ARA offers an ever-expanding line of positioning systems based on a mature, robust, digital motion control architecture and mechanical systems designed to satisfy the most demanding applications. Most systems use brushless DC servo-motors with integral resolvers for velocity feedback and separate absolute encoders coupled directly to the output for position feedback information. This dual loop feedback system is tightly controlled by a specialized motion control system that provides precise speed and positioning capability.

The motion control architecture is also extremely flexible and can easily accommodate different types of motors and feedback sensors, even in the same system. Options are available for analog input devices such as resolvers or an Extended I/O option that provides up to 100 lines of digital I/O that can be used for safety device input or control of RF components.

To simplify integration of ARA positioning systems, the User Interface and command structure remain very similar across the entire line of positioning systems. There may be differences in some individual commands due to number of axis or application, but it is very easy to control the ARA positioners using the Remote Interface.

ARA Positioners are fundamentally mechanical devices and therefore extreme importance is placed on all aspects of the mechanical design to insure it has the strength, rigidity, accuracy and performance to meet the specified requirements. ARA uses the highest quality, custom servo motors, precision mechanical and electrical components designed to provide high accuracies in the most rugged applications.

ARA positioning systems have been used successfully on both military and commercial applications. Many of the controllers and positioners have been qualified to MIL-STD-810 for Environmental Testing and MIL-STD-461 for EMI/RFI and are successfully installed in ground-based, shipboard and airborne applications.

The ARA Positioner product line is subdivided into the following categories:

1) **Single Axis Positioners**
   a. ARP Series
   b. Polarization Rotators

2) **Two Axis Positioners**
   a. Elevation over Azimuth Positioners (EAP and EAR series)
   b. Azimuth over Elevation (AEP series)

3) **Positioners for Masts**
   a. Elevation over Azimuth Positioners (AEC-60)
   b. Azimuth Rotators (ARP-100)

4) **Antenna Positioners for Portable Satcom terminals**
1) SINGLE AXIS POSITIONERS

1a) ARP SERIES

The ARP series of azimuth rotators are designed for ground-base, shipboard or mast mounting. Units are available that can support up to 1000 pounds. The range of motion varies from +/-60 degree sector travel to continuous azimuth motion. These positioners are designed to meet the environmental and EMI/RFI requirements of MIL-STD-810 and MIL-STD-461E.

Several configurations of the ARP Series have been developed, the ARP-1000 above is an example of a heavy duty stationary unit while the ARP-100D shown on the stand is an example of a mast-mounted unit.

The ARP-100D series are lightweight, rugged rotators designed to be installed easily on a mast and have the antenna or other sensor attached to the output hub. The structure is high strength, light weight carbon fiber with machined aluminum weldments providing the precision surfaces for the drive and feedback components.

The APS-100 on the right is an example of a shipboard based Azimuth Rotator that provided accurate +/-100° of motion for a very unbalanced 150 lb payload. The RF transmit and receive sections along with the antennas were mounted above the pedestal and all controls from the ship were passed through the pedestal.

There is a connector panel, not shown, and a large 3.0 inch hole through the center allowed the cables to pass through the rotation axis.

These units are sealed and were fully qualified to MIL-STD-810E, MIL-STD-461C and MIL-STD-1399 for shipboard, above deck operation.
This unit, model number ARP-30-200, is another example of a shipboard azimuth rotator. This unit provides continuous rotation with variable speed up to 200 rpm. A secondary position encoder provides the fast position update information to a ship's data buss.

The system as sold and supported by Antenna Research Associates consists of the Controller, Positioner and four separate antennas, two directional and two omni-directional, covering from 0.5 to 18 GHz. All of the antennas, RF components and cables are packaged as part of the system by ARA in the photo on the right.

The photos below show the ACU-3D Series Controller, the ARP-30-200 Rotator and the 0.5 to 18 GHz directional antennas with the Radome and Omni Directional Antennas removed. The bottom right photo shows the directional antennas during lab testing operating at 200 rpm.
1b) POLARIZATION ROTATORS

The ARP-90 Polarization Rotator shown on the right provides 0 to 90° of rotation for the antenna feed. It can be either a standalone unit, interfaced through RS-232 or integrated into a complete system from ARA.

