REPLACE AIR CONDITIONING

BUILDING - 1

TINKER A.F.B.

AHU #	JCI DWG#	LOCATION ROOM#	SERVES	MECHANICAL CHANGES	TEMPERATURE CONTROL CHANGES
1	2	142	142	Replace AHU	Install new controls
2	-	141	print shop	Replace coil only	No control changes specified
3	1	north of 121	Admin. West 1st floor	Replace AHU	Install new controls
4	1	283	Admin. East 2nd floor	Replace AHU	Install new controls
5	3	171	170	Replace AHU	Install new controls
6		230	Mezzanine	Replace AHU	No control changes specified
7	3	171	161	Replace AHU	Install new controls
8	3	171	160	Replace AHU	Install new controls
9	1	109	Admin. Cent. 1st floor	Replace AHU	Install new controls
10	1	107	Admin. West 1st floor	Replace AHU	Install new controls
11	1	120	Admin. West 1st floor	Replace AHU	Install new controls
12	1	120	Admin. West 1st floor	Replace AHU	Install new controls
13		102	102	EXISTING	No control changes specified
14	2	114	Admin. East 1st floor	Replace AHU	Install new controls
15	1	114	Admin. East 1st floor	Replace AHU	Install new controls
16	1	114	Admin. East 1st floor	Replace AHU	Install new controls
17	1	114	Admin. East 1st floor	Replace AHU	Install new controls
18	1	147	print shop	Replace AHU	Install new controls
19		102	102	EXISTING	No conrol changes specified
20		warehouse	Area "A"	Replace AHU	No control changes specified
21	1	108	Admin. Cent. 1st floor	Replace AHU	Install new controls
22	1	108	Admin. Cent. 1st floor	Replace AHU	Install new controls
23	1	108	Admin. Cent. 1st floor	Replace AHU	Install new controls
24	1	108	Admin. Cent. 1st floor	Replace AHU	Install new controls
25	1	100	Admin. West 1st floor	Replace AHU	Install new controls
26	1	100	Admin. West 1st floor	Replace AHU	Install new controls
27	2	100	Admin. West 1st floor	Replace AHU	Install new controls
28	1	100	Admin. West 1st floor	Replace AHU	Install new controls
29	1	200A	Admin. West 2nd floor	Replace AHU	Install new controls
30	1	200A	Admin. West 2nd floor	Replace AHU	Install new controls
31	1	200A	Admin. West 2nd floor	Replace AHU	Install new controls
32	1	200A	Admin. West 2nd floor	Replace AHU	Install new controls
33	1	roof of 208	Admin. Cent. 2nd floor	Replace AHU	Install new controls
34	1	218	Admin. East 2nd floor	Replace AHU	Install new controls
35	1	218	Admin. East 2nd floor	Replace AHU	Install new controls
36	1	218	Admin. East 2nd floor	Replace AHU	Install new controls
37	1	218	Admin. East 2nd floor	Replace AHU	Install new controls

JOHNSON CONTROLS

Prime source of problem-solving systems.

- ■ Environmental Control System
- ☐ JC/80 Building Automation System
- ☐ Fire Alarm And Smoke Detection System
- ☐ Security System
- ☐ Time System
- ☐ Emergency Lighting System
- ☐ Communication System
- ☐ Integrated Motor Control Center
- ☐ Air And Water Systems Balancing
- ☐ Instrumentation System Installation
- ☐ Water Treatment System
- ☐ Building Operations Management
- ☐ Energy Conservation Control
- ☐ Programmed Maintenance For:
  - Temperature And Humidity Control
  - Control Center
  - Heating System
  - Refrigeration And Air Conditioning System
  - Fire Alarm And Smoke Detection System
  - Security System
  - Clock System
  - Lighting System
  - Communication System
  - Electrical Equipment
  - Rooftop Unit
  - Air Filter Replacement
  - Coil Cleaning
  - Water Treatment

Project

REPLACE POWER DISTRIBUTION,
LIGHTS AND AIR CONDITIONING.
BUILDING - 1
TINKER A.F.B.

Legend

- HANGING PIPE TYPE AND SIZE
- HANGING PIPE TYPE AND SIZE
- HIGH PRESSURE AIR SUPPLY TYPE AND PSIG
- AIR LINE OR ELECTRICAL WIRE
- CONNECTED LINES OR WIRES
- CROSSING LINES OR WIRES NOT CONNECTED
- ELECTRIC WIRE IN CONDUIT STROKES INDICATE NO. OF WIRES
- INSTRUMENT IDENTIFICATION NUMBER
- PNEUMATIC TUBE TERMINAL WITH APPROPRIATE NUMBER
- ELECTRICAL WIRE TERMINAL WITH APPROPRIATE NUMBER
- SPECIAL TERMINALS WITH APPROPRIATE NUMBER MUST BE IDENTIFIED IN DRAWING
- ITEM LOCATED IN CONTROL PANEL
- ITEM LOCATED IN MOTOR STARTER
- ITEM LOCATED AT A.C. UNIT
- ITEM LOCATED ON PANEL FACE
- OPTIONAL LOCATION
- IN-LINE RESTRICTOR .007"
- IN-LINE RESTRICTOR .005"
- BULB TYPE TEMPERATURE SENSING ELEMENT
- AVERAGING TYPE TEMPERATURE SENSING ELEMENT
- VAPOR TENSION TEMPERATURE SENSING ELEMENT
- BULB TYPE TEMPERATURE SENSING ELEMENT LOCATED UNDER SHIELD IN OUTSIDE AIR
- BULB TYPE TEMPERATURE SENSING ELEMENT LOCATED INSIDE SEPARABLE SOCKET WELL
- AIR PRESSURE GAGE
- DRAWING REVISION SYMBOL WITH APPROPRIATE NUMBER USE NUMBERS 1 2 3-ETC
- CONTINUATION SYMBOL FROM ONE SHEET TO ANOTHER USE LETTERS A,B,C -ETC

Abbreviations

COLOR ABBREVIATIONS

AMB	Amber
BLU	Blue
BLK	Black
BRN	Brown
GLD	Gold
GRN	Green
GRY	Gray
ORN	Orange
PNK	Pink
RED	Red
SIL	Silver
VIO	Violet
WHT	White
YEL	Yellow

A

AC	Air Conditioning
A.C.	Alternating Current
ADJ	Adjust
AHU	Air Handling Unit
ALT	Alternate
AMP	Ampere
ASP	Aspirate, Aspirating
ASSN	Association
ASSY	Assembly
AUTH	Authority
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AWG	American Wire Gage

B

B	Bandwidth
BLDG	Building
BRD	Board
BRKR	Breaker
BRKT	Bracket
BTU	British Thermal Unit
BTUH	British Thermal Unit per Hour

C

C	Celsius, Centigrade
CAP	Capillary
CB	Circuit Breaker
C/C	Cooling Coil
CFM	Cubic Feet Per Minute
CHWR	Chilled Water Return
CHWS	Chilled Water Supply
CIRC	Circulating
CKT	Circuit
CL	Close, Closed
CLG	Cooling
COL	Column
COM	Common
COMPR	Compressor
CON	Contactor
COND	Condensor
CONV	Convector or Converter
Cv	Flow Coefficient
CWR	Condenser Water Return
CWS	Condenser Water Supply

D

Δ (Delta)	Difference
DB	Dry Bulb
D.C.	Direct Current
DHW	Domestic Hot Water
DIA	Diameter
DIFF	Differential, Difference
DIR	Direct Acting
DISC	Disconnect
DISCH. A	Discharge Air
D-N	Day-Night
DPR	Damper
D.R.	Direct Readjustment
DWG	Drawing
DX	Direct Expansion

E

EDR	Equivalent Direct Radiation
ELEC.	Electric or Electronic
ENCL	Enclosure, Enclosed
ENGR	Engineer
EQUIP	Equipment
EVAP.	Evaporator
EXH. A	Exhaust Air
EXP. V	Expansion Valve

F

F	Fahrenheit
F & BYP	Face and Bypass
FCU	Fan Coil Unit
FLG	Flange
FPM	Feet Per Minute
F.P.T.	Female Pipe Thread
FT	Foot
FTG	Fitting
FVNR	Full Voltage Non-Reversing

G

GA	Gage
GAL	Gallon
GD	Guard
GPM	Gallons Per Minute
GL	Globe
GRD	Ground

H

H	Hot
H/C	Heating Coil
HL	High Limit
HOA	Hand-Off-Automatic
HP	High Pressure, Horsepower
HTG	Heating
HTR	Heater
HFIER	Humidifier
H & V	Heating & Ventilating
HWR	Hot Water Return
HWS	Hot Water Supply

I

IC	Interrupting Capacity
ICC	Integrated Control Center
ID	Inside Diameter
IN	Inch
IND	Indicator
IPS	Iron Pipe Size

J

JB	Junction Box
JCI	Johnson Controls, Inc.

K

KO	Knockout
KW	Kilowatt

L

LB	Pound
LIQ	Liquid
LL	Low Limit
LPS	Low Pressure Steam

M

MAN	Manual
MAX	Maximum
MBH	1000 BTU/Hour
MCC	Motor Control Center
MECH	Mechanic, Mechanical
MFR	Manufacturer
MIN	Minimum
M.P.T.	Male Pipe Thread
MTD	Mounted
MTG	Mounting
MZ	Multi-Zone

N

N	Neutral
N.C.	Normally Closed
NEG	Negative
NEMA	National Electrical Manufacturers Assn.
N.O.	Normally Open
NPT	National Pipe Thread

O

O.A.	Outside Air
OCC	Occupied
OD	Outside Diameter
OL	Overload
OPR	Operator

P

P	Pilot
PHT	Preheat
PL	Pilot Light
PNEU	Pneumatic
PNL	Panel
POS	Positive, Position, Positioner
SPEC	Plug-in Relay
P.R.	Pressure
PRESS	Proportional
PROP	Pressure Reducing Valve
PRV	Pounds Per Square Inch
PSI	Pounds Per Square Inch (Gage)
PSIG	Point
PT	

R

R	Relay
RAD	Radiation
RECIRC	Recirculate
REFRIG	Refrigeration
REQD	Required
RET. A	Return Air
REV	Reverse Acting
RH	Relative Humidity
RHT	Reheat
RM	Room
RPM	Revolutions Per Minute
RR	Reverse Readjustment

S

S	Supply
SC	Screwed
SCFM	Standard Cubic Feet per Minute
SCIM	Standard Cubic Inches per Minute
SCR	Silicon Controlled Rectifier
SENS	Sensitivity
SEP. SOC	Separable Socket (Well)
SEQ	Sequence
SP	Static Pressure
SPEC	Specification
SPG	Spring
SPKR	Speaker
SS	Stainless Steel
STD	Standard
STM	Steam
SUM	Summer
SYM	Symmetricoil
SYS	System

T

TEMP	Temperature
TRANS	Transmitter

U

UH	Unit Heater
UL	Underwriters' Laboratories, Inc.
UN	Union
UNOCC	Unoccupied
UV	Unit Ventilator

V

V	Volt
VA	Volt Amperes
VEL	Velocity
VOL	Volume

W

W/	With
WB	Wet Bulb
WIN	Winter
W/O	Without

X

XFMR	Transformer

TUBING

CU(H)	Hard Copper
CU(S)	Soft Copper
PE	Single Polyethylene (Black)
PE(A)	Bundled Polyethylene (Armored)
PE(C)	Bundled Polyethylene (Poly-Cor)
PE(D)	Bundled Polyethylene (Dekabon)
PU	Polyurethane

Architect
BASE
CIVIL ENGINEERING

Engineer
BASE
CIVIL ENGINEERING

Contractor
INDUSTRIAL
MECHANICAL

Revision	ECN	Date
CHANGE ORDER		1-22-85

Johnson Controls, Inc.

