NGC-IDU
Antenna Control System

Advanced Technical Manual

Manual# 7581691 – Revision D

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INTRODUCTION: How to Use This Manual

1.1 Purpose, Overview, & Description

Purpose

The purpose of this manual is to provide installation, preventive maintenance, troubleshooting and corrective maintenance information together with detailed checkout procedures for the NGC Antenna Controller Indoor Unit (IDU). **This manual is intended for use by qualified technical and/or installation personnel ONLY**, for the performance of installation, operation, and maintenance procedures for the NGC-IDU system.

IMPORTANT NOTE: General Users DO NOT use this manual! General Users should refer to manual 7581739

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Overview

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

The NGC Antenna Control System offers precise, user-friendly control over the basic motorization kits for *ASC Signal Corporation* antennas with sizes ranging from 2.4 meters and up. The NGC Antenna Control System may be used in situations that have previously used (or had the potential to use) the ACS3000.

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.

Another feature of the NGC system is the use of VFDs (Variable Frequency Drives) that allow the antenna to increase speed when the antenna is commanded to move to a new target satellite, while moving at a precise lower speed when the antenna is tracking or peaking up on a satellite.

Providing 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.

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General Product Description

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

The NGC-IDU provides the following basic and optional features:

- Variable Speed motor control for two- and three-axis motor systems complying with the standard *ASC Signal* interface, using VFDs for driving the Az and El axes
- Support for single phase AC 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
- Local control from the outdoor unit through an advanced handheld unit
- 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 *ASC Signal*'s patented three-point peaking step-track and SmarTrack® hybrid feedback/predictive program tracking algorithms
- NORAD and Intelsat program tracking
- Optional integrated subreflector tracking (SRT) capability for high-accuracy Ka-band tracking, including hybrid main dish and SRT positioning and tracking

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 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 NGC-ODU is packaged in multiple layouts based on application. All are generally mounted outside, on the positioner, pedestal or tripod mount. Depending on the ordered chassis variant, the NGC-ODU may use 208VAC or 380VAC three-phase WYE power, or 240VAC single-phase power. The NGC-ODU may use common or separate sources for technical and service power, as desired by the customer.

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 them. All tracking functions are isolated to the NGC-IDU, which 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 the 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.

I.II Personnel Requirements

NOTICE

INSTALLATION, MAINTENANCE, OR REMOVAL OF AN ANTENNA REQUIRES QUALIFIED, EXPERIENCED PERSONNEL. THESE *ASC SIGNAL CORP*. INSTALLATION INSTRUCTIONS HAVE BEEN WRITTEN AND ILLUSTRATED FOR SUCH PERSONNEL.

ANTENNA SYSTEMS SHOULD BE INSPECTED AT LEAST ONCE A YEAR BY QUALIFIED PERSONNEL TO VERIFY PROPER INSTALLATION, MAINTENANCE AND CONDITION OF THE EQUIPMENT.

ASC SIGNAL CORP DISCLAIMS ANY LIABILITY OR RESPONSIBILITY FOR THE RESULT OF IMPROPER OR UNSAFE INSTALLATION OR MAINTENANCE PRACTICES.

I.III Miscellaneous Notices

Proprietary Information

The technical data contained herein is proprietary to *ASC Signal Corporation*. It is intended for use in the installation, operation, and maintenance of *ASC Signal* equipment. This data shall not be disclosed or duplicated, in whole or in part, without the expressed written consent of *ASC Signal Corporation*.

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Installation Notice

Installation, maintenance, or removal of the hardware described in this manual requires qualified and experienced personnel. *ASC Signal* installation instructions are written for such personnel. **Qualified personnel MUST perform proper installation** and maintenance of the equipment, and **MUST verify the condition of the equipment at initial installation** and periodically thereafter.

NOTE: *ASC Signal* is NOT liable or responsible for results of improper or unsafe installation and maintenance practices. All designs, specifications, and availability of products are subject to change without notice.

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IMPORTANT: What to Know When You See OPTION:

Any time you see "**OPTION:**" this means that the information following it is related to an optional element (in either hardware or software) that may or may not apply to the arrangement of your particular NGC System. Please note that if you see an option that you do not have but would like to purchase, you should contact *ASC Signal*.

I.IV Warning Symbols

Various components of this System may display safety symbols. Be sure to <u>use extreme caution</u> when operating components with any of the following safety symbols:

Certains éléments du système montreront peut-être des symboles de sécurité. <u>Faites très attention</u> à faire marcher tous les éléments qui tiennent les symboles de sécurité suivants:

 **OR**  **WARNING! HAZARDOUS MOVING PARTS! KEEP FINGERS AND OTHER BODY PARTS AWAY!**
AVERTISSEMENT! PIÈCES MOBILES DANGEREUSES! GARDEZ LES DOIGTS ET LES AUTRES PARTIES DU CORPS HORS D'ATTEINTE!

 **WARNING! RISK OF ELECTRIC SHOCK!**
AVERTISSEMENT! RISQUE D'ÉLECTROCUTION!

 **WARNING! REFER TO MANUAL**
AVERTISSEMENT! SE RÉFÉRER AU MANUEL D'UTILISATION.

I.V Safety Terms Summary

The following safety terms may appear on this product:
Les termes de sécurité suivants peuvent apparaître sur le produit:

DANGER—Indicates an immediately accessible injury hazard is present as you read the marking, and failure to take precautions could result in loss of life
DANGER*—Cette indication signale un risque de blessure immédiat et qui peut être mortel.*

WARNING—Indicates a nearby injury hazard that is not immediately accessible as you read the markings, and failure to take precautions could result in personal injury and/or loss of life
AVERTISSEMENT*—Cette indication signale un risque de blessure non immédiat mais qui peut être mortel.*

CAUTION—Indicates a potential hazard to property, including the product
PRUDENCE*—Indique un risque pour l'environ du produit, le produit inclus.*

The following safety symbols and terms may be used in this manual:
Les symbols et les termes suivants de sûreté peuvant être employés en ce manuel:


WARNING! Statements identify conditions & practices that could result in injury or loss of life.
AVERTISSEMENT! Les rapports d'avertissement identifient les conditions ou les pratiques qui pourraient avoir comme conséquence les dommages ou la perte de la vie.


RISK OF ELECTRIC SHOCK!
RISQUE DE DÉCHARGE ÉLECTRIQUE!

I.VI Summary of Safety Precautions

The following safety precautions are not related to any specific procedure, and so will not appear elsewhere in this manual. Ensure all personnel understand & apply these precautions in all phases of installation, operation, & maintenance. Failure to do so may result in loss of life.


KEEP AWAY FROM LIVE CIRCUITS: Personnel must observe all applicable safety regulations at all times. Ensure power is disconnected or removed from the unit BEFORE replacing any components. Potential hazards may exist even though the power control switch is in OFF position. Capacitors retain electrical charges. Always REMOVE POWER & use test equipment to confirm a circuit is at ground potential BEFORE touching it. NEVER reach into or enter an enclosure to service or adjust the equipment until the absence of power has been confirmed.


DO NOT SERVICE OR ADJUST ALONE: Under NO circumstances should ANY person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment **except in the presence of someone who is capable of rendering aid** in case of an accident/emergency.


RESUSCITATION: Personnel working with or near high voltage should be familiar with resuscitation methods (CPR and/or AED). CPR info may be obtained from medical personnel. For AED (Automated External Defibrillator) information, contact supervisor or hosting administration for details on the availability and/or location of an AED unit at your worksite.


ELECTROSTATIC DISCHARGE PRECAUTION
This equipment contains electrostatic discharge (ESD) sensitive devices. ESD sensitive equipment handling methods must be used to prevent equipment damage during handling and servicing.


ESSENTIAL HEALTH AND SAFETY REQUIREMENT
Refer to document "P/N 240117—Essential Health and Safety Requirements".

DO NOT DISCARD CONTENTS

The product in this packaging was placed in the market after August 13, 2005. Its components must not be discarded with normal municipal or household waste.

Contact your local waste disposal agency for recovery, recycling, or disposal instructions.

I.VII Things to Never Do

- **NEVER** touch circuits or reach into an enclosure until the disconnection of power and absence of charge has been confirmed
- **NEVER** service or adjust equipment alone. Electric shock can lead to cardiac arrest. Presence of **immediate aid gives you a 90% chance of survival**, but this **drops by 10% with every passing minute. After 5 minutes, resuscitation** without **permanent heart and/or brain damage is nearly impossible**. Consider this: **Without the immediate aid of CPR or an AED, what are the odds you will be found and successfully revived in under 5 minutes?**
- **NEVER** ignore warning symbols or fail to read safety signs
- **NEVER** skip steps in a sequence, unless specifically instructed to do so by the manual, software, and/or authorized ASC Tech Support Personnel. Aside from risking harm to yourself, you risk doing permanent damage to the equipment
- **NEVER** touch or stand near any potentially moving parts (even if they are not in motion at the time) when the unit is in operation or powered on, as they may move without warning
- **NEVER** stand underneath any object while it is being lifted
- **NEVER** remove, disable, or exceed the unit's safety, software, security, or movement limits, unless specifically instructed to do so by the manual, software, and/or authorized ASC Tech Support Personnel. The careless disabling of such safeguards is one of the most common causes of serious equipment damage during installation and operation

I.VIII Parts Verification

STOP! READ BEFORE BEGINNING ASSEMBLY OR INSTALLATION!

Upon receipt of your order, the shipment should be verified to ensure that all parts have reached your site. This process should occur before the installation process begins. *ASC Signal Corporation* thoroughly inspects and carefully packs all equipment before shipment. If you find that there are missing or damaged components, please refer to the step-by-step instructions (located in back of this manual) on how to properly report equipment loss or damage. When you have received your order, verify that all parts contained in the shipment correspond to the parts listed on your packing slip/inventory.

1.0 NGC-IDU System & Parts Overview

The following sections will cover all parts and components for the NGC-IDU, both internal and external. These sections will also cover all current standard, optional, and additional features for the NGC-IDU.

Figure 1-1: NGC-IDU Front View

Figure 1-2: NGC-IDU Rear View

NOTE: normally, the chassis should NOT be opened as shown in the above figures.

1.1 NGC-IDU Standard and Optional Features

NOTE: some features require optional and/or the installation of a software license key.

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1.1.1 Standard Features

All NGC-IDUs come with the following set of standard features:

- 800x480 WVGA-format 32,768-color touch screen
- Auxiliary keypad
- Optical (100baseFX) interface to the NGC-ODU
- Analog and serial beacon receiver interfaces
- TCP/IP over Ethernet (100BaseT) networking including SNMP, FTP, and NTP protocols
- USB jump drive support
- APC100 serial protocol emulation
- Status monitoring and logging
- External PC keyboard supported (not supplied)

When combined with certain NGC-ODUs, it adds the following standard feature:

- Automatic stow and deploy of TriFold® antennas.

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1.1.2 Options and Variations

The NGC-IDU is designed to create a complete system when combined with a wide variety of configurations. It automatically configures to match ODU capabilities, including all installed options [heaters, Pol drive kits, SRTs, etc.]. At the time of writing, the IDU supports the ODUs listed in **Table 1.1**.

Table 1.1: NGC-ODUs Compatible with NGC-IDU

Part Number	Description
NGC-ODU-208-3	208VAC, 3HP, Fixed
NGC-ODU-208-3D	208VAC, 3HP, Fixed, Dual Az (High Accuracy Encoders)
NGC-ODU-208-3-HA	208VAC, 3HP, Fixed, High Accuracy Encoders
NGC-ODU-208-5	208VAC, 5HP, Fixed
NGC-ODU-208-5-HA	208VAC, 5HP, Fixed, High Accuracy Encoders
NGC-ODU-208-LPP	208VAC, Low Profile Positioner, Dual Az
NGC-ODU-208-SPP	208VAC, Standard Profile Positioner
NGC-ODU-380-3	380VAC, 3HP, Fixed
NGC-ODU-380-3-HA	380VAC, 3HP, Fixed, High Accuracy Encoders
NGC-ODU-380-5	380VAC, 5HP, Fixed
NGC-ODU-380-5-HA	380VAC, 5HP, Fixed, High Accuracy Encoders
NGC-ODU-SRT	120/240VAC, SRT-only system, fixed

The following optional hardware elements can be installed in or with the NGC-IDU. Optional software associated with some of these elements is automatically activated by the NGC-IDU hardware.

Table 1.2: NGC-IDU Optional Hardware Elements

Option Code	Feature Name	Notes
NGC-001	Spectrum Analyzer	Factory-installed hardware spectrum analyzer.
NGC-003	DVB-S Receiver	Factory-installed DVB receiver
NGC-009	Rack slides	Factory-installed rack slides
NGC-006	ESTOP switch	Factory-installed additional ESTOP switch

The following software elements can be field activated by software license key as shown in the following table:

Table 1.3: NGC-IDU Optional Software Elements

Option Code	Feature Name	Notes
NGC-101	Step Tracking	(Standard)
NGC-102	SmarTrack®	Orbital prediction algorithm
NGC-103	Predictive Track	NORAD and Intelsat ephemeris
NGC-104	Full Track	NGC-101 + NGC-102 + NGC-103
NGC-107	Enhanced Spec An	Requires NGC-001 to be effective.

The software elements shown in the following table are automatically activated by the presence of specific NGC-ODU hardware:

Table 1.4: Software Elements

Option Code/Part #	Feature Name	Notes
NGC-105	Acquisition Assist	Activated by presence of AS-1 unit, mobile operational configuration
7579403	Three-axis SRT carriage	Motorized subreflector tracking carriage for 8.1m antennas
7581065	Dual-axis SRT carriage	Motorized subreflector tracking carriage for 3.5m antennas

The NGC-IDU software system is common to all deliveries. Unlike some other antenna control systems, customized software is not used. Therefore, the current release can always be updated on the NGC-IDU and any optional feature will continue to work.

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1.1.3 Overall NGC-IDU System Performance

Table 1.5: System Performance Specs

Item	Specification	Remarks
Az/El Axis Resolution	0.001° internal 0.001° display	True resolution depends on encoder/resolver used in NGC-ODU
Pol Axis Resolution	0.001° internal 0.100° display	True resolution depends on encoder/resolver used in NGC-ODU
Pointing accuracy	Varies with NGC-ODU	
Beacon sensitivity	0.01dB	Analog

1.2 NGC-IDU Chassis Front Panel

The NGC-IDU front panel has an 800x480 color 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.

Figure 1-3: NGC-IDU Front Panel

#	Item	Description
1	USB Jack	Allows a limited number of peripheral devices to be connected to system. These include USB keyboards and Windows-formatted USB drives (jump drives) which can be used for data entry tasks without networking. There is also a USB jack on the back of the unit. ⚠ **CAUTION:** Some jump drives or other peripherals can interfere with the bootstrap of Linux operating system. Do not leave jump drives or other peripheral devices attached when you are not using them.
2	Touch-screen Panel Unit (TPU)	Allows interactive data entry and display of all controls to and information from the system. This TPU is the central user interface of the NGC-IDU.
3	Fault	LED indicates current faults. If you touch it, screen jumps to Current Fault Summary
4	Standby	Used to halt program movement quickly. It is a program halt (only program movement is inhibited). LED is lit if system is halted
5	Signal	Used to jump to Spectrum Analyzer function (if installed). LED lit if low signal fault present
6	Tracking	Used to jump to tracking screen. LED indicates system is actively moving, seeking a new peak by flashing, and indicates the system is actively tracking if constantly lit
7	GoTo	Used to jump to satellite selection screen. LED flashes if antenna is in motion
8	LCL/Remote	Used to toggle between Local (LCL) and Remote (REM) modes.
9	Jog Mode	As the button text suggests, this button toggles the Jog mode
10	Jog Keys	Allows jogging (if system is in correct mode), jump to **Movement** screen, and provides backup to the touch-screen in the event that it becomes unresponsive
11	Keypad	Allows alphanumeric entries as well as sign (+/-) and decimal (.) values
12	Power Button	NGC-IDU Power ON/OFF

OPTION: one option is an **EMERGENCY STOP** button on left of front panel just above USB port. Emergency stop is an inhibiter. Antenna will not move until it is cleared.

1.2.1 Front Panel LEDs

- Each Front Panel LED uses specific combinations of color and flashing rate to communicate system status items at a glance.
- During startup the LEDs cycle in a characteristic pattern from the FAULT LED to the power LED. Once the LEDs stop cycling, the SCP has started, and the system will resume operation in a couple of seconds.
- During shutdown the LEDs will flash white twice and then go dark.
- During software update the LEDs will cycle like they do for startup.

NOTE: Some versions of software may vary somewhat from these descriptions

The following table gives the steady-state meanings of each LED, listed by number labels as found in **Figure 1-3**:

Table 1.6: Front Panel LEDs

#	Key	LED Type/Color	Meaning
3	FAULT	BLUE fast blink	Loss of comm. with ODU (see **NOTE**)
		RED solid	Major or critical fault
		YELLOW solid	Minor fault or event active (see **NOTE**)
		GREEN solid	No unacknowledged faults
4	STANDBY	BLUE solid	Standing still
		Off (no color)	Moving
5	SIGNAL	YELLOW slow blink	Low signal alarm
		Off (no color)	Signal level is OK
6	TRACKING	BLUE fast blink	Track fault
		BLUE slow blink	Scanning or finalizing peak
		BLUE solid	Tracking
		Off (no color)	Not tracking
7	GOTO	YELLOW fast blink	Position loop
		YELLOW slow blink	Jogging
		Off (no color)	Not moving
8	LCL/REM	GREEN on	Local mode
		YELLOW fast blink	Local handheld mode
		YELLOW on	Remote mode
9	JOG MODE	YELLOW fast blink	Jogging dish
		GREEN slow blink	Jogging SRT
		GREEN solid	Jog enabled
		BLUE solid	Jog disabled
12	POWER	Off (no color)	No power
		Very slow blink	Standby
		On/Solid	Normal On

NOTE: Some SCP software versions may not support some of the specific color/blink combinations mentioned in the above table.

1.3 NGC-IDU Back Panel

The NGC's back panel provides power and external interface connections.

Figure 1-4: NGC Back Panel

Figure 1-5: NGC Back Panel Connectors, Left Half, Expanded View

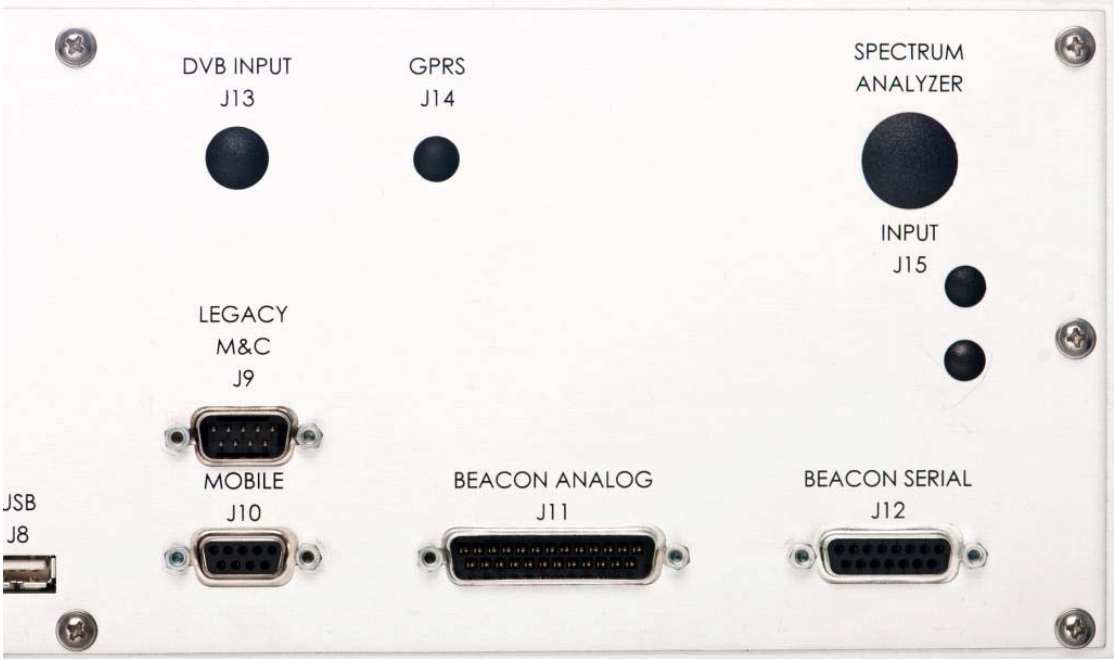

Figure 1-6: NGC Back Panel Connectors, Right Half, Expanded View

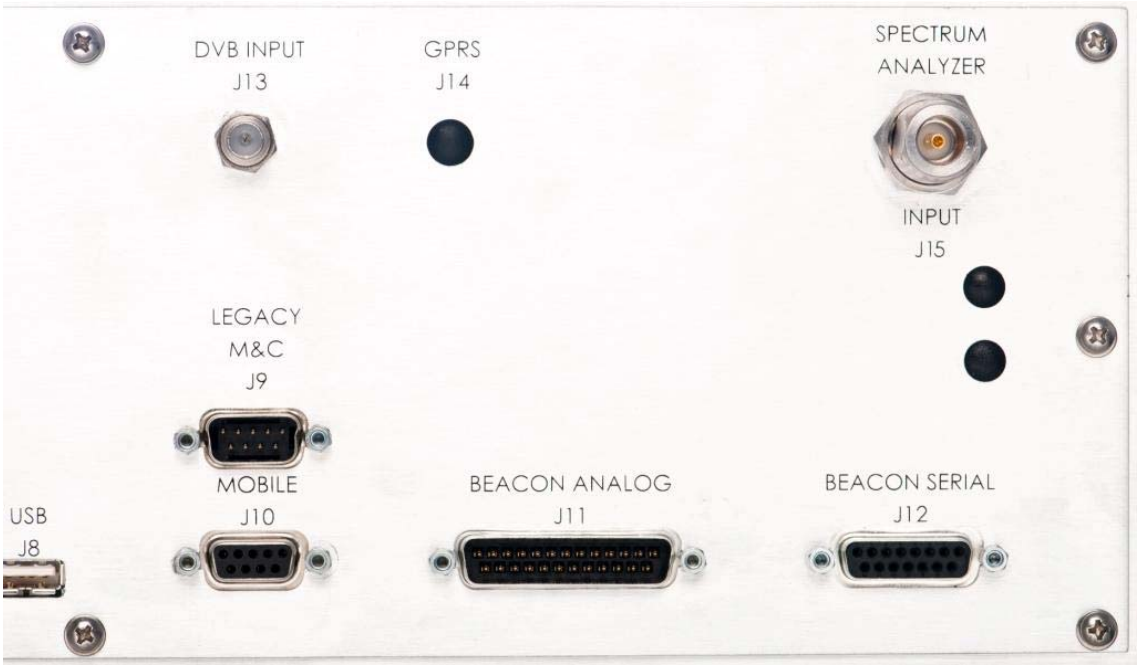

FIGURE 1-7: NGC BACK PANEL CONNECTORS, RIGHT HALF (W/ SPEC AN OPTION)

TABLE 1.7: NGC BACK PANEL CONNECTORS

Item	Function	Type	Description	Required Mating Connector
J1	+15VDC power	Power coaxial with locking screw	Interface to external power brick	*ASC Signal* P/N NGC-008 Power Supply
J2	+15VDC power	Power coaxial with locking screw	Interface to external power brick (redundant, optional)	*ASC Signal* P/N NGC-008 Power Supply
J3	Ethernet LAN	RJ45	Network interface	Standard RJ45
J4	Modem	RJ11	POTS modem interface	Standard RJ11 or RJ12
J5	Transmit Fiber	ST	100BaseFX link to ODU	Standard Type ST
J6	Receive Fiber	ST	100BaseFX link to ODU	Standard Type ST
J7	NGC Bus	IEC DIN connector	Serial bus for expansion equipment	*Amphenol-Tuchel Electronics* P/N C091 31H008 101 2
J8	USB	USB flat connector	USB for system control processor	Standard Type A USB plug or memory stick
J9	Legacy M&C	DB-9P	Legacy protocol	Standard Type D-Subminiature 9 socket female (receptacle). Example: *AMP/Tyco* P/N 5-747905-2
J10	Mobile	DB-9S	Dual RS-422 links for expansion	Standard Type D-Subminiature 9 Pin Male (Plug) connector. Example: *AMP/Tyco* P/N 5-747904-2
J11	Analog Beacon	DB-25P	Analog interface for beacon receiver, compatible with APC300 & APC400 pin-outs	Standard Type D-Subminiature 25 socket female (receptacle). Example: *AMP/Tyco* P/N 5-747913-2
J12	Serial Beacon	DB-15S	Serial interface, compatible with APC400	Standard Type D-Subminiature 15 Pin Male (Plug) connector. Example: *AMP/Tyco* P/N 5-747908-2
J13	DVB Input L-band	F-type		Standard Type F connector
J14	GPRS		Customer option	Not available at this time
J15	Spectrum analyzer input	N-type	Customer option	Standard Type N 50Ω male

1.4 NGC-IDU with Numbered Parts (internal)

WARNING: The following sections show the internal components of the NGC-IDU. This information is provided for use under guidance from *ASC Signal* service personnel only. Do not open IDU chassis unless directly instructed to do so by *ASC Signal* service personnel. Opening the IDU chassis without proper authorization may result in a voided warranty. Also, additional charges may apply to any subsequent repairs that are needed as a result of any unauthorized opening of the NGC-IDU chassis.

With the chassis lid removed, the internal components of the NGC-IDU can be seen.

Figure 1-8: NGC-IDU with Numbered Parts (Internal)

#	Part	Description	Reference Section
1	7579962	Rear Panel Interface PWA	Section 1.7
2	7579582	Embedded Spectrum Analyzer (Option)	Section 1.9
3	7579587	System Control Processor	Section 1.5
4	7544375	Embedded DVB-S Receiver (Option)	Section 1.10
5	7579590	Touch Panel Unit	Section 1.6
6	7579959	Keyboard Processor (KBCPU-1) PWA	Section 1.8.1
7	7579078	Keyboard PWA (KB-3)	Section 1.8.2

1.5 NGC-IDU System Control Processor (SCP)

The System Control Processor is a *Technologic Systems* TS-700 single board computer system. This item is supplied off-the-shelf, as-is, by the vendor. *ASC Signal* adds only software programs, an optional modem from the same manufacturer, and installs the unit in the chassis. This is a PC/104 compliant single board computer.

The TS-7300 is based upon the *Cirrus* EP9302 ARM9 CPU, which provides a standard set of on-board peripherals. The EP9302 features an ARM920T 200 MHz processor design with MMU. In addition, TS-7300 is powered with two SD Card flash sockets, one of which is used.

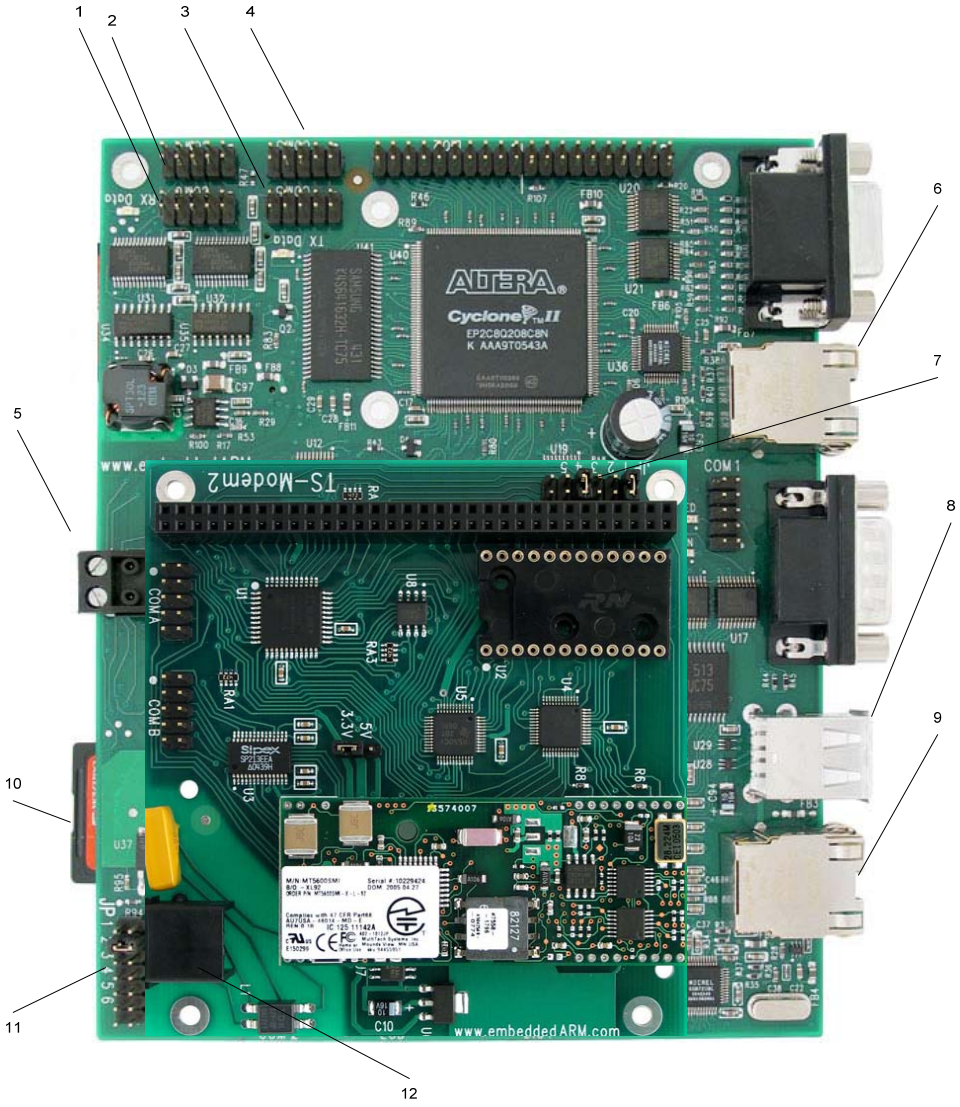

Figure 1-9: NGC-IDU SCP

#	Part	Name
1	COM6	RS-232 port. Not used
2	COM4	RS-232 port, DVB receiver option
3	COM5	RS-232 port, Keyboard CPU
4	COM3	RS-232 port, Legacy M&C protocol port (J9 on rear panel)
5	CN104	System +5VDC power
6	J2	Internal Ethernet LAN Network jack
7	JP1-JP5	Modem jumper set
8	J6	Dual USB jack
9	J5	External Ethernet LAN Network jack
10	CN4	SD Card socket. SD card contains system software. **NOTE:** SD Card must be supplied by ASC Signal. This card is not formatted for camera use or PC use. Do not remove unless directed to do so by *ASC Signal* support staff.
11	JP1-JP6	Jumpers
12	L1	Analog modem

Table 1.8: SCP LEDs

LED	Color	Name
"RED"	Red	CPU fault
"GREEN"	green	CPU run
"TX DATA"	green	Tx serial data
"RX DATA"	green	Rx serial data

Table 1.9: SCP Main Board Jacks & Plugs

Part	Function
CN1	COM2 serial port interface
CN104	System +5VDC power
CN301	COM1 serial port interface (Linux console)
CN303	COM3 serial port
CN304	COM4 serial port
CN305	COM5 serial port
CN306	COM6 serial port
CN9	VGA out (not used)
J2	Internal Ethernet LAN Network jack
J5	External Ethernet LAN Network jack
J6	Dual USB jack

Table 1.10: SCP Modem Jacks & Plugs

Part	Function
L1	POTS RJ-11 analog modem line

Table 1.11: SCP Main Board Jumpers

Part	Installed?	Function
JP1	No	Recovery bootstrap required. Do not install.
JP2	Yes	Enable serial console on COM1. Left installed.
JP3	No	Write-enable flash. Do not install. This flash is like the BIOS in a PC.
JP4	No	Console send to COM2. Do not install.
JP5	No	User jumper. If jumper is installed at power up, software will delete all data files, which causes system to be restored to a pre-factory state with no data files, configuration, and/or backup information. This may be used in extreme emergencies.
JP6	No	Fastboot jumper. Do not install. Installation will prevent NGC-IDU from working correctly.

Table 1.12: SCP Modem Jumpers

Part	Installed?	Function
JP1	No	COM port number selection
JP2	No	Not used
JP3	No	Not used
JP4	Yes	Interrupt selection
JP5	No	Interrupt selection

1.6 NGC-IDU Touch Panel Unit (TPU)

The Touch Panel Unit (TPU) is a *Technologic Systems* TS-7395 single board computer system with an integral 800x480 pixel 15-bit color graphics display. This item is supplied off-the-shelf, as-is, by the vendor. *ASC Signal* adds only an open-source software program and installs the unit in the front panel.

The TS-7395 CPU card has the following basic hardware features:

- Cirrus EP9302 200MHz ARM9 CPU running Debian 2.6 Linux
- On-board FPGA (5K LUT LatticeXP2 FPGA) with dedicated 8MiB RAM Framebuffer & 800x480 video core
- 128MiB DRAM
- 512MiB NAND flash memory
- 10/100BASE-T Ethernet port
- Dual full-speed USB ports (host)
- XY touch-screen interface

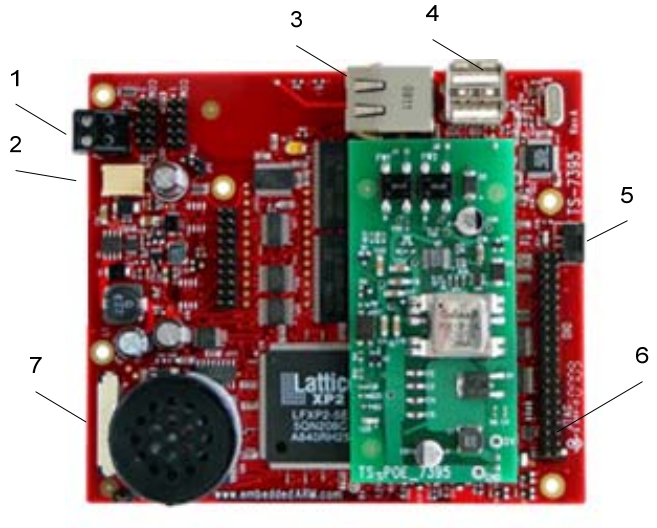

Figure 1-10: TS-7395 TPU CPU Card (picture may not be representative)

#	Part	Name
1	CN2	+12VDC power for TPU
2	n/a	Backlight power to LCD display
3	J5	100BaseT Ethernet LAN connector (RJ-45)
4	J6	Dual USB header
5	CN34	XY touch-screen interface cable
6	DIO	Diagnostic header, factory use only
7	CN4	LCD parallel display interface

Table 1.13: TPU LEDs

LED	Color	Name
D4	Red	Power on fault LED 2, fades off with power up. Will turn back on later
D5	Green	Power on fault LED 1, turns on with power up, turns off

Table 1.14: TPU Jacks & Plugs

Part	Function
CN2	5-28V Power In
CN34	XY touch-screen controller
CN4	LCD digital interface
J5	100BaseT Ethernet LAN connector (RJ-45)
J6	Dual USB connector

Table 1.15: TPU Jumpers

Part	Function
JP1	Boot from SD card, not used in the NGC-IDU. Do not install

1.7 NGC-IDU Real Panel Interface (RPI-6)

Rear Panel Interface (RPI-6) board provides nearly all external connections from NGC-IDU. RPI-6 contains beacon receiver interface, internal network switch, power distribution circuits, & support functions for chassis

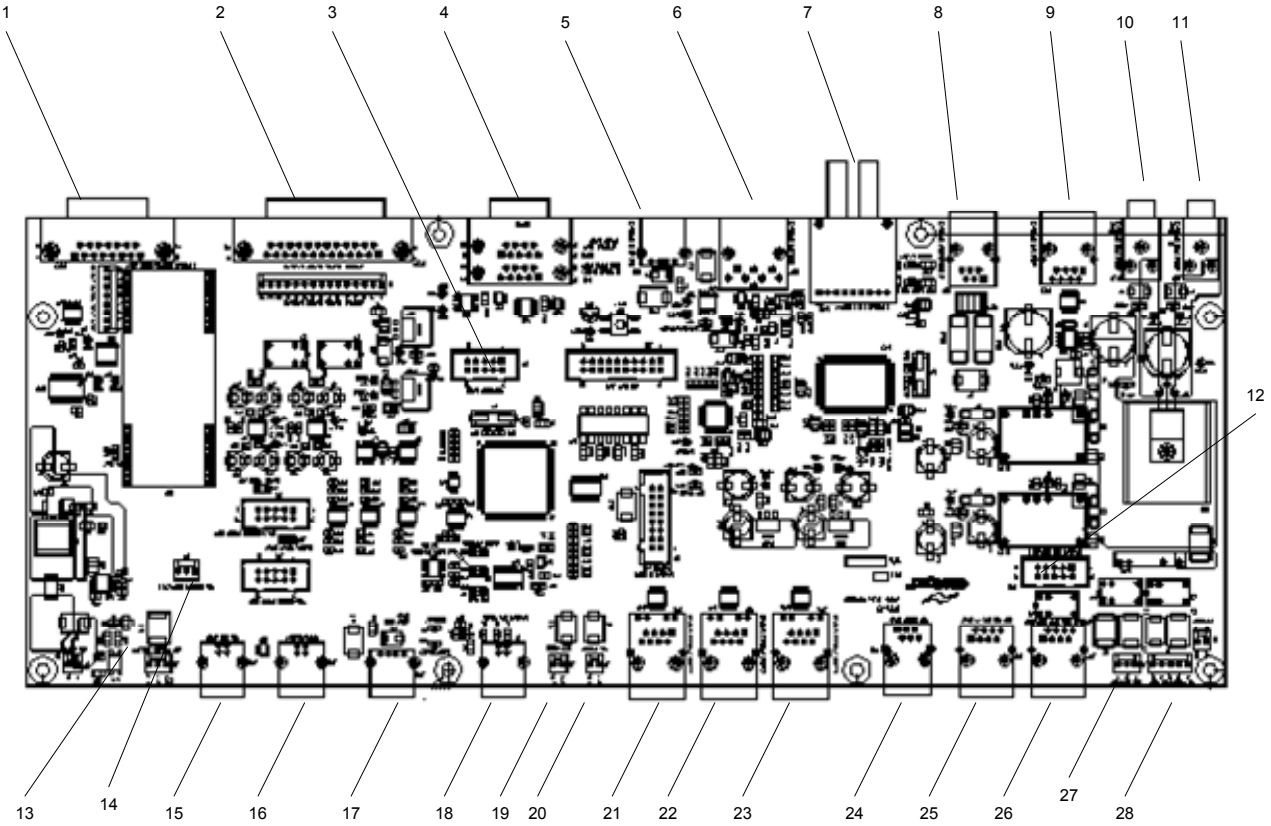

Figure 1-11: Rear Panel Interface (RPI-6) Board

#	Part	Name
1	RJ12	Beacon serial interface
2	RJ11	Beacon analog interface
3	J14	Legacy serial RS-232 connection to SCP
4	RJ910	Legacy serial to external connection, expansion serial ports
5	RJ8	Expansion USB
6	RJ7	NGC Bus
7	RJ5/RJ6	Fiber TX/RX
8	RJ4	Modem
9	RJ3	External LAN connection
10	RJ2	Secondary Power
11	RJ1	Primary Power
12	J26	Serial connection to control and monitor DVB receiver option
13	J9	KBCPU power/Standby
14	J17	TPU diagnostics
15	J19	TPU USB
16	J18	SCP USB
17	J20	Front Panel USB
18	J2	RPI-6 USB port
19	J6	SCP +5VDC power
20	J1	TPU +12VDC power
21	J23	TPU LAN
22	J24	Spectrum Analyzer LAN
23	J25	SCP LAN
24	J16	POTS modem to SCP
25	J12	External LAN
26	J27	DVB Serial Link
27	J5	DVB Power
28	J4	Expansion device power

Table 1.16: RPI-6 LEDs

LED	Color	Name
DS1	Green	USB link status. Used when JP1 is installed
DS2	Green	USB connection status. Used when JP1 is installed
DS3	Red	RPI-6 microprocessor fault
DS4	Green	RPI-6 microprocessor run
DS5	Green	+3.3V power rail status
DS6	Green	+15VDC primary raw power rail status
DS7	Green	+15VDC secondary raw power rail status
DS8	Green	+5VDC power status
DS9	Green	+3.3VDC analog power rail status
DS10	Green	+14.6V power rail status after diode OR from +15V inputs (unswitched)
DS11	Green	+12VDC power rail status
DS12	Green	+5VDC power rail status
DS13	Green	Future use (Wi-Fi RF link)
DS14	Green	Bus activity
DS15	Yellow	Internal RPI-6 processor link active (switch side)
DS16	Green	Internal RPI-6 processor link speed (switch side)
DS17	Yellow	Internal RPI-6 processor link active (processor side)
DS18	Green	Internal RPI-6 processor link speed (processor side)
DS19	Yellow	Fiber link active (to NGC-ODU)
DS20	Green	Fiber speed

Table 1.17: RPI-6 Jacks & Plugs

Part	Rear Panel Label	Location	Function
J1	None	Internal	Switches +12V DC power
J2	None	Internal	USB jack for software update
J3	None	Internal	Mirrors J11. Analog interface for internal beacon receiver option assembly
J4	None	Internal	Switched +5/+12VDC power for internal spectrum analyzer option assembly
J5	None	Internal	Switched +5/+12VDC power for internal DVB option assembly
J6	None	Internal	+5VDC power to System Control Processor PWA
J7	None	Internal	Contact closure for E-Stop button assembly option
J8	None	Internal	Switched +14.6VDC power rail for accessory power
J9	None	Internal	Standby/on/off power connection control from KBCPU; power supply to KBCPU, 1.5A@14.6VDC maximum
J10	None	Internal	Factory Use Only
J11	None	Internal	Internal beacon serial interface. Mirrors RJ12
J12	None	Internal	External LAN connection to SCP board (pass through to RJ3)
J13	None	Internal	Factory use only
J14	None	Internal	Internal interface to SCP COM3 RS232 serial port, used by legacy serial protocol on real panel's J9
J15	None	Internal	Factory use only
J16	None	Internal	Internal interface to POTS modem installed on SCP's PC-104 stack. Pass through to RJ4
J17	None	Internal	Diagnostic connection to TPU PWB
J18	None	Internal	Internal interface to USB port on SCP, with added +5VDC power.
J19	None	Internal	Internal interface to USB port on TPU PWA
J20	None	Internal	Internal interface to USB port on front panel, with added +5VDC power.
J21	None	Internal	Future use only
J22	None	Internal	NGC Bus Monitor port (TTL level)
J23	None	Internal Ethernet	TPU PWA network connection
J24	None	Internal Ethernet	Spectrum Analyzer Module network connection (optional)
J25	None	Internal Ethernet	SCP PWA network connection
J26	None	Internal	Internal interface to SCP COM4 RS232 serial port, used by DVB receiver option
J27	None	Internal	Serial connection to control and monitor DVB receiver option
RJ1	J1	External power	Primary +15VDC power supply from external P/S
RJ2	J2	External power	Secondary +15VDC power supply from external P/S (optional)
RJ3	J3	External LAN	External LAN connection to SCP board (pass through to J12)

Part	Rear Panel Label	Location	Function
RJ4	J4	External POTS	RJ11 connection to conventional analog phone line for remote diagnostic access
RJ5	J5	100BaseFX Fiber connection TX	Fiber connection to NGC-ODU or NGC-ODU-SRT
RJ6	J6	100BaseFX Fiber connection RX	Fiber connection from NGC-ODU or NGC-ODU-SRT
RJ7	J7	NGC bus	Serial/power bus for accessory expansion
RJ8	J8	USB	USB access for SCP. Reserved for future use.
RJ910	J9 & J10	Serial DB15 jacks	Expansion serial ports for future use
RJ11	J11	External DB25P	Beacon receiver analog interface. Analog interface has same pin-out as the analog interfaces on legacy ADU, APC300, & APC400 controllers & accessories.
RJ12	J12	External DB15S	Beacon receiver serial interface.

