# Girard Awnings®
ACMC Motor Controller
(Last revised on May 10, 2008)
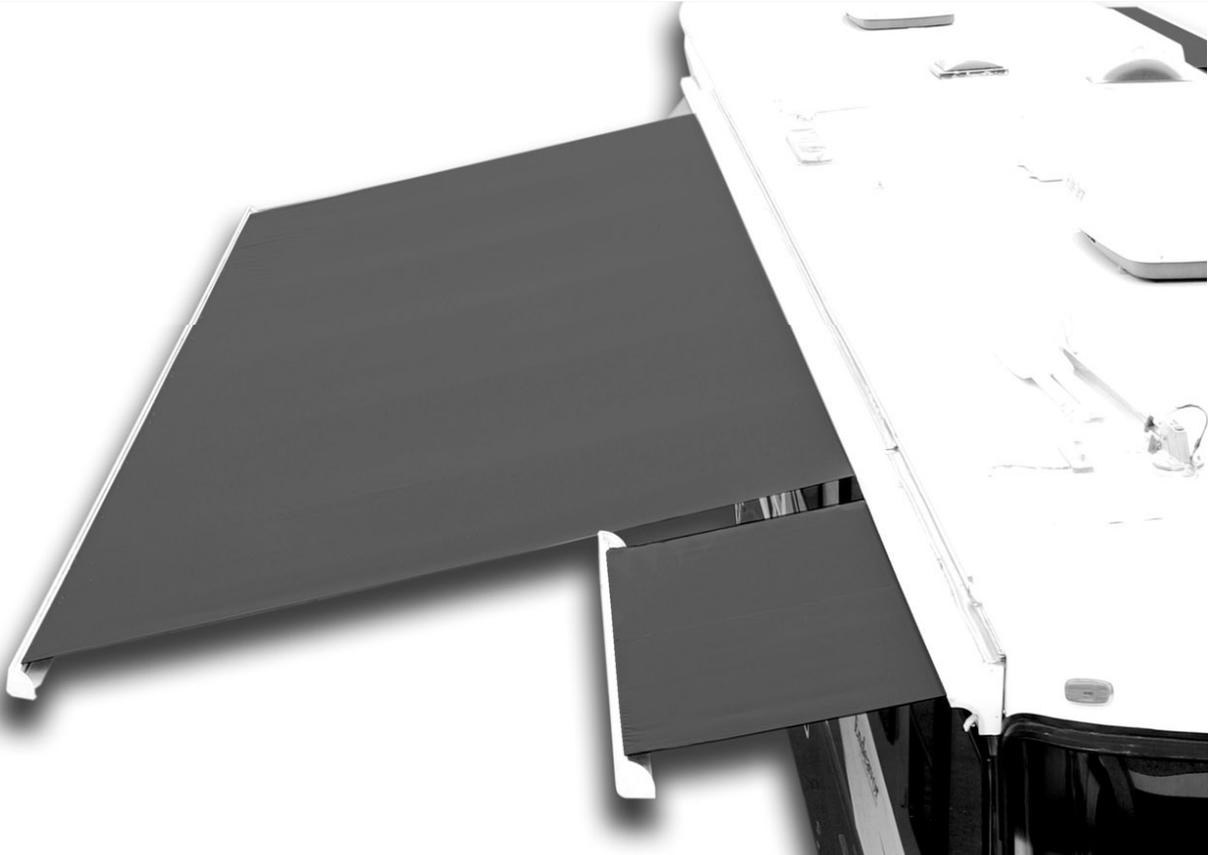
A *Visionary*® Awning Control by

GIRARD SYSTEMS®

Girard AC Motor Controller Installation Guide

ACMC
Revision 2.08
May 10, July 2008

Instructions for Safe Operation

1.   RANGE OF ENVIRONMENT CONDITIONS
     This product is designed to be safe under the following environmental conditions:
     - Indoor Use
     - Altitude up to 2000M
     - Temperature of 5°C to 40°C
     - Maximum relative humidity 80%
     - Mains supply voltage fluctuations not to exceed $\pm$ 10 % of the nominal Voltage.

