

**D0 Cryo  
Ventilation Fan  
Controls  
and  
Monitoring**

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**D0 Engineering Note  
3740.510.EN-242  
Revision A**

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## D0 CRYO VENTILATION FAN CONTROLS AND MONITORING

**GENERAL:** This engineering note describes how exhaust fan 6 (EF-6) and exhaust fan 7 (EF-7) are controlled and monitored. Since these two fans are a vital link in the ODH safety system, they will be monitored, controlled and periodically operated by the programmable logic controller(PLC). If there should be a fault in the ventilation system, the PLC will print a warning message to the cryo control room printer and flash a descriptive warning on the ODH/ventilation graphics page. This fault is also logged to the Xpresslink graphics alarm page and to an alarm history hard disk file. The ventilation failure is also an input to the auto dialer which will continue it's automatic sequence until acknowledged.

EF-6 delivers 13000 C.F.M. and is considered emergency ventilation. EF-7 delivers 4500 C.F.M. and will run 24 hrs a day. Both ventilation fans are located in an enclosed closet in the TRD gas room. Their ductwork, both inlets and outlets run along side the pipe chase, but are separated by an airtight wall. Their combination motor control starter cabinets are located in the TRD room in plain visible sight of the fans with the closet door open. The fans have signs that state they are automatically controlled and can energize at any time.

**FAN CONTROL:** Local control of EF-6 and EF-7 is provided by a toggle switch with memory on their starter cabinets. Remote automatic control is provided by the PLC, from Xpresslink on the ODH/ventilation graphics page. The sump low temperature switches override any mode of the starter cabinet selector switch, to turn EF-6 on. EF6 is energized, when the selector switch on the motor control cabinet is in auto, by the PLC ladder if EF7 is off, EF7 fails, or power is off to the PLC. The ODH system is not hard wired directly to the exhaust fans. It has been decided to keep output device activation from the ODH system to a minimum until further experience is gained with the ODH system. If it is determined that this is needed it can be done at any time through the PLC and ladder logic.

**FAN MONITORING:** The PLC continuously monitors power available, motor starter state, differential pressure in each fans ductwork, and two sump temperature switches.

The power available monitor detects power after the fuse of the 120vac control power of each fan. This insures that both the 3 phase power and the control power are present. If there is a loss of power detected, the cryo control room printer prints out a warning message and

the ODH/ventilation page flashes a continuous warning until power is returned.

The motor starter state is displayed on the PLC(Xpresslink) ODH/ventilation page as "fan on" or "fan off". If the starter changes state, a message is printed in the cryo control room.

The differential pressure switch across each fan is monitored by the ladder logic. If an "on" fan doesn't have proper differential pressure, the ladder will display a flashing operational failure on the ODH/ventilation page and print a failure warning on the cryo control room printer. Since EF-7 is required "on" all the time, loss of the differential pressure will show a failure on the ODH/ventilation graphics page and the cryo control room will print a failure.

Any one of the two sump temperature switches, when tripped on low temperature, will override any mode of the EF-6 fan controller, to turn EF-6 on. Both sump temperature switches will also print an alarm to the cryo control room printer and flash an Xpresslink warning on the ODH/ventilation graphics page until the low temperature trip clears.

**EMERGENCY VENTILATION TESTING:** The ladder logic in the PLC is programmed to run and test EF-6. The PLC will run EF-6 once a day for 20 minutes and monitor for the correct air flow during its operation. Should there be a failure of EF-6 during this testing period, Xpresslink will print out a failure message and flash a warning on the ODH ventilation graphics page.