NOTE: jacks and plugs on RPI-6 board have PCB labels that differ slightly from the silkscreen on the IDU rear panel

Table 1.18: RPI-6 Switches

Part	Function
SW1	Reset switch. Momentary contact.

Table 1.19: RPI-6 Jumpers

Part	Function
JP1	USB load jumper. When installed, RPI-6 operates as USB flash drive for software update
JP2	Factory use only, do not install
JP3	Factory use only, do not install
JP4	Future use only, do not install
JP5	Factory use only, do not install
JP6	NGC bus 120 ohm termination select, do not install

Table 1.20: RPI-6 Test Points

Part	Function
TP1	Scaled analog voltage 1
TP2	Scaled analog voltage 2
TP3	Scaled analog voltage 3
TP4	Scaled analog voltage 4
TP5	Hardware reset line
TP6	+3.3VDC digital regulated power
TP7	+15VDC primary
TP8	+15VDC primary
TP9	+5VDC regulated power for digital supplies
TP10	+3.3VDC analog regulated power
TP11	Analog ground (beacon analog input)
TP12	+12VDC regulated power
TP13	+5VDC regulated power for analog-to-digital conversion
TP14	Digital ground
TP15	Beacon receiver serial interface transmit (TTL level)
TP16	Beacon receiver serial interface receive (TTL level)
TP17	RPI-6 internal serial port 0 receive (future use)
TP18	RPI-6 internal serial port 0 transmit (future use)
TP19	RPI-6 internal serial port 2 receive (future use)
TP20	RPI-6 internal serial port 2 transmit (future use)
TP21	NGC bus transmit enable
TP22	RPI-6 internal serial port 3 receive (future use)
TP23	RPI-6 internal serial port 3 transmit (future use)
TP24	+2.5VDC digital regulated power
TP25	+1.8VDC analog regulated power
TP26	+1.8VDC digital regulated power
TP27	RPI-6 internal MAC interrupt request

1.8 NGC-IDU Keyboard CPU (KBCPU-1) and Keyboard (KB-3)

The following sections cover boards, parts, and components related to the Keyboard (KB-3) and its related CPU (KBCPU-1) for the NGC-IDU.

1.8.1 KBCPU-1

The keyboard CPU, when combined with the KB-3 module, makes up a USB keyboard assembly. To the rest of the system, the USB keyboard is indistinguishable from an ordinary USB keyboard. Unlike the rest of the system, however, this board is always powered on while the chassis is plugged in. This allows the board to implement the soft power function.

The KBCPU-1 contains a microprocessor that implements the USB HID protocol, necessary circuits to implement the capacitive touch sensors for up to 30 keys on the keyboard, and a piezoelectric speaker to make sounds to signal key presses.

The KBCPU can also be started in a mode where it emulates a USB flash drive. This mode can be used to change the firmware in the KBCPU by drag-and-drop using an ordinary PC.

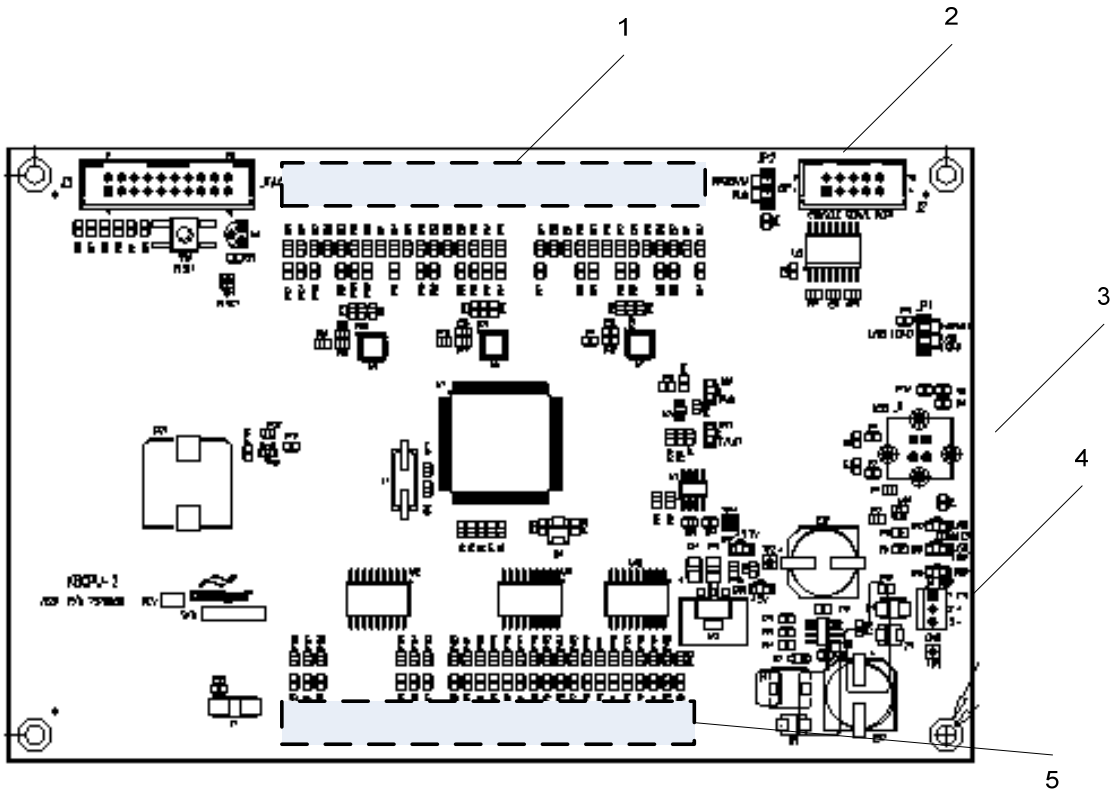

Figure 1-12: Keyboard CPU (KBCPU-1)

#	Part	Name
1	J5	Electrode interface to the Keyboard
2	J2	Serial port
3	J1	USB port used to connect to TPU
4	J4	Power/Standby
5	J6	LED interface to the Keyboard

Table 1.21: KBCPU-1 LEDs

LED	Color	Name
DS1	Green	USB link status. Used when JP1 is installed
DS2	Green	USB connection status. Used when JP1 is installed
DS3	Red	Microprocessor Fault
DS4	Green	Microprocessor Run
DS5	Green	Power
DS6	Green	+3.3VDC power rail

Table 1.22: KBCPU-1 Jacks & Plugs

Part	Function
J1	USB connection
J2	Serial port. This connects to SCP and is used to control the LEDs on the front panel of the unit
J3	JTAG port
J4	Power/Standby. The KBCPU is always powered when the unit is plugged in
J5	Electrode interface to the Keyboard
J6	LED interface to the Keyboard

Table 1.23: KBCPU-1 Switches

Part	Function
SW1	Reset switch. Momentary contact

Table 1.24: KBCPU-1 Jumpers

Part	Function
JP1	USB load jumper. When installed the RPI-6 powers in into a state where it operates as a USB flash drive for software update
JP2	Factory use only, do not install
JP3	Factory use only, do not install

Table 1.25: KBCPU-1 Test Points

Part	Function
TP1	Reset
TP2	+3.3VDC power
TP3	Digital Ground

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1.8.2 KB-3 Module

The keyboard, when combined with the KBCPU-1 module, makes up a USB keyboard assembly. The KB-3 has no active components except for multi-color LEDs.

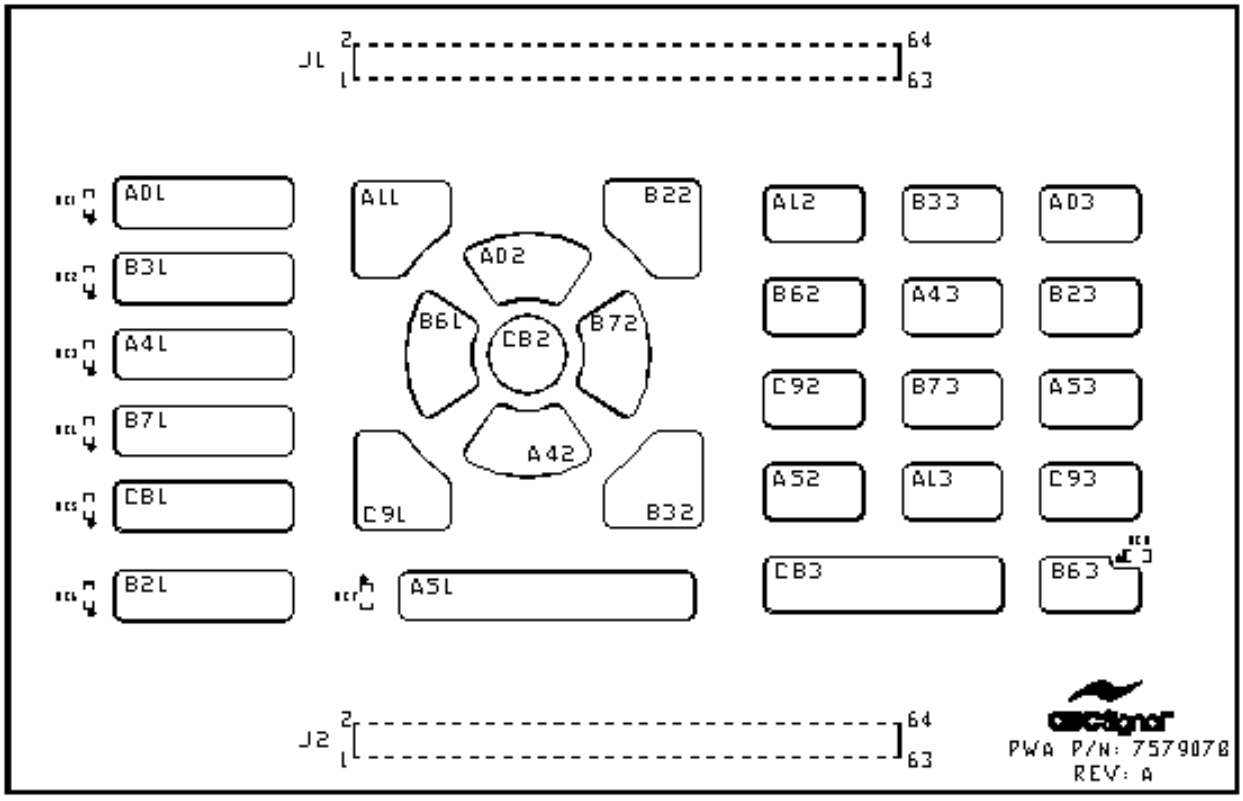

Figure 1-13: KB-3 Module

Table 1.26: Keyboard functions

Key	Legend	Function	Keyboard equivalent
A01	FAULT	Shortcut jump to fault screen	F3
A02	UP	Jog up/cursor up	Up
A03	3	Enter a 3	3
A11	PLUS/CW	Jog Pol clockwise/Enter a +/jog SRT out	+
A12	1	Enter a 1	1
A13	. (PERIOD)	Enter a period	.
A41	SIGNAL	Shortcut jump to Spectrum Analyzer screen	F5
A42	DOWN	Jog down/cursor down	Down
A43	5	Enter a 5	5
A51	JOG MODE	Toggle between jog enabled/disabled	F2
A52	0	Enter a 0	0
A53	DELETE	Delete character	DEL
B21	LCL/REM	Toggle between local and remote modes	F8
B22	MINUS/CCW	Jog Pol CCW/Enter a -/jog SRT in	-
B23	6	Enter a 6	6
B31	STANDBY	Stop all movement and tracking	F4
B32	HOME	Go to top of menu system	HOME
B33	2	Enter a 2	2
B61	LEFT	Jog Az CCW/move cursor left	Left
B62	4	Enter a 4	4
B63	POWER	Power	F9
B71	TRACKING	Shortcut jump to tracking status screen	F6
B72	RIGHT	Jog Az CW/move cursor right	right
B73	8	Enter an 8	8
C73	ENTER	Accept input	ENTER
C81	GOTO	Shortcut jump to select satellite screen	F7
C91	BACKSPACE	Backspace	BACKSPACE
C92	7	Enter a 7	7
C93	9	Enter a 9	9
CB2	BLUE	Goto	F1

Table 1.27: KB-3 LEDs

LED	Color	Name
DS1	Tricolor	Fault
DS2	Tricolor	Standby
DS3	Tricolor	Signal
DS4	Tricolor	Tracking
DS5	Tricolor	Goto
DS6	Tricolor	Local/Remote
DS7	Tricolor	Jog speed status
DS8	Tricolor	Power pilot LED

NOTE: See **Table 1.1** in this manual for specific LED color types, meanings, and descriptions

1.9 NGC-IDU Built-in Spectrum Analyzer (OPTION)

The optional spectrum analyzer provides signal measurement, display, and other functions. It is an *AVCOM of Virginia* RSA-2500B-SBS module.

Figure 1-14: Built-in Spectrum Analyzer

#	Part	Name
1	N/A	SMA jack for L-band input
2	N/A	Network RJ-45
3	N/A	Power jack

Table 1.28: Spectrum Analyzer Jacks and Plugs

Part	Function
SMA jack	L-band input from a cable connected to rear panel J15
USB jack	USB interface, no used
DB9	Serial port, not used
RJ-45	Internal LAN connection to the RPI-6.
Power jack	Accepts +14.6V power from the RPI-6 module

NOTE: The only LED on this part is the power indicator LED. There are no jumpers, test points, or other switches.

1.10 NGC-IDU Built In DVB-S Receiver (OPTION)

The optional DVB-S receiver provides signal measurement, display, and other functions. It is a vendor item, from *Horizon Global Electronics*, an HDSM satellite meter.
NOTE: DVB-S receiver is only capable of locking to DVB-S carriers. DVB-S2 carriers are not supported.

In the NGC-IDU, the receiver is turned off unless the current satellite in the Working Satellite Table has a defined DVB carrier.

The DVB-S receiver electronics consists of two modules, a tuner module and a main (demodulator) module. They are connected to each other using a *Molex* 98268-0155 Premo-Flex cable (ensure that when the ribbon cable is installed the contacts are on the correct side).

The following illustrations (**Figures 1-15** & **1-16**) show the components of the DVB-S receiver.

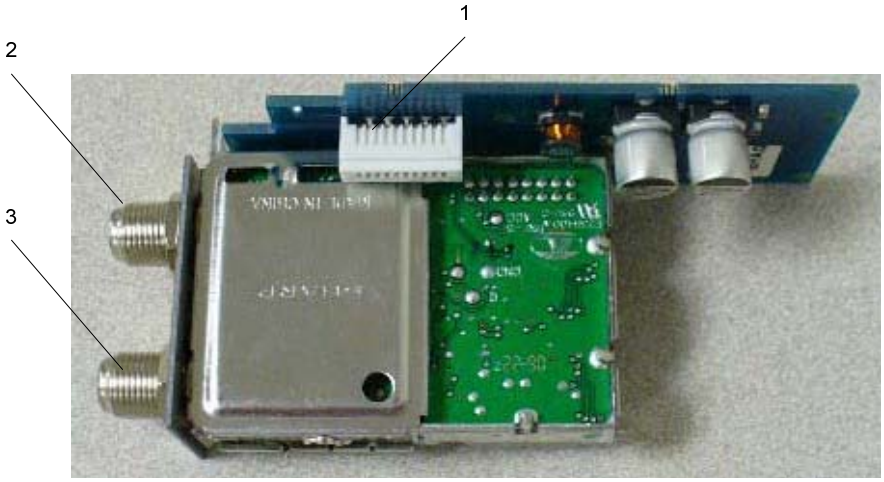

Figure 1-15: DVB-S Tuner Board

#	Part	Description
1	J101	Flex cable connector
2	n/a	L-band output (not used)
3	n/a	L-band input w/ 12VDC power bias. Connected to back panel through DC voltage block to remove DC bias

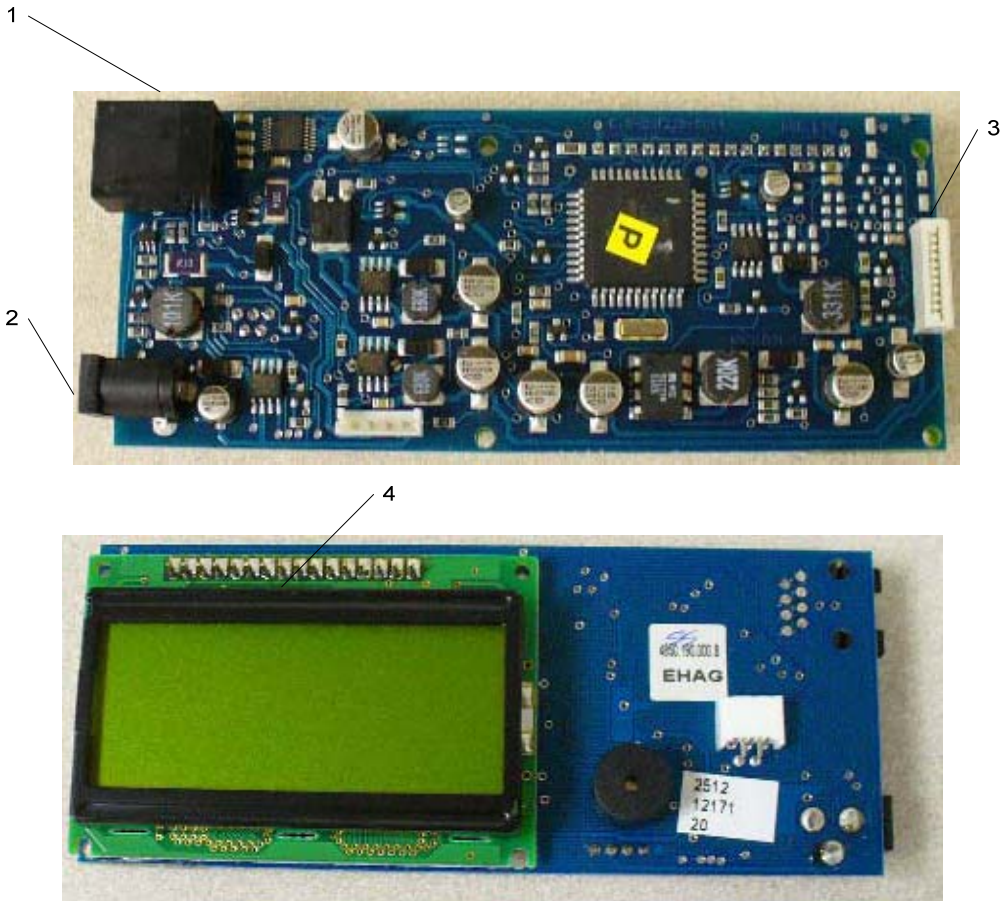

Figure 1-16: DVB-S Main/Demodulator Board

#	Part	Description
1	n/a	RJ-45 Serial/programming interface
2	n/a	Circular power jack (+12VDC in)
3	n/a	Flex cable connector
4	n/a	LCD display

NOTE: The only LED on this component is the power indicator LED. There are no jumpers, test points, or other switches.

1.11 Other options

The following sections deal with a number of miscellaneous, uncommon, and/or additional options for the NGC-IDU antenna controller.

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1.11.1 Rack Slides

Rack slides can be installed on the side of the unit for ease of mounting. Consult installation instructions.

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1.11.2 ESTOP switch

The NGC-IDU with option NGC-006 has a front panel ESTOP switch. When this switch is depressed, the NGC-IDU will stop the NGC-ODU from moving and refuse to accept any command that would move the antenna.

Please note that this ESTOP is not a substitute for the outdoor ESTOP switches, which are electrically interlocked. An NGC-IDU ESTOP will not prevent the handheld terminal from moving the antenna if it is connected to the NGC-ODU.

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1.11.3 External Keyboard (Customer-Supplied)

A standard PC keyboard can be plugged into the front panel to use for data entry. The NGC-IDU supports most standard business USB keyboards with US layout (QWERTY). Support for non-US keyboards has not been evaluated. ASC Signal cannot guarantee that any specific keyboard will work.

If this option is chosen, the Function Keys [F1 through F9] may be used to perform the following respective functions:

F1	F2	F3	F4	F5	F6	F7	F8	F9
BLUE (jog)	JOG MODE	FAULT	STAND BY	SIGNAL (spec an)	TRACKING	GOTO SAT SCREEN	LCL / REM	SOFT POWER

NOTE: the NGC-IDU does NOT support any non-QWERTY keyboard formats, such as AZERTY, QWERTZ, or QZERTY.

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1.11.4 External USB Jump Drive (Customer-Supplied)

External USB flash (jump) drives can be used for software update, configuration storage, data set updates, and other functions. The drive should be formatted as a conventional FAT32 volume. The NGC-IDU has been tested with many name-brand USB flash drives from *SanDisk*, *Lexar*, and other manufacturers.

The NGC-IDU cannot format these drives. Therefore, a *Windows* PC or similar computer must be used to perform any necessary formatting.

NOTE: many times these USB drives are formatted at the factory and normally this format will work just fine.

Compatibility Note: Some USB jump drives use non-standard methods to implement proprietary security or other features. These drives rely on the installation of specialized software device drivers so that *Windows* PCs can access them. The IDU will not recognize or support these drives.

Security Note: NGC-IDU software is not based on *Windows*, *MacOS*, or other common desktop operating systems. For this reason, it should not normally be susceptible to viruses such as Trojan horse programs, root kits, or other common security threats. While it is theoretically possible to target any system with malware, the odds of a compatible threat being developed and deployed for this system are extremely low.

1.12 External Beacon Receiver Connections

The NGC-IDU may be connected to a beacon receiver using either of two potential jacks, designated as **J11** and **J12**, which are located on the rear panel (see **Figures 1-5, 1-6,** & **1-7**) of the NGC-IDU.

J11: shown below in **Figure 1-17**, this jack acts as the analog port.

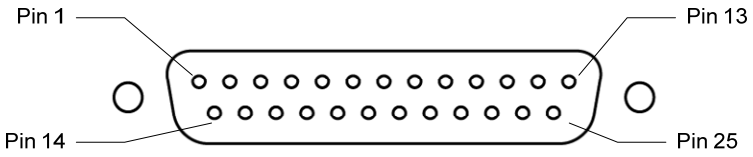

Figure 1-17: J11 Port

Table 1.29: J11 Pin-Out (analog beacon receiver interface)

Pin	Purpose	Comments
1	Analog 1+	Beacon input signal 0-10VDC
2	Analog 1-	Beacon input return 0VDC
3	Analog 2+	For future use only
4	Analog 2-	For future use only
5	N/C	
6	Aux Relay N.C.	Closed when beacon relay control normal
7	Aux Relay Common	Return for pins 8 and 8
8	Aux Relay N.O.	Closed when beacon relay control inverted
9	N/C	
10	Fault Relay N.C.	Closed when unacknowledged fault is not present
11	Fault Relay Common	Return for pins 10 and 12
12	Fault Relay N.O.	Closed when unacknowledged fault is present
13	Signal Ground	Signal ground
14	N/C	
15	N/C	
16	N/C	
17	N/C	
18	N/C	
19	N/C	
20	N/C	
21	N/C	
22	Analog 3+	For future use only
23	Analog 3-	For future use only
24	Analog 4+	For future use only
25	Analog 4-	For future use only

J12: shown below in Figure 1-18, this jack acts as the serial port.

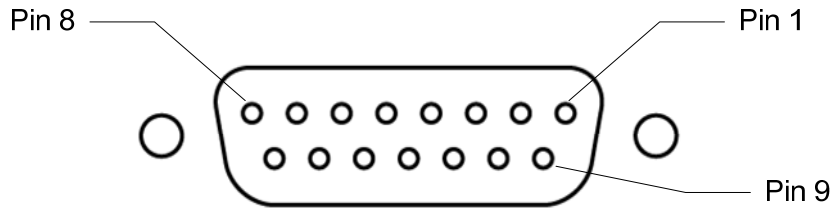

FIGURE 1-18: J12 PORT

TABLE 1.30: J12 PIN-OUT (RECEIVER SERIAL INTERFACE)

Pin	Purpose	Comments
1	RS422 RX+	Use with RS422 setting
2	RS422 RX-	Use with RS422 setting
3	RS422 TX -	Use with RS422 setting
4	RS422 TX +	Use with RS422 setting
5	RS232 TX	Use with RS232 setting
6	RS232 RX	Use with RS232 setting
7	Signal Ground	Ground
8	Signal Ground	Ground
9	N/C	
10	N/C	
11	N/C	
12	N/C	
13	N/C	
14	N/C	
15	N/C	

The NGC-IDU may be connected to the receiver using either one for both of these jacks. If only analog jack is connected, the IDU can use the analog voltage as a tracking source. If only serial port is connected, the IDU can often control the beacon receiver and also use the serial port for the tracking signal level. If both are connected, it can use both analog voltage and/or serial port based on user-selected option.

Supported beacon receivers include those listed in the following table:

TABLE 1.31: SUPPORTED BEACON RECEIVER MODELS

Manufacturer	Model	Notes
Atlantic Satellite	ASC3xx series	No restrictions
General Dynamics (Vertex)	VB-253	No restrictions
Miteq	BR-L	Serial interface is not recommended due to complexity
Novella	B30/B300-series	No restrictions

Any other beacon receiver with an analog output ranging from 0-10VDC can be used as well.

NOTE: The NGC-IDU supports an internal beacon receiver kit. If this kit is installed, it will preclude the use of the two external beacon receiver connectors. Connecting a beacon receiver to any of the pins on J11 or J12 except the alarm contacts will compromise the operation of both beacon receivers and could cause damage.

1.13 Network connection

The NGC-IDU may be connected to a wired LAN through CAT-5e patch cord connected to **J3** on the rear panel. This LAN connection conforms to 100BaseT standard. The NGC-IDU does not automatically sense transmit/receive, so installer must either use the proper cable or use the IDU with a switch that supports autosense.

Table 1.32: J3 RJ-45 Pin-Out

Pin	Function
1	TX+
2	TX-
3	RX+
4	No function
5	No function
6	RX-
7	No function
8	No function

See **Section 2.6** in this manual for instructions regarding NGC-IDU software.

1.14 Power Supplies

The input power for the NGC-IDU is a 15VDC, 6.7A maximum with a fuse. The NGC-IDU uses one or two external DC power bricks with a standard, detachable electrical cord.

OPTION: a second power supply can be plugged in & allowed to operate simultaneously with the primary power supply. If one power supply goes out, the other power supply will take over. When both power supplies are in proper working order, they will share the power load.

2.0 NGC-IDU Operation

The following sections will explain how to operate various functions of the NGC-IDU. Please note that the following NGC-IDU Menu Tree (**Figure 2-1**) is not intended to show every screen present in the system. The below menu tree simply illustrates the most significant and/or commonly encountered screens, up to three levels deep from the HOME/Main Menu screen.

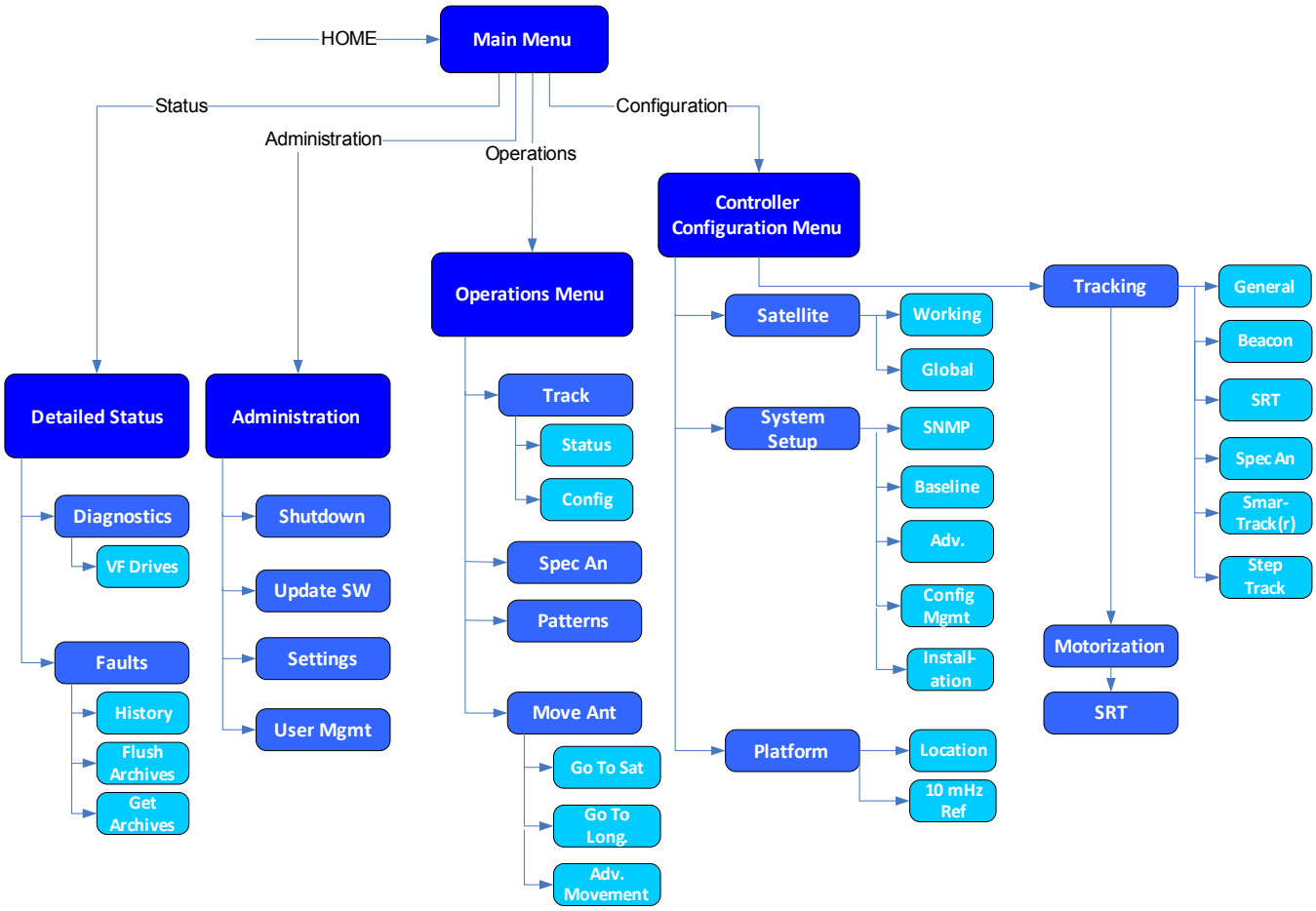

Figure 2-1: NGC-IDU Menu tree

2.1 Powering On & Off the NGC-IDU

⚠ **WARNING! PROVIDE ADEQUATE SURROUNDING SPACE FOR VENTILATION!** Take care not to cover vent or cooling hole/slot in side covers

The NGC-IDU is intended for indoor, controlled environment use only. Before you start-up the IDU, you MUST properly install and connect the system. For detailed instructions on installing the IDU, please refer to manual 7581695. For detailed instructions on installing the antennas motors, please refer to the Motor Kit Electrical Installation Instructions, document **7580540** (for both 208VAC & 380VAC).

To power **ON** the NGC-IDU**:**

- Press the Power Button (on bottom right of the NGC front panel).
- System should power on

NOTE: the LEDs of the NGC-IDU Front Panel will flash sequentially as the system boots up. This is nothing to worry about. Do not forget to **WAIT 90 SECONDS** for startup process to complete before attempting to operate the system.

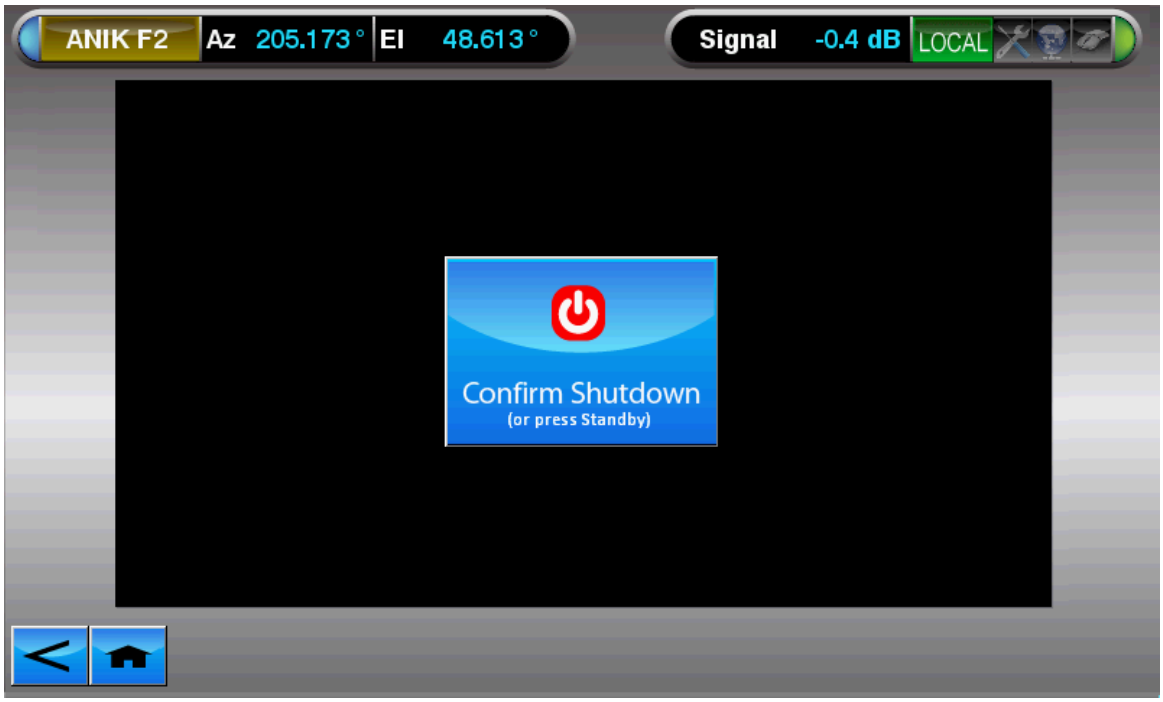

FIGURE 2-2: SHUTDOWN SCREEN

NOTE: **Before performing a shutdown** of the NGC-IDU, it is recommended that users refer to **Item #7** in **Figure 2-18** (see **Section 2.6** in this manual)

To power **OFF** the NGC-IDU:

Normal Shutdown (recommended)**:**

- **Press & release Power Button** on bottom-right of NGC-IDU front panel, which will bring up the **Confirm Shutdown** screen
- **Press Confirm Shutdown** in center of TPU (screen will **turn grey** & **begin 40 second countdown**)

NOTE: During shutdown, the screen may show "**SCP Lost Communication.**" Do not be concerned about this, as it is a **normal part of the NGC-IDU shutdown sequence.**

Touch Screen Shutdown (also recommended)**:**

- **HOME → Administration**
- From **Administration** screen, press **SHUTDOWN** navigation button at **bottom of screen**
- **CONFIRM SHUTDOWN** will appear. Press **CONFIRM SHUTDOWN** on touch screen

Forced Shutdown (allowed, but not recommended for shutdowns under normal conditions)**:**

- **Press & hold Power Button** (See **Figure 1-3**) for 6 seconds until system powers down
- The NGC-IDU will make a **continuous beeping sound**. This is **nothing to be concerned about.**

2.2 Touch-Screen Screen & Keys Breakdown

There are a number of keys, buttons, and key/button types that are regularly encountered while using the NGC-IDU. **Table 2.1** provides a basic rundown of what these keys/buttons are, where they are located, and (if applicable) how they may be used.

Table 2.1: Touch Screen Icons & Buttons

Image	Name	Description
	**HOME** (Bottom Button Ribbon)	Go to HOME screen (Main Menu)
	**SCREEN BACK ARROW** (Bottom Button Ribbon)	Go BACK to previous screen
	**PAGE BACK ARROW** (left side of screen)	Go BACK to previous page (PAGE NAVIGATION ONLY: will not navigate away from screen, which remains the same)
	**PAGE FORWARD ARROW** (right side of screen)	Go FORWARD to next page (PAGE NAVIGATION ONLY: will not navigate away from screen, which remains the same)
	**NAVIGATION BUTTONS** (Bottom Button Ribbon)	These rectangular blue buttons are found at bottom of the screen. These allow you to jump to a different screen. i.e., pressing the example button would take you to the CURRENT FAULTS/CONDITIONS screen.
	**ACTION BUTTONS** (commonly appear on either side of screen, commonly in grey margins)	These buttons are located at the side of the screen (usually the left side), and offer user actions. For example, the provided image would be for a "Log On" action.
	**RADIO BUTTON (GREEN)**	These buttons commonly appear to the right side of screens, when applicable. They change from a darker to lighter shade of Green when selected.
	**RADIO BUTTON (GREY)**	These buttons are commonly found at the bottom of the screen, in the same location (and usually in place of) Navigation Buttons. And like Navigation Buttons, they are also usually arranged in a Button Ribbon.
	**USB ICON**	Denotes that a USB device is currently plugged in to the NGC-IDU USB port. When present, this icon normally appears in the upper right hand corner of the screen.
	**TOGGLE BUTTON**	This button type is a scroll device that may be used to toggle between certain related screens. It can be used by touching the above or below screen options (the center is your current screen).
	**3-WAY ROCKER**	The 3-Way Rocker consists of the following elements: • Rocker text from top to bottom: Name of field, units (if applicable) and value. • Top third of rocker or '+': Press to increment value or through list of values. • Bottom third of rocker or '-': Press to increment value or through list of values. • Middle third of rocker: Press to bring up keyboard or list box to edit value.

NOTE: Tapping many of the graphics that appear on the NGC-IDU touch screen may redirect you to a related screen or allow you to "zoom in" on a particular field. For example, if a view of the Az Plot is shown on an area of the screen, tapping it will take you to the Az Plot screen.

2.2.1 Status Bar Breakdowns

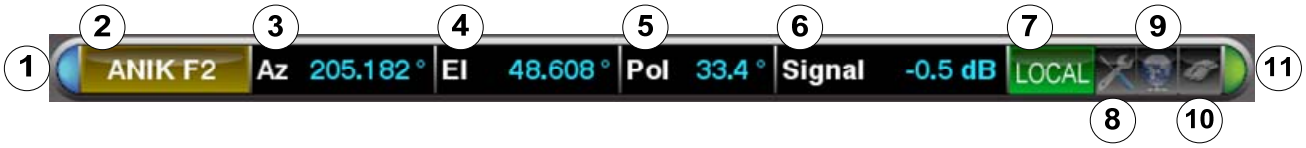

Figure 2-3a: Status Bar (Pol Drive Present)

#	Item	Description
1	Tracking LED	On (light blue) if antenna is tracking satellite. Off (dark blue) if antenna is not tracking.
2	Satellite Quick Menu	Current Satellite (i.e. satellite that according to the sat table is related to the current coordinates). If the current coordinates do not correspond to a bird this field will be blank. Tap to open dropdown Quick Menu (see **Section 2.2.3**).
3	Az	Current Azimuth or "ODU?" if ODU is disconnected
4	El	Current Elevation or "ODU?" if ODU is disconnected
5	Pol	Current Pol or "NA" if antenna does not have Pol drive or "ODU?" if ODU is disconnected
6	Signal	Current signal strength
7	Mode	Will show as Local, Remote, or Handheld. All configuration functions are available in Local, while most are disabled in other modes. Remote mode is only used if the SNMP agent is being utilized. Handheld cannot be chosen. It will appear when handheld unit is plugged into the ODU.
8	Hardware Faults	Illuminates RED for Hardware faults. Pressing it will take you to the Current Faults screen.
9	Network Faults	Illuminates RED for Network faults. Pressing it will take you to the Current Faults screen.
10	User Faults	Illuminates RED for User faults. Pressing it will take you to the Current Faults screen.
11	Connectivity to SCP (LED)	Shows status for SCP connection, illuminated as either GREEN for connected or RED for not connected

Figure 2-3b: Status Bar (Pol Drive Not Present)

#	Item	Description
1	Tracking LED	On (light blue) if antenna is tracking satellite. Off (dark blue) if antenna is not tracking.
2	Satellite Quick Menu	Current Satellite (i.e. satellite that according to the sat table is related to the current coordinates). If the current coordinates do not correspond to a bird this field will be blank. Tap to open dropdown Quick Menu (see **Section 2.2.3**).
3	Az	Current Azimuth or "ODU?" if ODU is disconnected
4	El	Current Elevation or "ODU?" if ODU is disconnected
5	Signal	Current signal strength
6	Mode	Will show as Local, Remote, or Handheld. All configuration functions are available in Local, while most are disabled in other modes. Remote mode is only used if the SNMP agent is being utilized. Handheld cannot be chosen. It will appear when handheld unit is plugged into the ODU.
7	Hardware Faults	Illuminates RED for Hardware faults. Pressing it will take you to the Current Faults screen.
8	Network Faults	Illuminates RED for Network faults. Pressing it will take you to the Current Faults screen.
9	User Faults	Illuminates RED for User faults. Pressing it will take you to the Current Faults screen.
10	Connectivity to SCP (LED)	Shows status for SCP connection, illuminated as either GREEN for connected or RED for not connected

2.2.2 Home Screen Breakdown

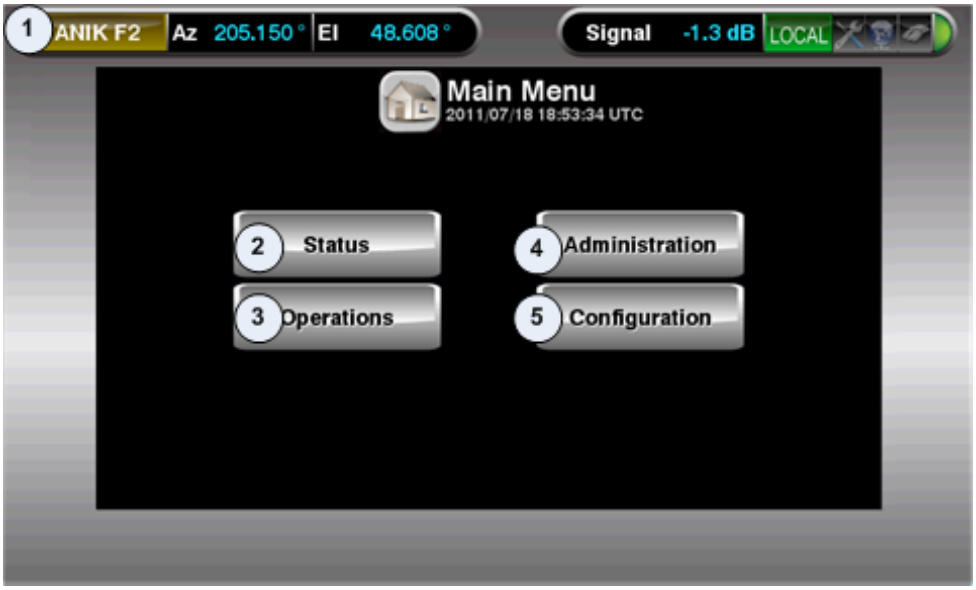

Figure 2-4: Home (Main Menu) Screen

#	Item	Description
1	Status Bar	See **Figures 2-3a – 2-3b** for detailed description of Status Bar types
2	Status	Go to Detailed Status screen
3	Operations	Go to Operations Menu screen
4	Administration	Go to Administration screen
5	Configuration	Go to Controller Configuration Menu screen

- - - - - - - - - - - - - -

2.2.3 Quick Menu Breakdowns

The NGC-IDU user interface offers two "Quick Menus," which can be accessed from most screens to jump to different screens or satellites without having to navigate from the Home Page. The first is the **Navigation Quick Menu**, which can be accessed by touching the Screen Title Icon and provides a list of screens. The second is the **Satellite Quick Menu**, which can be accessed by pressing **Item #2** in the **Status Bar** (**Figure 2-3a or 2-3b**).