4310 N. COOPER
OKLAHOMA CITY, OK.
73118

T1 - 1 - F 7 - 221

OC 9-9

Sales Engr.	Appl. Engr.	Date	Contract No.
D.R.	C.T.	10-18-84	4031-0053

1088

[redacted]

FORM NO. 1759 REV 9 76
(BES-45-5 07)

ISSUE A☐ B☐ C☐ D☐ E☐ F☐ G☐ H☐ J☐ K☐ L☐ M☐ N☐ O☐ P☐ Q☐ R☐ S☐ T☐ U☐ V☐ W☐ X☐ Y☐ Z☐

JOHNSON CONTROLS

VALVE SCHEDULE

PROJECT/ADDRESS: BUILDING 1

REPLACE AIR CONDITIONING

TINKER AIR FORCE BASE

BUILDING DESIGNATION : LOGISTICS COMMAND

MECHANICAL ENGINEER : BASE CIVIL ENGINEERING

MECHANICAL CONTRACTOR: INDUSTRIAL MECHANICAL

SHEET NO: 1 OF 1

CONTRACT NO: 4031-0053

PREPARED BY: C. TARTAGLIONE

DATE : 1-24-85

BRANCH : OKLA.CITY

TAG ITEM	SYSTEM	SERVICE	QUAN.	FAIL POS. OPN	FAIL POS. CLOSE	VALVE CODE NUMBER	BODY STYLE	SIZE	Cv	CAPACITY GPM	DIFF PRES	ACTUATOR INFO. TYPE	PIPING DETAIL	RANGE
TU-1	AHU-1	CHW	1	X		V-4322-1034	SCREW	2	30.0	57.0	3.61	3-WAY	D	9-13
TU-2	AHU-1	HHW	1	X		V-4324-1007	SCREW	1	13.9	21.0	2.28	3-WAY	D	4-8
TU-3	AHU-1	CHG-OVR	1	HHW		V-5842-7	FLNGE	2 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-3	CHW	1	X		V-4322-1032	SCREW	1 1/2	21.0	31.0	2.18	3-WAY	D	9-13
TU-2	AHU-3	HHW	1	X		V-4324-1002	SCREW	1/2	4.4	5.0	1.29	3-WAY	D	4-8
TU-3	AHU-3	CHG-OVR	1	HHW		V-4322-1034	SCREW	2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-4	CHW	1	X		V-4324-1008	SCREW	1	13.9	17.0	1.49	3-WAY	D	9-13
TU-2	AHU-4	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	12.0	1.94	3-WAY	D	4-8
TU-3	AHU-4	CHG-OVR	1	HHW		V-4322-1032	SCREW	1 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-5	CHW	1		X	V-4322-1034	SCREW	2	30.0	53.0	3.12	3-WAY	A	9-13
TU-2	AHU-5	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	15.0	3.04	3-WAY	D	4-8
TU-3	AHU-5	CHG-OVR	1	HHW		V-5842-9	FLNGE	3	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-6	CHW	1	X		V-4324-1008	SCREW	1	13.9	23.0	2.73	3-WAY	D	9-13
TU-2	AHU-6	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	13.0	2.29	3-WAY	D	4-8
TU-3	AHU-6	CHG-OVR	1	HHW		V-4322-1032	SCREW	1 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-7	CHW	1		X	V-4322-1034	SCREW	2	30.0	48.0	2.56	3-WAY	A	9-13
TU-2	AHU-7	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	9.0	1.10	3-WAY	D	4-8
TU-3	AHU-7	CHG-OVR	1	HHW		V-5842-9	FLNGE	3	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-8	CHW	1		X	V-4322-1032	SCREW	1 1/2	21.0	32.0	2.32	3-WAY	A	9-13
TU-2	AHU-8	HHW	1	X		V-4324-1002	SCREW	1/2	4.4	7.0	2.53	3-WAY	D	4-8
TU-3	AHU-8	CHG-OVR	1	HHW		V-5842-7	FLNGE	2 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-11	CHW	1	X		V-4322-1032	SCREW	1 1/2	21.0	37.0	3.10	3-WAY	D	9-13
TU-2	AHU-11	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	12.0	1.95	3-WAY	D	4-8
TU-3	AHU-11	CHG-OVR	1	HHW		V-5842-7	FLNGE	2 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-12	CHW	1	X		V-4322-1032	SCREW	1 1/2	21.0	37.0	3.10	3-WAY	D	9-13
TU-2	AHU-12	HHW	1	X		V-4324-1005	SCREW	3/4	8.6	12.0	1.95	3-WAY	D	4-8
TU-3	AHU-12	CHG-OVR	1	HHW		V-4322-1034	SCREW	2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-18	CHW	1	X		V-4324-1006	SCREW	3/4	8.6	12.0	1.95	3-WAY	D	9-13
TU-2	AHU-18	HHW	1	X		V-4324-1002	SCREW	1/2	4.4	6.0	1.86	3-WAY	D	4-8
TU-3	AHU-18	CHG-OVR	1	HHW		V-4322-1032	SCREW	1 1/2	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-A	CHW	1	X		V-5842-7	FLNGE	2 1/2	54.0	74.0	1.88	3-WAY	D	9-13
TU-2	AHU-A	HHW	1	X		V-4324-1008	SCREW	1	13.9	27.0	3.77	3-WAY	D	4-8
TU-3	AHU-A	CHG-OVR	1	HHW		V-5842-9	FLNGE	3	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-B	CHW	1	X		V-5842-7	FLNGE	2 1/2	54.0	67.0	1.54	3-WAY	D	9-[illegible]
TU-2	AHU-B	HHW	1	X		V-4324-1007	SCREW	1	13.9	18.2	1.71	3-WAY	D	4-8
TU-3	AHU-B	CHG-OVR	1	HHW		V-5842-9	FLNGE	3	-----LINE SIZE-----			3-WAY	R	9-1[illegible]
TU-1	AHU-C	CHW	1	X		V-5842-7	FLNGE	2 1/2	54.0	77.0	2.03	3-WAY	D	9-13
TU-2	AHU-C	HHW	1	X		V-4322-1032	SCREW	1 1/2	21.0	30.0	2.04	3-WAY	D	9-13
TU-3	AHU-C	CHG-OVR	1	HHW		V-5842-9	FLNGE	3	-----LINE SIZE-----			3-WAY	R	9-13
TU-1	AHU-D	CHW	1	X		V-5842-7	FLNGE	2 1/2	54.0	64.1	1.41	3-WAY	D	9-13
TU-2	AHU-D	HHW	1	X		V-4324-1006	SCREW	3/4	8.6	14.0	2.65	3-WAY	D	9-13
TU-3	AHU-D	CHG-OVR	1	HHW		V-5842-9	SCREW	3	-----LINE SIZE-----			3-WAY	R	9-13
TU-4	A-1	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	1.8	.67	3-WAY	D	4-8
TU-4	A-2	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.1	.91	3-WAY	D	4-8
TU-4	A-3	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.6	1.40	3-WAY	D	4-8
TU-4	A-4	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.5	1.55	3-WAY	D	4-8
TU-4	A-5	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	3.4	2.39	3-WAY	D	4-8
TU-4	A-6	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	3.1	1.99	3-WAY	D	4-8
TU-4	C-1	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	1.8	.67	3-WAY	D	4-8
TU-4	C-2	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.1	.91	3-WAY	D	4-8
TU-4	C-3	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	3.1	1.99	3-WAY	D	4-8
TU-4	C-4	BOOSTER	1	X		V-4324-1002	SCREW	1/2	4.4	4.5	1.10	3-WAY	D	4-8
TU-4	C-5	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.1	.91	3-WAY	D	4-8
TU-4	C-6	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	2.1	.91	3-WAY	D	4-8
TU-4	C-7	BOOSTER	1	X		V-4324-1001	SCREW	1/2	2.2	.9	.18	3-WAY	D	4-8
TU-4	D-1	BOOSTER	1	X		V-4324-1002	SCREW	1/2	4.4	6.0	1.86	3-WAY	D	4-8
TV-5	VAV-6	REHEAT	3	X		V-3754-1020	2-WAY	1/2"	2.2	3	1.86	SCREW	V-3000	X 3-6
TV-5	VAV-7	REHEAT	3	X		V-3754-1020	2-WAY	1/2"	2.2	2.5	1.29	SCREW	V-3000	X 3-6
TV-5	VAV-8	REHEAT	6	X		V-3754-1020	2-WAY	1/2"	2.2	4.7	4.56	SCREW	V-3000	X 3-6
TV-5	VAV-9	REHEAT	1	X		V-3754-1021	2-WAY	1/2"	4.4	8.75	3.95	SCREW	V-3000	X 3-6
V-1	HW/CHW	change over	1		X HW X CHW	JCMA 368	3-WAY	8"	LINE	SIZE			D-3246-1	X 8-13
V-2	CHW	shut off	1		X	JCMA 268	2-WAY	8"	LINE	SIZE			D-3246-1	X 8-13
V-3	HW/CHW	change over	1		X HW X CHW	JCMA 368	3-WAY	8"	LINE	SIZE			D-3246-1	X 8-13
V-4	HHW	shut off	1	X		JCMA 268	2-WAY	8"	LINE	SIZE			D-3246-1	X 8-13
V-5	HHW	steam	1		X	V-5462-7	2-WAY	2½"	54	3310	19.3	FLG	5R	X 3-15
V-6	CW	shut off	1		X	JCMA 268	2-WAY	8"	LINE	SIZE			D-3246-1	X 8-13
V-7	CW	bypass	1		X CT	JCMA 368	3-WAY	8"	LINE	SIZE			D-3246-2	X 3-15

2

JOHNSON CONTROLS

FORM 1326 REV. 6-82 BEIMS 45-4-04

DAMPER SCHEDULE

NOTES:
- All sizes shown are nominal. Allowance should be made for duct clearance

PROJECT ADDRESS: REPLACE AIR CONDITIONING, BUILDING #1, TINKER AFB, OKLAHOMA

BUILDING DESIGNATION

MECHANICAL CONTRACTOR: INDUSTRIAL MECHANICAL

SHEET METAL CONTRACTOR

SHEET NO 1 OF 1

CONTRACT NO 4031-0053

PREPARED BY C. TARTAGLIONE

DATE 10-15-84

BRANCH OKLAHOMA

TAG Item	SYSTEM	SERVICE	DAMPER INFORMATION Quan.	Fail Pos. Open	Fail Pos. Close	Damper Type	Damper Size** W	Damper Size** H	* Refer to Install. Detail	ACTUATOR INFORMATION Quan.	Code No.	Pilot Yes	Pilot No	Actuator Range	Mounting W	Mounting F	Mounting Other	REMARKS
D-1	AHU-3	EXHAUST	1		X	OPPOSED BLADE	48	28		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-4	EXHAUST	1		X	OPPOSED BLADE	28	16		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-5	EXHAUST	1		X	OPPOSED BLADE	48	24		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-6	EXHAUST	1		X	OPPOSED BLADE	72	18		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-7	EXHAUST	1		X	OPPOSED BLADE	48	24		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-8	EXHAUST	1		X	OPPOSED BLADE	40	20		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-11	EXHAUST	1		X	OPPOSED BLADE	46	34		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-12	EXHAUST	1		X	OPPOSED BLADE	46	34		1	D-3073-2		X	8-13	X			RUSKIN CD-35
D-1	AHU-18	EXHAUST	1		X	OPPOSED BLADE	38	20		1	D-3073-2		X	8-13	X			RUSKIN CD-35

APPROVED BY

DATE

* SEE ACCOMPANYING FORM 1015 FOR COUPLED DAMPER INSTALLATION DETAILS

**SIZES SHOWN ARE NOMINAL — SEE REVERSE SIDE FOR ACTUAL DIMENSIONS

CONTROL AIR SYSTEM

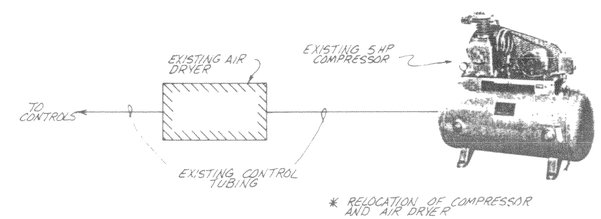
The intent of this project is to reuse the existing control air system including the existing 5HP air compressor, air dryer, and any necessary existing control air lines. The existing control air system must be capable of providing 33,454 SCIM'S of free air at 80 pounds per square inch and must be clean and dry. Installation of existing compressors and existing air dryer shall conform to ANSI B19.3. Existing air dryer will be located at the outlet of the tank. Air lines for pneumatic controls will be seamless copper tubing or non-metallic tubing. Piping will be concealed except in mechanical rooms or areas where other piping is exposed or not feasible to be concealed. Tubing will be periodically tested for leaks during installation and all tubing will be free of installation impurities and moisture before connecting to the control instruments.

Copper tubing will be hard-drawn in exposed areas and either hard-drawn or annealed in concealed areas. Where copper tubing is run exposed, each tube will be secured at regular intervals and will run parallel to the line of the building. Only tool-made bends will be acceptable. Fittings for copper tubing will be brass or copper solder joint-type except at connections to apparatus, where fittings will be brass compression-type.

Tubing concealed in walls containing insulation, fill, or other packing materials will be hard-drawn copper tubing or non-metallic tubing run in conduit. Terminal single lines will be hard-drawn copper tubing, except if the run is less than 12", flexible polyethylene may be used.

Non-metallic tubing will be compounded from ployethylene, meeting the stress crack test of ASTM D 1693. Individual tube ployethylene or multi-tube instrument tubing bundle will be classified as flame retardant in UL 94 and the polyethylene material will be rated as self-extinguishing when treated in accordance with ASTM D 635. Non-metallic tubing will not be used for applications where the tubing could be subjected to temperatures exceeding 130°F. Fittings for polyethylene tubing will be for instrument service and may be brass or acetal resin of the compression or barb push-on type. Tubing will be number coded or color coded and keyed to the submittal drawings for future identification and servicing the control system. Non-metallic tubing will be run within adequately supported, covered rigid metallic raceway or electric metallic tubing except as indicated. Multi-tube instrument bundle may be used in place of single tube where a number of tubes run to the same points. Factory manufactured bundles of polyethylene tubing, with protective outer sheath, will be installed without an additional raceway or protective enclosure envelope.

