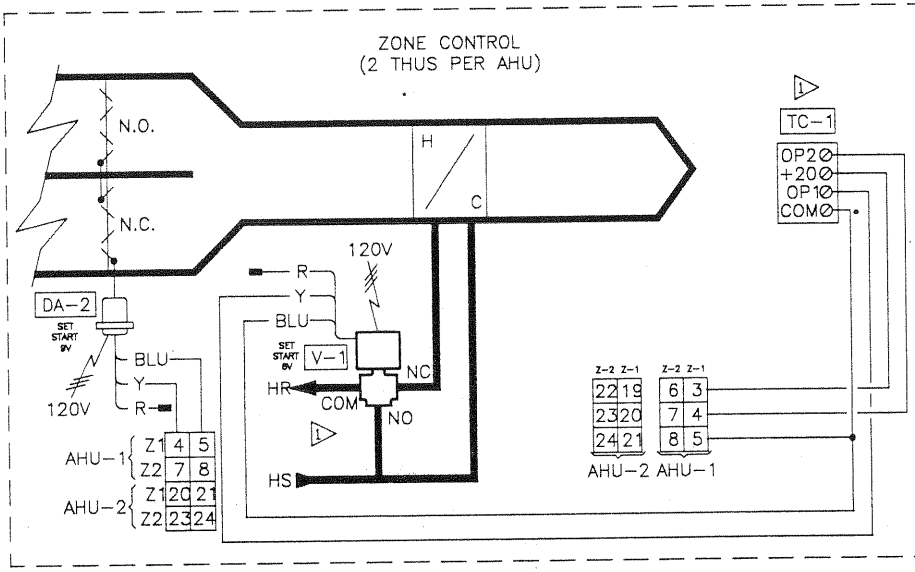
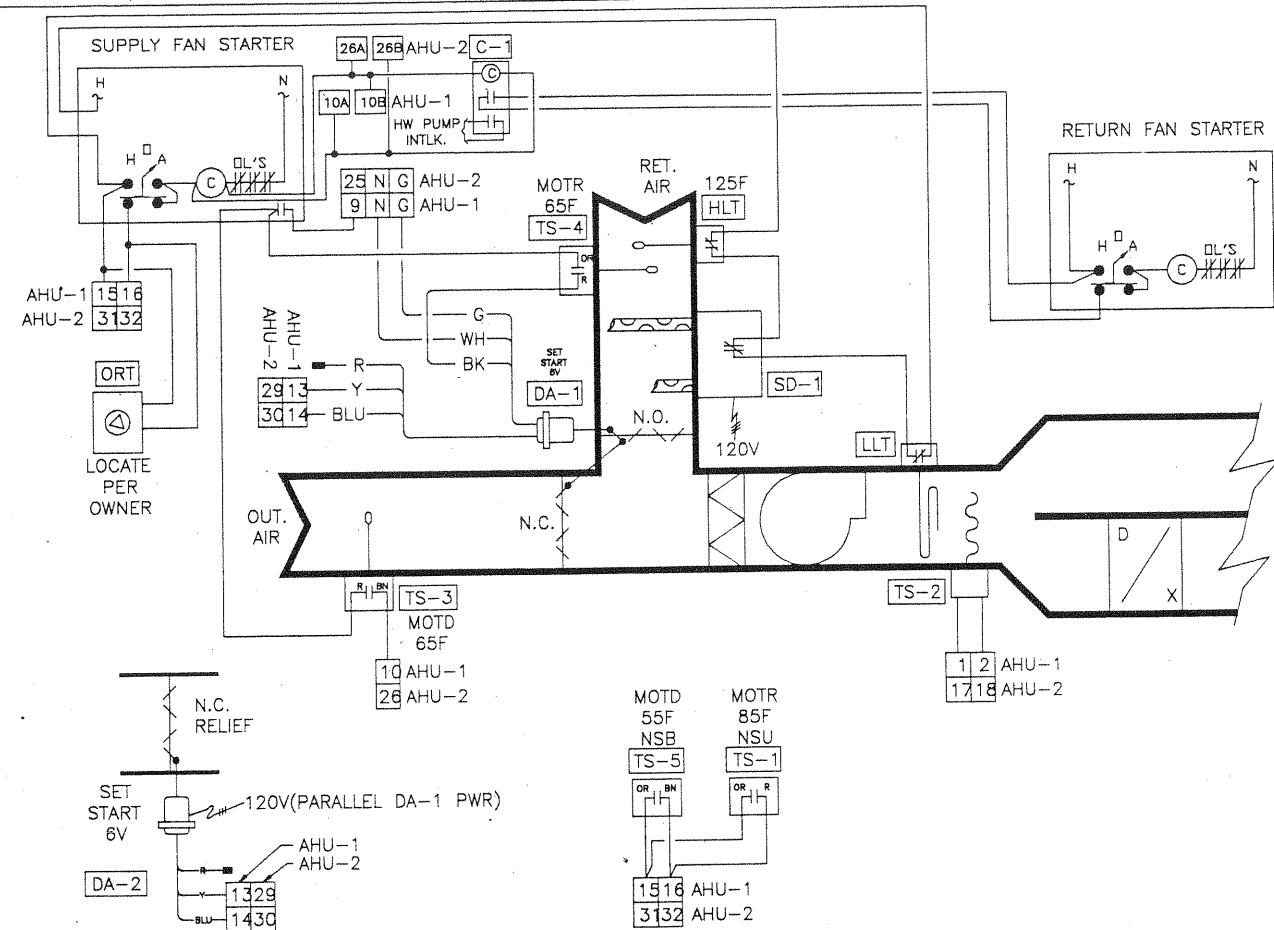


# MULTIZONE AHU-1 AND AHU-2



## BILL OF MATERIAL

ITEM	CODE NO.	DESCRIPTION
**FIELD EQUIPMENT**		
TC-1	TP-8124	ROOM CONTROLLER, DUAL SETPOINT
DA-2	MP-5430	DAMPER ACTUATOR, 120VAC
acc.	AM-161-3	DAMPER LINKAGE KIT
acc.	AM-125	LINKAGE ROD
V-1	-	SEE VALVE SCHEDULE
TS-2	TS-8405	DUCT SENSOR, AVERAGING
TS-3,4	TC-4111	ELEC. REMOTE BULB STAT
acc.	AT-208	DUCT FLANGE
TS-5,1	TC-1191-404	ROOM STAT, BLANK COVER
DA-1	MS-83040	DAMPER ACTUATOR, 120V
acc.	AM-161-3	DAMPER LINKAGE KIT
acc.	AM-125	LINKAGE ROD
SD-1	-	BRK SMOKE DETECTOR
HLT	A11A-1	ELEC. HIGH LIMIT STAT, MANUAL RESET
LLT	A25AN-1	ELEC. LOW LIMIT STAT, MANUAL RESET
ORT	-	BYPASS TIMER, MARK TIME
C-1	AE-314	120V POWER RELAY, DPDT
acc.	AE-300	ENCLOSURE
DA-2	MP-5430	DAMPER ACTUATOR, 120V
acc.	AM-161-3	DAMPER LINKAGE KIT
**PANEL EQUIPMENT**		
CP-1	AE-631	CONTROL PANEL-24" W X 32" H X 7" D
F-1	-	FUSE HOLDER
TC-2,3	CC-8111-120	ELECTRONIC CONTROLLER
HSS-1,2	AD-8201	HIGH SIGNAL SELECTOR
LSS-1,2	AD-8201	LOW SIGNAL SELECTOR
SR-1,2	CC-8102	SEQUENCING RELAY
CLK-1,2	DIGI-12-45-1	GRASSLIN 7-DAY CLOCK W/RESERVE
R-1-6	P-127-2-4	3PDT RELAY, 120V
acc.	P-100-4	RELAY BASE
MPS-1,2	AD-8301	MANUAL POSITION SWITCH