Figure 2-5: Navigation Quick Menu

#	Item	Description
1	Screen Title Icon	Touching this icon will open the Navigation Quick Menu
2	Navigation Quick Menu	Once opened, you may jump to any screen by simply selecting it from the list. In order to choose a screen, be certain to keep your finger pressed on the desired section for a moment (this is done in order to prevent accidental selection)

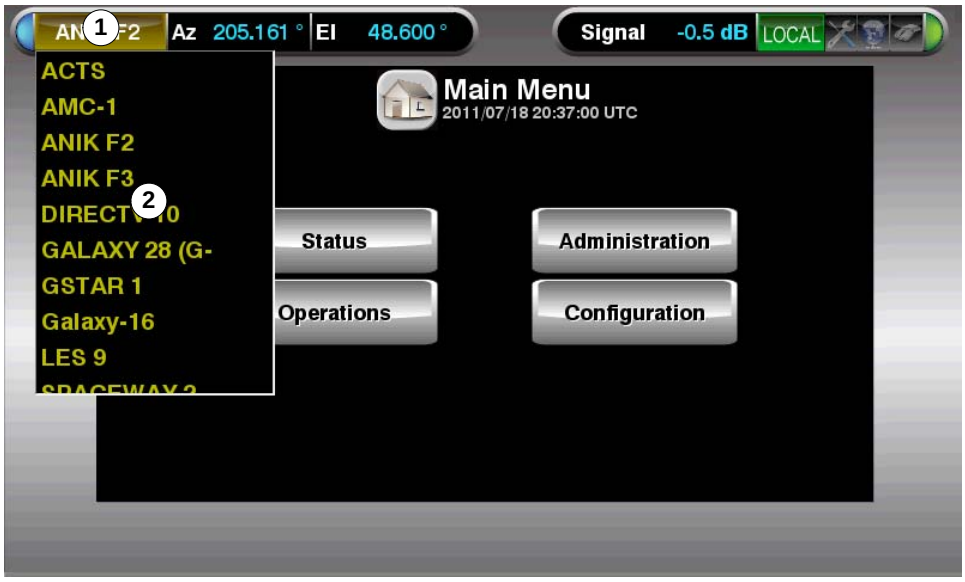

FIGURE 2-6: SATELLITE QUICK MENU

#	Item	Description
1	Satellite Indicator (on Status Bar)	Press here to open the Satellite Quick Menu
2	Satellite Quick Menu	Once opened, you may immediately change the Current Satellite by simply selecting it from the list. In order to choose a satellite, be certain to keep your finger pressed on the selection for a moment (this is done in order to prevent accidental selection).

2.3 ACCESS LEVELS

The NGC-IDU programming includes a basic security model of decreasing privilege. Each security level except monitor is identified by a password. When logging in, the user does not have to supply the intended level. For this reason, the passwords have to be unique for each level.

The four levels are Installer, Customer Administrator, Customer User, and Monitor.

TABLE 2.2: SECURITY ACCESS LEVELS

Security Level	Summary	Modification Privileges	Data View Privileges
Installer	Super user. Installed and commissions antenna.	Can modify installation parameters such as networking, pedestal configuration, loop control, redundancy configuration, etc.	None
Customer Admin	Power user. Tunes system.	Can modify everything lower levels can modify plus tracking parameters and satellite definitions	Cannot see higher level passwords
Customer User	Typical user. Maintains data sets, watches system.	Can modify volatile satellite data, antenna positions and current satellite; can move antenna, trigger redundancy	Cannot see installer-privileged data
Monitor	Locked system	Almost none	Highly limited

(There is one additional security level, Administrator, which is not covered by this document. This is the *ASC Signal* proprietary mode. It cannot be accessed by customers because it may be used to change the system serial number. Otherwise, it is identical to Installer.)

Path: **HOME → Administration → User Mgmt**.

The Installer password cannot be changed, and is locked as **JFQB23**.

The user changes the security level from the following path:

Path: **HOME → Administration →** press "**Log On**" action button

Security levels are persistent and survive power cycling.

The choice of what security level in which to leave the system is up to the discretion of customer. *ASC Signal* recommends choosing a level that best fits the specific circumstances and preferences of the Earth Station.

2.4 General Features of the Touch-screen

The following sections will cover some of the general user features of the NGC-IDU, such as the Screen Saver and shortcuts provided by the Front Panel Keyboard.

- - - - - - - - - - - - - -

2.4.1 Screen Saver

Path: **HOME (Main Menu) → Administration → Settings**

The above path will take navigate to the TPU Settings screen, where selections can be made between the Screen Saver settings ("ON" or "OFF").

NOTE: the NGC-IDU touch screen does not develop "screen burn," as one might experience with a CRT screen saver. LCDs do not "burn in." The NGC-IDU can develop temporary "memory" at times, which may resemble screen burn. However, this is not permanent and will wear off in a short period of time.

Keep the following points in mind regarding the NGC-IDU Screen Saver:

- The default setting for the Screen Saver is "OFF"
- The Screen Saver will activate after 15 minutes of not using the TPU (touch screen)
- Screen Saver can be deactivated at any time by simply touching the TPU screen or pressing any key/button on the front panel keypad
- The Screen Saver actually alternates between two screens: Status (**Figure 2-7a**) and Current Fault Summary (**Figure 2-7b**) screens

Figure 2-7a: Screen Saver 1 (Status screen)

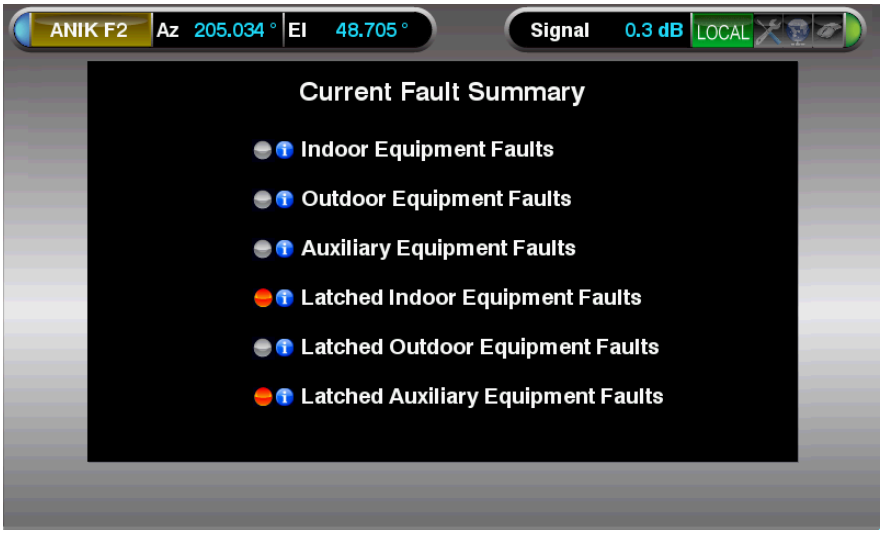

Figure 2-7b: Screen Saver 2 (Current Fault Summary screen)

2.4.2 Keyboard Shortcuts

In addition to the TPU touch screen interface, the NGC-IDU also comes equipped with a physical keyboard (found on the IDU front panel). These buttons provide the user with shortcuts to various screens and/or functions of the NGC-IDU, as explained below in **Figure 2-8**.

Figure 2-8: NGC-IDU Keyboard

#	Item	Description
1	Fault	Pressing this will take you to the Current Faults/Conditions screen
2	Standby	Takes you to the Movement screen
3	Signal	Takes you to the Spec An screen (if installed). This LED will grow brighter as signal strength increases and dimmer as the signal decreases.
4	Tracking	Takes you to the Tracking screen
5	GOTO	Takes you to the GoTo Satellite screen
6	LCL/REM	Toggle between Local and Remote modes
7	Jog Mode	Activate Jog Mode (Blue=OFF, Green=ON)
8	Back Arrow	Return to previous screen
9	HOME	Go to the HOME (Main Menu) screen
10	CW (+)	Jog Pol Clockwise (increase Pol value)
11	CCW (-)	Jog Pol Counterclockwise (decrease Pol value)
12	Jog Screen	Go to Jog screen
13	El Up	Jog Elevation UP
14	El Down	Jog Elevation DOWN
15	Az CCW	Jog Azimuth Counterclockwise
16	Az CW	Jog Azimuth Clockwise
17	Number Pad (0-9)	Used to input numeric values. In Jog Mode, use these to input Jog Speed: from 1=10% (slowest) to 9 = 90% (fastest). Note that choosing 0 = 0% Jog Speed, meaning the antenna will not jog
18	Delete	Delete selected field or value
19	Enter	Accept input of selected field or value
20	Power Button	Used to power ON/OFF the NGC-IDU

2.5 Checking Status

The following sections deal with system status screens for the TPU of the NGC-IDU.

- - - - - - - - - - - - - -

2.5.1 Detailed Status

Path: **HOME → Status**

There are a number of main detailed status screens (**Figures 2-9a** to **2-9d**), and an additional screen exclusive to SRT systems (**Figure 2-9e**). These screens provide status information that helps the user understand the state of the system.

Figure 2-9a: Detailed Status 1

#	Item	Description
1	Azimuth	Current Az angle. Same as status at top of screen & displayed in global coordinates
2	Elevation	Current El angle. Same as status at top of screen & displayed in global coordinates
3	Polarization	Current Pol angle. Same as status at top of screen & displayed in global coordinates
4	Latitude	Latitude of station on Earth. May/may not be editable depending on configuration. If system is "fixed" station, they usually can be edited. If "mobile" they cannot be edited, as they are supplied by the GPS. If GPS is provisioned on fixed system, fields will appear as editable, but editing them will not accomplish anything as the GPS reading will override any entered value. **NOTE:** Unless program tracking, it is not necessary to enter site's exact latitude & longitude. However, NGC system automatically calculates many satellite look angles if the site's exact latitude & longitude is entered.
5	Longitude	Longitude of the station on the surface of Earth **NOTE:** If you change latitude & longitude, look angles & Pol will be recalculated!
6	Altitude	Altitude of the station on the surface of Earth
7	Track Mode	Displays currently selected track mode. Pressing it brings up a screen which allows selection of various Track Mode functionalities
8	Track State	Indicates the compass reading.
9	Heading	This displays the True Heading, which corresponds to 0 degrees for platform Azimuth
10	GPS Status	AS-1 fault status is reported here (not used in fixed antennas, and status will display as "fixed") Possible values: No data from dev, no satellite fix, or fixed
11	GPS Quality	AS-1 quality is reported here (not used in fixed antennas). Possible values: good, marginal, or none
12	GPS Sat Count	GPS satellite count is reported here (not used in fixed antennas). Range: 0 to 12
13	Back Arrow	Return to previous screen
14	Home	Return to HOME screen
15	Diagnostics	Go to Diagnostics screen
16	Faults	Go to Current Faults/Conditions screen
17	Tracking	Go to Track Status screen

FIGURE 2-9B: DETAILED STATUS 2

#	Item	Description
1	SCP Storage	Amount of storage capacity currently ???
2	Roll	This displays the angle of the kingpost side-to-side—typically, around a vector pointing straight out from 180 degrees. Usually, this is set to 0.0
3	Pitch	This displays the angle of the kingpost side-to-side—typically, around a vector pointing straight out toward 90 degrees
4	Scan El Offset	Displays the distance between raster scans during acquisition assist. Parameter is used by TriFold® antennas only. Automatically calculated from 3dB beamwidth
5	Scan Pass Count	Displays max number of raster scans during acquisition assist. Parameter is used by TriFold® antennas only. Automatically calculated from 3dB beamwidth

FIGURE 2-9C: DETAILED STATUS 3

#	Item	Description
1	Compass Fault	Indicates whether or not the compass (if equipped) is operational

NOTE: This field may or may not be editable depending on system configuration; generally speaking, if the system is a "fixed" station it can be edited, and if a system is "mobile" it cannot be edited as it is supplied by the GPS. If a GPS is provisioned on a fixed system, the field appears as editable, but editing them will not accomplish anything as the GPS reading will override any entered value.

FIGURE 2-9D: DETAILED STATUS 4 (NO SRT PRESENT)

#	Item	Description
1	SRT Status	The current status of the SRT. If an SRT is present in your system, this will be indicated here (in the above example, note that the SRT is shown as "null" … this means the system in question does NOT have an SRT)
2	SRT X Limit	See **Figure 2-9e**
3	SRT Y Limit	See **Figure 2-9e**
4	Az Limit	Azimuth limit engaged, and what type (Hard or Soft, Off = limit not engaged)
5	El Limit	Elevation limit engaged, and what type (Hard or Soft, Off = limit not engaged)

NOTE: See **APPENDIX C, Table C.3** for Axis Limit Conditions

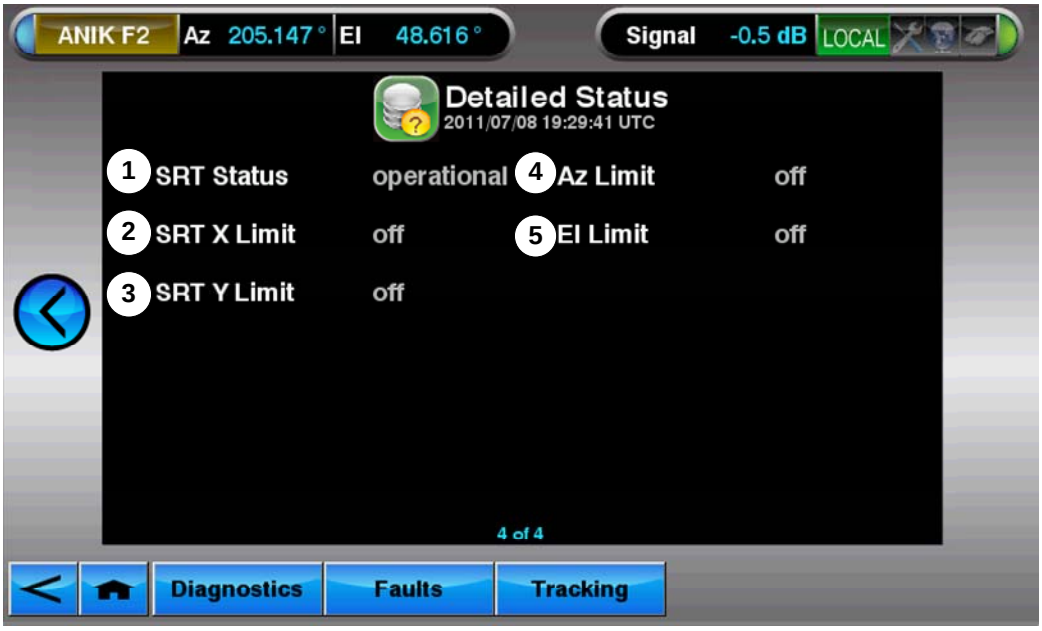

FIGURE 2-9E: DETAILED STATUS 4 (SRT PRESENT)

#	Item	Description
1	SRT Status	The current status of the SRT (for SRT systems only)
2	SRT X Limit	X axis limit engaged, and what type (Hard or Soft, Off = limit not engaged)
3	SRT Y Limit	Y axis limit engaged, and what type (Hard or Soft, Off = limit not engaged)
4	Az Limit	Azimuth limit engaged, and what type (Hard or Soft, Off = limit not engaged)
5	El Limit	Elevation limit engaged, and what type (Hard or Soft, Off = limit not engaged)

NOTE: See **APPENDIX C, Table C.3** for Axis Limit Conditions

2.5.2 Faults and Fault Logs

Path: **HOME → Status → Faults**

Figure 2-10: Current Faults/Conditions Screen

#	Item	Description
1	ACO	Alarm Cut off. Pressing this causes all active alarms to be acknowledged.
2	Clear Latched	Clear all displayed faults in Latched Faults Column
3	Active LEDs & Column	List of all active (unacknowledged) alarms
4	Latched LEDs & Column	List of all alarms registers since last Clear Latched
5	ACO LEDs & Column	List of all active acknowledged alarms
6	Get Archives	Jump to Retrieve Archives screen
7	Flush Archives	Go to Flush Archives screen
8	History	Go to Event History screen

Path: **HOME → Status → Faults → History**

Figure 2-11: Event History Screen

#	Item	Description
1	Clear Table	Clear all displayed events from Event History Table
2	Warning Column	Icon here indicates this alarm is major or minor and active: BLUE = minor, RED = major
3	Time	This column displays date and time of event. Sortable.
4	Message Column	Message explains type of event
5	Flags	SET = set, CLR = Clear, Min = Minor, Maj = Major, Cri = Critical, Info = Informational
6	Scroll Bar	Navigate up and down list of events. Also can be done by dragging finger across screen

2.5.3 Diagnostics

Path: **HOME → Status → Diagnostics**

The Diagnostics screens, reached from Detailed Status and then Diagnostics, are useful for isolating the root causes of any problems and parameters that are not reasonably grouped as other items.

The main screen shows some general information and provides several action and navigation buttons.

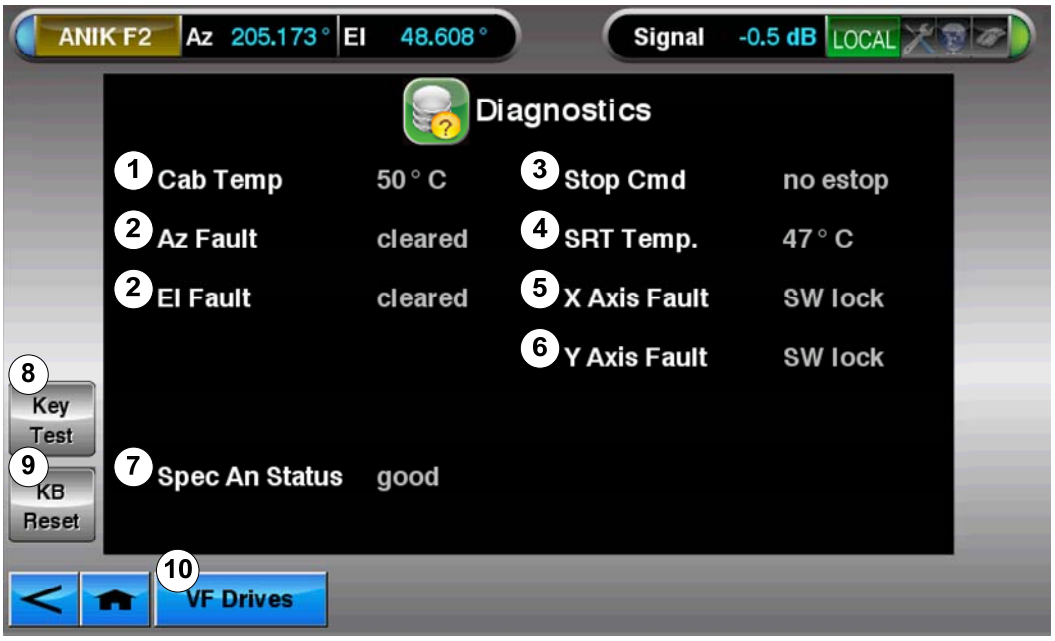

Figure 2-12: Diagnostics Screen

#	Item	Description
1	Cabinet Temperature	Current measured temperature in the ODU
2	Az Faults El Faults Pol Faults (not shown, but will be displayed if a Pol drive is installed)	These two fields show various fault situations as follows: • Cleared: fault has been cleared. • Timeout: movement took longer than normal due to a problem or obstruction • Overcurrent: movement caused current draw more than normal due to some problem or obstruction • Interlock: movement prohibited due to an open interlock • Feedback Failure: resolver failure / problem is present • Comm Bus Fault: Communication Bus failure indicated • Maintenance Mode: system is in Maintenance Mode
3	Stop Command	Indicates an ESTOP switch (option) has been activated. If ESTOP switch has been activated on the ODU system, "ESTOP" will be displayed as well.
4	SRT Temperature	(SRT systems ONLY) Monitored temperature of the SRT, in degrees Celsius
5	X Axis Fault	Displays any current X Axis faults in the SRT (if present)
6	Y Axis Fault	Displays any current Y Axis faults in the SRT (if present)
7	Spectrum Analyzer Status	Relays any internal problems with spectrum analyzer subsystem
8	Key Test	Used to access function check for Front Panel Keypad or keyboard plugged into the unit
9	KB Reset	Resets the keyboard
10	VF Drives	Jumps to diagnostic screen providing extremely detailed information from the VFD (see **Section 2.5.4**)

NOTE: Depending on the options and/or hardware of the system in question, this screen may display additional fields that are not shown in the above figure (i.e. Pol Fault, Z Axis Fault, etc.)

2.5.4 VFD Screens

Path: **HOME → Status → Diagnostics → VF Drives**

The VF Drives screen, reached from Detailed Status and then Diagnostics, offers a series of pages allowing access to various parameters and fields related to the Variable Frequency Drive

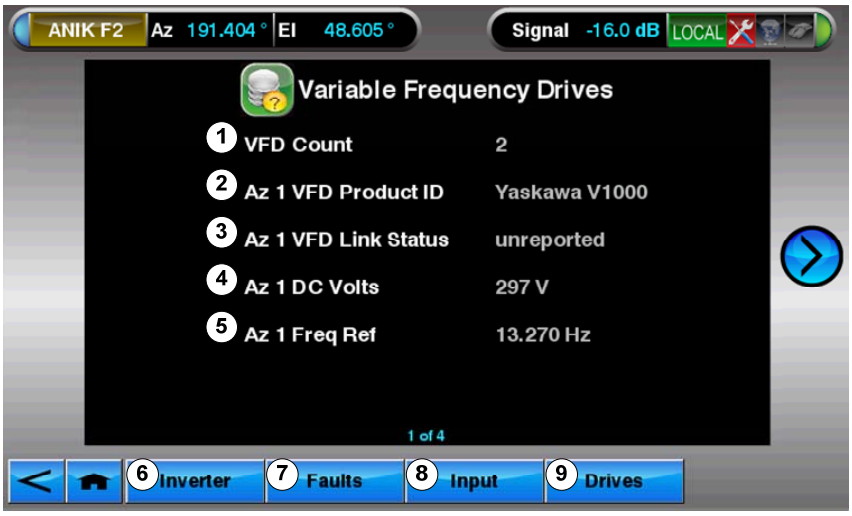

Figure 2-13a: VFD Main Screen 1

#	Item	Description
1	VFD Count	Number of Variable Frequency Drives present in the system
2	Az 1 VFD Product ID	Manufacturer product ID of the Azimuth 1 VFD
3	Az 1 VFD Link Status	Status of the Az 1 VFD Serial Link: reported = present; unreported = NOT present.
4	Az 1 DC Volts	DC Voltage of the Azimuth 1 VFD
5	Az 1 Freq Ref	External reference signal used to generate the Az 1 VFD Output Frequency
6	Inverter	Jump to VFD Inverter Status screen (see **Section 2.5.4.1**)
7	Faults	Jump to VFD Fault Contents screen (see **Section 2.5.4.2**)
8	Input	Jump to Input screen (see **Section 2.5.4.3**)
9	Drives	Jump to VFD Drive Status screen (see **Section 2.5.4.4**)

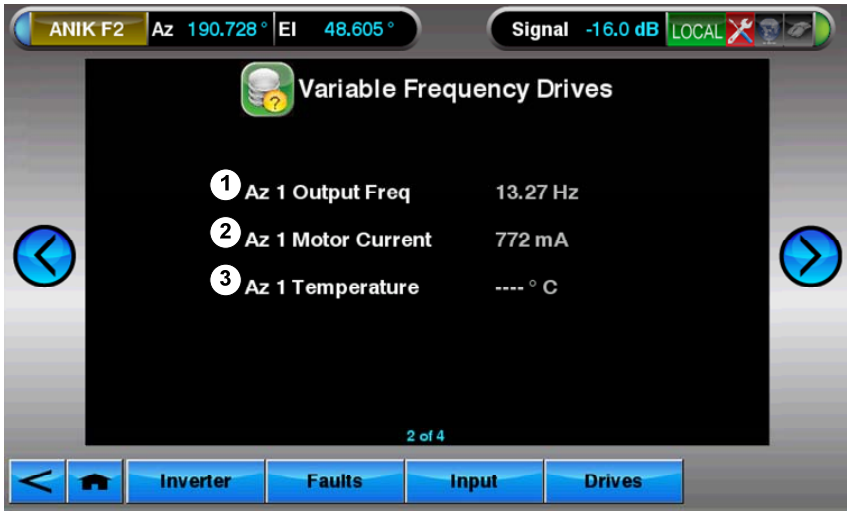

Figure 2-13b: VFD Main Screen (Page 2)

#	Item	Description
1	Az 1 Output Freq	Frequency/Speed at which the Az 1 VFD motor is commanded to move, measured in Hz
2	Az 1 Motor Current	Amount of electrical current used by the Az 1 VFD motor, measured in mA
3	Az 1 Temperature	Monitored temperature of the Az 1 VFD in degrees Celsius

FIGURE 2-13C: VFD MAIN SCREEN (PAGE 3)

#	Item	Description
1	El VFD Product ID	Manufacturer product ID of the Elevation VFD
2	El VFD Link Status	Status of the El VFD Serial Link: reported = present; unreported = NOT present.
3	El DC Volts	DC Voltage of the Elevation VFD
4	El Freq Ref	External reference signal used to generate the El VFD Output Frequency

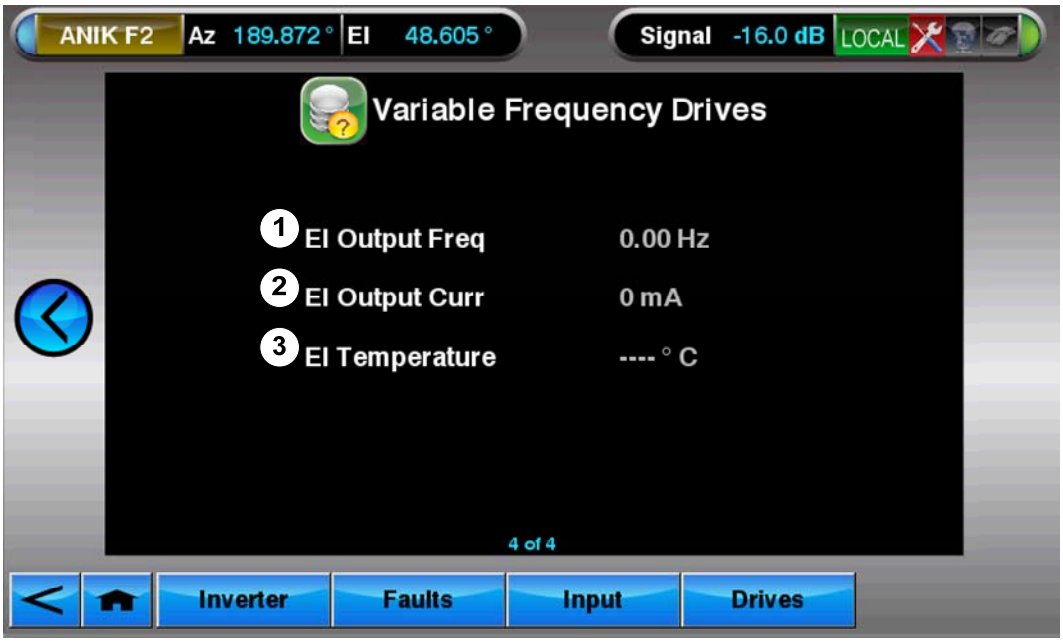

FIGURE 1-13D: VFD MAIN SCREEN (PAGE 4)

#	Item	Description
1	El Output Freq	Frequency/Speed at which the El VFD motor is commanded to move, measured in Hz
2	El Motor Current	Amount of electrical current used by the El VFD motor, measured in mA
3	El Temperature	Monitored temperature of the Elevation VFD in degrees Celsius

2.5.4.1 VFD Inverter Status Screens

Path: **HOME → Status → Diagnostics → VF Drives → Inverter**

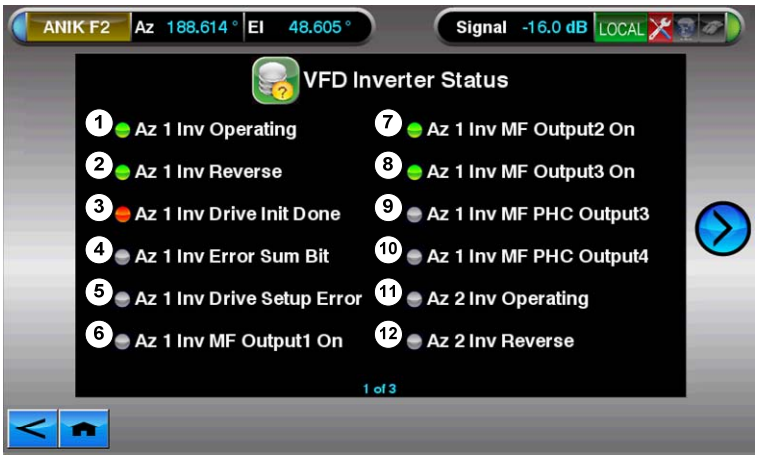

Figure 2-14a: VFD Inverter Status 1

#	Item	Description
1	Az 1 Inv Operating	Indicates whether the Az 1 VFD is operating
2	Az 1 Inv Reverse	Indicates whether the Az 1 VFD motor is moving in the reverse direction
3	Az 1 Inv Drive Init Done	Indicates whether the Az 1 VFD Drive has been initialized
4	Az 1 Inv Error Sum Bit	Indicates a fault within the Az 1 VFD
5	Az 1 Inv Drive Setup Error	Data Setting error has occurred somewhere in the Az 1 VFD
6	Az 1 Inv MF Output1 On	Terminal MA/MB-MC contact output
7	Az 1 Inv MF Output2 On	Photocoupler output 1
8	Az 1 Inv MF Output3 On	Photocoupler output 2
9	Az 1 Inv MF PHC Output3	**G7** only: Photocoupler output 3 (V1000: reserved)
10	Az 1 Inv MF PHC Output4	**G7** only: Photocoupler output 4 (V1000: reserved)
11	Az 2 Inv Operating	Indicates whether the Az 2 VFD is operating
12	Az 2 Inv Reverse	Indicates whether the Az 2 VFD motor is moving in the reverse direction

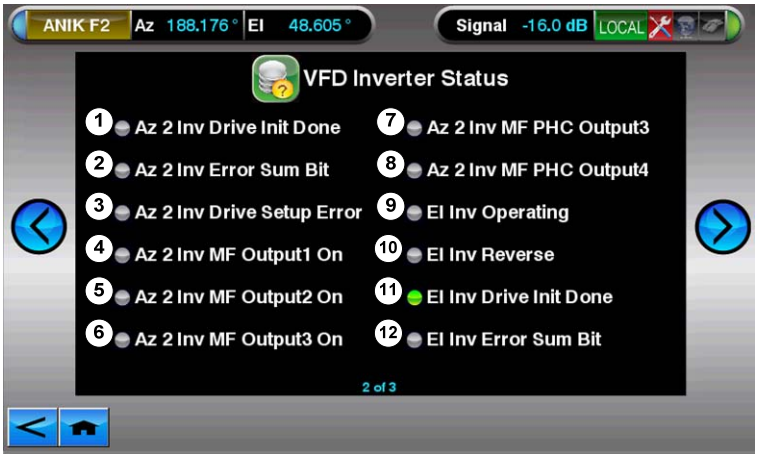

Figure 2-14b: VFD Inverter Status (Page 2)

#	Item	Description
1	Az 2 Inv Drive Init Done	Indicates whether the Az 2 VFD has been initialized
2	Az 2 Inv Error Sum Bit	Indicates a fault within the Az 2 VFD
3	Az 2 Inv Drive Setup Error	Data Setting error has occurred somewhere in the Az 2 VFD
4	Az 2 Inv MF Output1 On	Terminal MA/MB-MC contact output
5	Az 2 Inv MF Output2 On	Photocoupler output 1
6	Az 2 Inv MF Output3 On	Photocoupler output 2
7	Az 2 Inv MF PHC Output3	**G7** only: Photocoupler output 3 (V1000: reserved)
8	Az 2 Inv MF PHC Output4	**G7** only: Photocoupler output 4 (V1000: reserved)
9	El Inv Operating	Indicates whether the El VFD is operating
10	El Inv Reverse	Indicates whether the El VFD motor is moving in the reverse direction
11	El Inv Drive Init Done	Indicates whether the El VFD Drive has been initialized
12	El Inv Error Sum Bit	Indicates a fault within the El VFD

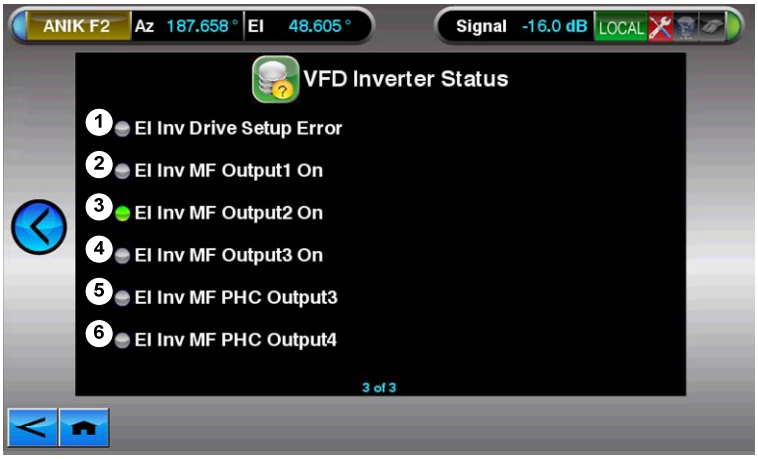

FIGURE 2-14C: VFD INVERTER STATUS (PAGE 3)

#	Item	Description
1	El Inv Drive Setup Error	Data Setting error has occurred somewhere in the El VFD
2	El Inv MF Output1 On	Terminal MA/MB-MC contact output
3	El Inv MF Output2 On	Photocoupler output 1
4	El Inv MF Output3 On	Photocoupler output 2
5	El Inv MF PHC Output3	NOT USED in El VFD
6	El Inv MF PHC Output4	NOT USED in El VFD

- - - - - - - - - - - - - -

2.5.4.2 VFD FAULT CONTENTS SCREENS

Path: **HOME → Status → Diagnostics → VF Drives → Faults**

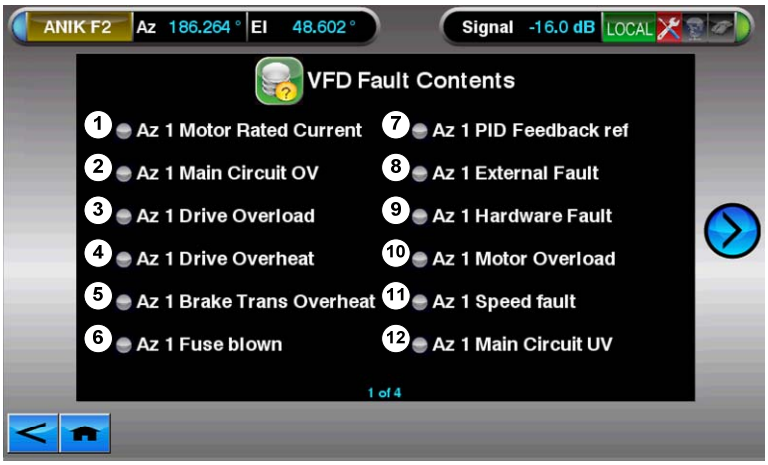

FIGURE 2-15A: VFD FAULTS CONTENTS 1

#	Item	Description
1	Az 1 Motor Rated Current	Az 1 Overcurrent or Ground fault reported
2	Az 1 Main Circuit OV	Az 1 Main Circuit Overvoltage fault
3	Az 1 Drive Overload	Az 1 Drive Overload Fault
4	Az 1 Drive Overheat	Az 1 Drive Overheat Warning fault
5	Az 1 Brake Trans Overheat	Az 1 Dynamic Braking Transistor fault
6	Az 1 Fuse Blown	Az 1 Blown Fuse reported
7	Az 1 PID Feedback ref	Az 1 PID Feedback Loss fault
8	Az 1 External Fault	Az 1 External fault reported
9	Az 1 Hardware Fault	Az 1 Hardware fault reported
10	Az 1 Motor Overload	Az 1 Motor Overload fault
11	Az 1 Speed Fault	Az 1 Overspeed or Excessive Speed Deviation fault
12	Az 1 Main Circuit UV	Az 1 Main Circuit Undervoltage fault

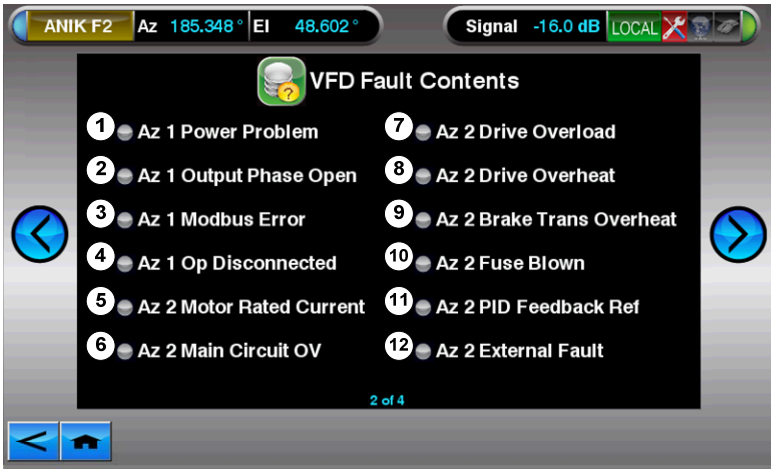

FIGURE 2-15B: VFD FAULTS CONTENTS (PAGE 2)

#	Item	Description
1	Az 1 Power Problem	Az 1 Power Supply Undervoltage or Soft Charge Circuit fault
2	Az 1 Output Phase Open	Az 1 Output Phase Loss
3	Az 1 Modbus Error	Az 1 Modbus Communication error
4	Az 1 Op Disconnected	Az 1 Operator Connection Fault
5	Az 2 Motor Rated Current	Az 2 Overcurrent or Ground fault reported
6	Az 2 Main Circuit OV	Az 2 Main Circuit Overvoltage fault
7	Az 2 Drive Overload	Az 2 Drive Overload Fault
8	Az 2 Drive Overheat	Az 2 Drive Overheat Warning fault
9	Az 2 Brake Trans Overheat	Az 2 Dynamic Braking Transistor fault
10	Az 2 Fuse Blown	Az 2 Blown Fuse reported
11	Az 2 PID Feedback ref	Az 2 PID Feedback Loss fault
12	Az 2 External Fault	Az 2 External fault reported

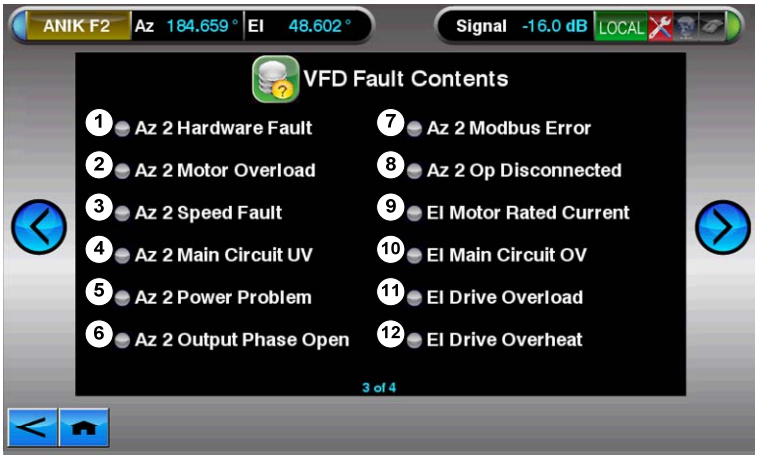

FIGURE 2-15C: VFD FAULTS CONTENTS (PAGE 3)

#	Item	Description
1	Az 2 Hardware Fault	Az 2 Hardware fault reported
2	Az 2 Motor Overload	Az 2 Motor Overload fault
3	Az 2 Speed Fault	Az 2 Overspeed or Excessive Speed Deviation fault
4	Az 2 Main Circuit UV	Az 2 Main Circuit Undervoltage fault
5	Az 2 Power Problem	Az 2 Power Supply Undervoltage or Soft Charge Circuit fault
6	Az 2 Output Phase Open	Az 2 Output Phase Loss
7	Az 2 Modbus Error	Az 2 Modbus Communication error
8	Az 2 Op Disconnected	Az 2 Operator Connection Fault
9	El Motor Rated Current	El Overcurrent or Ground fault reported
10	El Main Circuit OV	El Main Circuit Overvoltage fault
11	El Drive Overload	El Drive Overload fault
12	El Drive Overheat	El Drive Overheat Warning fault

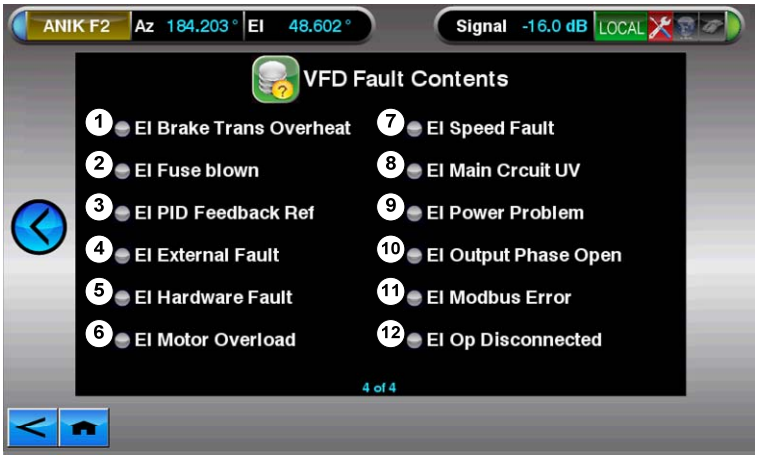

FIGURE 2-15D: VFD FAULTS CONTENTS (PAGE 4)

#	Item	Description
1	El Brake Trans Overheat	El Dynamic Braking Transistor fault
2	El Fuse Blown	El Blown Fuse reported
3	El PID Feedback ref	El PID Feedback Loss fault
4	El External Fault	El External fault reported
5	El Hardware Fault	El Hardware fault reported
6	El Motor Overload	El Motor Overload fault
7	El Speed Fault	El Overspeed or Excessive Speed Deviation fault
8	El Main Circuit UV	El Main Circuit Undervoltage fault
9	El Power Problem	El Power Supply Undervoltage or Soft Charge Circuit fault
10	El Output Phase Open	El Output Phase Loss
11	El Modbus Error	El Modbus Communication error
12	El Op Disconnected	El Operator Connection Fault