The tube carrier system (covered rigid metallic raceway, electric metallic tubing, or sheathed multi-bundle tubing) will be installed in a workmanlike manner, parallel to building lines, adequately supported, etc. All connections except for terminal connections to valves, damper actuators, etc., will be made inside the raceway or protective enclosure, junction boxes, or control cabinets.



ROOM 142

T1 - 1 - F 7 - 215

DRAWING TITLE: VALVE & DAMPER SCHEDULE MISC.

REFERENCE DRAWINGS	NO	REVISION - LOCATION	ECN	DATE	BY
	2	REVISED VALVE SCHEDULE		2-25-85	C.T.
	1	CHANGE ORDER		1-22-85	C.T.

SALES ENGR: D. RIGHTHOUSE; APPLICATION ENGR: C. TARTAGLIONE; DRAWN: BY M.H. DATE 10-22-84; APPROVED: BY ___ DATE ___

PROJECT: T.A.F.B. BLDG. #1 RENOVATION

JOHNSON CONTROLS Systems & Services Division, 4310 N. COOPER, OKC, OK 73118

OC-9-9

CONTRACT NUMBER 4031-0053

DRAWING NUMBER 78 OF 88

22" x 34" ORIGINAL

FORM NO. 1753D (BES 48-5.01)

[redacted]

JOHNSON CONTROLS

VALVE SCHEDULE

Form 1334 Rev 2-77 (BES 45-4.05)

PROJECT/ADDRESS	REPLACE AIR CONDITIONING BUILDING #1 TINKER AFB, OKLAHOMA
BUILDING DESIGNATION	
MECHANICAL ENGINEER	Base Civil Engineering
MECHANICAL CONTRACTOR	Industrial Mechanical
SHEET NO	1 OF 3
CONTRACT NO	4031-0053
PREPARED BY	C. Tartaglione
DATE	10-15-84
BRANCH	Oklahoma City

TAG				VALVE INFORMATION												ACTUATOR INFO.			
ITEM	SYSTEM	SERVICE	Reference Drawing No.	QUAN.	FAIL POS. Open	FAIL POS. Close	VALVE CODE NO	BODY STYLE	SIZE	C_v	CAPACITY GPM	CAPACITY #/HR	ΔP PSI	PIPING DETAILS	ACTUATOR TYPE	PILOT YES	PILOT NO	Range
TV-1	AHU-1	HW/CHW		1	X		V-3752-1048	2-WAY	2"	26	58		4.97	SCREW	V-3000		X	3-6
TV-1	AHU-3	HW/CHW		1	X		V-3754-1023	2-WAY	1"	13.9	32		5.29	SCREW	V-3000		X	3-6
TV-1	AHU-4	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	17		3.91	SCREW	V-3000		X	3-6
TV-1	AHU-5	HW/CHW		1	X		V-3752-1048	2-WAY	2"	26	53		4.15	SCREW	V-3000		X	3-6
TV-1	AHU-7	HW/CHW		1	X		V-3752-1047	2-WAY	1½"	20	40.2		4.04	SCREW	V-3000		X	3-6
TV-1	AHU-8	HW/CHW		1	X		V-3754-1023	2-WAY	1"	13.9	31.8		5.23	SCREW	V-3000		X	3-6
TV-1	AHU-9	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	17.8		4.28	SCREW	V-3000		X	3-6
TV-1	AHU-10	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	17.8		4.28	SCREW	V-3000		X	3-6
TV-1	AHU-11	HW/CHW		1	X		V-3754-1023	2-WAY	1"	13.9	31.6		5.16	SCREW	V-3000		X	3-6
TV-1	AHU-12	HW/CHW		1	X		V-3754-1023	2-WAY	1"	13.9	31.6		5.16	SCREW	V-3000		X	3-6
	AHU-13	EXISTING UNIT TO REMAIN UNCHANGED																
TV-1	AHU-14	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	11.6		1.82	SCREW	V-3000		X	
TV-1	AHU-15	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	16		3.46	SCREW	V-3000		X	
TV-1	AHU-16	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	16		3.46	SCREW	V-3000		X	
TV-1	AHU-17	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	16		3.46	SCREW	V-3000		X	3-6
TV-1	AHU-18	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	15		3.04	SCREW	V-3000		X	3-6
	AHU-19	EXISTING UNIT TO REMAIN UNCHANGED																
TV-1	AHU-21	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	7		2.53	SCREW	V-3000		X	3-6
TV-1	AHU-22	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	7		2.53	SCREW	V-3000		X	3-6
TV-1	AHU-23	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	7		2.53	SCREW	V-3000		X	3-6
TV-1	AHU-24	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	7		2.53	SCREW	V-3000		X	3-6
TV-1	AHU-25	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	15.4		3.21	SCREW	V-3000		X	3-6
TV-1	AHU-26	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.1		4.28	SCREW	V-3000		X	3-6
TV-1	AHU-27	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	15.4		3.21	SCREW	V-3000		X	3-6
TV-1	AHU-28	HW/CHW		1	X		V-3754-1022	2-WAY	3/4"	8.6	15.4		3.21	SCREW	V-3000		X	3-6
TV-1	AHU-29	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	8.6		3.82	SCREW	V-3000		X	3-6
TV-1	AHU-30	HW/CHW		1	X		V-3754-±011	2-WAY	3/4"	8.6	15.4		3.21	SCREW	V-3000		X	3-6
TV-1	AHU-31	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.6		4.76	SCREW	V-3000		X	3-6
TV-1	AHU-32	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.6		4.76	SCREW	V-3000		X	3-6
TV-1	AHU-33	HW/CHW		1	X		V-3752-1043	2-WAY	2"	26	55.3		4.52	SCREW	V-3000		X	3-6
TV-1	AHU-34	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.4		4.56	SCREW	V-3000		X	3-6
TV-1	AHU-35	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.4		4.56	SCREW	V-3000		X	3-6
TV-1	AHU-36	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.4		4.56	SCREW	V-3000		X	3-6
TV-1	AHU-37	HW/CHW		1	X		V-3754-1021	2-WAY	½"	4.4	9.4		4.56	SCREW	V-3000		X	3-6
TV-2	VAV-6	REHEAT		3	X		V-3754-1020	2-WAY	1/2"	2.2	3		1.86	SCREW	V-3000		X	3-6
TV-2	VAV-7	REHEAT		3	X		V-3754-1020	2-WAY	1/2"	2.2	2.5		1.29	SCREW	V-3000		X	3-6
V-1	HW/CHW	change over		1	X HW	X CHW	JCMA 368	3-WAY	8"	LINE	SIZE				D-3246-1		X	8-13
V-2	CHW	shut off		1		X	JCMA 268	2-WAY	8"	LINE	SIZE				D-3246-1		X	8-13
V-3	HW/CHW	change over		1	X HW	X CHW	JCMA 368	3-WAY	8"	LINE	SIZE				D-3246-1		X	8-13
V-4	HHW	shut off		1	X		JCMA 268	2-WAY	8"	LINE	SIZE				D-3246-1		X	8-13
V-5	HHW	steam		1		X	V-5462-7	2-WAY	2½"	54		3310	19.3	FLG	5R	X		3-15
V-6	CW	shut off		1		X	JCMA 268	2-WAY	8"	LINE	SIZE				D-3246-1		X	8-13
V-7	CW	bypass		1		X CT	JCMA 368	3-WAY	8"	LINE	SIZE				D-3246-2	X		3-15

JOHNSON CONTROLS

FORM 1326 REV. 6/82 BEIMS 45-4.04

DAMPER SCHEDULE

NOTES:
- All sizes shown are nominal. Allowance should be made for duct clearance.

PROJECT/ADDRESS	REPLACE AIR CONDITIONING BUILDING #1 TINKER AFB, OKLAHOMA
BUILDING DESIGNATION	
MECHANICAL CONTRACTOR	INDUSTRIAL MECHANICAL
SHEET METAL CONTRACTOR	
SHEET NO.	1 OF 3
CONTRACT NO.	4031-0053
PREPARED BY	C. Tartaglione
DATE	10-15-84
BRANCH	Oklahoma

TAG			DAMPER INFORMATION								ACTUATOR INFORMATION								
Item	SYSTEM	SERVICE	Quan.	Fail Pos. Open	Fail Pos. Close	Damper Type	Damper Size** W	Damper Size** H	* Refer to Install. Detail		Quan.	Code No.	Pilot Yes	Pilot No	Actuator Range	Mounting W	Mounting F	Mounting Other	REMARKS
----	AHU-1	----------				DAMPERS NOT REQUIRED													
	AHU 2																		RUSKIN CD-35
D-1	AHU-3	EXHAUST	1		X	OPPOSED BLADE	48	28			1	D-251-405		X	8-13	X			
D-1	AHU-4	EXHAUST	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-5	EXHAUST	1		X	OPPOSED BLADE	48	24			1	D-251-405		X	8-13	X			
	AHU-6																		
D-1	AHU-7	EXHAUST	1		X	OPPOSED BLADE	48	24			1	D-251-405		X	8-13	X			
D-1	AHU-8	EXHAUST	1		X	OPPOSED BLADE	40	20			1	D-251-405		X	8-13	X			
D-1	AHU-9	EXHAUST	1		X	OPPOSED BLADE	34	28			1	D-251-405		X	8-13	X			
D-1	AHU-10	EXHAUST	1		X	OPPOSED BLADE	38	20			1	D-251-405		X	8-13	X			
D-1	AHU-11	EXHAUST	1		X	OPPOSED BLADE	46	34			1	D-251-405		X	8-13	X			
D-1	AHU-12	EXHAUST	1		X	OPPOSED BLADE	46	34			1	D-251-405		X	8-13	X			
	AHU-13	EXHAUST				EXISTING UNIT TO REMIAN UNCHANGED													
	AHU-14	----------				DAMPERS NOT REQUIRED													
D-1	AHU-15	EXHAUST AIR	1		X	OPPOSED BLADE	22	17			1	D-251-405		X	8-13	X			
D-1	AHU-16	EXHAUST AIR	1		X	OPPOSED BLADE	20	17			1	D-251-405		X	8-13	X			
D-1	AHU-17	EXHAUST AIR	1		X	OPPOSED BLADE	26	14			1	D-251-405		X	8-13	X			
D-1	AHU-18	EXHAUST AIR	1		X	OPPOSED BLADE	38	20			1	D-251-405		X	8-13	X			
	AHU-19	----------				EXISTING UNIT TO REMAIN UNCHANGED													
	AHU-20																		
D-1	AHU-21	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-22	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-23	EXHAUST AIR	1		X	OPPOSED BLADE	38	16			1	D-251-405		X	8-13	X			
D-1	AHU-24	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-25	EXHAUST AIR	1		X	OPPOSED BLADE	24	14			1	D-251-405		X	8-13	X			
D-1	AHU-26	EXHAUST AIR	1		X	OPPOSED BLADE	24	14			1	D-251-405		X	8-13	X			
D-1	AHU-27	----------				DAMPERS NOT REQUIRED													
D-1	AHU-28	EXHAUST AIR	1		X	OPPOSED BLADE	24	14			1	D-251-405		X	8-13	X			
D-1	AHU-29	EXHAUST AIR	1		X	OPPOSED BLADE	24	16			1	D-251-405		X	8-13	X			
D-1	AHU-30	EXHAUST AIR	1		X	OPPOSED BLADE	24	14			1	D-251-405		X	8-13	X			
D-1	AHU-31	EXHAUST AIR	1		X	OPPOSED BLADE	24	20			1	D-251-405		X	8-13	X			
D-1	AHU-32	EXHAUST AIR	1		X	OPPOSED BLADE	24	20			1	D-251-405		X	8-13	X			
D-1	AHU-33	EXHAUST AIR	1		X	OPPOSED BLADE	46	30			1	D-251-405		X	8-13	X			
D-1	AHU-34	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-34	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-35	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-36	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			
D-1	AHU-37	EXHAUST AIR	1		X	OPPOSED BLADE	28	16			1	D-251-405		X	8-13	X			

APPROVED BY: DATE

CONTROL AIR SYSTEM

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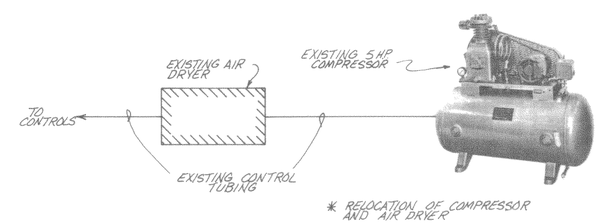