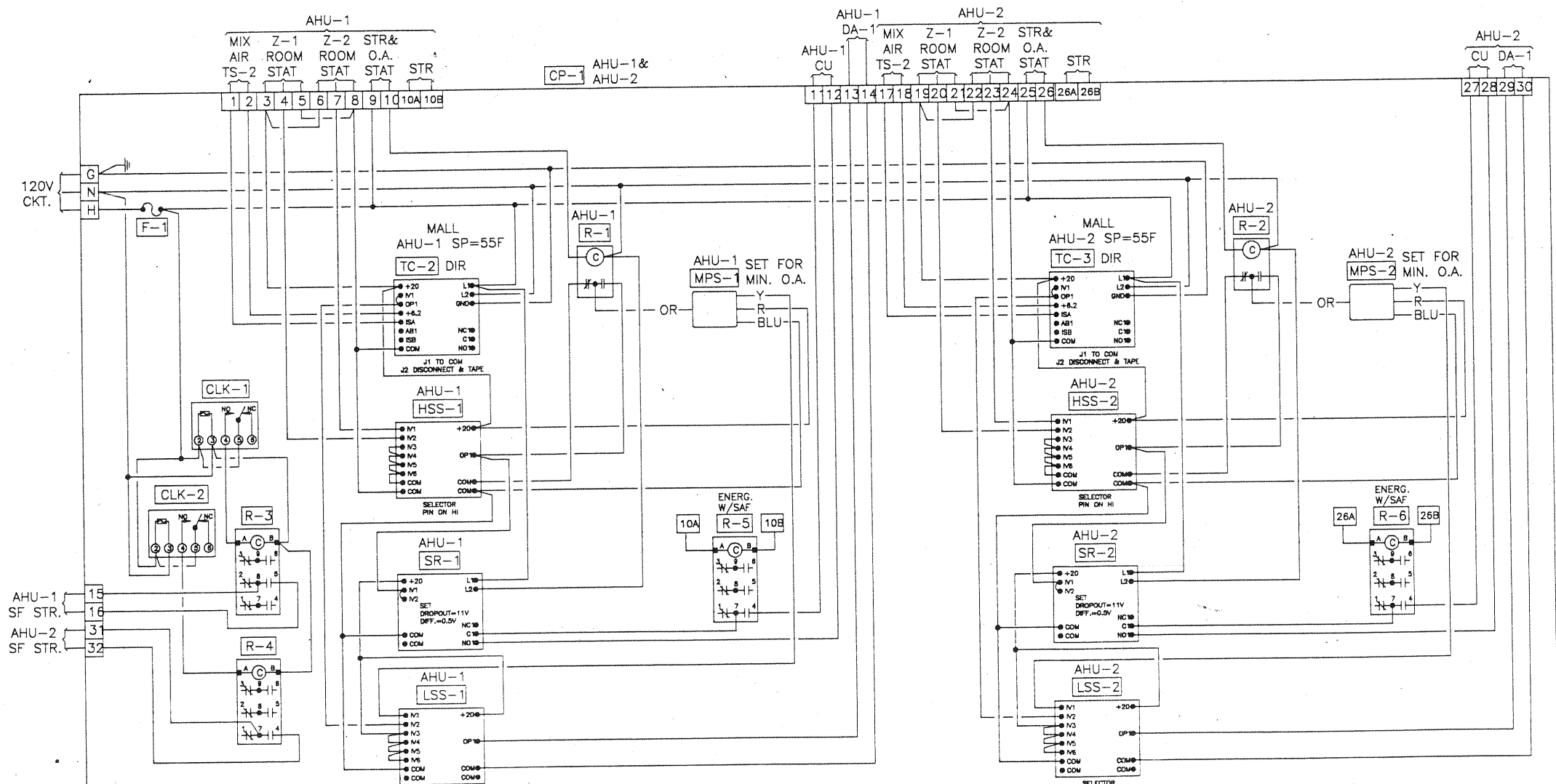
## SEQUENCE OF OPERATION

**OCCUPIED MODE:** AHU IS STARTED AND STOPPED BY 7-DAY CLOCK 'CLK-1'. RETURN AIR SMOKE DETECTOR 'SD-1', RETURN AIR HIGH LIMIT 'HLT', AND MIXED AIR LOW LIMIT 'LLT' ARE INTERLOCKED TO STOP THE SUPPLY FAN UPON ACTIVATION. WHEN THE SUPPLY FAN IS OFF, THE OUTDOOR AIR DAMPER CLOSES.

ZONE TEMPERATURE IS CONTROLLED THROUGH ROOM CONTROLLER 'TC-1' MODULATING THE ZONE DAMPER AND HOT WATER VALVE IN SEQUENCE TO MAINTAIN ZONE TEMPERATURE. THE ZONE REQUIRING THE MOST COOLING OPERATES THE MIXING DAMPERS (VENT CYCLE) AND THE CONDENSING UNIT ON A DEMAND FOR COOLING. AND THE CONDENSING UNIT ON A DEMAND FOR COOLING.

ON START UP, DURING MORNING WARMUP, RETURN AIR STAT 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED UNTIL THE RETURN TEMPERATURE WARMS UP TO 65F. IF OUTDOOR AIR TEMPERATURE IS BELOW 65F, ON A CALL FOR COOLING THE OUTDOOR AIR DAMPER IS MODULATED OPEN BY LOW SIGNAL SELECTOR 'LSS'. MIXED AIR AS SENS BY 'TS-2' IS PREVENTED FROM DROPPING BELOW 55F BY CONTROLLER TC-2 (AHU-1) 'TC-3' (AHU-2). IF THE OUTDOOR AIR DAMPER IS FULL OPEN AND COOLING DEMAND IS STILL NOT SATISFIED, FACE DAMPER IS MODULATED OPEN AND SEQUENCING RELAY 'SR' ENERGIZES THE CONDENSING UNIT.

**UNOCCUPIED MODE:** NIGHT SETBACK THERMOSTAT 'TS-5' OR NIGHT SETUP THERMOSTAT 'TS-1' STARTS THE AHU WHEN THEIR SETPOINT IS EXCEEDED. DURING WARMUP, 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED. OVERRIDE TIMER 'ORT' WILL ALSO RESUME OPERATION OF THE UNIT.



