An Overview of ATC CABINETS

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AGENDA

• Introduction
• ATC Cabinet Overview
• Brief Development Overview
• Features and Benefits
• Assemblies & Components
• Panel Q & A
PANEL INTRODUCTION
Panel of Experts

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CABINET OVERVIEW
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, ITS v1, and Caltrans 33x.

Photo courtesy of McCain Inc.
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.
BRIEF DEVELOPMENT HISTORY
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.
Brief Development History

• The ITE/NEMA/AASHTO funding was restored in late 2015 and the standards Working Group restarted development of a draft standard in January of 2016.

• A final published national Standard is expected in Q4-2016.

• To date, three OEM companies are in cabinet production with close to 100 ATC Cabinets deployed across the US including several low voltage DC cabinets.
FEATURES AND BENEFITS
Design Objectives

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

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

- Compact double density size, 19” rack mounted
- High Density Components
- 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 LED compatibility.** Switch Packs will support Ultra low power LED signals less than 2 watts.
- **Higher energy efficiency** within the cabinet, Switch Packs utilize FET devices minimizing heat and waste, with no leakage current.
- Battery backup becomes more cost effective.
ATCC Features (LED Signals)

- Conventional Triac based 10 Amp load switches have forced LED signal designers to maintain a minimum load for reliable field operation.

The LED revolution is not over yet!
ATCC Features (Motorist Safety)

Load Current monitoring detects a dark approach immediately.

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
ATCC Features (Technician Safety)

Technician Safety
- High voltage (over 50 V) components are not exposed, per NEC

NFPA 70 Requirements
- Low Voltage cabinet further promotes Technician safety in the cabinet, as well as citizen safety when downed wires are present.
ATCC Low Voltage Configuration

The same ATC Cabinet design can also support Low Voltage DC operation

• Spend less on PPE requirements
• Improved operational efficiencies
• Component costs are reduced
• Reduce liability risks
• Minimize regional electrician licensing issues
• Knocked down poles and cabinets will not have high voltage wires exposed to the public

Photo courtesy of Intelight Inc.
ATCC Features (Architecture)

• Modular Assembly design
  – Modular construction facilitates a wide variety of configurations and allows for future expansion

• Easily handle advanced operations:
  – Adaptive
  – Bicycle detection
  – Count data
  – Texas Diamond
  – RWIS, etc....

• Competitive Procurement
  – Open architecture allows for interchangeable assemblies and components between manufacturers
  – Same cabinet design can support either 120 Vac or 48 Vdc operation.
ATCC Features (Size & Modularity)

Modular rack mounted configurable design

- Accommodate large or multiple intersections, down to small CBD or HAWK configurations. Configurations can be considered to optimize any application.
ASSEMBLIES AND COMPONENTS
ATCC Assemblies

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

Clean Power Bus Assembly
DC Power Bus Assembly
SB1 / SB2 Assembly

Raw Power
Clean Power
DC Power
SB1 / SB2
Misc. Connection
Detector, PPB, etc.

Diagram courtesy of McCain Inc.
Output Assembly

Output Assembly Houses

- Model 2212 Cabinet Monitor Unit (CMU2)
- Model 2202 High-Density Switch Pack (HDSP)
  - 16 channel version
  - 32 channel version
  - 8 channel Combo version
- Model 2218 Serial Interface Unit (SIU)
- Main Contactor (MC)
  - 48 VDC coil
  - Mercury-free

Photos courtesy of McCain Inc.
Input Assembly

24-Channel Input Assembly
- Houses twelve 2-channel devices, or six 4-channel devices, or a combination of 2 & 4 channel devices
  - Detector fault status provided
  - Supports 120 input channels

48-Channel Input Assembly
- Houses twelve 4-channel half width devices

Photos courtesy of McCain Inc.
ATCC Key Components

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

- Card based *two channel* Switch Pack, 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

Photo courtesy of Eberle Design Inc.
ATCC Components (CMU, ADU)

- The CMUip-2212 is a modular signal monitor capable of monitoring 32 channels.
- Voltage and current data is received from each HDSP and HDFU device via SB #3.
- All configuration programming is provided in the Datakey, a non-volatile memory device.

- The ADU2220 provides a modular CMU display capability for access to the SmartMonitor® technology.

Photo courtesy of Eberle Design Inc.
ATCC Components (FTR)

Combat the Elements

HD Flash Transfer Relay

- Hermetically sealed nitrogen enclosure
- LED indicator reports actual contact status
- DC coil voltage

Photo courtesy of Struthers-Dunn
ATCC Components (Surge)

Combat the Elements

- Pluggable SHA1250 Surge/Filter
  - LED health indicators
- Pluggable Input and Output
  Transient protection devices
  - Loop Inputs
  - Field Outputs
  - Mains Inputs
- Pluggable means testable
SUMMARY
Fail-safer design is safer for drivers & workers.

Compact, HD components provide increased capabilities in ½ the space.

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

ATCC Summary

ATC Cabinet Series

Safer

Smart

Energy Efficient

Graphics courtesy of McCain Inc.
ATCC Status

• Equipment Availability
  – Three OEM manufacturers in production (HV & LV)
  – One additional OEM manufacturer in design
• Many projects already deployed, close to 100 cabinets
• Six CU local software suppliers
  – Four currently qualified for ATCC software
• Funding has been reinstated for the ITE/NEMA/AASHTO Working Group to complete the ATCC Standard
  – http://www.ite.org/standards/ITScabinet/v2.0.asp
• Standards documents in draft development
Q & A

Want to Know More?
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Q&A

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• Intelight  www.Intelight.com
• McCain  www.McCain-inc.com
• Struthers-Dunn  www.struthers-dunn.com
• Mobotrex  www.mobotrex.com
• Econolite  www.Econolite.com