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2.5.4.3 VFD INPUT SCREENS

Path: **HOME → Status → Diagnostics → VF Drives → Input**

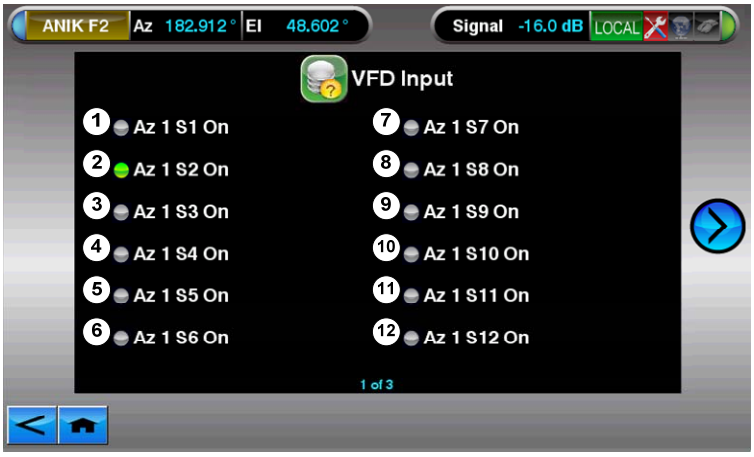

FIGURE 2-16A: VFD INPUT 1

#	Item	Description
1	Az 1 S1 On	Az 1 VFD Terminal S1 closed
2	Az 1 S2 On	Az 1 VFD Terminal S2 closed
3	Az 1 S3 On	Az 1 VFD Terminal S3 closed
4	Az 1 S4 On	Az 1 VFD Terminal S4 closed
5	Az 1 S5 On	Az 1 VFD Terminal S5 closed
6	Az 1 S6 On	Az 1 VFD Terminal S6 closed
7	Az 1 S7 On	Az 1 VFD Terminal S7 closed
8	Az 1 S8 On	Az 1 VFD Terminal S8 closed
9	Az 1 S9 On	Az 1 VFD Terminal S9 closed
10	Az 1 S10 On	Az 1 VFD Terminal S10 closed
11	Az 1 S11 On	Az 1 VFD Terminal S11 closed
12	Az 1 S12 On	Az 1 VFD Terminal S12 closed

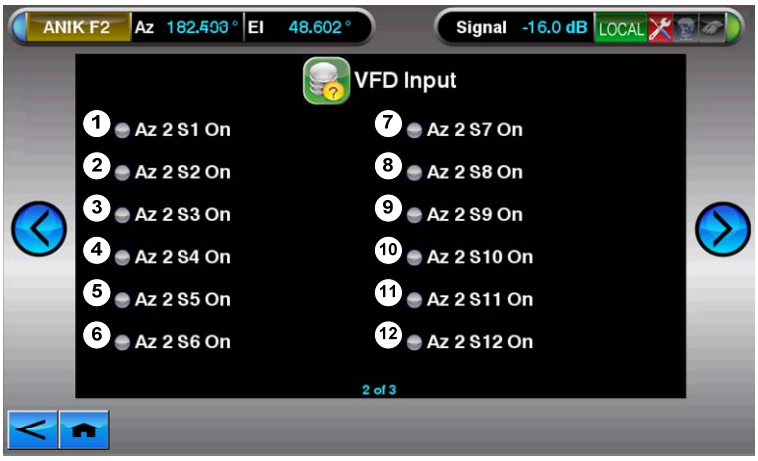

FIGURE 2-16B: VFD INPUT (PAGE 2)

#	Item	Description
1	Az 2 S1 On	Az 2 VFD Terminal S1 closed
2	Az 2 S2 On	Az 2 VFD Terminal S2 closed
3	Az 2 S3 On	Az 2 VFD Terminal S3 closed
4	Az 2 S4 On	Az 2 VFD Terminal S4 closed
5	Az 2 S5 On	Az 2 VFD Terminal S5 closed
6	Az 2 S6 On	Az 2 VFD Terminal S6 closed
7	Az 2 S7 On	Az 2 VFD Terminal S7 closed
8	Az 2 S8 On	Az 2 VFD Terminal S8 closed
9	Az 2 S9 On	Az 2 VFD Terminal S9 closed
10	Az 2 S10 On	Az 2 VFD Terminal S10 closed
11	Az 2 S11 On	Az 2 VFD Terminal S11 closed
12	Az 2 S12 On	Az 2 VFD Terminal S12 closed

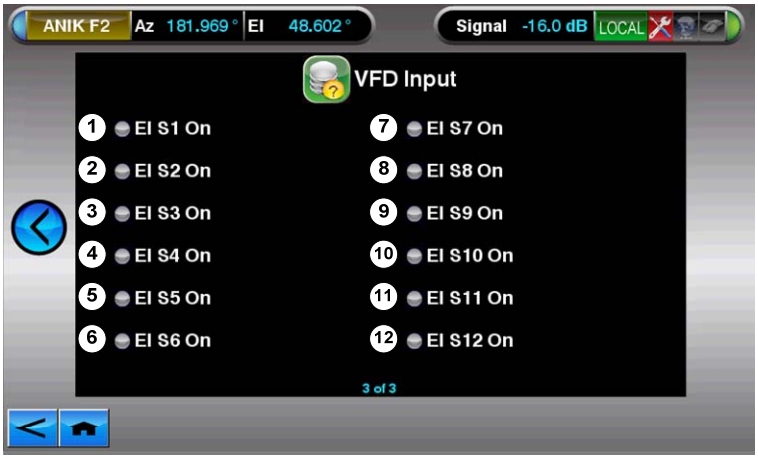

FIGURE 2-16C: VFD INPUT (PAGE 3)

#	Item	Description
1	El S1 On	El VFD Terminal S1 closed
2	El S2 On	El VFD Terminal S2 closed
3	El S3 On	El VFD Terminal S3 closed
4	El S4 On	El VFD Terminal S4 closed
5	El S5 On	El VFD Terminal S5 closed
6	El S6 On	El VFD Terminal S6 closed
7	El S7 On	El VFD Terminal S7 closed
8	El S8 On	El VFD Terminal S8 closed
9	El S9 On	El VFD Terminal S9 closed
10	El S10 On	El VFD Terminal S10 closed
11	El S11 On	El VFD Terminal S11 closed
12	El S12 On	El VFD Terminal S12 closed

2.5.4.4 VFD Drive Status Screens

Path: **HOME → Status → Diagnostics → VF Drives → Drives**

Figure 2-17a: VFD Drive Status 1

#	Item	Description
1	Az 1 Operating	Az 1 VFD operating
2	Az 1 Zero SPD	Az 1 Zero Speed
3	Az 1 Freq Matched	Az 1 Speed Agreement
4	Az 1 User SPD Matched	Az 1 User Speed Agreement
5	Az 1 Freq Detected 1	Az 1 Frequency Detection 1
6	Az 1 Freq Detected 2	Az 1 Frequency Detection 2
7	Az 1 Startup Complete	Az 1 Drive Ready
8	Az 1 Low Voltage	Az 1 Undervoltage detected
9	Az 1 Baseblock	Az 1 Baseblock detection
10	Az 1 Freq Ref Flt	Az 1 Frequency Reference from operator keypad
11	Az 1 Run Cmd Flt	Az 1 Run Command from operator keypad
12	Az 1 Overtorque	Az 1 Overtorque detected

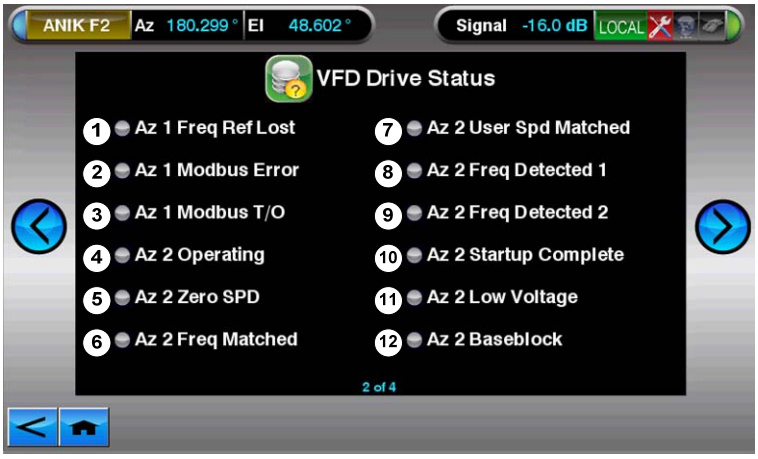

Figure 2-17b: VFD Drive Status (Page 2)

#	Item	Description
1	Az 1 Freq Ref Lost	Az 1 Frequency Reference Loss detected
2	Az 1 Modbus Error	Az 1 Modbus error detected
3	Az 1 Modbus T/O	Az 1 Modbus timeout fault
4	Az 2 Operating	Az 2 VFD operating
5	Az 2 Zero SPD	Az 2 Zero Speed
6	Az 2 Freq Matched	Az 2 Speed Agreement
7	Az 2 User SPD Matched	Az 2 User Speed Agreement
8	Az 2 Freq Detected 1	Az 2 Frequency Detection 1
9	Az 2 Freq Detected 2	Az 2 Frequency Detection 2
10	Az 2 Startup Complete	Az 2 Drive Ready
11	Az 2 Low Voltage	Az 2 Undervoltage detected
12	Az 2 Baseblock	Az 2 Baseblock detection

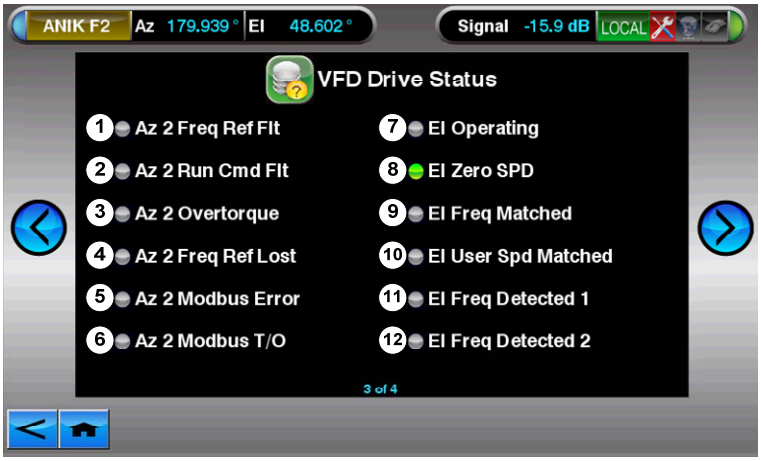

FIGURE 2-17C: VFD DRIVE STATUS (PAGE 3)

#	Item	Description
1	Az 2 Freq Ref Flt	Az 2 Frequency Reference from operator keypad
2	Az 2 Run Cmd Flt	Az 2 Run Command from operator keypad
3	Az 2 Overtorque	Az 2 Overtorque detected
4	Az 2 Freq Ref Lost	Az 2 Frequency Reference Loss detected
5	Az 2 Modbus Error	Az 2 Modbus error detected
6	Az 2 Modbus T/O	Az 2 Modbus timeout fault
7	El Operating	El VFD operating
8	El Zero SPD	El Zero Speed
9	El Freq Matched	El Speed Agreement
10	El User Spd Matched	El User Speed Agreement
11	El Freq Detected 1	El Frequency Detection 1
12	El Freq Detected 2	El Frequency Detection 2

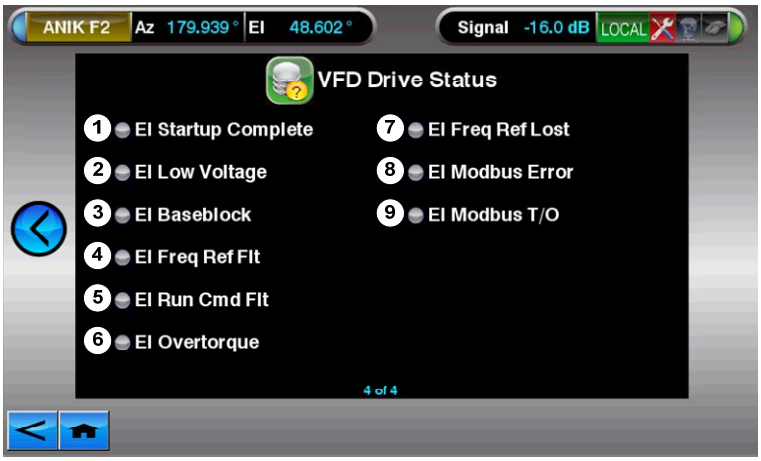

FIGURE 2-17D: VFD DRIVE STATUS (PAGE 4)

#	Item	Description
1	El Startup Complete	El Drive Ready
2	El Low Voltage	El Undervoltage detected
3	El Baseblock	El Baseblock detection
4	El Freq Ref Flt	El Frequency Reference from operator keypad
5	El Run Cmd Flt	El Run Command from operator keypad
6	El Overtorque	El Overtorque detected
7	El Freq Ref Lost	El Frequency Reference Loss detected
8	El Modbus Error	El Modbus error detected
9	El Modbus T/O	El Modbus timeout fault

2.6 Administration Functions

Path: **HOME → Administration**

Figure 2-18: Administration Screen

#	Item	Description
1	User Access Level	The current access level, as already described in this manual. The displayed access level is dependent upon which password has been used to access the system.
2	SCP Version	The current used version of SCP software
3	TPU Version	The current used version of TPU software
4	Goto View ID	Many screens have a View Code, which may be entered in this field in order to Shortcut to that screen. The View Code for any screen can be found in the SCREEN INFO box, which may be reached by holding down the HOME button for more than 5 seconds.
5	Log On	Pressing this button will bring up the virtual keyboard, allowing you to enter the appropriate password (unique to access level). Any incorrect passwords entered will be ignored and the most current access level will remain unchanged.
6	Log Off	Pressing this will reduce the Access Level down to “monitor,” which will restrict the user to basic status information. Also, the menu structure will be limited to general user operations.
7	Sync System	Pulls all RAM to permanent memory (used in cases of emergency hardware removal or shutdowns)
8	Shutdown	Commence shutdown [“Confirm Shutdown” icon will appear]
9	Update SW	Go to Update Software screen
10	Settings	Go to TPU Settings screen
11	User Mgmt	Go to User Management screen

2.6.1 Update Software Screen

Path: **HOME → Administration → Update SW**

Figure 2-19: Update Software Screen

#	Item	Description
1	SW Update Source	This field allows you to choose between either the Internet or a File as a source, from which you will retrieve software updates for installation. The content and appearance of the "File Path" fields (below) and the "Update" action buttons (to the left) will change in order to match what you select in this field.
2	SCP SW File/URL Path	Configurable path (File or URL, depending on what source is chosen) to SCP .deb file
3	TPU SW File/URL Path	Configurable path (File or URL, depending on what source is chosen) to TPU .deb file
4	Update SCP	Update the System Control Processor
5	Update TPU	Update the TPU (touch screen)

Other issues to keep in mind regarding the "Update Software" feature:

- The Update Software feature is disabled for the *Microsoft Windows* version of the GUI software
- Use of the Update Software feature is also disabled for copies of the GUI that run on a TPU which is not native to the same box of the SCP to which it is connected
- Use of the URL/Internet Update feature will require a connection to the Internet as well as a fairly forgiving firewall. A firewall that is too restrictive may prevent you from using of this feature.

2.7 Operations Functions

The following sections will cover screens related to the various operational functions of the NGC-IDU.

Path: **HOME → Operations**

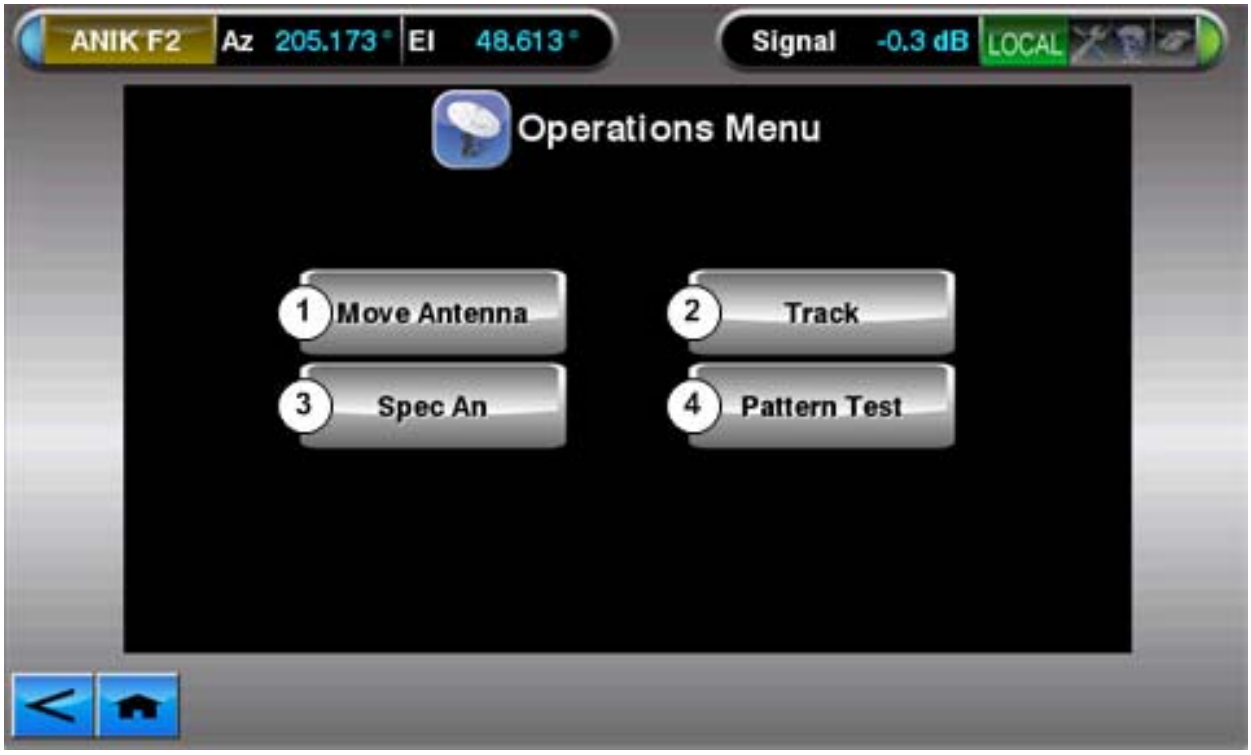

Figure 2-20: Operations Menu Screen

#	Item	Description
1	Move Antenna	Jumps to the Jog Screen (see **Section 2.7.2.2**)
2	Track	Brings up Track Configuration Screen (see **Section 2.8**)
3	Spec An	Brings up Spectrum Analyzer Screen (see **Section 2.7.3**)
4	Pattern Test	Brings up Pattern Screen

2.7.1 Tracking Operation

For more detailed instructions on starting and stopping Tracking Operations, refer to **Section 3.7** in this manual.

Path: **HOME → Operations → Track**

The tracking operation screen allows basic control and monitoring of tracking operations.

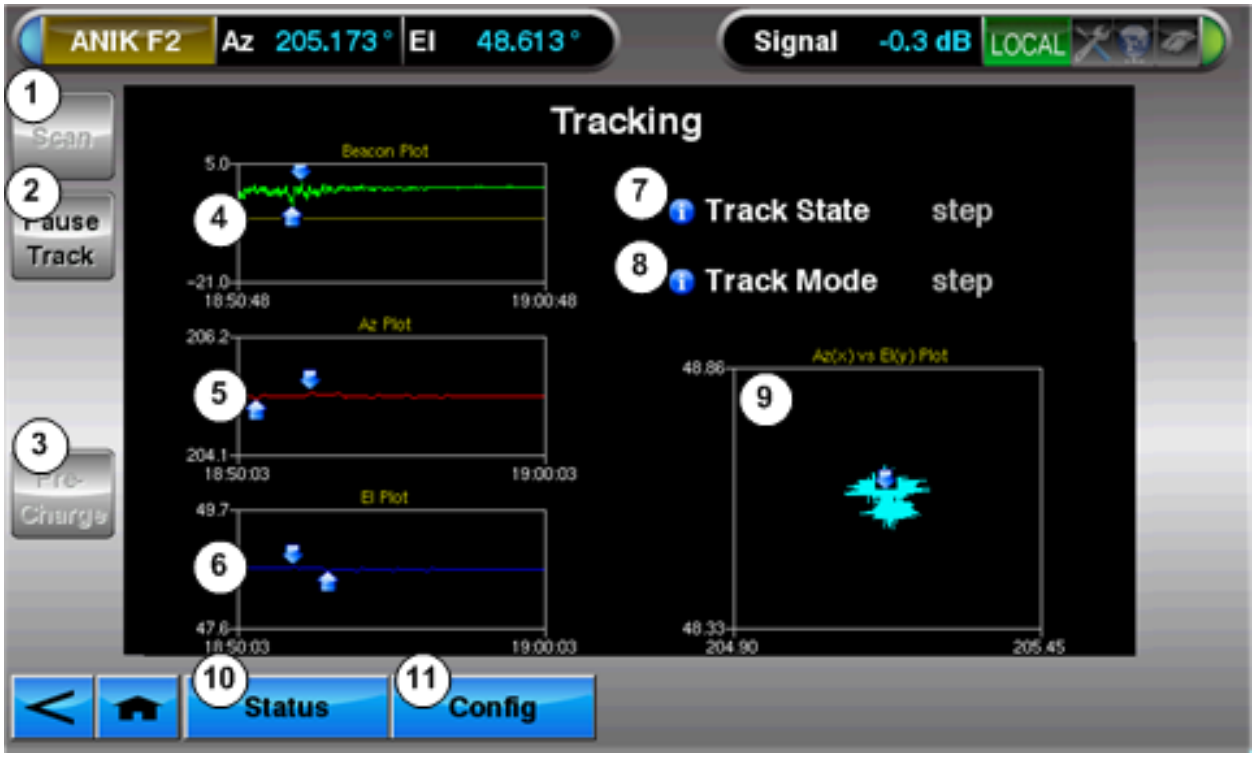

Figure 2-21: Tracking Screen

#	Item	Description
1	Scan	Initiates a spiral scan to attempt to find the satellite automatically.
2	Pause/Resume track	Tells the system to attempt to pause or resume the selected tracking mode. Button changes between Pause & Resume based on current status
3	Pre-charge	For adaptive predictive track modes like SmarTrack®, tells the system to attempt to resume selected tracking mode and use historical data to pre-charge the tracking model.
4	Beacon plot	Time strip-chart of beacon signal over the last ten minutes. Touch this area to zoom in.
5	Az plot	Time strip-chart of Az over the last ten minutes. Touch this area to zoom in.
6	El Plot	Time strip-chart of El over the last ten minutes. Touch this area to zoom in.
7	Track State	Summary of the current tracking state.
8	Track Mode	Current selected tracking mode. Editable, but only when Track is paused.
9	Az vs El Plot	XY plot of Az and El for current satellite over the history of position log. Touch this to zoom in.
10	Status	Goes to a lower level tracking status menu
11	Config	Goes to a tracking configuration menu, see **Section 2.8.3**

2.7.1.1 Track Status Menu

Path: **HOME → Operations → Track → Status**

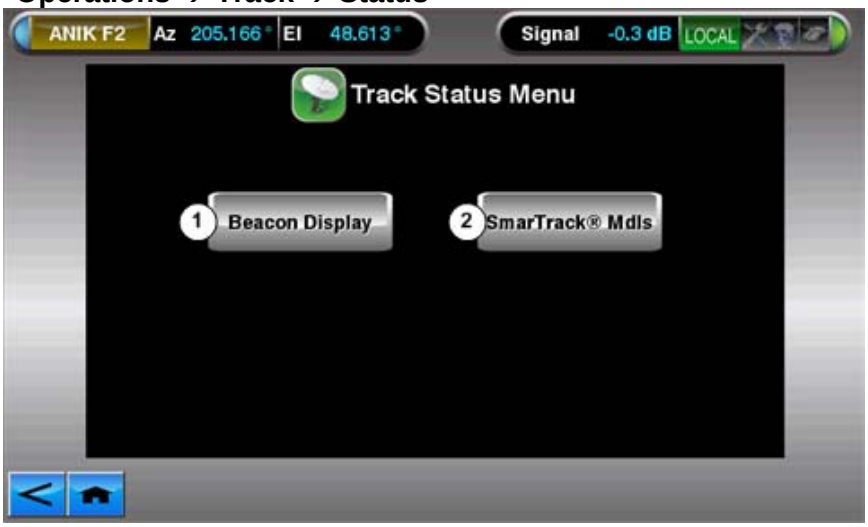

Figure 2-22: Track Status Menu

#	Item	Description
1	Beacon Display	This button will take you to the Beacon Display screen
2	SmarTrack® Models	This button will take you to the SmarTrack® Model screen

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2.7.1.2 Beacon Display Screen

Path: **HOME → Operations → Track → Status → Beacon Display**

The beacon display screen gives some statistics about the analog beacon signal.

NOTE: if tracking source is from a Spec An, serial data from a beacon receiver, or any other receiver type, the data on the Beacon Display screen may not necessarily be useful.

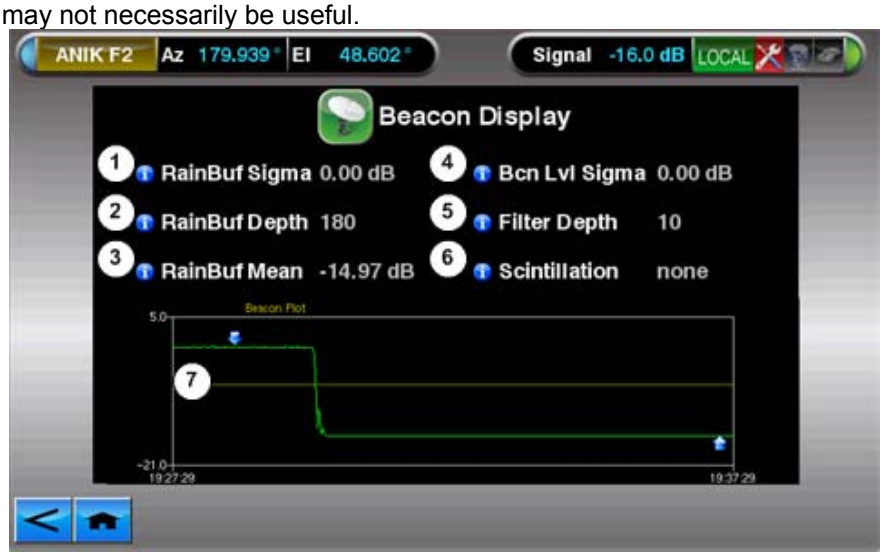

Figure 2-23: Beacon Display Screen

#	Item	Description
1	RainBuf Sigma	Standard deviation of rain sample buffer. Used to mark likely rain events in event history log.
2	RainBuf Depth	Number of one-minute sample intervals in the rain buffer
3	RainBuf Mean	Average signal strength in rain buffer
4	Bcn Lvl Sigma	Standard deviation of rain sample buffer. Used to mark likely rain events in event history log.
5	Filter Depth	Number of samples in the beacon averaging filter
6	Scintillation	System's evaluation of the level of scintillation in the atmosphere
7	Beacon Plot	Time strip-chart of beacon signal over the last ten minutes. Touch this element to zoom in.

2.7.2 Movement and Jogging

The following sections and subsections will cover NGC-IDU screens and operations that are specifically related to antenna movement and manual jogging.

Path: **HOME → Operations → Move Antenna → Adv. Mov**

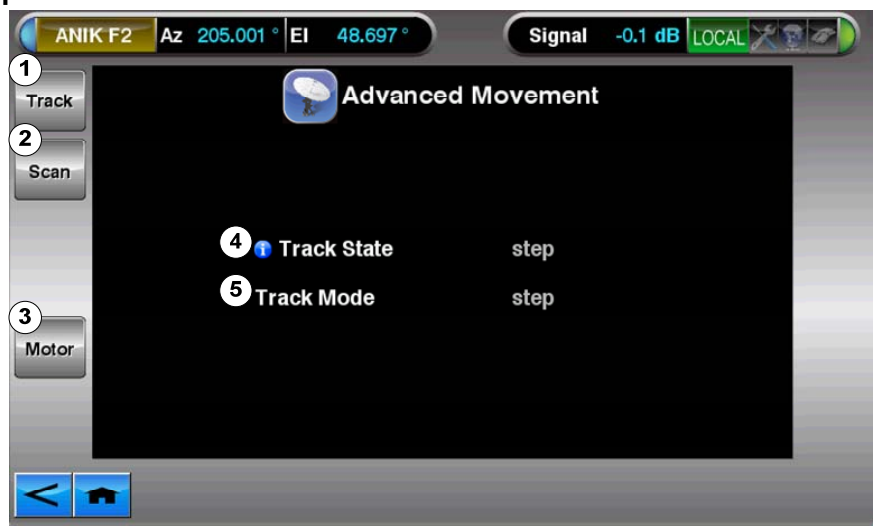

Figure 2-24a: Advanced Movement Screen

#	Item	Description
1	Track	Brings up a menu of tracking commands (see **Figure 2-18a**)
2	Scan	Initiates a spiral acquisition scan
3	Motor	Brings up a menu of low-level diagnostic commands (see **Figure 2-18b**)
4	Track State	Shows the current state of the tracking state machine.
5	Track Mode	Shows current tracking mode

Figure 2-24b: Advanced Movement Screen (Track Commands)

Command	Action
Clear SmarTrack® Model	Erases the current SmarTrack® model. Cannot be undone.
Recalc. SmarTrack®	Forces system to recompute model. Usually has little or no effect, for backward compatibility only
Clear rain buffer	Erases the rain analyzer buffer
Flush logs	Forces the system to write log files. Not used much in operational systems.
Pause track	Another way to stop track.
Resume track	Another way to resume track.
Precharge track	Another way to resume track through precharge.

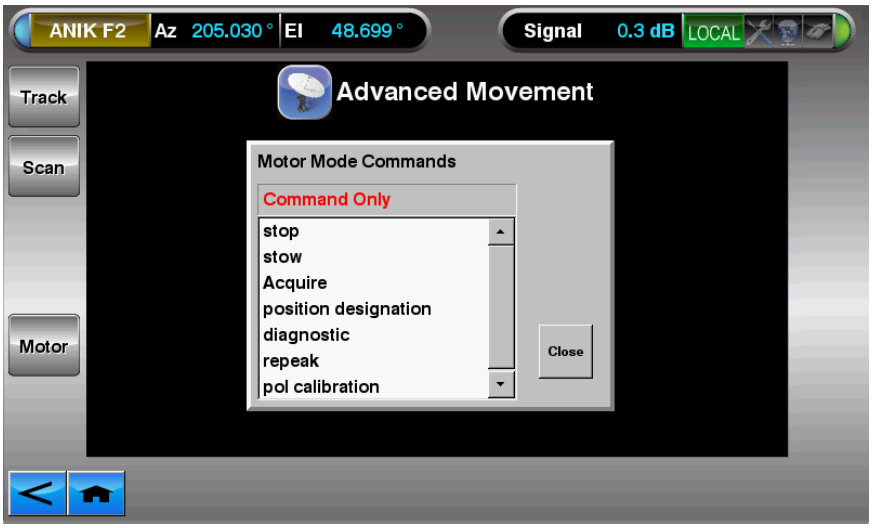

FIGURE 2-24C: ADVANCED MOVEMENT SCREEN (MOTOR MODE COMMANDS)

Command	Action
Stop	Stop all movement
Stow	Initiates the stow command. Only works for TriFold®
Acquire	Initiates the acquisition assist function. Only works for TriFold®
Position designation	Reissues the last commanded position.
Diagnostic	Not used.
Repeak	Initiates a step-track cycle that pauses automatically at the end of the peak.
Pol Calibration	Used to recalibrate Pol drives with that feature.

2.7.2.1 Goto Satellite Screen

Notice that the Goto Satellite screen (**Figure 2-25**) looks a lot like the Satellite Table screens. However, these are separate screens as far as operative functions are concerned.

Figure 2-25: Goto Satellite Screen

#	Item	Description
1	Goto	Sets up the receiver parameters for the indicated satellite and then moves to its stored location.
2	Retune	Sets up receiver parameters for indicated satellite but does not move to stored location
3	Recompute	Force angle recomputations
4	Warning column	Has warning symbol ⚠ if entry not filled out enough to support 3PP tracking. Sortable.
5	Working # column	Index into this table. Sortable.
6	Band column	See **Section 3.9.2**.
7	Name column	Name of the satellite. Sortable.
8	Longitude column	Orbital longitude of the satellite. Sortable.
9	Az column	Projected Azimuth of the satellite. Sortable.
10	El column	Projected Elevation of the satellite. Sortable.
11	Polarization column	Projected Pol angle of the satellite. Sortable.
12	Pol type column	See **Table 2.4** in this manual for definitions of the Pol Type Icons
13	NORAD ID column	NORAD Identification #s
14	Scroll bar	Used to move around the list window.
15	Working table shortcut	Jumps to the editing screens.

2.7.2.2 Goto Longitude Screen

The Goto Longitude screen can be used to point the antenna at the predicted location of a geostationary satellite at a specific longitude without going to the degree of creating a satellite entry. This is generally recommended only for installation.

Figure 2-26: Goto Longitude Screen

#	Item	Description
1	Satellite Long.	Longitude of satellite. Used with site latitude & longitude to compute nominal look angle
2	Stop	Stop current movement, if any.
3	Move	Execute changes to computed Az, El, and/or Pol from orbital parameters that have been entered.

2.7.2.3 Jog Screens

The Jog Screen set allows the user to jog the antenna or, if equipped, the SRT. It also allows direct command of the antenna using the Designate Position command.

Path: **HOME → Operations → Move Antenna**

Figure 2-27a: Typical Jog Screen (Pol Drive Installed)

#	Item	Description
1	Store Peak	Saves the current position into the working satellite table as the Peak Az, El, and Pol. This only works if Status Bar shows a current satellite.
2	Resume (Pause) Track	Resumes tracking if not tracking, pauses tracking if currently tracking. This is a convenience button to reduce the need for menu navigation.
3	Scan	Unit will scan for as long as needed. If already scanning, this button will be disabled.
4	CW Pol jog	Turns Pol rotator clockwise (if equipped). Blank if no Pol drive is configured.
5	CCW Pol jog	Turns Pol rotator counterclockwise (if equipped). Blank if no Pol drive is configured.
6	El up jog	Jogs Elevation up
7	El Down jog	Jogs Elevation down
8	Az CCW jog <	Jogs Azimuth counterclockwise
9	Az CW jog >	Jogs Azimuth clockwise
	Dish jog selector	(**not shown) ONLY present in SRT systems**. Selects main dish motorization for movement. Blank unless the system has both kinds of motorization. If the system has only an SRT, SRT selection should be implied.
	SRT jog selector	(**not shown) ONLY present in SRT systems**. Selects SRT motorization for movement. Blank unless system has both kinds of motorization
10	Jog Speed selection	Jog speed as a % of max speed. Jog speed of 0 effectively disables the jog function.
11	Jog Speed selector	Picks a jog speed as a % of the maximum speed, in increments of 10%
12	Target Az	Designated commanded position for Az. Note the SRT and main dish cannot be positioned independently except through jogging.
13	Target El	Designated commanded position for El. Note the SRT and main dish cannot be positioned independently except through jogging.
14	Target Pol	Target Pol, if equipped. Field is blank if no Pol drive is configured.
15	Stop	Stop current movement, if any.
16	Move	Execute changes to Az, El, and/or Pol that have been entered.
17	Panel Selector	Scrolls the right-hand panel between several options, see following screens.
18	Goto Sat.	Jumps to the Goto Satellite screen
19	Goto Long.	Jumps to the Goto Longitude screen
20	Adv. Mov.	Jumps to the Advanced Movement Screen

FIGURE 2-27B: JOG SCREEN (NO POL INSTALLED)

#	Item	Description
1	Store Peak	Allows you to store the current target coordinates as the signal peak
2	Resume Track	Allows you to return to the Tracking State
3	Scan	Unit will scan for as long as needed. If already scanning, this button will be disabled.
4	Jog Arrows	Use these arrows to jog Az & El. If Pol drive is installed, you will see the CW & CCW Pol arrows (**see Figure 2-21a**)
5	Jog Speed	This column allows you to choose your Jog Speed, in %, from 0% to 90%
6	Target Az	This field allows you to numerically input a Target Azimuth
7	Target El	This field allows you to numerically input a Target Elevation
8	STOP	Pressing this button will immediately STOP antenna movement
9	Move	Pressing this will accept the input Target Az & El (& Pol if installed), and move the antenna to the Target coordinates
10	Toggle Button	Allows toggle between views. For example, pressing up will show Spec An Beacon and down will show Beacon vs. Time Plot. Toggling up or down also allows other view options on toggle button.

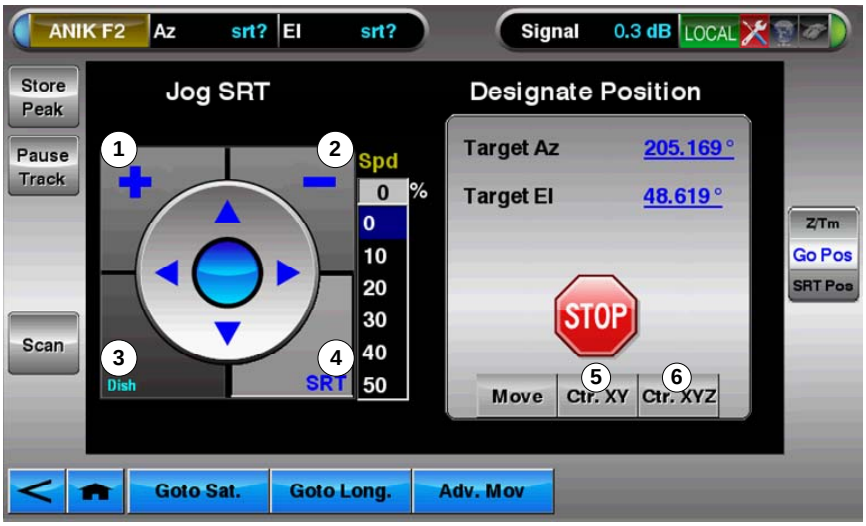

FIGURE 2-27C: JOG SRT SCREEN (SRT SELECTED FOR MOVEMENT)

#	Item	Description
1	+	Moves the axis out
2	-	Moves the axis in
3	Dish	Select Dish. Pressing this will return to normal Jog Screen. Will be Light Blue in color when not selected, as shown in the above figure
4	SRT	SRT selected. Will be Dark Blue in color when selected, as shown in the above figure
5	Ctr. XY	Center the XY Axes
6	Ctr. XYZ	Center the XYZ Axes

The display can be changed with the 3-way rocker on the right to display other information. A beacon plot can be shown along with the jog panel to facilitate manual peaking.

FIGURE 2-28A: JOG SCREEN WITH BEACON VS. TIME DISPLAYED

If the Spectrum Analyzer is installed, a beacon spectral display can be shown along with the jog panel to facilitate manual peaking.

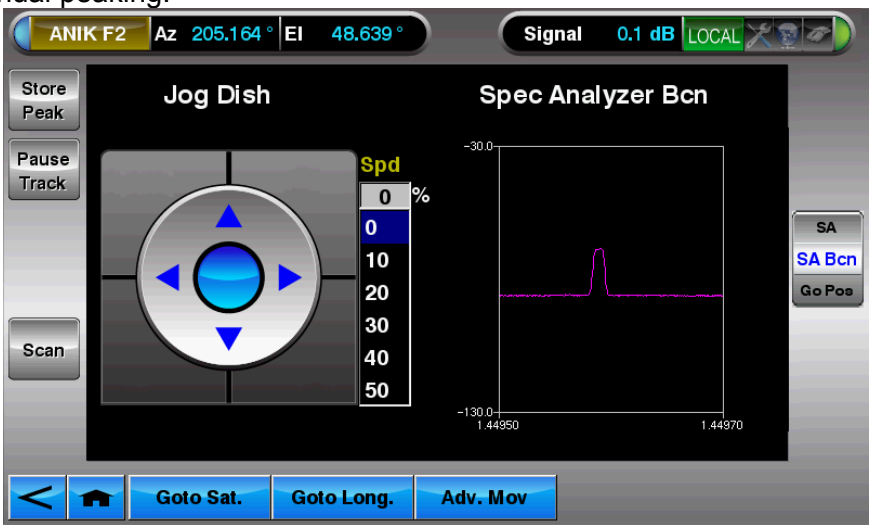

FIGURE 2-28B: JOG SCREEN WITH SPEC AN BEACON DISPLAYED

If the Spectrum Analyzer is installed, an L-band spectral display can be shown along with the jog panel to facilitate manual peaking.

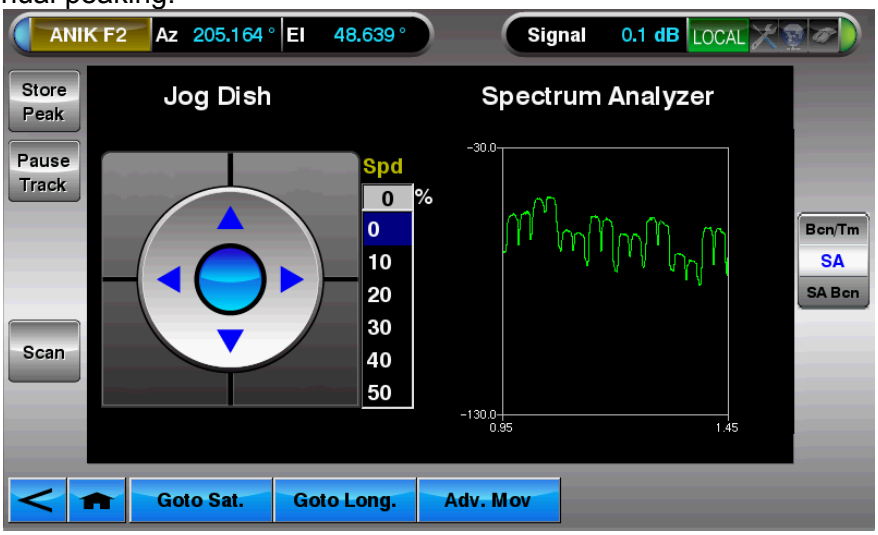

FIGURE 2-28C: JOG SCREEN WITH SPEC AN DISPLAYED

If an SRT is installed, an XY/Z plot can be shown to facilitate centering.