# CONSERVATROL ENERGY CONTROL SYSTEMS

P.O. BOX 29067 GREENSBORO, N.C. 27408 919-373-8127

PROJECT  
CENTRAL CAROLINA COMMUNITY COLLEGE  
SANFORD, NORTH CAROLINA

DRAWING TITLE  
AHU-1 & AHU-2 CONTROLS

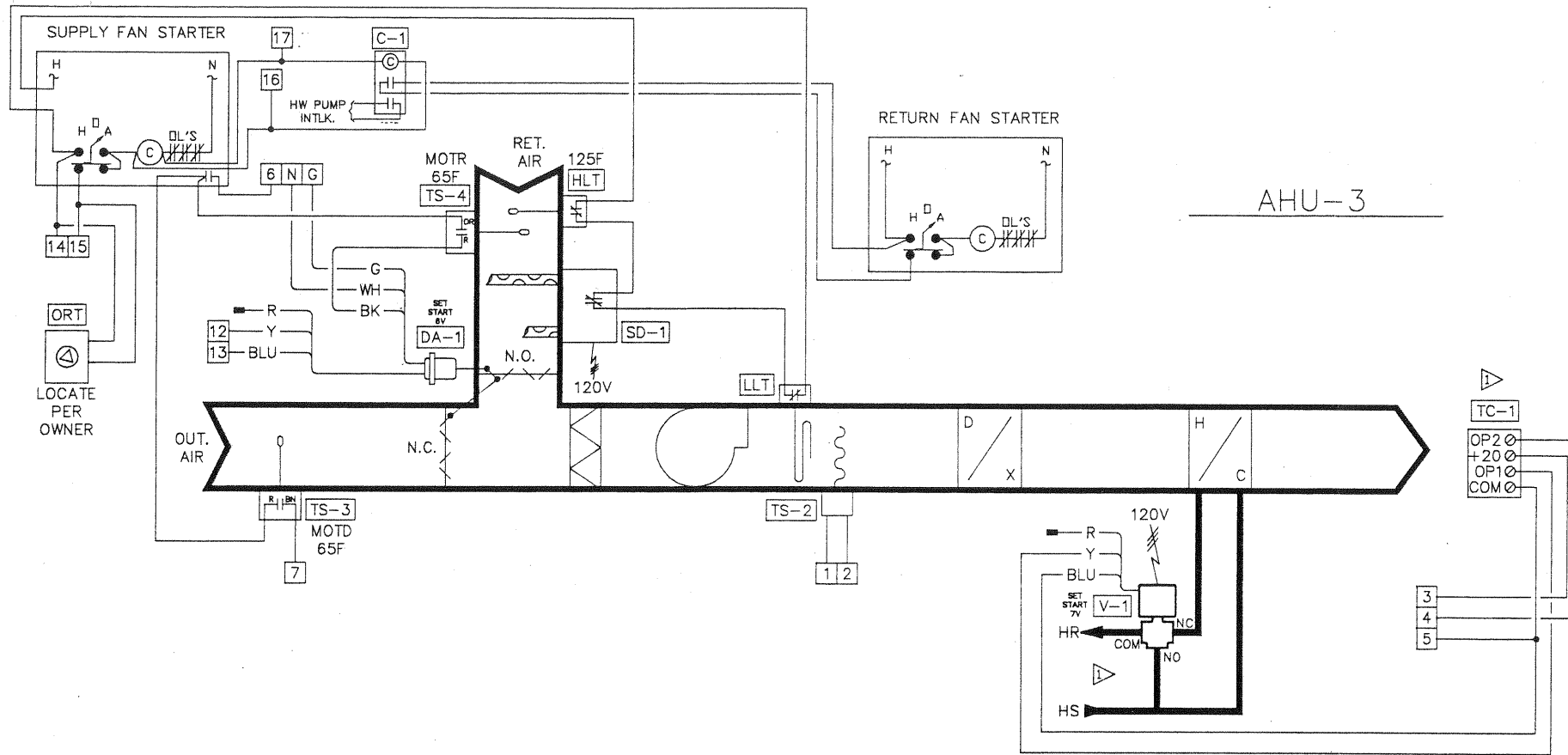
CONTRACTOR  
COOPER OIL COMPANY

ENGR/DRAWN BY: JFS/ DATE: AUGUST 13, 1990

JOB NO.: 891101 DWG. NO.: 1 OF 5

CAD DRAWING NO. 89110101

CONSERVATROL | CENTRAL CAROLINA COMMUNITY COLLEGE



BILL OF MATERIAL			
ITEM	CODE NO.	DESCRIPTION	QTY.
<b>**FIELD EQUIPMENT**</b>			
TC-1	TP-8124	ROOM CONTROLLER, DUAL SETPOINT	1
V-1	-	SEE VALVE SCHEDULE	-
TS-2	TS-8405	DUCT SENSOR, AVERAGING	1
TS-3,4	TC-4111	ELEC. REMOTE BULB STAT	2
acc.	AT-208	DUCT FLANGE	2
TS-5,1	TC-1191-404	ROOM STAT, BLANK COVER	2
DA-1	MS-83040	DAMPER ACTUATOR, 120V	1
acc.	AM-161-3	DAMPER LINKAGE KIT	1
acc.	AM-125	LINKAGE ROD	1
SD-1	-	BRK SMOKE DETECTOR	1
HLT	A11A-1	ELEC. HIGH LIMIT STAT, MANUAL RESET, JOHNSON CONTROLS	1
LLT	A25AN-1	ELEC. LOW LIMIT STAT, MANUAL RESET, JOHNSON CONTROLS	1
ORT	-	BYPASS TIMER, MARK TIME	1
C-1	AE-314	120V POWER RELAY, DPDT	1
acc.	AE-300	ENCLOSURE	1
DA-2	MP-5430	DAMPER ACTUATOR, 120V	1
acc.	AM-161-3	DAMPER LINKAGE KIT	1
<b>**PANEL EQUIPMENT**</b>			
CP-3	-	CONTROL PANEL	1
F-1	-	FUSE HOLDER	1
TC-2	CC-8111-120	ELECTRONIC CONTROLLER	1
LSS-1	AD-8201	LOW SIGNAL SELECTOR	1
SR-1	CC-8102	SEQUENCING RELAY	1
CLK-1	DIGI-12-45-1	GRASSLIN 7-DAY CLOCK W/ RESERVE	1
R-1,2,3	P-127-2-4	3PDT RELAY, 120V	3
acc.	P-100-4	RELAY BASE	3
MPS-1	AD-8301	MANUAL POSITION SWITCH	1

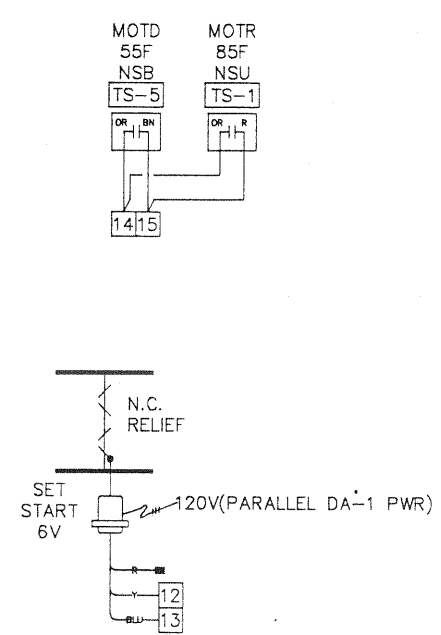
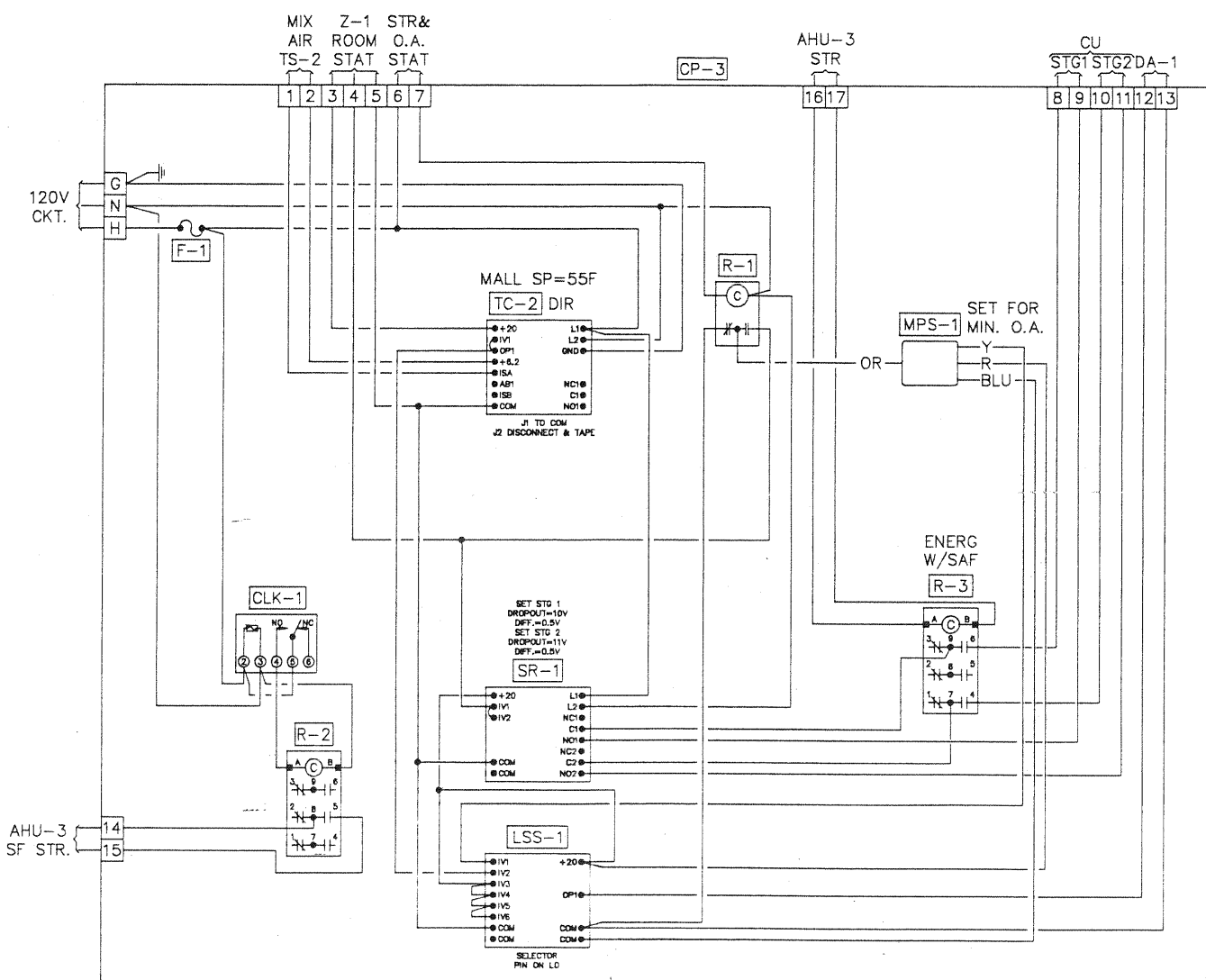
SEQUENCE OF OPERATION

