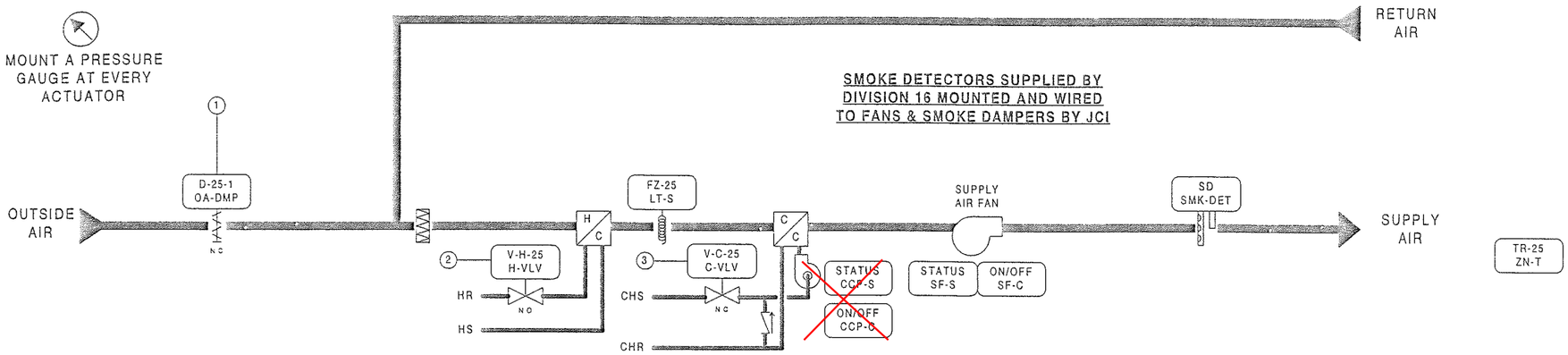
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

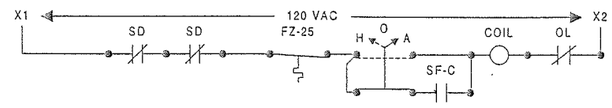
DRAW
BL-6579-26

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-24				UNT						EN-AHU24	AT UNIT														
		AHU-24	*			UNT	1	5				EN-AHU24	AT UNIT	0													
	AI-1	AHU-24				UNT	1	5	AI-1			EN-AHU24	AT UNIT	0		AHU24-5-AI-1											
	AI-2	AHU-24				UNT	1	5	AI-2			EN-AHU24	AT UNIT	0		AHU24-5-AI-2											
	AI-3	AHU-24				UNT	1	5	AI-3			EN-AHU24	AT UNIT	0		AHU24-5-AI-3											
	AI-4	AHU-24	ZN-T	Zone Temperature	Deg F	UNT	1	5	AI-4		PHONE JACK	EN-AHU24	AT UNIT	0		AHU24-5-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-24				UNT	1	5	AI-5			EN-AHU24	AT UNIT	0		AHU24-5-AI-5											
	AI-6	AHU-24				UNT	1	5	AI-6			EN-AHU24	AT UNIT	0		AHU24-5-AI-6											
	BI-1	AHU-24	SF-S	Supply Fan Status	Off On	UNT	1	5	BI-1		BI#,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-24	SMK-DET	Smoke Detectors	Normal Alarm	UNT	1	5	BI-2		BI#,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-24	LT-S	Low Temperature Stat	Normal Alarm	UNT	1	5	BI-3		BI#,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-24	CCP-S	Clg Coil Pump Status	Off On	UNT	1	5	BI-4		BI#,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-24	SF-C	Supply Fan Control	Off On	UNT	1	5	BO-1	RLY	BO#,24V,COM	EN-AHU24	AT UNIT	0		AHU24-5-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-24				UNT	1	5	BO-2			EN-AHU24	AT UNIT	0		AHU24-5-BO-2											
	BO-3	AHU-24	OA-DMP	Outside Air Damper	Closed Open	UNT	1	5	BO-3		BO#,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-24	CCP-C	Clg Coil Pump Control	Off On	UNT	1	5	BO-4	RLY	BO#,24V,COM	EN-AHU24	AT UNIT	0		AHU24-5-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-24				UNT	1	5	BO-5			EN-AHU24	AT UNIT	0		AHU24-5-BO-5											
	BO-6	AHU-24				UNT	1	5	BO-6			EN-AHU24	AT UNIT	0		AHU24-5-BO-6											
	AO-1	AHU-24	H-VLV	Heating Coil Valve	% Open	UNT	1	5	AO-1		AO#,AOCM,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-24	C-VLV	Cooling Coil Valve	% Open	UNT	1	5	AO-2		AO#,AOCM,24VAC	EN-AHU24	AT UNIT	0		AHU24-5-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

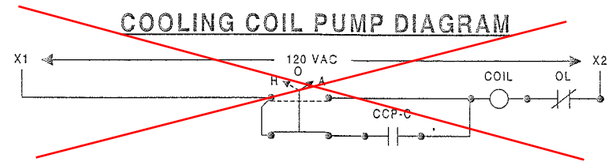
MOUNT A PRESSURE GAUGE AT EVERY ACTUATOR

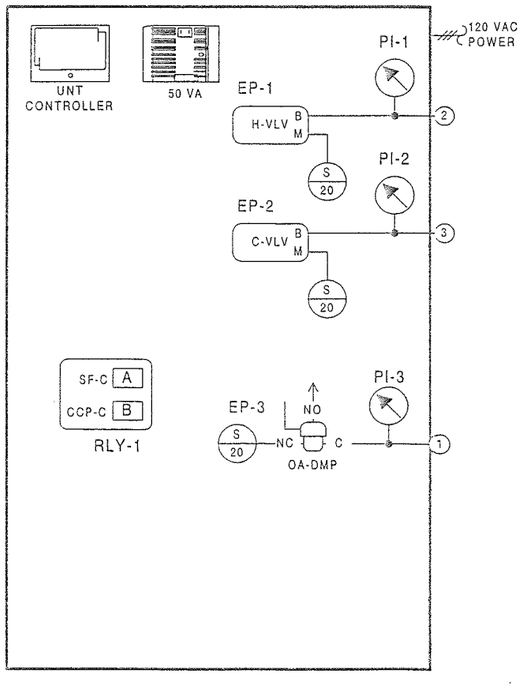


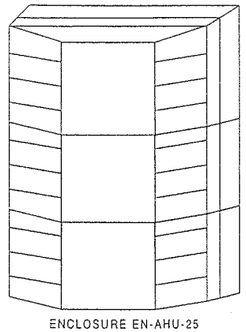
SUPPLY FAN WIRING DIAGRAM



COOLING COIL PUMP DIAGRAM







ENCLOSURE EN-AHU-25
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-4/N2 ADD = 3

BILL OF MATERIALS

Estimate: ahu-25 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-25-1	1	---	SEE DAMPER SCHEDULE
FZ-25	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-25	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0-10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS. BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-25-1, AND COOLING COIL VALVE V-C-25 WILL CLOSE; COOLING COIL PUMP WILL BE OFF, AND HEATING COIL VALVE V-H-25 WILL BE CLOSED TO THE COIL.

OCCUPIED MODE - SUPPLY FAN WILL BE RUNNING, OUTSIDE AIR DAMPER D-25-1 WILL OPEN. ROOM SENSOR TR-25 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL MODULATE HEATING COIL VALVE V-H-25 AND COOLING COIL VALVE V-C-25 IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F). COOLING COIL PUMP WILL START AND RUN CONTINUOUSLY WHENEVER THE COOLING COIL VALVE V-C-25 IS MODULATED OPEN.

UNOCCUPIED MODE - ROOM SENSOR TR-25, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED EXCEPT OUTSIDE AIR DAMPER D-25-1 WILL REMAIN CLOSED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:24 PM
FILE NAME AHU-25.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-25
TICKET OFFICE

MAIN CONSOURSE QUAD D

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

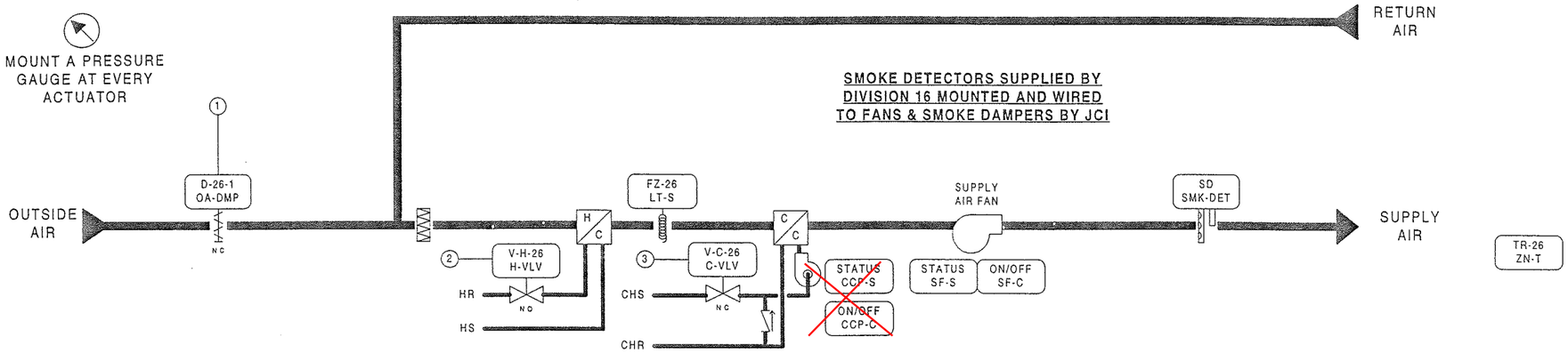
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

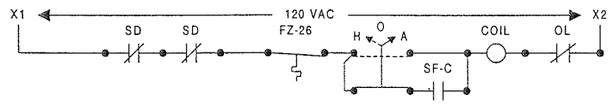
DRAWING NUMBER BL-6559-27

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-25					UNT						EN-AHU25	AT UNIT														Power to Controller
		AHU-25	*				UNT	1	3				EN-AHU25	AT UNIT	0													N2 Trunk
	AI-1	AHU-25					UNT	1	3	AI-1			EN-AHU25	AT UNIT	0		AHU25-3-AI-1											
	AI-2	AHU-25					UNT	1	3	AI-2			EN-AHU25	AT UNIT	0		AHU25-3-AI-2											
	AI-3	AHU-25					UNT	1	3	AI-3			EN-AHU25	AT UNIT	0		AHU25-3-AI-3											
	AI-4	AHU-25	ZN-T	Zone Temperature	Deg F		UNT	1	3	AI-4		PHONE JACK	EN-AHU25	AT UNIT	0		AHU25-3-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-25					UNT	1	3	AI-5			EN-AHU25	AT UNIT	0		AHU25-3-AI-5											
	AI-6	AHU-25					UNT	1	3	AI-6			EN-AHU25	AT UNIT	0		AHU25-3-AI-6											
	BI-1	AHU-25	SF-S	Supply Fan Status	Off	On	UNT	1	3	BI-1		BI#,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-25	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	3	BI-2		BI#,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-25	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	3	BI-3		BI#,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-25	CCP-S	Clg Coil Pump Status	Off	On	UNT	1	3	BI-4		BI#,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-25	SF-C	Supply Fan Control	Off	On	UNT	1	3	BO-1	RLY	BO#,24V,COM	EN-AHU25	AT UNIT	0		AHU25-3-BO-13/18	A,COILS,COM		RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-25					UNT	1	3	BO-2			EN-AHU25	AT UNIT	0		AHU25-3-BO-2											
	BO-3	AHU-25	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	3	BO-3		BO#,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-25	CCP-C	Clg Coil Pump Control	Off	On	UNT	1	3	BO-4	RLY	BO#,24V,COM	EN-AHU25	AT UNIT	0		AHU25-3-BO-43/18	B,COILS,COM		RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-25					UNT	1	3	BO-5			EN-AHU25	AT UNIT	0		AHU25-3-BO-5											
	BO-6	AHU-25					UNT	1	3	BO-6			EN-AHU25	AT UNIT	0		AHU25-3-BO-6											
	AO-1	AHU-25	H-VLV	Heating Coil Valve	% Open		UNT	1	3	AO-1		AO#,AOCM,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-AO-12/18	+,-		EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-25	C-VLV	Cooling Coil Valve	% Open		UNT	1	3	AO-2		AO#,AOCM,24VAC	EN-AHU25	AT UNIT	0		AHU25-3-AO-22/18	+,-		EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

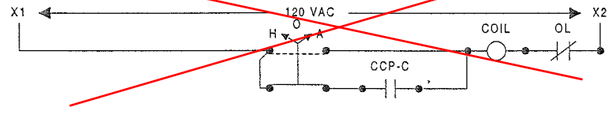
MOUNT A PRESSURE GAUGE AT EVERY ACTUATOR

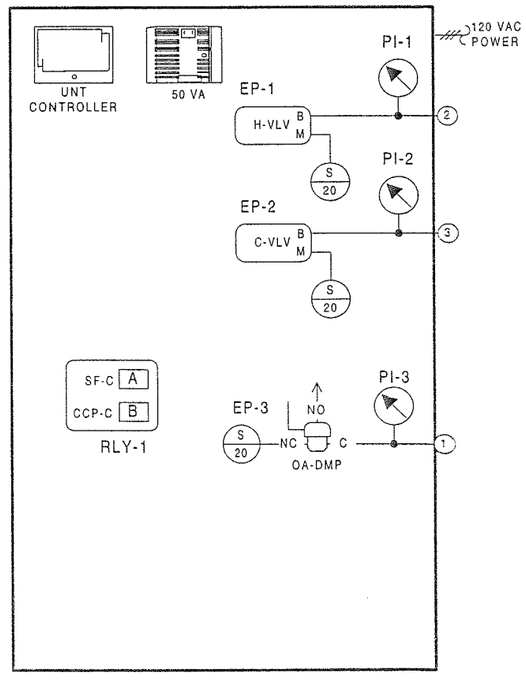


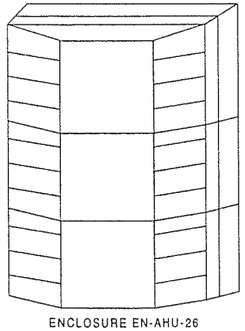
SUPPLY FAN WIRING DIAGRAM



COOLING COIL PUMP DIAGRAM







ENCLOSURE EN-AHU-26
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-2/N2 ADD = 2

BILL OF MATERIALS

Estimate: ahu-26 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-26-1	1	---	SEE DAMPER SCHEDULE
FZ-26	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV,C-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-AHU-26	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	2	EN-EXP101-0	UNIV PKG MOD.CVR & BACKBN
EP-1,2	2	EP-8000-2	XDUCR,EP,0-10V,HI VOL
EP-3	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER D-26-1, AND COOLING COIL VALVE V-C-26 WILL CLOSE; COOLING COIL PUMP WILL BE OFF, AND HEATING COIL VALVE V-H-26 WILL BE CLOSED TO THE COIL.

OCCUPIED MODE - SUPPLY FAN WILL BE RUNNING, OUTSIDE AIR DAMPER D-26-1 WILL OPEN. ROOM SENSOR TR-26 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL MODULATE HEATING COIL VALVE V-H-26 ANC COOLING COIL VALVE V-C-26 IN SEQUENCE TO MAINTAIN ITS SETTING OF SEVENTY-FIVE (75F). COOLING COIL PUMP WILL START AND RUN CONTINUOUSLY WHENEVER THE COOLING COIL VALVE V-C-26 IS MODULATED OPEN.

UNOCCUPIED MODE - ROOM SENSOR TR-26, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED EXCEPT OUTSIDE AIR DAMPER D-26-1 WILL REMAIN CLOSED. ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:25 PM
FILE NAME AHU-26.vsd

DRAWING TITLE
AIR HANDLING UNIT AHU-26
TICKET OFFICE

MAIN CONSOURSE QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY

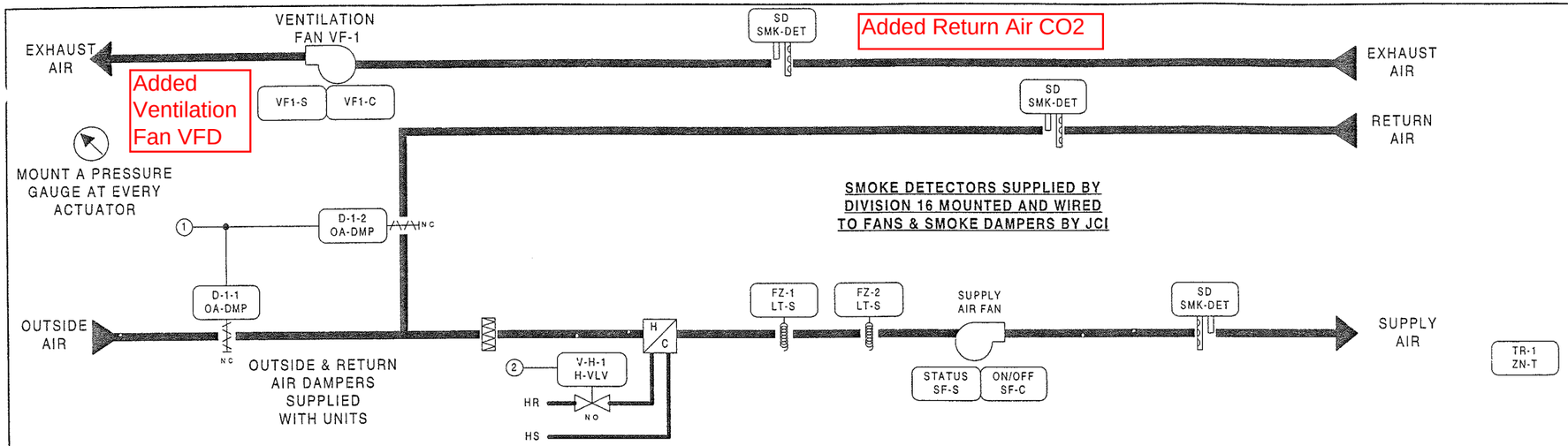
Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098
DRAWING NUMBER BL-6559-28

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		AHU-26					UNT						EN-AHU26	AT UNIT														Power to Controller
		AHU-26	*				UNT	1	2				EN-AHU26	AT UNIT	0													N2 Trunk
	AI-1	AHU-26					UNT	1	2	AI-1			EN-AHU26	AT UNIT	0		AHU26-2-AI-1											
	AI-2	AHU-26					UNT	1	2	AI-2			EN-AHU26	AT UNIT	0		AHU26-2-AI-2											
	AI-3	AHU-26					UNT	1	2	AI-3			EN-AHU26	AT UNIT	0		AHU26-2-AI-3											
	AI-4	AHU-26	ZN-T	Zone Temperature	Deg F		UNT	1	2	AI-4		PHONE JACK	EN-AHU26	AT UNIT	0		AHU26-2-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	AHU-26					UNT	1	2	AI-5			EN-AHU26	AT UNIT	0		AHU26-2-AI-5											
	AI-6	AHU-26					UNT	1	2	AI-6			EN-AHU26	AT UNIT	0		AHU26-2-AI-6											
	BI-1	AHU-26	SF-S	Supply Fan Status	Off	On	UNT	1	2	BI-1		BI#,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	AHU-26	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	2	BI-2		BI#,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	AHU-26	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	2	BI-3		BI#,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	AHU-26	CCP-S	Clg Coil Pump Status	Off	On	UNT	1	2	BI-4		BI#,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-BI-4						2/22	Device dependent	Aux Contact (NO)		U70	
	BO-1	AHU-26	SF-C	Supply Fan Control	Off	On	UNT	1	2	BO-1	RLY	BO#,24V,COM	EN-AHU26	AT UNIT	0		AHU26-2-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	AHU-26					UNT	1	2	BO-2			EN-AHU26	AT UNIT	0		AHU26-2-BO-2											
	BO-3	AHU-26	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	2	BO-3		BO#,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-BO-3			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	AHU-26	CCP-C	Clg Coil Pump Control	Off	On	UNT	1	2	BO-4	RLY	BO#,24V,COM	EN-AHU26	AT UNIT	0		AHU26-2-BO-4	3/18	B,COILS,COM	RELAY-B	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	AHU-26					UNT	1	2	BO-5			EN-AHU26	AT UNIT	0		AHU26-2-BO-5											
	BO-6	AHU-26					UNT	1	2	BO-6			EN-AHU26	AT UNIT	0		AHU26-2-BO-6											
	AO-1	AHU-26	H-VLV	Heating Coil Valve	% Open		UNT	1	2	AO-1		AO#,AOCM,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	AHU-26	C-VLV	Cooling Coil Valve	% Open		UNT	1	2	AO-2		AO#,AOCM,24VAC	EN-AHU26	AT UNIT	0		AHU26-2-AO-2	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	

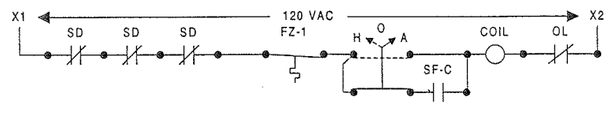


BILL OF MATERIALS

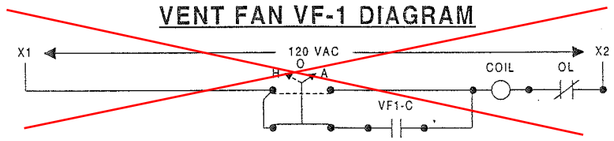
Estimate: hvu-1 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
FZ-1	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-1,TEF-A1	2	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-1	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

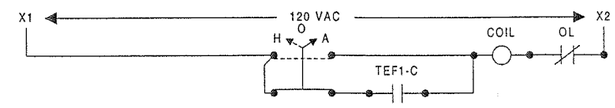
SUPPLY FAN WIRING DIAGRAM

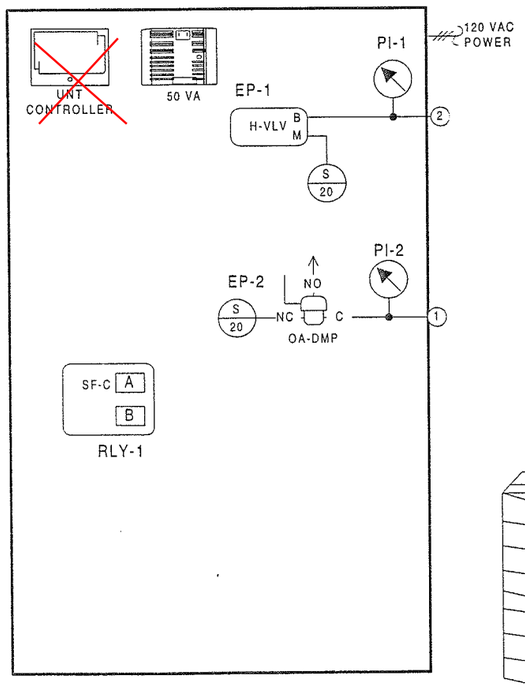


VENT FAN VF-1 DIAGRAM

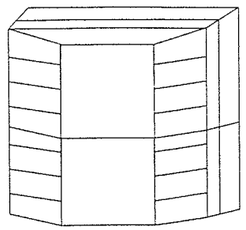


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-1	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-1	SERVICE LEVEL	MCC1SRA	4B	SERVICE LEVEL
TEF-A1	SERVICE LEVEL	MCC1SRA	9E	SERVICE LEVEL



ENCLOSURE EN-HVU-1
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 11

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-1-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-1-2 WILL BE OPEN AND HEATING COIL VALVE V-H-1 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-1 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-1-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-1-1 CLOSED. VENTILATION FAN VF-1 AND EXHAUST FAN TEF-A1 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-1 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-1-2 WILL CLOSE. OUTSIDE AIR DAMPER D-1-1 WILL OPEN AND VENTILATION FAN VF-1 AND EXHAUST FAN TEF-A1 WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-1-2 WILL CLOSE. ROOM SENSOR TR-1 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-1 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-1, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-1-1 WILL OPEN AND RETURN AIR DAMPER D-1-2 WILL CLOSE. HEATING COIL VALVE V-H-1 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-A1 - THE FAN WILL START WHEN THE HVU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:27 PM
FILE NAME HVU-1.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-1
CONCESSION STO/COMMISSARY

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

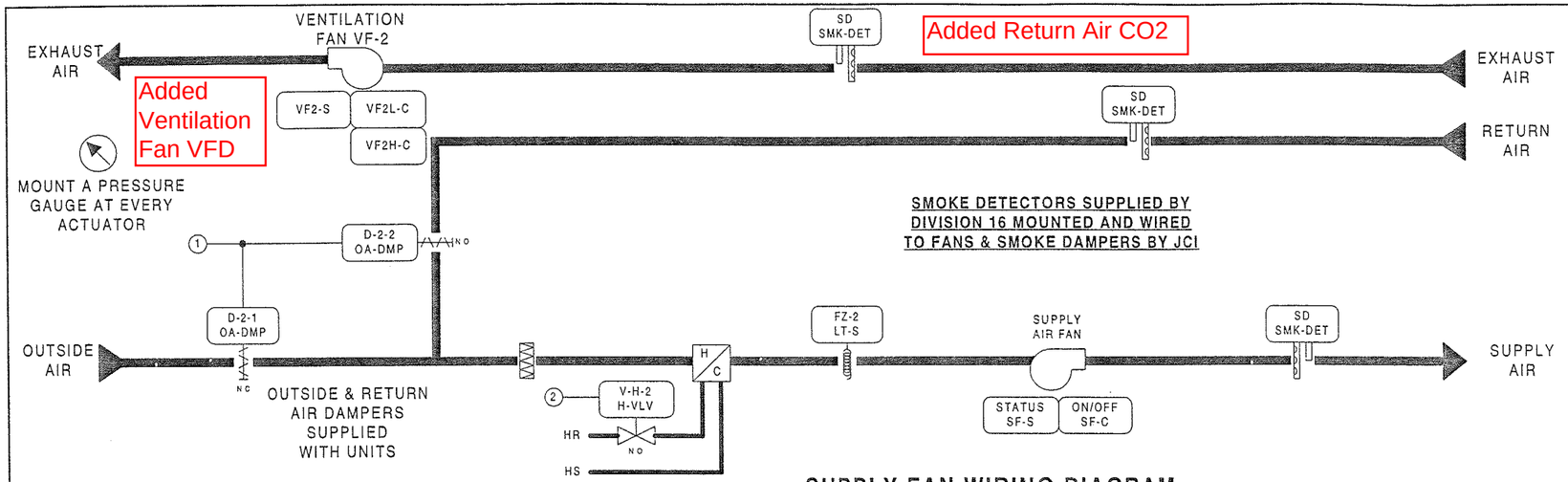
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

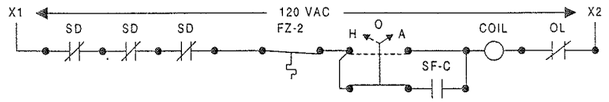
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-29

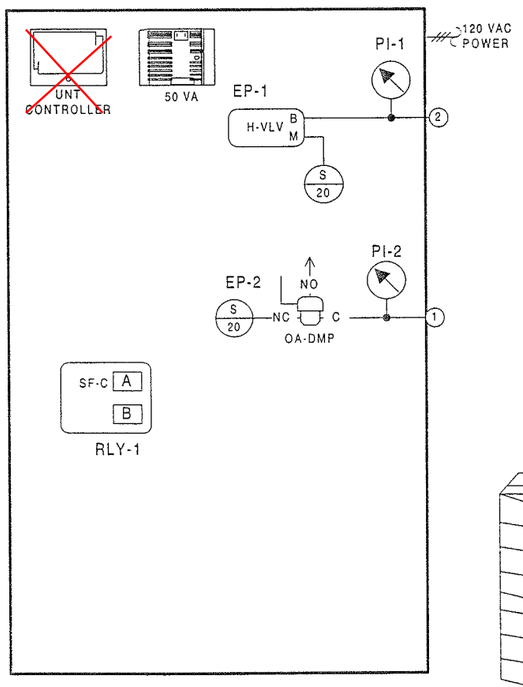
Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-1					UNT						EN-HVU-1	Service Level A		M.2-01A													Power to Controller
		HVU-1	*				UNT	1	11				EN-HVU-1	Service Level A	0	M.2-01A													N2 Trunk
	AI-1	HVU-1					UNT	1	11	AI-1			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-1												
	AI-2	HVU-1					UNT	1	11	AI-2			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-2												
	AI-3	HVU-1					UNT	1	11	AI-3			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-3												
	AI-4	HVU-1	ZN-T	Zone Temperature	Deg F		UNT	1	11	AI-4		PHONE JACK	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-1					UNT	1	11	AI-5			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-5												
	AI-6	HVU-1					UNT	1	11	AI-6			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AI-6												
	BI-1	HVU-1	SF-S	Supply Fan Status	Off	On	UNT	1	11	BI-1		BI#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-1	VF1-S	Vent Fan 1 Status	Off	On	UNT	1	11	BI-2		BI#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-1	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	11	BI-3		BI#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-1	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	11	BI-4		BI#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-1	SF-C	Supply Fan Control	Off	On	UNT	1	11	BO-1	RLY	BO#,24V,COM	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-1	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	11	BO-2		BO#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-1	VF1-C	Vent Fan 1 Control	Off	On	UNT	1	11	BO-3		BO#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-1	TEF1-C	Toilet Exh Fan A1 Control	Off	On	UNT	1	11	BO-4		BO#,24VAC	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-5	HVU-1					UNT	1	11	BO-5			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-5												
	BO-6	HVU-1					UNT	1	11	BO-6			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-BO-6												
	AO-1	HVU-1	H-VLV	Heating Coil Valve	% Open		UNT	1	11	AO-1		AO#,AOCM,24VA	EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-1					UNT	1	11	AO-2			EN-HVU-1	Service Level A	0	M.2-01A	HVU-1-11-AO-2												

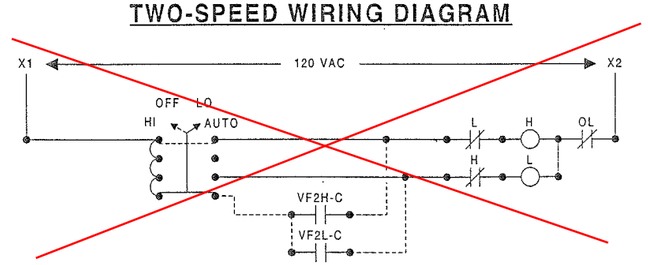


SUPPLY FAN WIRING DIAGRAM

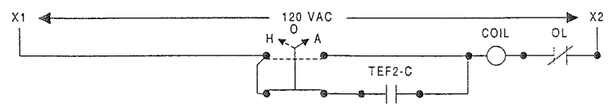


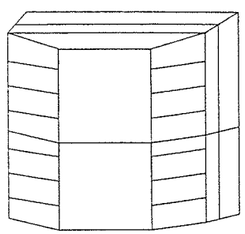
VENT FAN VF-2 DIAGRAM
TWO-SPEED WIRING DIAGRAM





TOILET EXHAUST FAN DIAGRAM





ENCLOSURE EN-HVU-2
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 12

FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-2	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-2	SERVICE LEVEL	MCC1SRA	4C	SERVICE LEVEL

BILL OF MATERIALS

Estimate: hvu-2 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
FZ-2	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-2,TEF-A1	3	BZ-1000-11	ENCL,4-5/8X 5-1 8 X 3-3/8
	3	PD-101-35	RLY BASE,3PDT,11PIN,10A
	3	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-2	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10W,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,N.O.V,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-2-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-2-2 WILL BE OPEN AND HEATING COIL VALVE V-H-2 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-2 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-2-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-2-1 CLOSED. VENTILATION FAN VF-2 AND EXHAUST FAN TEF-A2 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-2 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-2-2 WILL CLOSE. OUTSIDE AIR DAMPER D-2-1 WILL OPEN AND VENTILATION FAN VF-2 (LOW SPEED) AND EXHAUST FAN TEF-A2 WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-2-2 WILL CLOSE. ROOM SENSOR TR-2 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-2 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-2. WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FAN (HIGH SPEED) START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-2-1 WILL OPEN AND RETURN AIR DAMPER D-2-2 WILL CLOSE. HEATING COIL VALVE V-H-2 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-A2 - THE FAN WILL START WHEN THE HVU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:28 PM
FILE NAME	HVU-2.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-2
CONCESSION LOCKERS

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT			7/18/00	CME

REFERENCE DRAWING			DRAWN		APPROVED	
Sales Engineer	Project Manager	Application Engineer	BY	DATE	BY	DATE
JDP	WJT	RTS	RTS	09/04/97		