ROOM 142

T1 - 1 - F 7 - 214

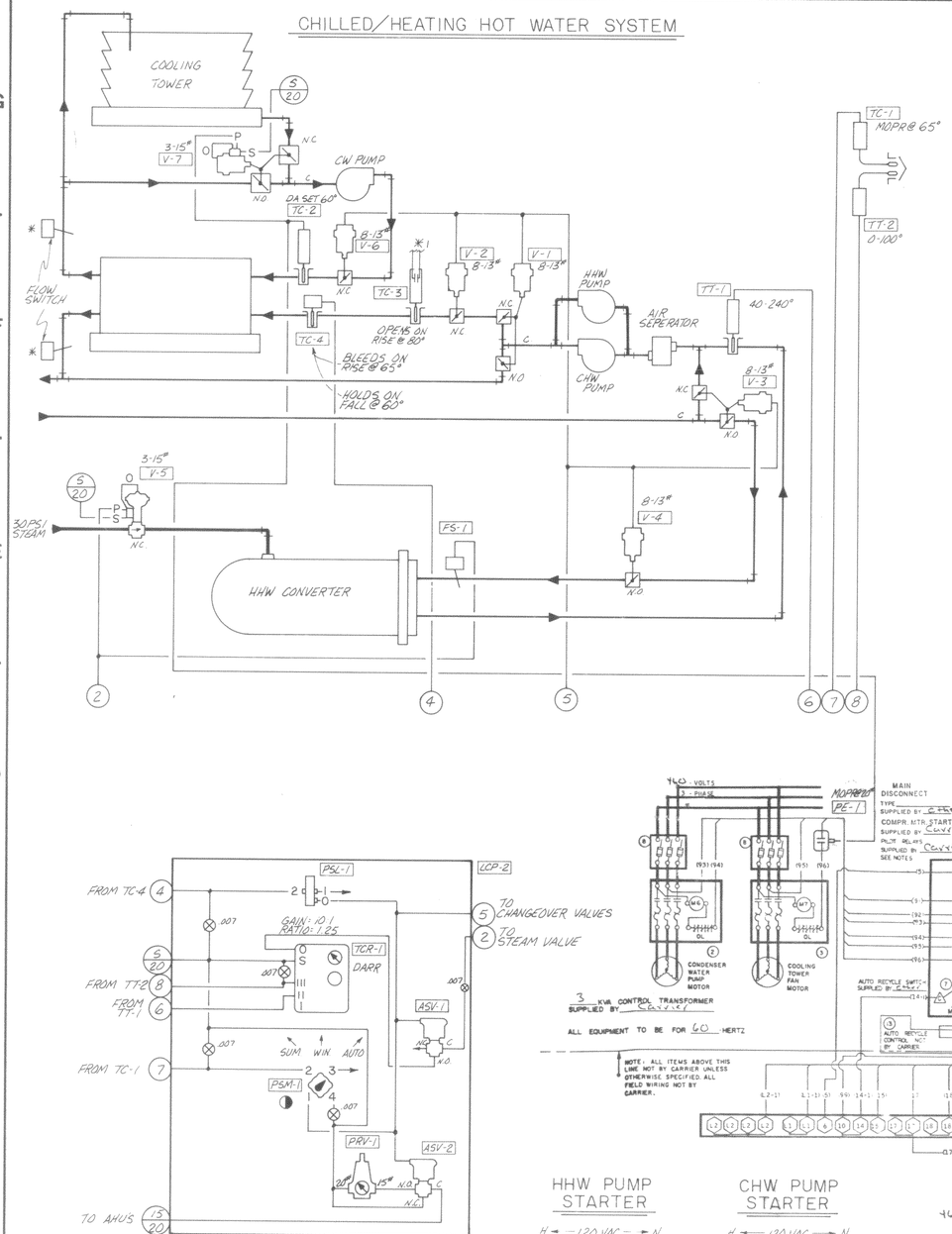
DRAWING TITLE: VALVE & DAMPER SCHEDULE MISC.	REFERENCE DRAWINGS	NO.	REVISION – LOCATION	ECN	DATE / BY
	SALES ENGR: D. RIGHTHOUSE	APPLICATION ENGR: C. TARTAGLIONE	DRAWN: BY M.H. DATE 10-22-84	APPROVED: BY / DATE	
PROJECT: T.A.F.B. BLDG. #1 RENOVATION	JOHNSON CONTROLS Systems & Services Division	4310 N. COOPER OKC, OK. 73118	OC-9-9	CONTRACT NUMBER 4031-0053	DRAWING NUMBER 88 OF 88

FORM NO. 1752D (BES 45-6.01)

22" x 34" ORIGINAL

[redacted]

CHILLED/HEATING HOT WATER SYSTEM



PSM-1 SCHEDULE

SUM	WIN	AUTO
1-4	1-3	1-2
20#	0#	

ASV-1&2 SCHEDULE
PILOT: 20# = SUM / C TO N.C. / 20#.
PILOT: 0# = WIN / C TO N.O. / 15#.

TCR-1 RESET SCHEDULE

II HWS		III O.A.		OUTPUT
TEMP	PSI	TEMP	PSI	
180	11.4	20	5.4	9#
130	8.4	40	7.8	9#
80	5.4	60	10.2	9#

SEQUENCE OF OPERATIONS

COOLING OPERATION

CHW PUMP WILL START THROUGH ACTION OF PE-3.
WHEN SUMMER/WINTER SWITCH PSM-1 IS IN THE SUMMER POSITION, SYSTEM WILL BE IN THE SUMMER MODE. WHEN PSM-1 IS IN THE AUTO POSITION, MODE OF OPERATION WILL BE CONTROLLED BY OUTSIDE AIR THEMEROSTAT TC-1. WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 65°, SYSTEM WILL BE IN THE SUMMER MODE OF OPERATION. HEATING/COOLING CHANGEOVER VALVES, V-1 AND V-3, WILL BE CLOSED TO THE HEATING HOT WATER CONVERTER AND OPENED TO THE CHILLER CHILLER SHUT OFF VALVE V-2 WILL OPEN TO THE CHILLER AND CONDENSED WATER SHUT OFF VALVE V-6 WILL BE OPENED TO THE CHILLER. HEATING HOT WATER SHUT OFF VALVE V-4 WILL BE CLOSED TO THE HEATING HOT WATER CONVERTER. CONDENSED WATER PUMP WILL START AND CHILLER WILL START IF FLOW IS PRESENT IN THE CHILLED WATER AND CONDENSED WATER LINES IF THE WATER TEMPERATURE ENTERING THE CHILLER IS BELOW 80°, AS SENSED BY TC-3, CHILLER WILL START.

CHILLER AND CHILLED WATER TEMPERATURE WILL BE MAINTAINED BY PACKAGED CHILLER CONTROLS.

CONDENSED WATER PUMP WILL BE STARTED THROUGH CHILLER PACKAGED CONTROLS. CONDENSED WATER BYPASS VALVE V-7 AND COOLING TOWER FAN WILL BE SEQUENCED TO MAINTAIN 60° CONDENSER WATER TEMPERATURE ENTERING THE CHILLER THROUGH ACTION OF TEMPERATURE CONTROLLER TC-2 AND PRESSURE ELECTRIC SWITCH PE-1. COOLING TOWER FAN WILL BE DE-ENERGIZED WHENEVER BYPASS VALVE V-7 IS BYPASSING THE COOLING TOWER.

HEATING OPERATION

HHW PUMP WILL START THROUGH ACTION OF PE-2.
WHEN SUMMER/WINTER SWITCH PSM-1 IS IN THE WINTER POSITION, SYSTEM WILL BE IN THE WINTER MODE. WHEN SUMMER/WINTER SWTICH PSM-1 IS IN THE AUTO MODE, SYSTEM WILL BE IN THE WINTER MODE WHENEVER THE OUTSIDE AIR TEMPERATURE AS SENSED BY TC-1 IS BELOW 65°F. HEATING/COOLING CHANGEOVER VALVES, V-1 AND V-3, WILL CLOSE TO THE CHILLER AND OPEN TO THE HEATING HOT WATER CONVERTER. CHILLER BYPASS VALVE V-2 AND COOLING TOWER BYPASS VALVE V-6 WILL BE CLOSED TO THE CHILLER AND HEATING HOT WATER CONVERTER BYPASS VALVE V-4 WILL OPEN TO THE HEATING HOT WATER CONVERTER. TEMPERATURE CONTROLLER TCR-1 WILL MODULATE STEAM VALVE V-5 TO MAINTAIN HOT WATER SUPPLY TEMPERATURE AS SENSED BY TEMPERATURE TRANSMITTER TT-1 AND RESET BY OUTDOOR AIR TEMPERATURE AS SENSED BY TEMPERATURE TRANSMITTER TT-2, ACCORDING TO TCR-1 RESET SCHEDULE. STEAM VALVE V-5 WILL BE CLOSED WHEN IN THE SUMMER MODE. FLOW SWITCH FS-1 WILL CLOSE STEAM VALVE V-5 IF THERE IS NO FLOW.

SYSTEM CHANGEOVER

WHEN SUMMER/WINTER SWITCH PSM-1 IS IN THE SUMMER POSITION, ALL AIR HANDLING UNITS WILL BE INDEXED TO THE SUMMER MODE. WHEN PSM-1 IS IN THE WINTER POSITION, AIR HANDLING UNITS WILL BE INDEXED TO THE WINTER MODE. WHEN PSM-1 IS IN THE AUTO POSITION, CHANGEOVER WILL OCCUR AT 65° OUTSIDE AIR TEMP THROUGH ACTION OF TC-1. AIR HANDLING UNITS WILL NOT SWITCH TO SUMMER MODE UNITL CHILLED WATER RETURN TEMP DROPS BELOW 80° AS SENSED BY TC-4. TIME DELAY RELAYS TDR-1&2 WILL PROVIDE FOR A TIME DELAY BETWEEN CHW & HHW PUMPS.

BILL OF MATERIAL

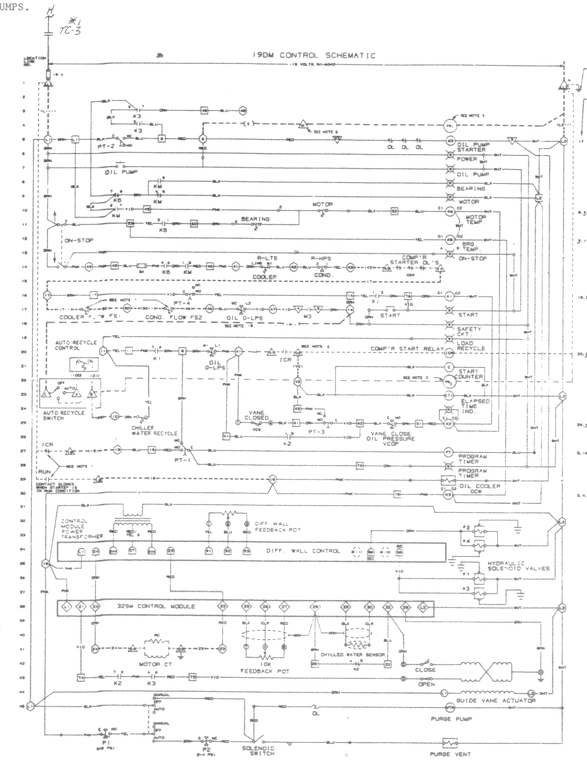
ITEM NO.	QTY.	DIV.	CODE NO.	DESCRIPTION	RANGE SETTING	REMARKS
V1-7	7			SEE VALVE SCHEDULE		
TC-1	1		A40EA-4	OUTSIDE AIR THERMOSTAT		ACC A
TC-2	1		T-8000-3	TEMPERATURE CONTROLLER		ACC D
TC-3	1		A19ABC-24	TEMPERATURE LIMIT		ACC B, E
TT-1	1		T-5210-1004	TEMPERATURE TRANSMITTER		ACC D
TT-2	1		T-5210-1114	TEMPERATURE TRANSMITTER		ACC A
PE-1			P10BJ-1	PRESSURE-ELECTRIC SWITCH		
TC-4	1		A40GA-2	TEMPERATURE CONTROLLER		ACC C, E
LCP-2	1		M8100-1824	LOCAL CONTROL PANEL		
TCR-1	1		T-9002-1	RECEIVER CONTROLLER		
ASV-1	1		V-6135-1	AIR SWITCHING VALVE		
ASV-2	1		V-4324-1002	AIR SWITCHING VALVE		
PSM-1	1		S-233-1	SUMMER/WINTER SWITCH		
PRV-1	1		R-130-5	PRESSURE REDUCING VALVE		
TDR-1&2	2		TIME DELAY ON	TIME DELAY RELAY		
PE-2&3	2		P10BC-7	PE SWITCH		
FS-1	1		F-40EA-1	FLOW SWITCH		

ACCESSORIES:

A	1		SHL 10A-603	SHIELD	
B	1		WEL14A-602R	WELL	
C	1		WEL17A-601R	WELL	
D	2		T-800-1605	WELL	
E	2		FTG13A-600R	FITTING	

ACCESSORIES:

FORM 1184 B REV. 8/73 BES-45-4.10 PRINTED IN U.S.A.