**OCCUPIED MODE:** AHU IS STARTED AND STOPPED BY 7-DAY CLOCK 'CLK-1'.  
 RETURN AIR SMOKE DETECTOR 'SD-1', RETURN AIR HIGH LIMIT 'HLT', AND MIXED AIR LOW LIMIT 'LLT' ARE INTERLOCKED TO STOP THE SUPPLY FAN UPON ACTIVATION. WHEN THE SUPPLY FAN IS OFF, THE OUTDOOR AIR DAMPER CLOSES.

ROOM TEMPERATURE IS CONTROLLED THROUGH DUAL SETPOINT ROOM CONTROLLER 'TC-1' MODULATING THE MIXING DAMPERS (IN VENT CYCLE), STAGE CONDENSING UNIT AND MODULATE HW VALVE IN SEQUENCE TO MAINTAIN SETPOINT.

ON START UP, DURING MORNING WARMUP, RETURN AIR STAT 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED UNTIL THE RETURN TEMPERATURE WARMS UP TO 65F. IF OUTDOOR AIR TEMPERATURE IS BELOW 65F, ON A CALL FOR COOLING THE OUTDOOR AIR DAMPER IS MODULATED OPEN BY LOW SIGNAL SELECTOR 'LSS'. MIXED AIR AS SENSED BY 'TS-2' IS PREVENTED FROM DROPPING BELOW 55F BY CONTROLLER TC-2. IF THE OUTDOOR AIR DAMPER IS FULL OPEN AND COOLING DEMAND IS STILL NOT SATISFIED, SEQUENCING RELAY 'SR' ENERGIZES THE CONDENSING UNIT.

**UNOCCUPIED MODE:** NIGHT SETBACK THERMOSTAT 'TS-5' OR NIGHT SETUP THERMOSTAT 'TS-1' STARTS THE AHU WHEN THEIR SETPOINT IS EXCEEDED. DURING WARMUP, 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED. OVERRIDE TIMER 'ORT' WILL ALSO RESUME OPERATION OF THE UNIT.



# CONSERVATROL

## ENERGY CONTROL SYSTEMS

P.O. BOX 29067 GREENSBORO, N.C. 27408 919-373-8127

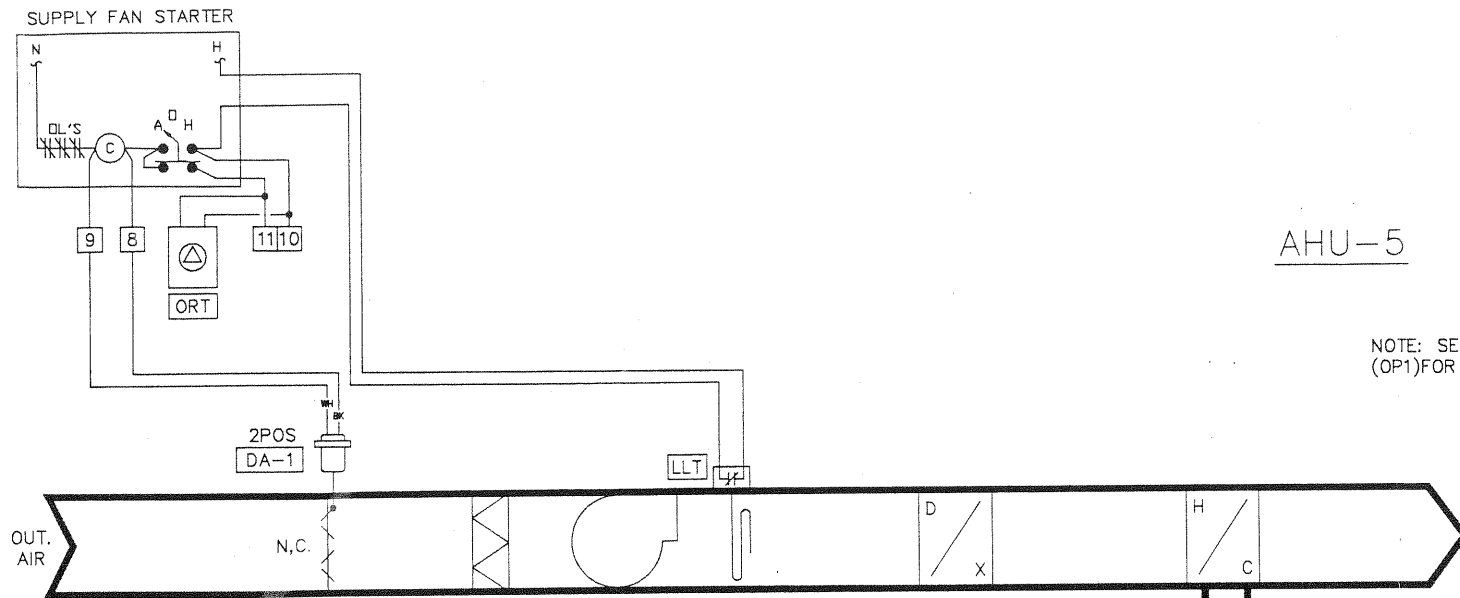
PROJECT		CENTRAL CAROLINA COMMUNITY COLLEGE	
CONTRACTOR		COOPER OIL COMPANY	
ENGR/DRAWN BY: JFS/	JOB NO.: 891101	DWG. NO. 2 OF 5	
DATE: AUGUST 14, 1990			

**SYMBOL LEGEND:**

- TERMINAL STRIP WIRING
- INTERIOR PANEL WIRING
- PNEUMATIC CONNECTIONS
- MUX CONNECTIONS
- FIELD WIRING
- ⊙ MOUNTED IN VAV UNIT
- ⊙ FUTURE INSTALLATION
- ⊙ REVISION (EXAMPLE: NO.2)
- ⊙ MOUNTED IN CONTROL PANEL
- ⊙ MOUNTED IN PANEL DOOR
- ⊙ MOUNTED REMOTE TO PANEL

