Overview

Dewar Interface
- Connectors
- Isolation

Transition Module (TSM)
- Chassis
- Transition Module Assembly

Controller
- Layout
- Power Supply Module (PSM)
- Chassis
- Local Control Board Assembly (LCB)
- Ethernet Board Assembly
- Blower Housing Assembly
- Removal / Installation from DHE

Detector Head Electronics (DHE)
- Assembly
- Momentary switches

Mechanical Hardware Manufacture
- Detail / Assembly drawings
- Materials / plating
- Machined part quotes
- Identification
• Transition Module is the only customizable part of the DHE
Dewar / Detector Head Electronics (DHE) Interface
Dewar / DHE Interface

- 2X 32 pin hermetically sealed receptacle
- 2X 10 pin hermetically sealed receptacle
- 2X Isolation Rails (G10)
- 6X Clearance holes for M4 mounting screws
- 6X M4 tapped holes in isolation rails
- 2X MS3116 32 pin plug
- 2X MS3116 10 pin plug

DHE Interface (Transition Module) can be customized to accept different dewars

Kitt Peak Universal Dewar Shown

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Assembled DHE on Dewar

Kitt Peak Universal Dewar Shown
Transition Module (TSM)
TSM Chassis

Connector Plate (G10)

Remaining chassis parts
Nickel plated Aluminum

Isolation rails (G10)
Transition Module Exploded View

Top Cover
TRNT-EL-02-1030

CCD Preamp Transition Board
TRNT-EL-02-0005

Front Cover
TRNT-EL-02-1029

6X Guide Pins

TSM Chassis
TRNT-EL-02-0006

Transition Utility Board
TRNT-EL-04-0009

2X MS3116 32 pin plug

Shutter Connector
Lemo ERA.2S.308.CLL

2X MS3116 10 pin plug

Thermocouple connectors
Omega MPJ-T-F
Controller
Controller Layout

- PSM and Blower located in separate sections to isolate noise from signal
Power Supply Module (PSM)

- Pull handles
- DHE mounting bracket and captive bolt
- Power Switch
- Remote Power Control (J4)
- Power In (J3)

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Controller Chassis Exploded View

- PCB Mount, Rear
  TRNT-EL-02-0009

- Cross Rail, Right
  TRNT-EL-02-1005

- Cross Rail, Left
  TRNT-EL-02-1006

- Front Panel
  TRNT-EL-02-1004

- Bottom Plate
  TRNT-EL-02-1002

- Blower
  NMB Technologies
  BG0703-B044

- Rear Panel
  TRNT-EL-02-1003

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Assembled Controller Chassis
Local Control Board (LCB) Assembly

- Heatsink
  - TRNT-EL-02-1015
  - Heatsink is flexure mounted to account for component height variation
- 4X Spacer
  - TRNT-EL-02-1014
- Thermal Pad
  - TRNT-EL-02-1033
- Local Control Board (LCB)
  - TRNT-EL-04-0002
- Total imparted force on FPGA is 0.8 – 3.4 lbs
- Max allowable force on FPGA is 5.6 kg (12.3 lbs)
Ethernet Board Assembly

Cover
TRNT-EL-02-1032

Chassis ground wire for RJ45 Jack shield (other end soldered to jack shield pin)

8X Richco R906-1 Nylon Spacer

Standoff
TRNT-EL-02-1031

Parlex 050R60-0090BO A Ribbon Cable

PT01-PB0MH1-32BG33
Pleora iPORT NTx-Mini IP Engine

4X Nylon M2 screws

Ethernet Board Assembly

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Blower Housing Assembly

Blower Housing
TRNT-EL-02-1018

RJ45 right angle coupler (unshielded)
Tyco C-555051-1

Ethernet Patch Cable (Shielded), Cat 6, 12” long
L-Com TRD695SCR-1

Ethernet Patch Cord

Blower Housing Assembly

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Exploded Controller Assembly

- Ethernet Board Assembly
  - TRNT-EL-02-0011
- Mezzanine Board
  - TRNT-EL-04-0003
- Momentary switch
  - C & K 8531MZQE2
- 2X EMI Plate
  - TRNT-EL-02-1019
- 4X Spacer
  - TRNT-EL-02-1013
- Rear Panel Insert
  - TRNT-EL-02-0007
Assembled Controller

RJ45 (routed from Ethernet Board)

2X RJ45 (data sync)