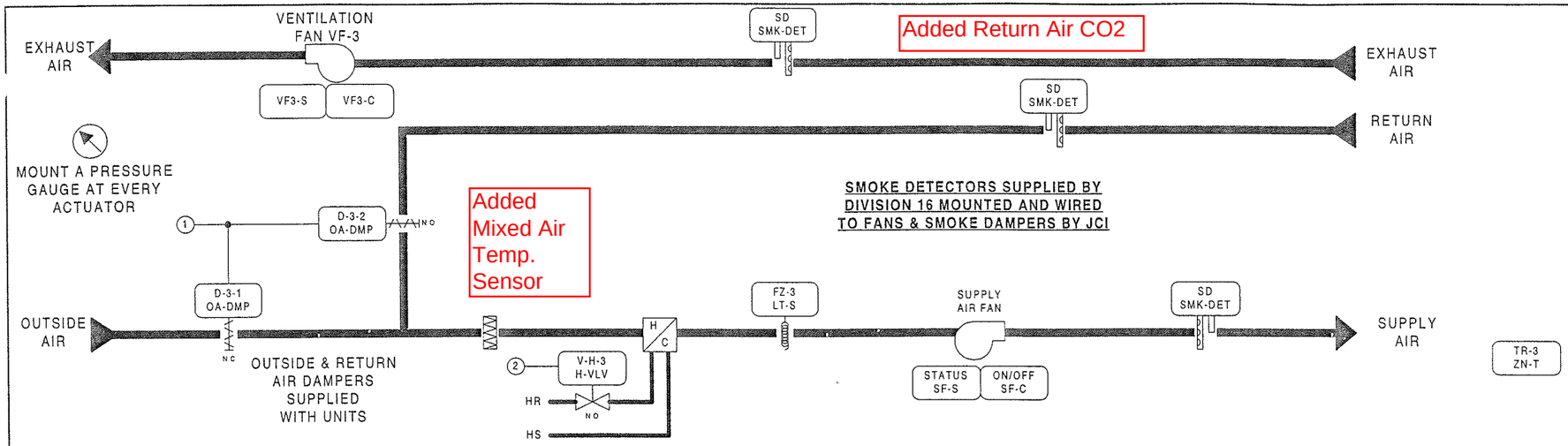
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-30

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-2					UNT						EN-HVU-2	Service Level A		M.2-01A												Power to Controller
		HVU-2					UNT	1	12				EN-HVU-2	Service Level A	0	M.2-01A												N2 Trunk
	AI-1	HVU-2					UNT	1	12	AI-1			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-1											
	AI-2	HVU-2					UNT	1	12	AI-2			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-2											
	AI-3	HVU-2					UNT	1	12	AI-3			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-3											
	AI-4	HVU-2	ZN-T	Zone Temperature	Deg F		UNT	1	12	AI-4		PHONE JACK	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-2					UNT	1	12	AI-5			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-5											
	AI-6	HVU-2					UNT	1	12	AI-6			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AI-6											
	BI-1	HVU-2	SF-S	Supply Fan Status	Off	On	UNT	1	12	BI-1		BI#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-2	VF2-S	Vent Fan 2 Status	Off	On	UNT	1	12	BI-2		BI#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-2	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	12	BI-3		BI#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-2	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	12	BI-4		BI#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-2	SF-C	Supply Fan Control	Off	On	UNT	1	12	BO-1	RLY	BO#,24V,COM	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-2	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	12	BO-2		BO#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-2	VF2L-C	Vent Fan 2 Control Low	Off	On	UNT	1	12	BO-3		BO#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-2	VF2H-C	Vent Fan 2 Control High	Off	On	UNT	1	12	BO-4		BO#,24VAC	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-5	HVU-2					UNT	1	12	BO-5			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-5											
	BO-6	HVU-2					UNT	1	12	BO-6			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-BO-6											
	AO-1	HVU-2	H-VLV	Heating Coil Valve	% Open		UNT	1	12	AO-1		AO#,AOCM,24VA	EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-2					UNT	1	12	AO-2			EN-HVU-2	Service Level A	0	M.2-01A	HVU-2-12-AO-2											

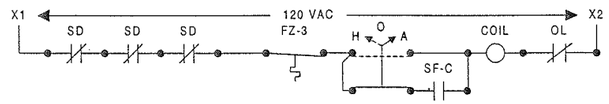


BILL OF MATERIALS

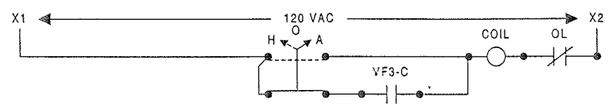
Estimate: hvu-3 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
FZ-3	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-3,TEF-A3	2	BZ-1000-11	ENCL,4-5/8X 5-1 8 X 3-3/8
	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-3	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CTR & BACKEN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,W.OV,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

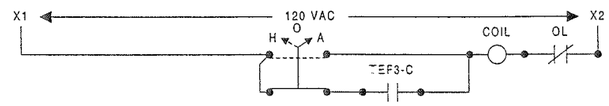
SUPPLY FAN WIRING DIAGRAM

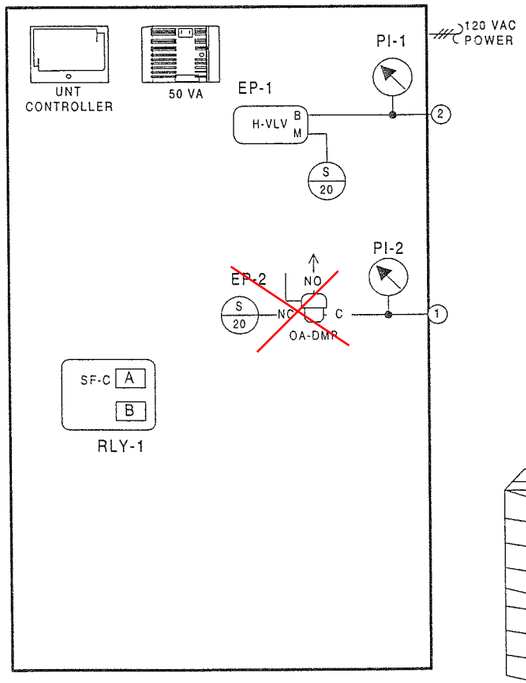


VENT FAN VF-3 DIAGRAM

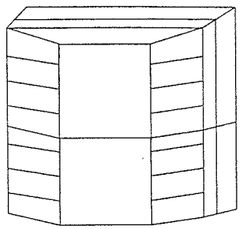


TOILET EXHAUST FAN DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-3	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-3	SERVICE LEVEL	MCC1SRA	4D	SERVICE LEVEL



ENCLOSURE EN-HVU-3
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 13

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-3-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-3-2 WILL BE OPEN AND HEATING COIL VALVE V-H-3 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-3 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-3-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-3-1 CLOSED. VENTILATION FAN VF-3 AND EXHAUST FAN TEF-A3 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-3 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-3-2 WILL CLOSE. OUTSIDE AIR DAMPER D-3-1 WILL OPEN AND VENTILATION FAN VF-3 AND EXHAUST FAN TEF-A3 WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-3-2 WILL CLOSE. ROOM SENSOR TR-3 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-3 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-3, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-3-1 WILL OPEN AND RETURN AIR DAMPER D-3-2 WILL CLOSE. HEATING COIL VALVE V-H-3 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

TOILET EXHAUST FAN TEF-A3 - THE FAN WILL START WHEN THE HVU SUPPLY FAN STARTS AND THE SYSTEM IS IN THE "OCCUPIED" MODE.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:29 PM
FILE NAME HVU-3.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-3
GAME DAY LOCKERS

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

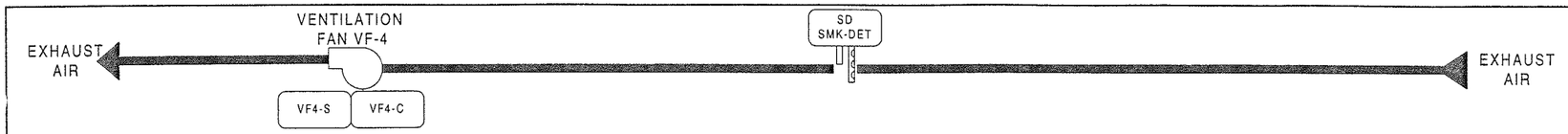
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

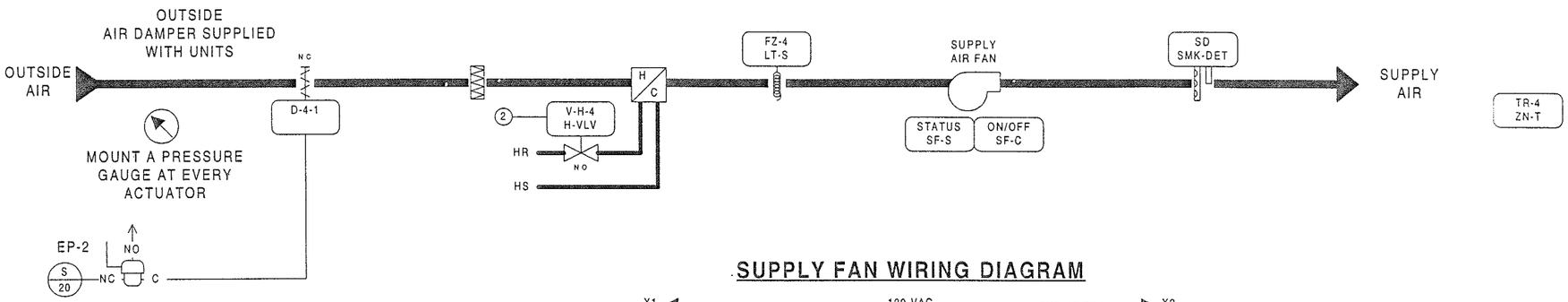
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-31

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-3					UNT						EN-HVU-3	Service Level A		M.2-01A													Power to Controller
		HVU-3	*				UNT	1	13				EN-HVU-3	Service Level A	0	M.2-01A													N2 Trunk
	AI-1	HVU-3					UNT	1	13	AI-1			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-1												
	AI-2	HVU-3					UNT	1	13	AI-2			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-2												
	AI-3	HVU-3					UNT	1	13	AI-3			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-3												
	AI-4	HVU-3	ZN-T	Zone Temperature	Deg F		UNT	1	13	AI-4		PHONE JACK	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-3					UNT	1	13	AI-5			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-5												
	AI-6	HVU-3					UNT	1	13	AI-6			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AI-6												
	BI-1	HVU-3	SF-S	Supply Fan Status	Off	On	UNT	1	13	BI-1		BI#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-3	VF3-S	Vent Fan 3 Status	Off	On	UNT	1	13	BI-2		BI#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-3	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	13	BI-3		BI#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-3	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	13	BI-4		BI#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-3	SF-C	Supply Fan Control	Off	On	UNT	1	13	BO-1	RLY	BO#,24V,COM	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-3	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	13	BO-2		BO#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-3	VF3-C	Vent Fan 3 Control	Off	On	UNT	1	13	BO-3		BO#,24VAC	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-3					UNT	1	13	BO-4			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-4												
	BO-5	HVU-3					UNT	1	13	BO-5			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-5												
	BO-6	HVU-3					UNT	1	13	BO-6			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-BO-6												
	AO-1	HVU-3	H-VLV	Heating Coil Valve	% Open		UNT	1	13	AO-1		AO#,AOCM,24VA	EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-3					UNT	1	13	AO-2			EN-HVU-3	Service Level A	0	M.2-01A	HVU-3-13-AO-2												



SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

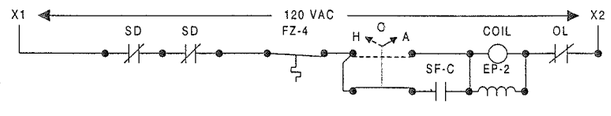


BILL OF MATERIALS

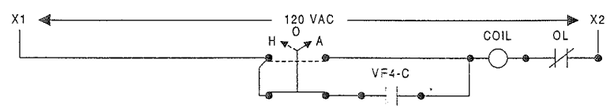
Estimate: hvu-4 70520098.pre

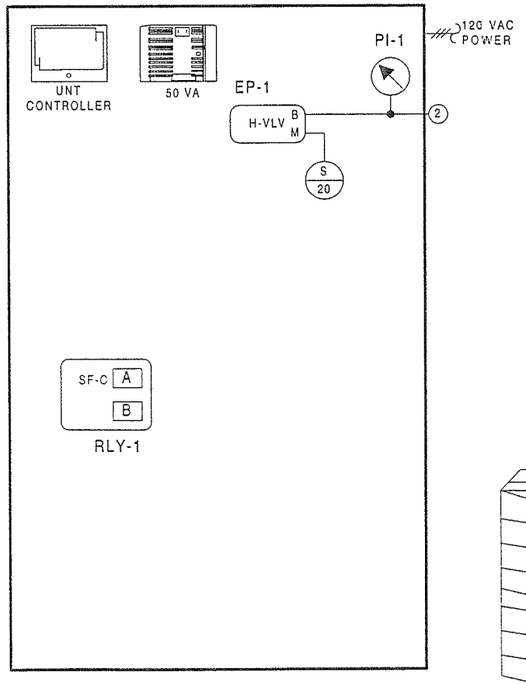
Desig.	Qty	Part #	Description
Field Devices:			
D-4-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-4	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
VF-4	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-4	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

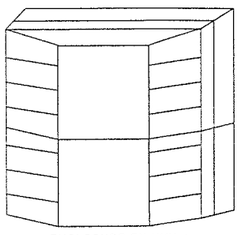
SUPPLY FAN WIRING DIAGRAM



VENT FAN VF-4 DIAGRAM







ENCLOSURE EN-HVU-4
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 14

FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-4	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-4	SERVICE LEVEL	MCC-SRA	4E	SERVICE LEVEL

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-4-1, WILL CLOSE. HEATING COIL VALVE V-H-4 WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER D-4-1 WILL OPEN AND VENTILATION FAN VF-4 WILL START AND RUN CONTINUOUSLY. ROOM SENSOR TR-4 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-4 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-4, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE OCCUPIED MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-4-1 WILL OPEN. HEATING COIL VALVE V-H-4 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:31 PM
FILE NAME HVU-4.dgn

DRAWING TITLE
HEAT-VENT UNIT HVU-4
RECYCLE

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
JDP	WJT	RTS	BY RTS	DATE 09/05/97	BY	DATE

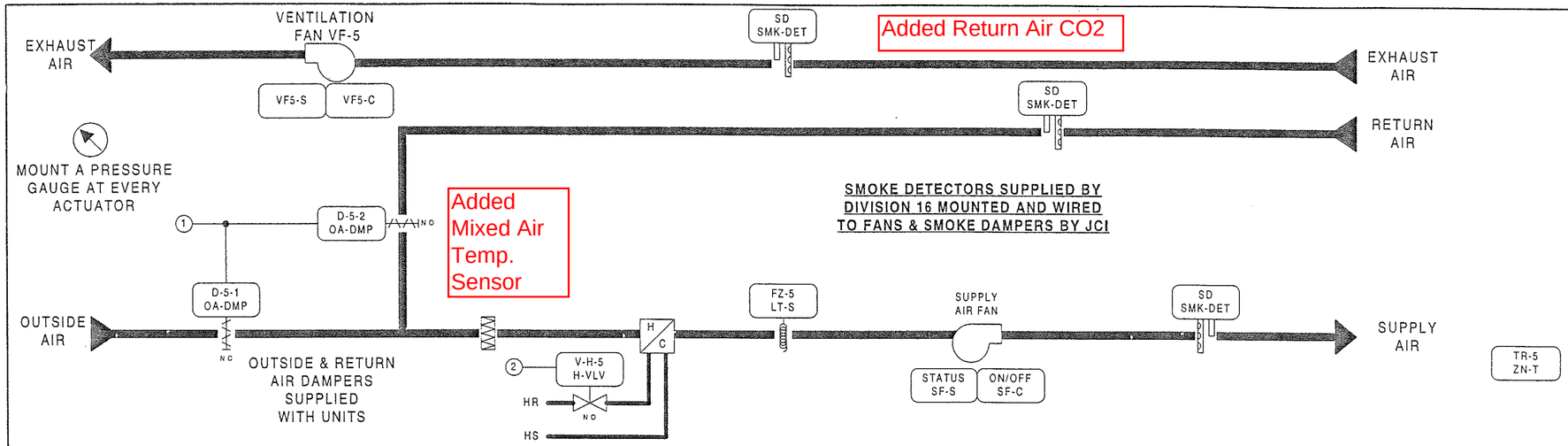
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-32

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-4					UNT						EN-HVU-4	Service Level A		M.2-01A													Power to Controller
		HVU-4	*				UNT	1	14				EN-HVU-4	Service Level A	0	M.2-01A													N2 Trunk
	AI-1	HVU-4					UNT	1	14	AI-1			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-1												
	AI-2	HVU-4					UNT	1	14	AI-2			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-2												
	AI-3	HVU-4					UNT	1	14	AI-3			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-3												
	AI-4	HVU-4	ZN-T	Zone Temperature	Deg F		UNT	1	14	AI-4		PHONE JACK	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-4					UNT	1	14	AI-5			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-5												
	AI-6	HVU-4					UNT	1	14	AI-6			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AI-6												
	BI-1	HVU-4	SF-S	Supply Fan Status	Off	On	UNT	1	14	BI-1		BI#,24VAC	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-4	VF4-S	Vent Fan 4 Status	Off	On	UNT	1	14	BI-2		BI#,24VAC	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-4	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	14	BI-3		BI#,24VAC	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-4	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	14	BI-4		BI#,24VAC	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-4	SF-C	Supply Fan Control	Off	On	UNT	1	14	BO-1	RLY	BO#,24V,COM	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-4	VF4-C	Vent Fan 4 Control	Off	On	UNT	1	14	BO-2		BO#,24VAC	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-2			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-4					UNT	1	14	BO-3			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-3												
	BO-4	HVU-4					UNT	1	14	BO-4			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-4												
	BO-5	HVU-4					UNT	1	14	BO-5			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-5												
	BO-6	HVU-4					UNT	1	14	BO-6			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-BO-6												
	AO-1	HVU-4	H-VLV	Heating Coil Valve	% Open		UNT	1	14	AO-1		AO#,AOCM,24VA	EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-4					UNT	1	14	AO-2			EN-HVU-4	Service Level A	0	M.2-01A	HVU-4-14-AO-2												

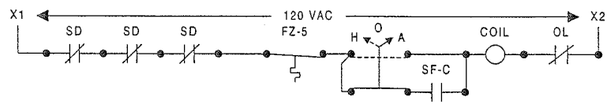


BILL OF MATERIALS

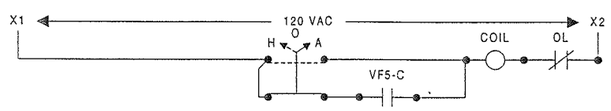
Estimate: hvu-5 70520098.pre

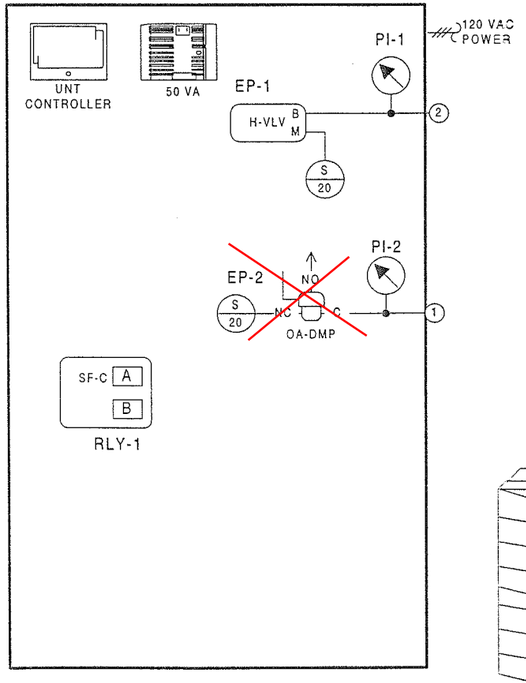
Desig.	Qty	Part #	Description
Field Devices:			
FZ-5	1	A70HA-1C	STAT,LL,20',EL,MAN,15,55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-5	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-5	1	AS-UNT111-101	UNT111 MTD IN UPM, W 50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,N/OV,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

SUPPLY FAN WIRING DIAGRAM

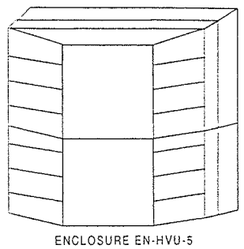


VENT FAN VF-5 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-5	SERVICE LEVEL	MCC1SRA	5D	SERVICE LEVEL
VF-5	M CONCOURSE		LOCAL	M CONCOURSE



ENCLOSURE EN-HVU-5
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 15

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-5-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-5-2 WILL BE OPEN AND HEATING COIL VALVE V-H-5 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-5 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-5-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-5-1 CLOSED. VENTILATION FAN VF-5 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-5 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-5-2 WILL CLOSE. OUTSIDE AIR DAMPER D-5-1 WILL OPEN AND VENTILATION FAN VF-5 WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-5-2 WILL CLOSE. ROOM SENSOR TR-5 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-5 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-5, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-5-1 WILL OPEN AND RETURN AIR DAMPER D-5-2 WILL CLOSE. HEATING COIL VALVE V-H-5 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:33 PM
FILE NAME HVU-5.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-5
FIELD MAINTENANCE

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION		DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

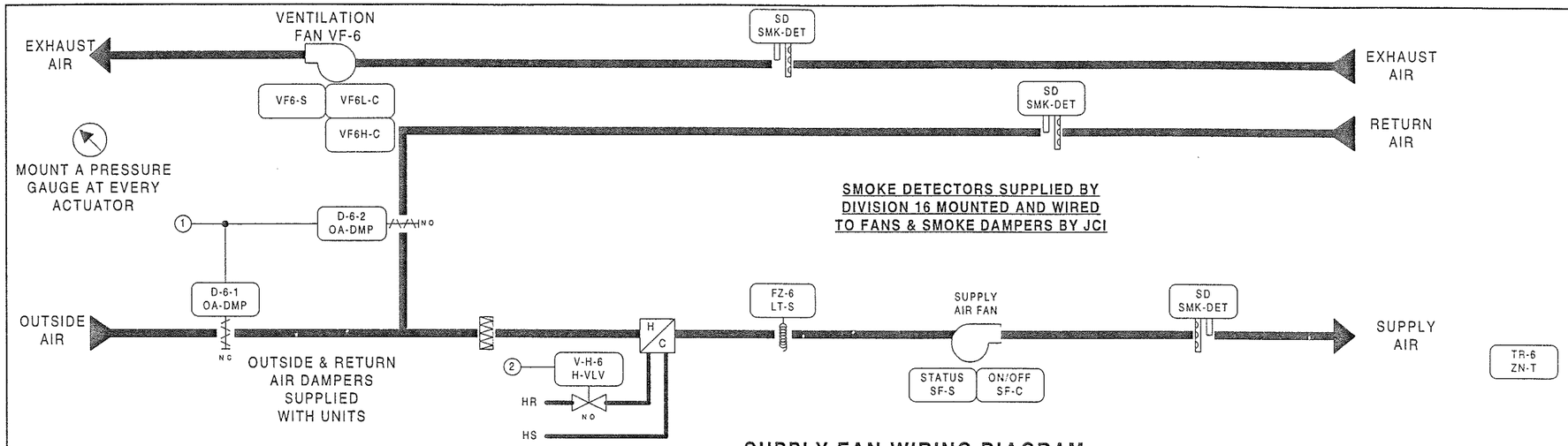
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-33

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-5					UNT						EN-HVU-5	Service Level A		M.2-01A												Power to Controller
		HVU-5	*				UNT	1	15				EN-HVU-5	Service Level A	0	M.2-01A												N2 Trunk
	AI-1	HVU-5					UNT	1	15	AI-1			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-1											
	AI-2	HVU-5					UNT	1	15	AI-2			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-2											
	AI-3	HVU-5					UNT	1	15	AI-3			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-3											
	AI-4	HVU-5	ZN-T	Zone Temperature	Deg F		UNT	1	15	AI-4		PHONE JACK	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-5					UNT	1	15	AI-5			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-5											
	AI-6	HVU-5					UNT	1	15	AI-6			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AI-6											
	BI-1	HVU-5	SF-S	Supply Fan Status	Off	On	UNT	1	15	BI-1		BI#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-5	VF5-S	Vent Fan 5 Status	Off	On	UNT	1	15	BI-2		BI#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-5	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	15	BI-3		BI#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-5	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	15	BI-4		BI#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-5	SF-C	Supply Fan Control	Off	On	UNT	1	15	BO-1	RLY	BO#,24V,COM	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-5	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	15	BO-2		BO#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-5	VF5-C	Vent Fan 5 Control	Off	On	UNT	1	15	BO-3		BO#,24VAC	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-5					UNT	1	15	BO-4			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-4											
	BO-5	HVU-5					UNT	1	15	BO-5			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-5											
	BO-6	HVU-5					UNT	1	15	BO-6			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-BO-6											
	AO-1	HVU-5	H-VLV	Heating Coil Valve	% Open		UNT	1	15	AO-1		AO#,AOCM,24V	EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-5					UNT	1	15	AO-2			EN-HVU-5	Service Level A	0	M.2-01A	HVU-5-15-AO-2											

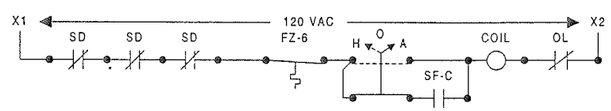


BILL OF MATERIALS

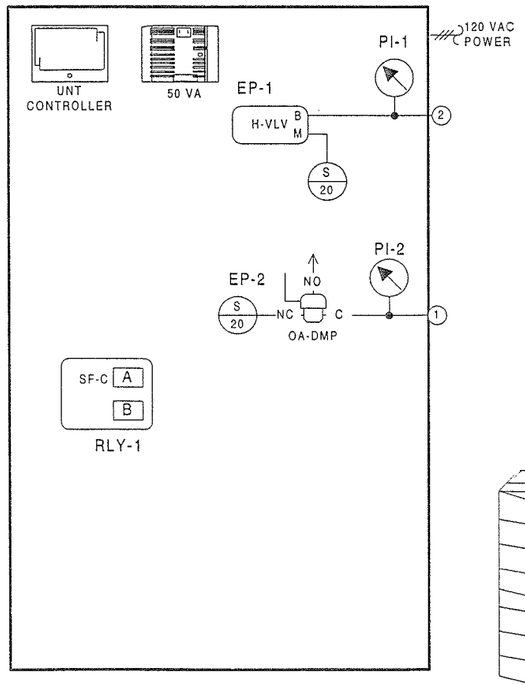
Estimate: hvu-6 70520098.pre

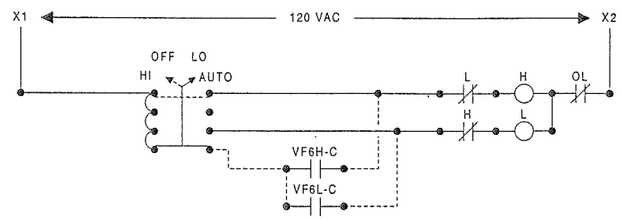
Desig.	Qty	Part #	Description
Field Devices:			
FZ-6	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-6	2	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-6	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKEN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

SUPPLY FAN WIRING DIAGRAM

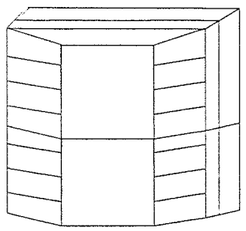


VENT FAN VF-6 DIAGRAM
TWO-SPEED WIRING DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-6	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-6	SERVICE LEVEL		LOCAL	SERVICE LEVEL



ENCLOSURE EN-HVU-6
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 16

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-6-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-6-2 WILL BE OPEN AND HEATING COIL VALVE V-H-6 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-6 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-6-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-6-1 CLOSED. VENTILATION FAN VF-6 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-6 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-6-2 WILL CLOSE. OUTSIDE AIR DAMPER D-6-1 WILL OPEN AND VENTILATION FAN VF-6 (LOW SPEED) WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-6-2 WILL CLOSE. ROOM SENSOR TR-6 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-6 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-6, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FAN (HIGH SPEED) START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-6-1 WILL OPEN AND RETURN AIR DAMPER D-6-2 WILL CLOSE. HEATING COIL VALVE V-H-6 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:33 PM
FILE NAME HVU-6.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-6
SHOP EAST

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO	REVISION-LOCATION		DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/08/97	BY DATE

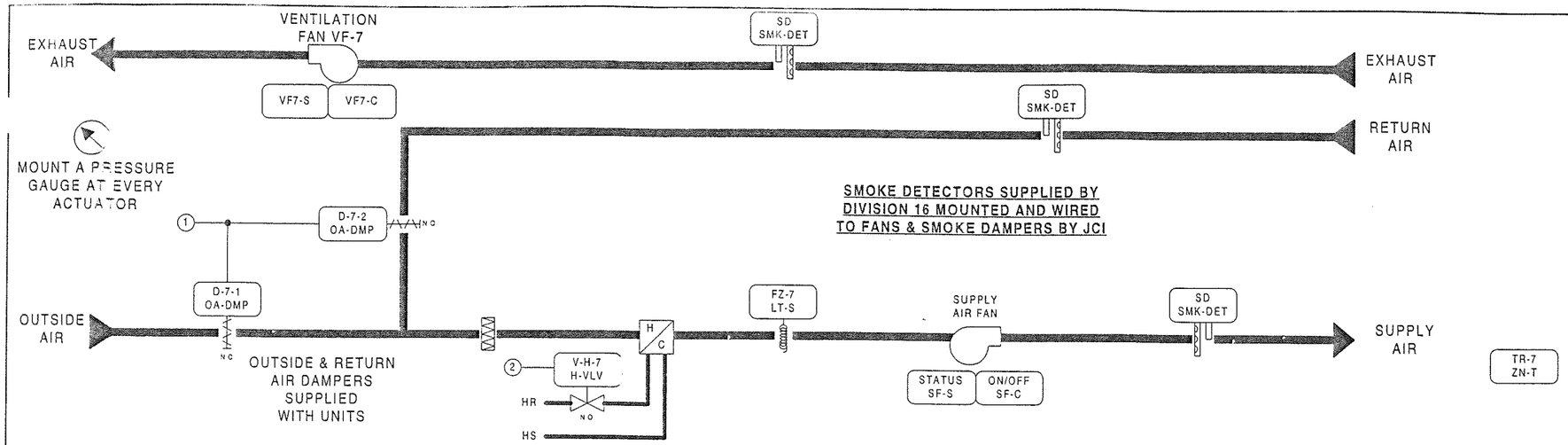
JOHNSON CONTROLS
Systems & Services Division

Branch information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-31

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Boy/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-6					UNT						EN-HVU-6	Service Level B		M.2-01B												Power to Controller
		HVU-6	*				UNT	1	16				EN-HVU-6	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	HVU-6					UNT	1	16	AI-1			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-1											
	AI-2	HVU-6					UNT	1	16	AI-2			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-2											
	AI-3	HVU-6					UNT	1	16	AI-3			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-3											
	AI-4	HVU-6	ZN-T	Zone Temperature	Deg F		UNT	1	16	AI-4		PHONE JACK	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-6					UNT	1	16	AI-5			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-5											
	AI-6	HVU-6					UNT	1	16	AI-6			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AI-6											
	BI-1	HVU-6	SF-S	Supply Fan Status	Off	On	UNT	1	16	BI-1		BI#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-6	VF6-S	Vent Fan 6 Status	Off	On	UNT	1	16	BI-2		BI#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-6	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	16	BI-3		BI#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-6	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	16	BI-4		BI#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-6	SF-C	Supply Fan Control	Off	On	UNT	1	16	BO-1	RLY	BO#,24V,COM	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-6	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	16	BO-2		BO#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-6	VF6L-C	Vent Fan 6 Control Low	Off	On	UNT	1	16	BO-3		BO#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-6	VF6H-C	Vent Fan 6 Control High	Off	On	UNT	1	16	BO-4		BO#,24VAC	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-5	HVU-6					UNT	1	15	BO-5			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-5											
	BO-6	HVU-6					UNT	1	16	BO-6			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-BO-6											
	AO-1	HVU-6	H-VLV	Heating Coil Valve	% Open		UNT	1	16	AO-1		AO#,AOCM,24V	EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-6					UNT	1	16	AO-2			EN-HVU-6	Service Level B	0	M.2-01B	HVU-6-16-AO-2											

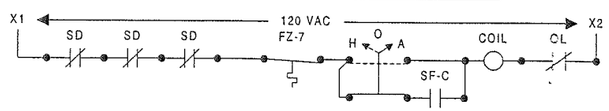


BILL OF MATERIALS

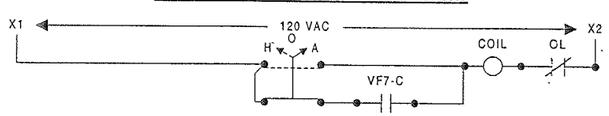
Estimate: hvu-7 70520098.pre

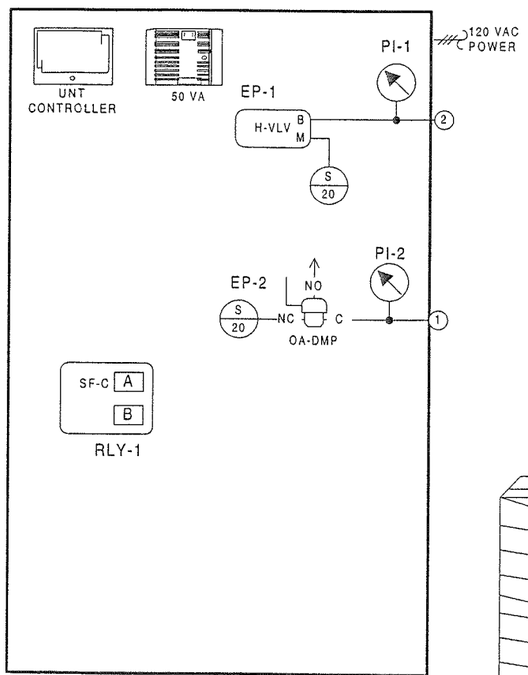
Desig.	Qty	Part #	Description
Field Devices:			
FZ-7	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
OA-DMP	2	D-3153-2	DMPR ACT,8-13#
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
VF-7	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-7	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
EP-2	1	V11HGA-100	3-W SOLENOID,W/OV,24 VAC
PI-1,2	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

SUPPLY FAN WIRING DIAGRAM

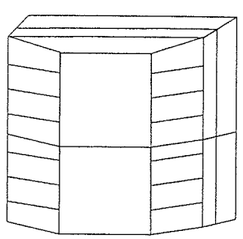


VENT FAN VF-7 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-7	SERVICE LEVEL		LOCAL	SERVICE LEVEL
VF-7	M CONCOURSE		LOCAL	M CONCOURSE



ENCLOSURE EN-HVU-7
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 17

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND VENTILATION FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-7-1, WILL CLOSE. UNOCCUPIED RETURN AIR DAMPER D-7-2 WILL BE OPEN AND HEATING COIL VALVE V-H-7 WILL BE CLOSED TO THE COIL.