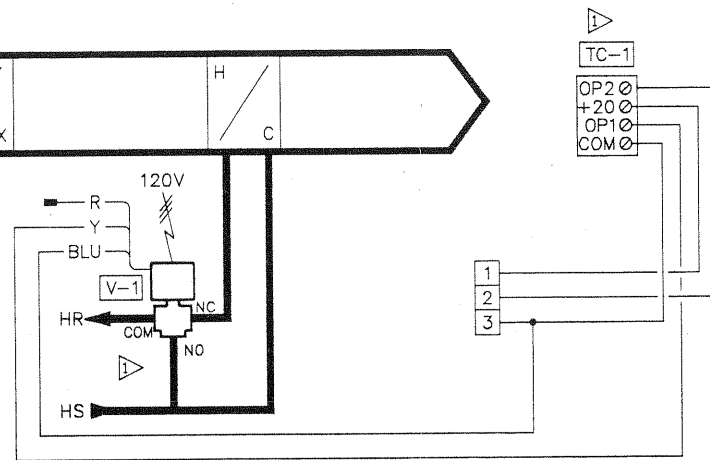
CAD DRAWING NO. 89110102	DATE
REV. NO. 001	REVISION DATA
1	REVISED VALVE V-1 PIPING, REMOVED DAMPER 07.
APR 18, 1991	BY

JOB NAME: CENTRAL CAROLINA COMMUNITY COLLEGE  
 TITLE: AHU-3 CONTROLS  
 DWG. NO.: 2 OF 5  
 JOB NO.: 891101



AHU-5

NOTE: SET HTG. OUTPUT (OP1) FOR 9V AT SETPOINT.

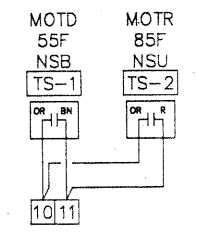
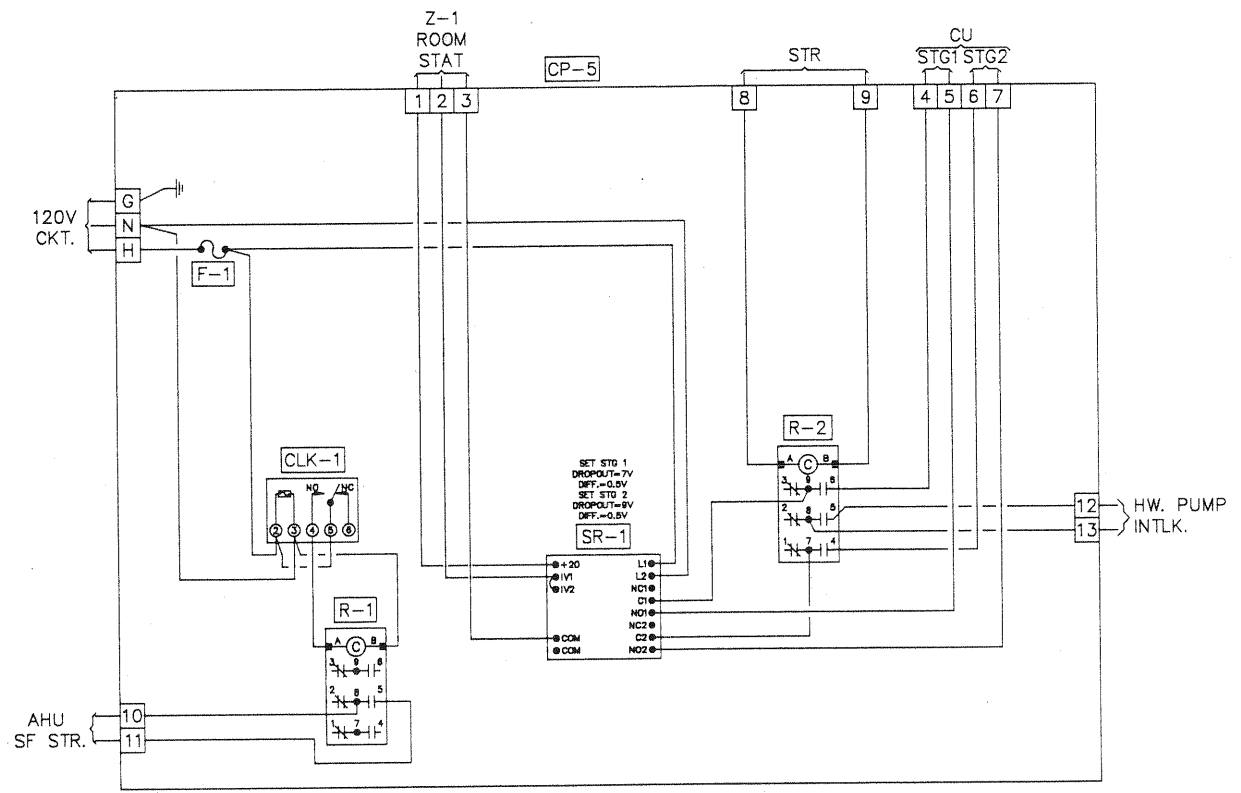


ITEM	CODE NO.	DESCRIPTION	QTY.
**FIELD EQUIPMENT**			
TC-1	TP-8124	ROOM CONTROLLER, DUAL SETPOINT	1
V-1	-	SEE VALVE SCHEDULE	-
TS-1,2	TC-1191-404	ROOM STAT, BLANK COVER	2
DA-1	MA-5330	DAMPER ACTUATOR, 120V	1
acc.	AM-161-3	DAMPER LINKAGE KIT	1
acc.	AM-125	LINKAGE ROD	1
LLT	A25AN-1	ELEC. LOW LIMIT STAT, MANUAL RESET, JOHNSON CONTROLS	1
ORT	-	BYPASS TIMER, MARK TIME	1
**PANEL EQUIPMENT**			
CP-5	-	CONTROL PANEL	1
F-1	-	FUSE HOLDER	1
SR-1	CC-8102	SEQUENCING RELAY	1
CLK-1	DIGI-12-45-1	GRASSLIN 7-DAY CLOCK W/ RESERVE	1
R-1, 2	P-127-2-4	3PDT RELAY, 120V	2
acc.	P-100-4	RELAY BASE	2

SEQUENCE OF OPERATION

OCCUPIED MODE: AHU IS STARTED AND STOPPED BY 7-DAY CLOCK 'CLK-1'. MIXED AIR LOW LIMIT 'LLT' IS INTERLOCKED TO STOP THE SUPPLY FAN UPON ACTIVATION. WHEN THE SUPPLY FAN IS OFF, THE OUTDOOR AIR DAMPER CLOSES. ROOM TEMPERATURE IS CONTROLLED THROUGH ROOM CONTROLLER 'TC-1' STAGING THE CONDENSING UNIT, AND MODULATING HW VALVE IN SEQUENCE TO MAINTAIN SETPOINT.