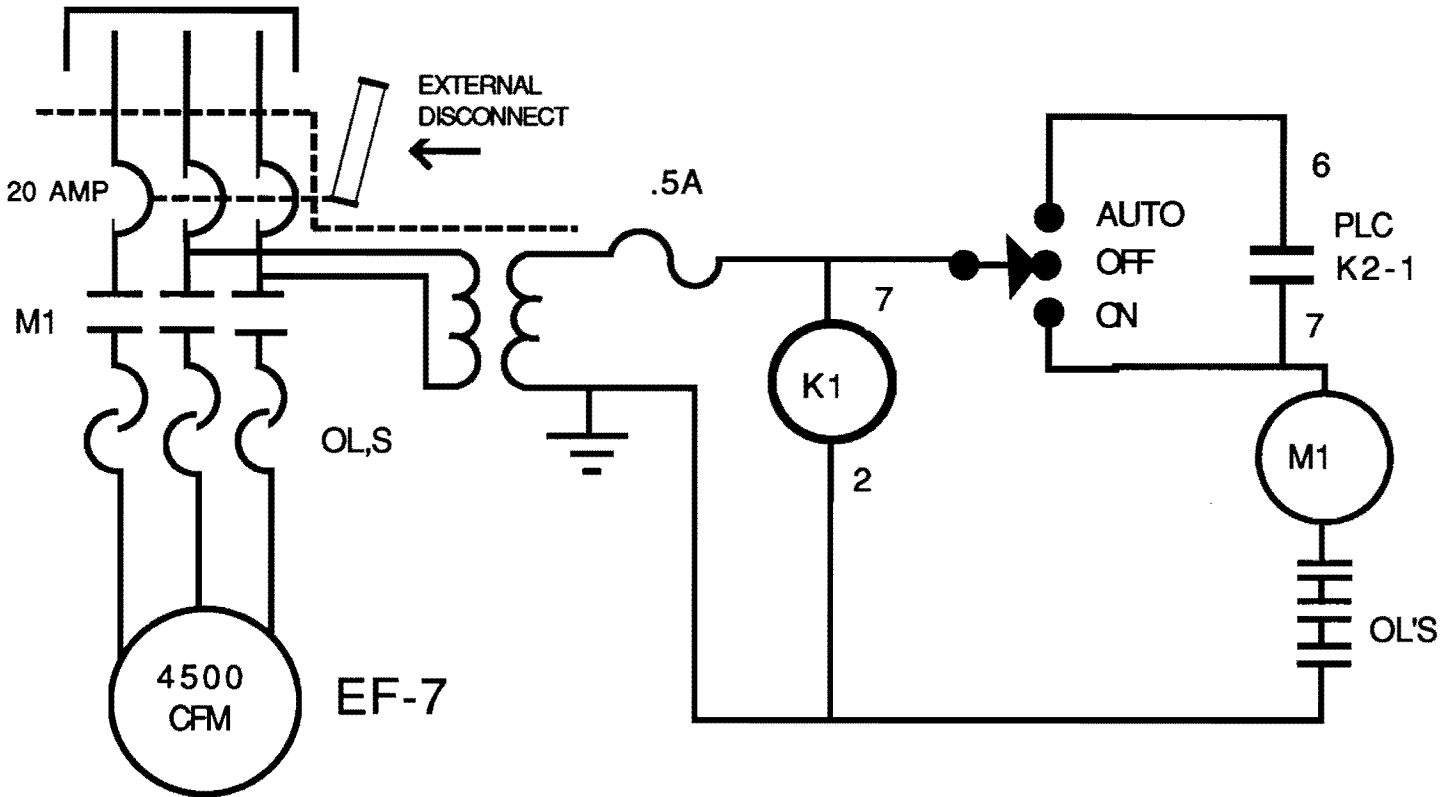
**PIPE CHASE DOOR MONITORING:** The pipe chase door positions are monitored by the PLC. If any of the doors are opened, the graphic for that door flashes on the ODH/ventilation graphics page and a change of state warning is printed on the cryo control room printer.

DAN MARKLEY 2/14/90  
X2849  
P-992

480 VAC  
 FEEDER PHP-D0-EM-2  
 CIRCUIT 1,2,3

# D0 VENT FANS (EF-7)

1/23/90      4500 C.F.M.