WARM-UP MODE - SUPPLY FAN WILL START AS DETERMINED BY THE OPTIMAL START PROGRAM OF THE METASYS SYSTEM. ON THE START OF THE UNIT, HEATING COIL VALVE V-H-7 WILL OPEN FULL TO COIL AND RETURN AIR DAMPER D-7-2 WILL BE FULLY OPEN WITH THE OUTSIDE AIR DAMPER D-7-1 CLOSED. VENTILATION FAN VF-7 WILL BE OFF DURING THE WARM-UP MODE. DURATION OF THE WARM-UP MODE IS DETERMINED BY THE METASYS SYSTEM AND WILL BE DYNAMICALLY UPDATED TO END FIFTEEN (15) MINUTES PRIOR TO OCCUPANCY TIME. WARM-UP MODE IS STOPPED WHEN THE ZONE AIR TEMPERATURE REACHES THE SETTING OF TR-7 (70F).

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING, RETURN AIR DAMPER D-7-2 WILL CLOSE. OUTSIDE AIR DAMPER D-7-1 WILL OPEN AND VENTILATION FAN VF-7 WILL START AND RUN CONTINUOUSLY AFTER THE WARM-UP MODE IS STOPPED. RETURN AIR DAMPER D-7-2 WILL CLOSE. ROOM SENSOR TR-7 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-7 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-7. WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE WARM-UP MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND VENTILATION FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-7-1 WILL OPEN AND RETURN AIR DAMPER D-7-2 WILL CLOSE. HEATING COIL VALVE V-H-7 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:32 PM
FILE NAME HVU-7.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-7
SHOP WEST

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/05/97 | APPROVED: BY DATE

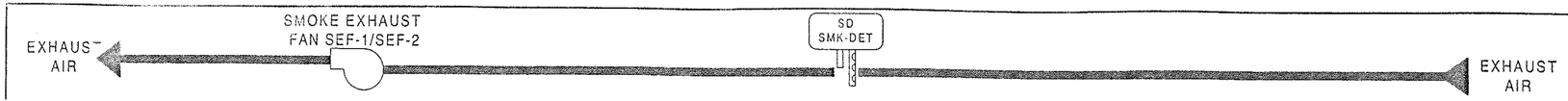
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-35

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-7					UNT						EN-HVU-7	Service Level B		M.2-01B												
		HVU-7	*				UNT	1	17				EN-HVU-7	Service Level B		0 M.2-01B												Power to Controller
	AI-1	HVU-7					UNT	1	17	AI-1			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-1											N2 Trunk
	AI-2	HVU-7					UNT	1	17	AI-2			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-2											
	AI-3	HVU-7					UNT	1	17	AI-3			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-3											
	AI-4	HVU-7	ZN-T	Zone Temperature	Deg F		UNT	1	17	AI-4		PHONE JACK	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-7					UNT	1	17	AI-5			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-5											
	AI-6	HVU-7					UNT	1	17	AI-6			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AI-6											
	BI-1	HVU-7	SF-S	Supply Fan Status	Off	On	UNT	1	17	BI-1		BI#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-7	VF7-S	Vent Fan 7 Status	Off	On	UNT	1	17	BI-2		BI#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-7	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	17	BI-3		BI#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-7	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	17	BI-4		BI#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BI-4						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-7	SF-C	Supply Fan Control	Off	On	UNT	1	17	BO-1	RLY	BO#,24V,COM	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-7	OA-DMP	Outside Air Damper	Closed	Open	UNT	1	17	BO-2		BO#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-2			V11HGA-100			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-3	HVU-7	VF7-C	Vent Fan 7 Control	Off	On	UNT	1	17	BO-3		BO#,24VAC	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-3			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-4	HVU-7					UNT	1	17	BO-4			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-4											
	BO-5	HVU-7					UNT	1	17	BO-5			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-5											
	BO-6	HVU-7					UNT	1	17	BO-6			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-BO-6											
	AO-1	HVU-7	H-VLV	Heating Coil Valve	% Open		UNT	1	17	AO-1		AO#,AOCM,24VA	EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-7					UNT	1	17	AO-2			EN-HVU-7	Service Level B		0 M.2-01B	HVU-7-17-AO-2											

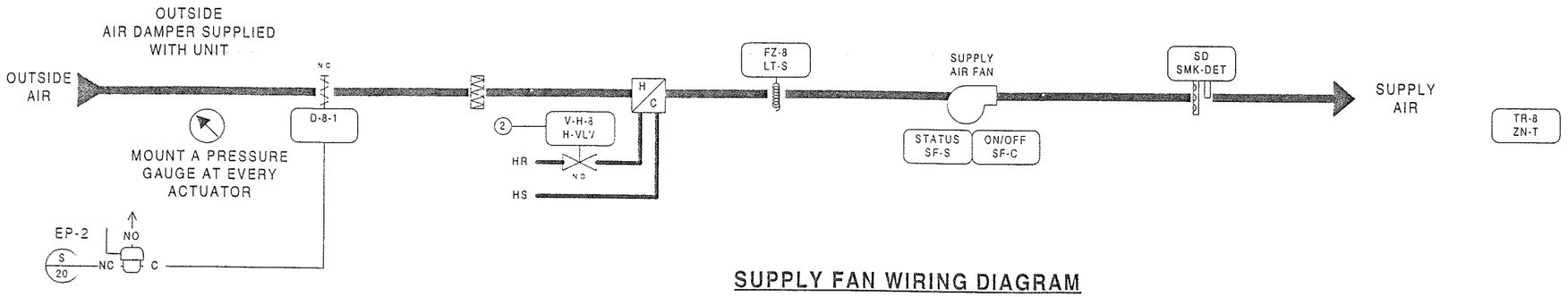


BILL OF MATERIALS

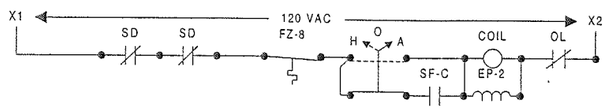
Estimate: hvu-8 70520098.pre

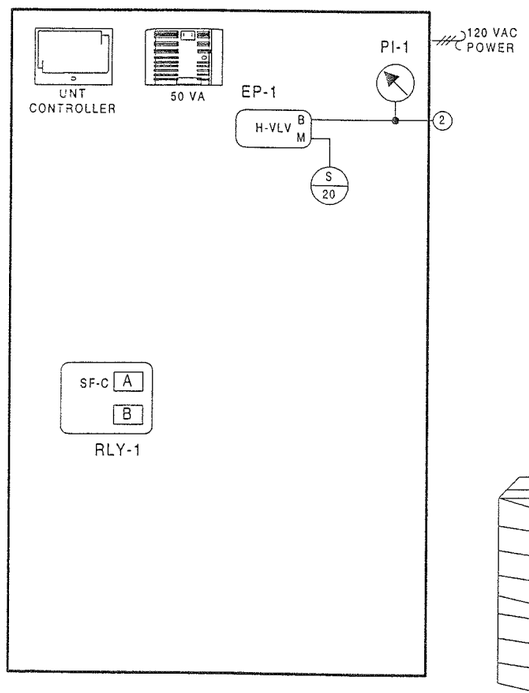
Desig.	Qty	Part #	Description
Field Devices:			
D-8-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-8	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			-
EN-HVU-8	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

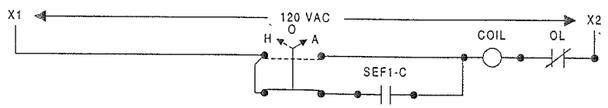


SUPPLY FAN WIRING DIAGRAM

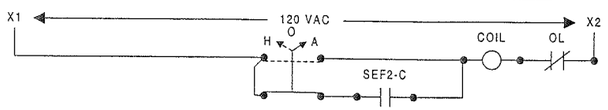




SMOKE EXHAUST FAN SEF-1 DIAGRAM

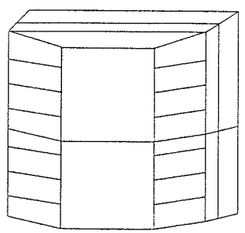


SMOKE EXHAUST FAN SEF-2 DIAGRAM



FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-8	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-1	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-2	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-1 AND SEF-2 METASYS POINT CONNECTIONS SEE AHU-19 CONTROL DIAGRAM BL-6559-25 POINT LIST NCM-5 PS-10



ENCLOSURE EN-HVU-8
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 18

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN **SEF-1** OR **SEF-2**. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN **SEF-1** OR **SEF-2** WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER **D-8-1**, WILL CLOSE. HEATING COIL VALVE **V-H-8** WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-8-1** WILL OPEN. ROOM SENSOR **TR-8** THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE **V-H-8** CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR **TR-8**, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER **D-8-1** WILL OPEN. HEATING COIL VALVE **V-H-8** WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-8 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER D-8-1. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-8,HVU-9 AND HVU-10 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:32 PM
FILE NAME HVU-8.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-8
FREIGHT ELEVATOR LOBBY

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer JDP | Project Manager WJT | Application Engineer RTS | DRAWN BY RTS DATE 09/05/97 | APPROVED BY DATE

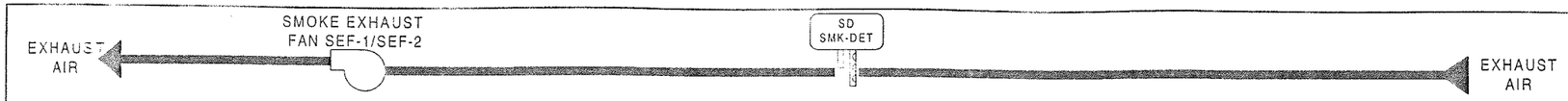
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

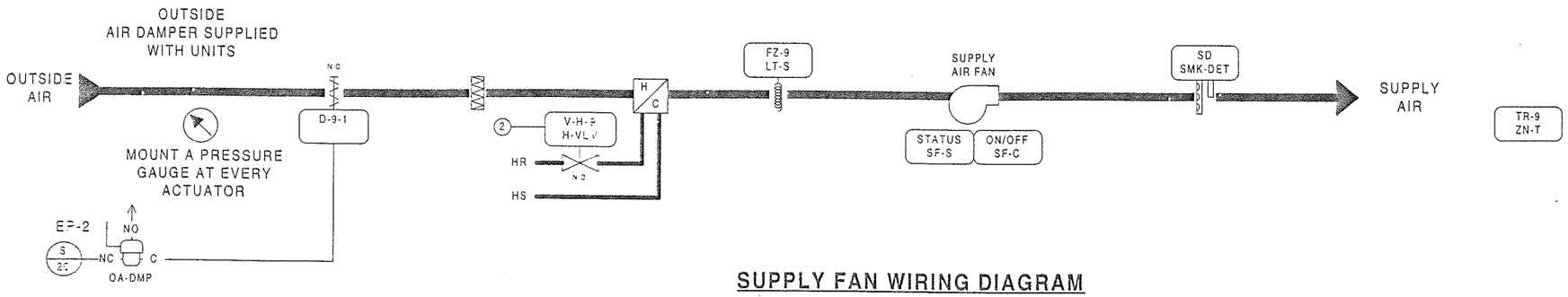
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-36

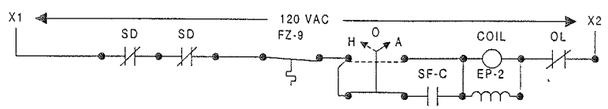
Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-8				UNT						EN-HVU-8	Service Level A		M.2-01A												
		HVU-8	*			UNT	1	13				EN-HVU-8	Service Level A		M.2-01A												Power to Controller
	AI-1	HVU-8				UNT	1	14	AI-1			EN-HVU-8	Service Level A	0	M.2-01A												N2 Trunk
	AI-2	HVU-8				UNT	1	15	AI-2			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-1											
	AI-3	HVU-8				UNT	1	16	AI-3			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-2											
	AI-4	HVU-8	ZN-T	Zone Temperature	Deg F	UNT	1	17	AI-4		PHONE JACK	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-3											
	AI-5	HVU-8				UNT	1	18	AI-5			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-6	HVU-8				UNT	1	19	AI-6			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-5											
	BI-1	HVU-8	SF-S	Supply Fan Status	Off : On	UNT	1	13	BI-1		BI#,24VAC	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AI-6											
	BI-2	HVU-8	SMK-DET	Smoke Detectors	Normal: Alarm	UNT	1	14	BI-2		BI#,24VAC	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	HVU-8	LT-S	Low Temperature Stat	Normal: Alarm	UNT	1	15	BI-3		BI#,24VAC	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-4	HVU-8				UNT	1	16	BI-4			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BO-1	HVU-8	SF-C	Supply Fan Control	Off : On	UNT	1	13	BO-1	RLY	BO#,24V,COM	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BI-4											
	BO-2	HVU-8				UNT	1	14	BO-2			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-3	HVU-8				UNT	1	15	BO-3			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-2											
	BO-4	HVU-8				UNT	1	16	BO-4			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-3											
	BO-5	HVU-8				UNT	1	17	BO-5			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-4											
	BO-6	HVU-8				UNT	1	18	BO-6			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-5											
	AO-1	HVU-8	H-VLV	Heating Coil Valve	% Open	UNT	1	12	AO-1		AO#,AOCM,24VA	EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-BO-6											
	AO-2	HVU-8				UNT	1	13	AO-2			EN-HVU-8	Service Level A	0	M.2-01A	HVU-8-18-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
																HVU-8-18-AO-2											



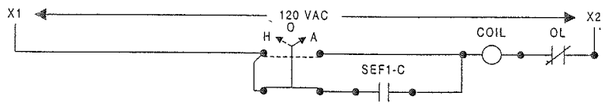
SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI



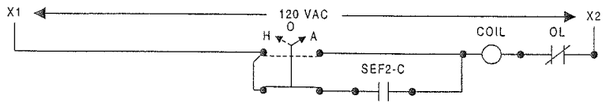
SUPPLY FAN WIRING DIAGRAM

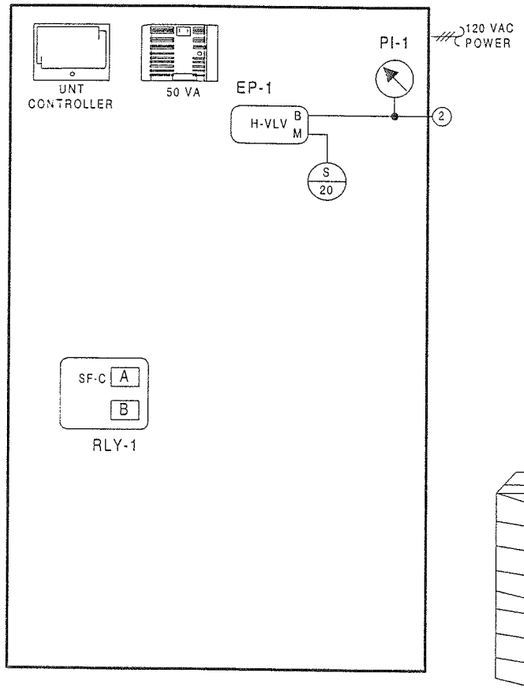


SMOKE EXHAUST FAN SEF-1 DIAGRAM



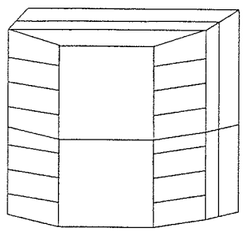
SMOKE EXHAUST FAN SEF-2 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-9	SERVICE LEVEL	MCC1SRA	5F	SERVICE LEVEL
SEF-1	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-2	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-1 AND SEF-2 METASYS POINT CONNECTIONS SEE AHU-19 CONTROL DIAGRAM BL-6559-25 POINT LIST NCM-5 PS-10



ENCLOSURE EN-HVU-9
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 19

BILL OF MATERIALS

Estimate: hvu-9 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-9-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-9	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-9	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN SEF-1 OR SEF-2. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN SEF-1 OR SEF-2 WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-9-1, WILL CLOSE. HEATING COIL VALVE V-H-9 WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER D-9-1 WILL OPEN. ROOM SENSOR TR-9 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-9 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-9, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-9-1 WILL OPEN. HEATING COIL VALVE V-H-9 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-9 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER D-9-1. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-8,HVU-9 AND HVU-10 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:34 PM
FILE NAME HVU-9.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-9
SERVICE TUNNEL

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer JDP | Project Manager WJT | Application Engineer RTS | DRAWN BY RTS DATE 09/05/97 | APPROVED BY DATE

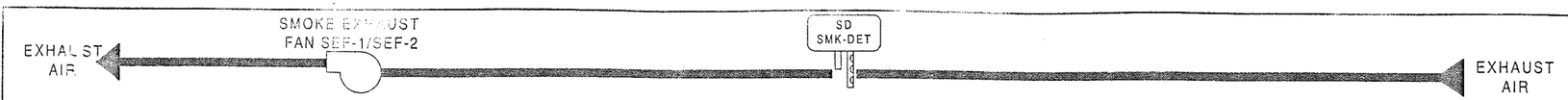
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-37

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-9				UNT						EN-HVU-9	Service Level A		M.2-01A												Power to Controller
		HVU-9	*			UNT	1	99				EN-HVU-9	Service Level A	0	M.2-01A												N2 Trunk
	AI-1	HVU-9				UNT	1	99	AI-1			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-1											
	AI-2	HVU-9				UNT	1	99	AI-2			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-2											
	AI-3	HVU-9				UNT	1	99	AI-3			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-3											
	AI-4	HVU-9	ZN-T	Zone Temperature	Deg F	UNT	1	99	AI-4		PHONE JACK	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-9				UNT	1	99	AI-5			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-5											
	AI-6	HVU-9				UNT	1	99	AI-6			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AI-6											
	BI-1	HVU-9	SF-S	Supply Fan Status	Off On	UNT	1	99	BI-1		BI#,24VAC	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-9	SMK-DET	Smoke Detectors	Normal Alarm	UNT	1	99	BI-2		BI#,24VAC	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	HVU-9	LT-S	Low Temperature Stat	Normal Alarm	UNT	1	99	BI-3		BI#,24VAC	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	HVU-9				UNT	1	99	BI-4			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BI-4											
	BO-1	HVU-9	SF-C	Supply Fan Control	Off On	UNT	1	99	BO-1	RLY	BO#,24V,COM	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-9				UNT	1	99	BO-2			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-2											
	BO-3	HVU-9				UNT	1	99	BO-3			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-3											
	BO-4	HVU-9				UNT	1	99	BO-4			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-4											
	BO-5	HVU-9				UNT	1	99	BO-5			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-5											
	BO-6	HVU-9				UNT	1	99	BO-6			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-BO-6											
	AO-1	HVU-9	H-VLV	Heating Coil Valve	% Open	UNT	1	99	AO-1		AO#,AOCM,24VA	EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-9				UNT	1	99	AO-2			EN-HVU-9	Service Level A	0	M.2-01A	HVU-9-19-AO-2											

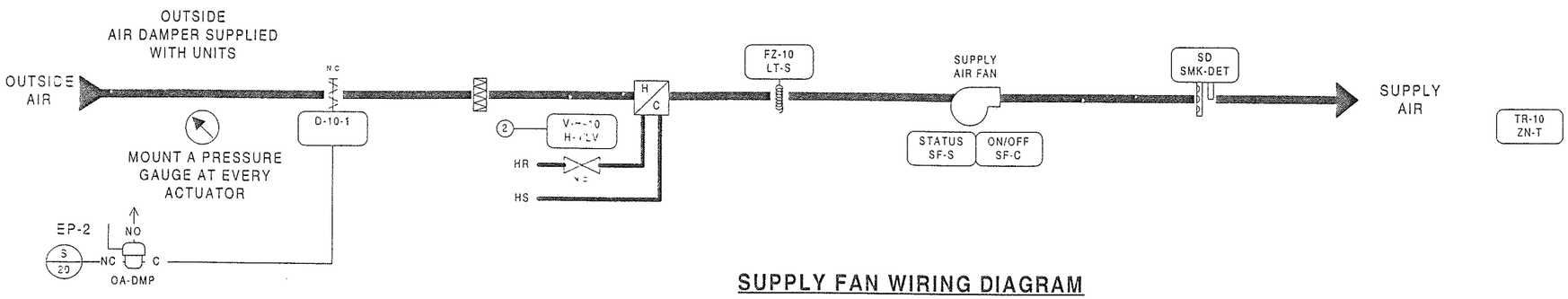


BILL OF MATERIALS

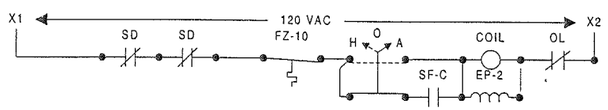
Estimate: hvu-10 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-10-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-10	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-10	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

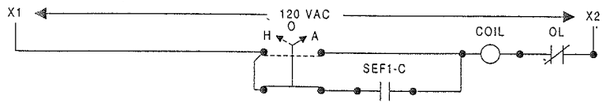
SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI



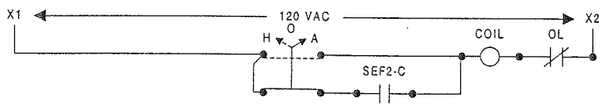
SUPPLY FAN WIRING DIAGRAM

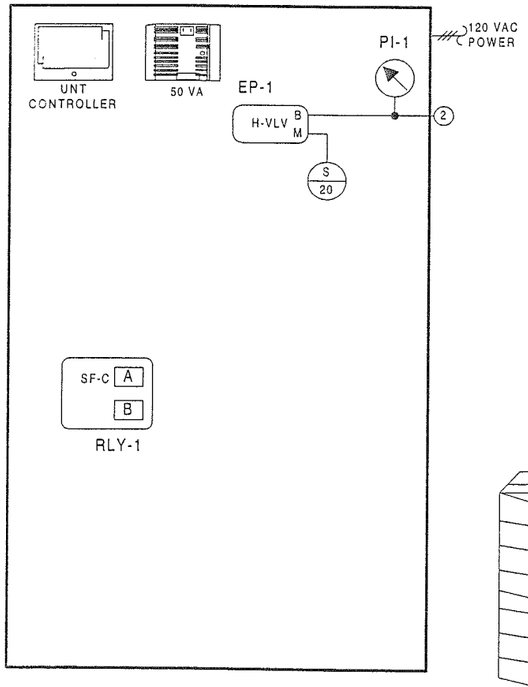


SMOKE EXHAUST FAN SEF-1 DIAGRAM



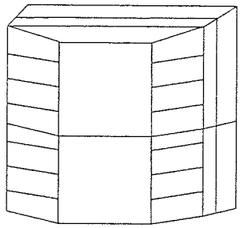
SMOKE EXHAUST FAN SEF-2 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-10	SERVICE LEVEL	MCC1SRA	9B	SERVICE LEVEL
SEF-1	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-2	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-1 AND SEF-2 METASYS POINT CONNECTIONS SEE AHU-19 CONTROL DIAGRAM BL-6559-25 POINT LIST NCM-5 PS-10



ENCLOSURE EN-HVU-10
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5.N2 ADD = 20

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN SEF-1 OR SEF-2. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN SEF-1 OR SEF-2 WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-10-1, WILL CLOSE. HEATING COIL VALVE V-H-10 WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER D-10-1 WILL OPEN. ROOM SENSOR TR-10 THROUGH THE METASYS SYSTEM CONTROL UNIT, WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-10 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-10, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-10-1 WILL OPEN. HEATING COIL VALVE V-H-10 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-10 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER D-10-1. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-8,HVU-9 AND HVU-10 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:35 PM
FILE NAME HVU-10.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-10
SERVICE TUNNEL

SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/05/97	BY DATE

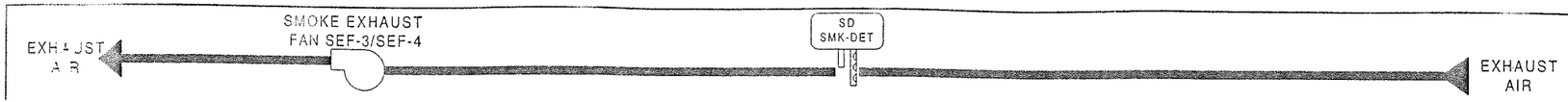
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-38

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-10					UNT						EN-HVU10	Service Level A		M.2-01A												
		HVU-10	*				UNT	1	20				EN-HVU10	Service Level A		0 M.2-01A												Power to Controller
	AI-1	HVU-10					UNT	1	20	AI-1			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-1											N2 Trunk
	AI-2	HVU-10					UNT	1	20	AI-2			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-2											
	AI-3	HVU-10					UNT	1	20	AI-3			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-3											
	AI-4	HVU-10	ZN-T	Zone Temperature	Deg F		UNT	1	20	AI-4		PHONE JACK	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-10					UNT	1	20	AI-5			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-5											
	AI-6	HVU-10					UNT	1	20	AI-6			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AI-6											
	BI-1	HVU-10	SF-S	Supply Fan Status	Off	On	UNT	1	20	BI-1		BI#,24VAC	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-10	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	20	BI-2		BI#,24VAC	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	HVU-10	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	20	BI-3		BI#,24VAC	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	HVU-10					UNT	1	20	BI-4			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BI-4											
	BO-1	HVU-10	SF-C	Supply Fan Control	Off	On	UNT	1	20	BO-1	RLY	BO#,24V,COM	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-10					UNT	1	20	BO-2			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-2											
	BO-3	HVU-10					UNT	1	20	BO-3			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-3											
	BO-4	HVU-10					UNT	1	20	BO-4			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-4											
	BO-5	HVU-10					UNT	1	20	BO-5			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-5											
	BO-6	HVU-10					UNT	1	20	BO-6			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-BO-6											
	AO-1	HVU-10	H-VLV	Heating Coil Valve	% Open		UNT	1	20	AO-1		AO#,AOCM,24VA	EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-10					UNT	1	20	AO-2			EN-HVU10	Service Level A		0 M.2-01A	HVU10-20-AO-2											

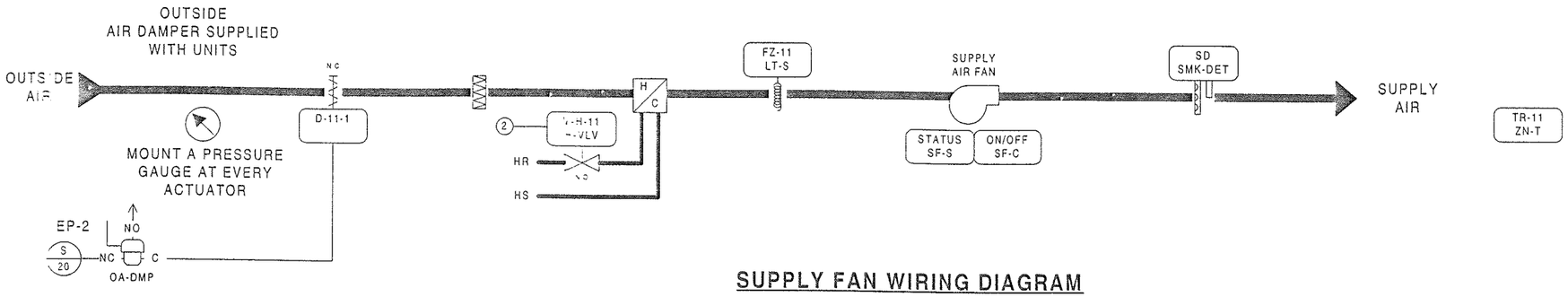


BILL OF MATERIALS

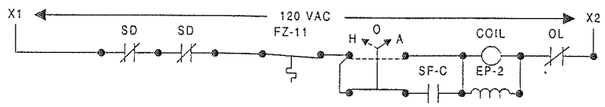
Estimate: hvu-11 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-11-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-11	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-11	1	AS-UNT111-101	UNT111 MTD IN UFM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

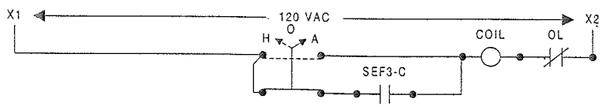
SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI



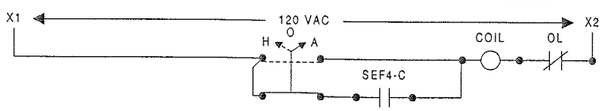
SUPPLY FAN WIRING DIAGRAM

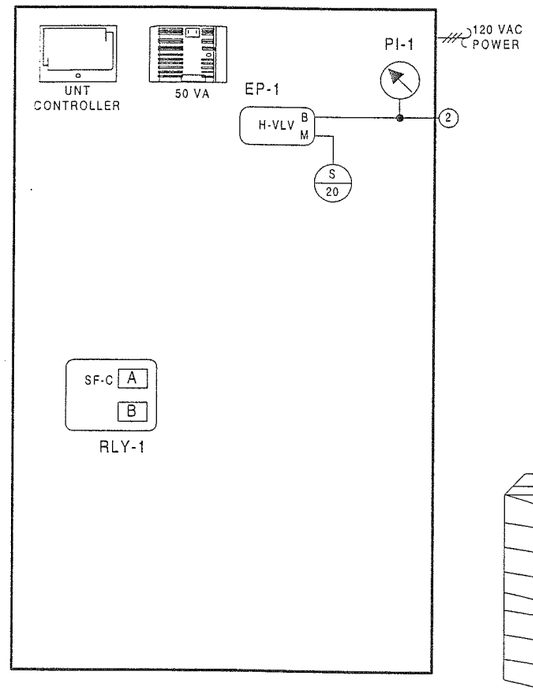


SMOKE EXHAUST FAN SEF-3 DIAGRAM



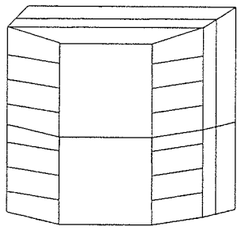
SMOKE EXHAUST FAN SEF-4 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-11	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-3	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-4	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-1 AND SEF-2 METASYS POINT CONNECTIONS SEE AHU-19 CONTROL DIAGRAM BL-6559-25 POINT LIST NCM-5 PS-10



ENCLOSURE EN-HVU-11
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 21

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN SEF-3 OR SEF-4. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN SEF-3 OR SEF-4 WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-11-1, WILL CLOSE. HEATING COIL VALVE V-H-11 WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER D-11-1 WILL OPEN. ROOM SENSOR TR-11 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-11 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-11, WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-11-1 WILL OPEN. HEATING COIL VALVE V-H-11 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-11 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER D-11-1. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-11,HVU-12 AND HVU-13 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:35 PM
FILE NAME HVU-11.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-11
SERVICE TUNNEL

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/05/97 | APPROVED: BY DATE

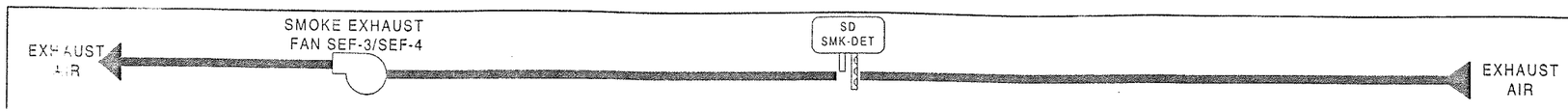
JOHNSON CONTROLS
Systems & Services Division

Branch information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-39

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
b		HVU-11					UNT						EN-HVU11	Service Level B		M.2-01B												Power to Controller
		HVU-11	*				UNT	1	21				EN-HVU11	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	HVU-11					UNT	1	21	AI-1			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-1											
	AI-2	HVU-11					UNT	1	21	AI-2			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-2											
	AI-3	HVU-11					UNT	1	21	AI-3			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-3											
	AI-4	HVU-11	ZN-T	Zone Temperature	Deg F		UNT	1	21	AI-4		PHONE JACK	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-11					UNT	1	21	AI-5			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-5											
	AI-6	HVU-11					UNT	1	21	AI-6			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AI-6											
	BI-1	HVU-11	SF-S	Supply Fan Status	Off	On	UNT	1	21	BI-1		BI#,24VAC	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-11	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	21	BI-2		BI#,24VAC	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	HVU-11	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	21	BI-3		BI#,24VAC	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	HVU-11					UNT	1	21	BI-4			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BI-4											
	BO-1	HVU-11	SF-C	Supply Fan Control	Off	On	UNT	1	21	BO-1	RLY	BO#,24V,COM	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-11					UNT	1	21	BO-2			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-2											
	BO-3	HVU-11					UNT	1	21	BO-3			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-3											
	BO-4	HVU-11					UNT	1	21	BO-4			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-4											
	BO-5	HVU-11					UNT	1	21	BO-5			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-5											
	BO-6	HVU-11					UNT	1	21	BO-6			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-BO-6											
	AO-1	HVU-11	H-VLV	Heating Coil Valve	% Open		UNT	1	21	AO-1		AO#,AOCM,24VA	EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-11					UNT	1	21	AO-2			EN-HVU11	Service Level B	0	M.2-01B	HVU11-21-AO-2											