UNOCCUPIED MODE: NIGHT SETBACK THERMOSTAT 'TS-1' OR NIGHT SETUP THERMOSTAT 'TS-2' STARTS THE AHU WHEN THEIR SETPOINT IS EXCEEDED, OVERRIDE TIMER 'ORT' WILL ALSO RESUME OPERATION OF THE UNIT



# CONSERVATROL

## ENERGY CONTROL SYSTEMS

P.O. BOX 29067 GREENSBORO, N.C. 27408 919-373-8127

PROJECT CENTRAL CAROLINA COMMUNITY COLLEGE SANFORD, NORTH CAROLINA		
DRAWING TITLE AHU-4 CONTROLS		
CONTRACTOR COOPER OIL COMPANY		
ENGR/DRAWN BY: JFS/	JOB NO.: 891101	DWG. NO. 3 OF 5
DATE: AUGUST 30, 1990		

SYMBOL LEGEND:

- TERMINAL STRIP WIRING
- ◇— INTERIOR PANEL WIRING
- PNEUMATIC CONNECTIONS
- △— MUX CONNECTIONS
- \*— FIELD WIRING
- MOUNTED IN VAV UNIT
- FUTURE INSTALLATION
- REVISION (EXAMPLE: NO.2)
- MOUNTED IN CONTROL PANEL
- MOUNTED IN PANEL DOOR
- MOUNTED REMOTE TO PANEL

JOB NAME  
CENTRAL CAROLINA COMMUNITY COLLEGE

TITLE  
AHU-4 CONTROLS

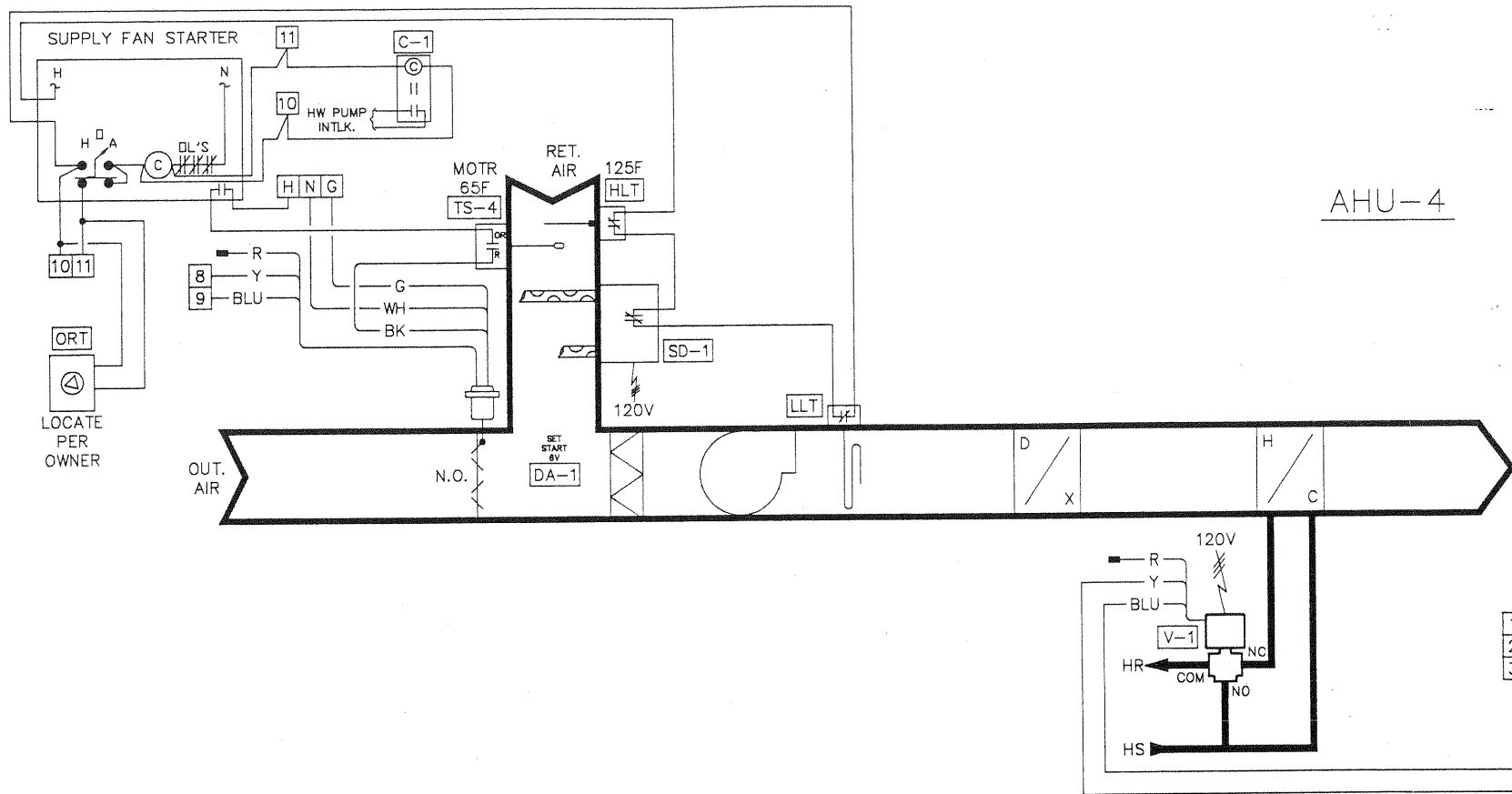
JOB NO.  
891101

DWG. NO.  
3 OF 5

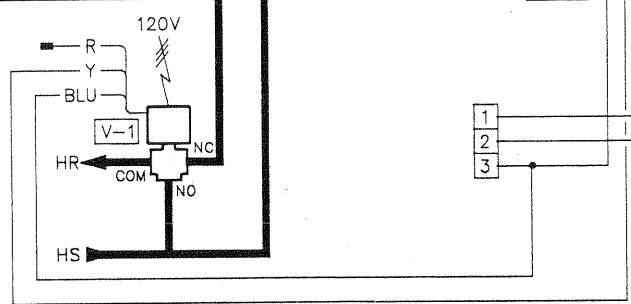
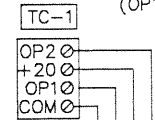
CAD DRAWING NO. 89110103

REV. NO. REVISION DATA

DATE  
APR 16, 1991



NOTE: SET HTG. OUTPUT (OP1) FOR 9V AT SETPOINT.



ITEM	CODE NO.	DESCRIPTION	QTY.
**FIELD EQUIPMENT**			
TC-1	TP-8124	ROOM CONTROLLER, DUAL SETPOINT	1
V-1	-	SEE VALVE SCHEDULE	-
TS-4	TC-4111	ELEC. REMOTE BULB STAT	1
acc.	AT-208	DUCT FLANGE	1
TS-2.3	TC-1191-404	ROOM STAT, BLANK COVER	2
DA-1	MS-83040	DAMPER ACTUATOR, 120V	1
acc.	AM-161-3	DAMPER LINKAGE KIT	1
acc.	AM-125	LINKAGE ROD	1
SD-1	-	BRK SMOKE DETECTOR	1
HLT	A11A-1	ELEC. HIGH LIMIT STAT, MANUAL RESET, JOHNSON CONTROLS	1
LLT	A25AN-1	ELEC. LOW LIMIT STAT, MANUAL RESET, JOHNSON CONTROLS	1
ORT	-	BYPASS TIMER, MARK TIME	1
C-1	AE-314	120V POWER RELAY, DPDT	1
acc.	AE-300	ENCLOSURE	1
**PANEL EQUIPMENT**			
CP-4	-	CONTROL PANEL	1
F-1	-	FUSE HOLDER	1
SR-1	CC-8102	SEQUENCING RELAY	1
CLK-1	DIGI-12-45-1	GRASSLIN 7-DAY CLOCK W/ RESERVE	1
R-1, 2	P-127-2-4	3PDT RELAY, 120V	2
acc.	P-100-4	RELAY BASE	2
MPS-1	AD-8301	MANUAL POSITION SWITCH	1