2.   This symbol is marked on the equipment when it is necessary for the user to refer to the manual for important safety information.

3.   This symbol denotes a potential hazard. Attention must be given to the statement to prevent damage, destruction or harm.

Table of Contents

1 Introduction

The ACMC (AC Motor Controller) provides multi-function control of motorized lateral arm awnings. It features redundant closure sensing and safety interlocks to prevent operation when the vehicle is in motion or in an unusable condition. The companion rf Remote Control allows the user to operate the awning from outside the coach.

This document contains instructions for the proper installation and operation of the ACMC. The ACMC can be controlled by the rf Remote Control, an existing ACS Controller or from a wall switch. In addition to basic extend and retract functionality, the ACMC supports the following features (not all features are fitted to all models, please refer to the model number for specific features):

- **Ignition monitoring** When the vehicle ignition is turned on, the awning is automatically retracted for safety reasons.
- **Parking-brake monitoring** When the vehicle parking brake is released, the awning is automatically retracted.
- **Anemometer (Wind-speed) sensing** An external anemometer, supplied by Girard, may be used to measure local wind-speed. The awning will be automatically retracted when the wind-speed exceeds a preset, user selectable threshold.
- **Limit-switch inputs** The motor is automatically stopped when the awning position limit-switch is tripped.
- **Current-limiter** The motor is automatically stopped when it stalls at the extent of operation (box closed condition). The current-limiter is implemented on retract only, in order to account for awning-stretch over time, ensuring that the awning is fully retracted.

The RF communication protocol is proprietary, and uses the ISM licence-free band for RF communication (316.05MHz). The ACMC can be configured for use with a maximum of 16 rf remote controls (more than one channel from a single remote is permitted, if for example, group and individual control is required). The ACMC requires 120V ac power from either shore input or an inverter input.

The ACMC hardware is available in a number of different configurations, set at the factory. In all configurations the primary function of the board is to control a reversible AC motor.

Version 1 (serial number suffix ver1) has a built in current limiter, rf communication, anemometer inputs, low voltage awning control capability and a limit switch input for retract operation. (This version will replace the earlier SOMFY-ACL controllers.)

Version 2 (serial number suffix ver2) has a built in current limiter, rf communication, anemometer inputs, low voltage awning control capability, a limit switch input for retract operation and safety interlocks for park brake and ignition inputs.

Version 3 (serial number suffix ver3) has a built in current limiter, rf communication, anemometer inputs, low voltage awning control capability, a limit switch input for retract operation, safety interlocks for park brake and ignition inputs and an interface to an existing ACS controller panel.

2 Installing the ACMC

2.1 Mounting

1. Determine suitable mounting location for the ACMC board. The back wall of a cabinet is ideal, as it provides a solid mounting surface.
2. Use the mounting holes on the corners of the plastic casing and wood screws to mount the device.
3. Wire the awnings and power using the connectors mounted on the Printed circuit board making sure it is the direction indicated on the board.
4. Connect the outputs to other devices, passing the wire through the provided strain relief.
5. Motor ground must be connected to maintain electrical safety.
6. Tighten the strain relief on both sides of the device before screwing the top on.

Version 0 connector reversed on Version 1

Mounting holes

Strain relief's (actual positions may vary according to version)