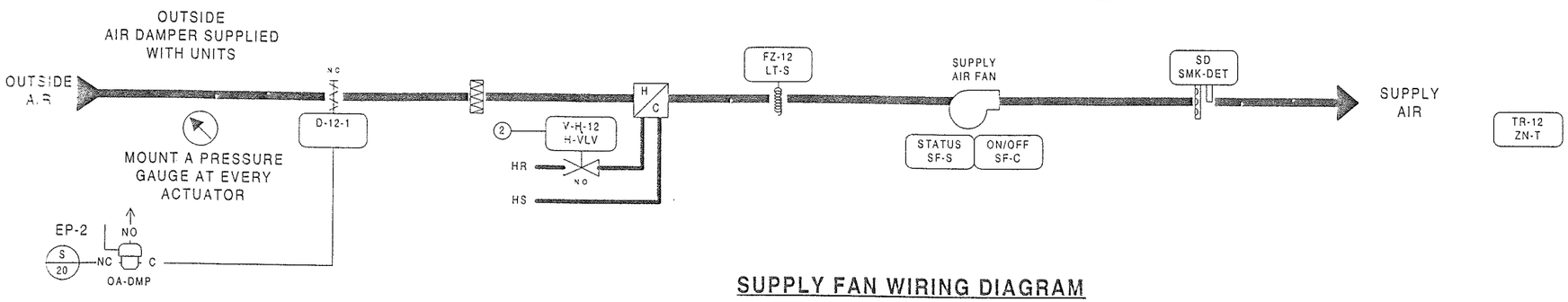


BILL OF MATERIALS

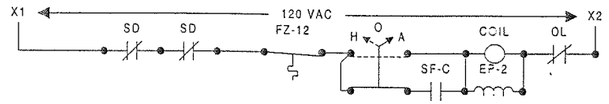
Estimate: hvu-12 70520098.pre

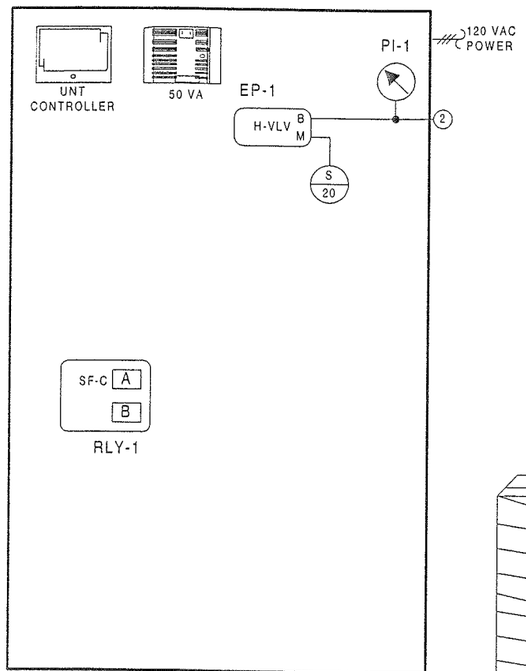
Desig.	Qty	Part #	Description
Field Devices:			
D-12-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-12	1	A70HA-1C	STAT,LL,20',EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-12	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

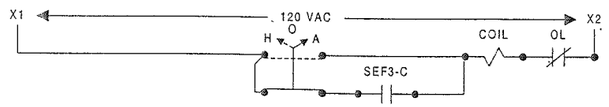


SUPPLY FAN WIRING DIAGRAM

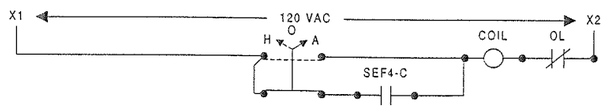




SMOKE EXHAUST FAN SEF-3 DIAGRAM

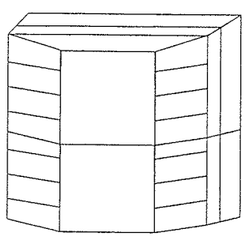


SMOKE EXHAUST FAN SEF-4 DIAGRAM



FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-12	SERVICE LEVEL	MCC2SRB	3B	SERVICE LEVEL
SEF-3	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-4	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-3 AND SEF-4 METASYS POINT CONNECTIONS SEE AHU-13 CONTROL DIAGRAM BL-6559-18 POINT LIST NCM-5 PS-4



ENCLOSURE EN-HVU-12
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5,N2 ADD = 22

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN **SEF-3** OR **SEF-4**. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN **SEF-3** OR **SEF-4** WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER **D-12-1**, WILL CLOSE. HEATING COIL VALVE **V-H-12** WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-12-1** WILL OPEN. ROOM SENSOR **TR-12** THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE **V-H-12** CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR **TR-12**. WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER **D-12-1** WILL OPEN. HEATING COIL VALVE **V-H-12** WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-12 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER **D-12-1**. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-11,HVU-12 AND HVU-13 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:36 PM
FILE NAME HVU-12.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-12
SERVICE TUNNEL

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer JDP | Project Manager WJT | Application Engineer RTS | DRAWN BY RTS DATE 09/09/97 | APPROVED BY DATE

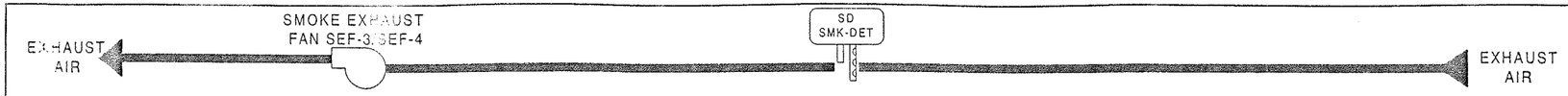
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-40

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-12					UNT						EN-HVU12	Service Level B		M.2-01E												Power to Controller
		HVU-12	*				UNT	*	22				EN-HVU12	Service Level B	0	M.2-01E												N2 Trunk
	AI-1	HVU-12					UNT	*	22	AI-1			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-1											
	AI-2	HVU-12					UNT	*	22	AI-2			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-2											
	AI-3	HVU-12					UNT	*	22	AI-3			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-3											
	AI-4	HVU-12	ZN-T	Zone Temperature	Deg F		UNT	*	22	AI-4		PHONE JACK	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-4					8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-12					UNT	*	22	AI-5			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-5											
	AI-6	HVU-12					UNT	*	22	AI-6			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AI-6											
	BI-1	HVU-12	SF-S	Supply Fan Status	Off	On	UNT	*	22	BI-1		BI#,24VAC	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BI-1					2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-12	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	*	22	BI-2		BI#,24VAC	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BI-2					2/22	Device dependent	Contact (NO)		U70	
	BI-3	HVU-12	LT-S	Low Temperature Stat	Normal	Alarm	UNT	*	22	BI-3		BI#,24VAC	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BI-3					2/22	NO,M1	A70 (NC)		U71	
	BI-4	HVU-12					UNT	*	22	BI-4			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BI-4											
	BO-1	HVU-12	SF-C	Supply Fan Control	Off	On	UNT	*	22	BO-1	RLY	BO#,24V,COM	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-12					UNT	*	22	BO-2			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-2											
	BO-3	HVU-12					UNT	*	22	BO-3			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-3											
	BO-4	HVU-12					UNT	*	22	BO-4			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-4											
	BO-5	HVU-12					UNT	*	22	BO-5			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-5											
	BO-6	HVU-12					UNT	*	22	BO-6			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-BO-6											
	AO-1	HVU-12	H-VLV	Heating Coil Valve	% Open		UNT	*	22	AO-1		AO#,AOCM,24V#	EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-12					UNT	*	22	AO-2			EN-HVU12	Service Level B	0	M.2-01E	HVU12-22-AO-2											

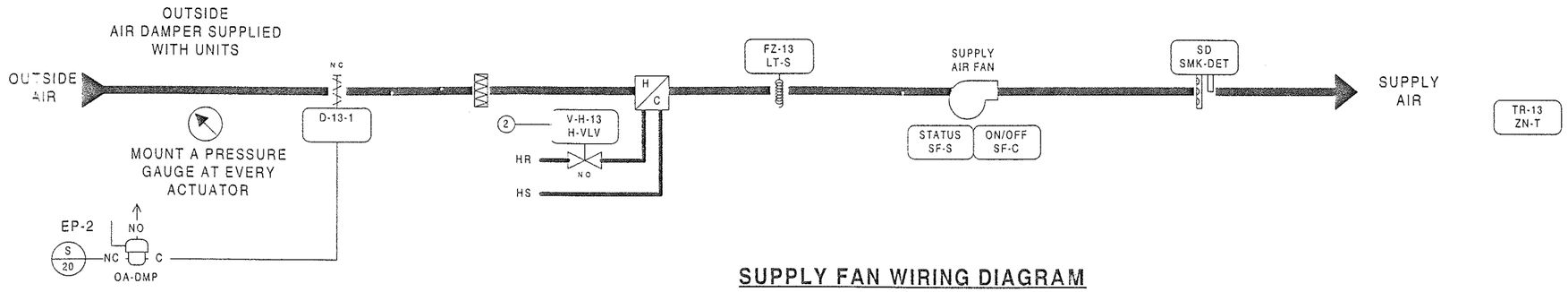


BILL OF MATERIALS

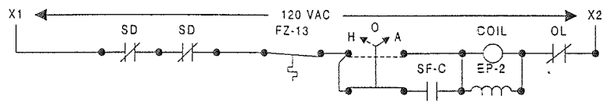
Estimate: hvu-13 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-13-1	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
FZ-13	1	A70HA-1C	STAT,LL,20",EL,MAN,15/55F
H-VLV	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-HVU-13	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

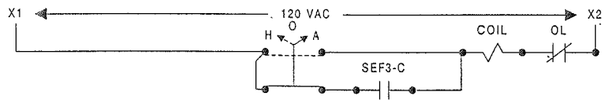
SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI



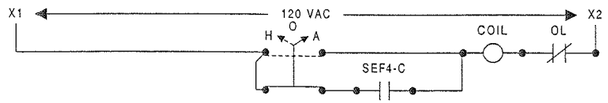
SUPPLY FAN WIRING DIAGRAM

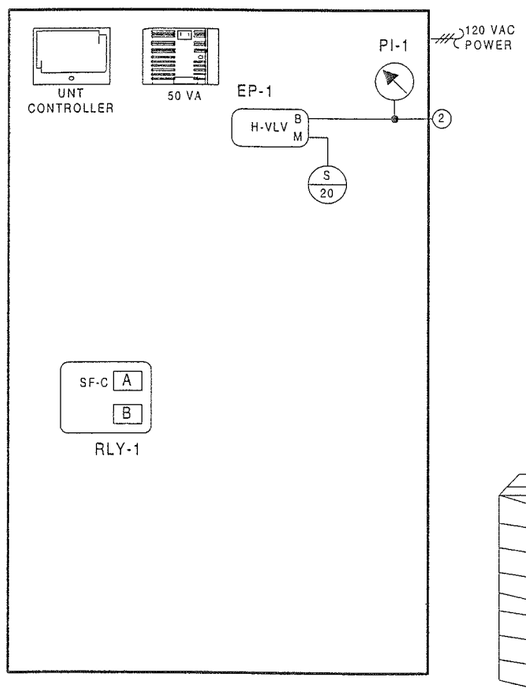


SMOKE EXHAUST FAN SEF-3 DIAGRAM



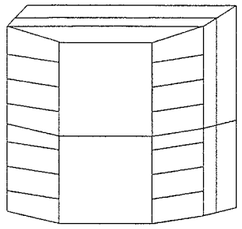
SMOKE EXHAUST FAN SEF-4 DIAGRAM





FAN	LOCATION	ELEC PANEL	STARTER	LOCATION
HVU-13	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-3	SERVICE LEVEL		LOCAL	SERVICE LEVEL
SEF-4	SERVICE LEVEL		LOCAL	SERVICE LEVEL

NOTE: FOR SMOKE EXHAUST FANS SEF-3 AND SEF-4 METASYS POINT CONNECTIONS SEE AHU-13 CONTROL DIAGRAM BL-6559-18 POINT LIST NCM-5 PS-4



ENCLOSURE EN-HVU-13
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-5/N2 ADD = 23

DESCRIPTION OF OPERATION

STARTING OF THE HVU SUPPLY FAN WILL INITIATE A START OF THE LEAD SMOKE EXHAUST FAN SEF-3 OR SEF-4. IF THE LEAD FAN FAILS OR FAILS TO START, THE LAG EXHAUST FAN SEF-3 OR SEF-4 WILL START AND RUN CONTINOUSLY.

THE METASYS SYSTEM WILL DETERMINE THE "OCCUPIED AND UNOCCUPIED" MODES OF OPERATION. OCCUPIED MODES GENERALLY OCCUR DURING STADIUM EVENTS, BUT MANUAL OVERRIDE THROUGH THE METASYS SYSTEM ON SELECTED UNITS WILL FREQUENTLY BE REQUIRED. WHEN THE UNIT AND SMOKE EXHAUST FAN ARE DE-ENERGIZED, OUTSIDE AIR DAMPER D-13-1, WILL CLOSE. HEATING COIL VALVE V-H-13 WILL BE CLOSED TO THE COIL.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER D-13-1 WILL OPEN. ROOM SENSOR TR-13 THROUGH THE METASYS SYSTEM CONTROL UNIT , WILL ON A RISE IN TEMPERATURE ABOVE ITS SETTING OF SEVENTY-FIVE (75F) MODULATE V-H-13 CLOSED TO THE HEATING COIL. ON A FALL IN TEMPERATURE, THIS CYCLE IS REVERSED.

UNOCCUPIED HEATING MODE - ROOM SENSOR TR-13. WILL ON A FALL IN TEMPERATURE TO ITS SETTING OF FIFTY (50F). ACTIVATE THE SYSTEM TO RUN IN THE HEATING MODE AS HEREINBEFORE DESCRIBED.ON A RISE IN TEMPERATURE TO FIFTY-FIVE (55F), THE SYSTEM WILL BE DE-ENERGIZED. IN THE UNOCCUPIED MODE ALL AIR HANDLING UNIT DAMPERS AND CONTROLS WILL RETURN TO THEIR NORMAL POSITION READY FOR RESTARTING.

OCCUPIED VENTILATING MODE - SUPPLY AND SMOKE EXHAUST FANS START AND RUN CONTINUOUSLY. OUTSIDE AIR DAMPER D-13-1 WILL OPEN. HEATING COIL VALVE V-H-13 WILL BE CLOSED TO THE COIL.

UNOCCUPIED VENTILATING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF.

SMOKE CONTROL - SMOKE DETECTORS FOR HVU-13 WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND CLOSE OUTSIDE DAMPER D-13-1. CROSS ZONED CEILING SMOKE DETECTORS IN THE SERVICE CORRIDOR OR A SPRINKLER WATER FLOW ALARM ON THE SERVICE LEVEL WILL ENERGIZE THE TWO (2) SMOKE EXHAUST FANS THROUGH THE FIRE ALARM SYSTEM. HVU-11,HVU-12 AND HVU-13 SERVICE THE AREA WILL BE DE-ENERGIZED AND ALL THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSITION WHEN THE SMOKE EXHAUST IS ENERGIZED BY THE FIRE ALARM SYSTEM. SERVICE LEVEL SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM SYSTEM. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM. TWO (2) SERVICE LEVEL EXIT CORRIDOR SMOKE EXHAUST SYSTEMS EXIST WITH A TOTAL OF FOUR (4) EXHAUST FANS. TWO (2) SMOKE EXHAUST FANS ARE RELATED TO THREE (3) HEATING AND VENTILATING UNITS. IF EITHER EXIT CORRIDOR SMOKE EXHAUST SYSTEM IS ACTIVATED, THE OTHER SYSTEM WILL ALSO BE ENERGIZED. FIRE ALARM SYSTEM CONTROL IS INDEPENDENT OF THE METASYS SYSTEM.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:35 PM
FILE NAME HVU-13.vsd

DRAWING TITLE
HEAT-VENT UNIT HVU-13
FREIGHT ELEVATOR LOBBY

SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/09/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

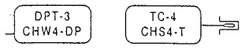
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-41

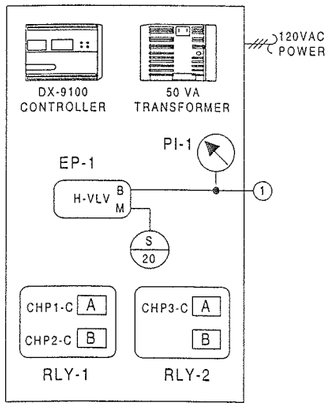
Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HVU-13					UNT						EN-HVU13	Service Level B		M.2-01B												Power to Controller
		HVU-13	*				UNT	1	23				EN-HVU13	Service Level B	0	M.2-01B												N2 Trunk
	AI-1	HVU-13					UNT	1	23	AI-1			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-1											
	AI-2	HVU-13					UNT	1	23	AI-2			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-2											
	AI-3	HVU-13					UNT	1	23	AI-3			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-3											
	AI-4	HVU-13	ZN-T	Zone Temperature	Deg F		UNT	1	23	AI-4		PHONE JACK	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	HVU-13					UNT	1	23	AI-5			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-5											
	AI-6	HVU-13					UNT	1	23	AI-6			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AI-6											
	BI-1	HVU-13	SF-S	Supply Fan Status	Off	On	UNT	1	23	BI-1		BI#,24VAC	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	HVU-13	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	23	BI-2		BI#,24VAC	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BI-2						2/22	Device dependent	Contact (NO)		U70	
	BI-3	HVU-13	LT-S	Low Temperature Stat	Normal	Alarm	UNT	1	23	BI-3		BI#,24VAC	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BI-3						2/22	NO,M1	A70 (NC)		U71	
	BI-4	HVU-13					UNT	1	23	BI-4			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BI-4											
	BO-1	HVU-13	SF-C	Supply Fan Control	Off	On	UNT	1	23	BO-1	RLY	BO#,24V,COM	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-1	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-2	HVU-13					UNT	1	23	BO-2			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-2											
	BO-3	HVU-13					UNT	1	23	BO-3			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-3											
	BO-4	HVU-13					UNT	1	23	BO-4			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-4											
	BO-5	HVU-13					UNT	1	23	BO-5			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-5											
	BO-6	HVU-13					UNT	1	23	BO-6			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-BO-6											
	AO-1	HVU-13	H-VLV	Heating Coil Valve	% Open		UNT	1	23	AO-1		AO#,AOCM,24VA	EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	HVU-13					UNT	1	23	AO-2			EN-HVU13	Service Level B	0	M.2-01B	HVU13-23-AO-2											

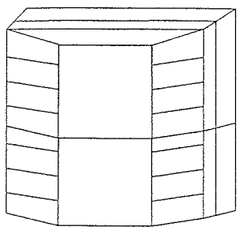
FOR WATER LINE CONNECTIONS
SEE AHU-3 DRAWING BL-6559-07
FOR POINT CONNECTIONS
SEE POINT SCHEDULE
NCM-3/PS-1

FOR WATER LINE CONNECTIONS
SEE FCU DRAWING BL-6559-09
FOR POINT CONNECTIONS
SEE POINT SCHEDULE
NCM-3/PS-4

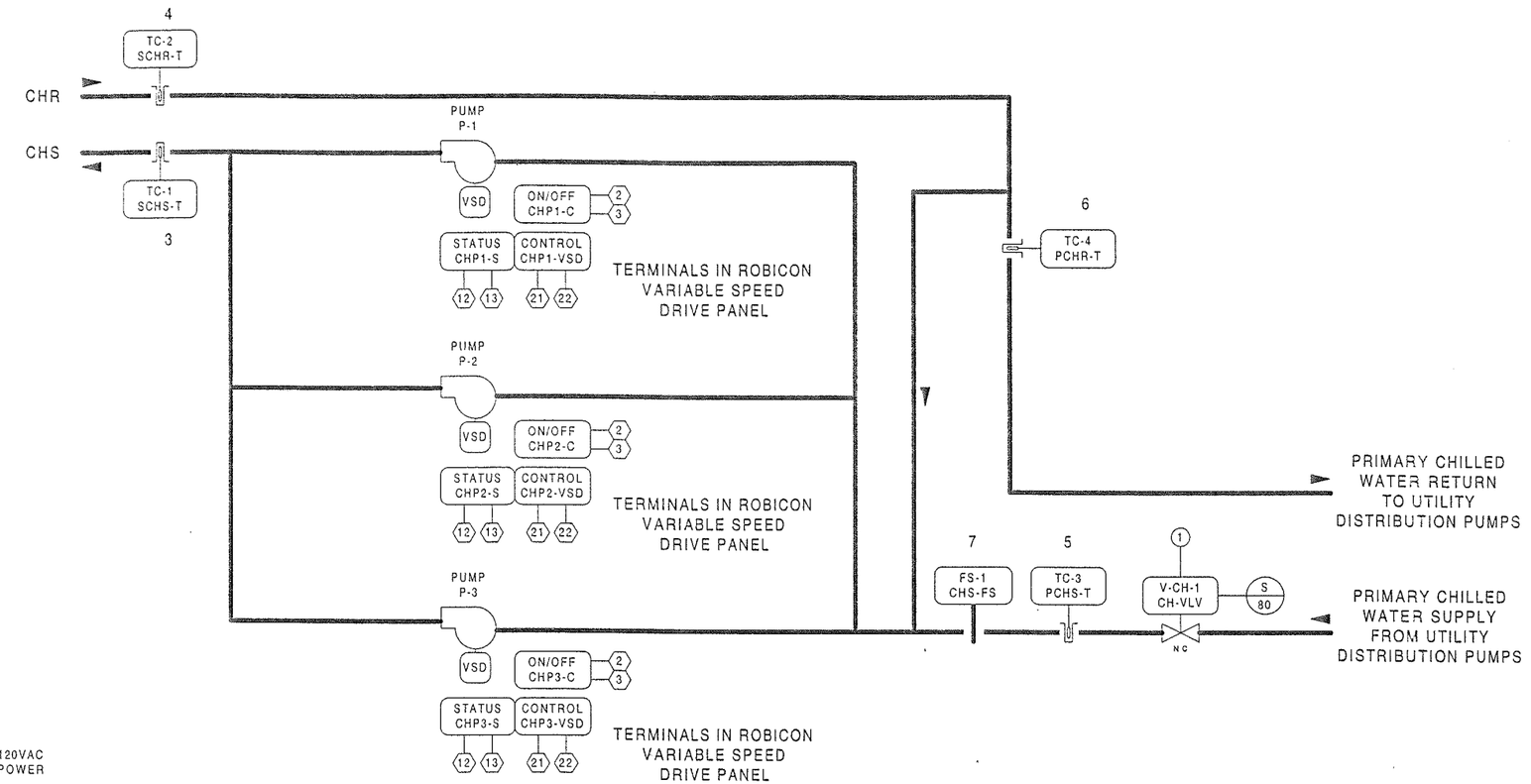


FOR WATER LINE CONNECTIONS
SEE AHU-4 DRAWING BL-6559-10
FOR POINT CONNECTIONS
SEE POINT SCHEDULE
NCM-4/PS-1





ENCLOSURE EN-COOL
DX-9100-8001
LOCATED IN MECHANICAL
ROOM
NCM-5/N2 ADD = 24



BILL OF MATERIALS

Estimate: cooling 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
FS-1	1	F61KB-11C	SW.FLOW,SPDT,1-6" PIPE
TC-1,2,3,4	4	TE-631AP-1	SENS,T-Ni,0.1%,P/WZ1000-5
	4	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
V-CH-1	1	--	SEE VALVE SCHEDULE
Panel Devices:			
DC-1	1	DX-9100-8454	DIGITAL CONTR., EXTENDED
	1	DX-9100-8990	MTG BASE (DX9100-8454)
EN-COOL	1	EN-EWC25-0	UNIV PKG MOD,DUAL,W/50VA
EP-1	1	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

PRIMARY CHILLED WATER PUMPS UTILITY FLOW METER AND BY-PASS VALVE PROVIDED BY CHILLED WATER UTILITY COMPANY

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL CONTROL THE CHILLED WATER SYSTEM. WHEN THE SYSTEM IS DE-ENERGIZED, THE PRIMARY CHILLED WATER VALVE V-CH-1 WILL CLOSE AND BUILDING SECONDARY CHILLED WATER DISTRIBUTION PUMPS P-1,P-2, AND P-3 WILL BE OFF. CONTROL OF UTILITY DISTRIBUTION PUMPS WILL BE PROVIDED BY THE UTILITY COMPANY. WHEN THE CHILLED WATER SYSTEM IS ENERGIZED BY THE BUILDING HEATING-COOLING CONTROL, CHILLED WATER VALVE V-CH-1 WILL MODULATE OPEN TO ITS MAXIMUM POSITION. THE SECONDARY CHILLED WATER DISTRIBUTION PUMPS MAY BE STARTED MANUALLY OR THROUGH THE METASYS SYSTEM AFTER PRIMARY CHILLED WATER FLOW HAS BEEN CONFIRMED BY UTILITY FLOW METER AND SYSTEM FLOW SWITCH FS-1. THE VARIABLE FREQUENCY DRIVE (VFD) SYSTEM FOR THE SECONDARY CHILLED WATER DISTRIBUTION PUMPS WILL BE CONFIGURED WITH THREE (3) INDEPENDENT VFD CABINETS, ONE FOR EACH PUMP. VFD CABINETS WILL BE CAPABLE OF MANUAL OPERATION THROUGH OPERATOR INTERVENTION IF REQUIRED. AFTER PRIMARY CHILLED WATER FLOW HAS BEEN CONFIRMED, THE LEAD PUMP AS SELECTED BY THE METASYS SYSTEM LEAD/LAG PROGRAM AND ACTING THROUGH THE VFD WILL START AT REDUCED SPEED AND RUN CONTINUOUSLY. REDUCED SPEED STARTING WILL BE THE MINIMUM SETTING OF THE VARIABLE FREQUENCY PUMP DRIVE AND WILL BE FULLY ADJUSTABLE THROUGHOUT THE RANGE OF THE DRIVE. IF PUMP P-1 FAILS OR FAILS TO START AS SENSED BY THE VFD PANEL CONTACT, PUMP P-2 OR P-3 WILL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF ANY DISTRIBUTION PUMP AS SENSED BY THEIR RESPECTIVE VFD PANEL CONTACT WILL BE ALARMED ON THE METASYS SYSTEM. EACH DISTRIBUTION PUMP WILL BE STARTED AT REDUCED SPEED THROUGH INDIVIDUAL VARIABLE FREQUENCY PUMP DRIVES AND SEQUENCED WITH THE PROGRAMMED LEAD/LAG OPERATION. THREE (3) DIFFERENTIAL PRESSURE TRANSMITTERS DPT-1,DPT-2 AND DPT-3 WITH ADJUSTABLE SETPOINT, THROUGH THE METASYS SYSTEM WILL MODULATE THE VARIABLE FREQUENCY PUMP DRIVE TO MAINTAIN THEIR SETPOINT. THE TRANSMITTER CALLING FOR AN INCREASE IN DIFFERENTIAL PRESSURE ABOVE ITS MINIMUM SETPOINT WILL TAKE CONTROL OF THE PUMP DRIVE. ON A FALL IN THE REQUIRED DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER THE PUMP DRIVE WILL GRADUALLY INCREASE THE PUMP SPEED FROM MINIMUM TO MAXIMUM AS REQUIRED TO MAINTAIN THE SETPOINT. ON A RISE IN DIFFERENTIAL PRESSURE THE REVERSE WILL OCCUR. THREE (3) DIFFERENTIAL PRESSURE TRANSMITTERS DPT-1,DPT-2 AND DPT-3 AND THREE (3) TEMPERATURE SENSORS TC-5,TC-6 AND TC-7 WILL BE LOCATED THROUGHOUT THE STADIUM COMPLEX AS FOLLOWS:

DPT-1 AND TC-5 WILL BE LOCATED ADJACENT TO AHU-3 ON THE PRESS LEVEL QUAD C
DPT-2 AND TC-6 WILL BE LOCATED AT THE TOP OF HYDRAULICALLY REMOTE CHS AND CHR RISER SERVING SUITES UPPER SUITES QUAD C
DPT-3 AND TC-7 WILL BE LOCATED ADJACENT TO AHU-4 ON THE PRESS LEVEL QUAD D

ON A CONTINUED FALL IN DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER WITH PUMP P-1 AT MAXIMUM SPEED, A SECOND OR LAG DISTRIBUTION PUMP P-2 OR P-3 AS APPLICABLE WILL BE STARTED. PRIOR TO STARTING THE SECOND PUMP, P-1 WILL BE REDUCED TO FIFTY (50) PERCENT FULL LOAD. THE SECOND PUMP WILL BE STARTED THROUGH ITS VARIABLE FREQUENCY DRIVE AT REDUCED SPEED. WHEN THE SECOND PUMP IS PROVEN OPERATIONAL BY ITS RESPECTIVE VFD PANEL CONTACT, BOTH PUMPS WILL BE GRADUALLY MODULATED AT THE SAME SPEED TO MAINTAIN THE SETPOINTS OF THE DPT-1,DPT-2 OR DPT-3 AS DETERMINED THROUGH THE METASYS SYSTEM. ON A CONTINUED FALL IN DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER WITH PUMPS P-1 AND P-2 AT MAXIMUM SPEED, THE THIRD DISTRIBUTION PUMP P-3 WILL BE STARTED. PRIOR TO STARTING THE THIRD PUMP, P-1 AND P-2 WILL BE REDUCED TO SIXTY-SEVEN (67) PERCENT FULL LOAD. THE THIRD PUMP WILL BE STARTED THROUGH ITS VARIABLE FREQUENCY PUMP DRIVE AT REDUCED SPEED. WHEN THE THIRD PUMP IS PROVEN OPERATIONAL BY ITS RESPECTIVE VFD PANEL CONTACT, ALL THREE (3) PUMPS WILL BE GRADUALLY MODULATED AT THE SAME SPEED TO MAINTAIN THE SETPOIINTS OF THE DPT-1,DPT-2 OR DPT-3, AS DETERMINED THROUGH THE METASYS SYSTEM. ON A RISE IN DIFFERENTIAL PRESSURE ABOVE THE SETPOINT OF ALL TRANSMITTERS THE REVERSE SEQUENCE WILL OCCUR. WHEN ALL THREE (3) DISTRIBUTION PUMPS HAVE BEEN REDUCED IN SPEED TO SIXTY-SEVEN (67) PERCENT OF THE MAXIMUM SPEED (ADJUSTABLE) PUMP P-1 WILL BE STOPPED. PUMPS P-2 AND P-3 WILL AGAIN BE GRADUALLY MODULATED AT THE SAME SPEED TO MAINTAIN THE SETPOINTS OF DPT-1,DPT-2 OR DPT-3, ON A CONTINUED RISE IN DIFFERENTIAL PRESSURE WITH PUMPS P-2 AND P-3 REDUCED IN SPEED TO FIFTY (50) PERCENT OF THE MAXIMUM SPEED (ADJUSTABLE) PUMP P-2 WILL BE STOPPED. PUMP P-3 WILL BE GRADUALLY MODULATED TO MAINTAIN THE SETPOINTS OF DPT-1,DPT-2 OR DPT-3. DISTRIBUTION PUMP CYCLES WILL BE LIMITED BY AN ADJUSTABLE TIME PERIOD OF ONE (1) HOUR. PUMP STARTS AND STOPS WILL BE LIMITED BY THE TIME PERIOD AND INDICATED ON THE METASYS SYSTEM. DISTRIBUTION PUMPS OPERATING IN PARALLEL WILL RUN AT THE SAME SPEED THROUGH THEIR RESPECTIVE VFD. SPEED ADJUSTMENTS WILL OCCUR QUICKLY WHEN A PUMP IS BROUGHT ON LINE. TEMPERATURE SENSOR TC-1 LOCATED IN THE CHILLED WATER SUPPLY LINE DOWNSTREAM OF PUMPS P-1,P-2 AND P-3 WILL MODULATE VALVE V-CH-1 TO MAINTAIN ITS SETTING OF THIRTY-SIX (36F). TEMPERATURE SENSORS TC-2, TC-3 AND TC-4 WILL MONITOR CHILLED WATER TEMPERATURE AT LOCATIONS INDICATED. UTILITY FLOW METER WILL BE USED TO MONITOR AND TREND CHILLED WATER CONSUMPTION AT THE FACILITY. DURING A STADIUM EVENT, THE METASYS SYSTEM WILL BE PROGRAMMED TO TREND THE TEMPERATURE READINGS FROM TC-1,TC-2,TC-3 AND TC-4 ; RECORD PRIMARY CHILLED WATER FLOW: AND INDICATE SECONDARY CHILLED WATER DISTRIBUTION PUMP OPERATION IN TEN MINUTE INCREMENTS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:37 PM
FILENAME	COOLING.vsd

DRAWING TITLE
CHILLED WATER SYSTEM

MECHANICAL ROOM NORTH
SERVICE LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	EGN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/10/97	BY DATE

