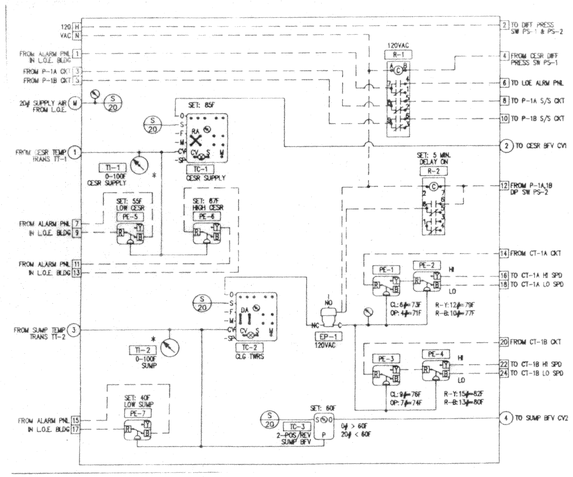
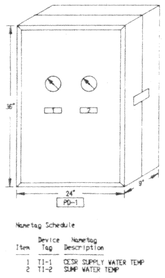
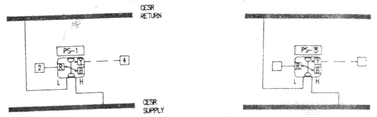


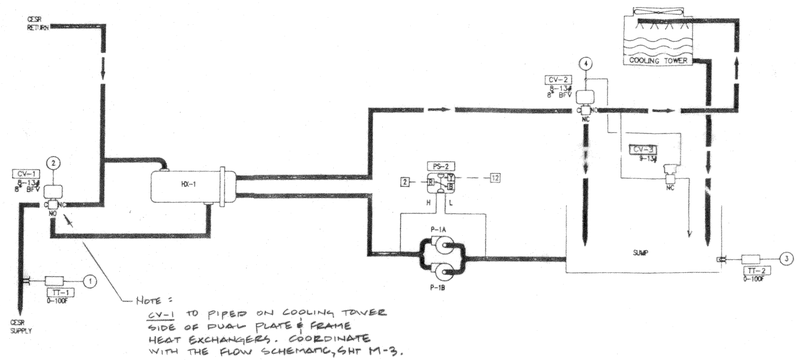


Nametag Schedule

Item	Device Tag	Nametag Description
1	TT-1	CESR SUPPLY WATER TEMP
2	TT-2	SUMP WATER TEMP



COOLING TOWER CONTROL



AUTOMATIC TEMPERATURE CONTROL SCHEMATIC

NO SCALE

Field Devices

Device Tag	Code Number	Description
CV-1,2	8LC-8285-4	8" ITT GRINNELL PNEU BFV, 8-13#
CV-3	V-3974-1005	1" NC GL 9-13# W/A 13.9
PS-1,2	P74FA-5	DIFF. PRESS. CONTR.., SPDT
TT-1,2	T-5210-1002	TRANS. 0/100F "B"
	T-800-1605	WELL BRASS 6-1/2"

Panel Devices

Device Tag	Code Number	Description
EP-1	V-2410-2	3- WAY SOLENOID AIR VALVE, 120VAC
PD-1	M-8100-2436	CONTROL PANEL 24 X 36 X 9
PE-1-4	P10BC-7	PRESSURE SWITCH, SPDT
PE-5,6,7	P10BG-3	PRESSURE SWITCH, SPDT, CLOSE DIFF.
R-1	PD-109-20	RELAY 3 PDT 10A 120 VAC
	PD-101-35	SOCKET-11 PIN BLADE
R-2	PD-109-12	TIME DELAY RELAY, DPDT, DELAY ON
	PD-101-36	RELAY SOCKET - 8 PIN
TC-1,2	T-5800-1	RECEIVER - CONT., SINGLE
TC-3	T-5312-3	RECEIVER - CONT., 2 - POS.
TI-1,2	T-5502-1002	PNEU THERMOMETER 0/100F