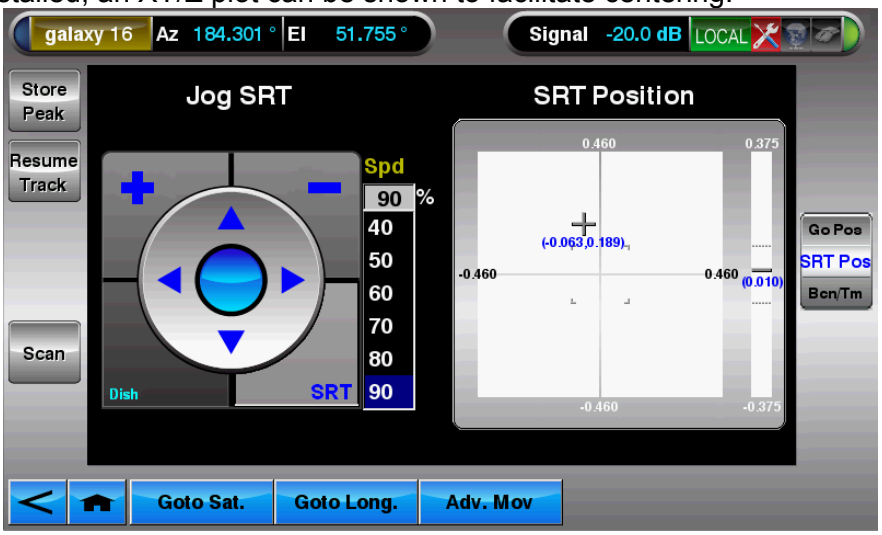

FIGURE 2-28D: JOG SCREEN WITH SRT POSITION DISPLAYED

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2.7.3 SPECTRUM ANALYZER (OPTION)

Path: **HOME** → **Operations** → **Spec An** (tap the touch screen to open **General Mode** screen)

FIGURE 2-29: SPEC AN TAB BAR

#	Item	Description
1	General	Activate General page (see **Section 2.7.3.1**)
2	Frequency	Activate Frequency page (see **Section 2.7.3.2**)
3	Span	Activate Span page (see **Section 2.7.3.3**)
4	Amplitude	Activate Amplitude page (see **Section 2.7.3.4**)
5	Marker	Activate Marker page (see **Section 2.7.3.5**)
6	RBW/Trace	Activate RBW/Trace page (see **Section 2.7.3.6**)

While at any page of the Spectrum Analyzer, all configurable parameters populate the right edge of the screen in the form of green radio buttons. The select parameter has absolute focus of all configuration techniques.

Configurable parameters may be edited using some or all of the following elements:

1. The description and value on the 3-Way rocker.
2. The virtual keyboard or selection box for invoked by pressing the 3-Way rocker in the center.
3. Incrementing and decrementing using the '+' or '-' sign on the 3-Way rocker.
4. The Left/Right or Down/Up arrow keys on the key pad.
5. The number pad, including enter and delete, on the keypad (not used for enumerated lists).
6. The arrows and numbers keys on a keyboard plugged into the USB jack or as part of a PC running the PC version of the UI.

2.7.3.1 General Page

This page is the home for general operations. It is also the only page where the keypad arrows actually affect the jog of the dish or SRT. In all other pages the keypad is redirected to the configuration values.

Figure 2-30: Spec An General Mode

#	Item	Description
1	User Control	Switches between L-Band & User Ctrl mode (in L-Band plot) or Beacon & L-Band (in Beacon plot). This means is that when in L-Band mode or Beacon mode the plot is drawn based on default settings that best depict L-Band frequencies or Beacon frequencies respectively. User Ctrl mode is initialized to whatever plot is chosen but allows the user, through the UI, to tweak setting for specific purposes such as zeroing in on a carrier or group of carriers.
2	Save Spectrum	Saves current L-Band plot as the reference spectrum of current satellite. Not available in User Ctrl or Beacon modes
3	ID Spectrum	Identifies current spectrum as being a saved reference spectrum for a specific satellite if one is found. Not available in User Ctrl or Beacon modes
4	Presets	Go to Presets page (see **Figure 2-33**), where you can load and store preset info.
5	Plot	Plot of Frequency (GHz) vs. Amplitude (dBm) in the confines of amp. and freq. ranges, as dictated by the L-Band, Beacon, or User Control modes.

FIGURE 2-31: PRESETS PAGE

#	Item	Description
1	Activate	After selecting a preset in the list by touching it, pressing “Activate” will configure the IDU to the preset plot parameters
2	Set to Current	After selecting a preset in list by touching it, pressing this will assign critical plot information to that preset
3	Delete	After selecting a preset in list by touching it, pressing this will zero out values and set Label to default
4	Edit Label	After selecting a preset, pressing this will bring up a virtual keyboard so you can create an appropriate label (if not edited, will be given a default label such as “Preset1”)
5	Label Column	A column displaying the labels of Presets
6	Ctr (MHz) Column	This column displays the Center Frequency of the preset. This is the same as what would be found on the Frequency tab
7	Span (MHz) Column	Displays Span of the preset. This is the same as what would be found on the Span tab
8	Ref Lvl (dB) Column	Displays the Reference Level of the preset
9	RBw (KHz) Column	Displays the Resolution Bandwidth of the preset

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2.7.3.2 FREQUENCY PAGE

This page allows alterations to X axis and contains parameters for altering range of frequency in plot.

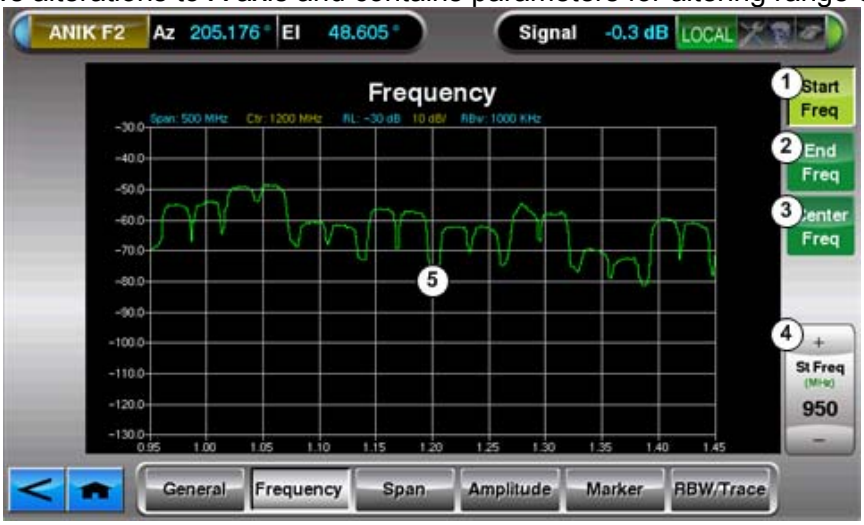

FIGURE 2-32: SPEC AN FREQUENCY MODE

#	Item	Description
1	Start Frequency	Alters value of the lowest frequency
2	End Frequency	Alters value of the highest frequency
3	Center Frequency	Alters values of both lowest and highest frequencies, so chosen freq is absolute center
4	3-Way Rocker	Used to edit values
5	Plot	Plot of Frequency (GHz) vs. Amplitude (dBm) in the confines of amp. and freq. ranges, as dictated by the L-Band, Beacon, or User Control modes.

2.7.3.3 Span Page

The Span Page contains parameters to alter the span of the frequency on plot. This is similar to altering the frequency; however, the Spec An now separates the span from the start, end, and center values.

Figure 2-33: Spec An Span Mode

#	Item	Description
1	Span	Adjust the start and end frequencies equally to accommodate the desired span. The frequency will not change.
2	3-Way Rocker	Used to edit values
3	Plot	Plot of Frequency (GHz) vs. Amplitude (dBm) in the confines of amp. and freq. ranges, as dictated by the L-Band, Beacon, or User Control modes.

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2.7.3.4 Amplitude Page

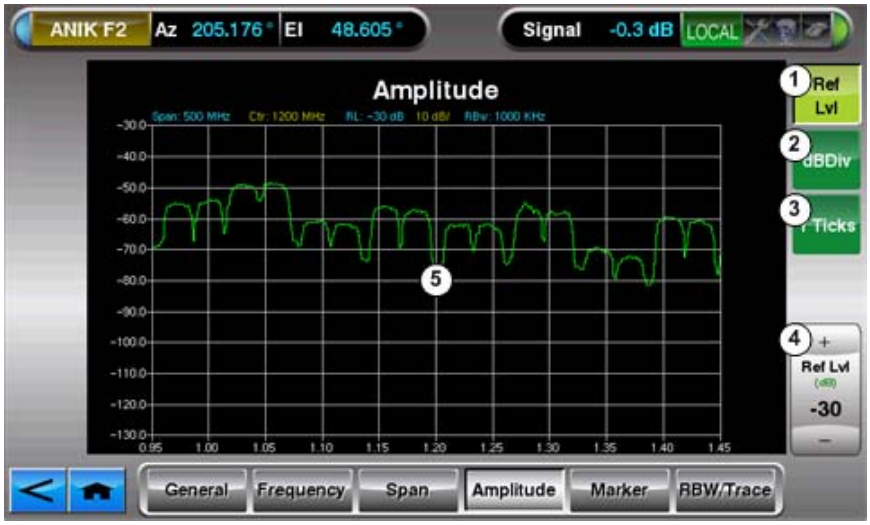

Figure 2-34: Spec An Amplitude Mode

#	Item	Description
1	Ref Lvl	Press this button to alter the highest point of amplitude.
2	dBDiv	Use this to alter the amount of amplitude between each Y-Tick, or horizontal line, in the plot graph.
3	Y-Ticks	Alters the number of horizontal reference lines in the plot, not including the axis.
4	3-Way Rocker	Used to edit values
5	Plot	Plot of Frequency (GHz) vs. Amplitude (dBm) in the confines of amp. and freq. ranges, as dictated by the L-Band, Beacon, or User Control modes.

2.7.3.5 Marker Page

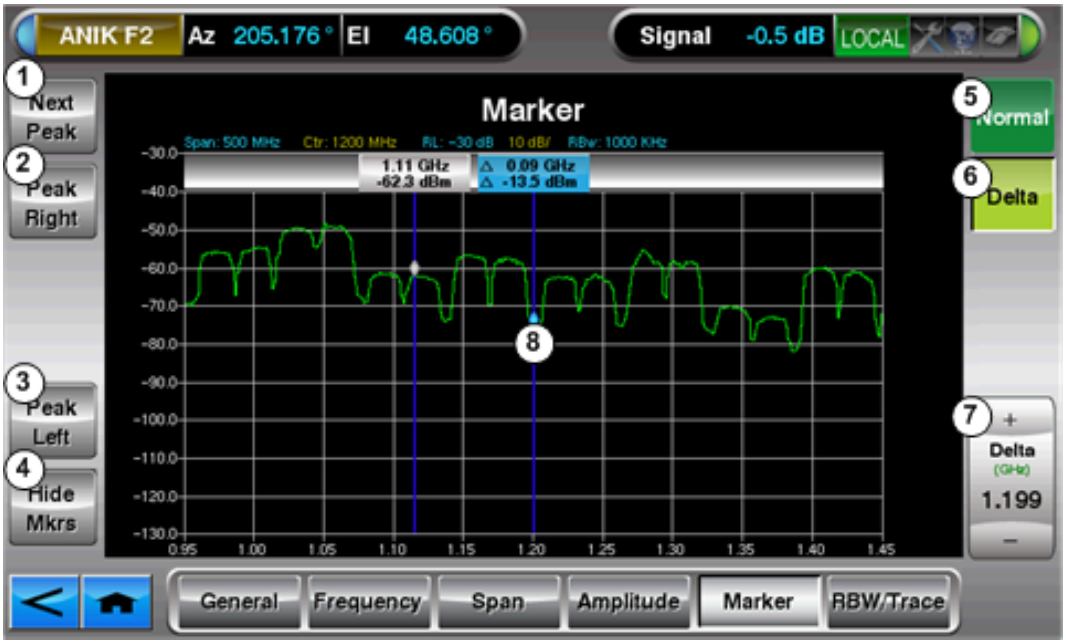

Figure 2-35: Spec An Marker Mode

#	Item	Description
1	Next Peak	Places marker in focus to next peak LOWER than marker is presently
2	Peak Right	Places marker in focus to next peak right of its current position. May be higher or lower than marker's current position
3	Peak Left	Places marker in focus to next peak left of its current position. May be higher or lower than marker's current position
4	Hide Markers	Hides any User Interface (UI) Markers currently in use. Press again to show UI Markers.
5	Normal	Allows you to move the Normal marker using 3-Way rocker, keypad, etc. (you can always "grab" and move the marker from any visible screen). The delta marker will not be visible if in Normal configuration. When in Normal configuration, normal marker is in focus for all action buttons
6	Delta	Allows movement of Delta marker with 3-Way rocker, keypad etc. Normal marker remains visible when in Delta configuration but can only be moved by "grabbing" it with finger. Frequency setting on 3-Way rocker is actual, while value displayed in delta marker box is difference between the actual delta marker position and normal marker position. When in Delta configuration, delta marker is in focus for all action buttons
7	3-Way Rocker	Used to edit values
8	UI Normal Marker	This action can be invoked by switching to Marker tab or just by touching plot in any other tab. Actual marker is gray diamond that rides on plot, while gray info button/box above contains marker's coordinates. You can move location of the marker by "grabbing" marker line with your finger and moving it left or right. The user marker is represented with a gray marker and gray info box, while the delta marker has a blue diamond and box. The delta info box doesn't show the marker coordinates, but difference of delta marker & normal marker coordinates

2.7.3.6 RBW/Trace Page

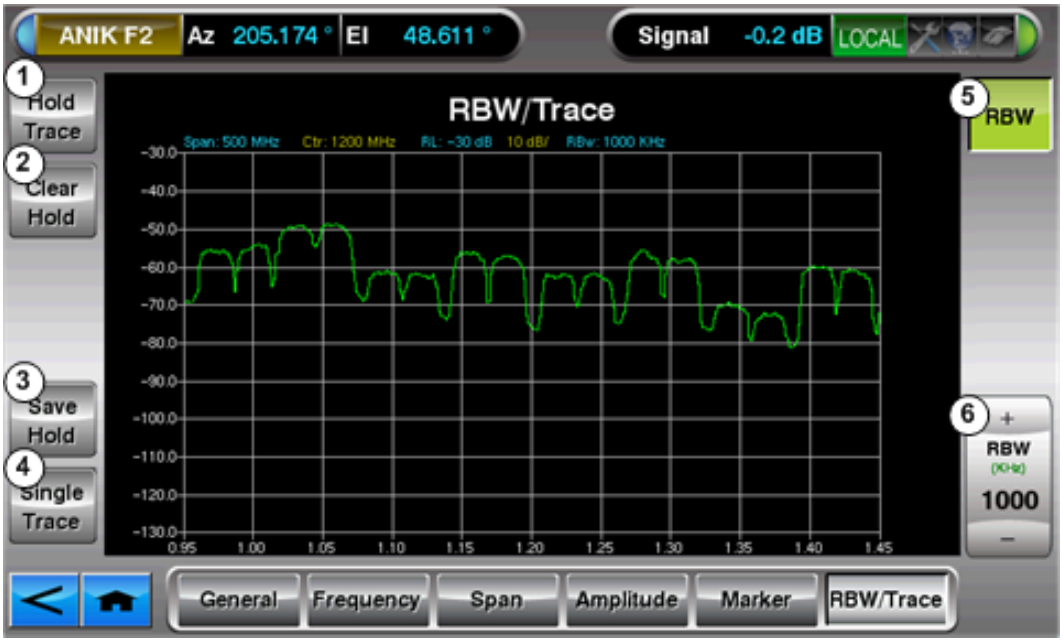

Figure 2-36: Spec An RBW/Trace Mode

#	Item	Description
1	Hold Trace	Draws a duplicate of the plot in gray exactly as it existed at the moment the action was pressed. As the "real" plot continues to change the trace plot will remain as a ghost image representing the plot at the time of the trace. The time of the trace will appear at the top right of the plot graph in UTC
2	Clear Hold	Clears the trace information and removes the trace image
3	Save Hold	Saves a common delimited set of plot coordinates of the trace plot to the USB thumb drive. Requires a thumb drive plugged in the USB port of the NGC IDU. Not available in Windows version of UI
4	Single Trace	This button acts as a kind of freeze command for the Spec An. Pressing this button instructs the SCP to halt all upgrades aside from one. Once pressed, the button will change to "Cont. Trace." When pressed, "Cont. Trace" reactivates regular updates and the button return to "Single Trace."
5	RBW	Alters the resolution bandwidth.
6	3-Way Rocker	Used to edit values

2.8 Configuration Functions

The following sections will cover the various screens related to functions for the configuration of your NGC-IDU and NGC antenna control system.

Path: **HOME → Configuration**

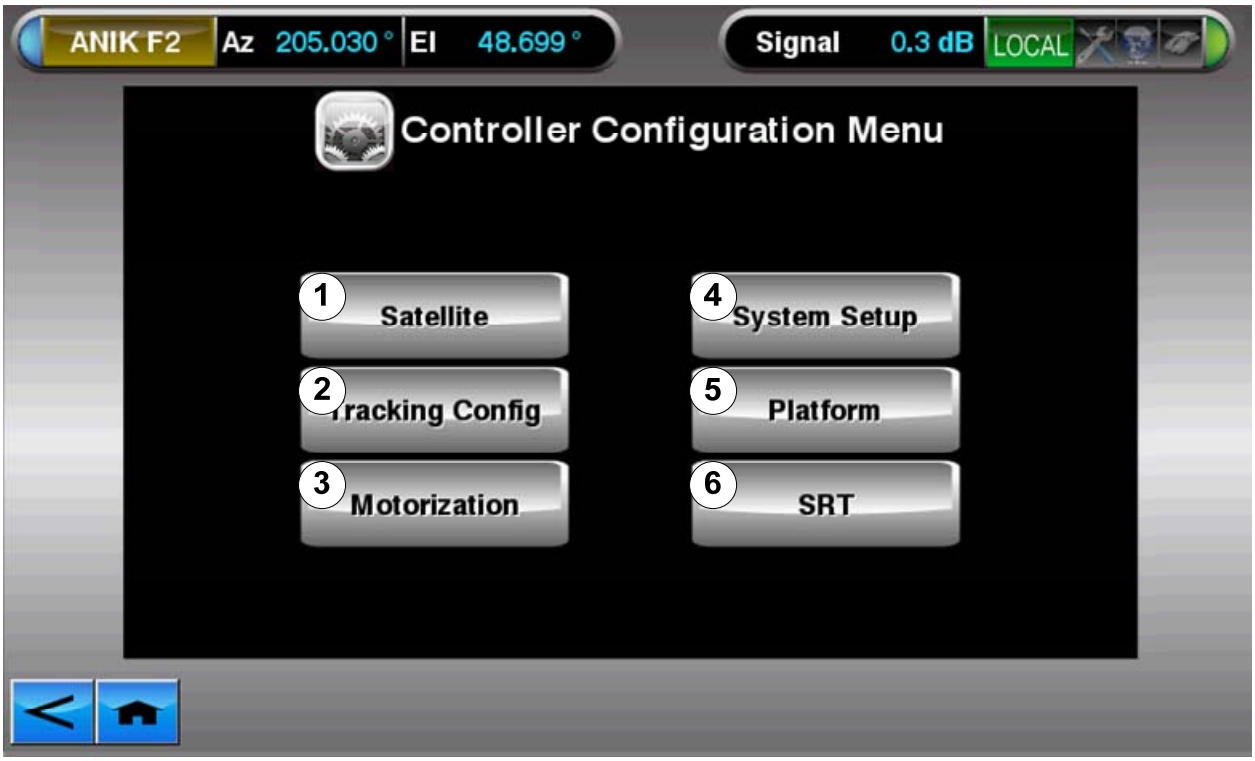

Figure 2-37: Controller Configuration Menu Screen

#	Item	Description
1	Satellite	Go to Satellite Menu screen
2	Tracking Config	Go to Tracking Configuration menu screen
3	Motorization	Go to Motorization screen
4	System Setup	Go to System Setup screen
5	Platform	Go to Platform Configuration screen
6	SRT	Go to SRT Configuration screen

2.8.1 Configuring the System

Path: **HOME → Configuration → System Setup**

These screens collect several general information elements related to overall system operation of the NGC-IDU itself. They include time, networking, and licensing functions.

Figure 2-38a: System Setup Screen

#	Item	Description
1	Restart GUI button	Restarts the GUI program. Not normally needed.
2	Operational Configuration	Basic setup parameters used to tell NGC-ODU what kind of pedestal and equipment it is running on. Be very careful to get this right. See table C.19 for meaning of values.
3	J9 Emulation	Configures which protocol to emulate on J9 on rear panel. Typical value is “APC100”
4	Time	Current UTC time from GPS or NGC-IDU. **DO NOT use local time**. The IDU does not adjust for daylight savings time or any other local conventions, and only uses UTC (also known as GMT or Zulu time).
5	Sys Name	Name of the system within the site
6	IP Addr	Network address of external ethernet port. See **Section 3.8**
7	IP Mask	Network mask of external Ethernet port. See **Section 3.8**
8	SNMP	Opens the SNMP Configuration Page
9	Baseline	Opens the Baseline Page
10	Accessories	For certain accessory functions
11	Config Mgmt	Opens the Configuration Management Page
12	Installation	Opens the Installation Interview

FIGURE 2-38B: SYSTEM SETUP PAGE 2

#	Item	Description
1	Gateway	Network address of local gateway router. See **Section 3.8**
2	Deg Prec	Not used
3	Product Key	Software license key. See **Section 3.12**
4	Product Serial Number	Serial number
5	HW Address	MAC Address of Ethernet. Cannot be changed.
6	NTP Server IP	Network address of an NTP server to synchronize time. A display of “0.0.0.0” means your system does not use NTP

FIGURE 2-38C: SYSTEM SETUP PAGE 3

#	Item	Description
1	Attached to SCP	True = Attached; False = Not Attached
2	TPU IP Addr.	IP Address for the TPU
3	SCP IP Addr.	IP Address for the SCP

2.8.1.1 SNMP Configuration

The following screens allow configuration of various elements of the NGC-IDU's SNMP agent.

Path: **HOME → Configuration → System Setup → SNMP**

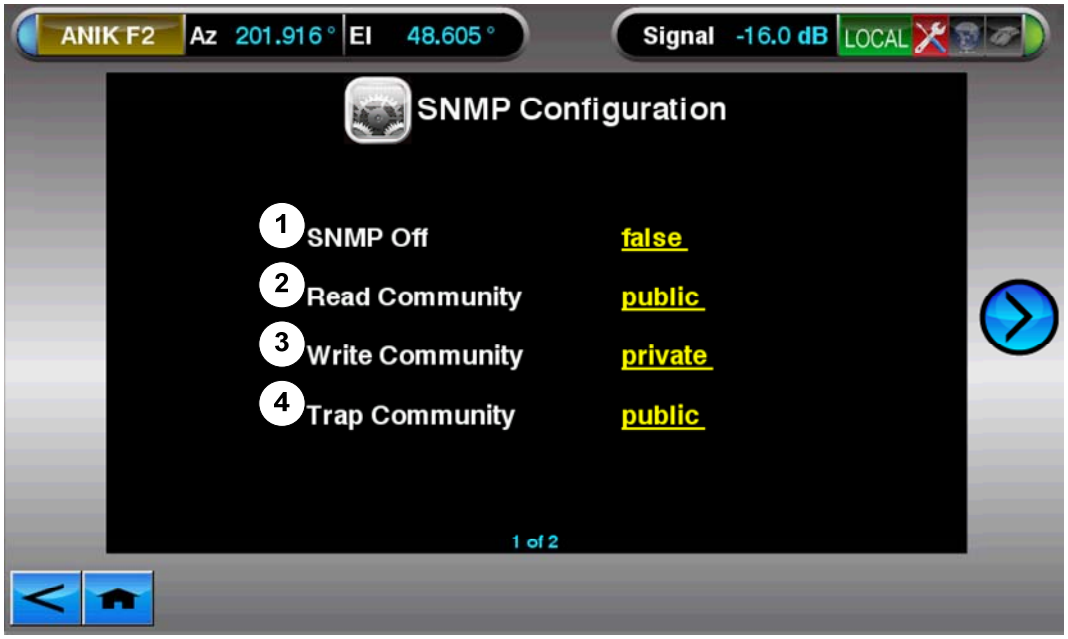

Figure 2-39a: SNMP Configuration Screen

#	Item	Description
1	SNMP Off	Enable or disable the SNMP agent globally. Changing this requires a power cycle
2	Read Community	Read community string used by SNMPv1 and SNMPv2 for GET and GET-NEXT access
3	Write Community	Write community string used by SNMPv1 and SNMPv2 for GET, SET, and GET-NEXT access
4	Trap Community	Trap community string used by SNMPv1 and SNMPv2 traps.

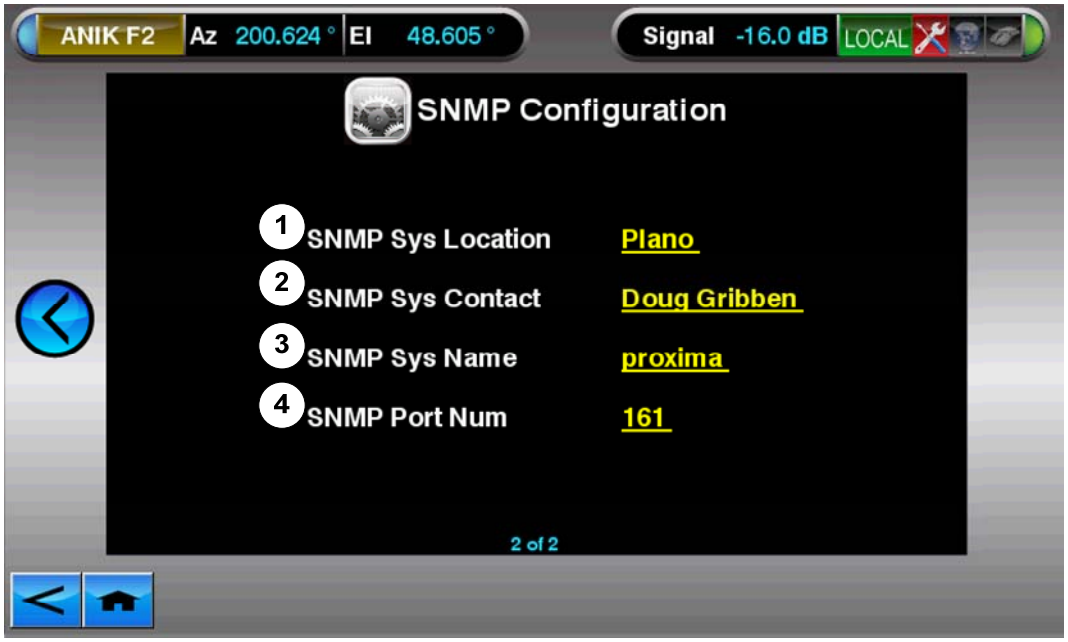

Figure 2-39b: SNMP Configuration Page 2

#	Item	Description
1	SNMP Sys Location	Configures what is reported for sysLocation MIB II parameter
2	SNMP Sys Contact	Configures what is reported for sysContact MIB II parameter
3	SNMP Sys Name	Configures what is reported for sysName MIB II parameter
4	SNMP Port Num	For future use only

2.8.2 Configuring Satellites

The NGC-IDU supports storage of up to 64 working satellites and up to 1000 global satellites in the system.

The NGC-IDU can store a variety of satellite information, including pre-programmed, fixed Az, El, and Pol values. Additionally, the NGC-IDU can store more sophisticated information, such as a full set of orbital tracking parameters used with the tracking option.

The working satellite table contains the satellites that can be used by the system immediately. These satellites can be edited, and the system can be pointed at them.

The global satellite table contains all satellites that the NGC-IDU knows about. In order to edit them, the user must put them in the working satellite table. Note that while only a limited amount of information is displayed for the global table entries, all information is retained when a satellite in demoted to the global table by the user.

Path: **HOME→ Configuration →Satellite**

The following screen allows the user to select between working table editing and global table actions.

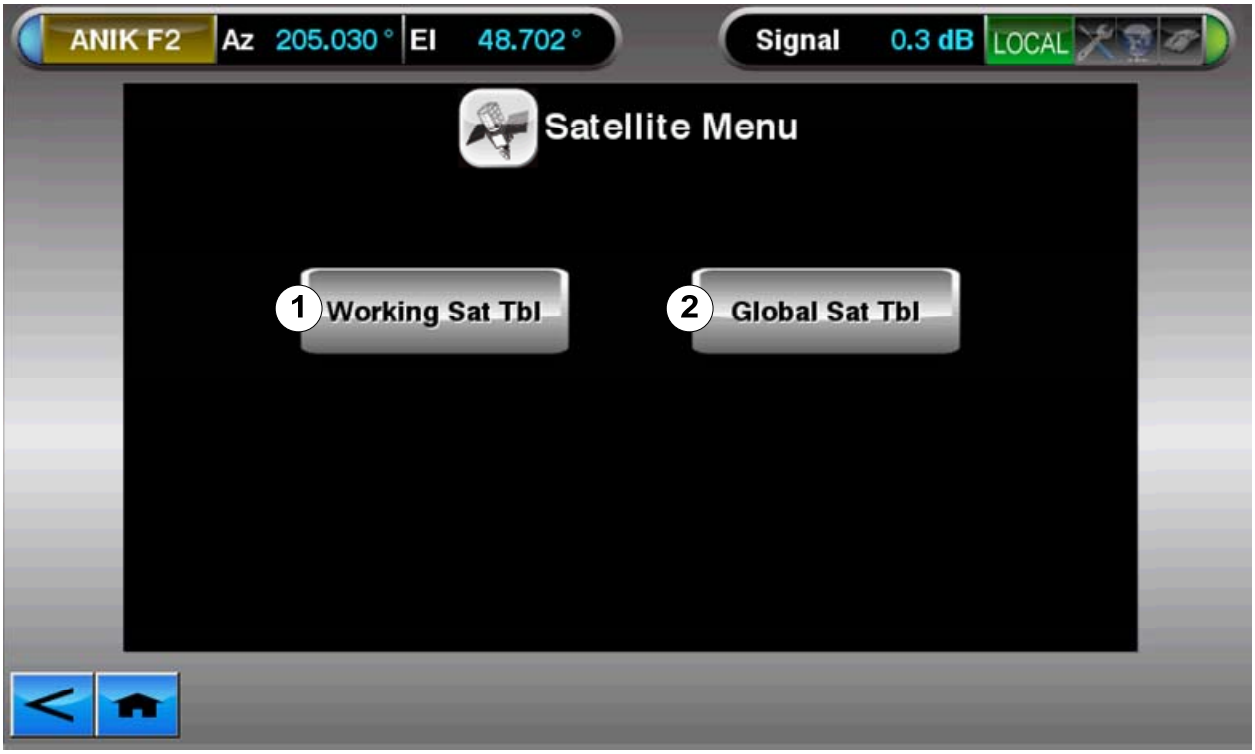

Figure 2-40: Satellite Menu Screen

#	Item	Description
1	Working Satellite Table	This button will take you to the Working Satellite Table
2	Global Satellite Table	This button will take you to the Global Satellite Table

2.8.2.1 Working with the Working Sat Table

The working satellite table is presented as a list screen, as shown in the following figure (**2-37**):

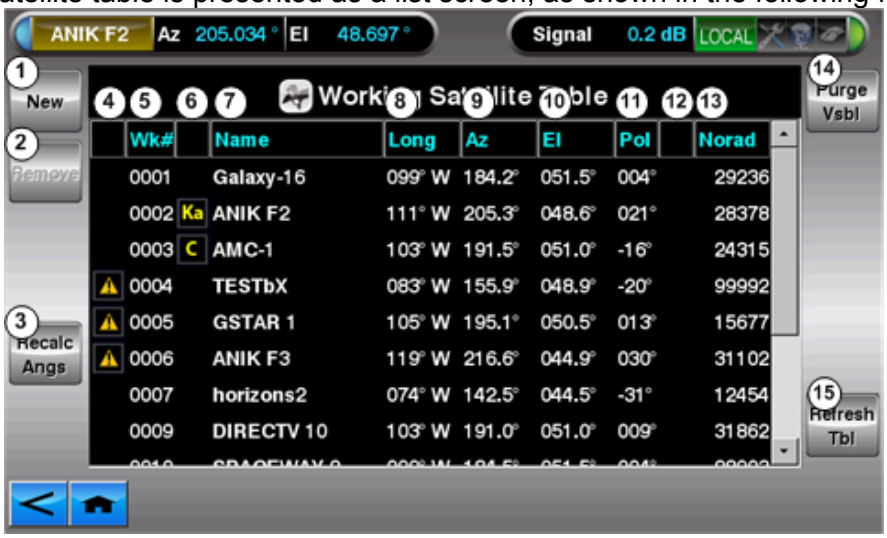

Figure 2-41: Working Satellite Table

#	Item	Description
1	New button	Pressing this button will start the process of creating a new satellite entry from scratch
	Edit button	**(Not shown)** Selecting a satellite and pressing Edit brings up the Edit Screens
2	Remove button	Selecting a satellite and pressing Remove will erase satellite after confirmation. Note unless it is also removed from Global Table it will still be available for recall. Note recalled satellite may not necessarily be put in the same column.
3	Recalc Angs button	Recompute look angles.
4	Warning column	Has warning symbol (⚠) if entry not filled out enough to support 3PP tracking. Sortable.
5	Working # column	Index into this table. Sortable.
6	Band column	See below.
7	Name column	Name of the satellite. Sortable.
8	Longitude column	Orbital longitude of the satellite. Sortable.
9	Az column	Projected Az of the satellite. Sortable.
10	El column	Projected El of the satellite. Sortable.
11	Polarization column	Projected Pol angle of the satellite. Sortable.
12	Pol type column	See **Table 2.4** in this section
13	NORAD ID column	NORAD Identification #s
14	Purge Visible button	Erases any entries below the horizon.
15	Refresh Table button	Reloads this table.

Table 2.3 Band Type Icons

Icon	
none	Automatic
C	C band feed
X	X band feed
Ku	Ku band feed
Ka	K/Ka band feed
UD1	User defined 1
UD2	User defined 2
UD3	User defined 3
UD4	User defined 4

Table 2.4: Pol Type Icons

Icon	Meaning
none	Automatic
	Circular Pol, no Pol drive active
	Linear Pol, Pol drive active

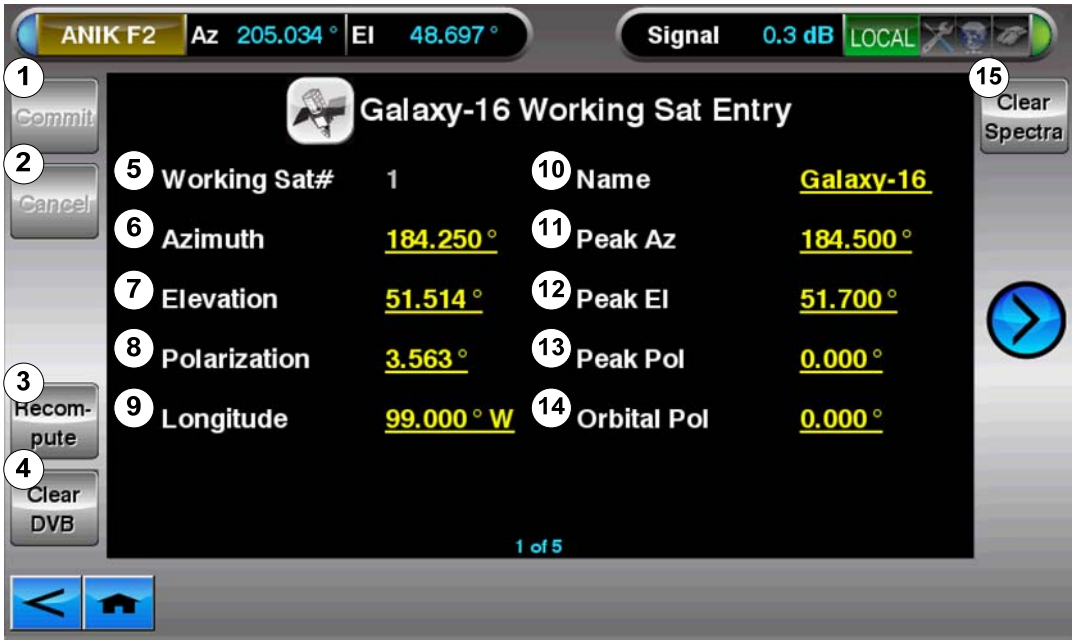

Figure 2-42a: Working Satellite Entry Screen

#	Item	Description
1	Commit	Saves the current entry into the satellite tables. Updates to working tables are also made to global tables.
2	Cancel	Drops the current edits and restores the previous data. This is used when the user has made a serious mistake and wishes to start over.
3	Recompute	Re-project the look angle based on current data. The system does not always do this automatically, so this is a way to force it to do so.
4	Clear DVB	Erases the (optional) DVB descriptor (see **Section 2.8.2.1.2**)
5	Working Sat #	Index into the working satellite table
6	Azimuth	Calculated Az of the satellite from the current location. This entry can be edited if desired but the Recompute button will cause it to be overwritten.
7	Elevation	Calculated El of the satellite from the current location. This entry can be edited if desired but the Recompute button will cause it to be overwritten.
8	Polarization	Calculated Pol of satellite from current location, taking into account orbital Pol & local skew angle. This entry can be edited if desired but Recompute button will cause it to be overwritten.
9	Longitude	Orbital longitude slot of the satellite. This is essential data, see **Section 4.7**
10	Name	Name of the satellite. This is essential data, see **Section 4.7**
11	Peak Az	Saved peak Az of satellite. It may not match calculated Az. Note the recompute button will erase this angle. Peak Az of 0.000 is ignored.
12	Peak El	Saved peak Az of the El. It may not match calculated El. Note the recompute button will erase this angle. Peak Az of 0.000 is ignored.
13	Peak Pol	Saved peak Pol of the El. It may not match the calculated Pol. Note the recompute button will erase this angle. Peak Pol of 0.000 is ignored.
14	Orbital Pol	Orbital Pol angle plus offset, used to calculate Pol angles. This is essential data, see **Section 4.7**
15	Clear Spectra	Used to erase any associated L-band spectra in the system taken with Spectrum Analyzer.

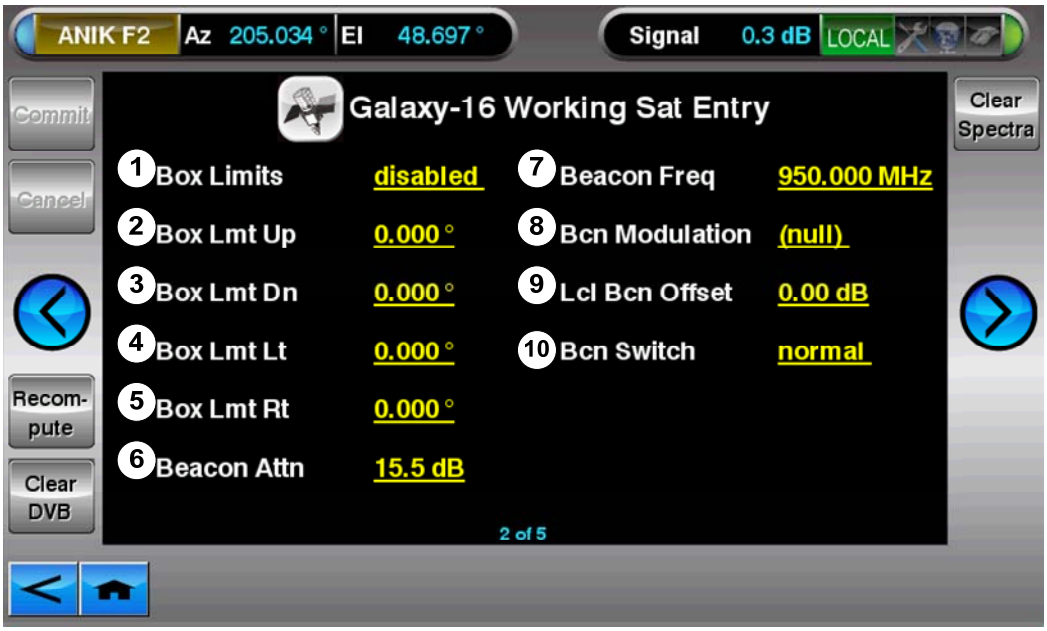

FIGURE 2-42B: WORKING SATELLITE ENTRY PAGE 2

#	Item	Description
1	Box Limits	Toggles whether limit are defined and enforced for this satellite, see **Section 4.8**
2	Box Lmt Up	Elevation up box limit
3	Box Lmt Dn	Elevation down box limit
4	Box Lmt Lt	Azimuth counterclockwise box limit
5	Box Lmt Rt	Azimuth clockwise box limit
6	Beacon Attn	Beacon attenuation setting. See tracking receivers in **Section 4.4**
7	Beacon Freq	Beacon downlink frequency. This is essential data, see **Section 4.7**
8	Lcl Bcn offset	Local offset applied to the received beacon strength. Not recommended to be used.
9	Bcn Switch	Setting for external switch connected to J11 pins 6, 7, &8. See **Section 1.12** for details

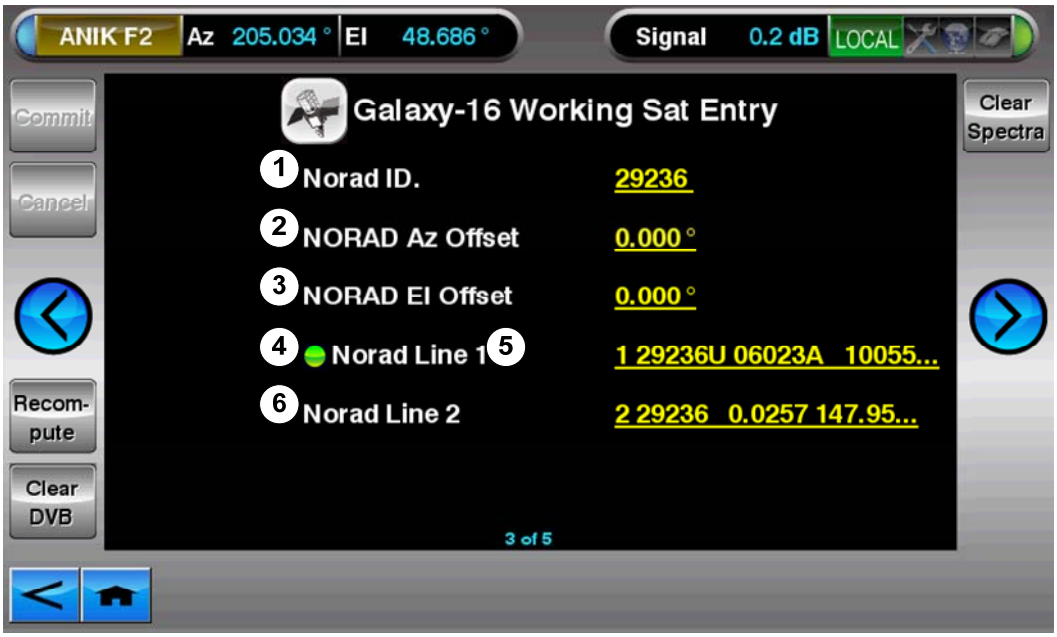

FIGURE 2-42C: WORKING SATELLITE ENTRY PAGE 3

#	Item	Description
1	Norad ID	5-digit ID assigned by NORAD. This is essential data, see **Section 4.7**
2	NORAD Az Offset	Per-satellite Az offset for NORAD fine tuning. See **Section 4.1.2**
3	NORAD El Offset	Per-satellite El offset for NORAD fine tuning. See **Section 4.1.2**
4	Norad Data Validity Indication	Red or Green indicates whether data has expired (Red = expired)
5	Norad Line 1	69-character TLE line 1
6	Norad Line 2	69-character TLE line 2

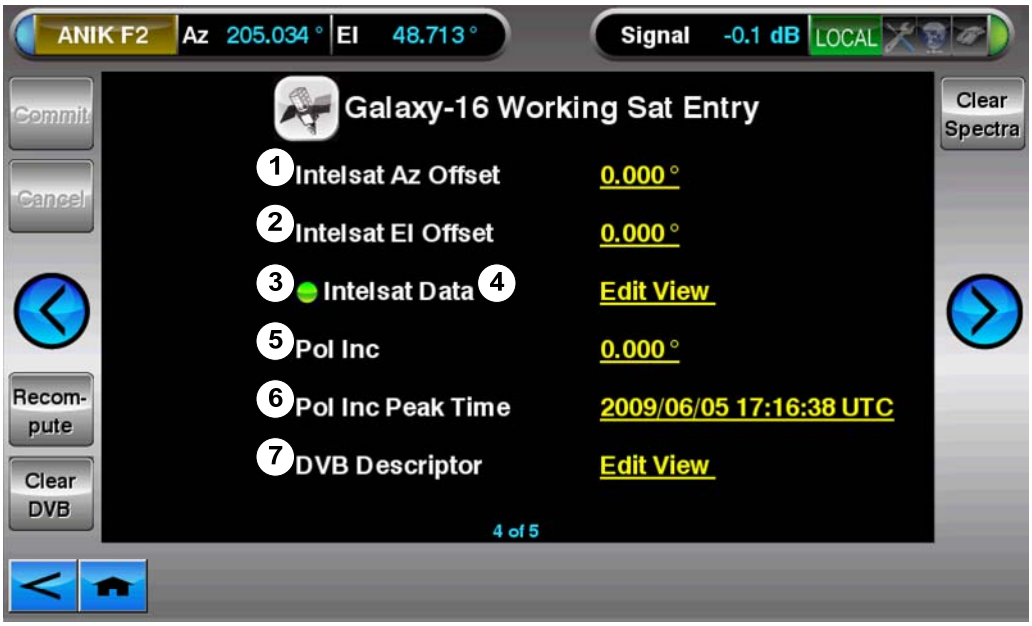

FIGURE 2-42D: WORKING SATELLITE ENTRY PAGE 4

#	Item	Description
1	Intelsat Az Offset	Per-satellite Az offset for Intelsat fine tuning. See **Section 4.2.2** predictive tracking offsets
2	Intelsat El Offset	Per-satellite El offset for Intelsat fine tuning. See **Section 4.2.2** predictive tracking offsets
3	Intelsat Data Validity Indication	Red or Green tells if data has expired
4	Intelsat Data	Press to edit, see **Section 2.8.2.1.1**
5	Polarization Inclination	Amplitude of Pol offset, see **Section 5.6**
6	Polarization Inclination Peak Time	Time of max Pol offset, see **Section 5.6**
7	DVB Descriptor	Press to edit, see **Section 2.8.2.1.2**

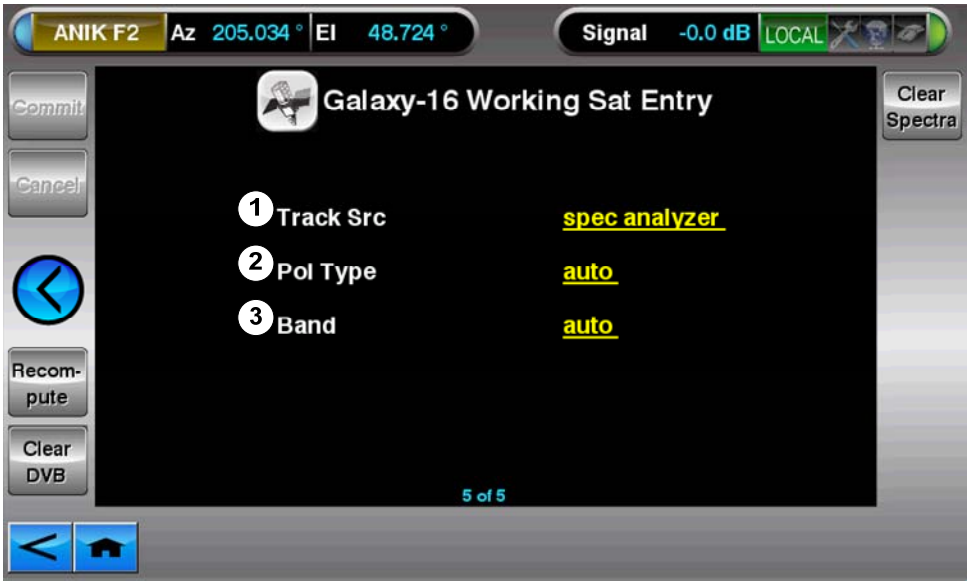

FIGURE 2-42E: WORKING SATELLITE ENTRY PAGE 5

#	Item	Description
1	Track Source	Signal source to use for peaking, 3PP step-track, and so forth. Users who are unsure should leave this set to auto.
2	Pol Type	Type of Pol associated with the satellite. See **Section 3.10** for more information. This is useful for TriFold ® systems with interchangeable feeds. Users who are unsure should leave this set to auto.
3	Band	Type of band associated with the satellite. See **Section 3.10** for more information. This is useful for TriFold® systems with interchangeable feeds. If unsure, you should leave this set to auto.
	Acq Source	(**Not shown above**) Signal source to use for acquisition assist. If unsure, you should leave this set to auto.