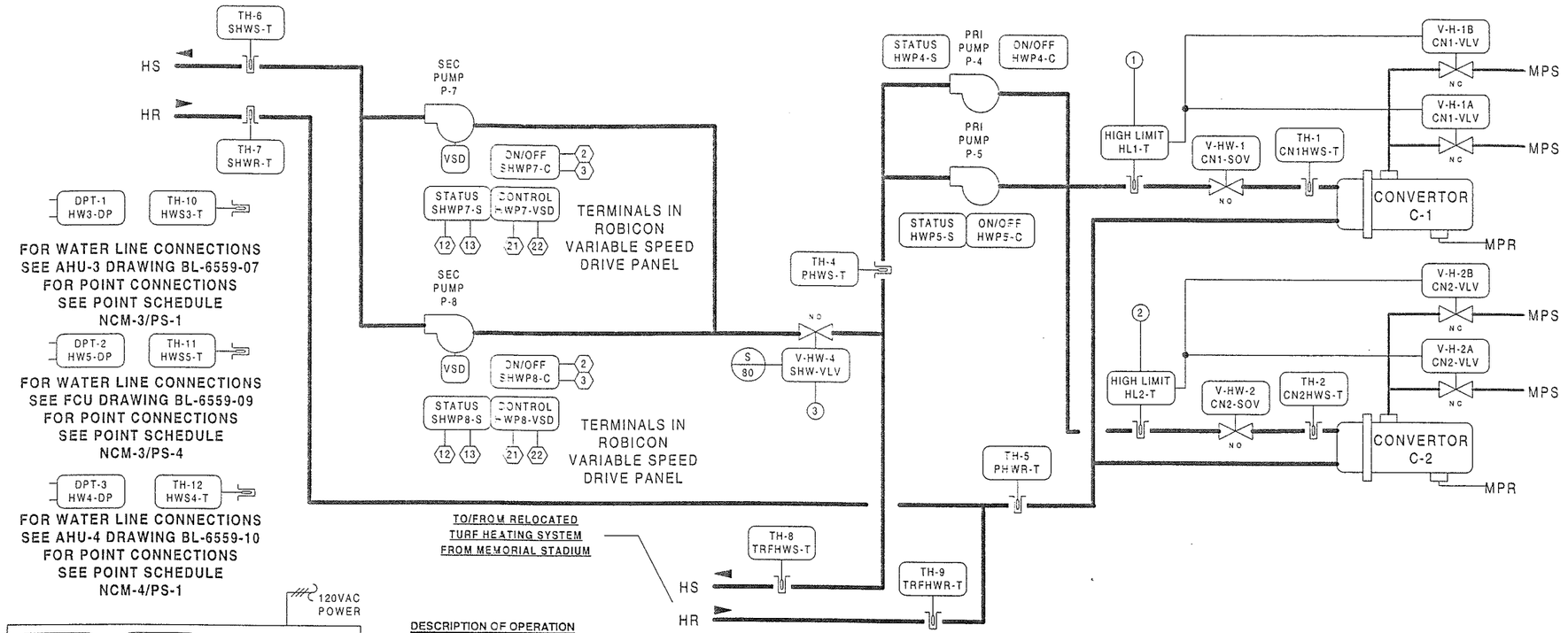
JOHNSON CONTROLS
Systems & Services Division

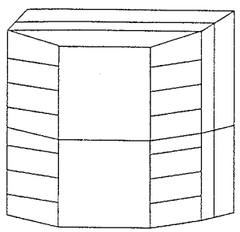
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-42

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		COOLING					DX9100						EN-COOL	Service Lev MER A		M,3-14												
		COOLING	*				DX9100	1	24				EN-COOL	Service Lev MER A		0M,3-14												Power to Controller
	DI-1	COOLING	CHP1-S	Chill Wtr Pump 1 Status	Off	On	DX9100	1	24	DI-1		DI#,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-1											N2 Trunk
	DI-2	COOLING	CHP2-S	Chill Wtr Pump 2 Status	Off	On	DX9100	1	24	DI-2		DI#,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-2						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-3	COOLING	CHP3-S	Chill Wtr Pump 3 Status	Off	On	DX9100	1	24	DI-3		DI#,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-3						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-4	COOLING	CHS-FS	Chill Wtr Sup Flow Sw	Open	Closed	DX9100	1	24	DI-4		DI#,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-4						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-5	COOLING					DX9100	1	24	DI-5			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-5						2/22	Device dependent	Contact (NO)		D70	
	DI-6	COOLING					DX9100	1	24	DI-6			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-6											
	DI-7	COOLING					DX9100	1	24	DI-7			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-7											
	DI-8	COOLING					DX9100	1	24	DI-8			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DI-8											
	AO-1	COOLING	CH-VLV	Main Chill Wtr Valve		%	DX9100	1	24	AO-1		AO#,AOCOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-1	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-2	COOLING	CHP1-VSD	Ch Wat Pmp 1 Var Spd Dr		%	DX9100	1	24	AO-2		AO#,AOCOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-2						2/18	Device dependent	0-20mA OUT		D21	
	AO-9	COOLING	CHP2-VSD	Ch Wat Pmp 2 Var Spd Dr		%	DX9100	1	24	AO-9		AO#,AOCOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-9						2/18	Device dependent	0-20mA OUT		D21	
	AO-10	COOLING	CHP3-VSD	Ch Wat Pmp 3 Var Spd Dr		%	DX9100	1	24	AO-10		AO#,AOCOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-10						2/18	Device dependent	0-20mA OUT		D21	
	AO-11	COOLING					DX9100	1	24	AO-11			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-11											
	AO-12	COOLING					DX9100	1	24	AO-12			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-12											
	AO-13	COOLING					DX9100	1	24	AO-13			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-13											
	AO-14	COOLING					DX9100	1	24	AO-14			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AO-14											
	DO-3	COOLING	CHP1-C	Chill Water Pump 1 Cntrl	Off	On	DX9100	1	24	DO-3	RLY	DO#,24V,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-3	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-4	COOLING	CHP2-C	Chill Water Pump 2 Cntrl	Off	On	DX9100	1	24	DO-4	RLY	DO#,24V,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-4	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-5	COOLING	CHP3-C	Chill Water Pump 3 Cntrl	Off	On	DX9100	1	24	DO-5	RLY	DO#,24V,COM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-5	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-6	COOLING					DX9100	1	24	DO-6			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-6											
	DO-7	COOLING					DX9100	1	24	DO-7			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-7											
	DO-8	COOLING					DX9100	1	24	DO-8			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-DO-8											
	AI-1	COOLING	PCHS-T	Pri Chill Wtr Supply Temp		Deg F	DX9100	1	24	AI-1		AI#,AICOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-1						2/18	2-Wire	TE-631AP-1		D3	
	AI-2	COOLING	PCHR-T	Pri Chill Wtr Return Temp		Deg F	DX9100	1	24	AI-2		AI#,AICOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-2						2/18	2-Wire	TE-631AP-1		D3	
	AI-3	COOLING	SCHS-T	Sec Chill Wtr Supply Temp		Deg F	DX9100	1	24	AI-3		AI#,AICOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-3						2/18	2-Wire	TE-631AP-1		D3	
	AI-4	COOLING	SCHR-T	Sec Chill Wtr Supply Temp		Deg F	DX9100	1	24	AI-4		AI#,AICOM	EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-4						2/18	2-Wire	TE-631AP-1		D3	
	AI-5	COOLING					DX9100	1	24	AI-5			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-5											
	AI-6	COOLING					DX9100	1	24	AI-6			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-6											
	AI-7	COOLING					DX9100	1	24	AI-7			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-7											
	AI-8	COOLING					DX9100	1	24	AI-8			EN-COOL	Service Lev MER A		0M,3-14	COOL-24-AI-8											





ENCLOSURE EN-HEAT
DX-9100-8001
LOCATED IN MECHANICAL ROOM
NCM-5/N2 ADD = 25

BILL OF MATERIALS

Estimate: heating 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
HL1-T,HL2-T	2	T-8020-1	CONTRLR,IMMERSION,PROP
	2	T-8020-101	WELL,BRASS,F/T-8020
TH-1,2,4,5,6,7,8,9	8	TE-631AP-1	SENS,T-Ni,0.1%,F/WZ1000-5
TH-1,2,4,5,6,7,8,9,	8	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
V-H-1,V-H-2	4	--	SEE VALVE SCHEDULE
V-HW-1,2,4	3	--	SEE VALVE SCHEDULE
Panel Devices:			
DC-1	1	DX-9100-8454	DIGITAL CONTR., EXTENDED
	1	DX-9100-8990	MTG BASE (DX9100-8454)
EN-HEAT	1	EN-EWC25-0	UNIV PKG MOD,DUAL,W/50VA
EP-1,2,3	3	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1,2,3	3	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2,3	3	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL CONTROL THE HOT WATER SYSTEM. WHEN THE SYSTEM IS DE-ENERGIZED, THE STEAM/HEATING WATER CONVERTORS AND BUILDING HEATING PUMPS WILL BE OFF. THE HEATING SYSTEM WILL GENERALLY RUN ALL YEAR WITH REDUCED CAPACITY IN THE COOLING SEASON. WHEN THE HEATING WATER SYSTEM IS ENERGIZED, THE PRIMARY HEATING WATER PUMPS AND CONVERTORS WILL BROUGHT ON-LINE IN STAGES TO MAINTAIN PROGRAMMED HEATING WATER TERMPERATURE DIFFERENCE. THE LEAD PUMP P-4 AND CONVERTOR C-1 AS SELECTED BY THE METASYS SYSTEM LEAD/LAG PROGRAM WILL BE ENERGIZED TO START AND RUN CONTINUOUSLY AFTER ISOLATION VALVE V-HW-1 OPENS. IF THE LEAD COMPONENTS FAIL OR FAIL TO START AS SENSED BY THEIR RESPECTIVE AUX CONTACT , THE LAG COMPONENTS WILL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF ANY COMPONENT AS SENSED BY THEIR RESPECTIVE AUX CONTACT WILL BE ALARMED ON THE METASYS SYSTEM. STEAM CONTROL VALVES V-H1A AND V-H-1B SERVING CONVERTOR C-1 WILL BE MODULATED IN SEQUENCE BY TEMPERATURE SENSOR TH-1 TO MAINTAIN HEATING WATER SUPPLY TEMPERATURE OF 200F. CONTROL FOR CONVERTOR C-2 WILL BE SIMILAR TO C-1 AND INDEPENDENT OF EACH OTHER. EACH CONVERTOR WILL BE PROVIDED WITH A HIGH LIMIT THERMOSTAT IN THE SUPPLY LINE WHICH WILL PREVENT SUPPLY WATER TEMPERATURE FROM EXCEEDING 210F. PRIMARY HEATING WATER SUPPLY AND RETURN WATER TEMPERATURE SENSORS TH-4 AND TH-5 WILL BE USED TO STAGE CONVERTOR OPERATION. WITH THE LEAD HEATING PUMP AND CONVERTOR OPERATIONAL, IF THE HEATING WATER TEMPERATURE DIFFERENCE EXCEEDS TWENTY-FOUR (24F) THE LAG PUMP AND CONVERTOR WILL BE ENERGIZED. THE SYSTEM DESIGN REQUIRES A MAXIMUM OF TWO (2) CONVERTORS TO CARRY THE BUILDING LOAD. WHEN TWO (2) HEATING PUMPS AND CONVERTORS ARE OPERATIONAL AND THE PRIMARY HEATING WATER TEMPERATURE DIFFERENCE IS REDUCED TO TWELVE (12F) , THE LEAD PUMP AND CONVERTOR WILL BE DE-ENERGIZED. THE VARIABLE FREQUENCY DRIVE (VFD) SYSTEM FOR THE SECONDARY HEATING WATER DISTRIBUTION PUMPS WILL BE CONFIGURED WITH TWO (2) INDEPENDENT VFD CABINETS, ONE FOR EACH PUMP. VFD CABINETS WILL BE CAPABLE OF MANUAL OPERATION THROUGH OPERATOR INTERVENTION IF REQUIRED. AFTER PRIMARY HEATING WATER FLOW HAS BEEN CONFIRMED, THE LEAD PUMP AS SELECTED BY THE METASYS SYSTEM LEAD/LAG PROGRAM AND ACTING THROUGH THE VFD WILL START AT REDUCED SPEED AND RUN CONTINUOUSLY. REDUCED SPEED STARTING WILL BE THE MINIMUM SETTING OF THE VARIABLE FREQUENCY PUMP DRIVE AND WILL BE FULLY ADJUSTABLE THROUGHOUT THE RANGE OF THE DRIVE. IF PUMP P-7 FAILS OR FAILS TO START AS SENSED BY THE VFD PANEL CONTACT, PUMP P-8 WILL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF ANY DISTRIBUTION PUMP AS SENSED BY THEIR RESPECTIVE VFD PANEL CONTACT WILL BE ALARMED ON THE METASYS SYSTEM. EACH DISTRIBUTION PUMP WILL BE STARTED AT REDUCED SPEED THROUGH INDIVIDUAL VARIABLE FREQUENCY PUMP DRIVES AND SEQUENCED WITH THE PROGRAMMED LEAD/LAG OPERATION. THREE (3) DIFFERENTIAL PRESSURE TRANSMITTERS DPT-1,DPT-2 AND DPT-3 WITH ADJUSTABLE SETPOINT, THROUGH THE METASYS SYSTEM WILL MODULATE THE VARIABLE FREQUENCY PUMP DRIVE TO MAINTAIN THEIR SETPOINT. THE TRANSMITTER CALLING FOR AN INCREASE IN DIFFERENTIAL PRESSURE ABOVE ITS MINIMUM SETPOINT WILL TAKE CONTROL OF THE PUMP DRIVE. ON A FALL IN THE REQUIRED DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER THE PUMP DRIVE WILL GRADUALLY INCREASE THE PUMP SPEED FROM MINIMUM TO MAXIMUM AS REQUIRED TO MAINTAIN THE SETPOINT. ON A RISE IN DIFFERENTIAL PRESSURE THE REVERSE WILL OCCUR. THREE (3) DIFFERENTIAL PRESSURE TRANSMITTERS DPT-1,DPT-2 AND DPT-3 AND THREE (3) TEMPERATURE SENSORS TH-10,TH-11 AND TH-12 WILL BE LOCATED THROUGHOUT THE STADIUM COMPLEX AS FOLLOWS:

DPT-1 AND TH-10 WILL BE LOCATED ADJACENT TO AHU-3 ON THE PRESS LEVEL QUAD C
DPT-2 AND TH-11 WILL BE LOCATED AT THE TOP OF HYDRAULICALLY REMOTE CHS AND CHR RISER SERVING SUITES UPPER SUITES QUAD C
DPT-3 AND TH-12WILL BE LOCATED ADJACENT TO AHU-4 ON THE PRESS LEVEL QUAD D

ON A CONTINUED FALL IN DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER WITH PUMP P-7 AT MAXIMUM SPEED, THE LAG DISTRIBUTION PUMP P-8 WILL BE STARTED. PRIOR TO STARTING THE SECOND PUMP, P-7 WILL BE REDUCED TO FIFTY (50) PERCENT FULL LOAD. THE SECOND PUMP WILL BE STARTED THROUGH ITS VARIABLE FREQUENCY DRIVE AT REDUCED SPEED. WHEN THE SECOND PUMP IS PROVEN OPERATIONAL BY ITS RESPECTIVE VFD PANEL CONTACT, BOTH PUMPS WILL BE GRADUALLY MODULATED AT THE SAME SPEED TO MAINTAIN THE SETPOINTS OF THE DPT-1,DPT-2 OR DPT-3 AS DETERMINED THROUGH THE METASYS SYSTEM. ON A RISE IN DIFFERENTIAL PRESSURE ABOVE THE SETPOINT OF ALL TRANSMITTERS THE REVERSE SEQUENCE WILL OCCUR. WHEN BOTH DISTRIBUTION PUMPS HAVE BEEN REDUCED IN SPEED TO FIFTY (50) PERCENT OF THE MAXIMUM SPEED (ADJUSTABLE) PUMP P-7 WILL BE STOPPED. PUMP P-8 WILL AGAIN BE GRADUALLY MODULATED AT THE SAME SPEED TO MAINTAIN THE SETPOINTS OF DPT-1,DPT-2 OR DPT-3. DISTRIBUTION PUMP, HEATING PUMP AND CONVERTOR CYCLES WILL BE LIMITED BY AN ADJUSTABLE TIME PERIOD OF ONE (1) HOUR. PUMP STARTS AND STOPS WILL BE LIMITED BY THE TIME PERIOD AND INDICATED ON THE METASYS SYSTEM. DISTRIBUTION PUMPS OPERATING IN PARALLEL WILL RUN AT THE SAME SPEED THROUGH THEIR RESPECTIVE VFD. SPEED ADJUSTMENTS WILL OCCUR QUICKLY WHEN A PUMP IS BROUGHT ON LINE. TEMPERATURE SENSOR TH-6 LOCATED IN THE SECONDARY HEATING WATER SUPPLY LINE DOWNSTREAM OF PUMPS P-7 AND P-8 WILL MODULATE VALVE V-HW-4 TO MAINTAIN ITS SETTING OF 200F AT ZERO (0F) OUTDOOR AIR TEMPERATURE. TEMPERATURE RESET WILL BE A LINEAR FUNCTION BETWEEN ZERO (0F) AND SIXTY-FIVE (65F) OUTDOOR AIR TEMPERATURE. AS OUTDOOR AIR TEMPERATURE RISES ABOVE 65F SUPPLY WATER WILL REMAIN CONSTANT AT 120F. DURING A STADIUM EVENT, THE METASYS SYSTEM WILL BE PROGRAMMED TO TREND THE TEMPERATURE READINGS FROM ALL SENSORS TH-1 THRU TH-9 AND INDICATE PUMP AND CONVERTOR OPERATION, INCLUDING TURF HEATING IN TEN (10) MINUTE INCREMENTS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:39 PM
FILENAME	HEATING.vsd

DRAWING TITLE
HOT WATER SYSTEM

MECHANICAL ROOM SOUTH SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/10/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

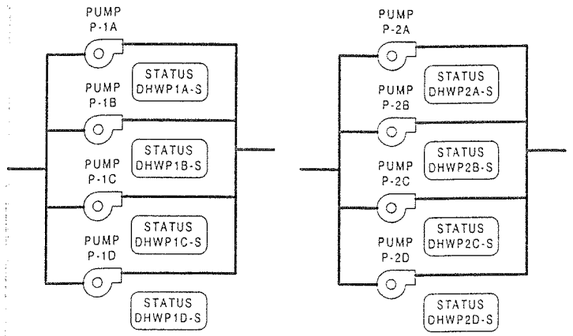
Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

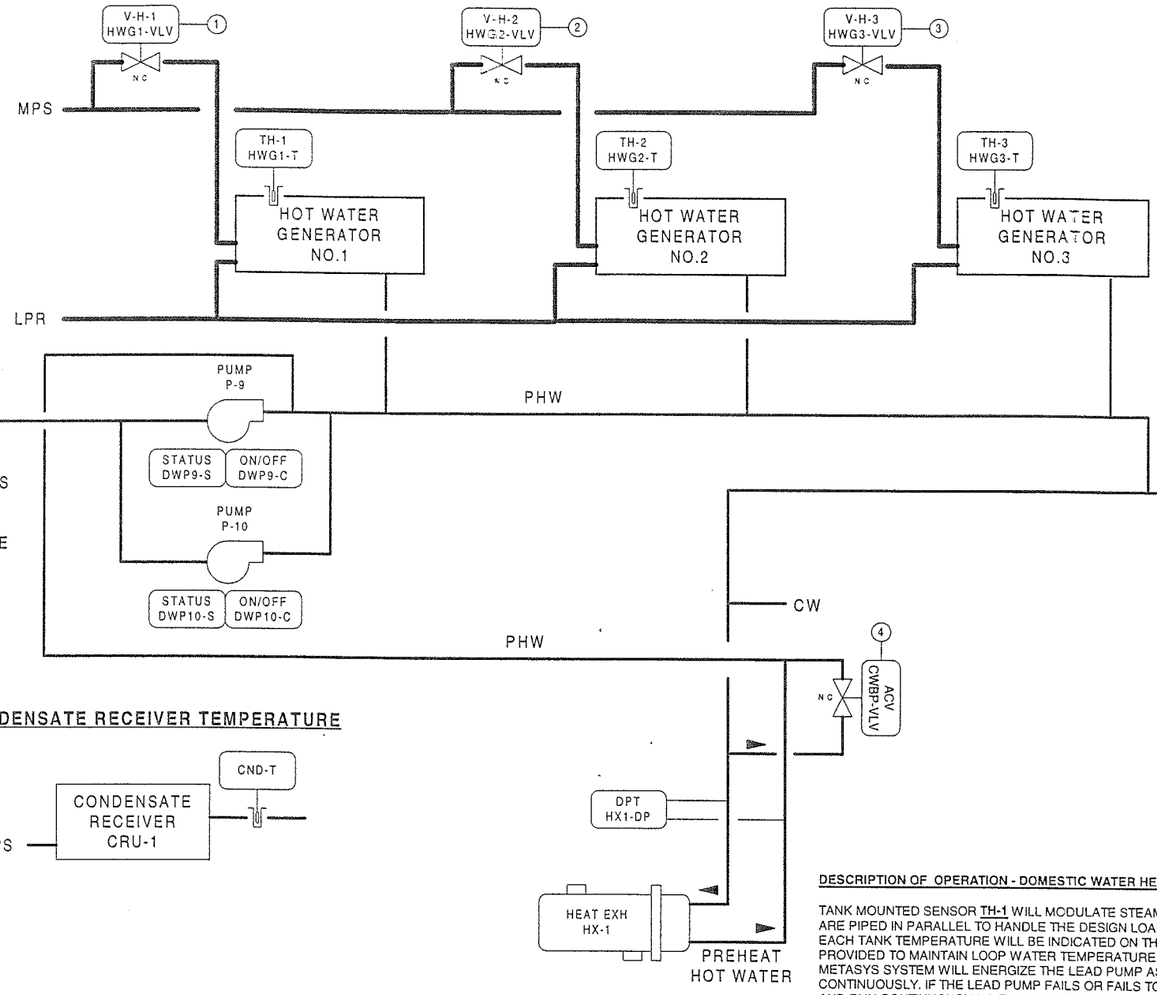
DRAWING NUMBER
BL-6559-43

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		HEATING					DX9100						EN-HEAT	Service Lev MER B		M..3-16												
		HEATING	*				DX9100	1	25				EN-HEAT	Service Lev MER B		0M..3-16												Power to Controller
	DI-1	HEATING	PHWP4-S	Pri HW Pump 4 Status	Off	On	DX9100	1	25	DI-1		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-1											N2 Trunk
	DI-2	HEATING	PHWP5-S	Pri HW Pump 5 Status	Off	On	DX9100	1	25	DI-2		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-2						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-3	HEATING	SHWP7-S	Sec HW Pump 7 Status	Off	On	DX9100	1	25	DI-3		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-3						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-4	HEATING	SHWP8-S	Sec HW Pump 8 Status	Off	On	DX9100	1	25	DI-4		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-4						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-5	HEATING	DWP9-S	Dom HW Pump 9 Status	Off	On	DX9100	1	25	DI-5		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-5						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-6	HEATING	DWP10-S	Dom HW Pump 10 Status	Off	On	DX9100	1	25	DI-6		DI#,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-6						2/22	Device dependent	Aux Contact (NO)		D70	
	DI-7	HEATING					DX9100	1	25	DI-7			EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-7											
	DI-8	HEATING					DX9100	1	25	DI-8			EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DI-8											
	AO-1	HEATING	CN1-VLV	Conv 1 Steam Valves		%	DX9100	1	25	AO-1		AO#,AOCOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-1	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-2	HEATING	CN2-VLV	Conv 2 Steam Valves		%	DX9100	1	25	AO-2		AO#,AOCOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-2	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-9	HEATING	HWP7-VSD	Sec HW Pump 1 Var Spd Dr		%	DX9100	1	25	AO-9		AO#,AOCOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-9						2/18	Device dependent	0-20mA OUT		D21	
	AO-10	HEATING	HWP8-VSD	Sec HW Pump 2 Var Spd Dr		%	DX9100	1	25	AO-10		AO#,AOCOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-10						2/18	Device dependent	0-20mA OUT		D21	
	AO-11	HEATING	SHW-VLV	Sec HW Control Valve		%	DX9100	1	25	AO-11		AO#,AOCOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-11	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-12	HEATING					DX9100	1	25	AO-12			EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-12											
	AO-13	HEATING					DX9100	1	25	AO-13			EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-13											
	AO-14	HEATING					DX9100	1	25	AO-14			EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AO-14											
	DO-3	HEATING	PHWP4-C	Pri HW Pump 4 Control	Off	On	DX9100	1	25	DO-3	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-3	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-4	HEATING	PHWP5-C	Pri HW Pump 5 Control	Off	On	DX9100	1	25	DO-4	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-4	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-5	HEATING	SHWP7-C	Sec HW Pump 7 Control	Off	On	DX9100	1	25	DO-5	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-5	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-6	HEATING	SHWP8-C	Sec HW Pump 8 Control	Off	On	DX9100	1	25	DO-6	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-6	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-7	HEATING	CN1-SOV	Conv 1 Shut Off Valve	Off	On	DX9100	1	25	DO-7	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-7	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-8	HEATING	CN2-SOV	Conv 2 Shut Off Valve	Off	On	DX9100	1	25	DO-8	RLY	DO#,24V,COM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-DO-8	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	AI-1	HEATING	CN1HWS-T	Conv 1 HW Supply Temp		Deg F	DX9100	1	25	AI-1		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-1						2/18	2-Wire	TE-631AP-1		D3	
	AI-2	HEATING	CN2HWS-T	Conv 2 HW Supply Temp		Deg F	DX9100	1	25	AI-2		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-2						2/18	2-Wire	TE-631AP-1		D3	
	AI-3	HEATING	PHWS-T	Pri HW Supply Temp		Deg F	DX9100	1	25	AI-3		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-3						2/18	2-Wire	TE-631AP-1		D3	
	AI-4	HEATING	PHWR-T	Pri HW Return Temp		Deg F	DX9100	1	25	AI-4		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-4						2/18	2-Wire	TE-631AP-1		D3	
	AI-5	HEATING	SHWS-T	Sec HW Supply Temp		Deg F	DX9100	1	25	AI-5		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-5						2/18	2-Wire	TE-631AP-1		D3	
	AI-6	HEATING	SHWR-T	Sec HW Return Temp		Deg F	DX9100	1	25	AI-6		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-6						2/18	2-Wire	TE-631AP-1		D3	
	AI-7	HEATING	TRFHWS-T	Turf HW Supply Temp		Deg F	DX9100	1	25	AI-7		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-7						2/18	2-Wire	TE-631AP-1		D3	
	AI-8	HEATING	TRFHWR-T	Turf HW Return Temp		Deg F	DX9100	1	25	AI-8		AI#,AICOM	EN-HEAT	Service Lev MER B		0M..3-16	HEAT-25-AI-8						2/18	2-Wire	TE-631AP-1		D3	

DOMESTIC WATER BOOSTER PUMPS

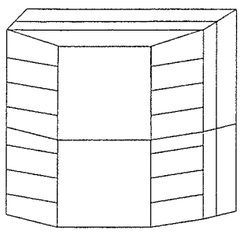


MASTER OUTSIDE AIR TEMPERATURE/HUMIDITY



NOTE: HOT WATER PUMP STATUS POINTS ARE IN ENCLOSURE EN-HEAT SEE POINT SCHEDULE NCM-5.PS-25

CONDENSATE RECEIVER TEMPERATURE



ENCLOSURE EN-DOM
DX-9100-8001
LOCATED IN MECHANICAL ROOM
NCM-5/N2 ADD = 26

BILL OF MATERIALS

Estimate: domestic 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
HX1-DP	1	C-252	DELTA TRANS ROB/HALP
OA-T,OA-H	1	RHT-2-I-O/A	OUTSIDE AIR TEMP/HUMD
TH-1,2,3,5	4	TE-631AP-1	SENS,T-Ni,0.1%,F/WZ1000-5
	4	WZ-1000-5	WELL,BRASS,1/2"NPT+COMPND
V-H-1,2,3, ACV	4	--	SEE VALVE SCHEDULE
Panel Devices:			
DC-1	1	DX-9100-8454	DIGITAL CONTR., EXTENDED
	1	DX-9100-8990	MTG BASE (DX9100-8454)
EN-DOM	1	EN-EWC25-0	UNIV PKG MOD,DUAL,W/50VA
EP-1,2,3,4	4	EP-8000-4	XDUCR,EP,4-20ma,HI VOL
PI-1,2,3,4	4	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1	1	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION - DOMESTIC WATER HEATERS

TANK MOUNTED SENSOR TH-1 WILL MODULATE STEAM VALVES V-H-1 TO MAINTAIN ITS SETTING OF 140F. THREE (3) STORAGE WATER HEATERS ARE PIPED IN PARALLEL TO HANDLE THE DESIGN LOAD. EACH HEATER WILL HAVE SELF CONTAINED CONTROL OF ITS OWN TANK TEMPERATURE. EACH TANK TEMPERATURE WILL BE INDICATED ON THE METASYS SYSTEM. TWO (2) DOMESTIC HOT WATER RECIRCULATION PUMPS ARE PROVIDED TO MAINTAIN LOOP WATER TEMPERATURE. ONE (1) PUMP IS REQUIRED TO FOR DESIGN LOAD AND WILL RUN CONTINUOUSLY. THE METASYS SYSTEM WILL ENERGIZE THE LEAD PUMP AS SELECTED BY THE LEAD/LAG PROGRAM AND THE PUMP WILL START AND RUN CONTINUOUSLY. IF THE LEAD PUMP FAILS OR FAILS TO START AS SENSED BY ITS AUX CONTACT, THE LAG PUMP WILL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF EITHER PUMP AS SENSED BY THEIR RESPECTIVE AUX CONTACT WILL BE ALARMED ON THE METASYS SYSTEM. ONE (1) DOMESTIC WATER SUPPLY TEMPERATURE SENSOR TH-5 WILL BE PROVIDED WHERE INDICATED ON THE DOMESTIC WATER RISER DIAGRAM. TEMPERATURE SENSOR WILL MONITOR LOOP TEMPERATURE AND TREND DATA DURING STADIUM EVENTS IN TEN (10) MINUTE INCREMENTS. DOMESTIC HOT WATER SUPPLY TEMPERATURE TO DISTRIBUTION WILL BE MECHANICALLY REGULATED TO 120F USING MANUALLY ADJUSTING TEMPERING VALVES LOCATED DOWNSTREAM OF WATER HEATERS. HEAT EXCHANGER HX-1 WILL BE USED TO PREHEAT DOMESTIC HOT WATER AND TO COOL DOWN STEAM CONDENSATE BEFORE DISCHARGING TO THE DRAINAGE SYSTEM. SELF-CONTAINED TEMPERATURE CONTROL VALVE V-H-5 WILL BE USED TO INJECT COLD WATER INTO STEAM CONDENSATE DOWNSTREAM OF HX-1 AS REQUIRED TO FURTHER REDUCE CONDENSATE TEMPERATURE TO 140F. HEAT EXCHANGER HX-1 IS A MECHANICAL DEVICE REQUIRING NO TEMPERATURE CONTROLS. BYPASS COLD WATER VALVE ACV WILL MODULATE OPEN AS THE DIFFERENTIAL PRESSURE AS SENSED BY HX1-DP INLET AND OUTLET PIPING RISES ABOVE ITS SETTING (AS HOT WATER DEMAND RISES ABOVE CAPACITY OF HX-1 AND PREHEATING IS MAXIMIZED).

DESCRIPTION OF OPERATION - DOMESTIC WATER BOOSTER PUMPS

TWO (2) PACKAGED DOMESTIC WATER BOOSTER PUMP SYSTEMS WITH FOUR (4) PUMPS EACH ARE PROVIDED FOR THE FACILITY. EACH SYSTEM WILL BE SELF-CONTAINED WITH FULLY PACKAGED CONTROLS. STATUS INDICATION WILL BE PROVIDED ON THE METASYS SYSTEM THROUGH THE BOOSTER PUMP CONTROL PANEL FOR EACH PUMP.