This photo shows the ARP-90 integrated with a collapsible carbon fiber reflector and a cross log periodic feed. An RF switch and amplifier unit are attached to the rear of the ARP-90.

Not shown is the AEC-60 El/Az positioner, the ACU-3C Controller and the DC Power Supply unit. All of these components make up a complete system available from ARA.

ARA has also designed and manufactured positioners for airborne applications. These can be used as either single axis positioners or polarization rotators.

The photos on the right show a couple of examples of these systems prior to installation on an aircraft.

The ARP-90L units are designed for an airborne environment where the positioner is located outside the pressurized compartment. In this location, they are exposed to shock, vibration, condensing humidity and temperatures down to -55°C (-67°F). These units were tested and qualified using MIL-STD-810F procedures and are successfully deployed.
2) TWO AXIS POSITIONERS

2a) ELEVATION OVER AZIMUTH POSITIONERS

ARA manufactures two types of El/Az Positioners, the EAP and EAR series positioners. The EAP Series have a limited range of motion in both axes, with +/-200° in Azimuth and -5° to 180° in Elevation being the standard. The EAR series offer continuous Azimuth motion and typically -5° to 180° range of motion in Elevation.

Standard units are available with payloads from 250 pounds to over 4000 pounds.

All of these pedestals are designed and manufactured for rugged outdoor environments and are based on designs that have passed qualification testing for both the environmental requirements of MIL-STD-810 and the electromagnetic interference requirements of MIL-STD-461.

EAR SERIES

The EAR series rotators have Elevation over Azimuth motion and range for payloads from 250 pounds to over 4000 pounds. The elevation range of motion is -5 degrees to +180 degrees while the azimuth has continuous range of motion (includes slip rings and rotary joints).

The photo on the right shows an entire system delivered by ARA and includes a 15 foot Reflector, dual polarized feed, waveguide, EAR-1000 pedestal, ACU-3D-24/C antenna controller, slip ring and dual channel rotary joints.
2b) Azimuth over Elevation Pedestals

ARA is expanding its line of Az/E1 Positioners. The first of these, the AEP-300 will be available in Q2 2009.

This unit is ideally suited for rotating cantilevered loads up to 300 lbs. It is a very heavy duty unit with large precision bearings and 300 ft-lbs of torque in Azimuth and 1000 ft-lbs in Elevation.

3) Positioners for Mast Applications

3a) AEC-60 El/Az Mast Mountable Positioner

The AEC-60 is a lightweight Elevation over Azimuth positioner that is ideally suited for extendable masts. This positioner will support 60 pounds (i.e. a 4 foot reflector) in light winds. The elevation range of motion is -20 to +90 degrees and the azimuth range of motion is +/-200 degrees.

These units are designed for portable/transportable applications and have been integrated with ARA collapsible, composite antennas, rotatable feeds and numerous RF front end configurations that are controlled via the ACU-3C-22 Antenna Controller.

3b) ARP-100D Azimuth Rotators

The ARP-100D was designed to provide precision, Azimuth-only rotation of a large antenna. These units feature brushless servo motors driving zero backlash gear reducers and timing belts for precision drive mechanisms that produce up to 300 ft-lbs of torque. To take advantage of this drive and accurately position the load, a 15 bit absolute encoder provides position feedback while precision tapered roller bearings provide smooth accurate motion for the largest antennas.

The ARP-100D-285 on the right is a mast-mounted, azimuth rotator designed for payloads up to 100 lb with +/-180° rotation and 0.1 degree positioning accuracy.
The photo on the right shows the ARP-100D-300 version with a low frequency Log Periodic Antenna mounted with the MRP-3100 Polarization Rotator that allows the antenna polarization to be easily adjusted between Horizontal and Vertical.

The ARP-100D-300 provides 300 ft-lbs of torque and can accurately position the payload within 0.3° anywhere within +/- 180° standard range of motion.

**4) SATCOM Systems**

To serve the growing Satellite Communication applications, ARA has developed both a fly away and a roof-mount portable systems consisting of a four axis positioner, controller, antenna and feed.