NOTES

1. CONTROL CIRCUIT MUST BE GROUNDED EITHER AT THE SOURCE WITH THE GROUNDED CONDUCTOR CONNECTED TO THE TERMINAL L12 IN THE STARTER OR, IF CONTROL POWER IS TAKEN FROM AN UNGROUNDED SOURCE, BY GROUNDING TERMINAL L12 IN THE STARTER. A 1.5A, 115V FUSE SHOULD BE USED BUT MUST NOT BE LOCATED BETWEEN THE CONTROL CIRCUIT AND GROUND.
2. NUMBERS INDICATE LOCATION LINE NUMBER OF RELAY CONTACTS. UNDER-LINED NUMBERS INDICATE NORMALLY CLOSED CONTACTS. OVER-LINED NUMBERS INDICATE CONTACTS ARE PART OF SAME RELAY.
3. THE CONTACTS OF ALL SWITCHES, RELAYS, ETC. ARE SHOWN IN THE POSITION WHICH THEY WOULD ASSUME WITH THE CIRCUIT DE-ENERGIZED.
4. CAUTION: DO NOT APPLY IMPROPER VOLTAGE TO TERMINALS 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 CONTROL FAILURE MAY RESULT.
5. PILOT RELAYS AND AUTO RECYCLE SWITCH CONTROL COOLER AND CONDENSER WATER PUMPS AND COOLING TOWER FAN MOTOR STARTERS. PILOT RELAY PR1 REQUIRES 3 NORMALLY OPEN CONTACTS, PR2 REQUIRES 1 NORMALLY OPEN CONTACT.
6. MAXIMUM EXTERNAL LOAD CONNECTED BETWEEN TERMINALS 4 AND 5 AND BETWEEN TERMINALS 4A AND 5 TO EE 750 VA INRUSH AND 50 VA SEALED.
7. MINIMUM RATING OF FLOW SWITCH CONTACTS BETWEEN TERMINALS 17 AND 18 TO BE 125 VA SEALED AT 125 VOLTS BETWEEN TERMINALS 7A AND 12A AND MINIMUM RATING TO BE 480 VA SEALED AT 125 VOLTS.
8. LOW VOLTAGE COMPR. MOTOR STARTER WIRING IS ALREADY INSTALLED IN A CARRIER MOUNTED STARTER IS SUPPLIED.
9. ALL FIELD WIRING AND FIELD-SUPPLIED DEVICES MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES AND JOB SPECIFICATIONS. ITEMS NOT BY CARRIER INCLUDE TRANSFORMERS, STARTERS, DISCONNECTS, PILOT CONTROL WIRING AND ALL POWER WIRING. COMPRESSOR-MOTOR FRAME TO BE GROUNDED IN CORDANCE WITH NATIONAL ELECTRIC CODE FOR EQUIPMENT GROUNDING. FIELD WIRES ARE LABELED ---- TO INDICATE CORRESPONDING TERMINALS CONNECTED. ALL TRANSFORMERS USED SHALL MEET ANSI CRITERIA.
10. FIELD-SUPPLIED 115 VOLT CONTROL WIRES TO BE AT LEAST NUMBER 18 A.W.G.
11. FIELD WIRES ARE TO BE MARKED USING THE SAME NUMBERS AS CONNECTING TERMINALS OR WHERE NO TERMINAL IS PRESENT, THOSE AS SHOWN. TO AID TRAINING, FACTORY WIRING IN CONTROL PANEL IS COLOR CODED ONLY.
12. ALL CONTROL AND POWER WIRING IS TO BE ROUTED SO THAT THE CONDUIT WILL NOT INTERFERE WITH THE OPENING OF DOORS OR THE READING, ADJUSTING, OR SERVICING OF THE EQUIPMENT.
13. CONTROL TRANSFORMER REQUIREMENTS LISTED IN DUTY BLOCK INCLUDE PILOT RELAY (PR). ICR RELAY AND PURGE REQUIREMENTS.
14. REFER TO DRAWING 190M-201-4WZ FOR FIELD WIRING DETAILS.
15. A SEPARATE 115-1-60 SOURCE MUST BE USED FOR THE OIL HEATER TO ENSURE ITS OPERATION DURING CHILLER SERVICING. CHILLER SHUT-DOWN AND WHEN POWER TO CHILLER CONTROLS OR MAIN MOTOR STARTER IS INTERRUPTED.
16. REMOVE FACTORY JUMPER BETWEEN TERMINALS 10 AND 14 AND WIRE AS SHOWN.

PROGRAM TIMER SEQUENCE
SHADED AREA SHOWS SWITCH POSITION BEING USED
0° = SEQUENCE BEGINS (TIMER STARTS)
A = 13 ± 5 SEC. AFTER D N.C. ICR TAKES CONTROL
B = 10 ± 5 SEC. AFTER A (OIL PUMP STARTS)
C = 15 ± 5 SEC. AFTER B (FLOW SAFETIES TAKE CONTROL)
D = 13 ± 5 SEC. AFTER C (COMPR. STARTS, TIMER STOPS)
E = COMPR. STOPS. TIMER RESTARTS
F = 2 ± 5 SEC. AFTER E (VANES CLOSED)
G = 3 ± 5 SEC. AFTER F (FLOW SAFETIES BYPASSED)
H = 15 ± 5 SEC. AFTER G (OIL PUMP STOPS)
D = 12 MIN - 13 SEC. AFTER H (TIMER STOPS)
TOTAL CYCLE TIME IS TO DI = 15 MIN ± 15 SEC., EXCLUDING INTERVAL D - E.

REFERENCE DRAWINGS	NO.	REVISION – LOCATION	ECN	DATE	BY
	1	CHANGE ORDER		1-22-85	C.T.

DRAWING TITLE
CHILLED WATER/HEATING HOT WATER SYSTEM

PROJECT
T.A.F.B. BLDG. #1 RENOVATION

SALES ENGR. D. RIGHTHOUSE
APPLICATION ENGR. K. DOTTER
DRAWN BY M.H. DATE 10-19-84
APPROVED BY DATE

JOHNSON CONTROLS
Systems & Services Division
4310 N. COOPER
OKC, OK. 73118
OC-9-9

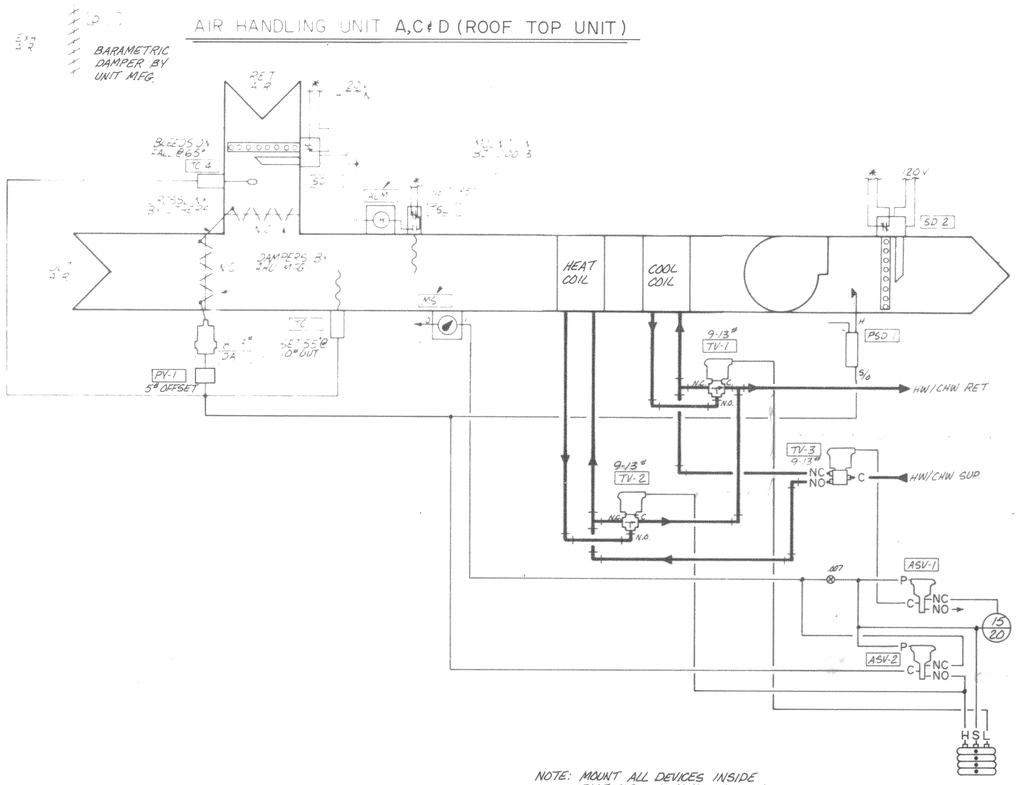
CONTRACT NUMBER 4031-0053
DRAWING NUMBER 6.8 OF 8.8

T1 - 1 - F7 - 216

FORM NO. 1752D (BES 45-5.01)

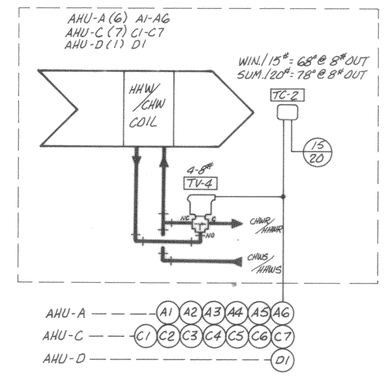
22" x 34" ORIGINAL

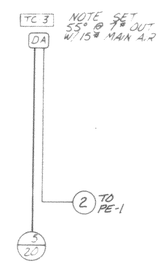
AIR HANDLING UNIT A,C & D (ROOF TOP UNIT)



NOTE: MOUNT ALL DEVICES INSIDE ROOF TOP AIR HANDLING UNIT.

BOOSTER COIL (14 THUS)

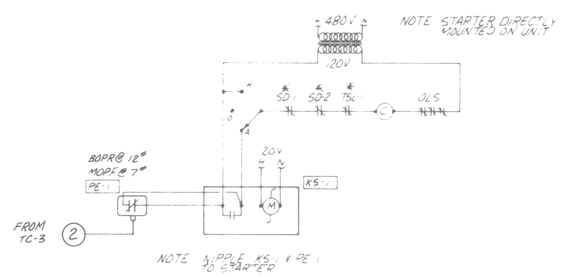


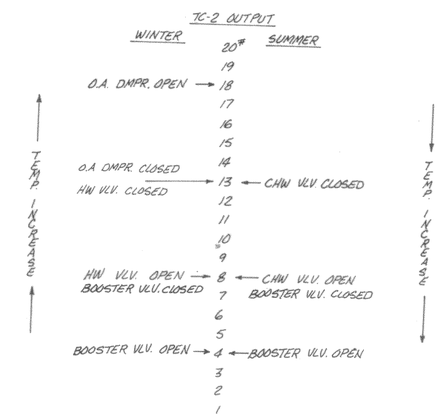


ASV-1&2 SCHEDULE

15#/WIN. = C. TO N.O.
20#/SUM. = C. TO N.C.

AHU STARTER





BILL OF MATERIAL

ITEM NO.	QTY.	DIV.	CODE NO.	DESCRIPTION	RANGE SETTING	REMARKS
ASV-1,2	6		V-6135-3	AIR SWITCHING VALVE		
DA-1	3		D-3153-2	DAMPER ACTUATOR		
KS-1	3		C-7351-2	TIME CLOCK		
MS-1	3		R-4000-3	SWITCH		ACC F
PE-1	3		P10BC-7	PNEUMATIC ELECTRIC SWITCH		
PSD-1	3		P-5232-1	AIR FLOW SWITCH		ACC C
TC-1	3		T-3610-1	TEMPERATURE CONTROLLER		ACC C
TC-2	14		T-4756-201	ROOM THERMOSTAT		ACC A & B
TC-3	3		T-4002-201	NITE THERMOSTAT		ACC A & B
TSL-1	3		A11A-1	TEMPERATURE SWITCH LOW		ACC D & E
TV-1-4				SEE VALVE SCHEDULE		
SD-1&2	6		824CZ	SMOKE DETECTOR		ACC G
TC-4	3		A40EA-3	RETURN AIR THERMOSTAT		ACC D & E
ALM-1	3		PD-111-5	SOLID STATE HORN		ACC F
	3		R-3710-2007	.007 RESTRICTOR		
PSHL-1	3		C-2220-13	HIGH PRESSURE SELECTOR		ACC H&I

ACCESSORIES:

A	17		T-4054-2139	COVER
B	17		T-4002-124	BRACKET
C	6		T-800-1603	FLANGE
D	6		FLG10A-602	FLANGE
E	6		FTG134-601	FITTING
F	3		BZ-1000-3	ENCLOSURE
G	6		205-B	SAMPLING TUBES
H	11		C-2220-14	SLAVE

ACCESSORIES:

I	3		C-2220-5	BRACKET

14 B REV. 9/72 BES-45-4.10 PRINTED IN U.S.A.

SEQUENCE OF OPERATIONS

OCCUPIED

AIR HANDLING UNIT WILL BE ENERGIZED THROUGH ACTION OF TIME CLOCK KS-1.

SUMMER/WINTER CONTROLLER LOCATED IN THE BOILER ROOM WILL AUTOMATICALLY SWITCH SPACE THERMOSTAT TC-2 AND CONTROL SYSTEM INTO SUMMER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS ABOVE 65° AND INTO WINTER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS BELOW 65°.