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:39 PM
DRAWING DOMESTIC.vsd

DRAWING TITLE
DOMESTIC HOT WATER SYSTEM

MECHANICAL ROOM SOUTH SERVICE LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	EDN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/11/97 | APPROVED: BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

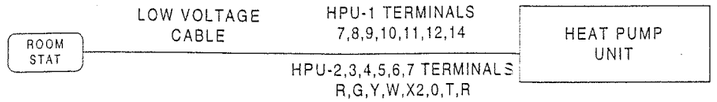
CONTRACT NUMBER 7052-0098

DRAWING NUMBER BL-6559-44

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		DOMESTIC					DX9100						EN-COM	Service Lev MER B		M.3-16												Power to Controller
		DOMESTIC	*				DX9100	1	26				EN-COM	Service Lev MER B		M.3-16												N2 Trunk
	DI-1	DOMESTIC	DHWP1A-S	Dom HW Pump 1A Status	Off	On	DX9100	1	26	DI-1		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-1						2/22	Device dependent	Contact (NO)		D70	
	DI-2	DOMESTIC	DHWP1B-S	Dom HW Pump 1B Status	Off	On	DX9100	1	26	DI-2		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-2						2/22	Device dependent	Contact (NO)		D70	
	DI-3	DOMESTIC	DHWP1C-S	Dom HW Pump 1C Status	Off	On	DX9100	1	26	DI-3		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-3						2/22	Device dependent	Contact (NO)		D70	
	DI-4	DOMESTIC	DHWP1D-S	Dom HW Pump 1D Status	Off	On	DX9100	1	26	DI-4		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-4						2/22	Device dependent	Contact (NO)		D70	
	DI-5	DOMESTIC	DHWP2A-S	Dom HW Pump 2A Status	Off	On	DX9100	1	26	DI-5		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-5						2/22	Device dependent	Contact (NO)		D70	
	DI-6	DOMESTIC	DHWP2B-S	Dom HW Pump 2B Status	Off	On	DX9100	1	26	DI-6		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-6						2/22	Device dependent	Contact (NO)		D70	
	DI-7	DOMESTIC	DHWP2C-S	Dom HW Pump 2C Status	Off	On	DX9100	1	26	DI-7		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-7						2/22	Device dependent	Contact (NO)		D70	
	DI-8	DOMESTIC	DHWP2D-S	Dom HW Pump 2D Status	Off	On	DX9100	1	26	DI-8		DI#,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DI-8						2/22	Device dependent	Contact (NO)		D70	
	AO-1	DOMESTIC	HWG1-VLV	HW Gen 1 Steam Valve	%		DX9100	1	26	AO-1		AO#,AOCOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-1	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-2	DOMESTIC	HWG2-VLV	HW Gen 2 Steam Valve	%		DX9100	1	26	AO-2		AO#,AOCOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-2	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-9	DOMESTIC	HWG3-VLV	HW Gen 3 Steam Valve	%		DX9100	1	26	AO-9		AO#,AOCOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-9	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-10	DOMESTIC	CWBP-VLV	Cold Water Bypass Valve	%		DX9100	1	26	AO-10		AO#,AOCOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-10	2/18	+,-	EP-8000-2	SUPPLY,O		1/4"	Barb Fitting	EP-PNEU.		D22	
	AO-11	DOMESTIC					DX9100	1	26	AO-11			EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-11											
	AO-12	DOMESTIC					DX9100	1	26	AO-12			EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-12											
	AO-13	DOMESTIC					DX9100	1	26	AO-13			EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-13											
	AO-14	DOMESTIC					DX9100	1	26	AO-14			EN-COM	Service Lev MER B		M.3-16	DOM-26-AO-14											
	DO-3	DOMESTIC	DHWP9-C	Dom HW Pump 9 Control	Off	On	DX9100	1	26	DO-3	RLY	DO#,24V,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-3	3/18	A,COILS,COM	RELAY-A	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-4	DOMESTIC	DHWP10-C	Dom HW Pump 10 Control	Off	On	DX9100	1	26	DO-4	RLY	DO#,24V,COM	EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-4	3/18	B,COILS,COM	RELAY-B	COM,NO		2/14	See starter detail	Starter (NO)		D60	
	DO-5	DOMESTIC					DX9100	1	26	DO-5			EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-5											
	DO-6	DOMESTIC					DX9100	1	26	DO-6			EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-6											
	DO-7	DOMESTIC					DX9100	1	26	DO-7			EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-7											
	DO-8	DOMESTIC					DX9100	1	26	DO-8			EN-COM	Service Lev MER B		M.3-16	DOM-26-DO-8											
	AI-1	DOMESTIC	OA-T	Outdoor Air Temperature	Deg F		DX9100	1	26	AI-1		AI#,15V	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-1						2/18	-,+	RH-2-I-O/A		D1	
	AI-2	DOMESTIC	HWG1-T	HW Gen 1 HW Supply Temp	Deg F		DX9100	1	26	AI-2		AI#,AICOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-2						2/18	2-Wire	TE-631AP-1		D3	
	AI-3	DOMESTIC	HWG2-T	HW Gen 2 HW Supply Temp	Deg F		DX9100	1	26	AI-3		AI#,AICOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-3						2/18	2-Wire	TE-631AP-1		D3	
	AI-4	DOMESTIC	HWG3-T	HW Gen 3 HW Supply Temp	Deg F		DX9100	1	26	AI-4		AI#,AICOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-4						2/18	2-Wire	TE-631AP-1		D3	
	AI-5	DOMESTIC	HX1-DP	Dom HW Diff Pressure	PSI		DX9100	1	26	AI-5		AI#,+15V	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-5						2/18	Device dependent	Rob/Hal 252C		D1	
	AI-6	DOMESTIC	CND-T	Condensate Water Temp	Deg F		DX9100	1	26	AI-6		AI#,AICOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-6						2/18	2-Wire	TE-631AP-1		D3	
	AI-7	DOMESTIC	OA-H	Outdoor Air Humidity	% RH		DX9100	1	26	AI-7		AI#,15V	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-7						2/18	-,+	RH-2-I-O/A		D1	
	AI-8	DOMESTIC	DWS-T	Hot Water Supply Temp	Deg F		DX9100	1	26	AI-8		AI#,AICOM	EN-COM	Service Lev MER B		M.3-16	DOM-26-AI-8						2/18	2-Wire	TE-631AP-1		D3	

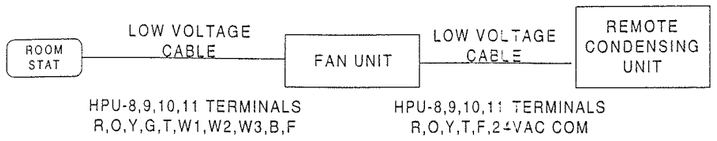
Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		SEF-A					VAV						EN-EXH	AT FAN														
		SEF-A	*				VAV	1	2				EN-EXH	AT FAN	0													Power to Controller
	AI-1	SEF-A					VAV	1	2	AI-1			EN-EXH	AT FAN	0		EXH-2-AI-1											N2 Trunk
	AI-2	SEF-A					VAV	1	2	AI-2			EN-EXH	AT FAN	0		EXH-2-AI-2											
	AI-3	SEF-A					VAV	1	2	AI-3			EN-EXH	AT FAN	0		EXH-2-AI-3											
	AI-4	SEF-A					VAV	1	2	AI-4			EN-EXH	AT FAN	0		EXH-2-AI-4											
	AI-5	SEF-A					VAV	1	2	AI-5			EN-EXH	AT FAN	0		EXH-2-AI-5											
	AI-6	SEF-A					VAV	1	2	AI-6			EN-EXH	AT FAN	0		EXH-2-AI-6											
	BI-1	SEF-A	SEF5-S	Smoke Exh Fan 5 Status	Off	On	VAV	1	2	BI-1		BI#,24VAC	EN-EXH	AT FAN	0		EXH-2-BI-1						2/22	Device dependent	Aux Contact		U70	
	BI-2	SEF-A	SEF6-S	Smoke Exh Fan 6 Status	Off	On	VAV	1	2	BI-2		BI#,24VAC	EN-EXH	AT FAN	0		EXH-2-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	SEF-A					VAV	1	2	BI-3			EN-EXH	AT FAN	0		EXH-2-BI-3											
	BI-4	SEF-A					VAV	1	2	BI-4			EN-EXH	AT FAN	0		EXH-2-BI-4											
	BO-1	SEF-A					VAV	1	2	BO-1			EN-EXH	AT FAN	0		EXH-2-BO-1											
	BO-2	SEF-A					VAV	1	2	BO-2			EN-EXH	AT FAN	0		EXH-2-BO-2											
	BO-3	SEF-A					VAV	1	2	BO-3			EN-EXH	AT FAN	0		EXH-2-BO-3											
	BO-4	SEF-A					VAV	1	2	BO-4			EN-EXH	AT FAN	0		EXH-2-BO-4											
	BO-5	SEF-A					VAV	1	2	BO-5			EN-EXH	AT FAN	0		EXH-2-BO-5											
	BO-6	SEF-A					VAV	1	2	BO-6			EN-EXH	AT FAN	0		EXH-2-BO-6											
	BO-7	SEF-A					VAV	1	2	BO-7			EN-EXH	AT FAN	0		EXH-2-BO-7											
	BO-8	SEF-A					VAV	1	2	BO-8			EN-EXH	AT FAN	0		EXH-2-BO-8											

PACKAGED HEAT PUMP UNITS (TYPICAL OF 7)

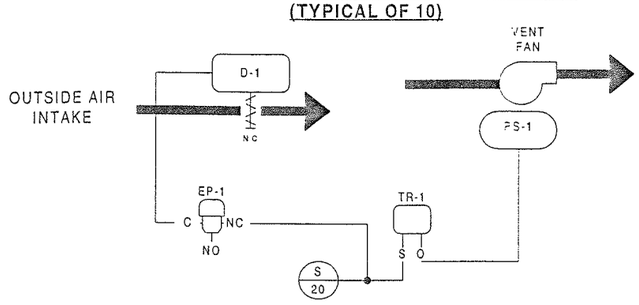


NOTE: ROOM THERMOSTATS SUPPLIED WITH PACKAGED UNITS

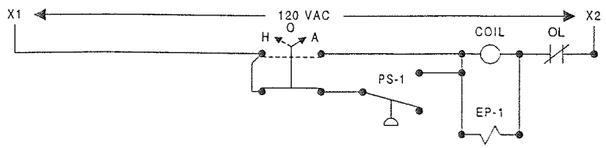
PACKAGED HEAT PUMP UNITS WITH REMOTE CONDENSING UNITS (TYPICAL OF 5)



GENERAL MECHANICAL ROOM VENTILATION (TYPICAL OF 10)

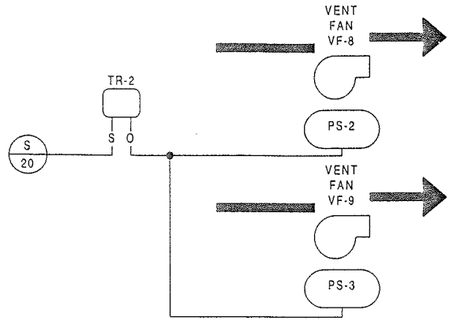


FAN WIRING DIAGRAM

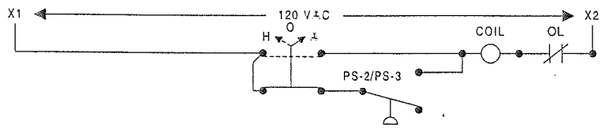


VENT FAN	LOCATION
VF-25	PRESS LEVEL MECH ROOM QUAD A
VF-25	PRESS LEVEL MECH ROOM QUAD B
VF-25	PRESS LEVEL MECH ROOM QUAD C
VF-25	PRESS LEVEL MECH ROOM QUAD D
VF-11	SERVICE LEVEL MECH ROOM QUAD B
VF-12	SERVICE LEVEL MECH ROOM QUAD B
VF-13	SERVICE LEVEL MECH ROOM QUAD B
VF-30	ELEVATOR MECH ROOM QUAD A
VF-30	ELEVATOR MECH ROOM QUAD B
VF-30	ELEVATOR MECH ROOM QUAD C

MECHANICAL ROOM QUAD A VENTILATION



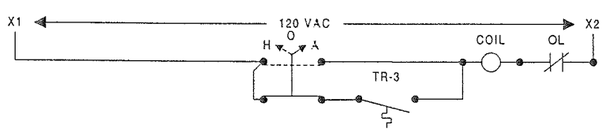
FAN WIRING DIAGRAM



ELECTRICAL ROOM VENTILATION (TYPICAL OF 8)

TR-3

FAN WIRING DIAGRAM

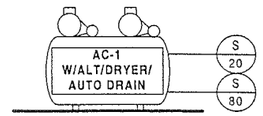


VENT FAN	LOCATION
VF-26	PRESS LEVEL ELECTRICAL ROOM QUAD A
VF-27	PRESS LEVEL ELECTRICAL ROOM QUAD B
VF-28	PRESS LEVEL ELECTRICAL ROOM QUAD C
VF-29	PRESS LEVEL ELECTRICAL ROOM QUAD D
VF-10	SERVICE LEVEL MECH ROOM B QUAD B
VF-24	SERVICE LEVEL MECH ROOM B QUAD B
VF-31	SERVICE ELEVATOR MECH ROOM QUAD A
VF-31	SERVICE ELEVATOR MECH ROOM QUAD B

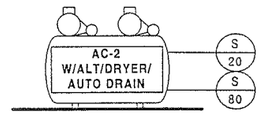
BILL OF MATERIALS

Estimate: miscellaneous 7052009S.pre

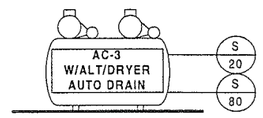
Desig.	Qty	Part #	Description
Field Devices:			
AC-1	1	AD-030-3C4	3 HP 460/3 80G DA DRY AD
AC-2,3	2	AD-007-1C4	3/4HP 460/3 30G DA DRY AD
D-1	10	D-4073-2	DMPR ACT,8-13#
EP-1	10	V11HAA-100	3-W SOLENOID,W/CV,120V&C
PS,1,2,3	12	P10BC-7C	SW,PE,SPDT,2#DIF
TR-1,2	11	T-4000-3139	CVR,WHT,JCI,HOR
	11	T-4002-124	STAT MOUNTING BRACKET
	11	T-4002-201	STAT,DIR,HORIZ,F
TR-3	8	T26S-18C	STAT,RM,H/C,ADJ,40/90F



3 H.P. LOCATED IN SERVICE LEVEL MECHANICAL ROOM QUAD B



3/4 H.P. LOCATED IN PRESS LEVEL AHU-3 MECHANICAL ROOM QUAD C



3/4 H.P. LOCATED IN PRESS LEVEL AHU-4 MECHANICAL ROOM QUAD D

PACKAGED AIR CONITIONING UNITS

PACKAGED AIR CONDITIONING SYSTEMS INCLUDE ELECTRIC HEAT PUMP UNITS AND SPLIT SYSTEM DIRECT EXPANSION COOLING UNITS WITH ELECTRIC HEAT. THESE SYSTEMS WILL BE PROVIDED WITH PACKAGED ELECTRONIC CONTROLS AND REMOTE MOUNTED PROGRAMMABLE THERMOSTAT.

GENERAL MECHANICAL ROOM VENTILATION - ROOM THERMOSTAT **TR-1** CONTROLS THE VENTILATION FAN. ON A RISE IN ROOM TEMPERATURE ABOVE THE SETTING OF **TR-1** TO NINETY-FIVE (95F), FAN WILL START AND RUN CONTINUOUSLY AND OUTSIDE AIR INTAKE DAMPER WILL OPEN FULL. ON A FALL IN TEMPERATURE TO EIGHTY-FIVE (85F) , FAN WILL BE DE-ENERGIZED AND THE OUTSIDE AIR INTAKE DAMPER WILL CLOSE.

MECHANICAL ROOM QUAD A VENTILATION - ROOM THERMOSTAT **TR-2** CONTROLS IN SEQUENCE TWO (2) VENTILATION FANS **VF-8** AND **VF-9**. ON A RISE IN ROOM TEMPERATURE ABOVE THE SETTING OF **TR-2**, TO NINETY-FIVE (95F), FAN **VF-8** WILL START AND RUN CONTINOUSLY. ON A CONTINUED RISE IN ROOM TEMPERATURE ABOVE THE SETTING OF **TR-2**, FAN **VF-9** WILL START AND RUN CONTINUOUSLY. ON A FALL IN TEMPERATURE TO EIGHTY-FIVE (85F) THE REVERSE SEQUENCE WILL OCCUR. ON A CONTINUED FALL IN TEMPERATURE FAN **VF-8** WILL BE DE-ENERGIZED.

ELECTRIC ROOM VENTILATION - ROOM THERMOSTAT **TR-3** WILL CONTROL THE VENTILATION FAN. ON A RISE IN ROOM TEMPERATURE ABOVE THE SETTING OF **TR-3** TO NINETY-FIVE (95F) , THE FAN WILL START AND RUN CONTINUOUSLY. ON A FALL IN TEMPERATURE TO EIGHTY-FIVE (85F) , FAN WILL BE DE-ENERGIZED.

REVISION INFORMATION

NUMBER

DATE 07/18/00

TIME 03:42 PM

FILE NAME MISC.vsd

Drawing Title: MISCELLANEOUS SYSTEMS AS SHOWN

REFERENCE DRAWING	NO.	REVISION-LOCATION	EDN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/11/97	BY DATE

Project Title: BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

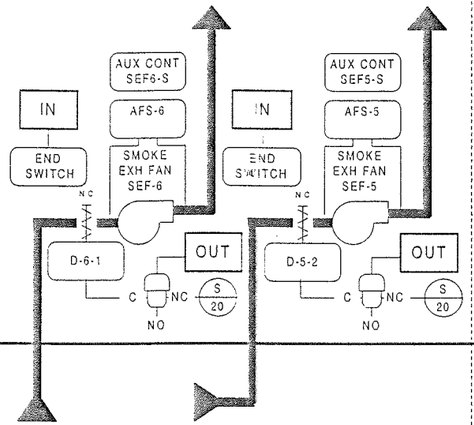
JOHNSON CONTROLS
Systems & Services Division

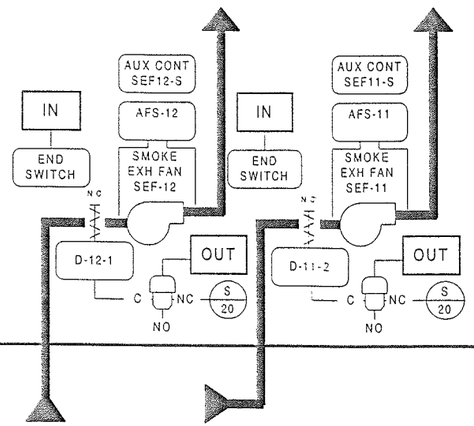
Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, Md 21152

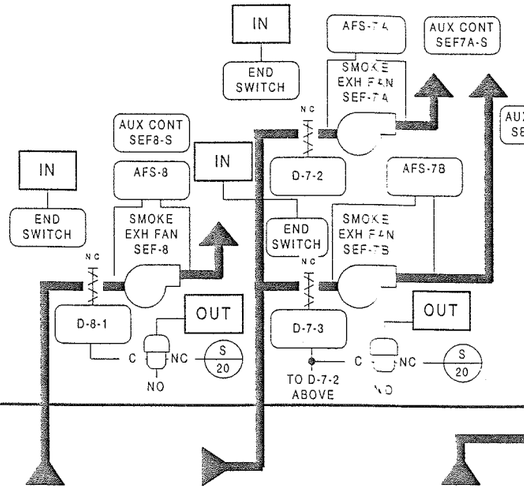
CONTRACT NUMBER 7052-0098

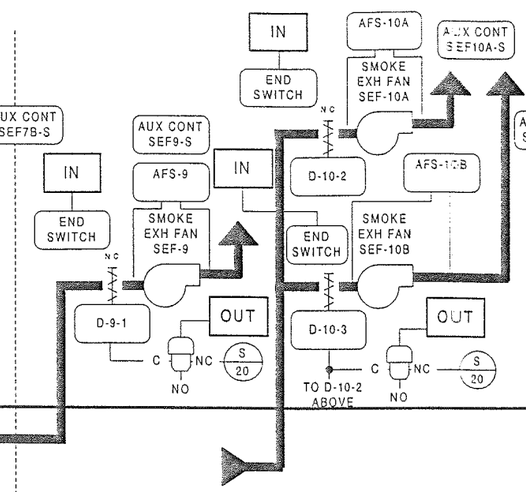
DRAWING NUMBER BL-6559-45

UPPER CONCOURSE ROOF









UPPER CONCOURSE

UPPER SUITE LEVEL

QUAD 'A'

QUAD 'D'

QUAD 'B'

QUAD 'C'

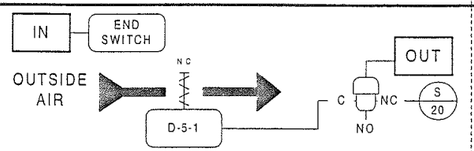
LOWER SUITE LEVEL

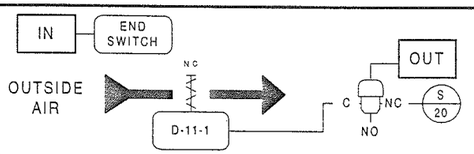
NORTH ATRIUM SMOKE ZONE

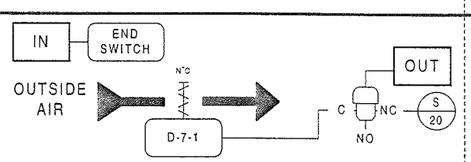
SOUTHEAST ATRIUM SMOKE ZONE

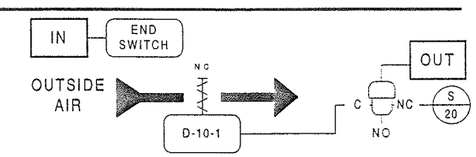
SOUTHWEST CLUB SMOKE ZONE

CLUB LEVEL









PRESS LEVEL

AHU-1 SUPPLY FAN

AHU-4 SUPPLY FAN

AHU-2 SUPPLY FAN

AHU-3 SUPPLY FAN

MAIN CONCOURSE

CROSS ZONED CEILING SMOKE DETECTORS, HVAC SMOKE DETECTORS, OR A SPRINKLER WATER FLOW ALARM WITHIN THE ATRIUM WILL ENERGIZE THE SMOKE EXHAUST SYSTEM THROUGH THE FIRE ALARM SYSTEM. WHEN A START SIGNAL HAS BEEN RECEIVED, FOUR (4) SMOKE EXHAUST FANS SEF-5,6,11,12 WILL START AND RUN CONTINUOUSLY AFTER INTAKE DAMPERS D-5-1 AND D-11-1 AND EXHAUST AIR DAMPERS HAVE BEEN PROVEN OPEN BY END SWITCHES. EACH EXHAUST FAN SHALL BE PROVIDED WITH A SAIL SWITCH TO PROVIDE POSITIVE STATUS FOR OPERATION ON THE FIRE ALARM SYSTEM. AIR HANDLING UNITS AHU-1 AND 4 SERVING THE ATRIUM WILL BE DE-ENERGIZED AND ALL OF THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSTION WHEN THE SMOKE EXHAUST IS ENERGIZED. ATRIUM SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM PANEL.

CROSS ZONED CEILING SMOKE DETECTORS, HVAC SMOKE DETECTORS, OR A SPRINKLER WATER FLOW ALARM WITHIN THE ATRIUM WILL ENERGIZE THE SMOKE EXHAUST SYSTEM THROUGH THE FIRE ALARM SYSTEM. WHEN A START SIGNAL HAS BEEN RECEIVED, FOUR (4) SMOKE EXHAUST FANS SEF-7A,7B,8,9 WILL START AND RUN CONTINUOUSLY AFTER INTAKE DAMPERS D-10-1 AND D-7-1 AND EXHAUST AIR DAMPERS HAVE BEEN PROVEN OPEN BY END SWITCHES. EACH EXHAUST FAN SHALL BE PROVIDED WITH A SAIL SWITCH TO PROVIDE POSITIVE STATUS FOR OPERATION ON THE FIRE ALARM SYSTEM. AIR HANDLING UNITS AHU-2 AND 3 SERVING THE ATRIUM WILL BE DE-ENERGIZED AND ALL OF THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSTION WHEN THE SMOKE EXHAUST IS ENERGIZED. ATRIUM SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM PANEL.

CROSS ZONED CEILING SMOKE DETECTORS, HVAC SMOKE DETECTORS, OR A SPRINKLER WATER FLOW ALARM WITHIN THE ATRIUM WILL ENERGIZE THE SMOKE EXHAUST SYSTEM THROUGH THE FIRE ALARM SYSTEM. WHEN A START SIGNAL HAS BEEN RECEIVED, TWO (2) SMOKE EXHAUST FANS SEF-10A,10B WILL START AND RUN CONTINUOUSLY AFTER INTAKE DAMPERS D-10-1 AND D-7-1 AND EXHAUST AIR DAMPERS HAVE BEEN PROVEN OPEN BY END SWITCHES. EACH EXHAUST FAN SHALL BE PROVIDED WITH A SAIL SWITCH TO PROVIDE POSITIVE STATUS FOR OPERATION ON THE FIRE ALARM SYSTEM. AIR HANDLING UNITS AHU-2 AND 3 SERVING THE ATRIUM WILL BE DE-ENERGIZED AND ALL OF THEIR DAMPERS WILL RETURN TO THEIR NORMALLY CLOSED POSTION WHEN THE SMOKE EXHAUST IS ENERGIZED. ATRIUM SMOKE EXHAUST FANS WILL BE AUTOMATICALLY AND MANUALLY STARTED AND STOPPED FROM THE FIRE ALARM PANEL.

SERVICE LEVEL

BILL OF MATERIALS

Estimate: smoke exh 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
AIR FLOW	10	AFS-222	FAN AIR FLOW SWITCH
D-5-1,D-7-1, D-10-1,D-11-1	4	---	SEE DAMPER SCHEDULE
END SW	12	TS-470	DPR POSITION SWITCH
SOLE VALVE	12	V11HAA-100	3-W SOLENOID,W/OV,120VAC
Panel Devices:			
EN-EXH	4	EN-EWC15-0	UNIV PKG MOD,SING,W/50VA
DC-1	4	AS-VAV110-1	VAV 6AI,4BI,8BO,8K

SOLENOID AIR VALVE AND DAMPER END SWITCH SUPPLIED BY JCI

INPUT AND OUTPUT MODULES SUPPLIED BY FIRE ALARM SYSTEM UNDER DIVISION 16

REVISION INFORMATION						
AS-BUILT					7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY

NUMBER

DATE 07/18/00

TIME 03:43 PM

FILE NAME SMOKE.vsd

Drawing Title
ATRIUM SMOKE EXHAUST
NORTH ATRIUM SMOKE ZONE

QUAD A & D

Project Title
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/11/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
Johnson Controls, Inc.
60 Loveton Circle
Sparks, Md 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-46

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		SEF-B					VAV						EN-EXH	AT FAN														Power to Controller
		SEF-B	•				VAV	1	3				EN-EXH	AT FAN	0													N2 Trunk
	AI-1	SEF-B					VAV	1	3	AI-1			EN-EXH	AT FAN	0		EXH-3-AI-1											
	AI-2	SEF-B					VAV	1	3	AI-2			EN-EXH	AT FAN	0		EXH-3-AI-2											
	AI-3	SEF-B					VAV	1	3	AI-3			EN-EXH	AT FAN	0		EXH-3-AI-3											
	AI-4	SEF-B					VAV	1	3	AI-4			EN-EXH	AT FAN	0		EXH-3-AI-4											
	AI-5	SEF-B					VAV	1	3	AI-5			EN-EXH	AT FAN	0		EXH-3-AI-5											
	AI-6	SEF-B					VAV	1	3	AI-6			EN-EXH	AT FAN	0		EXH-3-AI-6											
	BI-1	SEF-B	SEF7A-S	Smoke Exh Fan 7A Status	Off	On	VAV	1	3	BI-1		BI#,24VAC	EN-EXH	AT FAN	0		EXH-3-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	SEF-B	SEF7B-S	Smoke Exh Fan 7B Status	Off	On	VAV	1	3	BI-2		BI#,24VAC	EN-EXH	AT FAN	0		EXH-3-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	SEF-B	SEF8-S	Smoke Exh Fan 8 Status	Off	On	VAV	1	3	BI-3		BI#,24VAC	EN-EXH	AT FAN	0		EXH-3-BI-3						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-4	SEF-B					VAV	1	3	BI-4			EN-EXH	AT FAN	0		EXH-3-BI-4											
	BO-1	SEF-B					VAV	1	3	BO-1			EN-EXH	AT FAN	0		EXH-3-BO-1											
	BO-2	SEF-B					VAV	1	3	BO-2			EN-EXH	AT FAN	0		EXH-3-BO-2											
	BO-3	SEF-B					VAV	1	3	BO-3			EN-EXH	AT FAN	0		EXH-3-BO-3											
	BO-4	SEF-B					VAV	1	3	BO-4			EN-EXH	AT FAN	0		EXH-3-BO-4											
	BO-5	SEF-B					VAV	1	3	BO-5			EN-EXH	AT FAN	0		EXH-3-BO-5											
	BO-6	SEF-B					VAV	1	3	BO-6			EN-EXH	AT FAN	0		EXH-3-BO-6											
	BO-7	SEF-B					VAV	1	3	BO-7			EN-EXH	AT FAN	0		EXH-3-BO-7											
	BO-8	SEF-B					VAV	1	3	BO-8			EN-EXH	AT FAN	0		EXH-3-BO-8											

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		SEF-C					VAV						EN-EXH	AT FAN														Power to Controller
		SEF-C	*				VAV	1	6				EN-EXH	AT FAN	0													N2 Trunk
	AI-1	SEF-C					VAV	1	6	AI-1			EN-EXH	AT FAN	0		EXH-6-AI-1											
	AI-2	SEF-C					VAV	1	6	AI-2			EN-EXH	AT FAN	0		EXH-6-AI-2											
	AI-3	SEF-C					VAV	1	6	AI-3			EN-EXH	AT FAN	0		EXH-6-AI-3											
	AI-4	SEF-C					VAV	1	6	AI-4			EN-EXH	AT FAN	0		EXH-6-AI-4											
	AI-5	SEF-C					VAV	1	6	AI-5			EN-EXH	AT FAN	0		EXH-6-AI-5											
	AI-6	SEF-C					VAV	1	6	AI-6			EN-EXH	AT FAN	0		EXH-6-AI-6											
	BI-1	SEF-C	SEF9-S	Exh Fan 1 Status	Off	On	VAV	1	6	BI-1		BI#,24VAC	EN-EXH	AT FAN	0		EXH-6-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	SEF-C	SEF10A-S	Exh Fan 1 Status	Off	On	VAV	1	6	BI-2		BI#,24VAC	EN-EXH	AT FAN	0		EXH-6-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	SEF-C	SEF10B-S	Exh Fan 1 Status	Off	On	VAV	1	6	BI-3		BI#,24VAC	EN-EXH	AT FAN	0		EXH-6-BI-3						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-4	SEF-C					VAV	1	6	BI-4			EN-EXH	AT FAN	0		EXH-6-BI-4											
	BO-1	SEF-C					VAV	1	6	BO-1			EN-EXH	AT FAN	0		EXH-6-BO-1											
	BO-2	SEF-C					VAV	1	6	BO-2			EN-EXH	AT FAN	0		EXH-6-BO-2											
	BO-3	SEF-C					VAV	1	6	BO-3			EN-EXH	AT FAN	0		EXH-6-BO-3											
	BO-4	SEF-C					VAV	1	6	BO-4			EN-EXH	AT FAN	0		EXH-6-BO-4											
	BO-5	SEF-C					VAV	1	6	BO-5			EN-EXH	AT FAN	0		EXH-6-BO-5											
	BO-6	SEF-C					VAV	1	6	BO-6			EN-EXH	AT FAN	0		EXH-6-BO-6											
	BO-7	SEF-C					VAV	1	6	BO-7			EN-EXH	AT FAN	0		EXH-6-BO-7											
	BO-8	SEF-C					VAV	1	6	BO-8			EN-EXH	AT FAN	0		EXH-6-BO-8											

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Start Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		SEF-D					VAV						EN-EXH	AT FAN														Power to Controller
		SEF-D	*				VAV	1	4				EN-EXH	AT FAN	0													N2 Trunk
	AI-1	SEF-D					VAV	1	4	AI-1			EN-EXH	AT FAN	0		EXH-4-AI-1											
	AI-2	SEF-D					VAV	1	4	AI-2			EN-EXH	AT FAN	0		EXH-4-AI-2											
	AI-3	SEF-D					VAV	1	4	AI-3			EN-EXH	AT FAN	0		EXH-4-AI-3											
	AI-4	SEF-D					VAV	1	4	AI-4			EN-EXH	AT FAN	0		EXH-4-AI-4											
	AI-5	SEF-D					VAV	1	4	AI-5			EN-EXH	AT FAN	0		EXH-4-AI-5											
	AI-6	SEF-D					VAV	1	4	AI-6			EN-EXH	AT FAN	0		EXH-4-AI-6											
	BI-1	SEF-D	SEF11-S	Smoke Exh Fan 11 Status	Off	On	VAV	1	4	BI-1		BI#,24VAC	EN-EXH	AT FAN	0		EXH-4-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	SEF-D	SEF12-S	Smoke Exh Fan 12 Status	Off	On	VAV	1	4	BI-2		BI#,24VAC	EN-EXH	AT FAN	0		EXH-4-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	SEF-D					VAV	1	4	BI-3			EN-EXH	AT FAN	0		EXH-4-BI-3											
	BI-4	SEF-D					VAV	1	4	BI-4			EN-EXH	AT FAN	0		EXH-4-BI-4											
	BO-1	SEF-D					VAV	1	4	BO-1			EN-EXH	AT FAN	0		EXH-4-BO-1											
	BO-2	SEF-D					VAV	1	4	BO-2			EN-EXH	AT FAN	0		EXH-4-BO-2											
	BO-3	SEF-D					VAV	1	4	BO-3			EN-EXH	AT FAN	0		EXH-4-BO-3											
	BO-4	SEF-D					VAV	1	4	BO-4			EN-EXH	AT FAN	0		EXH-4-BO-4											
	BO-5	SEF-D					VAV	1	4	BO-5			EN-EXH	AT FAN	0		EXH-4-BO-5											
	BO-6	SEF-D					VAV	1	4	BO-6			EN-EXH	AT FAN	0		EXH-4-BO-6											
	BO-7	SEF-D					VAV	1	4	BO-7			EN-EXH	AT FAN	0		EXH-4-BO-7											
	BO-8	SEF-D					VAV	1	4	BO-8			EN-EXH	AT FAN	0		EXH-4-BO-8											

ELECTRICAL SUBSTATIONS

TMP-S — HIGH TEMPERATURE ALARM IN SUBSTATION ENCLOSURE (CONTACT BY DIVISION 16)

DCM-S — DIGITAL ELECTRIC METER IN SUBSTATION ENCLOSURE (CONTACT BY DIVISION 16)

SUBSTATION	LOCATION	JCI PANEL
SS1-PRA	PRESS LEVEL ELECTRICAL ROOM QUAD A	EN-ELEC-A1
SS2-PRA	PRESS LEVEL ELECTRICAL ROOM QUAD A	EN-ELEC-A2
SS1-PRB	PRESS LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-B1
SS2-PRB	PRESS LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-B2
SS1-PRC	PRESS LEVEL ELECTRICAL ROOM QUAD C	EN-ELEC-C1
SS2-PRC	PRESS LEVEL ELECTRICAL ROOM QUAD C	EN-ELEC-C2
SS1-PRD	PRESS LEVEL ELECTRICAL ROOM QUAD D	EN-ELEC-D1
SS2-PRD	PRESS LEVEL ELECTRICAL ROOM QUAD D	EN-ELEC-D2
SS1-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S1
SS2-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S2
SS3-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S3
SSFP-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S4
SSGE-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S5
SSGL-SRB	SERVICE LEVEL ELECTRICAL ROOM QUAD B	EN-ELEC-S6

HEAT TRACE PANELS

HTP-S — PANEL ALARM CONTACT IN ENCLOSURE (CONTACT BY DIVISION 16)

HEAT TRACE	LOCATION	JCI PANEL
QUAD A	MAIN CONCOURSE ELECTRICAL ROOM QUAD A	EN-ELEC-A1
QUAD B	MAIN CONCOURSE ELECTRICAL ROOM QUAD B	EN-ELEC-B1
QUAD C	MAIN CONCOURSE ELECTRICAL ROOM QUAD C	EN-ELEC-C1
QUAD D	MAIN CONCOURSE ELECTRICAL ROOM QUAD D	EN-ELEC-D1

CONCOURSE LEVEL TOILET EXHAUST FANS

TEFA4-C

EXHAUST FAN	LOCATION	JCI PANEL
TEF-A4	MAIN CONCOURSE LEVEL QUAD A	EN-ELEC-A1
TEF-A5	MAIN CONCOURSE LEVEL QUAD A	EN-ELEC-A1
TEF-A6	MAIN CONCOURSE LEVEL QUAD A	EN-AHU-1
TEF-A9	MAIN CONCOURSE LEVEL QUAD A	EN-AHU-1
TEF-B9	MAIN CONCOURSE LEVEL QUAD B	EN-AHU-2
TEF-B10	MAIN CONCOURSE LEVEL QUAD B	EN-AHU-2
TEF-B12	MAIN CONCOURSE LEVEL QUAD B	EN-AHU-2
TEF-B13	MAIN CONCOURSE LEVEL QUAD B	EN-AHU-2
TEF-C1	MAIN CONCOURSE LEVEL QUAD C	EN-ELEC-C1
TEF-C2	MAIN CONCOURSE LEVEL QUAD C	EN-ELEC-C1
TEF-C3	MAIN CONCOURSE LEVEL QUAD C	EN-AHU-3
TEF-D1	MAIN CONCOURSE LEVEL QUAD D	EN-AHU-4
TEF-D4	MAIN CONCOURSE LEVEL QUAD D	EN-ELEC-D1
TEF-D5	MAIN CONCOURSE LEVEL QUAD D	EN-ELEC-D1

BILL OF MATERIALS
Estimate: electric 7052D098.pre

Desig.	Qty	Part #	Description
Field Devices:			
TEF,CUH	14	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	14	PD-101-35	RLY BASE,3PDT,11PIN,10A
	14	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
Panel Devices:			
DC-1	14	AS-VAV110-1	VAV 6AI,4BI,8BO,8K
EN-ELEC-x	14	EN-EWC15-0	UNIV PKG MOD,SING,W 50VA

ELECTRICAL SUB-STATIONS

SUBSTATION TRANSFORMER HIGH TEMPERATURE ALARMS AND SUBSTATION ELECTRIC USAGE WILL BE MONITORED THROUGH THE METATSYS SYSTEM.