2.8.2.1.1 Intelsat Data Entry (OPTION)

This screen is used to enter the IESS 422 parameters.

OPTION: if this option is not installed, the data can be entered but will not be implemented or made useable.

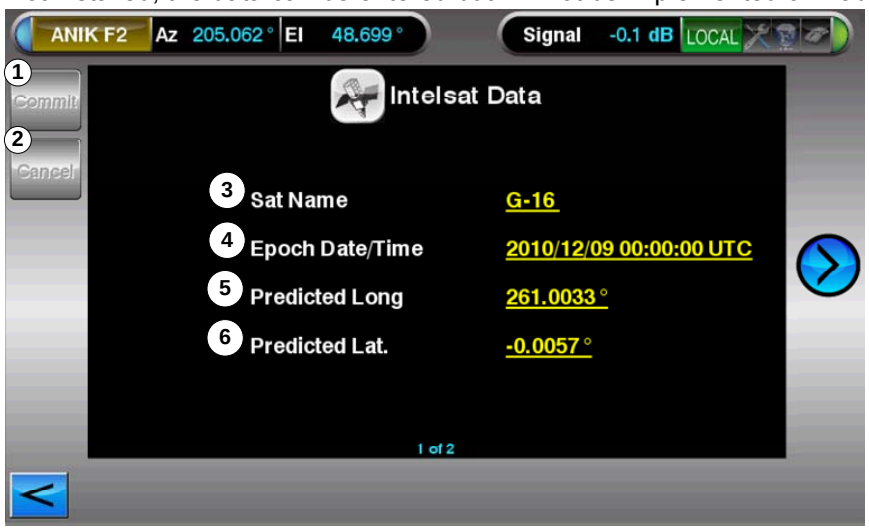

Figure 2-43a: Intelsat Data Screen

#	Item	Description
1	Commit	Save the current edits into the satellite table entry
2	Cancel	Drop the current edits from the satellite table entry
3	Sat Name	Name of the IESS 422 data set. Not critical
4	Epoch Date/Time	Epoch time on which ephemeris is based. Also start of timeframe for expiration.
5	Predicted Long.	Estimated longitude 170 hours after epoch time, used as a check on the rest of the data
6	Predicted Lat.	Estimated latitude 170 hours after epoch time, used as a check on the rest of the data

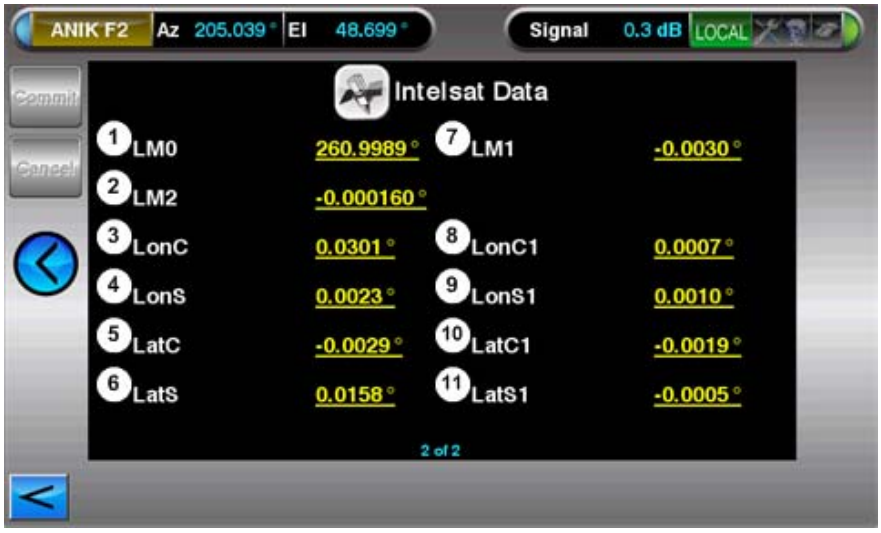

Figure 2-43b: Intelsat Data Page 2

#	Item	Description
1	LM0	Mean longitude, in degrees East
2	LM2	Longitude drift acceleration
3	LonC	Amplitude of longitude oscillation, cosine term
4	LonS	Amplitude of longitude oscillation, sine term
5	LatC	Latitude oscillation, cosine term
6	LatS	Latitude oscillation, sine term
7	LM1	Longitude drift, in degrees/day
8	LonC1	Rate of change of longitude oscillation, cosine term
9	LonS1	Rate of change of longitude oscillation, sine term
10	LatC1	Rate of change of latitude oscillation, cosine term
11	LatS1	Rate of change of latitude oscillation, sine term

2.8.2.1.2 DVB Descriptor Data Entry (OPTION)

These pages allow entering data from the DVB-S receiver. Note if the option is not installed, this data can be entered but it will not be used.

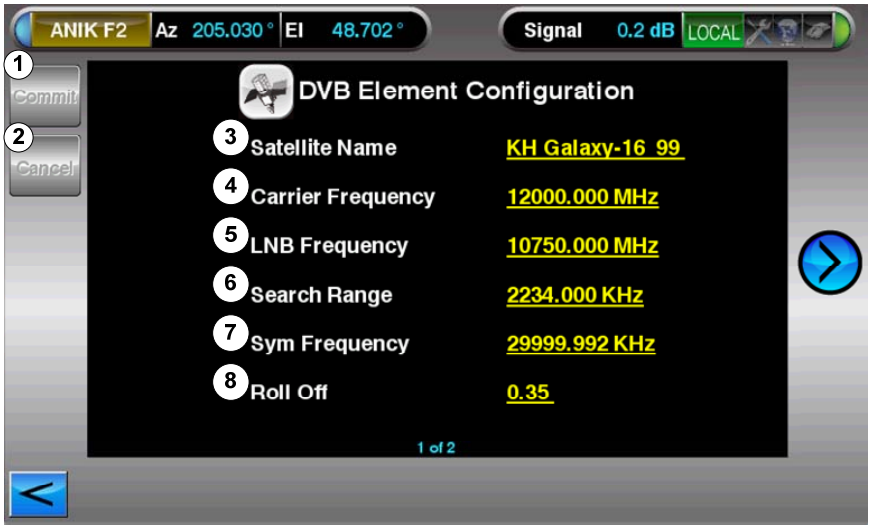

Figure 2-44a: DVB Element Configuration Screen

#	Item	Description
1	Commit	Save this DVB element into the table entry.
2	Cancel	Drop these edits.
3	Satellite Name	Name of the satellite, not used by DVB subsystem.
4	Carrier Frequency	Downlink carrier frequency, see **Table 5.1**
5	LNB Frequency	LNB local oscillator, see **Table 5.1**
6	Search Range	AFC capture range, see **Table 5.1**
7	Sym Frequency	Symbol rate, see **Table 5.1**
8	Roll Off	Roll off of filter, see **Table 5.1**

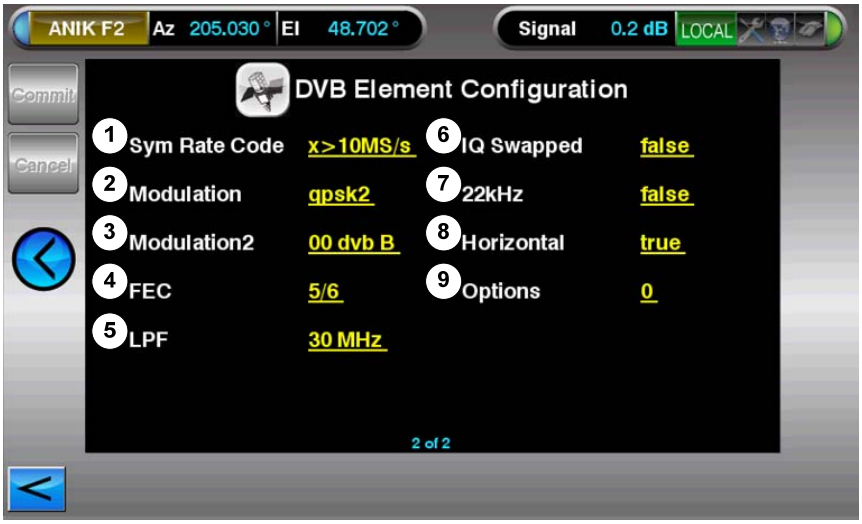

Figure 2-44b: DVB Element Configuration Page 2

#	Item	Description
1	Sym Rate Code	See **Table 5.1**
2	Modulation	See **Table 5.1**
3	Modulation2	See **Table 5.1**
4	FEC	Forward error correction, see **Table 5.1**
5	LPF	See **Table 5.1**
6	IQ Swapped	See Table 5.1
7	22kHz	Tone, not normally used. See **Table 5.1**
8	Horizontal	See **Table 5.1**
9	Options	See **Table 5.1**

2.8.2.2 Working with the Global Sat Table

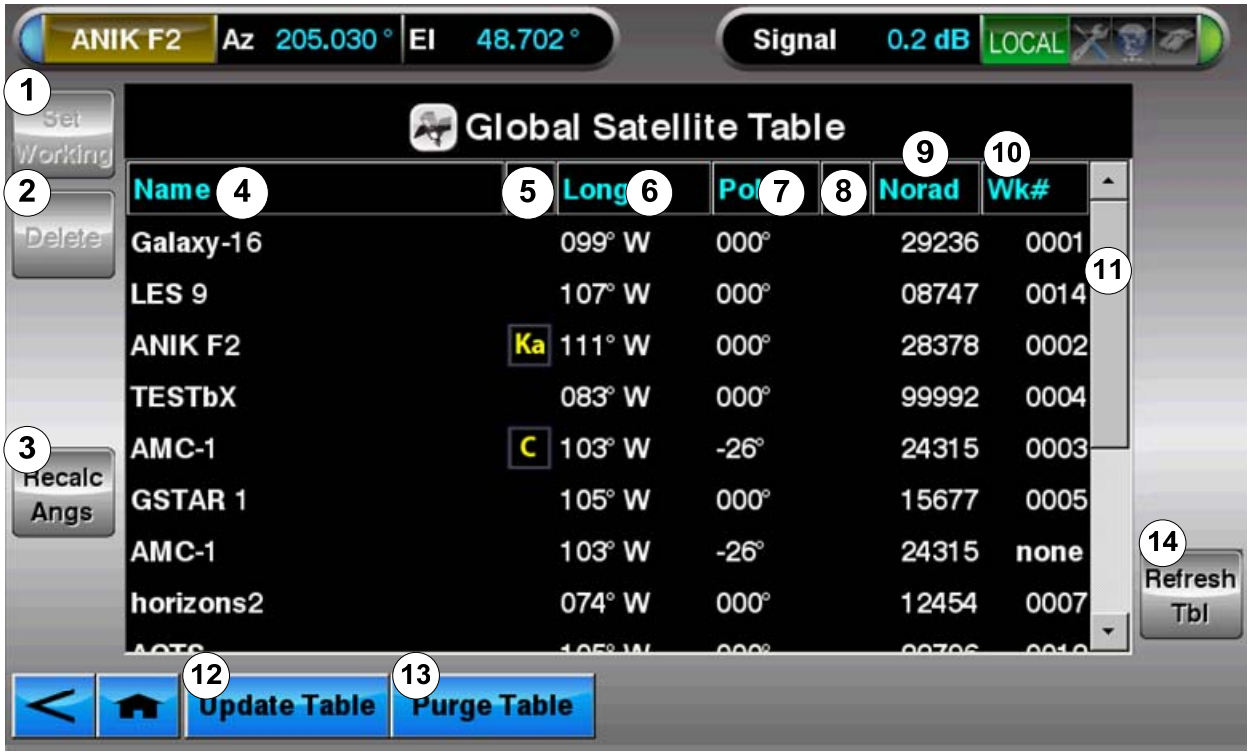

Figure 2-45: Global Satellite Table Screen

#	Item	Description
1	Set Working	If a satellite is highlighted and it is not in the working table, pressing this button moves it into the working table.
2	Delete	If a satellite is highlighted that is not in the working table, pressing this button will permanently delete it. All information will be lost. If the satellite is restored from the NORAD geo.txt file, all frequency and other configuration data not in the TLE is lost.
3	Recalc Angs	Recompute look angles for all satellites based on current geolocation.
4	Name column	The common name of the satellite, taken from the geo.txt file.
5	Band icon column	An indication that the satellite entry has been associated with a specific frequency band. See **Section 3.10** for more information.
6	Longitude column	Orbital longitude slot. For inclined orbit satellites this is the mean longitude.
7	Pol column	Orbital Pol. Usually 0 degrees for horizontal, 90 for vertical. Note some satellites have slightly twisted orientation.
8	Pol type icon column	Indicates if the satellite is associated with linear, circular, or neither (automatic) Pol. See working table page 5 (on screen) for more information.
9	NORAD ID	Five-digit number assigned by NORAD.
10	Working set number	Number of the satellite in the working table, or none
11	Scroll slider	Slider allows paging or scrolling through entries. Note user can also drag the screen.
12	Update Table	See **Section 2.8.2.2.1**
13	Purge Table	See **Section 2.8.2.2.2**
14	Refresh table	Refreshes the table (similar to refresh on a web browser)

2.8.2.2.1 Updating the Global Table

Figure 2-46: Update Satellite Table Screen

#	Item	Description
1	Install URL	Using the file named in item 5, the system updates the NORAD TLE in each element in the global satellite table. If the satellite is also in the working satellite table, it is updated too. If the satellite does not exist, a new entry in the global satellite table is created for it.
2	Install File	Using the file named in item 6, the system updates the NORAD TLE in each element in the global satellite table. If the satellite is also in the working satellite table, it is updated too. If the satellite does not exist, a new entry in the global satellite table is created for it.
3	Archive	When pressed, copies all satellite tables to the archive file path (item 7) on the jump drive.
4	Install Archive	Copies the archive named in item 7 into the system replacing the working and global satellite tables.
5	URL Path	File name of the NORAD file on an FTP site
6	File Path	File name of the NORAD file geo.txt
7	Archive File Path	File name of the archive file, always globalsatdump.tgz
8	Update URL	Using the file named in item 5, the system updates the NORAD TLE in each element in the global satellite table. If the satellite is also in the working satellite table, it is updated too. No new entries are created.
9	Update File	Using the file named in item 6, the system updates the NORAD TLE in each element in the global satellite table. If the satellite is also in the working satellite table, it is updated too. No new entries are created.

2.8.2.2.2 Purging the Global Table

The “purge” functions are provided in order to simplify maintenance of the Global Satellite Table. The table can get quite large – up to 1000 entries – and removing these entries one at a time would be very difficult and tedious.

Satellites in the working table are never removed from the global table no matter what other categories they fit into.

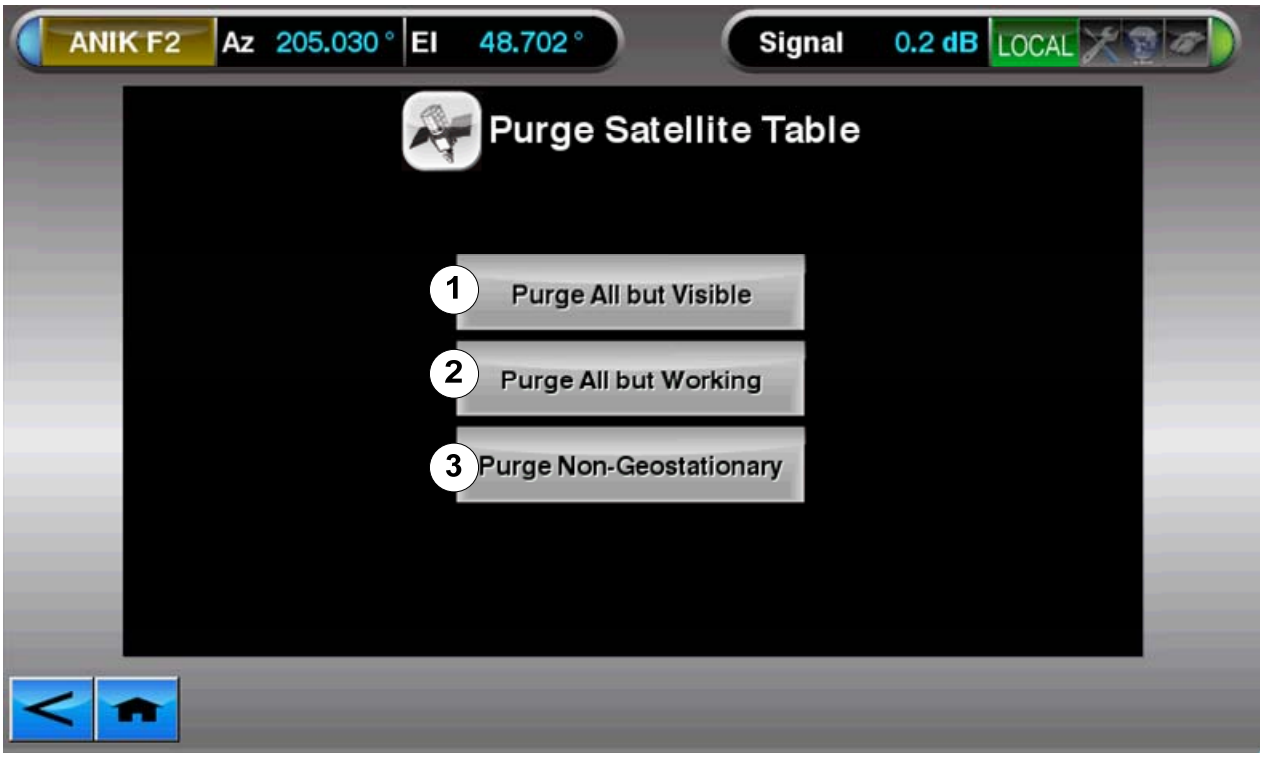

Figure 2-47: Purge Satellite Table Screen

#	Item	Description
1	Purge All but Visible	Remove all entries from global table that are not in working table as well as not visible. Visible is defined as below the horizon from current site location. This action cannot be undone.
2	Purge All but Working	Remove all entries from global table that are not in working table. This action cannot be undone.
3	Purge Non-Geostationary	Remove all entries from the global table that are not in the working table with inclinations greater than as determined by their NORAD TLEs (If an entry doesn’t have a TLE, it is assumed to be geostationary). This action cannot be undone.

2.8.3 Configuring Tracking

Path: **HOME → Configuration → Tracking Config → Step Track**

The IDU 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.

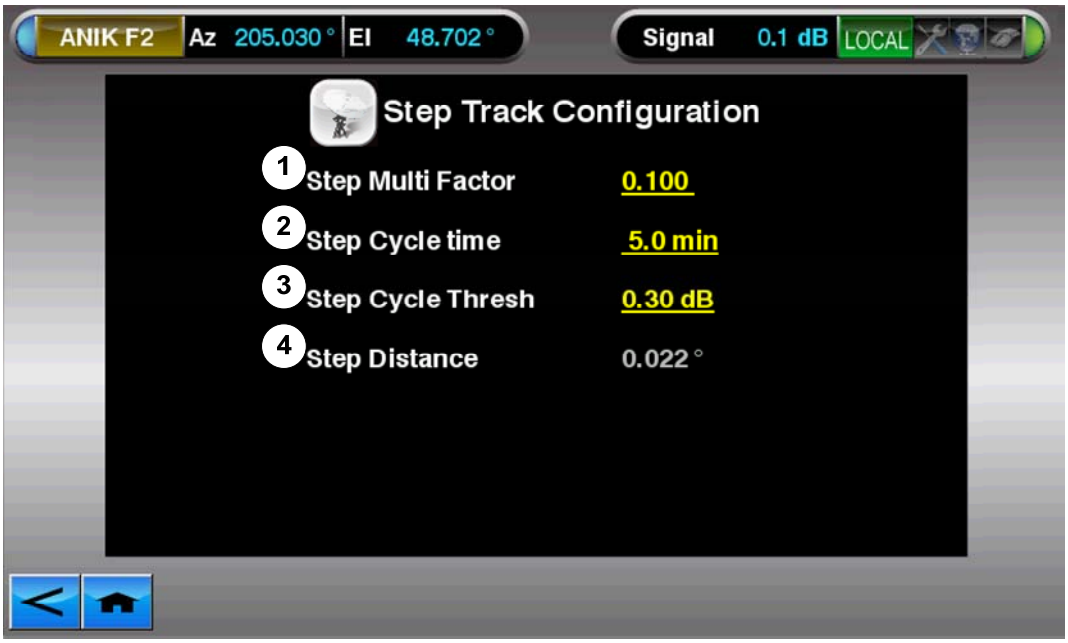

Figure 2-48: Step-Track Configuration Screen

#	Item	Description
1	Step Multi Factor	% of 3dB beamwidth to move during peaking. Parameter is typically set at 0.120 (12%), but you may have a slightly different idea for the value. Values <0.120 will tend to flatten the beacon response and weaken resolving power of tracking algorithm. Values >0.120 may produce more accurate peaks but may cause significant signal loss during the peaking process. *ASC Signal* does not normally recommend changing this value. There may be valid reasons, however, for overriding this parameter. Nominal value is 0.120
2	Step Cycle time	Max time between unconditional peaking intervals, in minutes. Nominal value is 15 min
3	Step Cycle Thresh	Signal loss from previous peaking result, at which system automatically re-peaks antenna. Smaller values will result in more movement. Nominal value is 0.40dB
4	Step Distance	Distance for each step-track move in degrees, automatically calculated from antenna size, downlink frequency, & step multiplier factor. Not user changeable

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2.8.4 SmarTrack® Configuration

Path: **HOME → Configuration →Tracking Config →SmarTrack®**

The NGC-IDU **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.

NOTE: many step track parameters also apply to **SmarTrack®** during the "model building" phase.

See following page for a figure of the SmarTrack® Configuration screen and descriptive table.

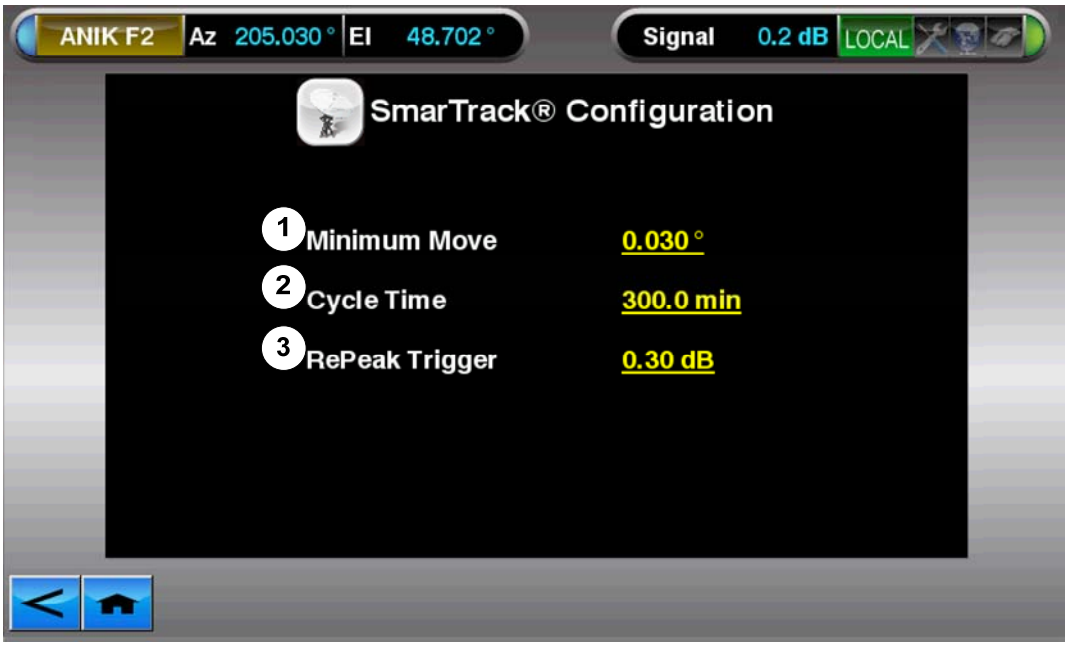

FIGURE 2-49: SMARTRACK® CONFIGURATION SCREEN

#	Item	Description
1	Minimum Move	Used in predictive tracking modes to determine allowable computed tracking error in degrees. When predicted Az/El vector differs from current Az/El vector by more than minimum move value, system orders a move. Value may need adjustment for your system requirements. Making value too small will cause extra movement, and making it too large will cause signal loss between jumps. **NOTE:** If the value is less than the deadband parameters in the Az and El axes this will be ineffective.
2	Cycle Time	The time between model updates once system is running in predictive mode. Should not be confused with Step Track cycle time
3	RePeak Trigger	Level at which model is updated because signal has fallen too far from last peak. This should not be confused with the Step Track Repeak Level

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2.8.5 CONFIGURING THE PLATFORM

Path: **HOME → Configuration → Platform**

The Platform Configuration screen allows the user to view, edit, & configure values related to the platform (Site ID, Antenna Size, fixed parameters, etc.)

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2.8.6 CONFIGURING MOTORIZATION

Path: **HOME → Configuration → Motorization**

These pages are used to configure all parameters related to the position and rate loops for each of the two or three axes for the main dish. There are up to five screens. The exact contents will vary based on the configuration of the NGC-ODU.

2.8.6.1 Azimuth Main Dish Axis Configuration Screens

The following two screens show in this section will be available unless the NGC-ODU is in the "SRT only" operational configuration.

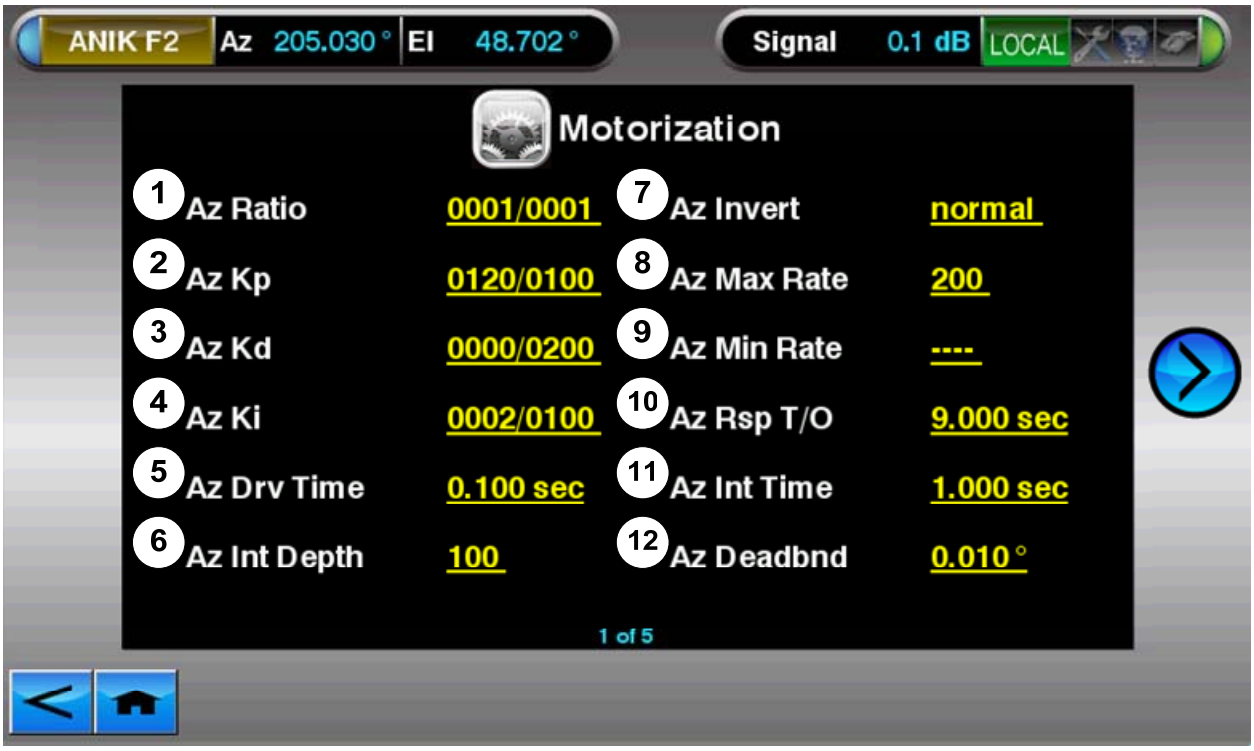

Figure 2-50a: Motorization Screen

#	Item	Description
1	Az Ratio	Az encoder turns ratio, related to resolver speed and any gearing. Note this does not refer to the transformation ratio, which is electrical.
2	Az Kp	Az axis PID controller proportional gain coefficient. This is similar in effect to the "ramp down" or "deceleration" parameter in other controllers, although entered as the reciprocal. A setting of 0125/0100 means that the controller will start slowing the axis at about (1/1.25) or 0.800 degrees. A higher gain means a steeper ramp-down.
3	Az Kd	Az axis PID controller derivative gain coefficient. This is almost always set with a numerator of 0. This can be used to dampen acceleration.
4	Az Ki	Az axis PID controller integration gain coefficient. This provides a slight boost to help drive out very small errors. It has a similar effect to the "hunting" coefficients of some other controllers. Note that if parameter is raised it may be necessary to lower the same axis' Kp.
5	Az Drv Time	Distance between samples in Integration buffer in Az axis PID to use as derivative difference signal.
6	Az Int Depth	Az Axis PID integrator depth in samples. Not generally changed from 100.
7	Az Invert	Indicates whether Az resolver/encoder is mounted so it counts backward from true angle
8	Az Max Rate	Az max rate. Ranges 100 to 1000, where 1000 corresponds to max permissible output of VFD
9	Az Min Rate	Az min rate. Ranges from 0 to 1000, where 1000 corresponds to the minimum permissible drive signal to the VFD. Not usually set below 100.
10	Az Rsp T/O	# of seconds with no discernable movement tolerated by Az axis control loop when position loop is enabled. May affect jogging in some NGC-ODUs as well.
11	Az Int Time	Number of seconds of samples to integrate in the Az PID control block.
12	Az Deadband	Az drive error tolerance. When the difference between target platform Az and the current platform Az as is less than this value, the Az command is completed. Note that the system will allow a slightly larger error without declaring a timeout in order to prevent resolver jitter from causing spurious errors.

FIGURE 2-50B: MOTORIZATION PAGE 2

#	Item	Description
1	Az Overcurrent Trip	VFD parameter indicating the max sustained current that should be generated for Az motor. Consult installation drawing for motor kit for correct value.
2	Az Brake Delay	Time delay between actuating Az brake release and turning on drive signal to Az motor. When set to 0.0 the brake release function is disabled.

2.8.6.2 Elevation Main Dish Axis Configuration Screens

These screens will be available unless the NGC-ODU is in the “SRT only” operational configuration.

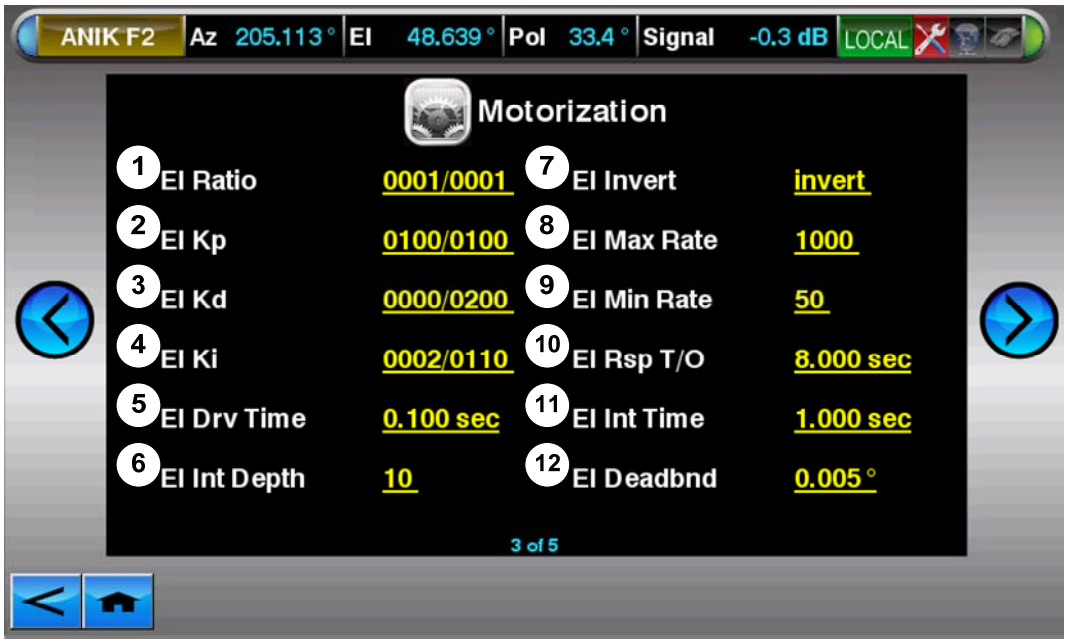

Figure 2-50c: Motorization Page 3

#	Item	Description
1	El Ratio	Elevation encoder turns ratio, related to resolver speed and any gearing. Note this does not refer to the transformation ratio, which is electrical.
2	El Kp	El axis PID controller proportional gain coefficient. Similar in effect to “ramp down” or “deceleration” parameter in other controllers, although entered as the reciprocal. A setting of 0125/0100 means controller will start slowing axis at about (1/1.25) or 0.800 degrees. Higher gain means steeper ramp-down.
3	El Kd	El axis PID controller derivative gain coefficient. This is almost always set with a numerator of 0. This can be used to dampen acceleration.
4	El Ki	El axis PID controller integration gain coefficient. Provides a slight boost to help drive out very small errors. Similar effect to the “hunting” coefficients of some other controllers. Note that if this parameter is raised it may be necessary to lower the same axis’ Kp.
5	El Drv Time	Distance between samples in Integration buffer in eL axis PID to use as derivative difference signal.
6	El Int Depth	El Axis PID integrator depth in samples. Not generally changed from 100.
7	El Invert	Indicates whether El resolver/encoder is mounted so it counts backward from the true angle.
8	El Max Rate	El max rate. Ranges 100 to 1000, where 1000 corresponds to max permissible output of VFD
9	El Min Rate	El min rate. Ranges from 0 to 1000, where 1000 corresponds to the min permissible drive signal to VFD. Not usually set below 100.
10	El Rsp T/O	# of seconds with no discernable movement tolerated by El axis control loop when position loop is enabled. May affect jogging in some NGC-ODUs as well.
11	El Int Time	# of seconds for samples to integrate in the El PID control block.
12	El Deadband	El drive error tolerance. When difference between target platform El and the current platform El as is less than this value, El command is completed. Note the system will allow a slightly larger error without declaring a timeout in order to prevent resolver jitter from causing spurious errors.

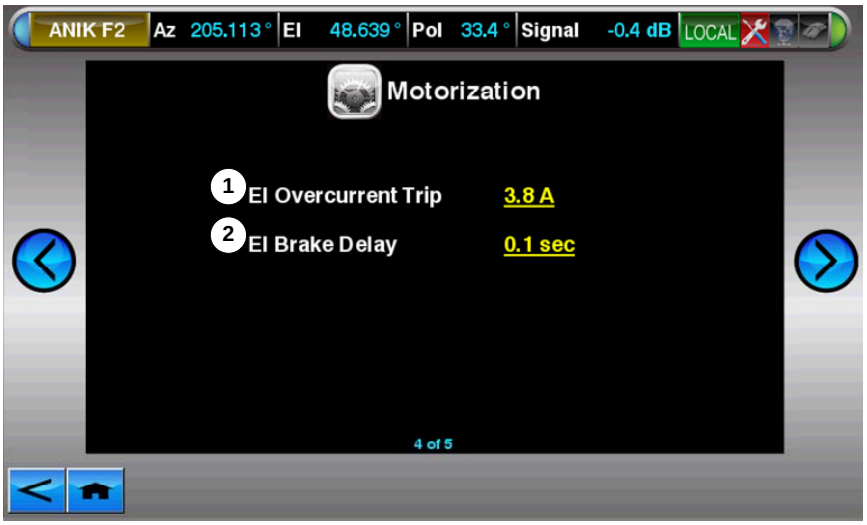

FIGURE 2-50D: MOTORIZATION PAGE 4

#	Item	Description
1	El Overcurrent Trip	VFD parameter indicating the maximum sustained current that should be generated for the El motor. Consult installation drawing for motor kit for correct value.
2	El Brake Delay	Time delay between actuating El brake release and turning on drive signal to El motor. When set to 0.0 the brake release function is disabled.

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2.8.6.3 POLARIZATION MAIN DISH AXIS CONFIGURATION SCREENS

This screen is always available.

FIGURE 2-50E: MOTORIZATION PAGE 5

#	Item	Description
1	Pol Present	Indicates whether or not a Pol drive is present, selected from a list of predefined options
2	Pol Invert	Indicates whether Pol resolver/encoder is mounted so it counts backward from true angle
3	Pol Ratio	Pol encoder turns ratio. The number of times the resolver or encoder turns per turn of the main axis
4	CW Coast	Distance from target platform Pol that NGC cuts power to Pol motor in CW direction
5	CCW Coast	Distance from target platform Pol that NGC cuts power to Pol motor in CCW direction
6	Pol Rsp T/O	# of seconds with no discernable movement tolerated by Pol axis control loop when position loop is enabled
7	Pol Brake Delay	Time delay between actuating Pol brake release and turning on drive signal to Pol motor. When set to 0.0 the brake release function is disabled.

If Pol drive present but not currently enabled, then only “Pol present” field will be displayed as “no”.

2.8.7 Configuring the SRT accessory

The SRT screens are used to configure the subreflector tracking carriage. An SRT may have two or three axes—X, Y, and Z—as shown below in **Figure 2-53**.

