ANTENNA CONTROLLER

NGC INDOOR UNIT (IDU)

OVERVIEW

The Kratos NGC Antenna Control System is an advanced level antenna control system intended for applications with demanding tracking requirements, complex geometries, and dynamic conditions.

The NGC Antenna Control System offers precise, user-friendly control over the basic motorization kits for Kratos antennas with sizes 2.4 meters and up.

The NGC-IDU features a SmarTrack® predictive tracking mode that utilizes a patented Three-Point Peak Algorithm that saves wear on the antenna motors and jacks.

The NGC IDU provides convenient features such as straightforward color graphics, LCD touch screen interface, and a number of powerful remote control software protocol options, the NGC Antenna Control System is an ideal solution for medium- to large- sized earth stations requiring complex pointing and tracking functions.

DESIGN FEATURES

- **Graphical User Interface** – Common shared interface design between controller, handheld, remote software package. Enables ease of use, reduced training, and advanced graphical operations & diagnostics.
- **Open, Standards Based Platform** – Non-proprietary hardware and software design based on proven and reliable technology. User customizable open source license User Interface.
- **Connectivity & Control** – Full complement of hardware interfaces for legacy and next generation technologies providing flexible accessibility for system networking, monitoring, control and maintenance.
- **Flexible Modular Upgrade Architecture** – Designed for field upgradable drop-in flexibility of hardware and software enhancements for expanded functionality.
- **Fiber Optic Interfacility Link** – For secure and reliable communications, and protection against lightning, interference and transient voltage.

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ANTENNA CONTROLLER

NGC INDOOR UNIT (IDU)

NGC SYSTEM DESCRIPTION

The NGC system is physically divided into an Indoor Unit (NGC-IDU) and an Outdoor Unit (NGC-ODU), connected by a dedicated multimode optical fiber link.

The functional allocation between NGC-IDU and NGU-ODU follows one basic principle: the indoor unit generates all pointing commands and the outdoor unit executes the move and verifies they were completed.

All tracking functions are isolated to the NGC-IDU, which as mentioned is indoors, where the beacon receiver or other signal measurement device will be located.

All motion control functions are isolated to the NGC-ODU, which is located on positioner or pedestal, allowing termination of all local control cables after short runs and minimizing interconnection between indoor and outdoor to AC power, transmit and receive signals, and a single control fiber pair.

No configuration of the dedicated link between NGC-IDU and NGC-ODU is required, this avoids the need for the installer to understand TCP/IP networking configuration..

The Kratos NGC-IDU is a modular, scalable, adaptable advanced-level antenna pointing and tracking controller intended for motorized satellite earth station antennas used with geosynchronous communications satellites.

The NGC-IDU is a 3RU 19-inch rackmount chassis that is mounted inside the equipment shelter or building. It provides the user interface and the interface to the tracking receivers. All NGC system variants have the same NGC-IDU package.

The system is intended for new installations, and as a replacement for legacy control systems such as the Kratos APC100, APC400, and ACS3000 systems.

The NGC provides the following basic and optional features:

- Variable Speed motor control for two- and three-axis motor systems complying with the standard Kratos interface, using VFDs for driving the Az and El axes
- Support for single speed AC or DC Pol rotators
- Automatic positioning of antennas to pre-programmed look angles
- Optical Interfacility link
- Local control from the indoor unit through an advanced touch screen LCD and keypad
- Automatic installation commissioning assistance
- 10/100 BaseT Ethernet interface for external M&Cs (via the IDU)
- Remote control through network-based and serial-port-based communications protocols, including both legacy protocols and SNMP
- Integral beacon receiver interfaces to support Kratos patented three-point peaking step-track and SmarTrack® hybrid feedback/predictive program tracking algorithms
- NORAD and Intelsat program tracking
- Optional Monopulse tracking for Ka-band applications
- Optional integrated subreflector tracking (SRT) capability for high-accuracy Ka-band tracking, including hybrid main dish and SRT positioning and tracking

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NGC INDOOR UNIT (IDU)

