Programming 90% complete

```c
// DIRC Environment

// Check temperature of Optical box electronic environment against shutdown limit, if over set a flag

IF DIRC_OB_N_Temp >= DIRC_OB_TempLimit THEN
    DIRC_OB_N_Overtemp:= 1;
END_IF;

IF DIRC_OB_S_Temp >= DIRC_OB_TempLimit THEN
    DIRC_OB_S_Overtemp:=1;
END_IF;

// Each optical box also has a ducted air flow switch and enclosure cover proximity switch
// If (no flow or high temp or no cover) then disable HV and LV

IF DIRC_OB_N_Overtemp OR DIRC_OB_N_LS OR DIRC_OB_N_FS THEN
    DIRC_LV_Disable:=1;
    DIRC_HV_Disable:=1;
END_IF;

IF DIRC_OB_S_Overtemp OR DIRC_OB_S_LS Or DIRC_OB_S_FS THEN
    DIRC_LV_Disable:=1;
    DIRC_HV_Disable:=1;
END_IF;

IF DIRC_Reset Then
    DIRC_OB_N_Overtemp:=0;
    DIRC_OB_S_Overtemp:=0;
    DIRC_LV_Disable:=0;
    DIRC_HV_Disable:=0;
END_IF;
```

To DO: Liquid Level Scaling and Alarms
Temp Sensor Scaling and Alarms
Tag List - 90% complete

<table>
<thead>
<tr>
<th>Type</th>
<th>Scope</th>
<th>Name</th>
<th>Description</th>
<th>Datatype</th>
<th>Specifier Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_BB_N_B_DP</td>
<td>North bottom barbox diff pressure</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
</tr>
<tr>
<td>TAG</td>
<td>DIRC_BF_N_R_F</td>
<td>DIRC_BB_N_B_F</td>
<td>North bottom barbox Flow</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_BF_N_T_DP</td>
<td>DIRC_BB_N_T_DP</td>
<td>North Top barbox diff pressure</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
</tr>
<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_BB_S_B_DP</td>
<td>South bottom barbox diff pressure</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
</tr>
<tr>
<td>TAG</td>
<td>DIRC_BF_S_B_F</td>
<td>DIRC_BB_S_B_F</td>
<td>South bottom barbox Flow</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_BF_S_T_DP</td>
<td>DIRC_BB_S_T_DP</td>
<td>South Top barbox diff pressure</td>
<td>REAL</td>
<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_Caen</td>
<td>Disable Caen</td>
<td>BOOL</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBAF</td>
<td>North Optical Box Air Flow Switch</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBP</td>
<td>North Optical Box Proximity Switch</td>
<td>BOOL</td>
<td>(RADIX = Decimal, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBT</td>
<td>North Optical Box Over Temp flag</td>
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<td>TAG</td>
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<td>North Optical Box Temp Data</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBF</td>
<td>South Optical Box Air Flow Switch</td>
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<td>TAG</td>
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<td>BOOL</td>
<td>(RADIX = Decimal, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBT</td>
<td>South Optical Box Over Temp flag</td>
<td>BOOL</td>
<td>(RADIX = Decimal, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_CA_OBT_D</td>
<td>South Optical Box Temp Data</td>
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<td>DIRC_Environment</td>
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<td>Optical Box Temp Limit for flag</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_Reset</td>
<td>Reset/Clear Flags Interlocks</td>
<td>BOOL</td>
<td>(RADIX = Decimal, Constant := false, ExternalAccess := Read/Write)</td>
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<tr>
<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_WS_MasterAlarm</td>
<td>Water Skid Master Clear Alarm</td>
<td>BOOL</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_WS_Flow</td>
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<td>TAG</td>
<td>DIRC_Environment</td>
<td>DIRC_WS_PumpEnable</td>
<td>Water Skid Turn on Pumps</td>
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<td>Water Temp Data</td>
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<td>(RADIX = Float, Constant := false, ExternalAccess := Read/Write)</td>
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</tbody>
</table>
## DIRC Controls Cables