IN THE SUMMER MODE OF OPERATION, THERMOSTAT TC-2 WILL BE REVERSE ACTING AND WILL MODULATE BOOSTER WATER VALVE TV-4 TO MAINTAIN SPACE TEMPERATURE OF 78°. MINIMUM POSITION SWITCH MS-1 WILL PROVIDE FOR MINIMUM POSITION OF THE OUTSIDE AIR DAMPERS. AHU CHILLED WATER VALVE TV-1 WILL BE MODULATED FROM ZONE CALLING FOR THE MOST COOLING THROUGH ACTION OF PRESSURE SELECTOR PSHL-1. CHANGEOVER VALVE TV-3 WILL BE OPEN TO THE COOLING COIL.

IN THE WINTER MODE OF OPERATION, THERMOSTAT TC-2 WILL BE DIRECT ACTING AND WILL MODULATE BOOSTER WATER VALVE TV-1 TO MAINTAIN SPACE TEMPERATURE OF 68°. MINIMUM POSITION SWITCH MS-1 WILL PROVIDE FOR MINIMUM POSITION OF THE OUTSIDE AIR DAMPERS. AHU HHW VALVE TV-2 & OA DAMPER WILL BE MODULATED IN SEQUENCE FROM ZONE CALLING FOR THE MOST COOLING THROUGH ACTION OF PRESSURE SELECTOR PSHL-1. CHANGEOVER VALVE TV-3 WILL BE OPEN TO THE HEATING COIL.

ECONOMIZER CYCLE: WHEN THE SUMMER/WINTER CONTROLLER IS IN THE WINTER MODE, SPACE THERMOSTAT TC-2 WILL MODULATE HEATING WATER TV-2 AND OUTSIDE AND RETURN AIR DAMPERS IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE.
TEMPERATURE LOW LIMIT TC-1 WILL NOT ALLOW THE MIXED AIR TEMPERATURE TO DROP BELOW 55°.

UNOCCUPIED

TIME CLOCK KS-1 WILL DE-ENERGIZE AIR HANDLING UNIT ACCORDING TO PROGRAMMED SCHEDULE. THE OUTSIDE AIR DAMPER WILL CLOSE THROUGH ACTION OF DIFFERENTIAL PRESSURE SWITCH PSD-1. NIGHT STAT TC-3 WILL OVERRIDE TIME CLOCK AND ENERGIZE AIR HANDLING UNIT WHENEVER SPACE TEMPERATURE DROPS TO 55° THROUGH ACTION OF PRESSURE ELECTRIC SWITCH PE-1.

THE CONTROL SYSTEM WILL AUTOMATICALLY PROVIDE FOR WARM-UP BY MAINTAINING 68° SPACE TEMPERATURE THROUGH ACTION OF RETURN THERMOSTAT TC-4 AND HEATING WATER VALVE TV-2. THE OUTSIDE AIR DAMPERS WILL REMAIN CLOSED DURING THE WARM-UPMODE.

SAFETY CONTROLS

LOW LIMIT THERMOSTAT TSL-1 WILL DE-ENERGIZE THE AIR HANDLING UNIT AND CLOSE THE OUTSIDE AIR DAMPERS WHENEVER MIXED AIR TEMPERATURE DROPS BELOW 35°. ALARM HORN ALM-1 WILL SOUND ALARM.

SMOKE DETECTORS SD-1 AND SD-2, UPON SENSING SMOKE IN RETURN AIR OR SUPPLY AIR, WILL DE-ENERGIZE AIR HANDLING UNIT AND CLOSE OUTSIDE AIR DAMPER.

T1 - 1 - F 7 - 217

REFERENCE DRAWINGS	NO	REVISION - LOCATION	ECN	DATE	BY
	1	CHANGE ORDER		1-22-85	C.T.

DRAWING TITLE: AHU CONTROL (TYPICAL) AHU-A,C & D

PROJECT: TAFB BLDG #1 RENOVATION

SALES ENGR: D. RIGHTHOUSE | APPLICATION ENGR: C. TARTAGLIONE | DRAWN BY M.H. DATE 10-18-84 | BY | APPROVED DATE

JOHNSON CONTROLS Systems & Services Division, 4310 N. COOPER, OKC, OK 73118

OC-9-9

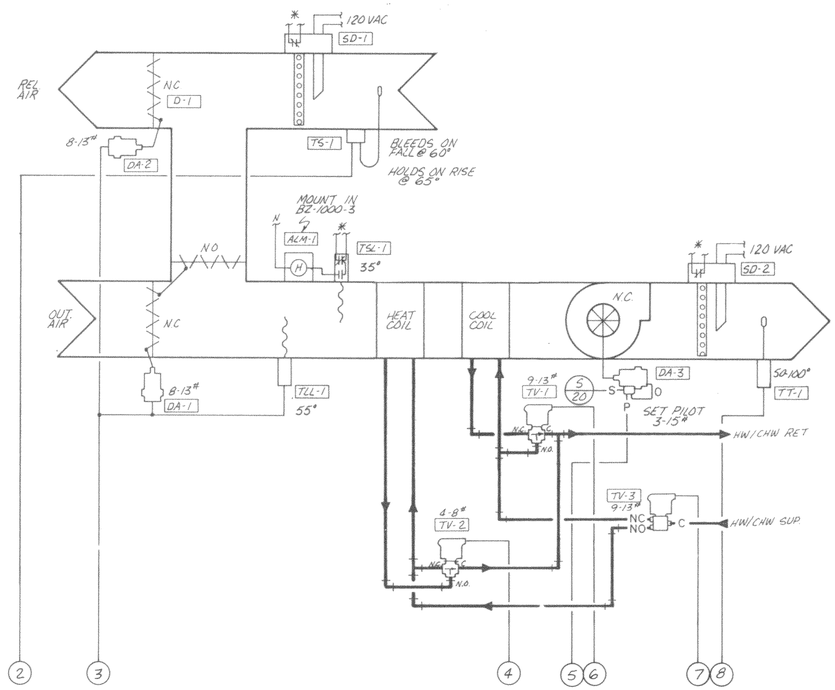
CONTRACT NUMBER: 4031-0053

DRAWING NUMBER: 54 OF 68

FORM NO. 1752D (BES 45-5.01)

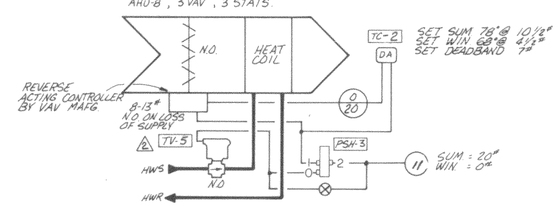
22" x 34" ORIGINAL

AIR HANDLING UNIT-5,7 & 8



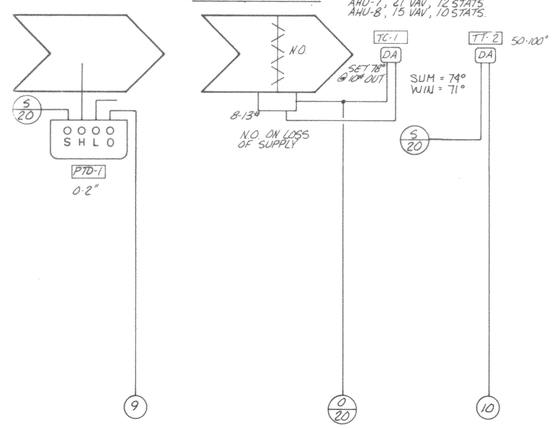
VAV W/RH 13 THUS

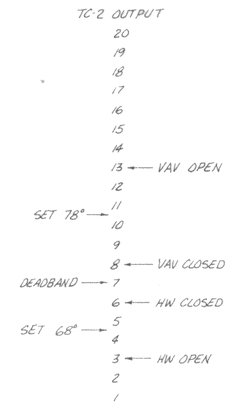
AHU-5, 3 VAV, 3 STATS.
AHU-7, 7 VAV, 3 STATS.
AHU-8, 3 VAV, 3 STATS.



VAV 62 THUS

AHU-5, 26 VAV, 19 STATS
AHU-7, 21 VAV, 12 STATS
AHU-8, 15 VAV, 10 STATS.





BILL OF MATERIAL

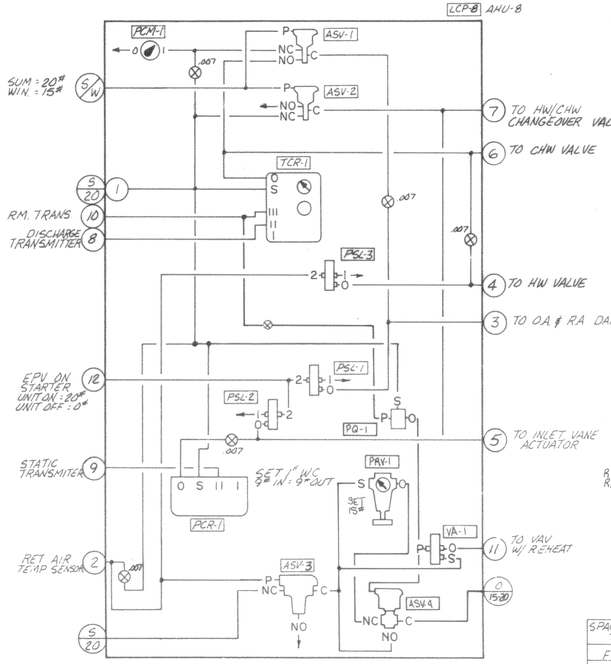
ITEM NO.	QTY.	DIV.	CODE NO.	DESCRIPTION	RANGE SETTING	REMARKS
				FIELD EQUIPMENT		
TC-1	41		T-4756-201	THERMOSTAT		ACC A & B
TC-2	11		T-4054-1	DEADBAND THERMOSTAT		ACC A & B
DA-1	3		D-3153-2	DAMPER ACTUATOR	8-13#	
DA-2	3		D-3244	INLET VANE ACTUATOR		
TLL-1	3		T-3610-1001	THERMOSTAT LOW LIMIT	55°	ACC C
TSL-1	3		A11A-1	LOW TEMPERATURE SENSOR	35°	ACC C
TS-1	3		A40EA-3	TEMPERATURE SENSOR	68°	ACC D & E
TT-1	2		T-5210-1002	TEMPERATURE TRANSMITTER	0-100°	ACC F
PTD-1	3		P-5215-9	STATIC PRESSURE TRANSMITTER	0-2"	
SD-1-2	6		824CZ	SMOKE DETECTOR		ACC G
EPV-1	3		V11HAA-109	SOLENOID AIR VALVE	120 VAC	
PE-1	3		P10BL-7	PNEUMATIC ELECTRIC SWITCH		
KS-1	3		C-7351-2	TIME CLOCK (7-DAY)	120 VAC	
TV1-3,5	22			SEE VALVE SCHEDULE		
D-1	3			SEE DAMPER SCHEDULE		
ALM-1	3		PD-111-5	SOLID STATE ALARM HORN		
PSH-3	11		C-5226-3	HIGH PRESSURE SELECTOR		
TT-2	3		T-5002-201	TEMPERATURE TRANSMITTER		ACC A & B
VA-1	3		R-2080-	SIGNAL BOOSTER		
PQ-1	3		C-9504-1	2 POS. SWITCH		
CP5,7,8	3		M-8100-2424	LOCAL CONTROL PANEL		
TCR-1	3		T-9002-1	TEMPERATURE RECEIVER CONTROLLER		
ASV-1,2	6		V-6135-3	AIR SWITCHING VALVE		SWITCHES @ 17#
ASV-3	3		V-6133-1	AIR SWITCHING VALVE		
PSL-1-3	9		C-5226-3	LOW PRESSURE SELECTOR		
PCM-1	3		R-4000-3	MIN. POSITION		
PCR-1	3		T-9111-8002	PI CONTROLLER		
ASV-4	3		V-4324-1004	AIR SWITCH VALVE		
PRV-1	3		R-130-5	PRESSURE REDUCING VALVE		

ACCESSORIES:					ACCESSORIES:
A	55		T-4054-2139	COVER	
B	55		T-4002-124	MTG. PLATE	
C					
D	6		FLG10A-600	FLANGE	
E	6		FTG-3A-600	FITTING	
F	9		T-800-1603	DUCT FLANGE	
G	6		205-B	SAMPLING TUBES	
H	3		BZ-1000-3	ENCLOSURE	

FORM 1144-B REV. 8/72 BES-45-4.10 PRINTED

LOCAL CONTROL PANEL

LCP-5 AHU-5
LCP-7 AHU-7
LCP-8 AHU-8



ASV-1 SCHEDULE

SUM/20# = C. TO N.C. = MIN. POSITION
WIN/0# = C. TO N.O. = FREE CLG

ASV-2 SCHEDULE

SUM/20# = C. TO N.C. = CHW
WIN/15# = C. TO N.O. = HHW

0# = HHW
20# = CHW

PQ-1 SCHEDULE

CUT IN = 74° = 9.2# = 20# COOLING
CUT OUT = 69° = 7.6# = 0# HEATING

ASV-4 SCHEDULE

0# = HEATING = 20# MAIN
20# = COOLING = 15# MAIN

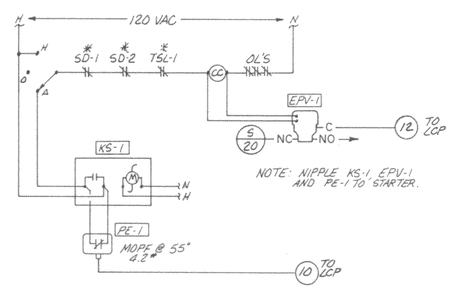
ASV-3 SCHEDULE

RA ABOVE 65° = 20# = C. TO N.C. = NORMAL OPERATION
RA BELOW 60° = 0# = C. TO N.O. = MORNING WARM-UP

TCR-1 RESET SCHEDULE

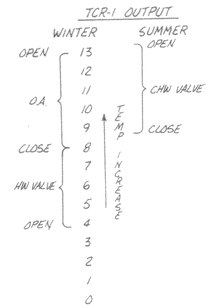
SPACE TEMP TT-2		DISCH TEMP TT-1		OUTPUT
F°	PSI	F°	PSI	
75	9.0	55	4.2	7#
72.5	8.4	60	5.4	7#
70	7.8	70	7.8	7#

AHU STARTER

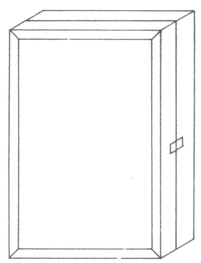


NOTE: NIPPLE KS-1, EPV-1 AND PE-1 TO STARTER.