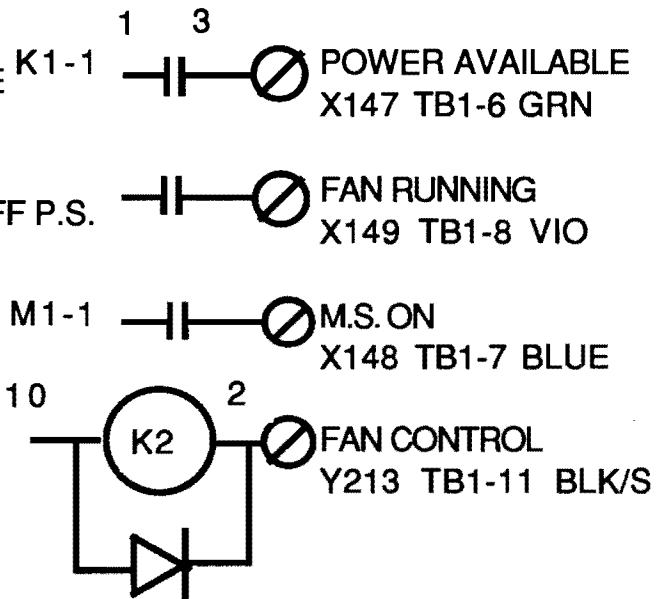


EF-7 RUNS 24 HOURS

I/O TO PLC

**NORMAL MONITOR**

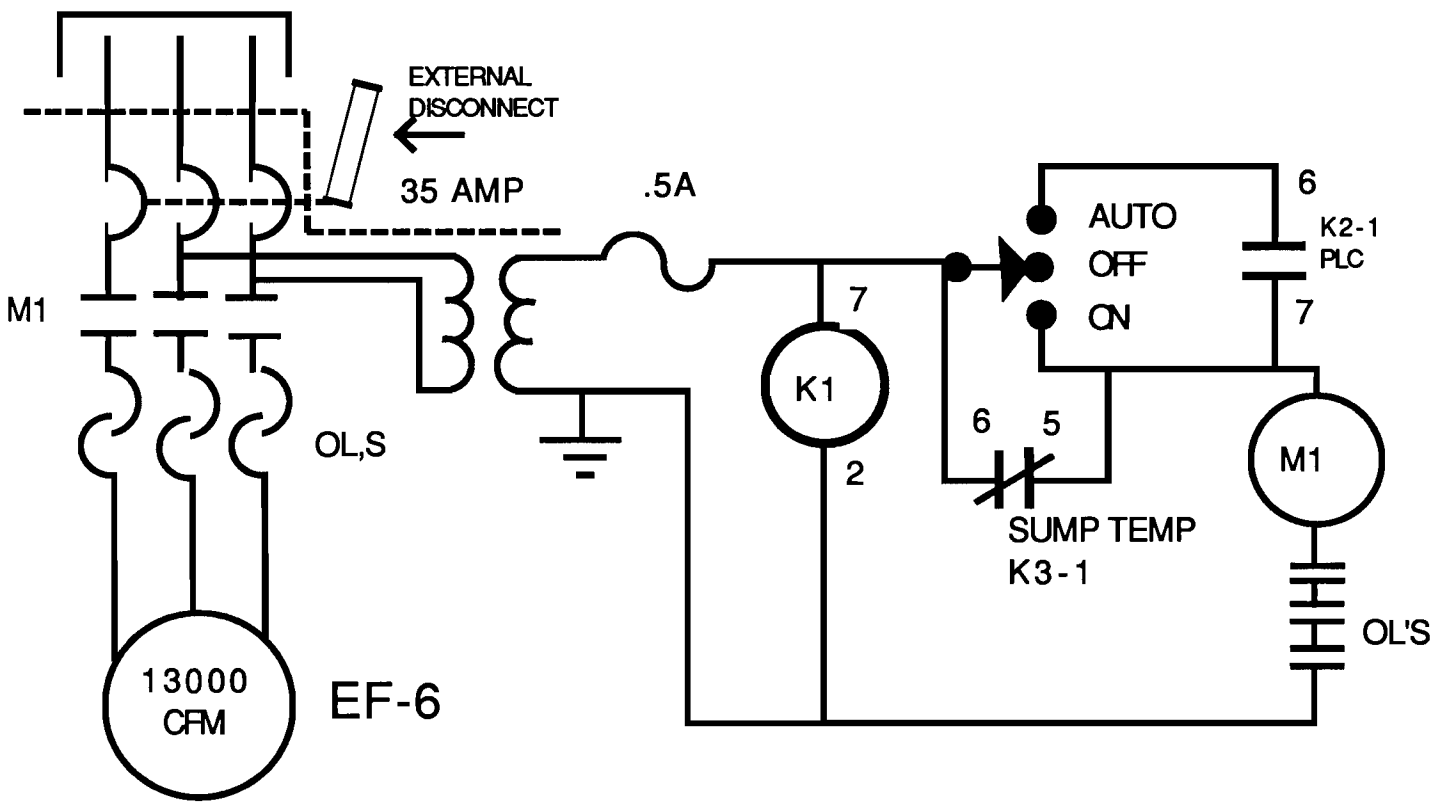
1. PRINT ALARM IF LOSE POWER AVAILABLE
2. PRINT ALARM IF FAN STATUS CHANGES
3. PRINT ALARM IF NO DIFF WHILE RUNNING
4. PRINT ALARM IF SUMP TEMP LOW