SEQUENCE OF OPERATION

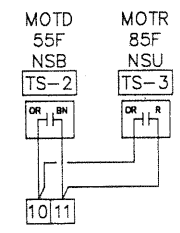
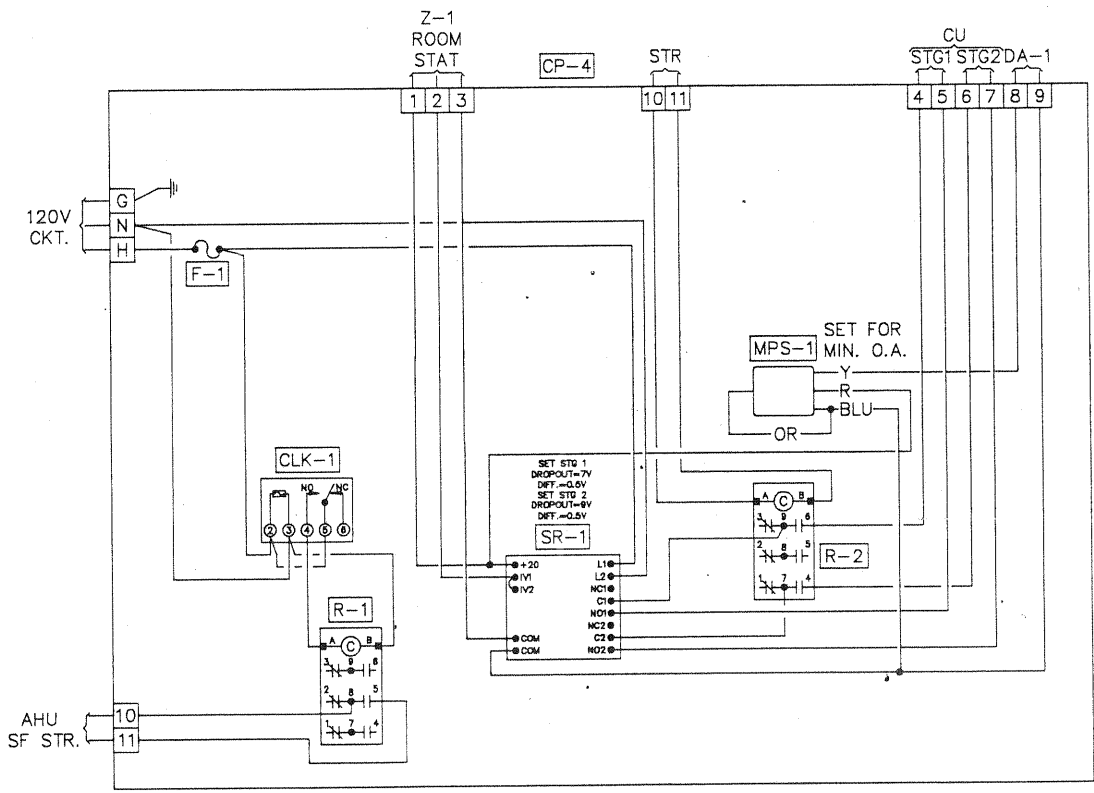
OCCUPIED MODE: AHU IS STARTED AND STOPPED BY 7-DAY CLOCK 'CLK-1'.

RETURN AIR SMOKE DETECTOR 'SD-1', RETURN AIR HIGH LIMIT 'HLT', AND MIXED AIR LOW LIMIT 'LLT' ARE INTERLOCKED TO STOP THE SUPPLY FAN UPON ACTIVATION. WHEN THE SUPPLY FAN IS OFF, THE OUTDOOR AIR DAMPER CLOSES.

ROOM TEMPERATURE IS CONTROLLED THROUGH ROOM CONTROLLER 'TC-1' STAGING THE CONDENSING UNIT, AND MODULATING HW VALVE IN SEQUENCE TO MAINTAIN SETPOINT.

ON START UP, DURING MORNING WARMUP, RETURN AIR STAT 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED UNTIL THE RETURN TEMPERATURE WARMS UP TO 65F.

UNOCCUPIED MODE: NIGHT SETBACK THERMOSTAT 'TS-2' OR NIGHT SETUP THERMOSTAT 'TS-3' STARTS THE AHU WHEN THEIR SETPOINT IS EXCEEDED, DURING WARMUP, 'TS-4' KEEPS THE OUTDOOR AIR DAMPER CLOSED. OVERRIDE TIMER 'ORT' WILL ALSO RESUME OPERATION OF THE UNIT.



CONSERVATROL  
ENERGY CONTROL SYSTEMS

P.O. BOX 29067 GREENSBORO, N.C. 27408 919-373-8127

PROJECT  
CENTRAL CAROLINA COMMUNITY COLLEGE  
SANFORD, NORTH CAROLINA

DRAWING TITLE  
AHU-5 CONTROLS

CONTRACTOR  
COOPER OIL COMPANY

ENGR/DRAWN BY: JFS/ JOB NO.: 891101 DWG. NO.: 4 OF 5

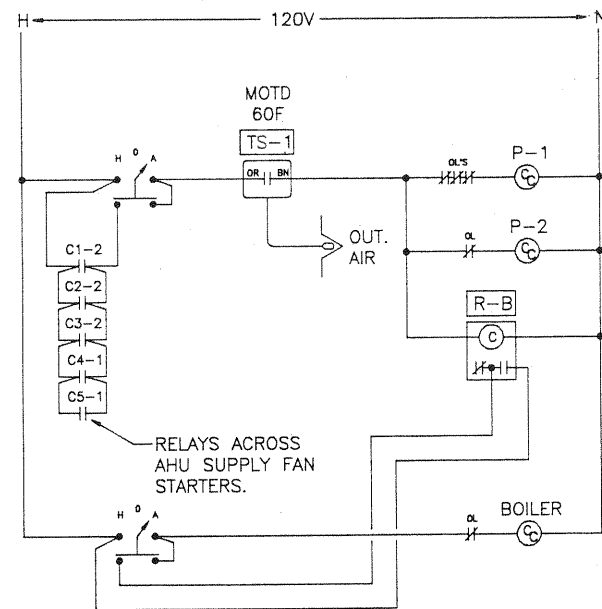
DATE: AUGUST 13, 1990

SYMBOL LEGEND:

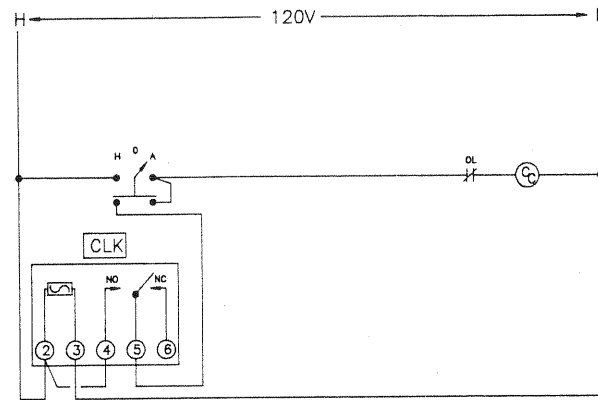
□	TERMINAL STRIP WIRING	⊙	MOUNTED IN VAV UNIT
◇	INTERIOR PANEL WIRING	⊕	FUTURE INSTALLATION
○	PNEUMATIC CONNECTIONS	⊖	REVISION (EXAMPLE: NO.2)
△	MUX CONNECTIONS	⊗	MOUNTED IN CONTROL PANEL
⊙	FIELD WIRING	⊛	MOUNTED IN PANEL DOOR
		⊞	MOUNTED REMOTE TO PANEL

JOB NO. 891101  
 TITLE AHU-5 CONTROLS  
 CONSERVATROL  
 CENTRAL CAROLINA COMMUNITY COLLEGE

### BOILER & HOT WATER CONTROL



### EXHAUST FAN F-1



#### BILL OF MATERIAL

ITEM	CODE NO.	DESCRIPTION	QTY.
TS-1	TC-4111	ELEC. REMOTE BULB STAT	1
acc.	AT-211	SUNSHIELD	1
R-B	AE-314	DPDT POWER RELAY	1
acc.	AE-300	ENCLOSURE	1
TS-2	TS-8201	IMMERSION SENSOR	1
acc.	AT-215	SS PIPE WELL	1
TS-3	TS-8501	OUTDOOR AIR SENSOR	1
TC-1	CP-8102	TWO INPUT CONTROLLER	1
CLK	DIGI-12-45-1	GRASSLIN 7-DAY CLOCK W/RESERVE	1

