RC3000

Satellite Locator/ Inclined Orbit Tracking Controller for Mobile Antennas

Avoid the time consuming tasks of manually positioning your mobile antenna and tracking inclined orbit satellites. The RC3000 allows even non-technical personnel to automatically locate and position a mobile antenna within minutes from power up.

FEATURES

- **Automatic Pointing Solution**
  Calculates azimuth, elevation, and polarization angles from any position and heading
- **Auto Acquisition**
  Via Built in DVB, BTR, or External Modem
- **Optional GPS Receiver**
  Battery backup for fast position fix, one pulse per second clock synch pulse
- **Optional Fluxgate Compass**
  Optimal calibration for all magnetic environments
- **Optional Inclined-Orbit Tracking**
  Step Track, Memory Track , TLE & Intelli-Search™ modes
- **Non-volatile Memory**
  Store position and polarization data (including inclined orbit track data) for 20 satellites
- **Slim 2U Rack Panel**
  For simple space saving mounting
- **User Friendly Interface**
  The industry standard for mobile antenna operation
- **Continuous Antenna Status Monitoring**
  Axis limits, jammed and runaway sensing
- **Optional Serial (RS-422 or RS-232) or Ethernet Control Interface**
  Remote control from any popular PC software packages
- **Multi-Band Operation**
  Supports C, Ku, L, Ka and X-band satellites
- **Potentiometer & Pulse Sensor or Resolver Interface**
  High resolution pulse sensor or resolver ensures accurate tracking, inclinometer for true elevation sensing
- **Designed for Future Expansion**
  Beacon receiver, GPS derived heading, resolver based position feedback
- **Motor Types**
  Low voltage DC, 90/180 VDC or AC motor with External AIU

Research Concepts, Inc.

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TRACKING ALGORITHM

The RC3000 tracking algorithm can be divided into three distinct stages - STEP_TRACK, MEMORY_TRACK, and SEARCH.

In **STEP_TRACK**, 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 (determined from antenna size and frequency band), satellite inclination and a user specified maximum allowable error (in dB). When a track table entry exists for the current sidereal time, STEP_TRACK switches to MEMORY_TRACK.

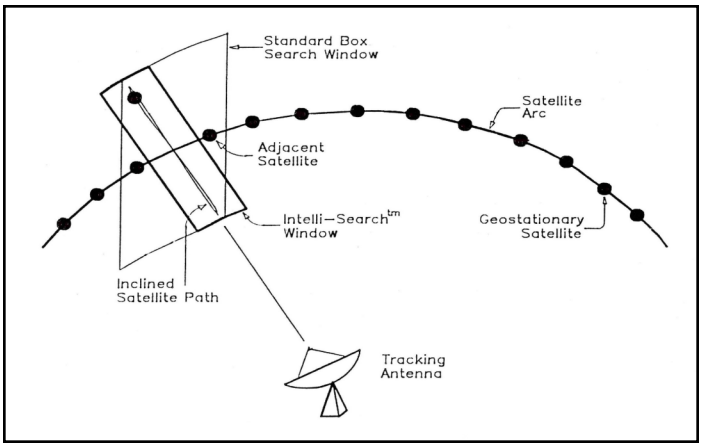
In **MEMORY_TRACK**, the controller smoothly moves the antenna to azimuth and elevation positions derived from entries in the track table. The time between movements is determined by the same factors which govern the time between peakup operations in STEP_TRACK. By increasing the maximum allowable error, antenna movements can be performed less frequently. In MEMORY_TRACK, 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.

SEARCH is entered when the satellite signal has been lost. The RC3000 utilizes Intelli-Search, an efficient search algorithm that minimizes errors associated with traditional box searches and frees the user from having to update vague search window parameters. This scheme accounts for the specific mount geometry, calculates the nominal trajectory for the satellite and then searches in an area that coincides with the satellite's expected path. When the satellite is located, the controller re-enters the STEP_TRACK mode.

In **Ephemeris Track** the RC3000EPH option allows the RC3000 to track satellites using NORAD Two Line Element (TLE) data sets. The RC3000 uses TLE data to calculate a satellite's current az/el position

Orbital elements are determined for all satellites by NORAD. Orbital elements for commercial satellites are freely distributed on the Internet in the form of TLE data sets. For many satellites, TLE data is updated weekly.

TLE data can be entered into the RC3000 either directly via the front panel or remotely via the (optional) RS232/422 serial or ethernet interfaces.



Auto Acquisition

In order to overcome heading estimate errors inherent with a magnetic compass (or in the case of a "no compass" configuration - no heading estimate), an optional "positive identification" feature is available. This feature is mechanized by integrating a Digital Video Broadcasting (DVB) compatible receiver with the RC3000.

When positive identification via DVB is enabled, the LOCATE function will scan the sky looking for an identifiable satellite referred to as a "signpost". The signpost satellite will be identified via the DVB receiver locking onto a frequency / symbol rate / forward error correction code pattern stored in the RC3000 for that satellite.

After peaking up on the identified signpost satellite, the RC3000 can perform a "fix" of the original heading estimate. After establishing the heading fix, the mount may then be moved with confidence to any satellite selected by the user.

SPECIFICATIONS

PHYSICAL	
Size:	19.0″ x 3.5″ x 17.0″ (rack) 2U Rack Enclosure, 17″ Deep
Weight:	18-.0—20.0 lbs
Temperature:	0^{o} – 50^{o} C
Input Power:	115/230 VAC: switchable (A model), specify input power when ordering (B model), 50/60 Hz., 50 W idle, 850 W when moving – **CE compliant**
Display:	4 x 40 LCD

INTERFACES	
Position:	Elevation inclinometer, azimuth & polarization potentiometers, azimuth & elevation pulse sensors (Reed, Hall Effect, Optical), elevation, azimuth & polarization resolvers, discrete limit switches
Ethernet	Replaces serial remote control interface
Serial:	RS-422/RS-232 (GPS, fluxgate, remote control)
AGC Input:	2 AGC input channels , -15 to +15 VDC input range, 2MΩinput 2 lock bit inputs, 0-5V
Output:	12 – 36 VDC motor drive (A model), 90 VDC motor drive, 180 optional (B model)
L-Band Input	Internal Beacon Receiver, DVB Receiver, Broadband Power Detector