480 VAC  
FEEDER PHP-D0-EM-2  
CIRCUIT 1,2,3

# D0 VENT FANS (EF-6)

1/23/90 13000 C.F.M.



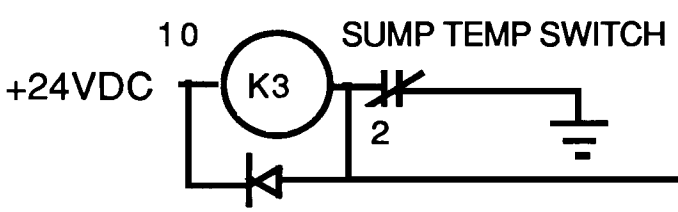
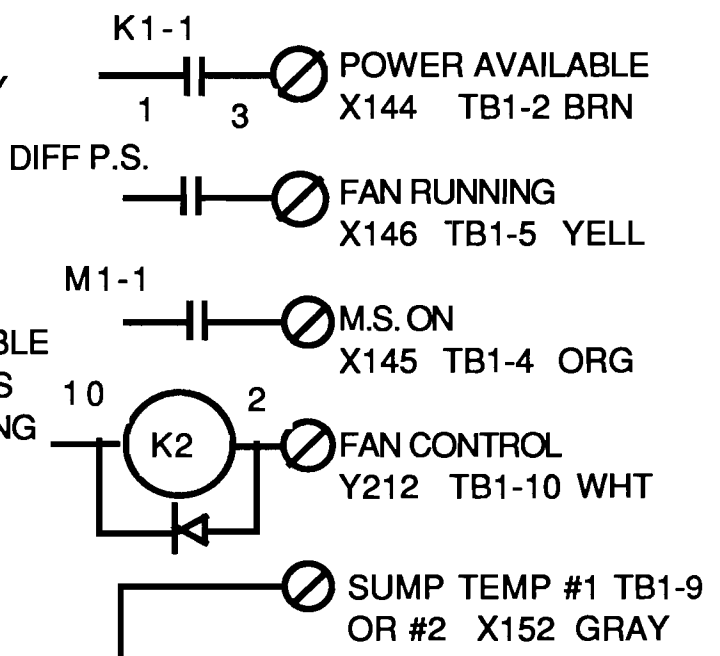
I/O TO PLC

**TEST/PERIOD**

1. START FAN
2. CHECK FOR DIFF SW AFTER TIME DELAY
3. PRINT FAILURE OR PRINT NO FAILURE
4. RUN FOR TIME PERIOD
5. TURN OFF FAN

**NORMAL MONITOR**

1. PRINT ALARM IF LOSE POWER AVAILABLE
2. PRINT ALARM IF FAN STATUS CHANGES
3. PRINT ALARM IF NO DIFF WHILE RUNNING
4. PRINT ALARM IF LOW SUMP TEMP