Antenna
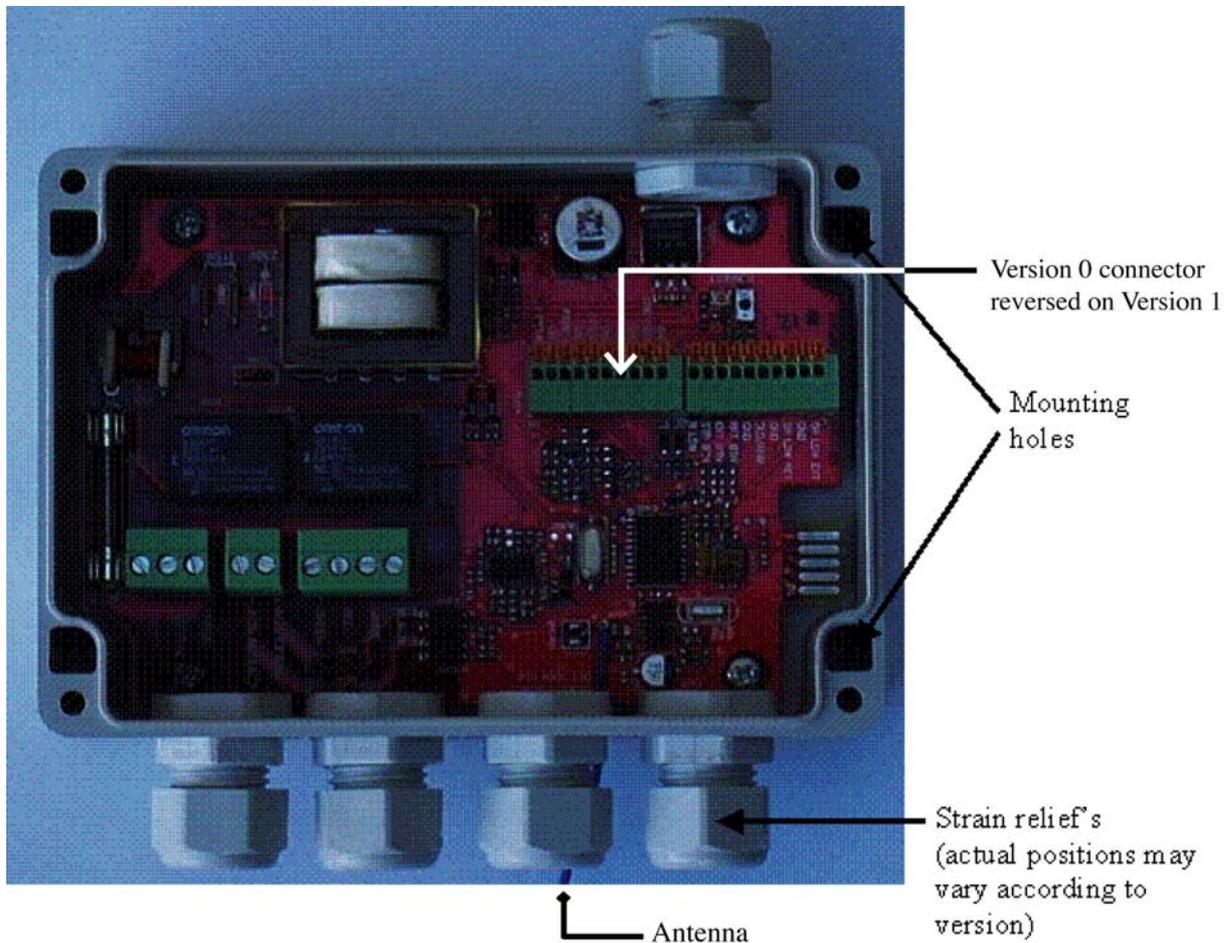
2.2 General Wiring Considerations

2.2.1 Warning!

Use extreme caution when making the power connections to the AC mains. Power must be turned OFF <u>before</u> any connections are made. Under no circumstances should the wiring be done when the electrical components are energized. The ACMC unit is to be installed by a qualified electrician in accordance with national and local electrical codes and the instructions in this document.

2.2.2 Power Supply

This device is designed to operate on 115V AC at 60HZ. The necessary power-rating will be determined by the specifications for motor being used.

### 2.2.3 High Voltage Connections

The high-voltage connections are described in detail in section 3. Wire all high-voltage connections using the appropriate mating halves for the connectors mounted on the board. Take note of the labels marked on the board, and ensure that all wires are connected as indicated.

<u>IMPORTANT</u>: The following guidelines should be adhered to for high-voltage wiring:

1. The ends of the wire must be stripped neatly to about $1/3^{rd}$ of an inch and if possible tinned to prevent fraying.