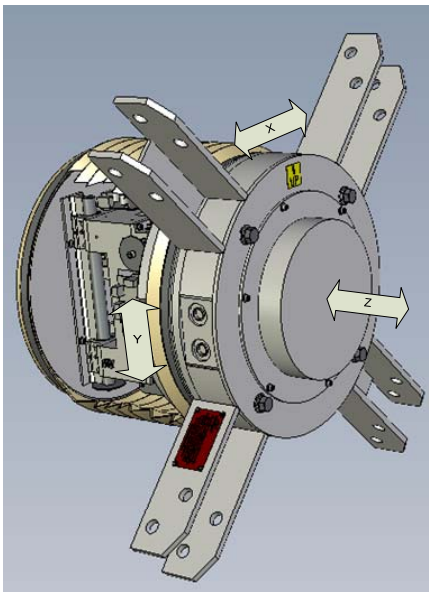

Figure 2-51: SRT Axes

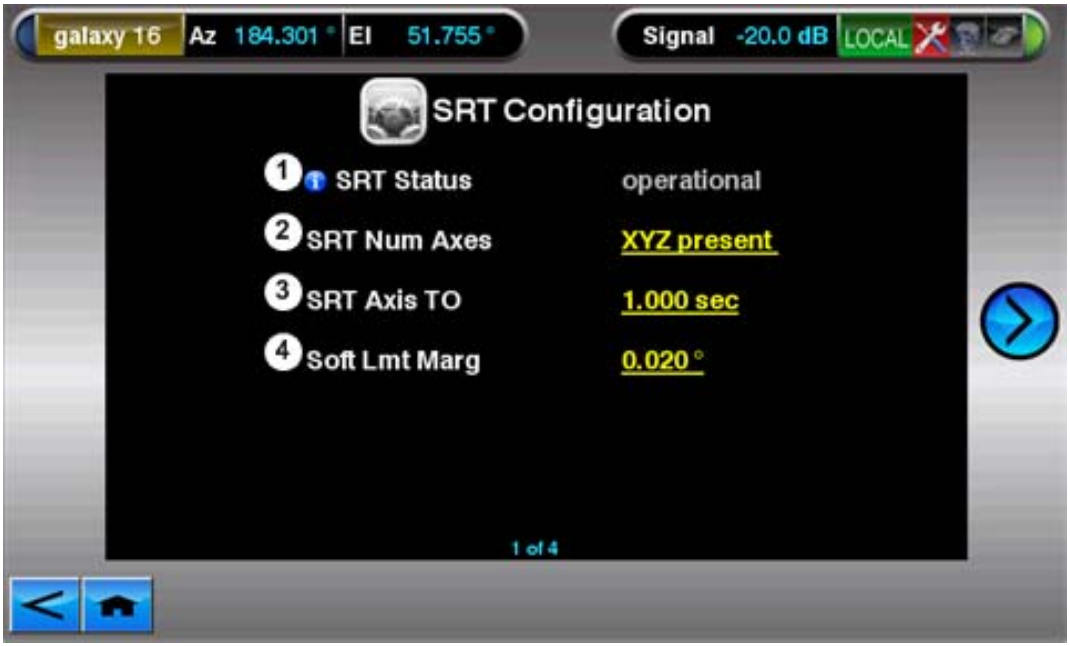

Figure 2-52a: SRT Configuration Screen 1

#	Item	Description
1	SRT Status	Overall summary of SRT's current state
2	SRT Num Axes	SRT master configuration field, selected from a list of predefined options none = no SRT axes detected XY present = XY SRT present XYZ present = XYZ SRT is present
3	SRT Axis TO	Timeout value for all SRT axes. Minimum time to drive motors without seeing any feedback change. Individual axes on the SRT cannot be separately configured for timeouts.
4	Soft Lmt Margin	Used in calibration of X and Y to ascertain position for soft limits versus detected hard limits

If no SRT is present, the screen will display SRT Status as "absent" and Num Axes as "not present". If SRT should be present but this screen is showing "not present," check to make sure it has been properly installed and securely connected to the system.

2.8.7.1 SRT X Axis Configuration

The screen shown in the below example (**Figure 2-53b**) is used to configure the SRT X axis (also known as the Azimuth or "Cross-Elevation").

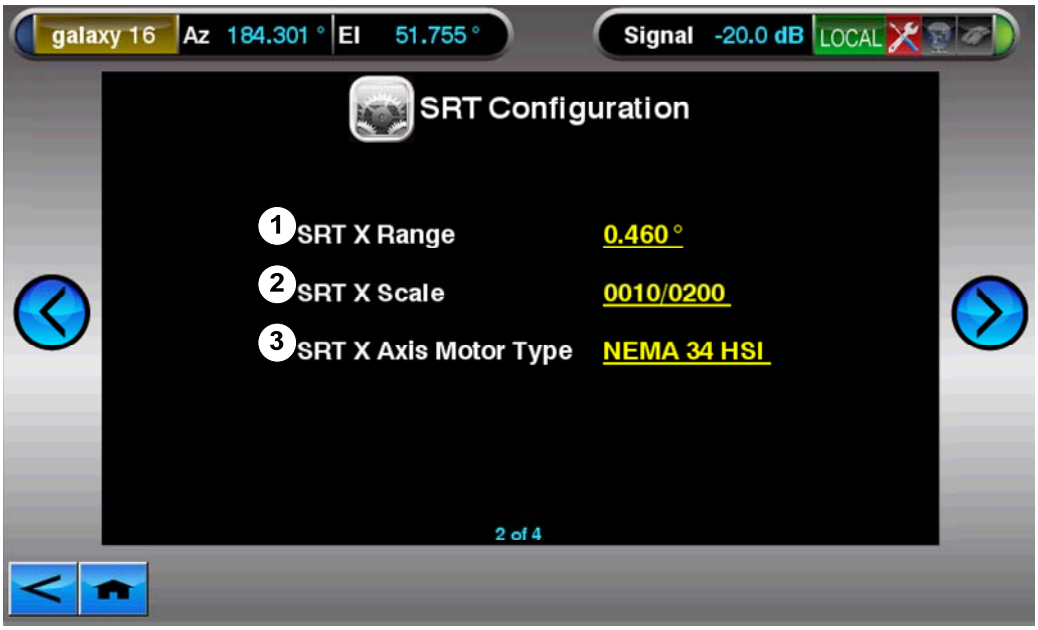

Figure 2-52b: SRT Configuration (X Axis) Screen 2

#	Item	Description
1	SRT X Range	Calibrated side-to-side range of SRT
2	SRT X Scale	Relationship between X offset and cross-el beam displacement
3	SRT X Axis Motor Type	Motor type for attached stepper motor to the X SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.

2.8.7.2 SRT Y Axis Configuration

The screen shown in the below example (**Figure 2-54d**) is used to configure the SRT Y axis (also known as the Elevation).

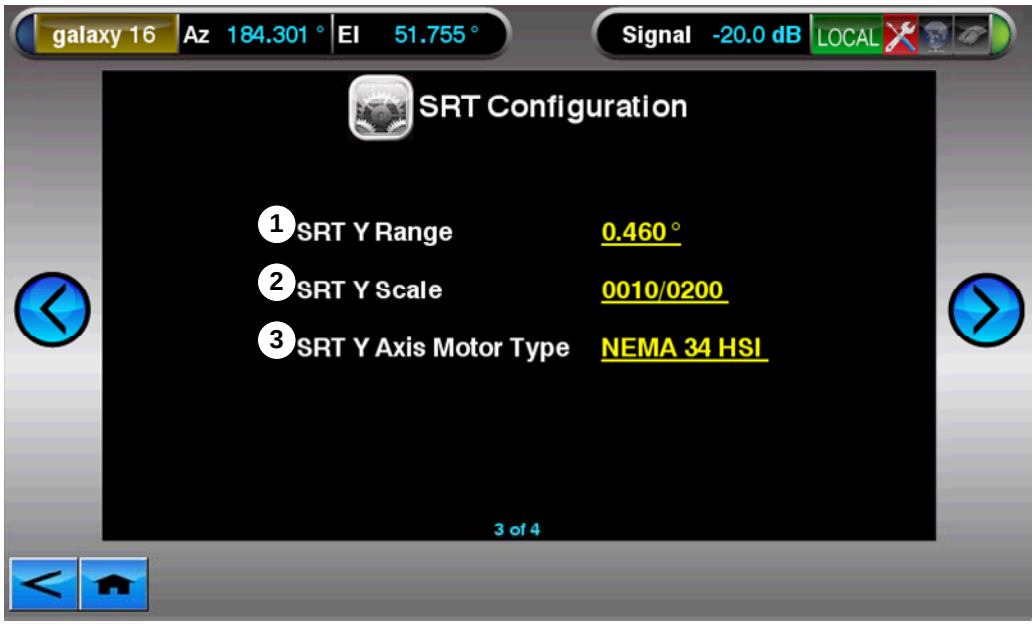

Figure 2-52c: SRT Configuration (Y Axis) Screen 3

#	Item	Description
1	SRT Y Range	Calibrated up-and-down range of SRT
2	SRT Y Scale	Relationship between Y offset and El beam displacement
3	SRT Y Axis Motor Type	Motor type for attached stepper motor to the Y SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.

2.8.7.3 SRT Z Axis Configuration

The screen shown in the below example (**Figure 2-54e**) is used to configure the SRT Z axis (also known as the focus).

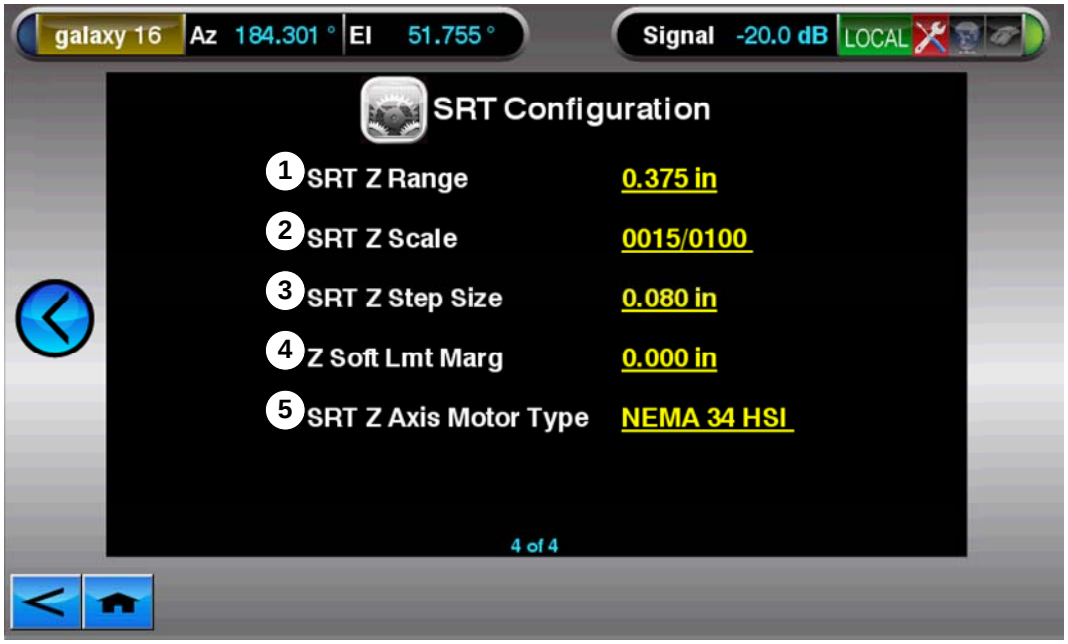

Figure 2-52d: SRT Configuration (Z Axis) Screen 4

#	Item	Description
1	SRT Z Range	Calibrated in-and-out range of SRT
2	SRT Z Scale	Relationship between Z offset and distance in inches
3	SRT Z Step Size	Step size during peaking for Z axis. If set to 0 Z axis peaking is disabled.
4	Z Soft Lmt Marg	Used in calibration of X and Y to ascertain position for soft limits versus detected hard limits
5	SRT Z Axis Motor Type	Motor type for attached stepper motor to the Z SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.

3.0 Basic Installation & Setup Tasks

NOTE: before beginning the initial setup, the process will go faster and smoother if the below info/data is on hand

To complete the minimum setup & configuration of the NGC-IDU, have the following information/data:

1. Site ID or Name
2. Site Latitude and Longitude. **OPTION:** with **GPS option**, this info is not needed
3. Current Coordinated Universal Time (UTC), in either Zulu (Z) or Greenwich (GMT) time. **OPTION:** Again, with **GPS option** this info is not needed
4. The center frequency of your local oscillator that down-converts the beacon to L-band
5. Whether the beacon is inverted (lower side band) or not (upper side band) by the down converter. **C-band** frequency is **usually inverted**, while **Ku is not**
6. The kind of beacon receiver to which you are interfacing
7. LAN address, mask, and gateway. Only needed if planning to use **Ethernet**
8. The satellite at which you intend to point the antenna, its NORAD ID, and its beacon frequency

INFO/DATA #1-#7 above will be needed during the INSTALLATION INTERVIEW and #8 will be needed during SATELLITE CONFIGURATION

3.1 Installation Interview GUI Conventions

The Installation Interview process makes use of the Graphical User Interface (GUI), the elements and details of which may be viewed in the following example (**Figure 3-1**):

Figure 3-1: Installation Interview GUI Conventions

#	Item	Description
1	Status Bar	Limited version of Status Bar (for more on Status Bar, see **Figure 2-3**)
2	Reset	Un-checks all steps and resets progress bar
3	Step List	Used to skip around to desired steps or to view which steps have been completed (completed steps will have checkmarks). Can be scrolled through by firmly dragging your finger up and down over list as if pushing it.
4	Sub-step Back Arrow	Move back to a previous sub-step (arrow **not shown in example**)
5	Exit	Leave Installation interview and return to System Setup screen
6	Progress Bar	Shows % of steps "completed." "Completed" simply means user has progressed through the elements (sub-steps) of the current step
7	Current Step	Description of current step. Will be checked if the step is completed
8	Field/Question	These are most often questions, yes/no choices, and/or a configuration field
9	Next Step	Pressing this button will move to the next step.
10	Sub-step Forward Arrow	Move forward to next sub-step (arrow **not shown in example**)

3.2 Completing the Installation Interview

⚠ This process will go by much faster if you first setup the antenna using the handheld controller. If you have completed the setup at the ODU, steps 1-14 of this process may only require a simple review.

The Installation Interview is an easy-to-follow, step-by-step, question-and-answer process that enables the user (provided the user has the necessary info/data on hand) to setup the NGC-IDU. As the name suggests, this feature allows the NGC-IDU to "interview" the user/installer/operator with a series of crucial setup questions. One convenient part of the Installation Interview is that every answer that the user/installer/operator inputs is immediately recorded and saved, meaning that the system will not lose any previously input info/data in the event of an unexpected power loss.

Path: **HOME** → **Configuration** → **System Setup**. Once at the **System Setup** screen, press the **Installation** button at the bottom of the screen.

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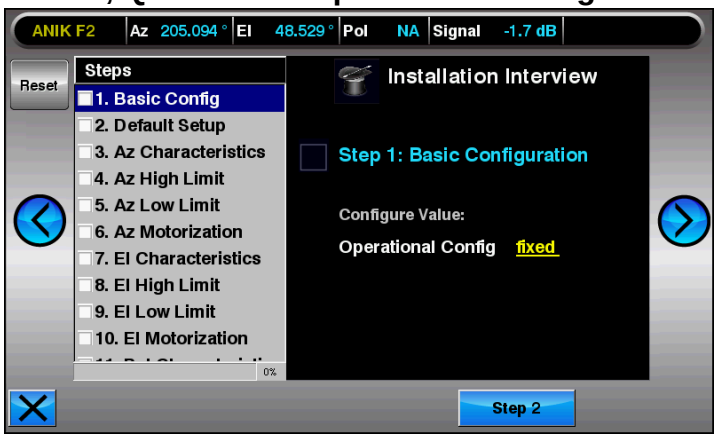
STEP 1: BASIC CONFIGURATION

Step 1 will ask the user to answer 3 basic setup questions. If **Step 1** has **already been completed at some point in the past**, this screen will first ask **"Do you want to review the basic configuration?"** Pressing **YES** will take you to **Question 1**. Pressing **NO** will take you to **Step 2**.

STEP 1, Question 1: Operational Configuration



If the Installation Interview is being performed during the initial setup of your NGC-IDU, the screen shown to the left should be the first screen displayed on.

Question 1 will ask you to choose the **Operational Configuration**.

- **FIXED**, which means your antenna is in a specific, permanent location
- **MOBILE**, meaning that your antenna is designed to be moved from location to location (such as a TriFold® antenna)

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STEP 1, Question 2: Antenna Size

Question 2 will ask the user to specify the size of the antenna. **Antenna Size** refers to the size of the antenna's **aperture** measured in **meters** (4.6m, 8.1m, etc.). Input the size of the antenna being configured and press the Sub-Step Forward Arrow to move on to **Step 1, Question 3**.

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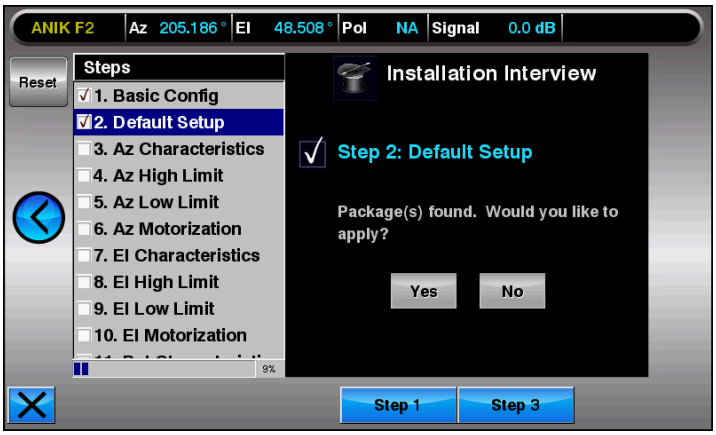
STEP 1, Question 3: Polarization Present

Question 3 (which is the final question for Step 1) will ask for a **YES** or **NO** answer as to whether or not a Polarization Drive is present in the system. If a **Pol Drive is present**, select **YES**. If a **Pol Drive is NOT present**, select **NO**. User may proceed to **STEP 2** by pressing "Step 2" at the bottom of the screen.

STEP 2: DEFAULT SETUP

Screen may ask **"Do you want to search for macros?" YES** searches for an **Automatic Template** based on data input with **Handheld** and/or during **Step 1**. **If antenna has been setup outside using the handheld, there is no need to select YES or NO.** Simply **move on to Step 3 by pressing it**.



The screen will now display "**Package(s) Found**," and will ask "**Would you like to apply?**" Pressing YES will cause one of two things to occur:

1. If only **1 matching package** was found, that template will be applied
2. User will be asked to **choose from a list of possible templates** (refer to details such as mount type or main voltage to find the correct match)

Once template is matched, proceed to **Step 3**.

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STEP 3: AZIMUTH CHARACTERISTICS

If this step has been done in the past, the screen may ask "**Would you like to move to the CW Limit manually?**" **YES** will move to the Jog screen. **NO** will cause the screen to ask "**Would you like to review the azimuth setup?**" Pressing **NO** will move to the next step, and **YES** will allow review/edit of the parameters listed below. Note that all of the above only applies if this step has been previously checked off.

If **Step 3** has NOT been done in the past, the screen will ask (as shown below), "**Would you like to center the antenna manually?**" Pressing **YES** will redirect you to the **Jog** screen so antenna can be centered. Return to Installation Interview by pressing **Back Arrow** then **Installation** (if automatically bumped forward to the next step, use the Step List to navigate back to this step).

Pressing **NO** will allow you to review the following data (use Sub-Step Arrows to navigate between these parameters):

- Az Encoder Offset
- Az Ratio
- Az Deadband
- Az Rsp T/O
- Az Min Rate
- Az Max Rate
- Az Invert

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STEP 4: AZ HIGH LIMIT

⚠**Software Limits (SW Lmt) are input by the HANDHELD/ODU; DO NOT CHANGE THEM.**

The screen may ask **"Would you like to review the azimuth CW limits?" NO** moves to **Step 5**. **YES** will cause screen to ask "**Would you like to move to the CW Limit manually?**" **YES** will move to the Jog screen. **NO** will allow review/edit of **Az CW Plat SW Lmt**.

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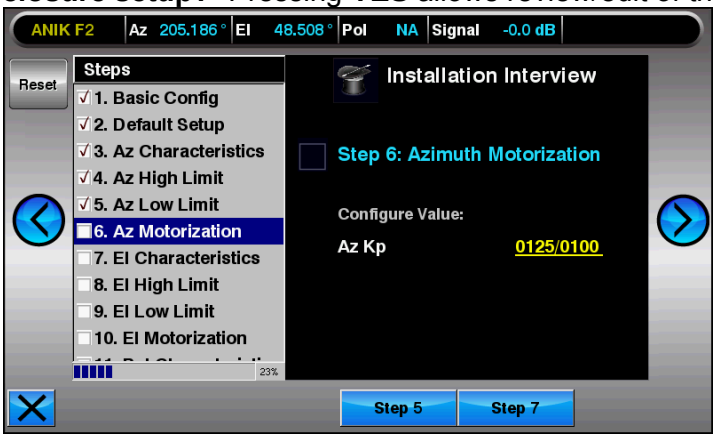
STEP 5: AZ LOW LIMIT

⚠**Software Limits (SW Lmt) are input by the HANDHELD/ODU; DO NOT CHANGE THEM.**

The screen may ask **"Would you like to review the azimuth CCW limits?" NO** moves to **Step 5**. **YES** will cause screen to ask "**Would you like to move to the CCW Limit manually?**" **YES** will move to the Jog screen. **NO** will allow review/edit of **Az CCW Plat SW Lmt**.

STEP 6: AZIMUTH MOTORIZATION

If **Step 6** has already been completed, the screen will ask "**Would you like to review the Azimuth loop closure setup?**" Pressing **YES** allows review/edit of the parameters listed below.



Upon initial setup, however, **Step 6** will allow you to review/input the following (use the Sub-Step forward arrow to navigate):

- Az Kp
- Az Kd
- Az Ki
- Az Drive (Drv) Time
- Az Int Time

⚠**Do NOT change values unless needed.**

Screen will now ask "**Would you like to configure miscellaneous parameters?**" **NO** will move user forward to **Step 7**. YES will allow user to review and edit the input data for the following:

- Az Overcurrent Trip
- Az Overcurrent Time
- Az Brake Delay

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STEP 7: ELEVATION CHARACTERISTICS

The **Step 7** screen will ask, as shown below, "**Would you like to center the antenna manually?**" Pressing **YES** will redirect you to the **Jog** screen so the antenna can be centered. **Return to Installation Interview** by hitting the **Back Arrow** then **Installation** (if automatically bumped forward to the next step, use the Step List to navigate back to this step).

Pressing **NO** will allow you to review the following data (use Sub-Step Arrows to navigate):

- El Encoder Offset
- El Ratio
- El Deadband
- El Invert
- EL Rsp T/O
- El Min Rate
- El Max Rate
- El Invert

⚠**Do NOT change values unless needed.**

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STEP 8: ELEVATION HIGH LIMIT

⚠**Software Limits (SW Lmt) are input by the HANDHELD/ODU; DO NOT CHANGE THEM.**

The screen may ask **"Would you like to move to the up limit manually?"** Pressing **NO** allows you to review/edit the input value for **El Up Plat SW Lmt** to make sure it is correct. **YES** will redirect to **Jog Screen**.

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STEP 9: ELEVATION LOW LIMIT

⚠**Software Limits (SW Lmt) are input by the HANDHELD/ODU; DO NOT CHANGE THEM.**

The screen may ask **"Would you like to move to the down limit manually?"** Pressing **NO** allows you to review/edit the input value for **El Dn Plat SW Lmt** to make sure it is correct. **YES** will redirect to **Jog Screen**.

STEP 10: ELEVATION MOTORIZATION

If **Step 10** has already been completed, the screen will ask "**Would you like to review the Elevation loop closure setup?**" Pressing **YES** allows user to review initial parameters listed below.

Upon initial setup, however, **Step 10** will allow you to review/input the following:

- El Kp
- El Kd
- El Ki
- El Drive (Drv) Time
- El Int Time

⚠**Do NOT change values unless needed.**

The screen may now ask "**Would you like to configure miscellaneous parameters?**" **NO** will move user to **Step 11**. **YES** will allow user to review/edit data for the following:

- El Overcurrent Trip
- El Overcurrent Time
- El Brake Delay

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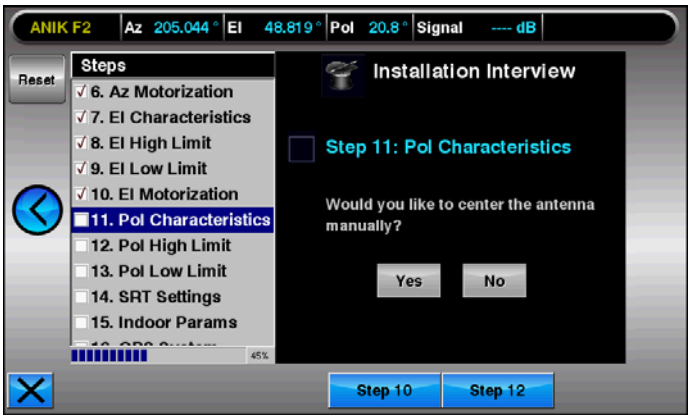
STEP 11: POLARIZATION CHARACTERISTICS

If Pol Drive is NOT present, this step will skip automatically. If a Pol drive is present, screen will ask "**Would you like to center the antenna manually?**" Pressing **YES** will redirect user to **Jog** screen so antenna can be centered.



Pressing **NO** will allow you to review the following data (use Sub-Step Arrows to navigate):

- Pol Encoder Offset
- Pol Ratio
- Pol Rsp T/O
- CW Coast
- CCW Coast
- Pol Invert

⚠**Do NOT change values unless needed.**

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STEP 12: Pol HIGH LIMIT

⚠**Software Limits (SW Lmt)** are input by the **HANDHELD/ODU; DO NOT CHANGE THEM.**
If Pol Drive is NOT present, this step will skip automatically.
The screen may ask **"Would you like to move to the CW limit manually?"** Pressing **NO** allows you to review/edit the input value for **Pol CW Plat SW Lmt** to make sure it is correct. **YES** will redirect to **Jog screen**.

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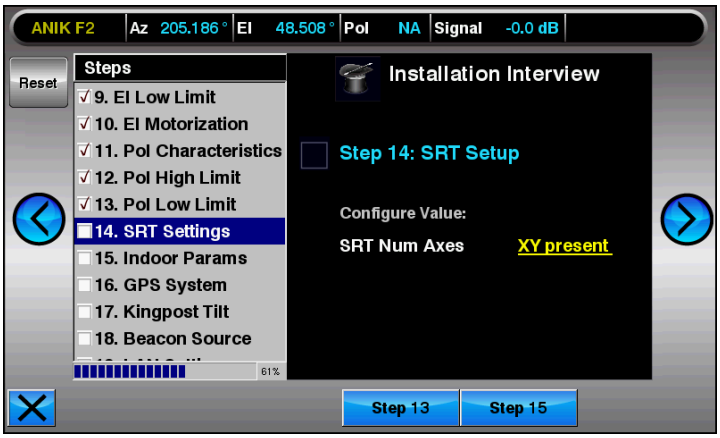
STEP 13: Pol LOW LIMIT

⚠**Software Limits (SW Lmt) are input by the HANDHELD/ODU; DO NOT CHANGE THEM.**
If Pol Drive is NOT present, this step will skip automatically.
The screen may ask **"Would you like to move to the CCW limit manually?"** Pressing **NO** allows you to review/edit the value for **Pol CCW Plat SW Lmt** to make sure it is correct. **YES** will redirect to **Jog screen**.

STEP 14: SRT SETTINGS



Step 14 is for SRT systems only. If an SRT is present, the system should detect it. If no SRT is present (or is for some reason not being detected) the screen will read "**No SRT detected. Should one be present?**" if system **DOES NOT have an SRT**, press **NO** and move on to **STEP 15**. If system **DOES have an SRT**, ensure it has been properly connected to the system, and follow the on-screen instructions.

If SRT is present and detected, configure the SRT Num Axes.

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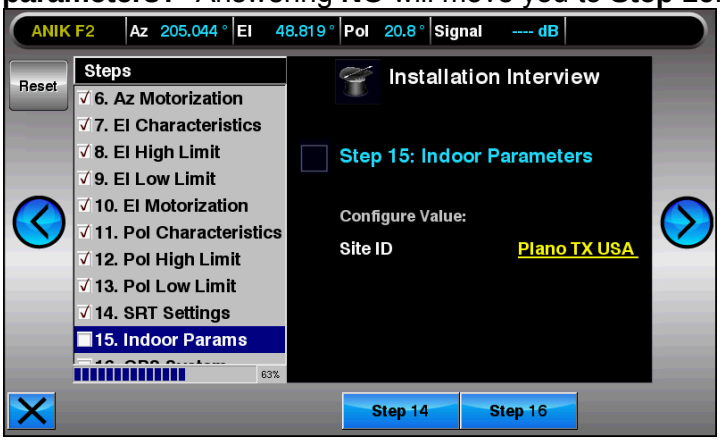
STEP 15: INDOOR PARAMETERS

If **Step 15** has already been completed, the screen will read "**Would you like to review the general indoor parameters?**" Answering **NO** will move you to **Step 16**. Initially, it will present the screen shown below.



YES will allow the user to review/edit the following values as needed. It is recommended that this data be recorded, for future reference, in the areas provided below:

- **Site ID**:_____
- **Deg Prec**: _____
- **Product Key**:_____

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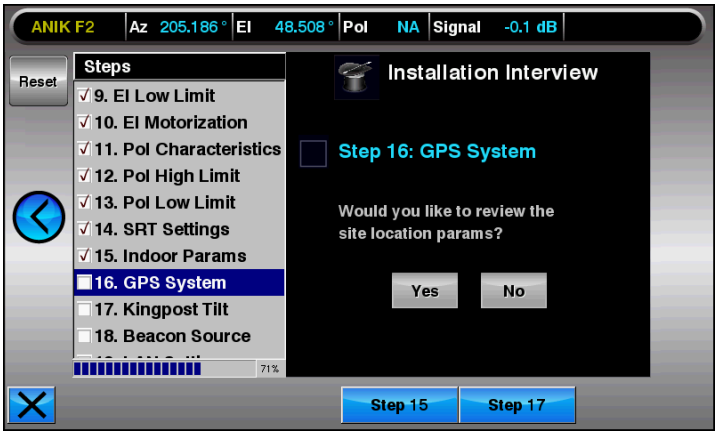
STEP 16: GPS SYSTEM



If the system has the GPS option, the NGC-IDU should detect this and will configure the location values on its own. Screen may ask "**Would you like to review the site location parameters?**" Press YES to review data (user may wish to record this info for future use).

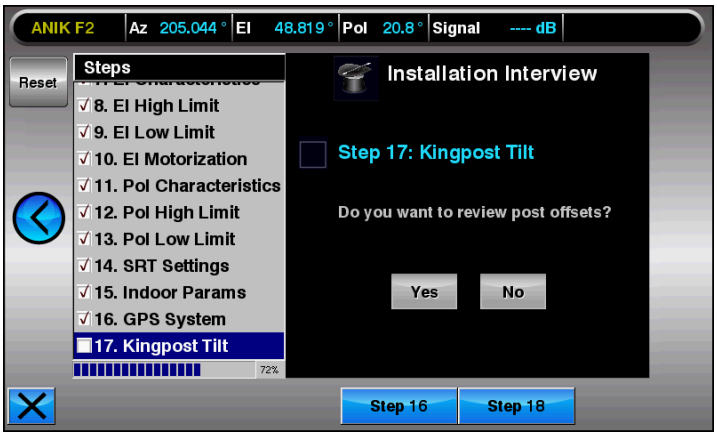
OPTION: if system **DOES NOT have GPS** (or it is not being detected for some reason), screen will display "**No GPS detected. Should there be?**" if a GPS should be present but is not detected, press YES, ensure device is connected to the system, and follow the on-screen instructions.

OPTION: if system **DOES NOT have a GPS option**, simply press **NO** and move on to **Step 17**. If GPS present and is detected, press **YES** and review/edit the following parameters:

- Latitude
- Longitude
- Altitude
- Time

STEP 17: KINGPOST TILT (POST OFFSETS)

The screen may ask "**Do you want to review post offsets?**"



⚠**ONLY QUALIFIED PERSONNEL SHOULD ALTER KINGPOST TILT PARAMETERS**

Pressing **NO** will move you on to the next step.

Pressing **YES** will allow you to review/edit data as needed for the following parameters (if unit is MOBILE, this step may be skipped):

- Roll
- Pitch
- Heading

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STEP 18: BEACON RECEIVER SETUP

If this step has been completed in the past, the screen will ask "**Would you like to review the beacon setup?**" If Bcn Rcvr is **configured for analog input**, **NO** will move to **STEP 19**. If **NOT configured for analog input**, **NO** will allow user to configure **LOW SIGNAL LVL**. **YES** allows review and edit of the below listed values. Note that all of the above only applies if this step has been previously checked off.

If **Step18** has **NOT** been previously checked off, the user will be allowed to review/input the following values:

- LNB Local Oscillator (MHz)
- Bcn Inversion (True = YES, the Beacon is INVERTED; False = NO, the Beacon is NOT INVERTED)

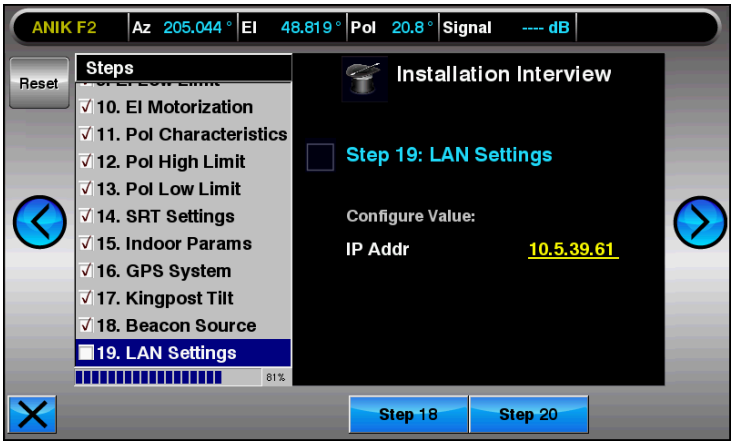
The screen will then ask "**Does the system control the Beacon Receiver?**" Answer **YES** or **NO** to this question, based on the below information:

- **YES** = review and/or input specific **Device Type**. System will search for a default template and, if one is found, will display "**Default setups exist. Apply?**" Answer **YES** to **apply defaults**, or **NO** to manually input values for **Serial Baud Rate**, **Serial Control**, **Serial Multi-address** (addr), **Bcn Offset**, **Bcn Slope**, and **Low Signal Lvl**.
- **NO** = review and/or manually input values for **Bcn Offset**, **Bcn Slope**, and **Low Signal Lvl**.

STEP 19: LAN SETTINGS

If **Step 19** has already been completed, screen will ask "**Would you like to review the network settings?**" Press **YES** to review. Pressing **NO** may cause screen to ask "**Would you like to review the ethernet settings?**" Press **YES** to review. Pressing **NO** may cause screen to ask "**Would you like to review the SNMP settings?**" Press **YES** to review.

If this is the initial Installation Interview, you will be presented with the screen shown below.



This screen will allow review/edit data of the following values (use Sub-Step Forward Arrow to navigate):

- IP Address (Addr)
- IP Mask
- Gateway

OPTION: the above three values only apply if system has the Ethernet option.

- SNMP Off (**True** = it is **OFF**; **False** = it is **ON**)
- Read Community (public, private, etc.)
- Write Community (public, private, etc.)
- Trap Community (public, private, etc.)

Use the Sub-Step Forward Arrow to move on, or press the **Step 17** Button at the bottom of the screen.

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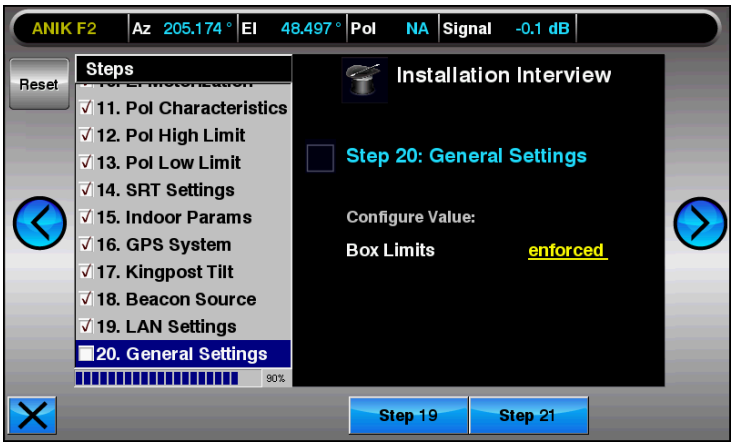
STEP 20: GENERAL SETTINGS



If this step has been previously completed, the screen will ask, "**Would you like to review the general settings?**" **YES** will allows review/edit of the below listed values. **NO** will move you to next step.

This screen will allow the review/edit of the following parameters:

- Box Limits
- Premove Alarm (Alm) Time

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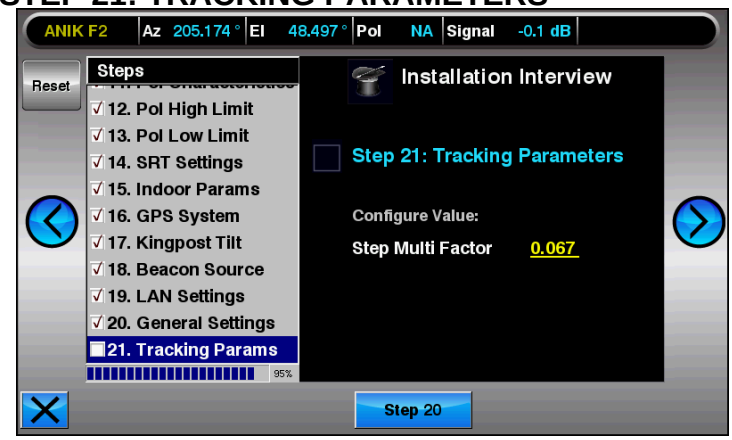
STEP 21: TRACKING PARAMETERS



If this step has been previously completed, the screen will ask, "**Would you like to review the tracking settings?**" **YES** allows review/edit of the below listed values. **NO** will move you to next step.

This step allows review/edit of the following values:

- Step Multi Factor
- Step Cycle Time
- Step Cycle Threshold (Thresh)
- Cycle Time
- Minimum Move
- NORAD Life
- INTELSAT Life

STEP 22: PLATFORM PARAMETERS

This screen will allow the review/edit of the following values:

- True Azimuth
- True Elevation
- True Polarization (if Pol is present)

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THIS CONCLUDES THE INSTALLATION INTERVIEW PROCESS

3.3 Checking the Beacon Receiver Interface

Before attempting to peak up or track, the user should make sure the beacon receiver interface is working correctly.

To check the basic beacon receiver interface:

1. If using an analog beacon, check the cabling, specifically the analog cable to J11 (see **Section 1.12** for details).
2. If using the serial connection to the beacon receiver, check the serial cable to J12 (see **Section 1.12** for details).
3. If using the Spectrum Analyzer, check to see the L-band downlink is connected to J15.
4. If using a serial connection to the beacon receiver, check to see if it is working.
    a. Path: **Home → Configuration → Tracking Config → Beacon Rcvr**
    b. Check beacon receiver type to make sure it matches the beacon receiver
    c. Path: **Home → Status → Faults**
    d. Ensure no Beacon Comm Fault is declared. If one is active, correct the beacon receiver connection. Note that the Atlantic Satellite receivers will declare communications faults if they are in LOCAL mode.
5. Testing the analog connection can be difficult without an active signal. With some beacon receivers, the user can adjust the slope and offsets to produce analog voltages. A signal generator can always be used to check the beacon receiver interface.
6. If using the Spectrum Analyzer, check to see if the analyzer appears to be making traces.
    a. Path: **Home → Operations → Spec An**
    b. You should be able to see the noise floor of analyzer varying slightly per trace

To check the response of the beacon receiver, you may need to steer the antenna slightly off the beam.

The following is a procedure for checking the response of the beacon receiver:

1. Determine the true receive 3dB beamwidth at the downlink frequency of the beacon receiver. The value computed by the IDU is an estimate using a generic formula. The true beamwidth should be available from the antenna manufacturer and may vary somewhat. Record this value.
2. Peak the antenna as well as possible using either the tracking system or manual jogging. Record the signal strength from the status bar.
3. Carefully steer the antenna off beam “up” by as close to exactly one-half the value determined in Step 1, above. Record the measured signal strength from the status bar.
4. Carefully steer the antenna off beam “down” from the point recorded in step 2 by as close to exactly one-half the value determined in Step 1, above. Record the measured signal strength from the status bar.
5. Compute the average of the measurements in step 3 and step 4. This average should be roughly 3dB below the value recorded in step 2.
6. If it is not, repeat the test using an external spectrum analyzer to check the 3dB response outside the beacon receiver-NGC combination.

Do not use Az for this test as Azimuth’s apparent 3dB beamwidth varies with the secant of the El angle due to the geometry of most mounts.

If there is no response at all from the analog interface, and the serial interface is connected and supported, try changing the beacon source to digital (serial) and repeating the test.

Use the following path and procedure in order to do this:

1. Path: **Home → Configuration → Tracking Config → Beacon Rcvr**
2. Change Bcn Data Type to digital
3. Repeat previous steps 1 through 5 (see the above steps)
4. Path: **Home → Configuration → Tracking Config → Beacon Rcvr**
5. Change Bcn Data Type back to analog

3.4 Initial Satellite Peak-up

When the antenna control system has not yet been completely aligned, finding and peaking on the first satellite can take some time. This section gives a procedure for doing this.

Once a satellite has been chosen, the antenna controller operator must peak up on that satellite for the first time. If the beacon receiver is connected, the readings from the beacon level may be used to peak. Otherwise, the operator must use another source to identify when the antenna is peaked on the satellite, refer to the satellite acquisition procedure below.

The operator may use both position designate and jog commands facilitate peaking. The displayed Az and El on the top of the screen may not be valid position readings as the resolvers have not been calibrated yet.

The actual antenna pointing angles may be approximately determined by using an inclinometer for the Elevation pointing angle and using the antenna foundation dead heading or a compass to determine the antenna Azimuth angle. Change the Azimuth and Elevation encoder offsets until the Az and El readings are approximately correct. Then steer the antenna to the approximate location of the satellite.

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3.4.1 Manual Peaking

At this point, if no beacon receiver is available, an external spectrum analyzer (not supplied) can be used. The specific procedure to acquire the satellite is as follows:

1. Connect the Spectrum Analyzer to the LNA output or convenient downlink monitor port.
2. Set the Spectrum Analyzer center frequency to the correct frequency for the satellite to be acquired.
3. Set the Spectrum Analyzer Settings to produce a fast sweep, as shown below:
   - Reference Level: As applicable
   - Input Attenuator: 0 dB
   - Scale: 10 db/Division
   - Center Frequency: For the base satellite
   - Span: 200 MHz
   - Resolution Bandwidth: Auto
   - Video Bandwidth: Auto
   - Sweep Time: Auto
4. Manually move the antenna in Az at the initial El angle over the range of ± 2°
5. While moving the antenna, monitor the Spectrum Analyzer for signals.
6. If signal detected, maximize the received signal level by tweaking the antenna Az and El angles
7. If a signal is not detected, increment and then decrement the antenna El angle, in steps, and repeat above until the satellite is acquired or

The step size should be equal to one-half of the half-power beamwidth. The NGC-IDU will calculate this on its own.

The above procedure is intended to peak the antenna on the satellite. To complete the antenna peaking on the satellite, align the antenna feed Polarization with the satellite by peaking the co-polarized feed port with a satellite signal or null the cross-polarized feed port with a satellite signal by rotating the feed.

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3.4.2 Automatic Peaking with an external analyzer

Whether or not the beacon receiver is present, the NGC-IDU can be used to peak the signal somewhat automatically.

1. Verify that the Antenna Size, beacon frequency, and LNB Local Oscillator are configured.
2. Set up the external analyzer as described in the previous section (**3.4.1**).
3. Pre-Position the antenna as described.
4. Follow path: **HOME → Operations → Track**
5. Set the Track Mode to **Step.**
6. Press the Scan button.
7. While the controller is moving the antenna, monitor the Spectrum Analyzer for signals.
8. If a signal is detected, press the STANDBY key. Maximize the received signal level by jogging the antenna's Azimuth and Elevation angles.