### WaterSkid to Platform PLC

**Digital**
- **DI 01**: Pump Enable (24VDC, Digital)
- **DI 02**: Master Clear Alarm (24VDC, Digital)
- **DI Return**: Return (24VDC, Digital)
- **DO 04**: Water Cart Alarm (24VDC, Digital)
- **DO Return**: Return (24VDC, Digital)

**DownStream PLC**
- **Local**: 1.O.Data.14
- **Local**: 1.O.Data.15
- **Local**: 2.I.Data.0
- **Local**: 2.I.Data.1

### Analog
- **AO 00**: Water Flow (Analog, 4-20mA)
- **AO 00**: Water Flow Return (Analog, 4-20mA)
- **AO 01**: Water Loop Temp (Analog, 4-20mA)
- **AO 01**: Water Loop Temp Return (Analog, 4-20mA)

**Local**: 7.I.Ch0Data
**Local**: 7.I.Ch0Data
**Local**: 7.I.Ch1Data
**Local**: 7.I.Ch1Data

### Junction Box (2x)

- **J1 01**: AirFlow Switch (24vdc)
- **J1 02**: AirFlow Switch Return (24vdc)
- **J2 01**: Limit Switch (24vdc)
- **J2 02**: Limit Switch Return (24vdc)
- **J3 01**: Temp Supply
- **J3 02**: Temp Return
- **J3 03**: Temp Data
- **J4 01**: Water Level Sup
- **J4 02**: Water Level Ret
- **J5 01**: DP Supply
- **J5 02**: DP Return
- **J5 03**: DP Data
- **J6 01**: DP2 Supply
- **J6 02**: DP2 Return
- **J6 03**: DP2 Data

**Local**: 2.I.Data.8
**Local**: 2.Return
**Local**: 2.I.Data.10
**Local**: 2.Return
**Local**: 9.Supply
**Local**: 9.Return
**Local**: 9.I.Ch2Data
**Local**: 7.I.Ch2Data
**Local**: 8.I.Supply
**Local**: 8.I.Return
**Local**: 8.I.Ch4Data
**Local**: 8.I.Ch5Data

### Notes

- **Belden 9541 060100, 24AWG, 15C, 35ft (2x)**

- **Note:**
  - Extra conductors if we need more I/O from the water skid after running for a few months

- **Examples:** Individually command pumps, UV lights, Vacuum head temp, etc.

- **Belden 9541 060100, 24awg, 15C, 50ft (4x)**

- **Note:**
  - Liquid Level currently configured for 4-20mA

- **(4) Spare Analog 0-5VDC channels**
- **(4) Spare Analog 4-20mA channels**
- **(4) Spare Digital 24VDC Input channels**
- **(4) Spare Digital 24VDC Output channels**
**Cable/Connectors to purchase**

<table>
<thead>
<tr>
<th>DIRC Controls Needs</th>
<th>qty</th>
<th>tag</th>
<th>description</th>
<th>P/N</th>
<th>Price</th>
<th>Ext</th>
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<tr>
<td></td>
<td>6</td>
<td>Male Recepticle</td>
<td>19pin Trim trio</td>
<td>SOU1528-ND</td>
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<td>2</td>
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<td>Hammond</td>
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<td></td>
<td>12</td>
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<td>3</td>
<td>Belden 15C</td>
<td>15conductor 24awg</td>
<td>BEL1411-100-ND</td>
<td>244</td>
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<td>2</td>
<td>Belden 4C</td>
<td>4 conductor 24awg</td>
<td>78124SL005-ND</td>
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<td>Needed for Fall 2018</td>
<td>$750</td>
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</tbody>
</table>
To Do:

• Purchase Connector/Cable/Jct box (in stock)
• Build/Install Water Skid Control Cable, JctBox Cable
• Install CAEN/MPOD Interlock cables (Mixed w/ ComCAL)
• Liquid Level Sensor >?
  – Can be 24vdc with 0-5vdc out
  – Or 4-20mA loop
  – Programming
• Limit Switch>?
  – Anticipating 24vdc (can be 5vdc)

• Consider Designing Feedthrough Panel for PLC side connections?