2. Extra care must be taken to ensure the connections are made in accordance with the wiring diagram presented in section 3.
3. If the wire has stranded conductors, make sure that there are no loose strands outside the terminal contact.

WRONG (Notice the loose strands outside the terminal contact)
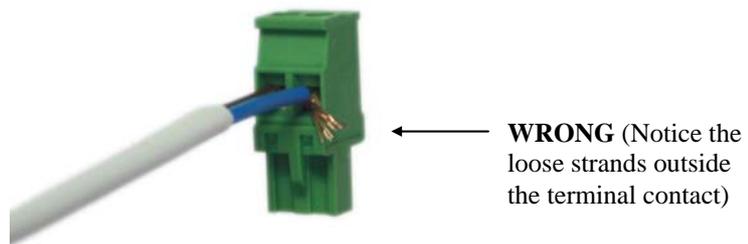
4. Be sure to pass the wires through the provided strain relief. Tighten the strain relief on both sides before attaching the top of the enclosure.
5. **DO NOT TOUCH** any part of the board at any time when it is energized.

Note: Motor ground must be connected to maintain electrical safety.

If the device does not operate as expected, verify that all wires are securely and correctly connected. If it still does not work, shut off power, disconnect the wiring and call Girard. DO NOT attempt to debug the device under any circumstances. **There are no user serviceable parts on this unit.**


2.2.4 Low Voltage Connections

The low-voltage connections are described in detail in section 4. The low voltage control inputs should be connected to the appropriate mating halves for the connectors mounted to the ACMC board. As with the high-voltage connections, the provided strain relief should be utilised. The two rightmost strain-relief's, one on either side of the box, are suggested for the low-voltage connections.

2.2.5 RF Antenna

On those ACMC boards with RF Communication capabilities, an RF antenna wire extends from the lower right corner of the board. This wire should pass through the drilled hole relief and out of the enclosure. It is important that this wire not be shortened (standard length is 9.5 inches), coiled or folded in any way. The antenna wire should be well separated from other wires, and kept clear of surrounding metallic objects.

2.3 Grounding

The high voltage ground is electrically isolated from the low voltage ground on the ACMC board as indicated by the figure below.
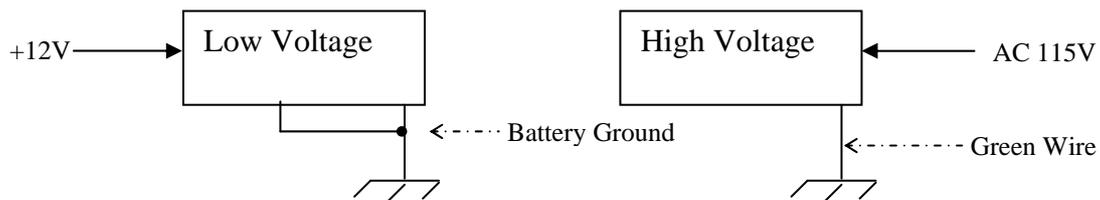
3 High Voltage Connections
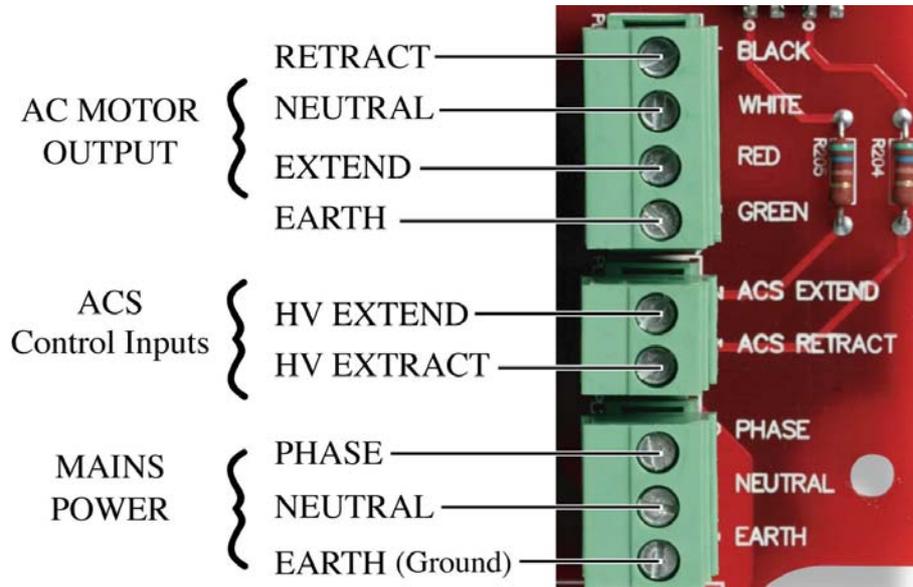
3.1 AC Motor Output (PL200)

