An Introduction to the Advanced Transportation Controller Cabinet (ATCC)

Intelligent Transportation Society of Arizona
Topics

• Cabinet Overview
• Brief Development History
• Design Objectives
• Features and Benefits
• Assemblies & Components
• Current Status
Cabinet Overview

• The ATCC is an open architecture traffic control cabinet based on the ITE/NEMA AASHTO ITS Cabinet v1 standard.
• It offers significant improvements to conventional cabinets in modularity and compact size, motorist safety, technician safety, and diagnostics.
• This cabinet is intended to update or replace all cabinet types; NEMA TS-1, NEMA TS-2, and Caltrans 33x.
Cabinet Overview

Best of All Worlds
• Combines existing standards and the latest technological advancements to increase cabinet reliability, functionality, and ease of maintenance.

Why “ATC”? 
• The ATCC Standard is a component of the ITE/NEMA/AASHTO suite of ATC standards. It is intended to update the ITS Cabinet standard v1 to version 2.
ATCC Block Diagram

- Controller Unit (CU)
- Auxiliary Display Unit (ADU)
- Power Supply (PS)
- Input Assembly I-5 (IA)
- Output Assembly (OA)
- Field Input Termination Assembly (FITA)
- Field Output Termination Assembly (FOTA)
- Service Assembly (SA)
- DC Power Bus Assembly
- SB1 / SB2 Assembly
- Raw Power
- Clean Power
- DC Power
- SB1 / SB2
- Misc. Connection
- Detector, PPB, etc.

Utility Power

Clean Power Bus Assembly

Service Assembly (SA)
Brief Development History

- The ATCC architecture is based on the ITS Cabinet ITE/NEMA/AASHTO Standard v01.02.17b, published in 2006.
- This next phase ATCC work (v2) was developed using the FHWA Systems Engineering Process to develop the Concept of Operations (ConOps), Systems Requirements, capture user needs and requirements, and produce a high level design.
  - USDOT Work Order 14-0701, Tasks 7-12
- Goal of the v2 project was to refine v1 and adapt the lessons learned, and to support low voltage DC operation.
- In 2011 the WG lost funding and three manufacturers continued the program to bring the high level design to the detail level and produce working equipment.
Design Objectives

- Compact size
- LED signal compatibility
- Motorist & Technician Safety
- Modular rack mounted configurable design
- Accommodate large or multiple intersections
- Low Voltage Operation
ATCC Features (Size)

Put twice the equipment in the same space or the same equipment in half the space.

- Compact double density size, 19” rack mounted
- 16 or 32 channel Output capacity (16 channels shown)
- 120 channel Input capacity
  - 48 channel quad-density input assembly option
ATCC Features (LED Signals)

The ATCC Output technology is an *enabler* for higher energy efficiency.

- True Ultra low power LED compatibility, load switches will support Ultra low power LED signals less than 2 watts.
- Higher energy efficiency within the cabinet, load switches utilize FET devices minimizing heat and waste, no leakage current.
- Battery backup becomes more cost effective.
ATCC Features (Safety)

• Motorist Safety
  – Load current monitoring will detect a dark approach *immediately*.
  – TS-2 MMU level of diagnostics and beyond.

• Numerous improvements for Fail-Safer design
  – Flasher Output Monitor
  – CMU Output Override
  – 24Vdc override
  – All assemblies except FOTA and SA can be replaced with intersection still in flash
  – Pluggable surge protection on Mains, Inputs, and Outputs

• Technician Safety
  – High voltage components are not exposed, per NEC
  – Low Voltage cabinet further promotes Technician safety in the cabinet, as well as citizen safety when downed wires are present.
ATCC Features (Architecture)

- **Modular Assembly design**
  - Modular construction facilitates a wide variety of configurations and allows for future expansion
- **Competitive Procurement**
  - Open architecture allows for interchangeable assemblies and components between manufacturers
  - Same cabinet design can support both 120 Vac and 48 Vdc operation.
- **Easily handle advanced operations:**
  - Adaptive
  - Bicycle detection
  - Count data
  - Texas Diamond
  - RWIS, etc....
ATCC Assemblies

• 19” or 14” Rack Mounted Modular System
  – ATC Controller with Serial Bus
  – Input Assembly
  – Output Assembly
  – Serial Bus / DC Bus Cable Assembly
  – AC Clean Power Cable Assembly
  – Input and Output Termination Panels
Output Assembly

Output Assembly Houses

• Model 2212 cabinet monitor unit (CMU2)
• Model 2218 serial interface unit (SIU2)
• Model 2202 high-density switch pack (HDSP)
• Main contactor (MC)
  – 48 VDC coil
  – Mercury-free
ATCC Key Components

- Cabinet Monitor Unit (CMU2)
- Auxiliary Display Unit (ADU)
- High Density Switch Pack / Flasher Unit (HDSP-FU)
- Serial Interface Unit (SIU2)
- Cabinet Power Supply (PS)
- High Density FTR
ATCC Components (High Density Switch Pack)

- Card based Two Channel Load Switch, interchangeable with the Four Output Flasher
- Output Voltage and Current measured for each output (6), reported to CMU via SB#3
  - Six outputs rated at 5 mA to 1 Amp (1-120 watts)
- LED compatible to <2 watts, no leakage
- CMU controlled output over-ride for fail-safer operation
- “ID” indicators driven by CMU based diagnostics for simplified trouble-shooting
- 120 Vac (HV) and 48 Vdc (LV) versions
ATCC Components (Misc)

- HD Flash Transfer Relay
  - Hermetically sealed nitrogen enclosure
  - LED indicator reports actual contact status
  - DC coil voltage
- Pluggable SHA1250 Surge/Filter
- Pluggable Input and Output Transient protection devices
DC Low Voltage Configuration

The ATC Cabinet design directly supports Low Voltage DC operation (48 VDC).

- Spend less on PPE requirements
- Improved operational efficiencies
- Component costs are reduced
- Reduce liability risks
- Minimize regional electrician licensing issues
ATCC Summary

Fail-safer design is safer for drivers & workers.

Compact, HD components provide increased capabilities in \( \frac{1}{2} \) the space.

Designed for LEDs. Ready to migrate to low-voltage 48 VDC operations.
ATCC Status

- **Equipment Availability**
  - Two OEM manufacturers in production (HV & LV)
  - Two other OEM manufacturers in design
- **Several projects already deployed**
- **Six CU local software suppliers**
  - Two currently qualified for ATCC software
- **Standards document in draft development**
- **Funding is being secured to reinstate the ITE/NEMA/AASHTO Working Group to complete the ATCC Standard**
ATCC Contacts

Want to Know More?

Q&A

• Eberle Design  www.EDItraffic.com
• Intelight  www.Intelight.com
• McCain  www.McCain-inc.com
• Struthers-Dunn  www.struthers-dunn.com
• Eagle Traffic  www.eagletrafficcontrolsystems.com
• Econolite  www.Econolite.com