Av-Comm
SATELLITE COMMUNICATIONS INFRASTRUCTURE

RC1500B

Tracking /Remote Controlled Antenna Controller for Single Axis Antennas

FEATURES

- **Inclined-Orbit tracking**
  Allows single axis tracking for modest-sized antennas with a motorized declination axis
- **Three Track Modes**
  Step Track, Memory & Search modes supported
- **Polarization Control Interface**
  Automatic or manual polarization control for three-wire Polarotor™ or optional control for rotating feeds with potentiometer feedback
- **High-Resolution Pulse Sensor Interface**
  Ensures accurate Ku-band positioning
- **Software Controlled Limits**
  Provides backup to mechanical limits
- **Dual Speed**
  For fast slewing, fine positioning, user programmable
- **RS-422 PC Control Interface**
  Automated control with many popular packages; basic PC-control software is included
- **Adapti-Drive™**
  Maintains stable speed with varying load
- **Solid-State Drive Circuitry**
  Provides reliable, quiet operation, rated at 10A with over-current protection
- **Multi-Band Operation**
  Supports C, Ku and L-band satellites

24/9 Powells Road, Brookvale, New South Wales 2100, Australia
+61 (02) 9939 4377 ▪ info@avcomm.com.au ▪ www.avcomm.com.au

OPERATIONAL OVERVIEW

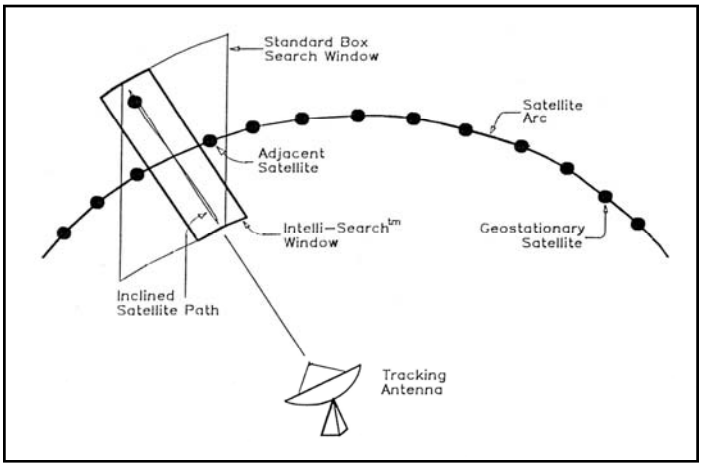
The RC1500 was designed to provide years of reliable operation through the use of a heavy duty solid-state drive network coupled with a novel microcontroller-based fault monitoring system. The 5 amp rated drive output capability is adequate for either moving feed trackers or full-size linear actuators and the Adapti-Drive digital servo speed control optimizes antenna movement for today's demanding Ku-band applications. Additional features like an RS-422 communications port for PC control and a very user-friendly, menu scheme make the RC1500 a unique and highly adaptable piece of equipment. Overall, the RC1500 is well equipped to handle the demanding requirements for cost sensitive domestic and international inclined-orbit satellite tracking.

TRACKING ALGORITHM

When using a modest-sized antenna in which the beam may be steered along the declination axis, (perpendicular to the geostationary arc) a satellite that is in an inclined orbit may be tracked with a single-axis antenna controller. The angular width of the "figure 8" pattern of the satellite's apparent motion is, in general, very small. For the mid-latitudes, this width is approximately:

$$W = 1.2 \times (\text{inclination})^2 / 115$$

or 0.26 degrees for a satellite with an inclination of 5 degrees.



If the antenna beamwidth is larger than the width of the figure 8, it can track the satellite with single-axis, declination motion. An 11.5m C-band or an 3.8m Ku-band antenna would have a 3dB beamwidths of about 0.6 degree. Properly aligned, these antennas could track the satellite with less than 3dB error.

The tracking algorithm used by the RC2000 antenna controllers can be divided into 3 distinct parts - STEP_TRACK, PROGRAM_TRACK and SEARCH. To initiate the track process, the user jogs the antenna to the satellite and verifies the identity of the satellite. The system then enters STEP_TRACK mode.

In STEP_TRACK mode, the controller periodically peaks the receiver's AGC signal strength by jogging the antenna. The time and position are recorded in a track table maintained in the controller's non-volatile memory. The interval between peakups is determined by antenna beamwidth (as determined from antenna size and the frequency band), satellite inclination, and a user specified maximum allowable error (in dB). STEP_TRACK mode is active until a time is reached that corresponds to a segment of the satellite's motion which has previously been stored in the track table. When this occurs PROGRAM_TRACK mode is activated.

In PROGRAM_TRACK mode the controller smoothly moves the antenna to azimuth and elevation positions derived from entries in the track table. The time between movements is determined by the same factors which govern the time between peakup operations in STEP_TRACK mode. In particular the user can specify the maximum allowable error between the antenna's actual position and the position specified by the track table. By increasing the maximum allowable error, antenna movements can be performed less frequently, thus avoiding unnecessary wear on the antenna actuators. In PROGRAM_TRACK mode the accuracy of the track table is monitored by periodically peaking up the receiver AGC signal. If the error exceeds a level set by the user, all entries in the track table are flagged for update. The period between these accuracy checks is specified by the user and typically varies from once a day to once a week.

SEARCH mode is entered from STEP_TRACK mode when the satellite signal has been lost. When the satellite is located, the controller re-enters the STEP_TRACK mode.

SPECIFICATIONS

PHYSICAL	
Size:	19.0″ x 3.5″ x 9.0″ (rack)
Weight:	8.5 lbs.
Temperature:	0° – 50° C
Input Power:	115/230 VAC, 50/60 Hz., 40 W

TRACK MODE	
Antenna Size:	0.4 – 5.0 meters
Maximum Inclination:	+/- 10° standard
Tracking Modes:	Search, Step Track, Program Track
AGC Input:	0 to +10 VDC input range, 2MΩ input impedance

DRIVE	
Output:	36 VDC, 10.0 Amps; 360 VA
Sensor Input:	Pulse-type: Reed, Hall Effect, Optical
Polarization:	Standard Polarotor™ Interface, optional rotating Feed-drive at voltages from 5 – 36 VDC @ 1A max