The AC Motor should be wired to the AC Motor Output connector using the wire colors indicated on the ACMC board. The color convention for the selected motor should be confirmed by comparison with the diagram above, and connections made accordingly. Girard recommends AWG16/18 wire for all high voltage connections. **The motor output connections indicated above are for a Left hand motor.** For a Right hand motor, reverse the Retract and Extend leads – Black should now be connected to Extend and Red to Retract.

3.2 ACS control input (PL201)

3.2.1 HV Extend

This input is functionally identical to the low-voltage extend signal (see section 4) except that it should be driven with an AC signal between 115 and 230V.

3.2.2 HV Retract

This input is functionally identical to the low-voltage retract signal (see section 4) except that it should be driven with an AC signal between 115 and 230V.

3.3 Mains Power (PL202)

The ACMC is designed to operate on 115V AC at 60HZ. The ACMC will work with both shore power and inverter power. The necessary power rating will be determined by the specifications for motor being used. DO NOT attempt to change the specified operating voltage of the board! Note that neutral is common to both the mains and the high voltage ACS signals.

4   Low Voltage Connections
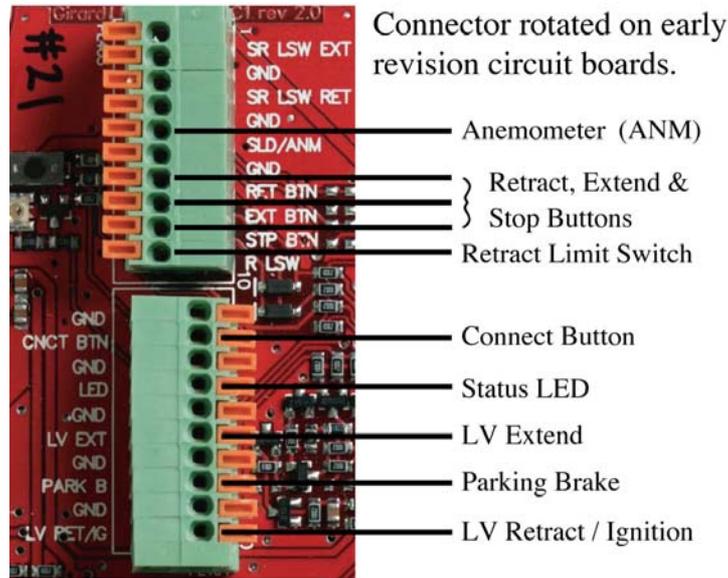
Note that most signals have a companion ground connection, which is assumed to be chassis ground (battery minus). In case any particular input is not used, it may be left unconnected unless specifically noted below. Girard recommends AWG20-22 wire for all low voltage connections.

4.1   Anemometer Input

[Pins 4 & 5 on PL403]

To enable wind speed monitoring and emergency retract function, a two-wire anemometer must be connected between this input and ground. This input enables the ACMC to measure wind speed and take the appropriate action as described below.