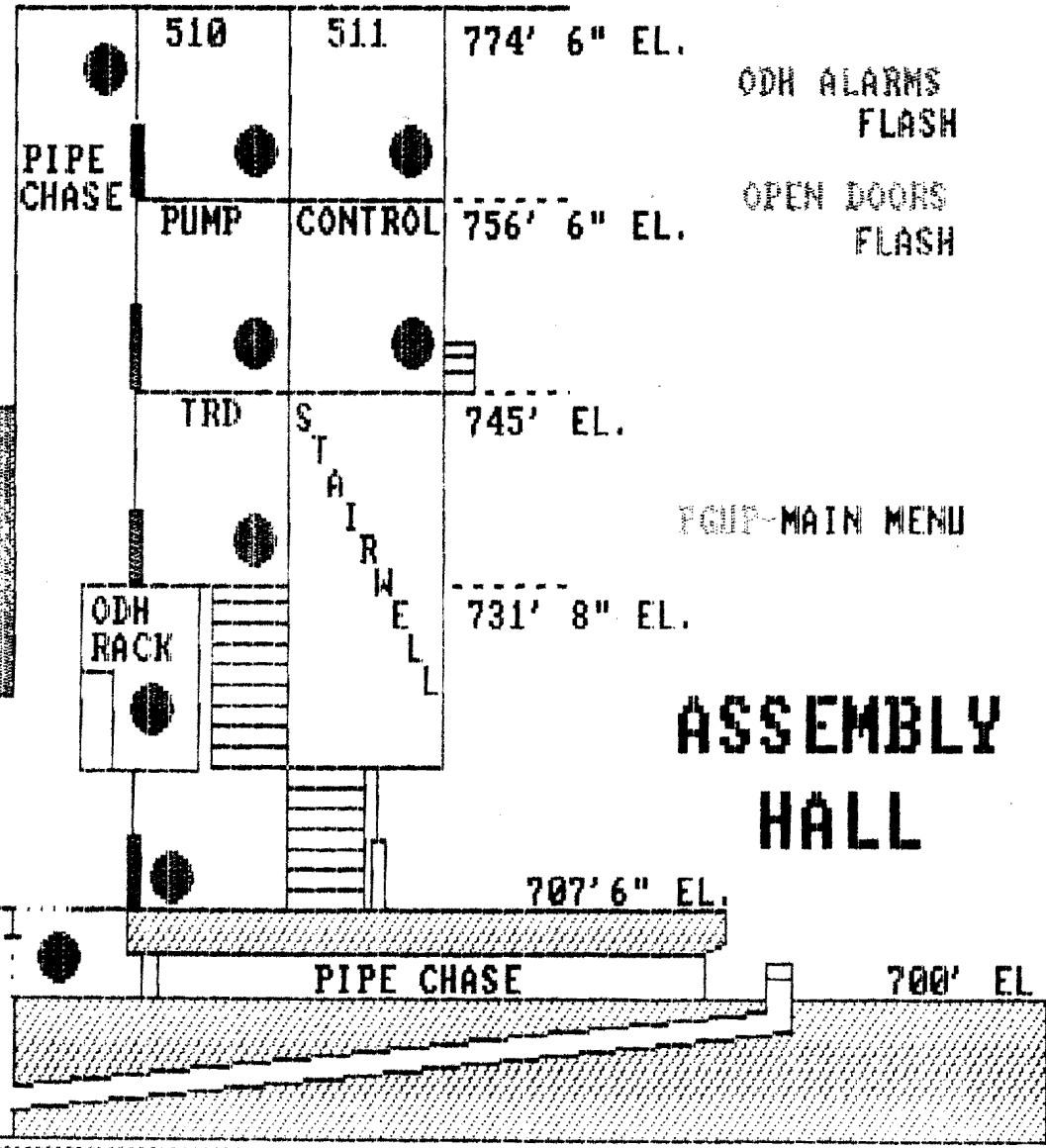


TIME: 09:59:44

# ODH SYSTEM STATUS

DATE: 03-02-90

VENTILATION	EF-6	EF-7
CFM	13,000	4,500
CONTROL	<u>OFF</u>	ON
FAN STATUS	OFF	ON
POWER	NORMAL	NORMAL
OPERATION	NORMAL	NORMAL

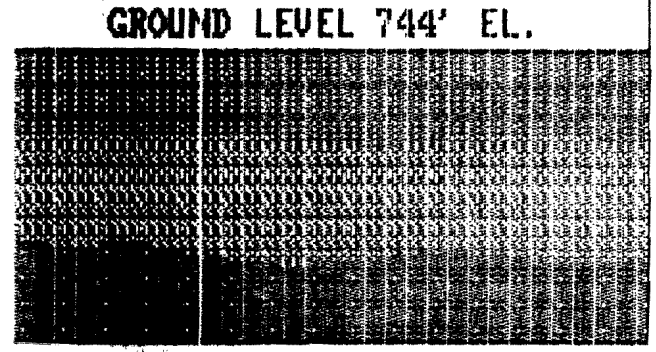


ODH ALARMS  
FLASH

OPEN DOORS  
FLASH

EGUP-MAIN MENU

## ASSEMBLY HALL



LAP DEWAR

SUMP



DISP: ODH

ENABLE