AAC-SolarTrac™ WindowManagement® System

Automation for low voltage Standard or Intelligent Motor Control Systems.

The AAC SolarTrac™ WindowManagement® System is designed to automatically adjust the

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May be used with:

- IQ/MLC™, MLC™
- Intelligent Motor Control System™/2 (I•CON™)

May be interfaced with most Building Management Systems (BMS)

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position of the shades incrementally throughout the building to maximize view and daylighting while protecting people and work surfaces from direct sun when and where needed, using a PC-based program. SolarTrac's intelligent multi-level command accounts for "Clear" or "Cloudy" sky conditions in accordance with established criteria for vertical, horizontal or sloping windows. In addition, it factors in the sun's angle of incidence, solar heat-gain (in BTUs or W/M^2), allowable solar penetration, plus brightness and glare control.

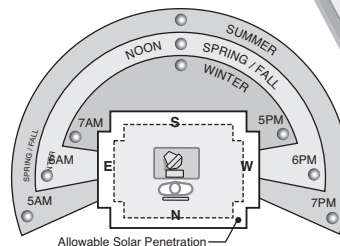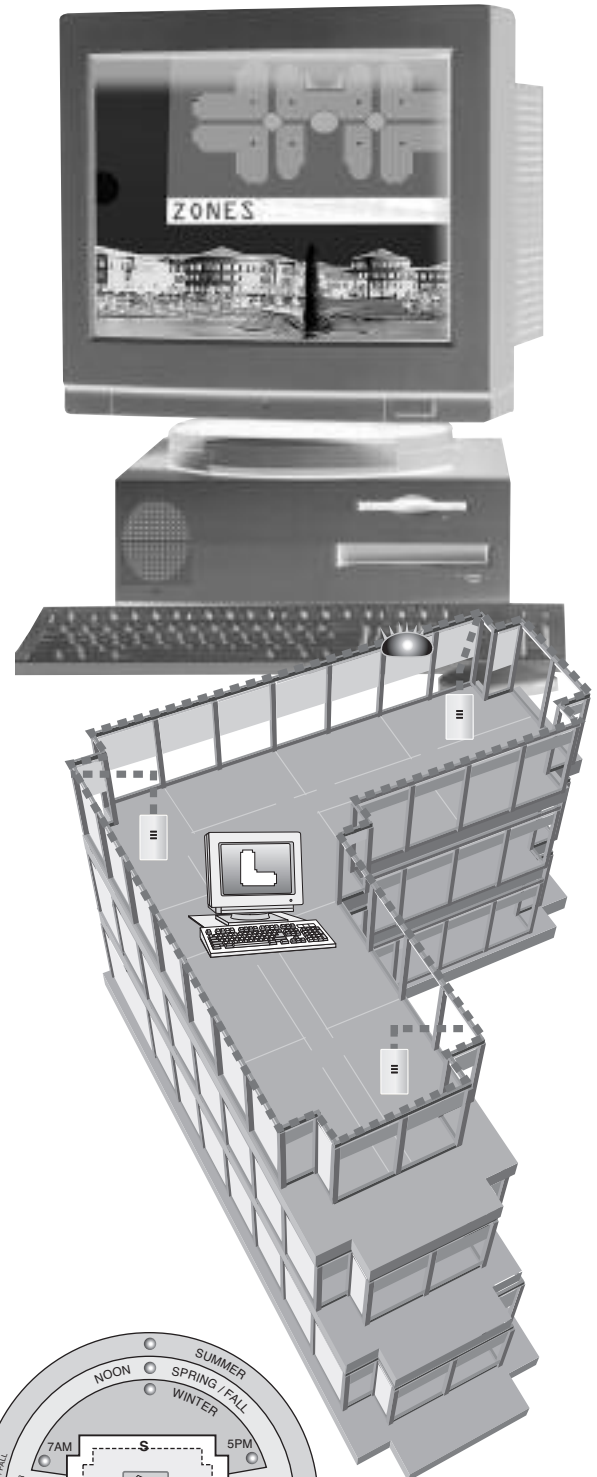**The AAC SolarTrac™ WindowManagement® System is a multi-zone controller that:**

- On a daily schedule, automatically positions the shade to meet varying sun angles.

- Using 3 radiometers, it determines the momentary microclimatic conditions such as sunny, cloudy or bright-overcast sky conditions.

- Maximizes the amount of natural light and view thru the window by keeping the shade as high up as possible while not allowing

the sun to penetrate beyond a user defined point within the space.

- Incorporates user defined internal time delays, for intermittent clouds and sun/no sun sky conditions and cycles the shades on a programmed basis.

- During nighttime winter conditions it lowers the shades to provide additional insulation if desired.

- During nighttime summer conditions it raises the shades to assist in nighttime cooling.

- Includes manual override capability by zone for executive offices, conference rooms and training facilities.

- MechoShade Systems, Inc. can monitor, perform system diagnostics and make adjustments via modem anywhere in the world.

- Integrates with building-management systems. (Optional)

AAC SolarTrac™ WindowManagement® System benefits include:

- Window shade alignment.

- Uniform building appearance by elevation.

- Optimizes use of natural light and views to the outside.

- Provides HVAC engineers with the flexibility to down size air conditioning or to operate at a higher temperature set point.

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Allowable Solar Penetration

AAC-SolarTrac™ WindowManagement® System

- Improves productivity by:

  1. Improving personal comfort.

  2. Maximizing view and healthy exposure to natural daylight.

  3. Regulating brightness and glare on CRT screens to reduce eye strain and improve productivity.

Description of Operation

The multi-zone, multi-position, PC-based AAC SolarTrac™ WindowManagement® System was developed exclusively for the operation of ElectroShades®.