These units are tightly integrated with the necessary LNB, BUC and satellite modem to simplify integration into the customer’s application. A Satellite News Gathering (SNG) truck is a good example of the application and the ARA Mobile Satellite System (MSS) was designed for this application. See Section 5A, Page 22 for more information.
EAP SERIES GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>TYPE</th>
<th>CONTROLLER</th>
<th>VERTICAL LOAD (lbs)</th>
<th>TORQUE (ft-lbs)</th>
<th>WEIGHT (lbs)</th>
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<tr>
<td>EAP-50</td>
<td>Ground/Mast</td>
<td>ACU-S-22</td>
<td>50</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>EAP-100</td>
<td>Ground/Mast</td>
<td>ACU-S-22</td>
<td>100</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td>EAP-250</td>
<td>Medium Duty</td>
<td>ACU-3D-24</td>
<td>250</td>
<td>300</td>
<td>600</td>
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<tr>
<td>EAR-250</td>
<td>Medium Duty</td>
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<td>300</td>
<td>600</td>
</tr>
<tr>
<td>EAP-500</td>
<td>Medium Duty</td>
<td>ACU-3D-24</td>
<td>500</td>
<td>500</td>
<td>3000</td>
</tr>
<tr>
<td>EAR-500</td>
<td>Medium Duty</td>
<td>ACU-3D-24</td>
<td>500</td>
<td>500</td>
<td>3000</td>
</tr>
<tr>
<td>EAP-1000</td>
<td>Heavy Duty</td>
<td>ACU-3D-24-240</td>
<td>1000</td>
<td>1000</td>
<td>6000</td>
</tr>
<tr>
<td>EAR-1000</td>
<td>Heavy Duty</td>
<td>ACU-3D-24-240</td>
<td>1000</td>
<td>1000</td>
<td>6000</td>
</tr>
<tr>
<td>EAP-1500</td>
<td>Heavy Duty</td>
<td>ACU-3D-24-240</td>
<td>1500</td>
<td>1500</td>
<td>8000</td>
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<tr>
<td>EAR-1500</td>
<td>Heavy Duty</td>
<td>ACU-3D-24-240</td>
<td>1500</td>
<td>1500</td>
<td>8000</td>
</tr>
</tbody>
</table>

COMMON SPECIFICATIONS

Azimuth Motion: EAP Series: +/-200 degrees Standard
               EAR Series: Continuous
Elevation Motion: -5 to +180 degrees Standard
Velocity (max):  20 deg/sec typical (40 deg/sec available some models)
Acceleration (max): 20 deg/sec²
Accuracy: +/-0.1 deg
Operational Temp: -20°C to +55°C (0°F to 130°F)
Humidity: 0 to 100%

ROTATOR ACCESSORIES

Dual axis digital controller: See Chart above for recommended optional model numbers

CABLESET-EAPXXX -- Set of 3 interconnect cables between controller and rotator. Standard length is 50 ft; other lengths are available.

RS## -- Riser for rotator with variable height from 24” to 80”; includes brackets and access panel for optional rotary joint.

ROTARY JOINT: See ARA Sales for details: single or dual channel; waveguide or coaxial inputs, high power option, many frequency bands available; available for elevation and azimuth axes.
EAP-500 GENERAL SPECIFICATIONS

The EAP-500 antenna positioning systems consists of the Elevation-over-Azimuth Rotator (EAP), controller (ACU-3D-24) and cables required for power and control of the positioner.

The load capacity of the system is 500 lbs with a 10g vertical shock rating.

The positioner is suitable for either base or wall mounting and provides up to +/-200° of motion in the azimuth axis. It is designed for reliable operation in outdoor environments and is designed to meet Mil-STD-810E.

The control unit can be remotely located to facilitate integration with the end user’s system. It can be controlled locally using front panel controls or remotely via serial Interface (RS-232) using simple, well defined commands. The control unit is suitable for mounting in an equipment rack or on a table. The controller is designed to meet Mil-STD-810E for indoor operation.