ELECTRIC HEAT TRACE SYSTEMS

THE FOUR (4) MAIN HEAT TRACE SYSTEM PANEL ALARMS WILL BE MONITORED THROUGH THE METAYS SYSTEM.

CONCOURSE LEVEL TOILET ROOMS

CONCOURSE LEVEL TOILET ROOMS HAVE THREE (2) MODES OF STANDARD OPERATION AS FOLLOWS:

1. OCCUPIED - FULLY OPERATIONAL DURING STADIUM EVENT.
2. UNOCCUPIED - NOT VENTILATED BETWEEN STADIUM EVENTS DURING THE NFL SEASON.

THE METASYS SYSTEM WILL HAVE THE ABILITY TO CONTROL INDIVIDUAL TOILET ROOM COMPONENTS (ON/OFF) AS REQUIRED BY THE MODE OF OPERATION. IN THE OCCUPIED MODE, INDIVIDUAL TOILET EXHAUST FANS WILL START AND RUN CONTINUOUSLY. GRAVITY OPERATED BACKDRAFT DAMPER ON FAN WILL RESPOND TO FAN OPERATION. IN THE UNOCCUPIED MODE INDIVIDUAL TOILET EXHAUST FANS WILL BE DE-ENERGIZED AND BACKDRAFT DAMPERS WILL CLOSE. PLUMBING LINE ARE VALVED OFF AND DRAINED, FIXTURES HAD TRAPS ARE PROTECTED FROM FREEZING WITH GLYCOL. THE JANITOR'S CLOSET ASSOCIATED WITH EACH TOILET ROOM WILL REMAIN HEATED THROUGHOUT THE HEATING SEASON. ISOLATION OF WATER PIPING AND DRAINING OF TOILET ROOM BRANCH LINES OCCURS IN THIS ROOM. HEATERS IN JANITOR'S CLOSET WILL BE ADJUSTED TO MAINTAIN FIFTY-FIVE (55F).

CABINET HEATERS FAN AND HEATING ELEMENTS WILL BE CYCLED ON AND OFF TO MAINTAIN A FIFTY-FIVE (55F) SPACE TEMPERATURE IN THE OCCUPIED OR UNOCCUPIED MODE .

REVISION INFORMATION
NUMBER
DATE 07/18/00
TIME 03:44 PM
FILE NAME ELECTRIC.vsd

Drawing Title: SUBSTATION ELEC METERING HEAT TRACE PANELS MAIN CONCOURSE TOILET EXHAUST FANS

Project Title: BALTIMORE NFL STADIUM AT CAMDEN YARDS

BALTIMORE, MARYLAND

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
AS-BUILT				7/18/00	CME

Sales Engineer: JDP | Project Manager: WJT | Application Engineer: RTS | DRAWN: BY RTS DATE 09/11/97 | APPROVED: BY DATE

JOHNSON CONTROLS
Systems & Services Division

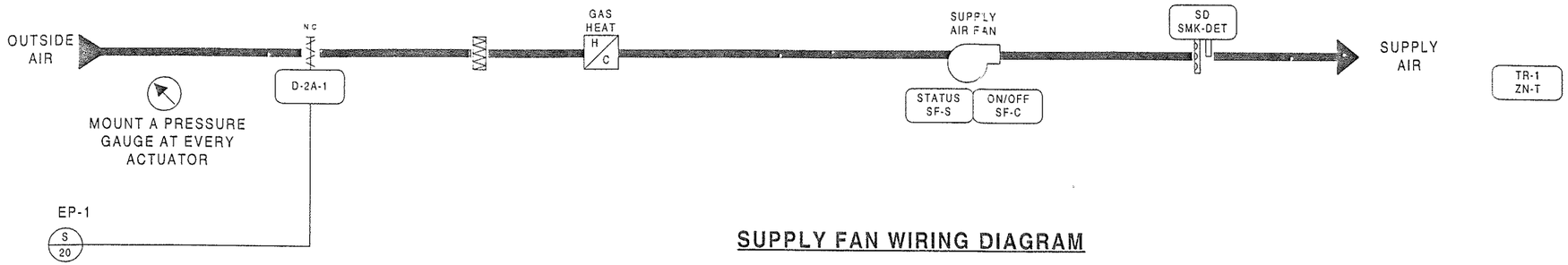
Branch Information: Johnson Controls, Inc. 60 Loveton Circle Sparks, Md 21152

CONTRACT NUMBER: 7052-0098

DRAWING NUMBER: BL-6559-47

Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		ELEC-A1					VAV						EN-ELECA	AT UNIT														
		ELEC-A1	*				VAV	1	4				EN-ELECA	AT UNIT	0													Power to Controller
	AI-1	ELEC-A1					VAV	1	4	AI-1			EN-ELECA	AT UNIT	0		ELECA-4-AI-1											N2 Trunk
	AI-2	ELEC-A1					VAV	1	4	AI-2			EN-ELECA	AT UNIT	0		ELECA-4-AI-2											
	AI-3	ELEC-A1					VAV	1	4	AI-3			EN-ELECA	AT UNIT	0		ELECA-4-AI-3											
	AI-4	ELEC-A1					VAV	1	4	AI-4			EN-ELECA	AT UNIT	0		ELECA-4-AI-4											
	AI-5	ELEC-A1					VAV	1	4	AI-5			EN-ELECA	AT UNIT	0		ELECA-4-AI-5											
	AI-6	ELEC-A1					VAV	1	4	AI-6			EN-ELECA	AT UNIT	0		ELECA-4-AI-6											
	BI-1	ELEC-A1					VAV	1	4	BI-1			EN-ELECA	AT UNIT	0		ELECA-4-BI-1											
	BI-2	ELEC-A1	HTP-A	Heat Trace Panel Quad A	Normal	Alarm	VAV	1	4	BI-2		BI#,24VAC	EN-ELECA	AT UNIT	0		ELECA-4-BI-2						2/22	Device dependent	Panel Contact (NO)		U70	
	BI-3	ELEC-A1	TMP-A1	Substation SS1-PRA Temp	Normal	Alarm	VAV	1	4	BI-3		BI#,24VAC	EN-ELECA	AT UNIT	0		ELECA-4-BI-3						2/22	Device dependent	Panel Contact (NO)		U70	
	BI-4	ELEC-A1	ELE-A1	Substation SS1-PRA Elec	Kw		VAV	1	4	BI-4		BI#,24VAC	EN-ELECA	AT UNIT	0		ELECA-4-BI-4						2/22	Device dependent	Panel Contact (NO)		U70	
	BO-1	ELEC-A1	TEFA4-C	Toilet Exh Fan A4 Cntrl	Off	On	VAV	1	4	BO-1		BO#,24VAC	EN-ELECA	AT UNIT	0		ELECA-4-BO-1		PD-109-51				2/18	Device dependent	24VAC OUT		U51	
	BO-2	ELEC-A1	TEFA5-C	Toilet Exh Fan A5 Cntrl	Off	On	VAV	1	4	BO-2		BO#,24VAC	EN-ELECA	AT UNIT	0		ELECA-4-BO-2		PD-109-51				2/18	Device dependent	24VAC OUT		U51	
	BO-3	ELEC-A1					VAV	1	4	BO-3			EN-ELECA	AT UNIT	0		ELECA-4-BO-3											
	BO-4	ELEC-A1					VAV	1	4	BO-4			EN-ELECA	AT UNIT	0		ELECA-4-BO-4											
	BO-5	ELEC-A1					VAV	1	4	BO-5			EN-ELECA	AT UNIT	0		ELECA-4-BO-5											
	BO-6	ELEC-A1					VAV	1	4	BO-6			EN-ELECA	AT UNIT	0		ELECA-4-BO-6											
	BO-7	ELEC-A1					VAV	1	4	BO-7			EN-ELECA	AT UNIT	0		ELECA-4-BO-7											
	BO-8	ELEC-A1					VAV	1	4	BO-8			EN-ELECA	AT UNIT	0		ELECA-4-BO-8											

SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

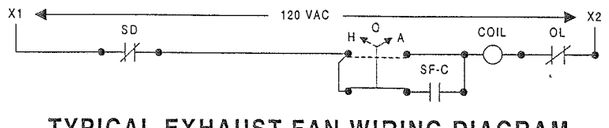


BILL OF MATERIALS

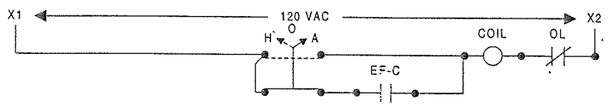
Estimate: mau-2a 70520098.pre

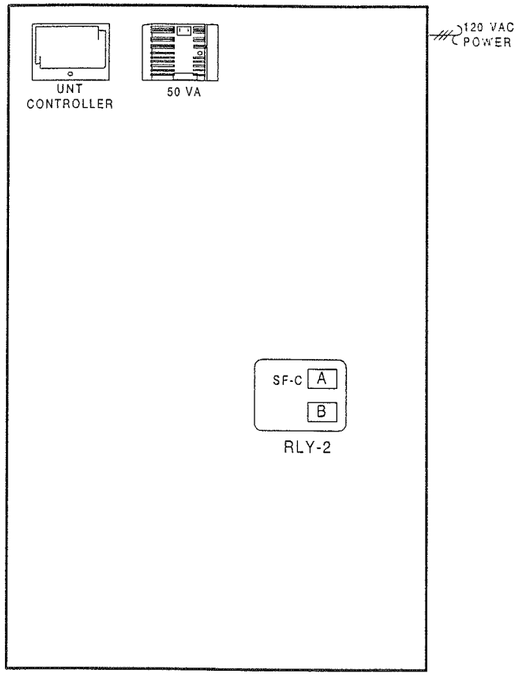
Desig.	Qty	Part #	Description
Field Devices:			
D-2A-1	1	---	SEE DAMPER SCHEDULE
	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EP-1	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
T-1	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
EF-3A,4A,5A, 6A	2	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	2	PD-101-35	RLY BASE,3PDT,11PIN,10A
	2	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-MAU-2A	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKEN
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

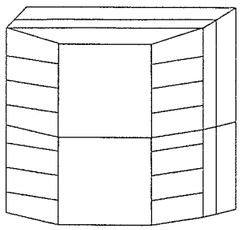
SUPPLY FAN WIRING DIAGRAM



TYPICAL EXHAUST FAN WIRING DIAGRAM







ENCLOSURE EN-MAU-2A
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-1/N2 ADD = 3

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL HAVE THE ABILITY TO CONTROL INDIVIDUAL CONCESSION COMPONENTS (ON/OFF) AS REQUIRED BY THE MODE OF OPERATION. IN THE OCCUPIED MODE, INDIVIDUAL CONCESSION MAKEUP AIR UNIT **MAU-2A** AND EXHAUST FANS **KEF-3A,4A,5A,6A** WILL START AND RUN CONTINUOUSLY. WHEN THE UNIT AND EXHAUST FANS ARE ENERGIZED, OUTSIDE AIR DAMPER **D-2A-1,** WILL OPEN. ROOM SENSOR **TR-1** WILL CYCLE DIRECT GAS FIRED HEATER TO MAINTAIN ITS SETPOINT. DISCHARGE SENSOR **T-1** WILL MONITOR SUPPLY TEMPERATURE AND PROVE GAS FIRING OF UNIT.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-2A-1** WILL OPEN AND EXHAUST FANS WILL START AND RUN CONTINUOUSLY. THE DIRECT GAS FIRED HEATER WILL BE ACTIVATED BY ZONE SENSOR **TR-1** TO MAINTAIN ITS SETTING OF FIFTY (50F). THE DIRECT GAS FIRED HEATER WILL BE MONITORED BY **T-1.** THE SYSTEM WILL ALARM WHEN ROOM SENSOR **TR-1** DROPS BELOW FIFTY (50F). DIRECT GAS FIRED HEATER CONTROL PANEL WILL BE INTERLOCKED WITH GAS EMERGENCY SHUT OFF SYSTEM ASSOCIATED WITH GAS COOKING EQUIPMENT. AUTOMATIC SHUT-DOWN WILL BE PROVIDED AS REQUIRED BY NFPA.

UNOCCUPIED HEATING MODE - MAKE-UP AIR UNIT AND EXHAUST FANS WILL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER WILL CLOSE. ELECTRIC UNIT HEATERS (WITH BUILT-IN THERMOSTAT) WILL CYCLE (ON/OFF) TO MAINTAIN FIFTY (50F).

OCCUPIED COOLING MODE - NONE

UNOCCUPIED COOLING MODE - NONE

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:46 PM
FILE NAME	MAU-2A.vsd

DRAWING TITLE
MAKE-UP AIR UNIT 2A
KITCHEN FOOD SERVICE

CLUB LEVEL QUAD A

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/16/97	BY DATE

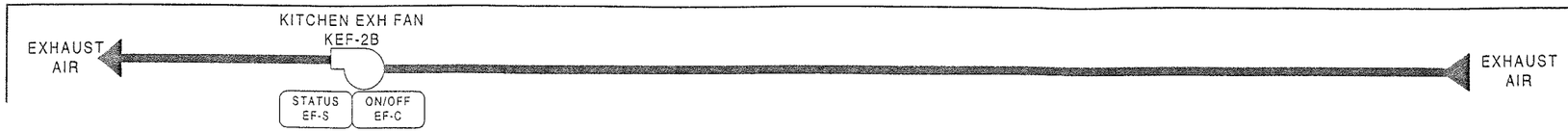
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

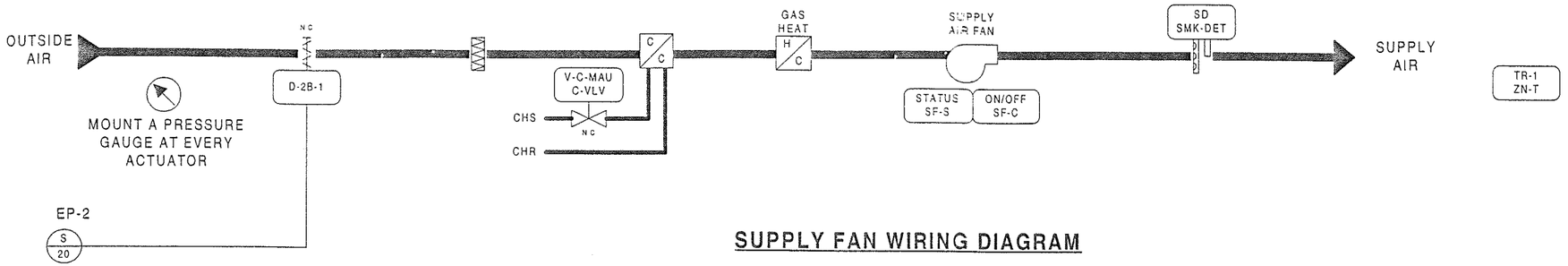
CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-48

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		MAU-2A					UNT						EN-MAU2B	AT UNIT														
		MAU-2A	*				UNT	1	3				EN-MAU2B	AT UNIT	0													Power to Controller
	AI-1	MAU-2A					UNT	1	3	AI-1			EN-MAU2B	AT UNIT	0													N2 Trunk
	AI-2	MAU-2A					UNT	1	3	AI-2			EN-MAU2B	AT UNIT	0		MAU2B-3-AI-1											
	AI-3	MAU-2A					UNT	1	3	AI-3			EN-MAU2B	AT UNIT	0		MAU2B-3-AI-2											
	AI-4	MAU-2A	ZN-T	Zone Temperature	Deg F		UNT	1	3	AI-4		PHONE JACK	EN-MAU2B	AT UNIT	0		MAU2B-3-AI-3					8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	MAU-2A					UNT	1	3	AI-5			EN-MAU2B	AT UNIT	0		MAU2B-3-AI-4											
	AI-6	MAU-2A					UNT	1	3	AI-6			EN-MAU2B	AT UNIT	0		MAU2B-3-AI-5											
	BI-1	MAU-2A	SF-S	Supply Fan Status	Off	On	UNT	1	3	BI-1		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-3-AI-6											
	BI-2	MAU-2A	EF-S	Exh Fan Status	Off	On	UNT	1	3	BI-2		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-3-BI-1					2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	MAU-2A	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	3	BI-3		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-3-BI-2					2/22	Device dependent	Aux Contact (NO)		U70	
	BI-4	MAU-2A					UNT	1	3	BI-4			EN-MAU2B	AT UNIT	0		MAU2B-3-BI-3					2/22	Device dependent	Contact (NO)		U70	
	BO-1	MAU-2A					UNT	1	3	BO-1			EN-MAU2B	AT UNIT	0		MAU2B-3-BI-4											
	BO-2	MAU-2A					UNT	1	3	BO-2			EN-MAU2B	AT UNIT	0		MAU2B-3-BO-1											
	BO-3	MAU-2A	SF-C	Supply Fan Control	Off	On	UNT	1	3	BO-3	RLY	BO#,24V,COM	EN-MAU2B	AT UNIT	0		MAU2B-3-BO-2											
	BO-4	MAU-2A	EF-C	Exh Fan Control	Off	On	UNT	1	3	BO-4		BO#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-3-BO[3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	MAU-2A					UNT	1	3	BO-5			EN-MAU2B	AT UNIT	0		MAU2B-3-BO-4		PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-6	MAU-2A					UNT	1	3	BO-6			EN-MAU2B	AT UNIT	0		MAU2B-3-BO-5											
	AO-1	MAU-2A					UNT	1	3	AO-1			EN-MAU2B	AT UNIT	0		MAU2B-3-BO-6											
	AO-2	MAU-2A					UNT	1	3	AO-2			EN-MAU2B	AT UNIT	0		MAU2B-3-AO-1											
																	MAU2B-3-AO-2											



SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

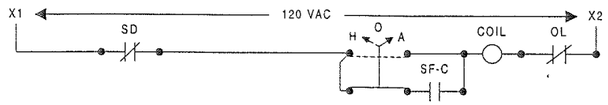


BILL OF MATERIALS

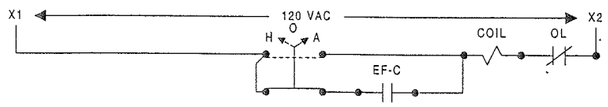
Estimate: mau-2b 70520098.pre

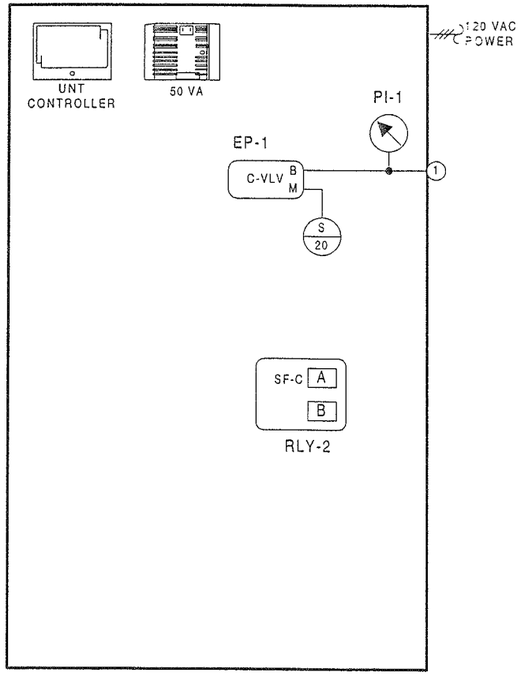
Desig.	Qty	Part #	Description
Field Devices:			
D-2B-1	1	---	SEE DAMPER SCHEDULE
	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EF-2B	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
EP-2	1	V11HAA-100	3-W SOLENOID,W/CV,120VAC
T-1	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
V-C-MAU	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-MAU-2B	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

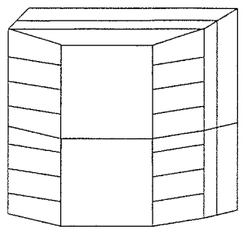
SUPPLY FAN WIRING DIAGRAM



TYPICAL EXHAUST FAN WIRING DIAGRAM







ENCLOSURE EN-MAU-2B
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-2/N2 ADD = 4

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL HAVE THE ABILITY TO CONTROL INDIVIDUAL CONCESSION COMPONENTS (ON/OFF) AS REQUIRED BY THE MODE OF OPERATION. IN THE OCCUPIED MODE, INDIVIDUAL CONCESSION MAKEUP AIR UNIT **MAU-2B** AND EXHAUST FAN **KEF-2B** WILL START AND RUN CONTINUOUSLY. WHEN THE UNIT AND EXHAUST FANS ARE ENERGIZED, OUTSIDE AIR DAMPER **D-2B-1,** WILL OPEN. ROOM SENSOR **TR-1** WILL CYCLE DIRECT GAS FIRED HEATER TO MAINTAIN ITS SETPOINT. DISCHARGE SENSOR **T-1** WILL MONITOR SUPPLY TEMPERATURE AND PROVE GAS FIRING OF UNIT.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-2B-1** WILL OPEN AND EXHAUST FANS WILL START AND RUN CONTINUOUSLY. THE DIRECT GAS FIRED HEATER WILL BE ACTIVATED BY ZONE SENSOR **TR-1** TO MAINTAIN ITS SETTING OF FIFTY (50F). THE DIRECT GAS FIRED HEATER WILL BE MONITORED BY **T-1.** THE SYSTEM WILL ALARM WHEN ROOM SENSOR **TR-1** DROPS BELOW FIFTY (50F). DIRECT GAS FIRED HEATER CONTROL PANEL WILL BE INTERLOCKED WITH GAS EMERGENCY SHUT OFF SYSTEM ASSOCIATED WITH GAS COOKING EQUIPMENT. AUTOMATIC SHUT-DOWN WILL BE PROVIDED AS REQUIRED BY NFPA.

UNOCCUPIED HEATING MODE - MAKE-UP AIR UNIT AND EXHAUST FANS WILL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER WILL CLOSE. ELECTRIC UNIT HEATERS (WITH BUILT-IN THERMOSTAT) WILL CYCLE (ON/OFF) TO MAINTAIN FIFTY (50F).

OCCUPIED COOLING MODE - SUPPLY FAN WILL BE RUNNING AND OUTSIDE AIR DAMPER WILL BE OPEN. ROOM SENSOR **TR-1** THROUGH THE METAYS SYSTEM WIL MODULATE CHILLED WATER VALVE **V-C-MAU** TO MAINTAIN ROOM TEMPERATURE SETTING OF EIGHTY (80F).

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF. OUTSIDE AIR DAMPER AND CHILLED WATER VALVE WILL BE CLOSED.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:48 PM
FILE NAME	MAU-2B.vsd

DRAWING TITLE
MAKE-UP AIR UNIT 2B
CLC-2-PANTRY

CLUB LEVEL QUAD B

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/16/97	BY DATE

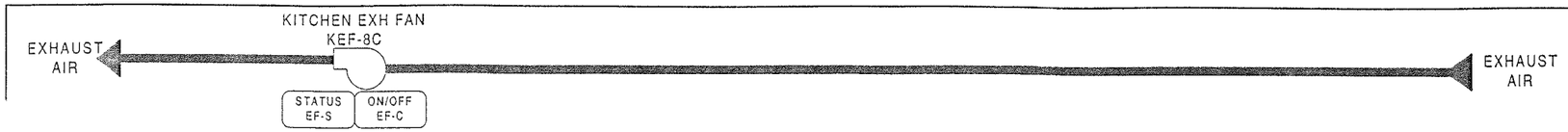
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

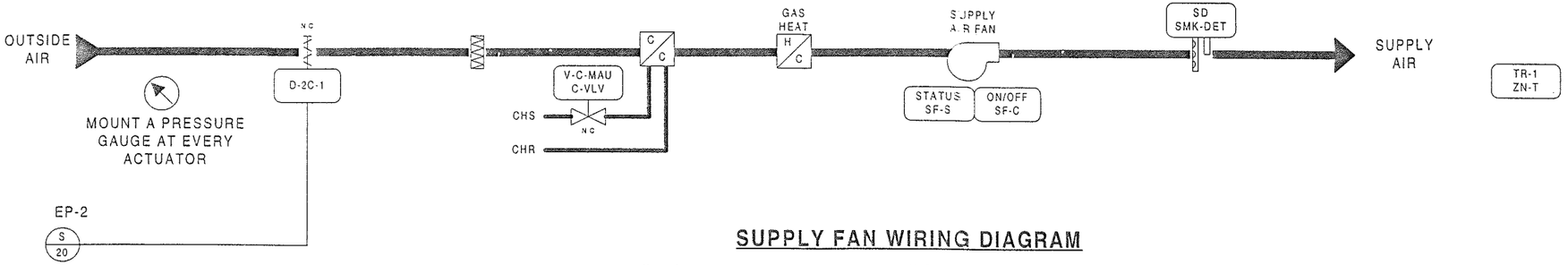
CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-49

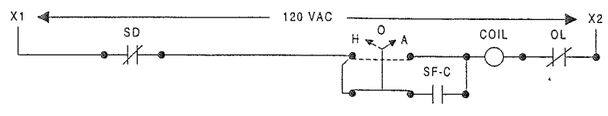
Full Spreadsheet		Software					Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		MAU-2B					UNT						EN-MAU2B	AT UNIT														
		MAU-2B	*				UNT	1	4				EN-MAU2B	AT UNIT	0													Power to Controller
	AI-1	MAU-2B					UNT	1	4	AI-1			EN-MAU2B	AT UNIT	0		MAU2B-4-AI-1											N2 Trunk
	AI-2	MAU-2B					UNT	1	4	AI-2			EN-MAU2B	AT UNIT	0		MAU2B-4-AI-2											
	AI-3	MAU-2B					UNT	1	4	AI-3			EN-MAU2B	AT UNIT	0		MAU2B-4-AI-3											
	AI-4	MAU-2B	ZN-T	Zone Temperature	Deg F		UNT	1	4	AI-4		PHONE JACK	EN-MAU2B	AT UNIT	0		MAU2B-4-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	MAU-2B					UNT	1	4	AI-5			EN-MAU2B	AT UNIT	0		MAU2B-4-AI-5											
	AI-6	MAU-2B					UNT	1	4	AI-6			EN-MAU2B	AT UNIT	0		MAU2B-4-AI-6											
	BI-1	MAU-2B	SF-S	Supply Fan Status	Off	On	UNT	1	4	BI-1		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-4-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	MAU-2B	EF-S	Exh Fan Status	Off	On	UNT	1	4	BI-2		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-4-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	MAU-2B	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	4	BI-3		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-4-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BI-4	MAU-2B					UNT	1	4	BI-4			EN-MAU2B	AT UNIT	0		MAU2B-4-BI-4											
	BO-1	MAU-2B					UNT	1	4	BO-1			EN-MAU2B	AT UNIT	0		MAU2B-4-BO-1											
	BO-2	MAU-2B					UNT	1	4	BO-2			EN-MAU2B	AT UNIT	0		MAU2B-4-BO-2											
	BO-3	MAU-2B	SF-C	Supply Fan Control	Off	On	UNT	1	4	BO-3	RLY	BO#,24V,COM	EN-MAU2B	AT UNIT	0		MAU2B-4-BO-3	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-4	MAU-2B	EF-C	Exh Fan Control	Off	On	UNT	1	4	BO-4		BO#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-4-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-5	MAU-2B					UNT	1	4	BO-5			EN-MAU2B	AT UNIT	0		MAU2B-4-BO-5											
	BO-6	MAU-2B					UNT	1	4	BO-6			EN-MAU2B	AT UNIT	0		MAU2B-4-BO-6											
	AO-1	MAU-2B	C-VLV	Cooling Coil Valve	% Open		UNT	1	4	AO-1		AO#,AOCM,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-4-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	MAU-2B					UNT	1	4	AO-2			EN-MAU2B	AT UNIT	0		MAU2B-4-AO-2											



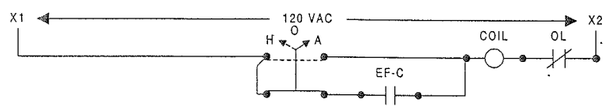
SMOKE DETECTORS SUPPLIED BY DIVISION 16 MOUNTED AND WIRED TO FANS & SMOKE DAMPERS BY JCI

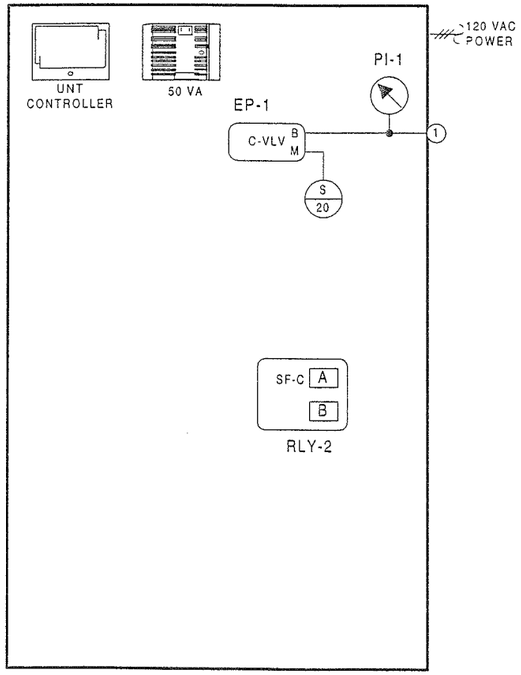


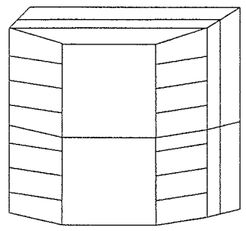
SUPPLY FAN WIRING DIAGRAM



TYPICAL EXHAUST FAN WIRING DIAGRAM







ENCLOSURE EN-MAU-2C
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-3/N2 ADD = 7

BILL OF MATERIALS

Estimate: mau-2c 70520098.pre

Desig.	Qty	Part #	Description
Field Devices:			
D-2C-1	1	---	SEE DAMPER SCHEDULE
	1	D-3153-2	DMPR ACT,8-13#
	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
EF-8C	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
EP-2	1	V11HAA-100	3-W SOLENOID,NO,OV,120VAC
T-1	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
V-C-MAU	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,CRACK
Panel Devices:			
EN-MAU-2C	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CTR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10V,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL HAVE THE ABILITY TO CONTROL INDIVIDUAL CONCESSION COMPONENTS (ON/OFF) AS REQUIRED BY THE MODE OF OPERATION. IN THE OCCUPIED MODE, INDIVIDUAL CONCESSION MAKEUP AIR UNIT **MAU-2C** AND EXHAUST FAN **KEF-8C** WILL START AND RUN CONTINUOUSLY. WHEN THE UNIT AND EXHAUST FANS ARE ENERGIZED, OUTSIDE AIR DAMPER **D-2C-1**, WILL OPEN. ROOM SENSOR **TR-1** WILL CYCLE DIRECT GAS FIRED HEATER TO MAINTAIN ITS SETPOINT. DISCHARGE SENSOR **T-1** WILL MONITOR SUPPLY TEMPERATURE AND PROVE GAS FIRING OF UNIT.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-2C-1** WILL OPEN AND EXHAUST FANS WILL START AND RUN CONTINUOUSLY. THE DIRECT GAS FIRED HEATER WILL BE ACTIVATED BY ZONE SENSOR **TR-1** TO MAINTAIN ITS SETTING OF FIFTY (50F). THE DIRECT GAS FIRED HEATER WILL BE MONITORED BY **T-1**. THE SYSTEM WILL ALARM WHEN ROOM SENSOR **TR-1** DROPS BELOW FIFTY (50F). DIRECT GAS FIRED HEATER CONTROL PANEL WILL BE INTERLOCKED WITH GAS EMERGENCY SHUT OFF SYSTEM ASSOCIATED WITH GAS COOKING EQUIPMENT. AUTOMATIC SHUT-DOWN WILL BE PROVIDED AS REQUIRED BY NFPA.