#### VAVLE SCHEDULE

SYSTEM	SERVICE	QTY.	FAIL	SIZE	BODY/STYLE	PPH/ GPM	CV	DP	ACTUATOR	PWR/ S.R.	CODE NUMBER
AHU-1	Z-1 HW	1	N.C.	1/2"	3-WAY SCR.	6.8	4.0	2.9	MP-5210	6-9V	VS-9313-211-4-4
AHU-1	Z-2 HW	1	N.C.	3/4"	3-WAY SCR.	8.4	6.8	1.5	MP-5210	6-9V	VS-9313-211-4-6
AHU-2	Z-1 HW	1	N.C.	1/2"	3-WAY SCR.	6.2	4.0	2.4	MP-5210	6-9V	VS-9313-211-4-4
AHU-2	Z-2 HW	1	N.C.	3/4"	3-WAY SCR.	9.8	6.8	2.0	MP-5210	6-9V	VS-9313-211-4-6
AHU-3	HW	1	N.C.	1"	3-WAY SCR.	13.9	12	1.3	MP-5210	6-9V	VS-9313-211-4-8
AHU-4	HW	1	N.C.	3/4"	3-WAY SCR.	7.1	6.8	1.1	MP-5210	6-9V	VS-9313-211-4-6
AHU-5	HW	1	N.C.	1/2"	3-WAY SCR.	4.5	4.0	1.3	MP-5210	6-9V	VS-9313-211-4-4
BOILER	HW	1	N.C.	1-1/2"	3-WAY SCR.	57.0	33.0	3.0	MS-83010	6-9V	VS-9313-353-4-10

#### SEQUENCE OF OPERATION

##### BOILER AND HW CIRCULATING PUMPS

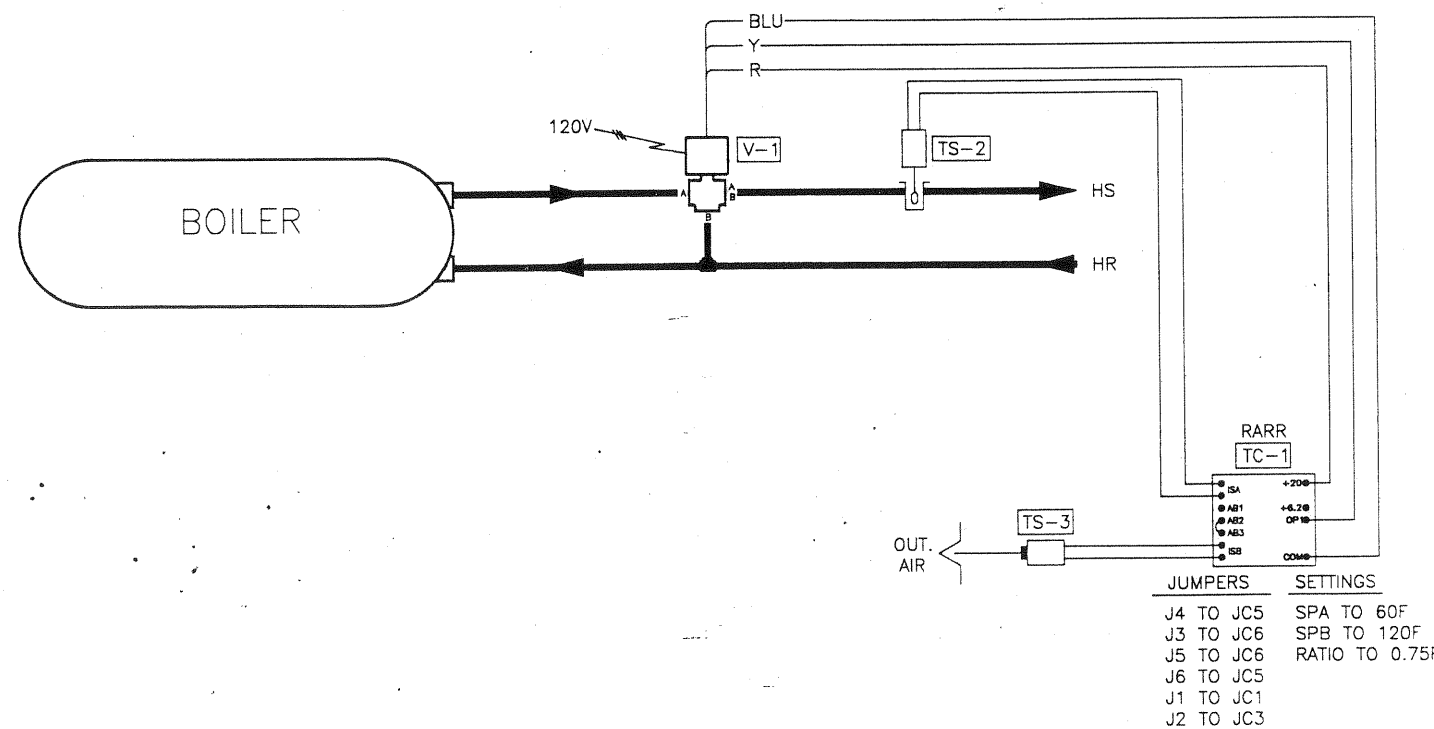
OCCUPIED MODE: THE BOILER AND PUMPS SHALL BE ENERGIZED WHEN OUTDOOR AIR TEMPERATURE AS SENSED BY 'TS-1', IS LESS THAN 60F AND ANY AHU IS RUNNING.

UNOCCUPIED MODE: THE BOILER AND PUMPS SHALL BE OFF UNLESS ANY OF THE ZONES CALL FOR HEATING AND AN AHU IS ENERGIZED.

HWS TEMPERATURE CONTROL: HWS TEMPERATURE AS SENSED BY 'TS-2' IS RESET INVERSELY BY OUTDOOR AIR TEMPERATURE AS SENSED BY 'TS-3' THROUGH CONTROLLER 'TC-1' MODULATING 3-WAY MIXING VALVE TO MAINTAIN RESET SCHEDULE AS FOLLOWS.

O.A.	HWS
15F	180F
60F	120F

EXHAUST FAN F-1: FAN IS ON DURING OCCUPIED PERIODS AND OFF DURING UNOCCUPIED PERIODS AS DETERMINED BY TIME CLOCK 'CLK'.



## CONSERVATROL

### ENERGY CONTROL SYSTEMS

P.O. BOX 29067 GREENSBORO, N.C. 27408 919-373-8127

PROJECT  
CENTRAL CAROLINA COMMUNITY COLLEGE  
SANFORD, NORTH CAROLINA

DRAWING TITLE  
BOILER/HOT WATER & EXHAUST FAN CONTROL

CONTRACTOR  
COOPER OIL COMPANY

ENGR/DRAWN BY: Jfs/ JOB NO: 891101 DWG. NO: 5 OF 5  
DATE: AUGUST 13, 1990

SYMBOL LEGEND:	
□	TERMINAL STRIP WIRING
◇	INTERIOR PANEL WIRING
○	PNEUMATIC CONNECTIONS
△	MUX CONNECTIONS
○	FIELD WIRING
⊗	MOUNTED IN VAV UNIT
⊕	FUTURE INSTALLATION
⊖	REVISION (EXAMPLE: NO.2)
⊙	MOUNTED IN CONTROL PANEL
⊛	MOUNTED IN PANEL DOOR
⊞	MOUNTED REMOTE TO PANEL

CAD DRAWING NO. 89110105  
REV. NO. REVISION DATA DATE

JOB NAME: CENTRAL CAROLINA COMMUNITY COLLEGE  
 TITLE: BOILER/HOT WATER & EXHAUST FAN CONTROL  
 JOB NO. 891101  
 DWG. NO. 5 OF 5