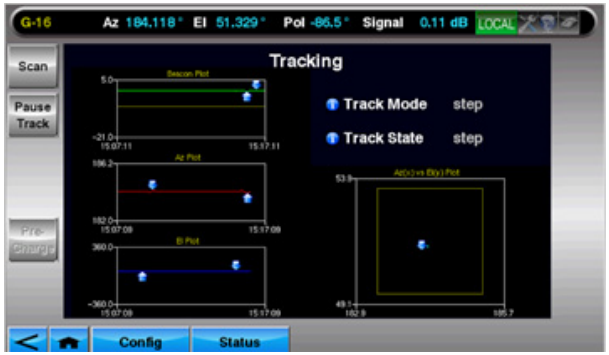
USER INTERFACE

NGC-IDU Front Panel

The NGC-IDU front panel has an 800x480 color touch screen Liquid Crystal Display (LCD) and 30 key areas. From this interface, the user can perform all functions to configure, control, and monitor operation of your antenna.
The front panel also includes a USB port.

NGC-IDU Touch Screen Display

The touch screen display is the key component to control the NGC-IDU. By its optimized design the NGC provides intuitive and easy to use menus. As an example, the screen is composed of four main zones, the top menu bar shows information such as satellite name, azimuth, elevation, polarization, signal level and faults; the center part of the screen displays graphs or menus as well as virtual keyboard; the left side shows sub-menu buttons while the bottom part provide shortcuts to specific functions.



NGC-IDU Keypad

The NGC-IDU front panel also includes a touch-sensitive “keypad” with built-in LED indicators for tracking state, alarms, signal strength, and other status indications.
From the NGC-IDU front panel, the user can jog the antenna, jog the SRT, control options such as redundancy, heaters and jump to several convenient starting points in the menu/screen tree.

NGC-IDU USB Port

The NGC-IDU front panel includes a USB port which may be used for installing an external keyboard temporarily or for installing a USB jump drive that can be used to upload or save controller configuration or files.

NGC-IDU Interface

The NGC-IDU has also an Open Source Interface this allows experienced customer to customize the interface for specific applications.

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NGC INDOOR UNIT (IDU)

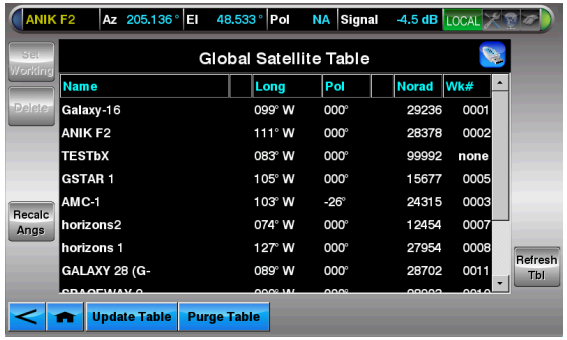
ANTENNA CONTROLLER

SATELLITE MEMORY and TRACKING

SATELLITE DATABASES FUNCTIONS

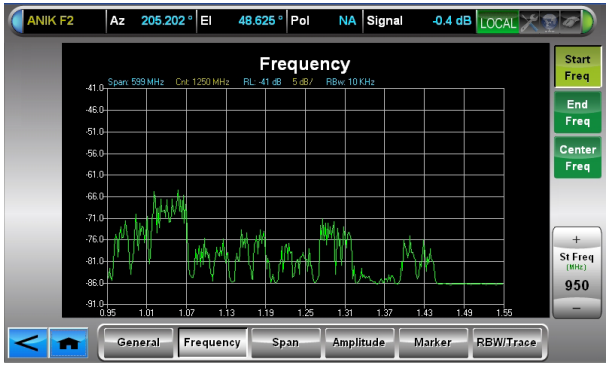
The NGC-IDU can hold up to 60 satellites in its working table for ready access and keep a database of 1000 satellites in its global set. Satellites can be easily moved to and from the working table. The global satellite table can be updated from a Celestrak or Space-Track.org geo.txt file, including NORAD TLEs, using a USB flash jump drive.

Note: The Ephemeris tables should be manually updated periodically.



RECEIVER INTERFACE

The NGC-IDU can interface to any analog beacon receiver with a 0-10V DC output. Other output ranges are not recommended and may in fact be harmful.
The NGC-IDU can interface to and control a certain level of parameters of selected beacon receivers using a serial interface, please contact Kratos for the complete list. This feature is useful for automatic tuning of the beacon receiver frequency and other parameters when switching between satellites.
The NGC-IDU's built-in spectrum analyzer can serve as a beacon receiver in many applications, please consult Kratos about the suitability of this option.