RANGE of MOTION
Azimuth: ± 200°
Elevation: -10 to 190°

POSITIONING ACCURACY
Azimuth: ±0.25°
Elevation: ±0.25°

CONTINUOUS TORQUE
Azimuth: 500 ft lbs
Elevation: 3,000 ft lbs

VELOCITY:
Azimuth: 1 - 20 deg/sec
Elevation: 1 - 20 deg/sec

ACCELERATION:
Azimuth: 20 deg/sec²
Elevation: 20 deg/sec²

POWER INPUT:
Controller 120/60Hz

WEIGHT:
Positioner: 700 lbs (318 kg)
Controller: 50 lbs (23 kg)

POSITIONER:
Operational Temp: 21°-131°F (-6° to 55°C)
Relative Humidity: 0 to 100%
EAR-1000 GENERAL SPECIFICATIONS

The EAR-1000 antenna positioning systems consist of the Elevation-over-Azimuth Rotator (EAR), slip ring assembly, controller (ACU-3D-24) and cables required for power and control of the positioner (standard 50 ft length).

The payload capacity of the system is 1000 lbs.

The positioner is suitable for either base or tower mounting and provides continuous motion in the azimuth axis. It is designed for reliable operation in outdoor environments and to meet Mil-STD-810E.

The control unit can be remotely located to facilitate integration with the end user’s system. It can be controlled locally using front panel controls or remotely via serial Interface (RS-232) using simple, well defined commands. The control unit is suitable for mounting in an equipment rack or on a table. The controller is designed to meet Mil-STD-810E for indoor operation.

RANGE of MOTION

| Azimuth: | Continuous |
| Elevation: | -10 to 190 |

POSITIONING ACCURACY

| Azimuth: | ±0.25° |
| Elevation: | ±0.25° |

CONTINUOUS TORQUE

| Azimuth: | 1,000 ft lbs |
| Elevation: | 6,000 ft lbs |

VELOCITY:

| Azimuth: | 1 - 16 deg/sec |
| Elevation: | 1 – 6 deg/sec |

ACCELERATION:

| Azimuth: | 10 deg/sec² |
| Elevation: | 10 deg/sec² |

POWER INPUT:

Controller: 120 VAC/60Hz (single phase; 4 – 20 A depending on load)

WEIGHT:

| Positioner: | 850 lbs (385 kg) |
| Controller: | 50 lbs (23 kg) |

POSITIONER:

| Operational Temp: | 21°-131°F (-6° to 55°C) |
| Relative Humidity: | 0 to 100% |
AEC-60 Elevation over Azimuth Positioning System:

Consists of the Two-Axis Positioner (shown at right), Control Unit (ACU-3C-32), Power Supply (PS42V20A-3c) and cables required for power and control of the positioner (50 ft length provided standard).

Positioner is ideally suited for mounting on extendable mast and provides up to +/-200° of motion in the azimuth axis and from -20° to +90° in the elevation axis. Designed for reliable operation in rugged outdoor environments.

The Control Unit and Power Supply can be remotely located to facilitate integration with a customer’s system. Can be controlled Locally using Front Panel controls or Remotely via Serial Interface (RS-232, RS-422 or RS-485) using simple, well defined commands.

SPECIFICATIONS:

**RANGE of MOTION**
- Azimuth: ± 200°
- Elevation: -20° to 90° (zenith)

**POSITIONING ACCURACY**
- Azimuth: ± 0.1°
- Elevation: ± 0.1°

**CONTINUOUS TORQUE**
- Azimuth: 2000 in-lbs (170 ft lbs)
- Elevation: 2000 in-lbs (170 ft lbs)

**VELOCITY:**
- Azimuth: 1 - 40 deg/sec
- Elevation: 1 - 40 deg/sec

**ACCELERATION:**
- Azimuth: 1 - 20 deg/sec²
- Elevation: 1 - 20 deg/sec²

**POWER INPUT:**
- Positioner: 42VDC
- Controller: 120/220VAC, 50/60Hz
  5A depending on load.

**WEIGHT:**
- Positioner: 105 lbs (48kg)
- Controller: 12 lbs. (5.5kg)

**POSITIONER:**
- Operational Temperature: 15°-122°F (-10° to 50°C)
- Relative Humidity: 0 to 100%
The ARA Controller product line is subdivided onto the following categories:

