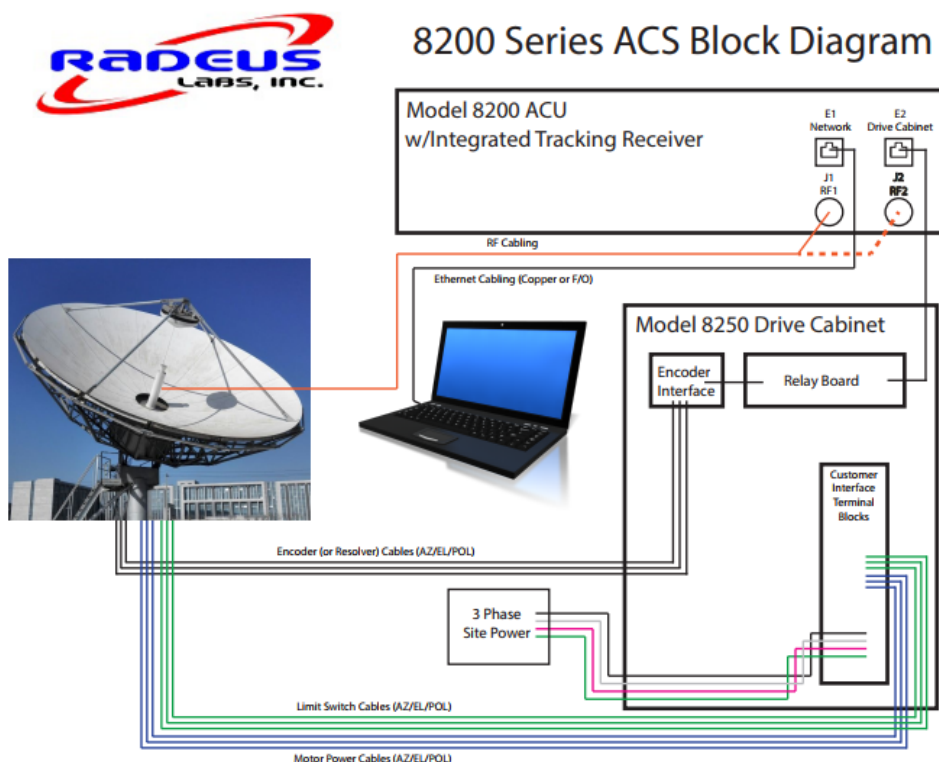


# Radeus Labs 8200/8250 Antenna Control System

## Limited Motion System Information

### 1. Overview

The Radeus Labs 8200/8250 is a new generation antenna control system (ACS) delivering high end tracking performance and innovative features for accurate and robust control of limited motion antennas. With more than 20-years of experience in the satellite communications field, the Radeus Labs Engineering team has designed in familiar and “industry standard” tracking modes as well as a number of high value, practical and innovative features that help the end user get the job done more efficiently. Moreover, when you are a Radeus Labs customer, you are backed by a world class customer support team. We respond promptly and can help to diagnose or correct many issues via a remote connection to the system through a web link.



The Radeus Labs ACS was developed by the same engineering team that developed the Vertex Communications 7200 ACS back in the mid-90s with a focus on quality, ease of use and tracking accuracy. In many ways the 8200 simplifies the interface with a modern, clean touch screen layout that takes an average of 3 touches to get to any parameter in the system and many features you would expect to find in contemporary equipment. The 8200 is not new, but is still in the early stages of its product life cycle and is quickly becoming the “go-to” solution for limited motion antenna control world-wide. Companies like SES, US Electrodynamics, Globecom, Linkcom, Santander, Global Eagle Entertainment, the US Army and many others are current customers/users and are expanding their population of 8200 systems.

## 2. 8200 ACU

The 8200 high performance Antenna Control Unit is an advancement in antenna control technology, providing high end features in a low power package and with a simplified user interface that is intuitive and simple to navigate. The 8200 offers all of the tracking modes required for robust tracking of targets. Further, the pointing modes provide great performance and will auto refresh the data sets from a remote server (internal or external) so the data sets are always fresh and ready to go at a moment's notice.



### Unique Features

The Radeus Labs 8200 is thoughtfully designed to provide innovative features that make for a better user experience and efficient antenna operation. Some of the features that set 8200 ACU apart in the industry are listed below. While not a complete listing, we find these are the key value drivers for our customers.

#### ***Set-up Wizard***

The set-up wizard saves time and increases the performance of the antenna. It is used when the antenna is initially commissioned or when changes are made to the systems drive train components. When run, it will cause the antenna to traverse the azimuth and then elevation axes to their limits, identifying where the hard limits are positioned then setting up the soft limits based on the hard limit positions. Next the wizard will go through a stepping process to determine the “bump” and “coast” times for each motor, resulting in a better tuned control system and better overall system performance. The entire process takes roughly 40 minutes (depending on antenna speed) and automatically configures many of the setup parameters required for operation.

#### ***Remote Team Viewer Interface***

The 8200 is designed with the ability to use a secure VPN interface to remotely operate, diagnose or update the ACU. This may be implemented through either an intranet or internet access. The full functionality of the ACU can be accessed remotely if granted. Many times access is not provided until such time support is needed, then the unit can be made accessible for remote diagnosis and support. Once completed, then access can be removed and the unit secured safely behind the firewall.

#### ***Dedicated Jog Panel Controls***

The 8200 has a dedicated jog panel control built into the ACU front panel for quick and ready access. This saves the need for a separate jog panel control panel and provides interlocked functionality with the drive cabinet jog panel. When either the ACU or Drive Cabinet jog panel is being used, both of the respective travel buttons are illuminated to indicate the axis and direction of motion for the antenna.