TRACKING ALGORITHMS

The NGC-IDU supports several tracking algorithms based on software license
options.

- Three-point peaking step-track.
- SmarTrack® hybrid feedback/predictive program tracking
- NORAD ephemeris predictive tracking
- Intelsat Ephemeris predictive tracking
- Monopulse for Ka band application

The NGC-IDU automatically calculates expected 3dB beamwidth from antenna size and downlink frequency. The stepsizes can be configured as a fraction of the 3dB beamwidth. The sensitivity of the tracking algorithms can be configured.

The NGC-IDU will perform limited signal processing on the tracking signal. This includes wild-point removal, and averaging to eliminate fluctuations. These functions are parameterized and can be customized for the application from the front panel. For analog interfaces, significant oversampling is used to statistically detect scintillation and reduce its effects.

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NGC INDOOR UNIT (IDU)

NGC MONITOR AND CONTROL

PRIVILEGE LEVELS

The NGC-IDU user interface supports four user-accessible privilege and security levels, from Installer to Monitor, allowing some control to prevent unauthorized parameter changes or operation.

ETHERNET TCP/IP

The NGC-IDU includes an Ethernet 100BaseT interface running TCP/IP. The NGC-IDU must be configured with a static IP4 address. The current product does not support IPv6 but this will be implemented in a future software release.

SNMP

The NGC-IDU supports management through the SNMP v1 and v2c protocols.
The security community can be altered from the front panel. Set functions can be locked out from the front panel, although the SNMP manager can override this by changing that setting, to prevent unnecessary site trips.
The SNMP interface is extremely powerful and necessarily lacks some of the safeguards built into the front panel user interface.

TIME

The NGC-IDU supports the Network Time Protocol and can use this feature to keep its local time synchronized. It can also use an optional GPS with 10MHz output, or the AS-1 module installed outside, to synchronize time. All system time is in UTC, no local time zones are used or supported.

LEGACY PROTOCOLS

The NGC-IDU has limited support for the APC100 protocol through the serial interface. Consult Kratos for details.

REMOTE CONTROL

A version of the NGC-IDU front panel software suitable for running on Windows PCs is available as an option (remote GUI). A customer may also successfully build a similar application from the source code supplied, in accordance with new license.

FAULT LOGGING

The NGC-IDU keeps lists of current, latched, and acknowledged (ACO) alarms, and keeps a time-based history of alarms and other significant events.
These logs can be viewed from the user interface.

CONFIGURATION STORE and RESTORE

The NGC-IDU can store a snapshot of current configuration, display any differences between the stored snapshot, and restore the snapshot to operation from a simple interface. This can also be done using the handheld controller.

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DATA EXPORT

The NGC-IDU can import and export all configuration files via the USB jump drive, and can save internal log files to the USB jump drive on request.
The NGC-IDU keeps position, tracking, event/fault, and audit logs indefinitely, but rovides an automatic purge function for file management. These files are stored as comma-separated-value (CSV) files and are thus compatible with common office suites for analysis and evaluation.

SOFTWARE UPDATE

Software Update of the NGC-IDU is typically accomplished using the jump drive. The NGC-IDU can also retrieve installation packages using FTP if necessary.

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NGC INDOOR UNIT (IDU)

OPTIONAL FEATURES

SPECTRUM ANALYZER CARD - ANALOG (NGC-002)

This option allows to use the optional internal L band spectrum analyzer card as a beacon receiver while simultaneously monitoring the L band spectrum.

BEACON RECEIVER (NGC-004-02)

The L band internal beacon receiver is entirely controlled by the IDU, the system can configure all the RF parameters. this beacon receiver is also capable of monopulse tracking.

EMERGENCY STOP BUTTON (NGC-006)

This safety feature is installed on the NGC-IDU front panel and provides an Emergency Stop Button to stop all antenna movement until reset.

10 MHZ REFERENCE SOURCE (NGC-007)

This GPS reference option provides a 10MHz timing source for the NGC-IDU, and provides this signal on the rear panel (Insert level, accuracy spec here if you have it) for distribution to system components requiring external reference requirements.