1) Military Controllers (ACU-3D series)
2) Commercial Controllers (ACU-3C series)

ACU-3D SERIES

The ACU-3D series Position Controllers feature complete digital control sections for both User Interface and Position Control functions. These controllers can handle from 1 to 3 axes of motion at various loads. These controllers have been tested and qualified for military use with MIL-STD-810E Environmental Tests and MIL-STD-461 Electromagnetic Interference. They can be computer controlled via serial interface (RS-232, RS-422 or RS-485).

ACU-3C SERIES

The ACU-3C series Position Controllers also feature complete digital control sections for both User Interface and Position Control functions. These controllers handle 1 to 4 axes of motion and can be configured to simultaneously control multiple different positioning devices. For this reason, these controllers typically use separate power supplies to provide power to the motors which are located with the positioner. These controllers have been designed incorporating many of the parts and techniques used in the Mil version controllers to provide a very high quality unit for commercial use. There is also a robust serial interface (RS-232, RS-422 or RS-485) that enables the positioner to be controlled by a standard computer.
ACU-3D CONTROLLERS: GENERAL SPECIFICATIONS

The ACU-3D Series Position Controllers feature complete digital control sections for both User Interface and Motion Control functions. This series of Position Controllers have been tested and qualified for military use using MIL-STD-810E Environmental Test Methods, MIL-STD-461E Control of Electromagnetic Interference and MIL-STD-1399 Section 300A Electric Power, Alternating Current for shipboard applications.

The primary purpose of the ACU-3D Controllers is the accurate control of motion. To achieve this result, a very flexible, digital servo control system architecture has been utilized based around brushless servomotors with resolver motor commutation and separate feedback devices to close position loops. The sensor typically used on these series controllers for the secondary feedback loop is a 15 Bit absolute encoder that provides position resolution down to 0.03 degrees.

All of ARA’s Position Controllers feature intuitive, easy to operate manual controls via the Front Panel interface. Additionally, there is a highly refined remote control interface using Serial I/O (RS-232/422/485) that provides the ability to perform any control, setup or monitoring function for the Positioner that are available through the Front Panel. Motion Commands are a common task for this interface, but if properly equipped, it is capable of controlling RF Front End switches and amplifiers.

Standard features include point-to-point positioning, step interval, precision manual control via joystick control and programmable continuous sequencing movement via the store and recall functions.

All modes of operation are easily selected via keys on the front-panel. The 4 x 40 yellow backlit LCD display provides a clear indication of positioner status, control and user input. All of these functionalities also available via the remote interface connection at the rear of the ACU.

Since ARA designs, builds and programs the digital control architecture, these controllers are routinely tailored for specific programs. There is an optional Extended I/O PCB that adds up to 100 lines of DIO that can be programmed to control RF Front End components or react to safety devices.

ARA has also developed a resolver interface for our existing motion control architecture that allows the use of rugged resolvers for position feedback and motor commutation. This allows ARA to use resolvers, which are much more durable sensors on the positioners where they will be subjected to hostile environmental and operational conditions.

The control unit is typically located to facilitate integration with the end user’s system. It can be controlled locally using front panel controls or remotely via serial Interface (RS-232, RS-422 or RS-485) using simple, well defined commands. The control unit is suitable for mounting in an equipment rack or on a table.

NOTE: The ACU-3D-35 Controller was specifically designed to provide coordinated control of three separate, single axis positioners. These can be located either together or apart and may be operated simultaneously or individually.
CONTROLLERS

REMOTE INTERFACE: RS232/422/485

DISPLAY: 4x40 characters

POWER INPUT: 115 or 230 VAC, 50 / 60 Hz versions available.

CURRENT CONSUMPTION: Less than 1A not including motors
1.5 - 10A approximately depending on load.

SIZE: 19” Rack Mount, threaded fasteners for slide mounting.
Optional mounting brackets for shelf or table mounting.

WEIGHT: 25-35 Lbs.