CESR LOW CONDUCTIVITY WATER COOLING AND COOLING TOWER SEQUENCE OF OPERATION

1. CESR Process Cooling (by ATC):
   - Receiver-controller TC-1 senses the CESR supply temperature TT-1 and modulates butterfly control valve CV-1 to maintain its 85°F set point.
2. Staging of Cooling Tower (by ATC):
   - Differential pressure switch PS-1 senses CESR process water flow and energizes control relay R-1 starting selected operating pump P-1A or P-1B and the automatic filtration unit AFU-1 will start. On pump start, time delay relay R-2 energizes and locks out tower fan start for its adjustable 0-5 minute delay period.
   - Receiver-controller TC-3 senses sump water temperature TT-2. Below its setting, 60°F, sump butterfly valve CV-2 and tower piping drain valve CV-3 are open to the sump. Above its setting of 60°F CV-3 closes and CV-2 switches to full flow through the tower. This sequence will reverse on temperature decrease.
   - Receiver-controller TC-2 senses sump water temperature TT-2. At 73°F TC-2 starts CT-1A fan on low speed through pressure switch PE-1, 2. As the sump temperature increases to 76°F, TC-2 starts CT-1B fan on low speed through pressure switch PE-3,4. On an increase to 79°F, TC-2 starts CT-1A fan on high speed through pressure switch PE-2. On a further increase to 82°F, CT-1B fan starts on high speed through pressure switch PE-4. This sequence will reverse on temperature decrease.
   - Each stage of the step controller will be individually adjustable.
3. When switching from the 30 horsepower highspeed cooling tower fan operation to the 7-1/2 horsepower low speed forward or reverse, there will be a 30 second time delay for coastdown (by Electrical).
4. When switching from the low speed reverse to either the low speed forward or to the high speed, there will be 30 second time delay for coast down (by EC).
5. There will be an electrical lockout to prevent the 30 and 7-1/2 horsepower cooling tower fan motors from operating at the same time and also the 7 1/2 horsepower reversing motor will be electrically interlocked to prevent closure of both forward and reversing coils (by EC).
6. For winter ice removal each cell can be operated in reverse, manually only, on low speed (by EC).
7. The vibration cutout switch on each cooling tower cell will automatically stop the respective fan motor and initiate a remote alarm (cooling tower MFR supplied contacts).
8. Mechanical Room Temperature Control:
   - Space thermostat T-1, provided with and mounted to the unit heater, will modulate the electric unit heater to maintain a 45°F space temperature.
9. Mechanical Room Ventilation Control:
   - Exhaust Fan, EF-1, will run continuously. When EF-1 is on, the motor actuator M-1 will open the intake louver, LV-1. When EF-1 is off, LV-1 will be closed.
10. Alarms: (panel, conduit, and wiring by ATC)
    - Acceptable manufacturers - Annunciator Panel
      A. Johnson Controls
      B. Rochester Instrument Systems
      C. Panalarm
    - In cooling tower mechanical room, provide alarm connections to a labelled terminal strip.
    - Each alarm in the annunciator panel shall be individually lighted. All alarms will be acknowledged with a light, 1 common output horn, horn quiet push-button, and common alarm relay. Panel will include test and reset buttons (all alarms shall be fully latchable).
    - The common alarm relay will be tied from the annunciator panel to the the Central Control Room Monitoring Station (coordinate with Wilson Lab Personnel).
    - Run remote alarms from the cooling tower mechanical building to the Central Control Room Annunciator Panel.
    - Control System Alarms:

1.	CESR Process LCW Loop On	(flow switch by ATC)
2.	High CESR Water Supply Temperature	(set @ 87°F contacts by ATC)
3.	Low CESR Water Supply Temperature	(set @ 55°F contacts by ATC)
4.	Low Cooling Tower Sump Temperature	(set @ 45°F contacts by ATC)
5.	Vibration Cutout CT-1A	(MFR supplied contacts)
6.	Vibration Cutout CT-1B	(MFR supplied contacts)
7.	Sump Level High	(MFR supplied contacts)
8.	Sump Level Low	(MFR supplied contacts)
9.	P-1A Motor Fault	(MCC contacts by EC)
10.	P-1B Motor Fault	(MCC contacts by EC)
11.	CT-1A 7-1/2 HP Motor Fault	(MCC contacts by EC)
12.	CT-1A 30 HP Motor Fault	(MCC contacts by EC)
13.	CT-1B 7-1/2 HP Motor Fault	(MCC contacts by EC)
14.	CT-1B 30 HP Motor Fault	(MCC contacts by EC)
15.	Automatic Filter High Pressure	(diff press switch by ATC)
16.	Fire Alarm Panel	(FAP contacts by EC)

GENERAL NOTES

1. Provide one spare control air line in the 1 1/2" buried conduit from LOE Main Building to the new cooling tower Mechanical Building. Cap air line ends for future use.

FACILITIES ENGINEERING
J.W. HUMPHREYS SERVICE BUILDING
CORNELL UNIVERSITY
ITHACA N.Y. 14853

APPROVAL	DATE
Philip L Cox	8/8/89
FACILITIES ENGINEERING	
LIFE SAFETY	

DRAWN BY	DATE
DCS	8/8/89

CHECKED BY

ARCH		ENERGY	
CIVIL		ENVIR	
ELEC			
MECH			
STRUCT			

REV	DATE	BY	DESCRIPTION

DRAWING TITLE
CONTROLS

PROJECT
WILSON LAB
CESR COOLING
TOWERS

LOCATION NO. 2085

SCALE	SHEET NO.
AS NOTED	M6
FILE NO. 85610	18 OF 20
DRAWING NO. D- 2849	

095-150