4.1.1   Wind speed switch settings

The ACMC measures the wind speed using the two-wire anemometer, and if this exceeds the preset threshold for 10 seconds, the ACMC goes into an override retract state. When the wind speed falls below the threshold for one minute, the ACMC comes out of the override state. In the override state, the ACMC will not accept any commands from the rf Remote. The wind speed threshold is set using the dipswitches situated on the lower right corner of the ACMC, as described below.

Switch 2	Switch 1	Wind Speed Threshold
OFF	OFF	18 mph (Recommended)
OFF	ON	20 mph
ON	OFF	22 mph
ON	ON	26 mph

Indicator (Status) LED
Connect Button
Wind Speed DIP Switch
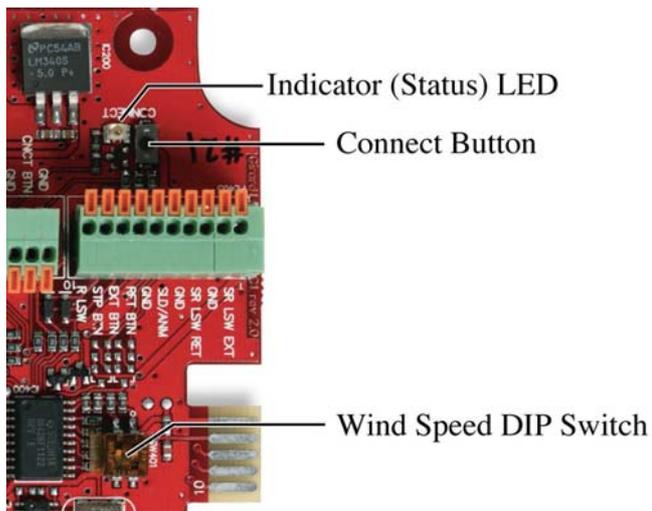
4.2 Retract, Extend and Stop Buttons

[Pins 7, 8 & 9 (signal) and 6 (ground) on PL403]

These inputs can be used as an alternative to, or instead of the rf Remote Control. External normally open switches should be connected between these inputs and ground. Three separate inputs are available for extend, retract and stop operation. It should be noted however, that an rf Remote is necessary for calibration and proper operation of the current limiter function.

4.3 Retract Limit Switch

[Pin 10 (signal) and Pin 2 (Ground) on PL403]

This switch automatically stops a retract operation, and all subsequent retract requests at the limit of operation (closed box condition) to prevent motor stalling. This input is activated when connected to ground.

4.4 Connect Button

[Pin 2 (signal) and Pin 1 (Ground) on PL404]

This button is used to establish an RF communication link between the ACMC and the ACS Remote Control. It is also used to initiate the motor calibration process. The Connect button can be extended to an external location using the connect button input, and a normally open push-button connected to ground.

4.5 Status LED

[Pin 4 (signal) and Pin 3 (Ground) on PL404]

The Status LED is used during the ID/channel learning process. The status LED may also be placed externally using the external status LED output. This output is powered from 3V and includes a 220-ohm series resistance. This output may also be used with other devices (e.g., a buzzer); please contact Girard for further details.

4.6 Low Voltage Extend Input

[Pin 6 (signal) and Pin 5 (ground) on PL404]

A switch to +12V can be used to control this input. This input is asserted when a voltage between 5 and 12V DC is applied. . The ACMC will extend the awning as long as a +12V signal is available on this input, to the limits of operation as determined by the extend limit switch.

4.7 Parking Brake Input

[Pin 8 (signal) and Pin 7 (Ground) on PL404]

This input should be connected to the vehicle's parking brake. The parking brake input over-rides all other inputs. For normal operation this input must be externally grounded. When the ACMC detects the parking brake is ungrounded (disengaged), it performs a full retract operation. The ACMC will also ignore all remote commands while the parking brake input is ungrounded. In the case where this input is not used, it must be connected to ground to enable normal operation of the ACMC.