TEMPERATURE RANGE: 0° C to 40° C Operational
0° C to 60° C Non-operational

AVAILABLE MODELS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>AXIS</th>
<th>AMP/ AXIS</th>
<th>HEIGHT</th>
<th>WEIGHT (lbs)</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACU-3D-12</td>
<td>1</td>
<td>20</td>
<td>2U</td>
<td>25</td>
<td>110V @ 3.5 A</td>
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<td>ACU-3D-14</td>
<td>1</td>
<td>20</td>
<td>4U</td>
<td>25</td>
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<tr>
<td>ACU-3D-14-30</td>
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<td>30</td>
<td>4U</td>
<td>25</td>
<td>110V @ 5 A</td>
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<tr>
<td>ACU-3D-24</td>
<td>2</td>
<td>20</td>
<td>4U</td>
<td>30</td>
<td>110V @ 7 A</td>
</tr>
<tr>
<td>ACU-3D-24-240</td>
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<td>40</td>
<td>4U</td>
<td>30</td>
<td>110V @ 14 A</td>
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<tr>
<td>ACU-3D-35</td>
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<td>20</td>
<td>5U</td>
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<td>110V @ 10 A</td>
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<td>20</td>
<td>2U</td>
<td>20</td>
<td>28V</td>
</tr>
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</table>
ACU-3C-22 CONTROLLER: GENERAL SPECIFICATIONS

The ACU-3C Series Position Controllers feature complete digital control sections for both User Interface and Position Control functions. This series Position Controllers are designed to operate with Smart Motors. The light duty controllers have built-in power supplies for the motors, while the heavy duty controllers have external power supplies for the motors.

The ACU-3C Series Position Controllers all feature intuitive easy to operate, manual controls via the Front Panel interface. Additionally, there is a highly refined remote control interface using Serial I/O (RS-232/422/485) that provides the ability to perform any control, setup or monitoring function that is available through the Front Panel. Motion Commands are a common task for this interface, but if properly equipped, it is capable of controlling other features such as RF Front End switches and amplifiers.

Features of the ACU-3C Series Controllers that differentiate them from the ACU-3D Series are the ability to control multiple positioning devices and in some cases axes can be added very easily. This is possible because this series utilizes separate power supply units for the motors and an RS232 link between the motors is used by the Controller for control of the motors. Because of this, an axis or entire positioner can be added simply by making another connection to the serial ring. There are limitations to this due to communication speed, but for most applications it is not a problem.

The ACU-3C series control unit can also be remotely located to facilitate integration with the end user’s system. It can be controlled locally using front panel controls or remotely via serial Interface (RS-232, RS-422 or RS-485) using simple, well defined commands. The control unit is suitable for mounting in an equipment rack or on a table.

Standard features include point-to-point positioning, step interval, precision manual control via joystick control and programmable continuous sequencing move via the store and the recall functions.

All modes of operation are easily selected via keys on the front-panel. The 4 x 40 yellow backlit LCD display provides a clear indication of positioner status, control and user input. All of these functionalities also available via provided remote interface connection at the rear of the ACU.
CONTROLLERS

REMOTE INTERFACE: RS232/422/485
DISPLAY: 4x40 characters
POWER INPUT: 115 or 230 VAC, 50 / 60 Hz versions available.
CURRENT CONSUMPTION: 3.5 A approx.
SIZE: 19” Rack Mount, threaded fasteners for slide mounting
Optional mounting brackets for shelf or table mounting.
WEIGHT: 15 Lbs.
TEMPERATURE RANGE: 0° C to 40° C Operational
0° C to 60° C Non-operational

ACU–3C–22 Version Controller

FRONT PANEL
REAR PANEL

AVAILABLE MODELS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>AXIS</th>
<th>AMP/ AXIS</th>
<th>HEIGHT</th>
<th>WEIGHT (lbs)</th>
<th>MOTOR POWER SUPPLY</th>
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<tbody>
<tr>
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<td>1</td>
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<td>2U</td>
<td>20</td>
<td>Internal</td>
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<td>15</td>
<td>Internal or External Optional PS42V20A-3C</td>
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<tr>
<td>ACU-3C-32</td>
<td>3</td>
<td>20A Max with External Power Supply</td>
<td>2U</td>
<td>15</td>
<td>External Optional PS42V20A-3C</td>
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</tbody>
</table>
CONTROLLERS