Duplex LC

Fiber-optic
Controller Installation

Controller TRNT-EL-02-0002

Detector Head Electronics (DHE) TRNT-EL-02-0001

Tighten captive M6 hex bolt

6X Guide Pins

Transition Module TRNT-EL-02-0003
Loosen captive M6 hex bolt

- Momentary switches ground and cut power
Momentary Switches

TSM Present Switch
(C&K Components 8531MZQE2, SPST, .095” travel)

Controller → TSM
• Cuts power to the Detector when the Controller is removed from the TSM (provides safety interlock for the detector)

Grounding Switch
(E-Switch TL 2285 OA, TSM preamp board mounted, DPDT, .098” travel)

Controller ← TSM
• Connects analog ground to chassis (shorts TSM to short CCD substrate)
Thermal Management

• 44 W power input for fully populated DHE (two AFE boards)

• 30 W power input for fully populated DHE, minus one AFE Board

• Electronic parameters drift with temperature

• Servo control speed of blower to maintain constant component temperatures for a given night (varies the convection coefficient)

• Convection (forced) and conduction inside enclosure

• Natural convection to outside environment
Heat Transfer

Forced convection

Conduction through chassis

Natural convection from outer surfaces

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Mechanical Hardware Manufacture
Assembly / Detail Drawings

- Complete set of assembly and detail drawings available on a local server in \TorrentEngr\DOC_CTRL\EL-02 and \TorrentEngr\DOC_CTRL\EL-04

- EL-02 contains the bulk of the mechanical documentation

- EL-04 is for the altered items

- The assembly and part files can be opened with e-Drawings (free download from SolidWorks website)
Materials / Plating

- Cover - 5052-H32 Aluminum Alloy (good for forming)
- Most remaining machined parts 6061-T6 Aluminum Alloy
- Where isolation required, G10 fiberglass
- Parts generally held to ±.005” tolerance
- Parts will be check fit before plating

Plating requires good heat conduction, durability and shielding properties

- Aluminum parts will be electroless Nickel plated per ASTM B733-04 Type V, SC1, Class 4 (no masking)
- This is a high Phosphorus (>10%) content Ni plating that has good EMI shielding characteristics (non-magnetic) and is duller in appearance than the more common lower Phosphorus content Ni coatings
- The applied plating will be nominally 0.0002” thick.
- The temperature rise due to the plating is insignificant
Machined Part / Plating Quotes

4 bids for machined parts:

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<th>Tahl Inc.</th>
<th>Lindel</th>
<th>Landmark</th>
<th>NOAO</th>
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<tr>
<td>10 units</td>
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3 bids for Nickel plating:

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<tr>
<th></th>
<th>Chem Research</th>
<th>Gold Tech Industries</th>
<th>Oasis</th>
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• Durability testing was done on several Metalcraft label samples and the full Report is on a local server in: \\TorrentEngr\Design_Documentation\Mechanical Design

• Most durable label was adhesive backed photo anodized Aluminum foil available from Metalcraft (PHF series)
Backup Slides
Blower

NMB Technologies Corp.

**Characteristic Curves**

- **Static Pressure (Ps)** vs. **Air Flow (CFM)**
  - Graph showing various Blower models (B041/B051, B043/B053, B044/B054) with corresponding In H2O (Pa) values.

**Outline**

- Units: **inch (mm)**
- **Rotation** values (2.96, 3.5, 3.5 ±0.3, 2.96, 2.52, 0.78, 2.34, 2.0)
- **Air Flow** (m³/min)
- **Pass Through** (2 - (4.5 ±0.3))
- **LOT No.**

**General Specifications**

- **Allowable Ambient Temperature Range:**
  - -10°C ~ +70°C (Operating)
  - -40°C ~ +70°C (Storage)
  - (non-condensing environment)

<table>
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<tr>
<th><strong>Model</strong></th>
<th><strong>Rated Voltage (V)</strong></th>
<th><strong>Operating Voltage (V)</strong></th>
<th><strong>Current (A)</strong></th>
<th><strong>Input Power (W)</strong></th>
<th><strong>Speed (min⁻¹)</strong></th>
<th><strong>Max. Air Flow (CFM)°¹</strong></th>
<th><strong>Max. Static Pressure (m³/min)°¹</strong></th>
<th><strong>In H2O (Pa)</strong></th>
<th><strong>Noise (dB)°¹</strong></th>
<th><strong>Mass (g)</strong></th>
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<td>BG0703-B044-000-</td>
<td>X0</td>
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