4.8 Ignition Input / Low Voltage Retract Input

[Pin 10 (signal) and Pin 9 (Ground) on PL404]

This input should be connected to the vehicle's Ignition circuit, or to an external switch to +12V. The ACMC will retract the awning and ignore all remote commands while this input is asserted. If the input is connected to both the vehicle ignition and to the external switch, both of these should be connected through a separate diode. Please refer to the wiring diagram for details. The ACMC will retract the awning as long as a +12V signal is available on this input, to the limits of operation as determined by the retract limit switch and the current limiter function. In case of +24V Ignition circuitry, please contact Girard for additional information on wiring.

5 Customizing rf Remote to ACMC

There are three different modes of operation of the ACMC with the rf Remote Control. They are described in the section below.

5.1 Learning Mode (Programming)

Before an ACMC can accept commands from an rf Remote Control, it must first 'learn' the ID and current channel number of the transmitting remote. The ACMC can store up to 16 remote control ID/channel pairs in its memory. This means that the ACMC board can be controlled by up to 16 different rf Remote Controls and channels. One may configure the ACMC to respond to multiple channels from an rf Remote Control. This allows the ACMC to be controlled on a channel individually, and additionally be controlled as part of a group, using the same rf Remote Control. Configuring more than 16 ID/channel pairs will replace the oldest stored one and so forth.

The remote ID/channel learning process can be initiated by pressing the Connect Button. When the Connect Button is pressed, the ACMC listens for a connect signal from the rf Remote Control for 20 seconds. A remote channel connect signal can be generated by simultaneously pressing extend and retract buttons on the rf Remote Control. The status LED blinks to indicate it is in 'listen' mode. When the connect signal is received, the ACMC stores the ID and current channel number of the transmitting remote. The status LED will turn off when programming the ID/channel is done successfully. Failure will cause the LED to stop flashing and remain on for 1 minute. This process is referred to as programming the ACMC.

An existing ID/channel pair may be removed from memory by repeating the programming process as described above for the particular ID/channel pair. All stored ID/channel pairs may be removed from the ACMC's memory by pressing and holding the Connect Button down for 10 seconds.

Consult the documentation for the rf Remote Control for details on its operation.

5.2 Motor Calibration Process

Once an ACMC has been programmed to communicate with a particular remote, motor calibration needs to be performed. The calibration process measures the motor's normal and stall characteristics and stores them in memory. These measurements are used by the current limiter to stop the motor when it reaches the stall condition during retract operation. The calibration operation can be performed only after an ACMC has been programmed, as it requires an rf Remote Control.

The motor calibration process can be initiated by pressing the Connect Button provided on the ACMC. When the Connect Button is pressed, the ACMC listens for a motor calibrate signal from the rf Remote Control for 20 seconds. The LED will blink for the duration of the calibration process. When the motor calibrate signal is received, the ACMC will initiate calibration process. Calibration takes a total of 20 seconds after activation. The awning is first extended for five seconds and the current is measured. The awning is then retracted for ten seconds and both the run current and the stall current are measured. If the calibration process is successfully completed the LED will turn off, else it will remain on for a minute after calibration. The LED will blink at a low rate until calibration is performed properly. Calibration is a required step for proper operation of the ACMC, and only needs to be done when the awning is first installed. Care should be taken to make sure

the awning is completely closed (fully retracted) before the start of the calibration; a false calibration would result in premature tripping of the awning motor.

5.3 Normal Operation

Normal operation can be started once the ACMC has been paired with a remote and has been calibrated. The extend, stop and retract buttons can now be used to position the awning as required. The interlocks will override user input to prevent any unsafe environmental condition from damaging the awning. All previously programmed remotes can be erased from ACMC's memory by pressing and holding the connect button for ten seconds. The Status LED stops blinking when this process is successfully completed.

5.4 Quick Reference

5.4.1 Programming

Push Connect button on ACMC, press and hold extend and retract buttons simultaneously on the remote control for seven seconds.

5.4.2 Calibration

Push Connect button on ACMC, press and hold extend and stop buttons simultaneously on the remote control for seven seconds.

5.4.3 Erase all

Push and hold Connect button on ACMC for ten seconds.