TCR-1 OUTPUT



PANEL FACE



SEQUENCE OF OPERATION

AIR HANDLING UNIT WILL BE ENERGIZED THROUGH ACTION OF TIME CLOCK KS-1.

SUMMER/WINTER CONTROLLER LOCATED IN THE BOILER ROOM WILL AUTOMATICALLY SWITCH CONTROL SYSTEM INTO SUMMER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS ABOVE 65F. AND INTO WINTER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS BELOW 65F.

CONTROL SYSTEM WILL BE INDEXED TO THE SUMMER MODE OF OPERATION THROUGH ACTION OF AIR SWITCHING VALVE ASV-2. TEMPERATURE CONTROLLER TCR-1 WILL MODULATE CHILLED WATER VAVLE TV-1 TO MAINTAIN DISCHARGE TEMPERATURE AS SENSED BY TEMPERATURE TRANSMITTER TT-1 AND RESET BY SPACE TEMPERATURE AS SENSED BY TEMPERATURE TRANSMITTER TT-2 PER TCR-1 RESET SCHEDULE. MINIMUM POSITION SWITCH PCM-1 WILL PROVIDE FOR MINIMUM POSITION OF THE OUTSIDE AND RETURN AIR DAMPERS. CHANGEOVER VALVE TV-3 WILL OPEN TO THE COOLING COIL.

CONTROL SYSTEM WILL BE INDEXED TO THE WINTER MODE THROUGH ACTION OF AIR SWITCHING VALVE ASV-2. TCR-1 WILL MODULATE HEATER WATER VALVE TV-2 TO MAINTAIN DISCHARGE TEMPERATURE PER TCR-1 RESET SCHEDULE. MINIMUM POSITION SWITCH PCM-1 WILL PROVIDE FOR A MINIMUM POSITION OF THE OUTSIDE AND RETURN AIR DAMPERS. CHANGEOVER VALVE TV-3 WILL BE OPEN TO THE HEATING COIL.

THE ECONOMIZER CYCLE WILL BE ACTIVATED WHEN CONTROL SYSTEM IS IN THE WINTER MODE THROUGH ACTION OF AIR SWITCHING VALVE ASV-1. TEMPERATURE CONTROLLER TCR-1 WILL MODULATE HEATING WATER VALVE TV-2 AND OUTSIDE AND RETURN AIR DAMPERS IN SEQUENCE TO MAINTAIN DISCHARGE TEMPERATURE PER TCR-1 RESET SCHEDULE.

STATIC PRESSURE CONTROLLER PCR-1 WILL MODULATE INLET VANES THROUGH ACTION OF DAMPER ACTUATOR DA-3 TO MAINTAIN STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTER PTD-1. WHEN THE AIR HANDLING UNIT IS DE-ENERGIZED, THE INLET VANES WILL CLOSE THROUGH ACTION OF LOW PRESSURE SELECTOR PSL-2.

UNOCCUPIED: WHEN SPACE TEMPERATURE DROPS BELOW 55F. AS SENSED BY TEMPERATURE TRANSMITTER TT-2. THE AIR HANDLING UNIT WILL ENERGIZE THROUGH ACTION OF PRESSURE ELECTRIC SWITCH PE-1. WHENEVER THE AIR HANDLING UNIT IS DE-ENERGIZED, OUTSIDE AIR DAMPER WILL CLOSE AND RETURN AIR DAMPER WILL OPEN THROUGH ACTION OF LOW PRESSURE SELECTOR PSL-1 AND EP VALVE EPV-1.

WARM-UP: WHENEVER THE RETURN AIR TEMPERATURE AS SENSED BY THERMOSTAT TS-1 IS BELOW 65F., THE OUTSIDE AIR DAMPER WILL CLOSE. RETURN AIR DAMPER WILL OPEN, VAV BOXES WILL OPEN. AND HW VALVE TV-2 WILL OPEN THROUGH ACTION OF PSL-3 AND ASV-3.

SAFETY CONTROLS: LOW LIMIT THERMOSTAT TSL-1 WILL DE-ENERGIZE THE AIR HANDLING UNIT AND CLOSE THE OUTSIDE AIR DAMPERS WHENEVER MIXED AIR TEMPERTURE DROPS BELOW 35F. THE ALARM HORN ALM-1 WILL SOUND ALARM.

SMOKE DETECTORS SD-1 AND SD-2 UPON SENSING SMOKE IN RETURN AIR OR SUPPLY AIR WILL DE-ENERGIZE AIR HANDLING UNIT AND CLOSE OUTSIDE AIR DAMPER.

VAV SEQUENCE: WHEN AIR HANDLING UNIT DISCHARGE TEMPERATURE RISES ABOVE COOLING SETPOINT THE AIR SWITCHING VALVE ASV-4 WILL SWITCH TO 15PSI MAIN, IF THE AIR HANDLING UNIT DISCHARGE TEMPERATURE DROPS BELOW THE HEATING SETPOINT THE AIR SWITCHING VALVE ASV-4 WILL SWITCH TO 20PSI MAIN PRESSURE.

THE 15/20 MAIN WILL REVERSE THE ACTION OF THE THERMOSTAT; 15=DA 20=RA. THE SPACE HEATING/COOLING THERMOSTAT TC-1 WILL MODULATE THE BOX OPEN ON A CALL FOR HEATING OR COOLING DEPENDING IF IT IS THE SUMMER OR WINTER MODE. THIS WILL ALLOW THE VAV TO HEAT IN THE WINTER OR COOL IN THE SUMMER. THE THERMOSTAT WILL MODULATE THE VAV DAMPER CLOSE TO MIN POSITION WHEN THE THERMOSTAT IS SATISFIED.

T1 - 1 - F 8 - 218

REFERENCE DRAWINGS	NO.	REVISION – LOCATION	ECN	DATE	BY
	3	TH'STAT CHANGEOUT		12-19-86	KO
	2	CHANGED VALVE NO.		2-25-85	C.T.
	1	CHANGE ORDER		1-22-85	C.T.

DRAWING TITLE: AHU-5,7 & 8 ACCOUNTING & FINANCE MECH. ROOM 171

PROJECT: T.A.F.B. BLDG. #1 RENOVATION

SALES ENGR. D. RIGHTHOUSE | APPLICATION ENGR. C. TARTAGLIONE | DRAWN BY M.H. DATE 10-23-84 | APPROVED BY DATE

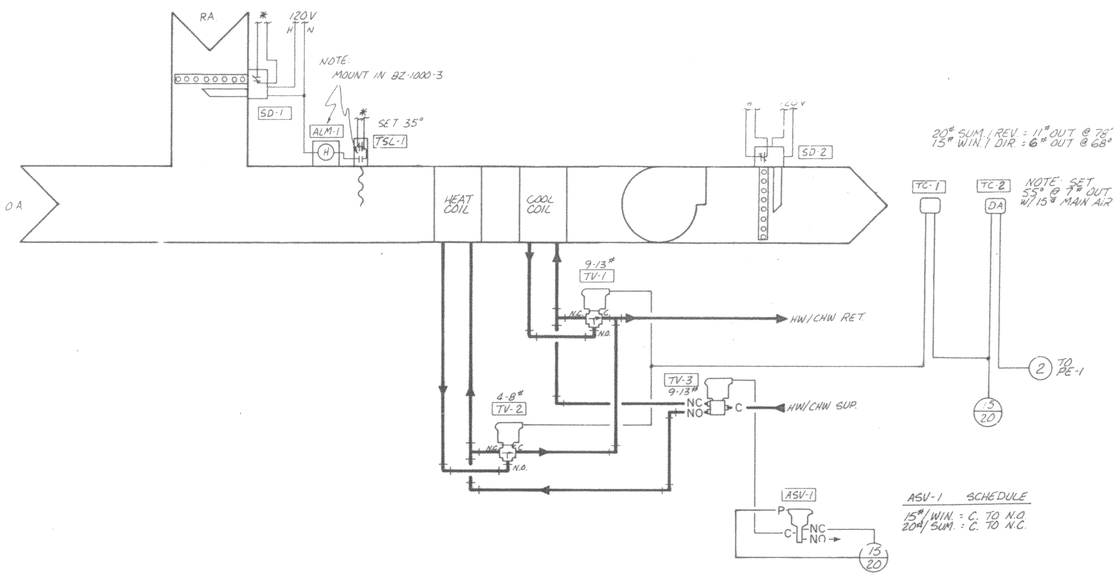
JOHNSON CONTROLS Systems & Services Division
4310 N. COOPER
OKC, OK. 73118
OC-9-9

CONTRACT NUMBER 4031-0053
DRAWING NUMBER 43 OF 68

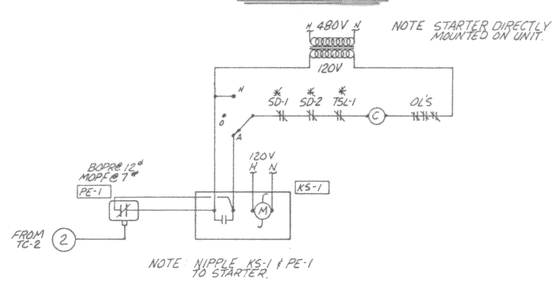
FORM NO. 1752D (BES 45-5.01)

22" x 34" ORIGINAL

AIR HANDLING UNIT I



AHU STARTER



TC-1 OUTPUT

WIN.		SUM.
	20	
	19	
	18	
	17	
	16	
	15	
	14	
	13 — CLG VALVE CLOSED	
	12	
	11 — SETPOINT 78	
	10	
	9 — CLG VALVE OPEN	
HTG VALVE CLOSED ---	8	
	7	
SETPOINT 68 —	6	
	5	
HTG VALVE OPEN -----	4	
	3	
	2	
	1	
	0	

TEMP. INCREASE ↑ (WIN.) ; ↓ TEMP. INCREASE (SUM.)

BILL OF MATERIAL

ITEM NO.	QTY	DIV.	CODE NO.	DESCRIPTION	RANGE SETTING	REMARKS
KS-1	1		C-7351-2	TIME CLOCK		
PE-1	1		P10BC-7	PNEUMATIC ELECTRIC SWITCH		
TC-1	1		T-4756-20	ROOM THERMOSTAT		ACC A,B
TC-2	1		T-4002-201	NITE STAT		ACC A,B
TSL-1	1		A11A-1	TEMPERATURE SWITCH LOW		ACC C,D
ALM-1	1		PD-111-5	SOLID STATE ALARM HORN		ACC E
SD-1&2	2		824CZ	SMOKE DETECTOR		ACC F
ASV-1	1		V-6135-3	AIR SWTICHING VALVE		
TV-1-3	3			SEE VALVE SCHEDULE		

ACCESSORIES:			
A	2	T-4054-2139	COVER
B	2	T-4002-124	BRACKET
C	1	FL010A-602R	FLANGE
D	1	FTG13A-601	FITTING
E	1	BZ-1000-3	ENCLOSURE
F	2	205-H	SAMPLING TUBE

ACCESSORIES:

FORM 1144 B REV. 8/72 BES-45-4.10 PRINTED IN U.S.A.

SEQUENCE OF OPERATIONS

OCCUPIED

AIR HANDLING UNIT WILL BE ENERGIZED THROUGH ACTION OF TIME CLOCK KS-1.

SUMMER/WINTER CONTROLLER LOCATED IN THE BOILER ROOM WILL AUTOMATICALLY SWITCH SPACE THERMOSTAT TC-1 AND CONTROL SYSTEM INTO SUMMER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS ABOVE 65° AND INTO WINTER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS BELOW 65°.