The system is an intelligent multi-level command program which automatically adjust the position of shades incrementally, in accordance with the sun's angle of incidence, solar heat-gain factors in BTUs, and allowable solar penetration.

The system allows for brightness and glare control by adjusting the shades to "clear-sky", "cloudy-sky", or "bright-overcast-sky" conditions. The AAC-SolarTrac system incorporates these elements in accordance with an established computer program for vertical, horizontal, or sloping windows.

The AAC SolarTrac System is a multi-zone controller that:

- On a 365-1/4 day solar analysis, AAC SolarTrac automatically positions the shades to meet varying sun angles. This is accomplished utilizing ASHRAE clear day radiation as compared micro-climactic conditions at the site provided through three redundant solar meters via analog inputs into the system.

- Using solar meters, determines the momentary micro-climactic conditions (clear, cloudy, or bright-overcast).

- Incorporates user adjustable internal time delays, which adjust for intermittent clouds.

- During nighttime winter conditions, lowers the shades to provide additional insulation; during nighttime summer conditions, raises the shades.

  Almost unlimited programming options are available to the end user such as lowering shades, at night and winter to reduce heat loss and/or reduce internal illumination transmitted out of the building.

- Includes manual override capability by zone.

- Incorporates on-site-adjustments to operating standards, either by user or remotely via modem by MechoShade.

Master Specifications

A. Hardware

1. The AAC SolarTrac WindowManagement System shall be equipped with a standard desktop PC or compatible computer with all the necessary interfacing, hardware and software to accept the following:

   a. Analog inputs for solar meters (solar-level detection).

   b. Analog inputs for optional temperature sensors.

   c. Digital inputs for building-computer priority commands.

   d. Inputs for fire alarm and additional non-designated ports.

2. The AAC SolarTrac software is compatible with: ElectroShade motorized solar sun screens utilizing Motor Logic Controllers (MLCs), IQ/MLCs, Smart Submasters. using standard asynchronous motors.

   ElectroShade motorized solar sun screens utilizing Intelligent Motor Control (IMC) System.

B. Software

1. Each zone on each floor in each building (or building module) shall be independently addressable.

2. For raising and lowering shades, each zone shall have typically 3 default intermediate aligned stop positions (25, 50 and 75% down) plus full up and full down. As an option additional programming can provide up to 16 incremental positions. Increment "0" represents the fully raised position. If five increments are selected for a particular zone of a floor of a building, the "0" setting indicates all the way up while "4" indicates fully down, with each increment one fourth of the total travel height.

3. Each zone on each floor in each building (or building module) shall have a set of tables which corresponds to a user-defined range of dates, times, and shade positions. The user can access these tables via the key board and through menu-driven screens.

4. Each table shall have a user-definable set of solar-level conditions. These levels shall define "clear-day", "overcast-glare", and "bright overcast sky" conditions. For the "clear-day" mode, the shades shall follow the

programmed positions. The other two modes represent special conditions when the shades move to a specified position.

5. Each zone shall have user-defined delays for cloud and sun conditions to prevent intermittent clouds or sun from triggering the above special modes.

6. Each zone shall have user-defined priority-command positions to accommodate alarm-signal indicators which are relayed from the building computer.

7. Designated zones may have user-defined time-of-day accessibility. The locally accessed Submaster and Local controls shall be returned to the automatic (AAC SolarTrac) master-computer unit at a user-defined time or period.

8. During normal operation, the status of all zones on each floor in each building shall be displayed. Solar-intensity levels shall be displayed and indoor and outdoor temperature readings can be displayed as an available option.

9. Operation of the shade motors throughout the system shall be staggered so that peak electrical-loading conditions are prevented.

Remote access software shall also be provided to enable monitoring the performance of the system from a remote location via a dedicated analog telephone line provided by the end user.

C. Sub-Master Controllers
IQ/MLC System (or MLC)

1. There shall be one INTELLIGENT SUB-MASTER controller on each floor, in each building (or building module), as required.

2. Each INTELLIGENT SUB-MASTER shall have 16 I/O ports and be able to accommodate up to 8 MLC's, or 8 IQ/MLC's with full up/down operation. Or accommodate up to 5 IQ/MLC's with full function intermediate stop positions.

3. Each INTELLIGENT SUB-MASTER controller shall accept up to two (2) multi-conductor shielded-serial-communications cables, one in and one out, providing a daisy-chain connection to the other INTELLIGENT SUB-MASTER controllers and to the AAC-SolarTrac master-computer unit.

4. Each INTELLIGENT SUB-MASTER controller shall be intelligent and shall decode signals from and respond interactively with the AAC-SolarTrac master-computer unit.

5. Each INTELLIGENT SUB-MASTER controller shall accommodate up to five or eight zones.

6. Each MOTOR-CONTROL zone shall be a low-voltage-control system of the type indicated in specification section and as indicated on the electrical drawings.

OR

C. Intelligent Motor Control System (I·CON™)

1. The I·CON is an Intelligent Motor Control system with a microprocessor for each motor, with bus line 2 way communication between the motors, bus line and intelligent motors. The PC shall be connected to the PC via the RS-485 Interface port. Analog Input from three (3) Redundant Solar Sensors which shall be communicated to the RS-485 card in the PC.

2. There shall be a RS-485 INTERFACE for each 256 zone control network or as required.

3. Each RS-485 INTERFACE controller shall accept up to two (2) multi-conductor shielded-serial-communications cables, one in and one out, providing a daisy-chain connection to the other RS-485 INTERFACE controllers and to the AAC-SolarTrac master-computer unit.

4. Each RS-485 INTERFACE controller shall be intelligent and shall decode signals from and respond interactively with the AAC-SolarTrac master-computer unit.

5. Each MOTOR-CONTROL zone shall be a low-voltage-control system of the type indicated in specification section and as indicated on the electrical drawings.