UNOCCUPIED HEATING MODE - MAKE-UP AIR UNIT AND EXHAUST FANS WILL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER WILL CLOSE. ELECTRIC UNIT HEATERS (WITH BUILT-IN THERMOSTATS) WILL CYCLE (ON/OFF) TO MAINTAIN FIFTY (50F).

OCCUPIED COOLING MODE - SUPPLY FAN WILL BE RUNNING AND OUTSIDE AIR DAMPER WILL BE OPEN. ROOM SENSOR **TR-1** THROUGH THE METAYS SYSTEM WIL MODULATE CHILLED WATER VALVE **V-C-MAU** TO MAINTAIN ROOM TEMPERATURE SETTING OF EIGHTY (80F).

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF. OUTSIDE AIR DAMPER AND CHILLED WATER VALVE WILL BE CLOSED.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION	
NUMBER	
DATE	07/18/00
TIME	03:49 PM
FILE NAME	MAU-2C.vsd

DRAWING TITLE
MAKE-UP AIR UNIT 2C
CLC-3-PANTRY

CLUB LEVEL QUAD C

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/15/97	BY DATE

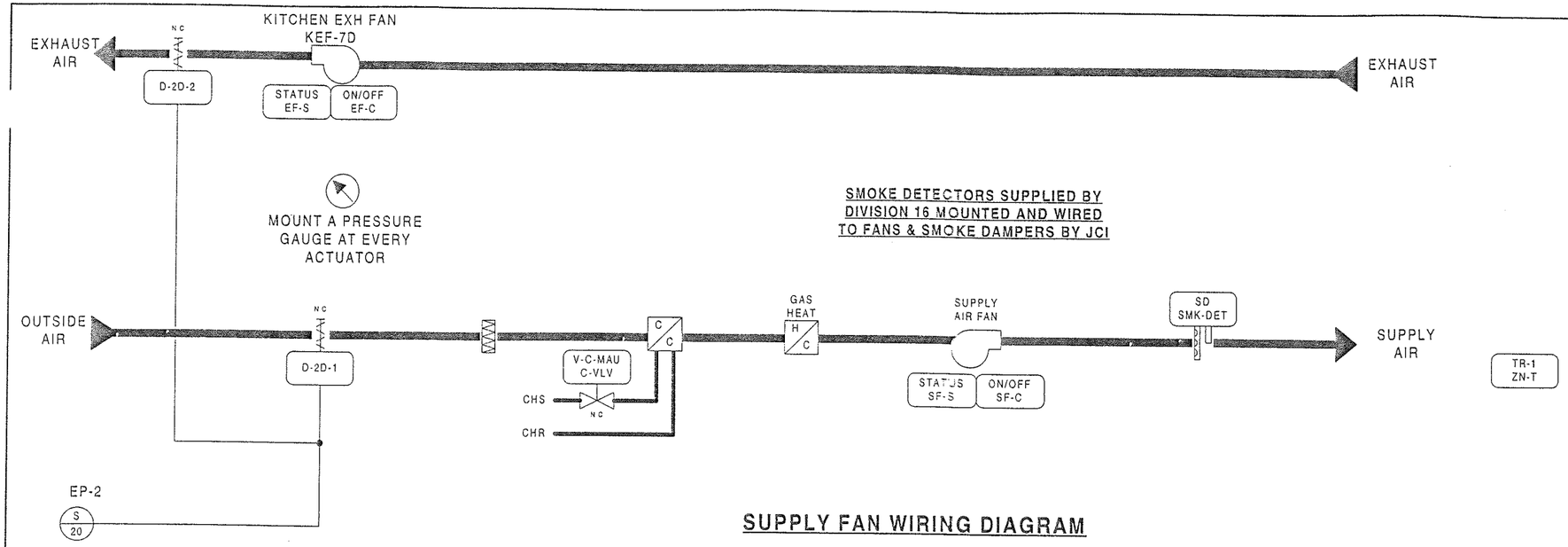
JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-50

Full Spreadsheet		Software					Digital Controller Information					Panel Information					Intermediate Device					Field Device						
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units		DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		MAU-2C					UNT						EN-MAU2C	AT UNIT														Power to Controller
		MAU-2C	*				UNT	1					EN-MAU2C	AT UNIT	0													N2 Trunk
	AI-1	MAU-2C					UNT	1	7	AI-1			EN-MAU2C	AT UNIT	0		MAU2C-7-AI-1											
	AI-2	MAU-2C					UNT	1	7	AI-2			EN-MAU2C	AT UNIT	0		MAU2C-7-AI-2											
	AI-3	MAU-2C					UNT	1	7	AI-3			EN-MAU2C	AT UNIT	0		MAU2C-7-AI-3											
	AI-4	MAU-2C	ZN-T	Zone Temperature	Deg F		UNT	1	7	AI-4		PHONE JACK	EN-MAU2C	AT UNIT	0		MAU2C-7-AI-4					8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-5	MAU-2C					UNT	1	7	AI-5			EN-MAU2C	AT UNIT	0		MAU2C-7-AI-5										
	AI-6	MAU-2C					UNT	1	7	AI-6			EN-MAU2C	AT UNIT	0		MAU2C-7-AI-6										
	BI-1	MAU-2C	SF-S	Supply Fan Status	Off	On	UNT	1	7	BI-1		BI#,24VAC	EN-MAU2C	AT UNIT	0		MAU2C-7-BI-1					2/22	Device dependent	Aux Contact (NO)		U70	
	BI-2	MAU-2C	EF-S	Exh Fan Status	Off	On	UNT	1	7	BI-2		BI#,24VAC	EN-MAU2C	AT UNIT	0		MAU2C-7-BI-2					2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	MAU-2C	SMK-DET	Smoke Detectors	Normal	Alarm	UNT	1	7	BI-3		BI#,24VAC	EN-MAU2C	AT UNIT	0		MAU2C-7-BI-3					2/22	Device dependent	Contact (NO)		U70	
	BI-4	MAU-2C					UNT	1	7	BI-4			EN-MAU2C	AT UNIT	0		MAU2C-7-BI-4										
	BO-1	MAU-2C					UNT	1	7	BO-1			EN-MAU2C	AT UNIT	0		MAU2C-7-BO-1										
	BO-2	MAU-2C					UNT	1	7	BO-2			EN-MAU2C	AT UNIT	0		MAU2C-7-BO-2										
	BO-3	MAU-2C	SF-C	Supply Fan Control	Off	On	UNT	1	7	BO-3	RLY	BO#,24V,COM	EN-MAU2C	AT UNIT	0		MAU2C-7-BO-3	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-4	MAU-2C	EF-C	Exh Fan Control	Off	On	UNT	1	7	BO-4		BO#,24VAC	EN-MAU2C	AT UNIT	0		MAU2C-7-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-5	MAU-2C					UNT	1	7	BO-5			EN-MAU2C	AT UNIT	0		MAU2C-7-BO-5										
	BO-6	MAU-2C					UNT	1	7	BO-6			EN-MAU2C	AT UNIT	0		MAU2C-7-BO-6										
	AO-1	MAU-2C	C-VLV	Cooling Coil Valve	% Open		UNT	1	7	AO-1		AO#,ACCM,24VAC	EN-MAU2C	AT UNIT	0		MAU2C-7-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
	AO-2	MAU-2C					UNT	1	7	AO-2			EN-MAU2C	AT UNIT	0		MAU2C-7-AO-2										

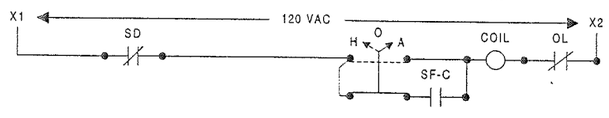


BILL OF MATERIALS

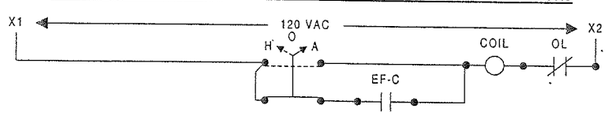
Estimate: mau-2d 70520098.pre

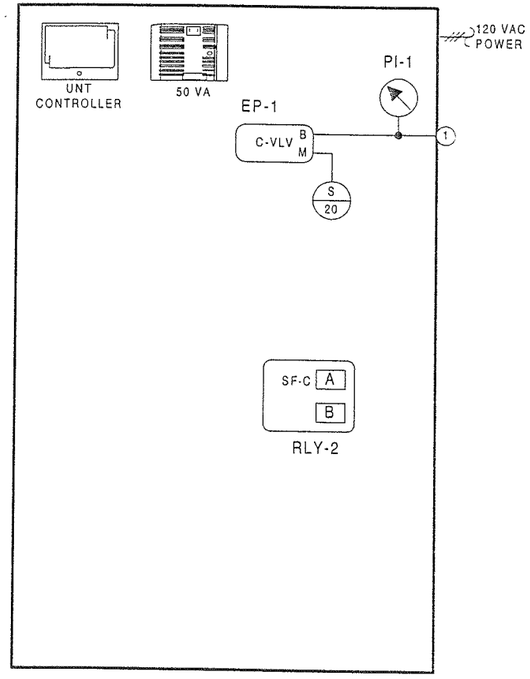
Desig.	Qty	Part #	Description
Field Devices:			
D-2D-1, D-2D-2	2	---	SEE DAMPER SCHEDULE
	2	D-4073-2	DMPR ACT,8-LB
	2	G-2010-11	GAGE,2",0-30 PSIG,STEM
EF-7D	1	BZ-1000-11	ENCL,4-5/8X 5-1/8 X 3-3/8
	1	PD-101-35	RLY BASE,3PDT,11PIN,10A
	1	PD-109-51	RELAY PLUG-IN 3PDT 24VAC
EP-2	1	V11HAA-100	3-W SOLENOID,W/OV,120VAC
T-1	1	TE-6315P-1	SENS,T-Ni,0.1%,8' AVG
V-C-MAU	1	--	SEE VALVE SCHEDULE
ZN-T	1	TE-6410W-1000	MSTAT,NI,BOX,JACK
Panel Devices:			
EN-MAU-2D	1	AS-UNT111-101	UNT111 MTD IN UPM, W/50VA
	1	EN-EXP101-0	UNIV PKG MOD,CVR & BACKBN
EP-1	1	EP-8000-2	XDUCR,EP,0/10W,HI VOL
PI-1	1	G-2010-11	GAGE,2",0-30 PSIG,STEM
RLY-1,2	2	AS-RLY002-0	RELAY; 2SPDT 5 AMP 240VAC

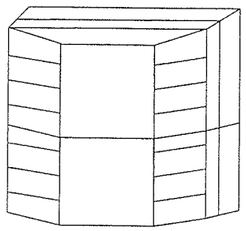
SUPPLY FAN WIRING DIAGRAM



TYPICAL EXHAUST FAN WIRING DIAGRAM







ENCLOSURE EN-MAU-2D
AS-UNT111-101
LOCATED ADJACENT
TO UNIT
NCM-4/N2 ADD = 5

DESCRIPTION OF OPERATION

THE METASYS SYSTEM WILL HAVE THE ABILITY TO CONTROL INDIVIDUAL CONCESSION COMPONENTS (ON/OFF) AS REQUIRED BY THE MODE OF OPERATION. IN THE OCCUPIED MODE, INDIVIDUAL CONCESSION MAKEUP AIR UNIT **MAU-2D** AND EXHAUST FAN **KEF-7D** WILL START AND RUN CONTINUOUSLY. WHEN THE UNIT AND EXHAUST FANS ARE ENERGIZED, OUTSIDE AIR DAMPER **D-2D-1** AND EXHAUST AIR DAMPER **D-2D-2** WILL OPEN. ROOM SENSOR **TR-1** WILL CYCLE DIRECT GAS FIRED HEATER TO MAINTAIN ITS SETPOINT. DISCHARGE SENSOR **T-1** WILL MONITOR SUPPLY TEMPERATURE AND PROVE GAS FIRING OF UNIT.

OCCUPIED HEATING MODE - SUPPLY FAN WILL BE RUNNING. OUTSIDE AIR DAMPER **D-2D-1** AND EXHAUST AIR DAMPER **D-2D-2** WILL OPEN AND EXHAUST FANS WILL START AND RUN CONTINUOUSLY. THE DIRECT GAS FIRED HEATER WILL BE ACTIVATED BY ZONE SENSOR **TR-1** TO MAINTAIN ITS SETTING OF FIFTY (50F). THE DIRECT GAS FIRED HEATER WILL BE MONITORED BY **T-1.** THE SYSTEM WILL ALARM WHEN ROOM SENSOR **TR-1** DROPS BELOW FIFTY (50F). DIRECT GAS FIRED HEATER CONTROL PANEL WILL BE INTERLOCKED WITH GAS EMERGENCY SHUT OFF SYSTEM ASSOCIATED WITH GAS COOKING EQUIPMENT. AUTOMATIC SHUT-DOWN WILL BE PROVIDED AS REQUIRED BY NFPA.

UNOCCUPIED HEATING MODE - MAKE-UP AIR UNIT AND EXHAUST FANS WILL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER WILL CLOSE. ELECTRIC UNIT HEATERS (WITH BUILT-IN THERMOSTATS) WILL CYCLE (ON/OFF) TO MAINTAIN FIFTY (50F).

OCCUPIED COOLING MODE - SUPPLY FAN WILL BE RUNNING AND OUTSIDE AIR DAMPER WILL BE OPEN. ROOM SENSOR **TR-1** THROUGH THE METAYS SYSTEM WIL MODULATE CHILLED WATER VALVE **V-C-MAU** TO MAINTAIN ROOM TEMPERATURE SETTING OF EIGHTY (80F).

UNOCCUPIED COOLING MODE - SYSTEM IS DE-ENERGIZED AND FANS ARE OFF. OUTSIDE AIR DAMPER AND CHILLED WATER VALVE WILL BE CLOSED.

SMOKE CONTROL - SMOKE DETECTORS WILL, ON THE DETECTION OF PRODUCTS OF COMBUSTION, SHUT DOWN THE SUPPLY AND EXHAUST FANS AND CLOSE ALL SYSTEM DAMPERS.

REVISION INFORMATION	NUMBER	DATE	TIME	FILE NAME
		07/18/00	03:50 PM	MAU-2D.vsd

DRAWING TITLE
MAKE-UP AIR UNIT 2D
CLC-4-PANTRY

CLUB LEVEL QUAD D

PROJECT TITLE
BALTIMORE NFL STADIUM
AT CAMDEN YARDS

BALTIMORE, MARYLAND

AS-BUILT				7/18/00	CME
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN	APPROVED
JDP	WJT	RTS	BY RTS DATE 09/16/97	BY DATE

JOHNSON CONTROLS
Systems & Services Division

Branch Information
JOHNSON CONTROLS
60 LOVETON CIRCLE
SPARKS, MD 21152

CONTRACT NUMBER
7052-0098

DRAWING NUMBER
BL-6559-51

Full Spreadsheet		Software				Digital Controller Information						Panel Information					Intermediate Device					Field Device					
Tag	Point Type	System Name	Object Name	Expanded ID	Display Units	DC Type	N2 Trunk	N2 Addr	Cable Destination Bay/Terminal	Module Type	Termination	Panel	Panel Location	Slot Number	Reference Drawing	Cable Number	Wiring/Tubing	Termination In	Device	Termination Out	Location	Wiring/Tubing	Terminations	Device	Location	Ref Detail	Comment
		MAU-2D				UNT						EN-MAU2B	AT UNIT														
		MAU-2D	*			UNT	1		5			EN-MAU2B	AT UNIT	0													Power to Controller
	AI-1	MAU-2D				UNT	1		5 AI-1			EN-MAU2B	AT UNIT	0													N2 Trunk
	AI-2	MAU-2D				UNT	1		5 AI-2			EN-MAU2B	AT UNIT	0		MAU2B-5-AI-1											
	AI-3	MAU-2D				UNT	1		5 AI-3			EN-MAU2B	AT UNIT	0		MAU2B-5-AI-2											
	AI-4	MAU-2D	ZN-T	Zone Temperature	Deg F	UNT	1		5 AI-4		PHONE JACK	EN-MAU2B	AT UNIT	0		MAU2B-5-AI-3											
	AI-5	MAU-2D				UNT	1		5 AI-5			EN-MAU2B	AT UNIT	0		MAU2B-5-AI-4						8/26	PHONE JACK	TE-6410W-1000		U2	
	AI-6	MAU-2D				UNT	1		5 AI-6			EN-MAU2B	AT UNIT	0		MAU2B-5-AI-5											
	BI-1	MAU-2D	SF-S	Supply Fan Status	Off On	UNT	1		5 BI-1		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-5-AI-6											
	BI-2	MAU-2D	EF-S	Exh Fan Status	Off On	UNT	1		5 BI-2		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-5-BI-1						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-3	MAU-2D	SMK-DET	Smoke Detectors	Normal Alarm	UNT	1		5 BI-3		BI#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-5-BI-2						2/22	Device dependent	Aux Contact (NO)		U70	
	BI-4	MAU-2D				UNT	1		5 BI-4			EN-MAU2B	AT UNIT	0		MAU2B-5-BI-3						2/22	Device dependent	Contact (NO)		U70	
	BO-1	MAU-2D				UNT	1		5 BO-1			EN-MAU2B	AT UNIT	0		MAU2B-5-BI-4											
	BO-2	MAU-2D				UNT	1		5 BO-2			EN-MAU2B	AT UNIT	0		MAU2B-5-BO-1											
	BO-3	MAU-2D	SF-C	Supply Fan Control	Off On	UNT	1		5 BO-3		RLY BO#,24V,COM	EN-MAU2B	AT UNIT	0		MAU2B-5-BO-2											
	BO-4	MAU-2D	EF-C	Exh Fan Control	Off On	UNT	1		5 BO-4		BO#,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-5-BO-3	3/18	A,COILS,COM	RELAY-A	NO,COM		2/14	See starter detail	Starter (NO)-(sw lo)		U60	
	BO-5	MAU-2D				UNT	1		5 BO-5			EN-MAU2B	AT UNIT	0		MAU2B-5-BO-4			PD-109-51			2/18	Device dependent	24VAC OUT (sw lo)		U51	
	BO-6	MAU-2D				UNT	1		5 BO-6			EN-MAU2B	AT UNIT	0		MAU2B-5-BO-5											
	AO-1	MAU-2D	C-VLV	Cooling Coil Valve	% Open	UNT	1		5 AO-1		AO#,AOCM,24VAC	EN-MAU2B	AT UNIT	0		MAU2B-5-BO-6											
	AO-2	MAU-2D				UNT	1		5 AO-2			EN-MAU2B	AT UNIT	0		MAU2B-5-AO-1	2/18	+,-	EP-8000-2	SUPPLY, O		3/18	Device dependent	0-10V OUT		U23	
																MAU2B-5-AO-2											

Damper Schedule

Tag				Damper Information								Duct Size		Damper Size				Actuator Information							
Item	System	Service	Ref. Dwg.	Qty.	Code No.	Fail Pos.	Dmpr. Type	Dmpr. Oper.	Blade Type	Bear. Type	Seals	W (in.)	H (in.)	W (in.)	H (in.)	Area (ft²)	Mtg.	Qty.	Code No.	Pilot	Type	Control Signal	Mtg.	Coupld. Detail	Comments
D-1-1A	AHU-1	Min Out Air	M.3-09	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	17"	148"	17"	17.5		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
D-1-1B	AHU-1	Max Out Air	M.3-09	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	28"	148"	28"	28.8		1	D-3153-1	D-9502	Pneu	8-13#			
				1	COPAS-370X280									37"	28"	7.2		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X280									37"	28"	7.2									
				1	COPAS-370X280									37"	28"	7.2									
				1	COPAS-370X280									37"	28"	7.2									
D-1-2	AHU-1	Return Air	M.3-09	1	COPAS-600X320		Control	Opposed	Double	Acetal	Standard	60"	32"	60"	32"	13.3		1	D-3153-1	D-9502	Pneu	8-13#			
D-1-3	AHU-1	Relief Air	M.3-09	1	COPAS-360X300		Control	Opposed	Double	Acetal	Standard	36"	30"	36"	30"	7.5		1	D-3153-1	D-9502	Pneu	8-13#			
D-2-1A	AHU-2	Min Out Air	M.3-10	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	30"	148"	30"	30.8		1	D-3153-1	D-9502	Pneu	8-13#			
				1	COPAS-370X300									37"	30"	7.7		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X300									37"	30"	7.7									
				1	COPAS-370X300									37"	30"	7.7									
				1	COPAS-370X300									37"	30"	7.7									
D-2-1B	AHU-2	Max Out Air	M.3-10	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	42"	148"	42"	43.2		1	D-3153-1	D-9502	Pneu	8-13#			
				1	COPAS-370X420									37"	42"	10.8		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X420									37"	42"	10.8									
				1	COPAS-370X420									37"	42"	10.8									
				1	COPAS-370X420									37"	42"	10.8									
D-2-2	AHU-2	Return Air	M.3-10	1	COPAS-740X300		Control	Opposed	Double	Acetal	Standard	74"	30"	74"	30"	15.4		1	D-3153-1	D-9502	Pneu	8-13#			
D-2-3	AHU-2	Relief Air	M.3-10	1	COPAS-600X360		Control	Opposed	Double	Acetal	Standard	60"	36"	60"	36"	15.0		1	D-3153-1	D-9502	Pneu	8-13#			
D-3-1A	AHU-3	Min Out Air	M.3-11	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	27"	148"	27"	27.8		1	D-3153-2	D-9502	n/a	8-13#			
				1	COPAS-370X270									37"	27"	6.9									
				1	COPAS-370X270									37"	27"	6.9									
				1	COPAS-370X270									37"	27"	6.9									
				1	COPAS-370X270									37"	27"	6.9									
D-3-1B	AHU-3	Max Out Air	M.3-11	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	45"	148"	45"	46.3		1	D-3153-1	D-9502	Pneu	8-13#			
				1	COPAS-370X450									37"	45"	11.6		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X450									37"	45"	11.6									
				1	COPAS-370X450									37"	45"	11.6									
				1	COPAS-370X450									37"	45"	11.6									
D-3-2	AHU-3	Return Air	M.3-11	1	COPAS-800X300		Control	Opposed	Double	Acetal	Standard	80"	30"	80"	30"	16.7		1	D-3153-1	D-9502	Pneu	8-13#			
D-3-3	AHU-3	Relief Air	M.3-11	1	COPAS-540X420		Control	Opposed	Double	Acetal	Standard	54"	42"	54"	42"	15.8		1	D-3153-1	D-9502	Pneu	8-13#			
D-4-1A	AHU-4	Min Out Air	M.3-12	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	17"	148"	17"	17.5		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
				1	COPAS-370X170									37"	17"	4.4									
D-4-1B	AHU-4	Max Out Air	M.3-12	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	148"	28"	148"	28"	28.8		1	D-3153-1	D-9502	Pneu	8-13#			
				1	COPAS-370X280									37"	28"	7.2		1	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-370X280									37"	28"	7.2									
				1	COPAS-370X280									37"	28"	7.2									
				1	COPAS-370X280									37"	28"	7.2									
D-4-2	AHU-4	Return Air	M.3-12	1	COPAS-600X280		Control	Opposed	Double	Acetal	Standard	60"	28"	60"	28"	11.7		1	D-3153-1	D-9502	Pneu	8-13#			
D-4-3	AHU-4	Relief Air	M.3-12	1	COPAS-600X280		Control	Opposed	Double	Acetal	Standard	60"	28"	60"	28"	11.7		1	D-3153-1	D-9502	Pneu	8-13#			

Damper Schedule

Tag				Damper Information								Duct Size		Damper Size				Actuator Information							
Item	System	Service	Ref. Dwg.	Qty.	Code No.	Fail Pos.	Dmpr. Type	Dmpr. Oper.	Blade Type	Bear. Type	Seals	W (in.)	H (in.)	W (in.)	H (in.)	Area (ft²)	Mtg.	Qty.	Code No.	Pilot	Type	Control Signal	Mtg.	Coupld. Detail	Comments
D-9-3	AHU-9	Relief Air	M.3-13	1	COPAS-380X180		Control	Opposed	Double	Acetal	Standard	38"	18"	38"	18"	4.8		1	D-3153-2	n/a	Pneu	8-13#			
D-9-4	AHU-9	Bypass Air	M.3-13	1	COPAS-300X160		Control	Opposed	Double	Acetal	Standard	30"	16"	30"	16"	3.3		1	D-3153-1	D-9502	Pneu	8-13#			
	"A" Press MER	VF-25 Intake	M.3-09	1	COPAS-320X320		Control	Opposed	Double	Acetal	Standard	32"	32"	32"	32"	7.1		1	D-4073-2	n/a	Pneu	8-13#			
	"B" Press MER	VF-25 Intake	M.3-10	1	COPAS-320X320		Control	Opposed	Double	Acetal	Standard	32"	32"	32"	32"	7.1		1	D-4073-2	n/a	Pneu	8-13#			
	"C" Press MER	VF-25 Intake	M.3-11	1	COPAS-320X320		Control	Opposed	Double	Acetal	Standard	32"	32"	32"	32"	7.1		1	D-4073-2	n/a	Pneu	8-13#			
	"D" Press MER	VF-25 Intake	M.3-12	1	COPAS-240X240		Control	Opposed	Double	Acetal	Standard	24"	24"	24"	24"	4.0		1	D-4073-2	n/a	Pneu	8-13#			
	"B" Plant MER	VF-24 Intake	M.3-17	2	COPAS-360X360		Control	Opposed	Double	Acetal	Standard	36"	36"	36"	36"	9.0		1	D-4073-2	n/a	Pneu	8-13#			
	"B" Plant MER	VF-11,12,13	M.3-17	1	COPAS-960X360		Control	Opposed	Double	Acetal	Standard	96"	36"	96"	36"	24.0		1	D-3153-2	n/a	Pneu	8-13#			
	"B" Plant MER	VF-11 Exh	M.3-17	1	COPAS-720X720		Control	Opposed	Double	Acetal	Standard	72"	72"	72"	72"	36.0		2	D-3153-1	D-9502	Pneu	8-13#			
	"B" Plant MER	VF-12 Exh	M.3-17	1	COPAS-720X720		Control	Opposed	Double	Acetal	Standard	72"	72"	72"	72"	36.0		2	D-3153-1	D-9502	Pneu	8-13#			
	"B" Plant MER	VF-13 Exh	M.3-17	1	COPAS-720X720		Control	Opposed	Double	Acetal	Standard	72"	72"	72"	72"	36.0		2	D-3153-1	D-9502	Pneu	8-13#			
	Elev Core MER	Out Intake	M.3-26	4	COPAS-360X360		Control	Opposed	Double	Acetal	Standard	36"	36"	36"	36"	9.0		1	D-4073-2	n/a	Pneu	8-13#			
	Elev Core MER	VF-30 Exh	M.3-26	4	COPAS-300X300		Control	Opposed	Double	Acetal	Standard	30"	30"	30"	30"	6.3		1	D-4073-2	n/a	Pneu	8-13#			
D-24-1	AHU-24	Outside Air	M.2-02C	1	COPAS-160X140		Control	Opposed	Double	Acetal	Standard	16"	14"	16"	14"	1.6		1	D-4073-2	n/a	Pneu	8-13#			
D-25-1	AHU-25	Outside Air	M.2-02D	1	COPAS-160X140		Control	Opposed	Double	Acetal	Standard	16"	14"	16"	14"	1.6		1	D-4073-2	n/a	Pneu	8-13#			
D-26-1	AHU-26	Outside Air	M.3-10	1	COPAS-160X140		Control	Opposed	Double	Acetal	Standard	16"	14"	16"	14"	1.6		1	D-4073-2	n/a	Pneu	8-13#			
D-5-1	"A" Smoke Intake	Outside Air	M.2-04A	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	192"	64"	192"	64"	85.3		1	D-3153-1	D-9502	Pneu	8-13#			
			M.4-03	1	COPAS-480X640									48"	64"	21.3		3	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-480X640									48"	64"	21.3									
				1	COPAS-480X640									48"	64"	21.3									
				1	COPAS-480X640									48"	64"	21.3									
D-7-1	"B" Smoke Intake	Outside Air	M.2-04B	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	192"	108"	192"	108"	144.0		2	D-3153-1	D-9502	Pneu	8-13#			
			M.4-03	1	COPAS-480X540									48"	54"	18.0		5	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
D-10-1	"C" Smoke Intake	Outside Air	M.2-04C	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	192"	108"	192"	108"	144.0		6	D-3153-1	D-9502	Pneu	8-13#			
			M.4-03	1	COPAS-480X540									48"	54"	18.0		5	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
				1	COPAS-480X540									48"	54"	18.0									
D-11-1	"D" Smoke Intake	Outside Air	M.2-04D	-	(Coupled Damper)		Control	Opposed	Double	Acetal	Standard	192"	64"	192"	64"	85.3		1	D-3153-1	D-9502	Pneu	8-13#			
			M.4-03	1	COPAS-480X640									48"	64"	21.3		3	D-3153-2	n/a	Pneu	8-13#			
				1	COPAS-480X640									48"	64"	21.3									
				1	COPAS-480X640									48"	64"	21.3									
				1	COPAS-480X640									48"	64"	21.3									
D-2A-1	MAU-2A	Outside Air		1	COPAS-840X600		Control	Opposed	Single	Acetal	Standard	84"	60"	84"	60"	35.0		2	D-3153-2		Pneu	8-13#			
D-2B-1	MAU-2B	Outside Air		1	COPAS-360X360		Control	Opposed	Double	Acetal	Standard	36"	36"	36"	36"	9.0		1	D-4073-2		Pneu	8-13#			
D-2C-1	MAU-2C	Outside Air		1	COPAS-360X360		Control	Opposed	Double	Acetal	Standard	36"	36"	36"	36"	9.0		1	D-4073-2		Pneu	8-13#			
D-2D-1	MAU-2D	Outside Air		1	COPAS-360X360		Control	Opposed	Double	Acetal	Standard	36"	36"	36"	36"	9.0		1	D-4073-2		Pneu	8-13#			
	KEF-7D	Exhaust Air		1	COPAS-360X240		Control	Opposed	Double	Acetal	Standard	36"	24"	36"	24"	6.0		1	D-4073-2		Pneu	8-13#			
27-1	AHU-27	Outside Air		1	COPAS-360X720		Control	Opposed	Double	Acetal	Standard	36"	72"	36"	72"	18.0		1	D-3153-2	n/a	Pneu	8-13#			
D-27-2	AHU-27	Return Air		1	COPAS-400X300		Control	Opposed	Double	Acetal	Standard	40"	30"	40"	30"	8.3		1	D-3153-2	n/a	Pneu	8-13#			
D-27-3	GEF-9A	Exhaust Air		1	COPAS-240X240		Control	Opposed	Double	Acetal	Standard	24"	24"	24"	24"	4.0		1	D-4073-2	n/a	Pneu	8-13#			