IN THE SUMMER MODE OF OPERATION, THERMOSTAT TC-1 WILL BE REVERSE ACTING AND WILL MODULATE CHILLED WATER VALVE TV-1 TO MAINTAIN SPACE TEMPERATURE OF 78°. CHANGEOVER VALVE TV-3 WILL BE OPEN TO THE CHILLED WATER COIL.

IN THE WINTER MODE OF OPERATION, THERMOSTAT TC-1 WILL BE DIRECT ACTING AND WILL MODULATE HEATING WATER VALVE TV-2 TO MAINTAIN SPACE TEMPERATURE OF 68°. CHANGEOVER VALVE TV-3 WILL BE OPEN TO THE HEATING WATER COIL.

UNOCCUPIED

TIME CLOCK KS-1 WILL DE-ENERGIZE AIR HANDLING UNIT ACCORDING TO PROGRAMMED SCHEDULE. NIGHT STAT TC-2 WILL OVERRIDE TIME CLOCK AND ENERGIZE AIR HANDLING UNIT WHENEVER SPACE TEMPERATURE DROPS TO 55° THROUGH ACTION OF PRESSURE ELECTRIC SWITCH PE-1.

THE CONTROL SYSTEM WILL AUTOMATICALLY PROVIDE FOR WARM-UP BY MAINTAINING 68° SPACE TEMPERATURE THROUGH ACTION OF SPACE THERMOSTAT TC-1 AND HEATING WATER VALVE TV-2.

T1 - 1 - F 7 - 219

REFERENCE DRAWINGS	NO.	REVISION – LOCATION	ECN	DATE	BY
	1	CHANGE ORDER		1-22-85	C.T.

SALES ENGR.	APPLICATION ENGR.	DRAWN		APPROVED	
D. RIGHTHOUSE	C. TARTAGLIONE	BY M.H.	DATE 10-18-84	BY	DATE

DRAWING TITLE: AHU CONTROL AHU-1

PROJECT: T.A.F.B. BLDG. # 1 RENOVATION

JOHNSON CONTROLS — Systems & Services Division
4310 N. COOPER
OKC, OK. 73118
OC-9-9

CONTRACT NUMBER: 4031-0053

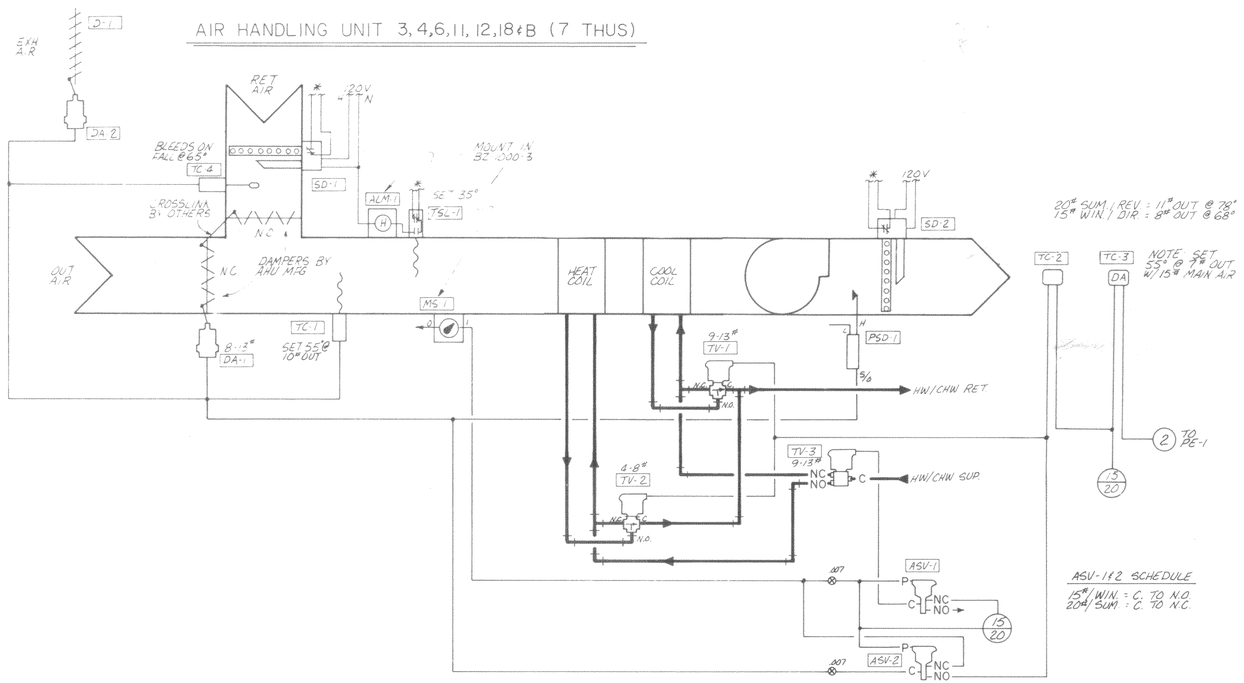
DRAWING NUMBER: 32 OF 88

[redacted]

FORM NO. 17520 (BES 45-5.01)

22" x 34" ORIGINAL

AIR HANDLING UNIT 3,4,6,11,12,18 & B (7 THUS)



NOTE: 1. AHU-B HAS BARAMETRIC RELIEF DAMPER BY AHU MFG.

2. AHU-B MOUNT ALL DEVICES INSIDE ROOF TOP UNIT.

20# SUM / REV = 11# OUT @ 78°
15# WIN / DIR = 8# OUT @ 68°

ASV-1 & 2 SCHEDULE

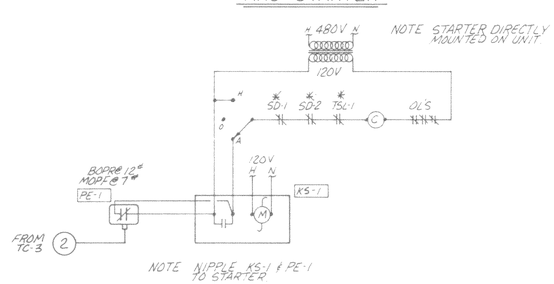
15# WIN = C. TO N.O.
20# SUM = C. TO N.C.

TC-2 OUTPUT

WINTER		SUMMER
	20#	
	19	
	18	
	17	
	16	
	15	
	14	
O.A. DMPR. OPEN →	13	← CHW VLV CLOSED
	12	
	11	← SET 78°
	10	
	9	← CHW VLV. OPEN
O.A. DMPR. CLOSED SET 68° HW. VLV. CLOSED →	8	
	7	
	6	
	5	
HW VLV. OPEN →	4	
	3	
	2	
	1	

TEMP. INCREASE

AHU STARTER



NOTE STARTER DIRECTLY MOUNTED ON UNIT

NOTE NIPPLE KS-1 & PE-1 TO STARTER

BILL OF MATERIAL

ITEM NO.	QTY	DIV.	CODE NO.	DESCRIPTION	RANGE SETTING	REMARKS
ASV-1,2	14		V-6135-3	AIR SWITCHING VALVE		
DA-1	7		D-3153-2	DAMPER ACTUATOR		
KS-1	7		C-7351-2	TIME CLOCK		
MS-1	7		R-4000-3	SWITCH		ACC F
PE-1	7		P10BC-7	PNEUMATIC ELECTRIC SWITCH		
PSD-1	7		P-5232-1	AIR FLOW SWITCH		ACC C
DA-2	7		D-3073-2	DAMPER ACTUATOR		
TC-1	7		T-3610-1	TEMPERATURE CONTROLLER		ACC C
TC-2	7		T-4756-201	ROOM THERMOSTAT		ACC A & B
TC-3	7		T-4002-201	NITE THERMOSTAT		ACC A & B
TSL-1	7		A11A-1	TEMPERATURE SWITCH LOW		ACC D & E
D-1				SEE DAMPER SCHEDULE		
TV-1-3	21			SEE VALVE SCHEDULE		
SD-1&2	14		824CZ	SMOKE DETECTOR		ACC G
TC-4	7		A40EA-3	RETURN AIR THERMOSTAT		ACC D & E
ALM-1	7		PD-111-5	SOLID STATE HORN		ACC F
	14		R-3710-2007	.007 RESTRICTOR		

ACCESSORIES:

	14	T-4054-2139	COVER
	14	T-4002-124	BRACKET
	14	T-800-1603	FLANGE
	7	FLG10A-602	FLANGE
	7	FTG134-601	FITTING
	7	BZ-1000-3	ENCLOSURE
	14	205-B	SAMPLING TUBES

ACCESSORIES:

FORM 1144-B REV. 9/72 BES 45-4.10 PRINTED IN U.S.A.

SEQUENCE OF OPERATIONS

OCCUPIED

AIR HANDLING UNIT WILL BE ENERGIZED THROUGH ACTION OF TIME CLOCK KS-1.

SUMMER/WINTER CONTROLLER LOCATED IN THE BOILER ROOM WILL AUTOMATICALLY SWITCH SPACE THERMOSTAT TC-2 AND CONTROL SYSTEM INTO SUMMER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS ABOVE 65° AND INTO WINTER MODE WHENEVER OUTSIDE AIR TEMPERATURE IS BELOW 65°.

IN THE SUMMER MODE OF OPERATION, THERMOSTAT TC-2 WILL BE REVERSE ACTING AND WILL MODULATE CHILLED WATER VALVE TV-1 TO MAINTAIN SPACE TEMPERATURE OF 78°. MINIMUM POSITION SWITCH MS-1 WILL PROVIDE FOR MINIMUM POSITION OF THE OUTSIDE AIR DAMPERS. CHANGE OVER VALVE TV-3 WILL BE OPEN TO THE CHILLED WATER COIL.

IN THE WINTER MODE OF OPERATION, THERMOSTAT TC-2 WILL BE DIRECT ACTING AND WILL MODULATE HEATING WATER VALVE TV-2 TO MAINTAIN SPACE TEMPERATURE OF 68°. MINIMUM POSITION SWITCH MS-1 WILL PROVIDE FOR MINIMUM POSITION OF THE OUTSIDE AIR DAMPERS. CHANGE OVER VALVE TV-3 WILL BE OPEN TO THE HEATING WATER COIL.

ECONOMIZER CYCLE: WHEN THE SUMMER/WINTER CONTROLLER IS IN THE WINTER MODE, SPACE THERMOSTAT TC-2 WILL MODULATE HEATING WATER VALVE TV-2 AND OUTSIDE AND RETURN AIR DAMPERS IN SEQUENCE TO MAINTAIN SPACE TEMPERATURE OF 68°. TEMPERATURE LOW LIMIT TC-1 WILL NOT ALLOW THE MIXED AIR TEMPERATURE TO DROP BELOW 50°.

UNOCCUPIED

TIME CLOCK KS-1 WILL DE-ENERGIZE AIR HANDLING UNIT ACCORDING TO PROGRAMMED SCHEDULE. THE OUTSIDE AIR DAMPER WILL CLOSE THROUGH ACTION OF DIFFERENTIAL PRESSURE SWITCH PSD-1. NIGHT STAT TC-3 WILL OVERRIDE TIME CLOCK AND ENERGIZE AIR HANDLING UNIT WHENEVER SPACE TEMPERATURE DROPS TO 55° THROUGH ACTION OF PRESSURE ELECTRIC SWITCH PE-1.

THE CONTROL SYSTEM WILL AUTOMATICALLY PROVIDE FOR WARM-UP BY MAINTAINING 68° SPACE TEMPERATURE THROUGH ACTION OF RETURN THERMOSTAT TC-4 AND HEATING WATER VALVE TV-2. THE OUTSIDE AIR DAMPERS WILL REMAIN CLOSED DURING THE WARM-UPMODE.

SAFETY CONTROLS

LOW LIMIT THERMOSTAT TSL-1 WILL DE-ENERGIZE THE AIR HANDLING UNIT AND CLOSE THE OUTSIDE AIR DAMPERS WHENEVER MIXED AIR TEMPERATURE DROPS BELOW 35°. ALARM HORN ALM-1 WILL SOUND ALARM.

SMOKE DETECTORS SD-1 AND SD-2, UPON SENSING SMOKE IN RETURN AIR OR SUPPLY AIR, WILL DE-ENERGIZE AIR HANDLING UNIT AND CLOSE OUTSIDE AIR DAMPER.

T1 - 1 - F 7 - 220

DRAWING TITLE: AHU CONTROL (TYPICAL) AHU-3,4,6,11,12,18 & B.

REFERENCE DRAWINGS	NO.	REVISION - LOCATION	ECN	DATE	BY
	1	CHANGE ORDER		1-22-85	C.T.

SALES ENGR. D. RIGHTHOUSE | APPLICATION ENGR. C. TARTAGLIONE | DRAWN BY M.H. DATE 10-18-84 | APPROVED BY DATE

PROJECT: T.A.F.B. BLDG. #1 RENOVATION

JOHNSON CONTROLS — Systems & Services Division

4310 N. COOPER OKC, OK. 73118 OC-9-9

CONTRACT NUMBER 4031-0053

DRAWING NUMBER 2 X OF 68

[redacted]

FORM NO. 1752D (BES 45-5.01)

22" x 34" ORIGINAL