OUTLINE DRAWING: ACU-3C-22

NOTES:
1) Cable Connection and Backshells extended at least 3 inches from Rear Panel
2) Additional room for Cable Strain Relief should also be provided

These drawings and specifications are the property of ARA Research Associates, Inc. and shall not be used in the manufacture or production of products unless a license is obtained from the principals or licensees thereof.
The ARA Polarization Rotator product line is subdivided into the following categories:

1) Motorized Polarization Rotators (ARP Series)
2) Manual Polarization Rotators (MRP Series)

ARP-90 SERIES

The ARP-90 series of polarization rotators are designed for use with antenna feeds. They usually provide rotation between 0 to 90 degrees, but some have had as much as +/-110 degrees of travel to allow for changing of the antenna polarization. These polarization rotators are designed to operate with the ACU-3C controllers.

The ARP-90L is a special airborne military version that operates at extreme low temperatures.
The ARP-90 shown on the right is the standard version which offers 90 degrees of travel. This unit is normally controlled via the ACU-3C series controller and provides 12 in-lbs of torque with +/-0.1 degree of positioning accuracy.

This unit is typically used in conjunction with the AEC-60C version El/Az Positioner on any type of erectable mast for a deployable/transportable system. An ACU-3C Series Controller and a DC Power Supply unit make up the complete system. The ACU-3C can also interface and control RF amplifiers and switches right at the feed for improved sensitivity.

There is also an option for controlling the ARP-90 from a standard RS232 serial port and ARA offers a GUI that runs on a Windows computer. In this case a separate DC power supply is required.

**MRP-90 SERIES**

The MRP series of manual polarization rotators are designed for use with both reflector feeds and Log Periodic antennas. The MRP-1 allows a small reflector feed to rotate in 45 degree increments.

The MRP-3100 rotator shown here attaches to the large (17 foot long, 80 lbs) LPD-3100-C3000 log periodic antenna and provides the user manual adjustment of the antenna polarization.
SWITCH NETWORKS

The ARA Switch product line is subdivided into the following categories:

1) Polarization Switch Networks (SW1000 Series)
2) LNA Redundant Network (SW2000 Series)
3) Control Units for the switch products

SW1000 SERIES

The Polarization Switch networks allow the selection of H, V, RHCP or LHCP signals by switching a 90 degree hybrid in line with the inputs of a dual polarized antenna. These networks are available with optional Low Noise Amplifiers and can be manually or computer controlled. The standard frequency band is 1 to 18 GHz.

The unit on the right is the SW-8100 which controls polarization selection of a single antenna. For this unit all RF Switches and the Hybrid are located in the antenna feed.

SW2000 SERIES

The LNA Redundant network allows the switching of a standby Low Noise Amplifier in place of one of the two standard LNAs. A switched input BITE port is also provided.

The unit at right has separate H and V paths along with a spare redundant path that can be electronically switched into either path. The network has a standard range of 1 to 12 GHz or 1-18 GHz and is computer controlled.
The **Controllers for Polarization Switch networks** allow the selection of H, V, RHCP or LHCP signals by switching a 90 degree quadrature hybrid in line with the inputs of a dual polarized antenna. Units are also available that can control up to four separate antennas. These networks are available with optional Low Noise Amplifiers and can be manually or computer controlled. The standard frequency band is 1 to 18 GHz.

The unit on the right is the **CU-8100** which controls polarization selection of a single antenna. This is a microprocessor based control unit with both local and an RS232 remote control capability.

For this unit, all RF Switches and the Hybrid are located in the antenna feed.

The second unit is the **CU-3400** which can control up to four separate antennas. It has the ability to select the appropriate antenna and control the polarization selections for that antenna.

This unit can be operated locally from the front panel or remotely through either a serial RS232 or Ethernet interface. An optional GUI provides the ability to control the unit from anywhere on a network.