### ***Delivery***

Radeus Labs places a high value on delivery. The typical lead time for our standard systems are 30-45 days and has been as low as two weeks in emergency situations. We understand that our customers often do not have the luxury of waiting 6-months for their equipment.

### ***World Class Customer Support***

Possibly the only thing we value higher than delivery, is supporting our customers. Our customer service team is prompt with responses, knowledgeable and thorough. Many times the support will be handled by one of our SatCom Engineers directly. The Team-Viewer interface to the ACU also helps tremendously with support. With this in place, we can perform field firmware upgrades, adjust parameters and download tracking logs to diagnose issues.

## **Operating Modes**

The 8200 ACU provides all of the operational modes for robust tracking of geosynchronous, inclined geosynchronous, LEO, or MEO targets. Below is a listing of the current operational modes and a brief description of each.

### ***Step-Track***

Since the 1970's the "step-track" technique has found widespread use for tracking geosynchronous satellites. Step-track is a basic, automated peaking method for earth station antennas. It has been widely adopted because of its simplicity and ease of use. It is particularly suited for use with geostationary satellites where the link budget does not place undue demands on the antenna pointing system. The Radeus Labs step-track algorithm design is a simple and robust process, performing periodic scans of azimuth and elevation axes to determine optimum antenna positioning for peak signal strength.

The period for each step-track event is determined by the user and may be set differently for each target satellite based on the characteristics of the specific target selected. The "Steptrack cycle time" set by the user determines how long the system will wait between step-track cycles. For inclined targets, the cycle time will be necessarily short and for well-kept targets, the cycle time may be lengthened in order to minimize wear for the equipment. The step size is determined by the antenna beam width for the target's tracking frequency.

### ***Predictive Track***

The Predictive Track algorithm builds upon step-track data gathered over a 24-hour period to develop a model for the target satellite. After 24-hours of data has been collected, the model is calculated and followed from that point forward. The model is periodically supplemented with additional step-track operations to ensure model accuracy over time. The reduced frequency of step-track cycles in the Predictive Track mode reduces equipment wear and improves overall signal level performance. Predictive Track is the preferred mode of operation for satellites that require periodic re-peaking during the day.

### ***Manual Jog***

In the manual mode of operation the antenna may be moved using the dedicated jog panel control on the right side of the 8200 ACU front panel. Each button function is clearly illustrated and labeled, to overcome language barriers. The AZ, EL, and Pol axes may be moved once the "DRIVER ENABLE" button has been engaged. Position feedback is given on the ACU display and

when the antenna is being moved, the axis and direction of movement is indicated via the circular LEDs that surround each button. In addition, there is an identical set of buttons built into the 8250 drive cabinet and the ACU motion LEDs will illuminate even when being driven from the drive cabinet. This allows persons observing the remote ACU to clearly see when the antenna is in motion. The speed of motion (track or slew) may be set in the “Manual Control” screen of the ACU. Button behavior (momentary or toggle) is also managed in the same screen.

#### ***Move to Look Angles***

The “Move to Look Angles” feature can be used to move to a targets pre-determined look angles and once at the desired look angles, will actively hold position.

#### ***Move to Longitude***

Similar to the “look angles” function, but the initial angles are computed from antennas site data and the satellite’s box center longitude.

#### ***NORAD Two-Line Element (TLE)***

Two-line elements (TLE) is a data format for encoding a list of orbital elements for an Earth-orbiting object for a given point in time (the *epoch*). The United States Air Force tracks all detectable objects in Earth orbit, creating a corresponding TLE set for each object, and makes available TLEs for non-classified objects on the website Space Track. The Radeus Labs 8200 will automatically update TLE data from a server (internal or external) maintaining the latest TLE data for all viewable targets from the antenna location. The TLE data may also be updated by uploading the data from a USB drive directly to the ACU. Viewable targets are determined from the site coordinates in combination with the antenna soft limits. In the TLE mode for a target, the antenna will be moved according to pointing data generated from the orbital model.

#### ***IESS-412 (INTELSAT 11 Element)***

The IESS-412 pointing mode is based on an Intelsat 11 Element orbital model. Like the TLE data sets, the IESS-412 data can be refreshed automatically from an internal or external server, or uploaded via a USB drive directly to the ACU. In this mode, the antenna is moved according to pointing data generated from the IESS-412 orbital model. Unique orbital models are maintained for all targets viewable for the antenna.

#### **Position Feedback**

The 8200 provides a flexible position transducer interface accepting several industry standard format options. The standard position transducer used with the 8200 ACU is a 25-bit, single turn optical encoder. This encoder provides ample resolution for higher frequency systems and is as cost effective as the older electromechanical “resolvers”.



### 3. 8250 Drive Cabinet



The 8250 Antenna Drive Cabinet is a clean and robust design that operates in a variety of rugged environments with exceptional performance. With the optional low temperature package, the drive cabinet can operate at temperatures to -55C. The following is a list of standard drive cabinet features.

- Dedicated jog panel control and indicators (same as ACU) with interlock
- Single Ethernet cable inter facility link from ACU to Drive Cabinet
- Removable door for maintenance operations
- Back panel is modular and removable from the drive cabinet with thumb screws
- Jog panel swing door, opens for component access

### 4. Warranty

The warranty for the Radeus Labs 8200/8250 ACS is a very competitive three-year warranty that covers parts and labor. Extended warranty options are available.