REDUNDANT POWER SUPPLY (NGC-008)

In addition to the external power supply provided with the NGC-IDU, a second unit can be installed to add PS redundancy capabilities

RACK SLIDES (NGC-009)

These rack slides are required when using deep rack units, they secure the IDU unit during maintenance or configuration

STEP TRACKING SOFTWARE (NGC-101)

This software option is standard with the NGC-IDU. The step-track algorithm uses the patented “three point peaking” (3PP) approach, where the antenna is peaked by fitting measured signals to the parabolic loss curve. This gives greater resolution than traditional signal-balancing step-track in less time.

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SMATRRACK TRACKING SOFTWARE (NGC-102)

The SmarTrack® algorithm is based on building a mathematical model of observed satellite orbit from the history of Az & El readings during tracking. Once sufficient data is collected to build a reliable model, the system switches to a predictive mode and uses occasional peaking to update the model. The quality level of this model is measured and provided in dB by computing the RMS error between the model's predictions and actual peaking points on the tracking status screen.

PREDICTIVE TRACKING SOFTWARE (NGC-103)

The predictive NORAD or Intelsat tracking mode, regenerates periodically a new angle from the loaded model. The rate at which this happens depends on how much the model indicates satellite appears to be moving.

FULL TRACKING SOFTWARE (NGC-104)

This option is a combination of the three previous options, NGC-101/102/103.

ACQUISITION ASSIST SOFTWARE (NGC-105)

The acquisition assist is a feature that allows TriFold® antennas to search for likely satellites that match the configured parameters. It requires hardware options such as beacon receiver, DVB-S receiver, sensor package.

REMOTE ACCESS SOFTWARE PACKAGE (NGC-106)

This software delivered free of charge with every NGC-IDU gives access your NGC from anywhere on your network. The remote screen is identical to the NGC touch panel, controllable just as the front panel using the keyboard and mouse. For obvious reasons critical settings cannot be changes via remote access.

SPECTRUM ANALYZER ENHANCED USER INTERFACE (NGC-107)

This software option provides additional operational capabilities to the spectrum analyzer card giving access to functions available to test equipment such as: CF, Span, VBW, Absolute Power Measurement Functions. It allows to record, store, & recall historical plots, output data in CSV file format. It requires the NGC-002 option.

RECEIVE PATTERN TEST TOOL SOFTWARE (NGC-108)

This software option enables the NGC to perform antenna patterns and measures Rx irectivity, 3 and 10 dB Rx Beamwidth, Side lobes & Null measurement, 29-25 & 32-25 Log Theta curves and provides Rx pattern envelope curves. It has also stores the results and is available for export to USB Flash drive, the plot is stored in an HTML format for use in other documents.
The software has also the capability to compare/display two recorded patterns. This option requires the NGC-002 and NGC-107 options.

EXTERNAL DEVICE SWITCHING SOFTWARE (NGC-109)

This software option is used in conjunction with NGC Redundancy or NGC waveguide switch matrix control. This option enables the display and control of components and waveguide/coax switches, eliminating the need for dedicated component redundancy controllers. A complete range of LNAs and LNBs are available in various frequency bands.
Refer to the Kratos product bulletins for more information.

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NGC INDOOR UNIT (IDU)

SAND/DUST DEVIATOR FEATURE SOFTWARE (NGC-111)

This software option is used in conjunction with the precipitation deviator and periodically forces high velocity air across the feed window to remove sand or dust. This option requires the Precipitation Deviator Kit

MONOPULSE TRACKING SOFTWARE (NGC-116)

This option provides Monopulse tracking capability to the NGC.

HIGH AVAILABILITY SYSTEM REDUNDANCY (NGC-119)

This software option provides redundancy for the NGC-IDU. The master NGC-IDU will periodically synchronize all parameters with the slave unit at user selected intervals. If a failure is sensed, a fault will occur and the service will revert to the slave.

ENVIRONMENTAL SYSTEM CONTROLLER (NGC-AESC)

This option is connected to the NGC-ODU via the NGC Bus, and provides monitor and control capabilities of the de-ice system, precipitation deviator, feed heater, hub heater and can be connected to an optional weather station. All the information are controlled and displayed from the NGC-IDU touch screen display.

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