During the scan, the antenna controller will execute a spiral scan with appropriate step sizes.

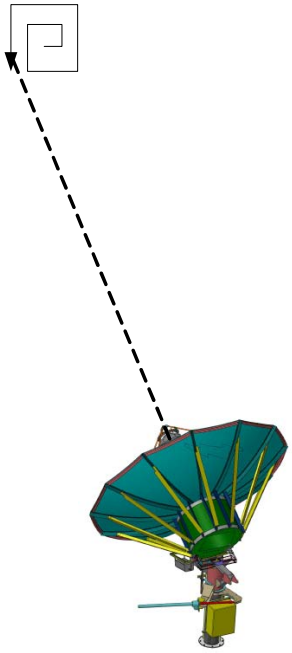

Figure 3-2: Spiral Scan

3.4.3 Adjusting the tracking level

Once the first satellite is acquired, the beacon receiver parameters and attenuation should be adjusted so the clear sky is 0.0dB after precise peaking. If using an analog beacon receiver, set clear sky so it is also about 7.5 to 8.0 volts. This process is a combination of configuring the beacon receiver and the NGC-IDU.

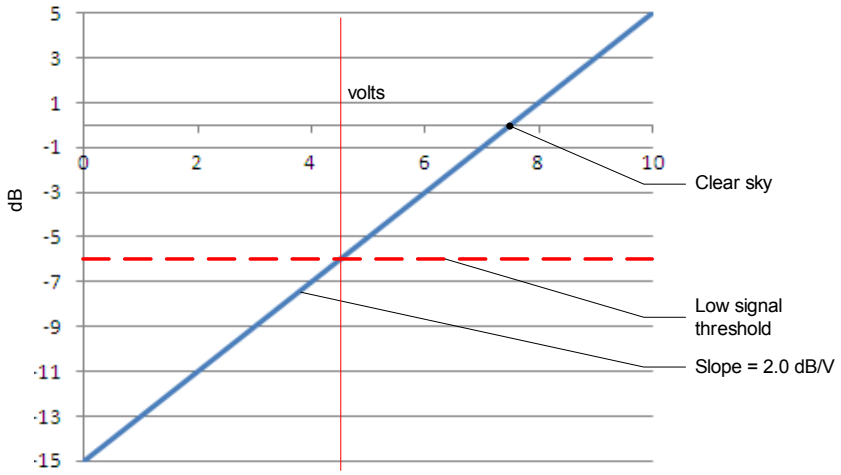

Figure 3-3: Analog Beacon Receiver Example

3.5 Platform Configuration

The platform configuration elements tell the NGC-IDU and NGC-ODU the antenna's size, how the pedestal is mounted, and the information needed to determine where the antenna is pointed. Most of the settings here are stored in and used by the ODU. The following sections will describe how they are to be used.

3.5.1 Antenna Size

The IDU needs to know the antenna size as part of the process of estimating 3dB beamwidth. The antenna size is always in meters.

To view or change the antenna size, use the following path:

- Path: **HOME → Configuration → Platform**

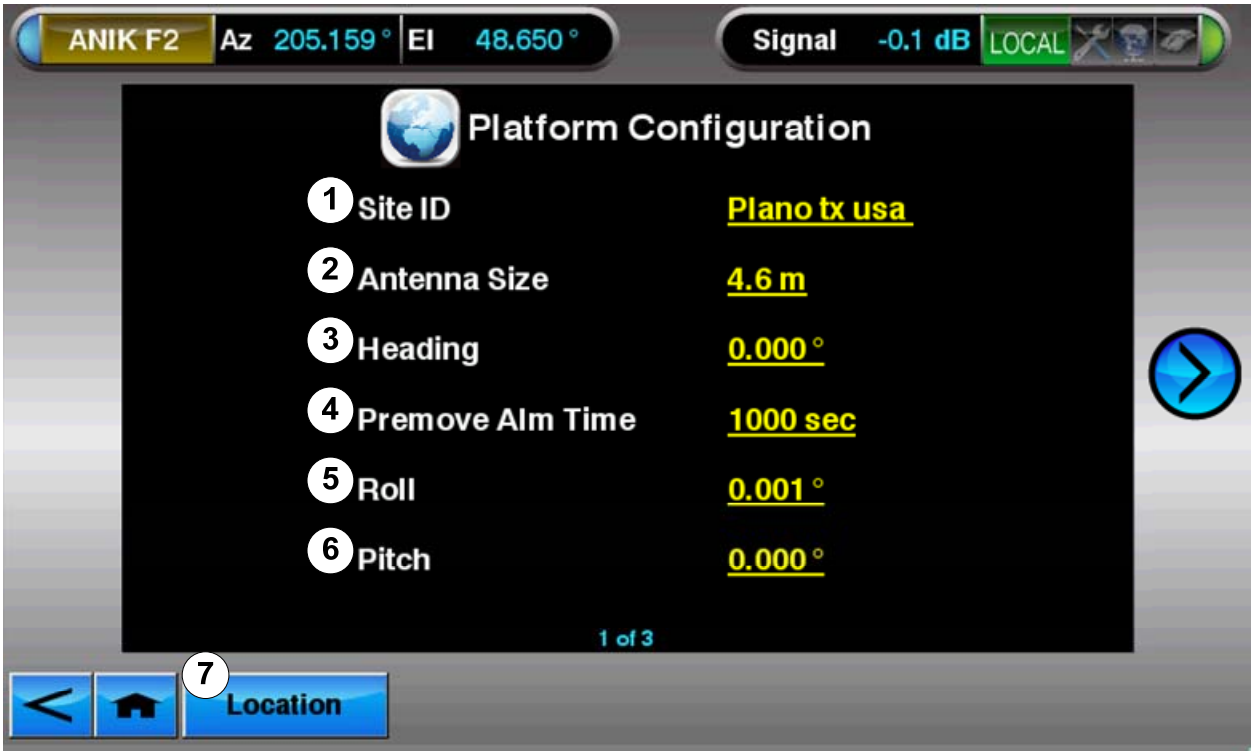

FIGURE 3-4A: PLATFORM CONFIGURATION SCREEN 1

#	Item	Description
1	Site ID	Name of site
2	Antenna Size	Antenna size in meters. Primarily used to guess 3dB beamwidth
3	Heading	True heading that corresponds to 0 degrees for platform Az
4	Roll	Angle of kingpost side-to-side; around a vector pointing straight out from 180 degrees, typically. Usually set to 0.0
5	Pitch	Angle of kingpost side-to-side; around a vector pointing straight out toward 90 degrees, typically
6	Premove Alm Time	How long to wait before moving if alarm is installed
7	Location	Pressing this navigates to the Location Configuration screen (see **Section 3.5.4**).

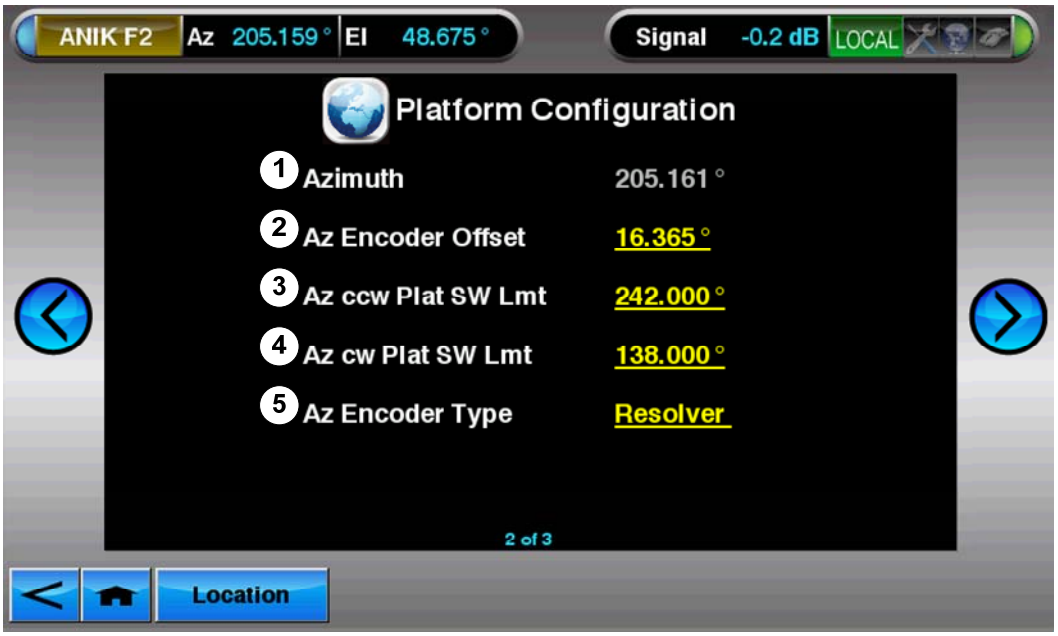

FIGURE 3-4B: PLATFORM CONFIGURATION SCREEN 2

#	Item	Description
1	Azimuth	Current global Az calculated from platform angles, attitude, and SRT position
2	Az Encoder Offset	Offset added to raw resolver offset to get to current platform Az
3	Az CCW Play SW Lmt	Software limit, min legal value of Current Platform Az. If Target Platform Az lower than this, impossible angle will be declared
4	Az CW Plat SW Lmt	Software limit, max legal value of Current Platform Az. If Target Platform Az greater than this, impossible angle will be declared
5	Az Encoder Type	Az axis angle feedback device type & architecture, selected from list of predefined types

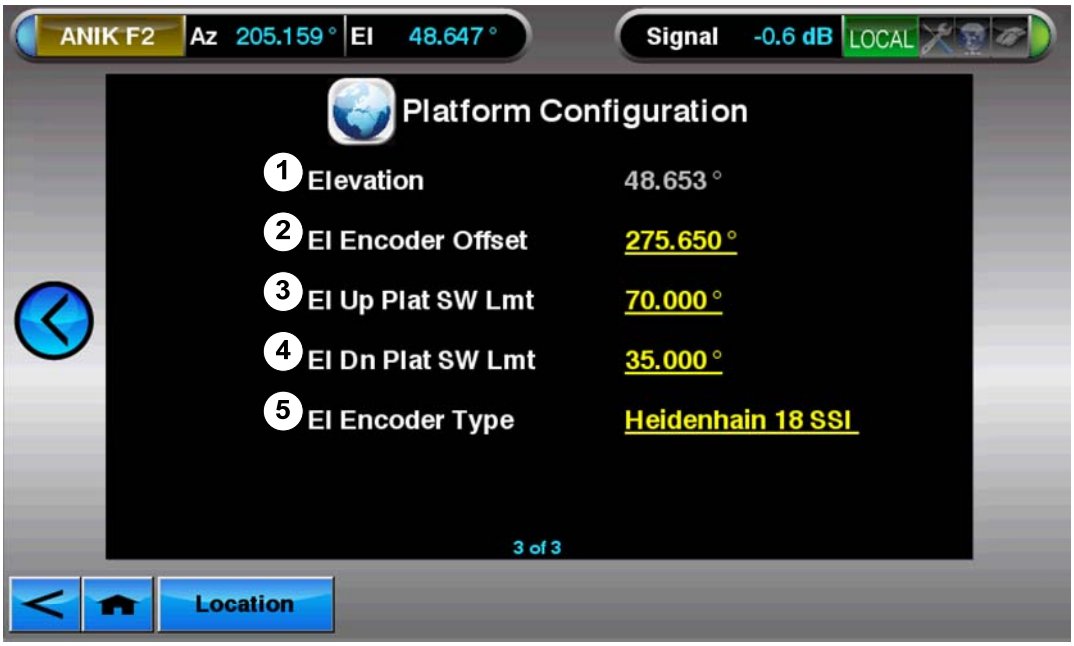

FIGURE 3-4C: PLATFORM CONFIGURATION SCREEN 3

#	Item	Description
1	Elevation	Current global El calculated from platform angles, attitude, and SRT position
2	El Encoder Offset	Offset added to raw resolver offset to get to current platform El
3	El Up Plat SW Lmt	Software limit, max legal value of Current Platform El. If Target Platform El is greater than this, impossible angle will be declared.
4	El Dn Plat SW Lmt	Software limit, min legal value of Current Platform El. If Target Platform El is lower than this, impossible angle will be declared.
5	El Encoder Type	El axis angle feedback device type & architecture, selected from list of predefined types

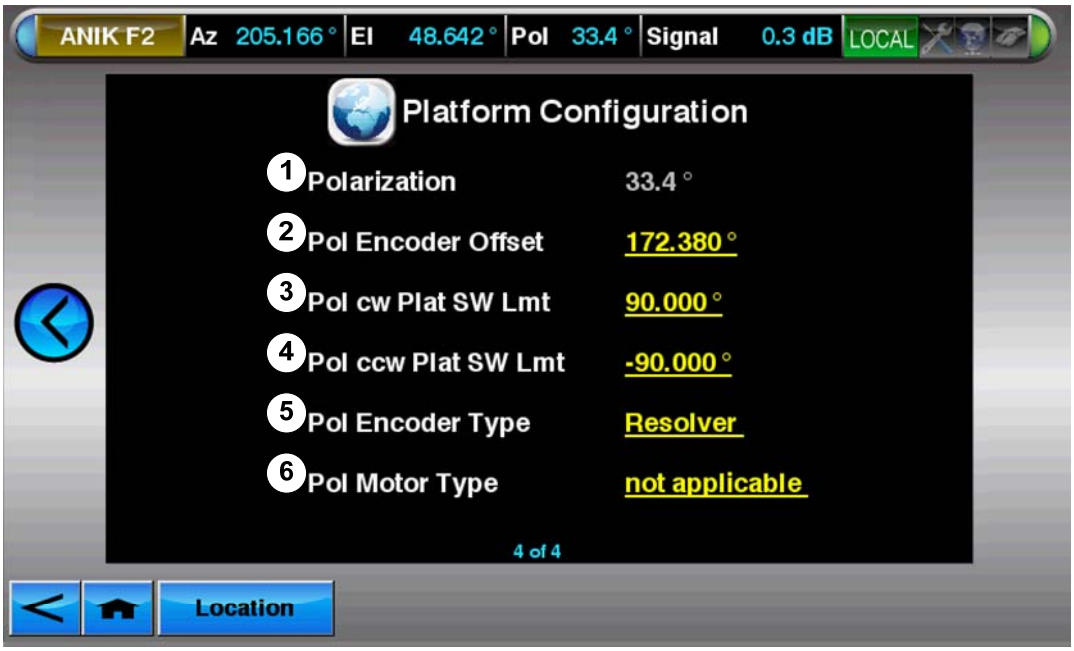

FIGURE 3-4D: PLATFORM CONFIGURATION SCREEN 4 (AC POL MOTOR TYPE)

#	Item	Description
1	Polarization	Current global Pol calculated from platform angles, attitude, and SRT position
2	Pol Encoder Offset	Offset added to raw resolver offset to get to current platform Pol
3	Pol CW Plat SW Lmt	Software limit, the max legal value of Current Platform Pol. If Target Platform Pol is greater than this, impossible angle will be declared.
4	Pol CCW Plat SW Lmt	Software limit, which is the minimum legal value of Current Platform Pol. If Target Platform Pol is lower than this, impossible angle will be declared.
5	Pol Encoder Type	Pol axis angle feedback device type & architecture, selected from list of predefined types. Will display "**Resolver**" **for AC** Motor Type; For **DC Motor Type**, will display "**Potentiometer**".
6	Pol Motor Type	If no Pol present, will read "not applicable." For AC Pol Drive, should display "----". For DC Pol Drive, should display a motor type (i.e. "NEMA 23 HIS")

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3.5.2 ANTENNA ENCODER OFFSETS, TYPES, AND LIMITS

The NGC-ODU has two built-in coordinate systems: Local coordinate system and Global coordinate system. The ODU takes raw resolver/encoder readings and adds programmed center offsets to create platform angles that, when combined with SRT offsets (if present), make up the local coordinate system.

Soft movement limits are always specified along real axes in the NGC-ODU and IDU. Therefore, for example, the Azimuth limits are "CCW platform SW Limit" and "CW Platform SW Limit". The IDU does not calculate or enforce travel limits based on the global coordinate system (Note, however, that the box limits are calculated and enforced as global coordinates).

Use the following path and procedure to view or change the encoder offsets, encoder type, and soft limits:

- Path: **HOME → Configuration → Platform**.
- Go to the page associated with the axis (Az, El, Pol: see **Figures 3-4a** to **3-4e**)

NOTE: if the encoder center offsets are changed, it may be necessary to change the software limits as these are not automatically connected to each other in the software.

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3.5.3 HEADING, ROLL, AND PITCH

The heading, roll, and pitch values are used to adjust this system for the orientation of the pedestal through a mathematical transform. The resulting (true) Azimuth, Elevation, and Polarization are sent to the IDU. If the heading, roll, and pitch angles are all 0°, this transform is an identity. The following figure shows the flow of calculations.

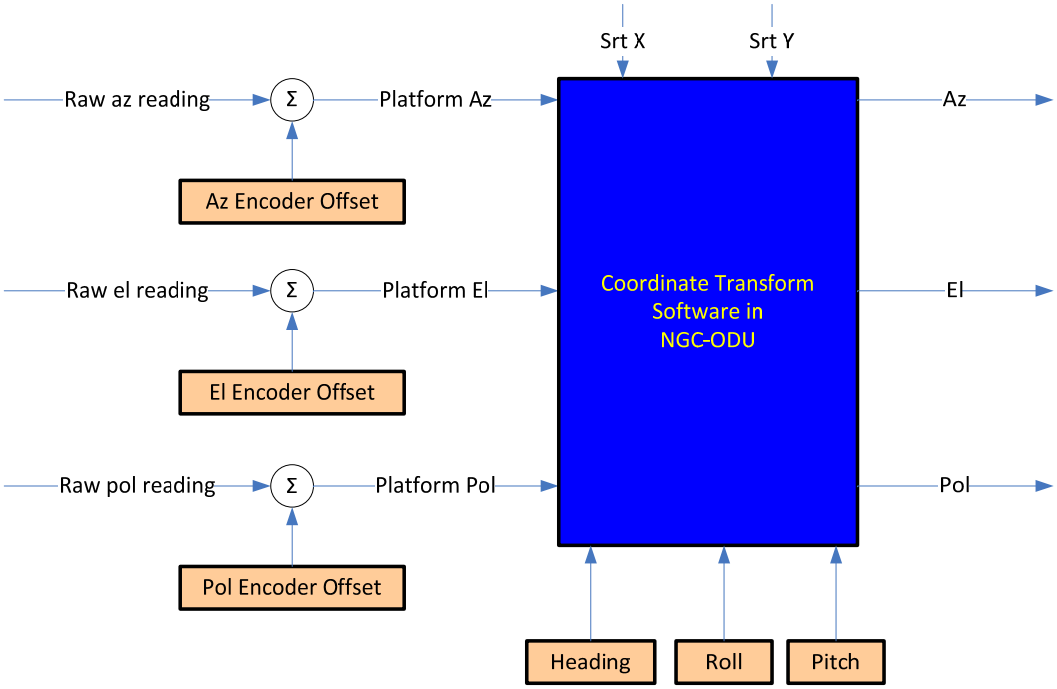

FIGURE 3-5: ODU COORDINATE TRANSFORM FLOW

The heading value can be used to allow for the antenna not being mounted with the center of travel facing due South. See Appendix A for an example of what to do for an antenna that is installed in the Southern Hemisphere.

The roll and pitch values can be used to correct for what is called “kingpost tilt.” Kingpost tilt is basically a deviation of the Az axis of rotation from perpendicular. For a fixed antenna, the following diagram shows the relevant terms. For example, if an antenna is installed so the pedestal is leaning back by 1.2° from perpendicular in the North direction, the resulting effects on the coordinate system can be largely corrected by setting the pitch setting to -1.200°.

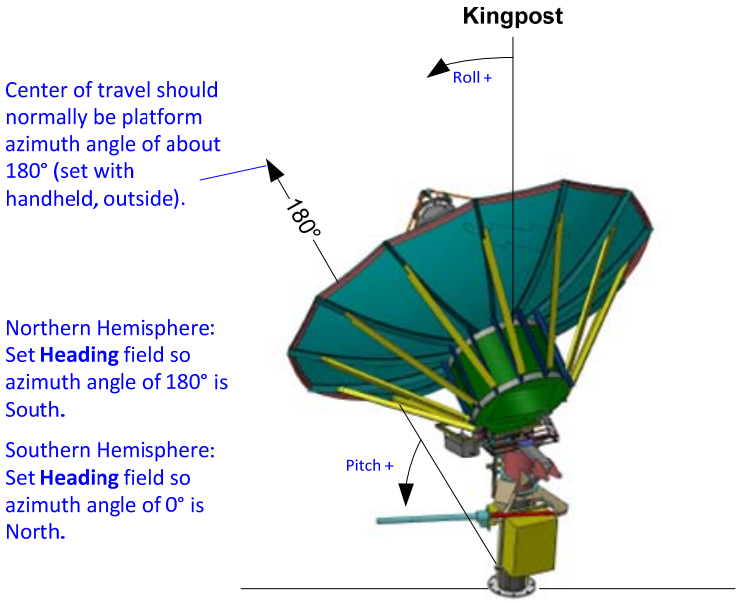

FIGURE 3-6: ROLL & PITCH IN NGC-ODU & HOW THEY ARE USED

In a mobile TriFold® antenna, this calculation is very important and is automatically applied (see **Appendix F**). This is an unusual correction for a fixed antenna; however, all NGC equipment is capable of making it.

Use the following path to view or change the heading, roll, or pitch:

- Path: **HOME → Configuration → Platform**

3.6 Earth Location Configuration

Earth Location is a critical parameter for the NGC-IDU. The Earth Location is used to compute satellite look angles from orbital parameters. The site latitude and longitude are especially critical. Altitude is less so, although it may make a small difference for large antennas with tight pointing requirements.

If the NGC-IDU is connected to a GPS service, either through the AS-1 module as in a TriFold® controller, or through the 10MHz reference option, it may not be necessary to enter this information directly.

Use the following path and procedure if no GPS service is available, in order to enter the latitude, longitude, and altitude:

- Path: **HOME → Configuration → Platform**
- Press the Location navigation button.

NOTE: latitude and longitude are entered in fractional degrees, not in degrees and minutes.

3.7 Tracking Start, Stop, & Status Check

The NGC-IDU screens can be used to start and stop tracking, and to check on the status of tracking. For a detailed breakdown of the various screens related to Tracking Operations, refer to **Section 2.7.1** in this manual.

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3.7.1 Start Track

Assuming that tracking has been configured to suit the user, use the following path and procedure to start the system tracking:

1. Path: **HOME → Operations → Track**
2. Press the **Resume Track** or the **Pre-Charge** button, depending on what action is desired

For 3PP step-track, NORAD, and Intelsat, "Resume Track" is the usual selection.

"Pre-Charge" is appropriate for SmarTrack® when the user has been Step-tracking for some period of time. Pre-Charge will use the position log information from previous peaking intervals to retrospectively build the model. See **Section 4.3** in this manual for more information on SmarTrack®.

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3.7.2 Stop Track

There are several ways to stop tracking.

1. From anywhere, press the STANDBY button on the front panel. This will abandon all current movement and place the NGC-IDU tracking subsystem into stop mode.
2. From **HOME→Operations →Track**, press the Pause Track button. (This button only appears when the system is actively tracking.)
3. From the Jog screen, press the Pause Track button. (This button only appears when the system is actively tracking.)

The NGC-IDU does not pause tracking because of any NGC-ODU-reported fault condition. The NGC-IDU will continue to attempt to track through faults as best it can.

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3.7.3 Status Check

The simplest way to check the status of tracking is to check the Tracking LED on the front panel. If it is a steady blue or a slowly blinking blue, the system is tracking.

- Path: **HOME→Operations → Track**
- Track Status field gives the precise status of tracking.

See **Table C.28** for detailed explanations of the statuses.

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3.7.4 Automatic Track Resume

The NGC-IDU can be configured to resume tracking automatically upon NGC-IDU power-up.

To set this up, use the following path and procedure:

1. Path: **HOME → Configuration → Tracking Config → General**, page 3 (on screen)
2. Edit the **Auto Track Resume** field to "true"

Automatic Track Resume has the following four requirements:

1. The feature must be enabled.
2. A box limit must be configured for the current satellite.
3. Box limit enforcement must be turned on.
4. The system has to have been tracking at the time of power-down or reboot.

If any of these four requirements are not met, the NGC-IDU will not resume tracking on power-up. An entry will be made in the Fault/Event History indicating this, and why.

3.8 Configuring the Network

The IDU can be connected to a TCP/IP-based Ethernet network using port J3 on the back panel. This is a standard 100BaseT network connection on a RJ-45 connector.

Please note the IDU may not work well with some older 10BaseT-only Ethernet hubs. If the IDU does not appear to be functioning correctly on the network, check to see if the equipment supports 100BaseT.

The IDU is designed to work with a static IP address only.

To configure the static IP address, use the following path: **HOME → Configuration → System Setup**

Doing this requires the following three pieces of information:

- IP Address
- IP Mask
- Gateway (also known as a router)

Selection of IP addresses and masks and router addresses is out of scope for this document. Generally speaking, configuring these should only be done in cooperation with qualified IT support personnel.

Each IP address, mask, and gateway consists of four decimal numbers between 0 and 255 separated by periods, e.g., 1.2.3.4. This is called dotted-decimal notation. When entering these numbers, do not add any extra leading 0s; the system will follow the UNIX/Linux convention of treating these as base-8 numbers, which is probably not is desired.

Sometimes the IP Mask is specified in slash form as part of the IP Address, e.g., 1.2.3.4/24.

The following table converts common slash forms to dotted-decimal form:

Table 3.1: Common Slash-to-Decimal Forms

Slash notation	IP mask
/8	255.0.0.0
/16	255.255.0.0
/24	255.255.255.0
/25	255.255.255.128
/26	255.255.255.192
/27	255.255.255.224
/28	255.255.255.240

Once the network is configured, it is best to test it using PING. The use of this utility is outside the scope of this document.

3.9 Baseline Save and Restore

The NGC-IDU has a powerful feature to save, view, and restore known-good configuration settings as a group. This set is called a “baseline.” These baselines are useful for restoring known-good operating conditions automatically.

In the NGC-ODU, parameters are stored in the PWAs closest to where they are “needed.” So, for example, the Polarization ACU is where the master copy of the Polarization coast coefficients are stored. The Pol ASU is where limits and encoder offsets are stored.

To simplify maintenance, the installation documents recommend saving a baseline when installation is completed for restoration.

If these boards are swapped out as part of a repair, the new boards need to have the parameters set to match the system. The easiest and safest way to do this is a baseline restore.

- The current system settings can be saved as the baseline using the Save command on the Baseline screen. This command captures virtually every configurable parameter in the system except the satellite tables and models and saved them internally. Note that it also saves off tracking configuration, beacon configuration, and so forth.
- The current system settings can be compared to the baseline using the Diff command on the Baseline screen. All differences are displayed in the text window on the screen.
- The baseline must be re-applied to the system using the Restore command on the Baseline screen. Restoring the baseline takes roughly one minute.
- Subsets of the baseline can be re-applied for Az, El, Pol, and so forth using the Restore Select screen. When components are replaced, this is the recommended way to do this.

NGC-ODU parameters can also be saved and/or restored using the Handheld Terminal. See either of the NGC-ODU manuals (**7580368** for Technicians; **7581776** for General Users) for details on this function.

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3.9.1 Custom Polarization

For TriFold® systems with interchangeable feeds, the Save Pol function on the Baseline screen can be used to save a set of parameters specific to the current band and Pol function.

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3.9.2 Multi-Band Systems with Interchangeable Feeds

ASC Signal's TriFold® antennas include removable, interchangeable feeds. If feeds use traditional AC motors, ODU & IDU need to be slightly reconfigured when feed changes to adjust to different encoder offsets and software limits from feed to feed. This can be done manually, but automatic means is available.

If working set entry for a satellite includes a Band and a Pol Type selection other than auto, the controller will attempt to apply a "Pol template" for a baseline matching the indicated band and Pol selection if one is saved (If not, there is a message indicating this when the satellite is selected for GoTo or ReTune).

To create template, user should first create the satellite and specify the band and Pol, and attempt to use ReTune command. User should then manually configure system, including the following parameters:

- Polarization configuration
- Polarization encoder center offset
- Polarization software limits
- Polarization coast coefficients
- Polarization ratio
- Polarization deadband
- Polarization timeout

Once parameters are satisfactory, user should go to Baseline screen and select Save Pol. At this point, settings will be associated with Band and Pol configuration of current satellite. They will be automatically recalled whenever any satellite of this combination of Band and Pol configuration is selected for use.

NOTE: once user has elected to use the automatic means, it's not possible to revert to manual means. Corresponding Pol template cannot be deleted. It can only be updated.

3.10 System Time

NORAD, Intelsat, and SmarTrack® require accurate synchronization of the NGC's system time to Universal Coordinated Time (UTC), also known as "GMT" or "Zulu time". Other forms of tracking do not require the time be synchronized; however, event logs and other data will be more useful if the time is set.

The IDU system can get system time from several sources:

- Built-in clock
- NTP server
- AS-1

The NGC-IDU has a built-in battery-backed-up real time clock module. This clock is accurate to ±1 minute per month and should hold the date and time for approximately 10 years. This also allows the IDU to ride through outages of any other source for reasonable amounts of time. The clock module is located in the IDU SCP module.

The NGC-IDU can acquire time from any network host or device reachable from the LAN port (connected to **J3**) that implements the Network Time Protocol (NTP) according to RFC 1305. This interface is commonly implemented by commercial GPS systems. The protocol obtains four samples from the server specified on the System Config page, using port 123, and these values are filtered and the best value is selected. NTP is usually capable of keeping the system synchronized to less than one second, which is far more than is needed for any tracking application. Note that, as of this version, there is no alarm generated if the NTP client in the NGC cannot reach the server, the only way to tell if this is working is to check the time. In this case, date and time will be automatically set and maintained. The NTP client runs every 15 minutes, or whenever the NTP server address is entered by the user (even if it does not change).

The NGC-IDU can obtain time from the external GPS in the optional ASC Signal AS-1 module. For mobile TriFold® systems where no connection to the Internet is available, this is mandatory. An AS-1 can also be installed in fixed applications to serve as both a system time and location source. In this case, date and time will be automatically set and maintained.

Generally speaking, it is safe to use all three as long as the NTP server is properly synchronized to the GPS time system.

If no GPS or NTP time is available, the user may directly enter the current date and time from the Current Time field on any page that displays it, e.g., the System Config page. Note that if the user enters time into a system with an NTP connection, it may be overridden within 15 minutes, as soon as the NTP client runs again.

Unlike some other systems, the IDU allows the system date and time to be changed at any time. Intervals between tracking steps and other periodic tasks are performed by elapsed time, which is unaffected by setting the clock forward or backward. Note, however, that changing the time may make time-sensitive plots and data look confused or awkward, as previous data samples are not adjusted by the system.

Some NGC Antenna Control Systems may have other time sources, such as built-in GPS references, as well. This is out of scope for this manual.

3.11 Legacy Serial Protocols

Port J9 on the rear panel can be connected to systems that supported legacy APC100/NGC-IDU controllers for limited emulation.

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3.11.1 APC100 Emulation

The NGC-IDU can be configured to emulate, partially, the *ASC Signal Corporation* (formerly *Andrew*) APC100 product previously available. This emulation is limited in some respects, but in general M&C programs written for the APC100 should partially work with minimal changes. The emulation follows section 7 of the APC100 Operation and Maintenance Manual.

The DB9 communication port J9 on the rear of the unit is functionally compatible with the DB25S port on the rear of the APC100 when configured for RS-232 mode. A commercially available adapter can be used to connect the RS-232 ports. (A null modem may be required.)

Note that RS-422 and RS-485 are not supported; if this is required an external adapter should be fitted. The port operates only at 9600 baud, even parity, 8 data bits, and 1 stop bit.

Limitations and restrictions are given in **Appendix E**.

To enable or disable this interface:

1. Path: **HOME → Configuration → System Setup**
2. Set J9 emulation to “APC100”

The “APC 300” and “telemetry” settings are for specific customer use only and are not generally supported at this time.

3.12 License Keys

The NGC-ODU has a limited number of software features that are enabled and disabled by a license key.

A license key will look similar to the following example: **$F4C0-67DA-180B-4202**
NOTE: the above combination of digits is only meant to serve as an example, and is **NOT an ACTUAL license key**

License keys can be obtained from *ASC Signal* Customer Service for the following cases:

- Incorrect configuration of a licensed system, or
- Purchase of a feature not previously licensed.

To obtain a new key, the requestor will need the serial number of the NGC-IDU. This can be obtained from the back label of the unit, or from the NGC-IDU front panel:

To obtain the serial number, use the following path and procedure:

- Path: **HOME → Configuration → System Setup**
- Navigate to page 2 (on screen) and write down the serial number from the Product Serial Number field

Provide this information to the ASC Signal customer service/technical support person.

To enter a new license key, use the following path and procedure:

- Path: **HOME → Configuration → System Setup**
- Navigate to page 2 (on screen)
- Edit the product key carefully. Be sure to preserve the punctuation. (Note that the key is not case sensitive. Be sure to distinguish between the number zero and the letter 'O', and between the number one and the letter 'L'
- Press Save. If the key has been correctly entered, the value will change. If not, an error will be displayed, and the user must start over

Note each license key is only good for the NGC-IDU with the same serial number for which it was generated.

Because there is a random element in key generation, if the key supplied is unclear due to letter/number confusion, you can always request another one. Each possible combination of serial number and features has many hundreds of possible keys.

The key is encrypted and decrypted using a cipher algorithm which is permissible for export from the United States.

3.13 Administration Operations

The following sections will cover screens and processes related to Administration Operations. General Users (unqualified/non-technical personnel) should NEVER access the screens explained in these sections.

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3.13.1 Updating Software

Most updates are made to TPU (front panel) and SCP (internal tracking, SNMP, & data storage system). TPU and SCP are updated separately from separate distributed files. Generally, SCP & TPU software is forward-and-backward-interoperable, and the order of update is not important. There are two common ways to apply updates in the field: jump drive and FTP.

The IDU can copy files from a jump drive plugged into the front panel USB port. This method is preferred. The update packages (.deb files) can be copied to a PC-formatted (FAT32) USB memory stick/jump drive. They should be placed in the root directory of the drive. Pay careful attention to file names.

The IDU can also copy files from an FTP server. This mechanism is fast and reliable, but because of evolving network security policies it has become more and more difficult to support.

Other mechanisms do exist. The programs may be updated via analog POTS modem by ASC Signal support staff as well, in some circumstances if necessary, if data connection is stable enough to support multi-Megabyte downloads. It is also possible to update programs using an RS-232 serial line, although this would not normally be done in the field.

To update the software of the NGC-IDU, use the following procedure:

1. Choose your data source: Internet or File
2. Confirm that the path to the file (fields 2 & 3 in **Figure 2-14**) is correct
3. REFER to the **Following Section**

Updating the IDU and ODU embedded systems is done by installing a firmware image (binary file) through drag-and-drop to each board when it is configured to operate as a USB flash drive mode.

When inserting the jump drive allow about 15 seconds for the NGC to recognize the jump drive.

- Unzip the file
- Copy all files **NGCSCP.4.0.0.0.deb** & **NGCTPU.4.0.0.2.deb** onto a jump drive into the root directory
- Use the "Safely remove hardware" option on the PC to eject the jump drive
- Plug it into the IDU front panel USB jack
- Follow this Path: **HOME → Administration → Update SW**
- Set the SW update source to File
- Edit the SCP SW update path to "**/var/jumpdrive/NGCSCP.4.0.0.0.deb**". It needs to be exact.
- Press Update SCP
- Wait about 4 minutes for update to take. Update is complete when the front panel stops cycling LEDs
- Repeat for the TSM SW update path "**/var/jumpdrive/NGCTPU.4.0.0.2.deb**".
- Press Update TSM
- Wait 3 minutes or so

The handheld terminal cannot be field updated at this time.

During the update process, a prompt may appear on the screen similar to the one shown in the below photo (**Figure 3-7**)

Installing new software package, please wait...
This may take a minute...

Installation complete, restarting panel...
This may take a couple of minutes...

FIGURE 3-7: NGC-IDU RESTART AFTER SW UPDATE

3.13.2 User Management

Path: **HOME → Administration → User Mgmt**

This screen allows the customer administrator user to change the passwords for the configurable security access levels. See **Section 2.2** for more information on access levels.

NOTE: the installer password will is not displayed and cannot be changed.

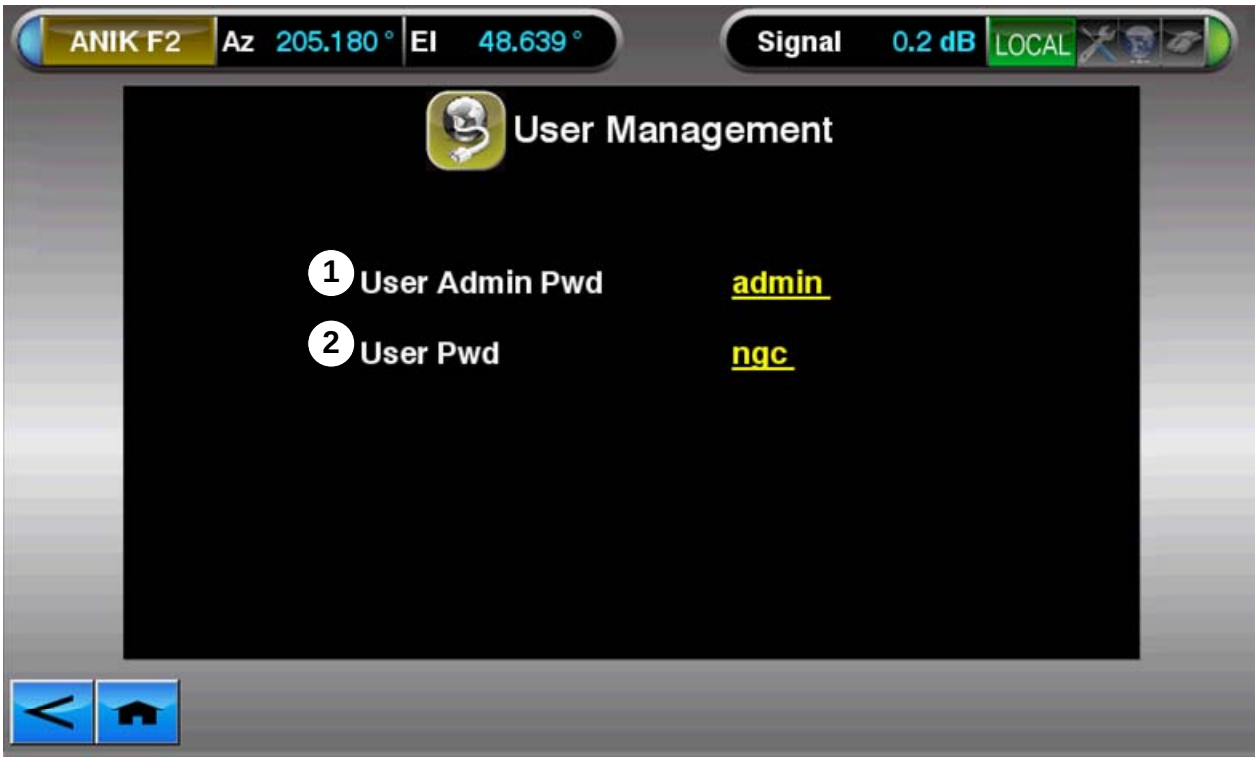

Figure 3-8: User Management Screen

#	Item	Description
1	User Admin Pwd	Password for the customer (or user) administrator mode
2	User Pwd	Password for the user level.

4.0 Intermediate Installation & Setup

The following sections will cover advanced processes and procedures for both the installation and setup of the NGC-IDU.

4.1 NORAD and Intelsat Tracking Setup and Optimization

Depending on software license keys that have been purchased with the system, the NGC-IDU can track satellites using predictive tracking with either the NORAD or Intelsat data sets.

"NORAD" is a shorthand reference to a set of "simplified perturbation models" SDP4/SGP4 that calculate the predicted location of the satellite in orbit over time. The models use data input called two-line element sets (TLEs). TLEs are available for almost all communications satellites from NORAD, NASA, and some commercial sources.

Choosing the best tracking mode depends on a number of potential factors.

Tracking modes can be roughly categorized as follows:

- Empirical methods that use the received beacon signal as the only source for pointing angles. If the beacon signal degenerates due to weather or other issues, this kind of tracking stops
- Predictive methods that use the mathematical data as the only source for pointing angles. These are immune to beacon loss but subject to several sources of errors
- Hybrid methods that use empirical methods to collect data which is processed by a modeling system and used to generate pointing angles which may be used instead of empirically measured pointing angles

The following table gives the tracking modes supported by various ASC Signal controllers:

Table 4.1: Summary of Some Tracking Techniques

Tracking approach	Summary	Method Type
3PP/other	Periodic or continuous signal peak through hill-climb or parabolic fit algorithm	**Empirical**
Adaptive Continuous Step Track	3PP with movement projected by linear extension of observed peak locations	**Empirical**
SmarTrack® orbital prediction	Fit of observed Az and El to model of orbital dynamics. Update model with periodic peak measurements.	**Hybrid**
NORAD Predictive	Unit follows look angles predicted by mathematical model	**Prediction**
Intelsat Predictive	Unit follows look angles predicted by mathematical model	**Prediction**

Here is some advice on selecting tracking modes:

- Empirical modes work best if the dominant problem is not orbital motion
- Predictive and hybrid modes work best if the dominant problem is orbital motion

One challenge in predictive tracking systems has evolved as the frequencies rose. Satellite station-keeping has improved to the point where orbital effects, while still important, are just another contributor to tracking requirements. Physical changes in the antennas due to solar heating alone can cause as much or more need for tracking adjustments than actual satellite motion. Obviously, these changes cannot be predicted by astrodynamics no matter how sophisticated. Since they affect both the antenna pointing and its ability to measure the position of the satellite, these effects compromise both predictive tracking algorithms like SDP4/SGP4 and adaptive orbital modeling algorithms like SmarTrack® and competitors' substantially similar algorithms.

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4.1.1 Predictive Tracking

When the system is in NORAD or Intelsat tracking mode, the NGC-IDU regenerates a new angle from the model periodically. The rate at which this happens depends on how much the model indicates satellite appears to be moving. When the new pointing angle exceeds the minimum move constraint from the previous angle, the command angle is updated. No feedback or other considerations alter the generation of these angles.

The angle is of course the ideal look angle from the current location. To make this accurate, the system time must be closely synchronized and the latitude and longitude of the earth station must be accurately known. The predictive track user should either install an AS-1 to get the time, connect the NTP client in

the NGC-IDU to an accurate time server, or monitor and correct the time of the NGC-IDU at least monthly. Refer to section **3.10 System Time** in this manual.

The data set must be entered before this approach can be used. See below for details.

Predictive track works best if antenna is very precisely installed and aligned. The antenna mount should be as orthogonal as possible (El axis perpendicular to Az, and the kingpost dead plumb). The resolver offsets should be carefully set to minimize pointing error.

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4.1.2 Predictive Tracking Offsets

Even if all of these offsets are well done, there still may be small errors due to nonlinearities in the mount. The NGC-IDU includes the ability to use satellite-by-satellite offsets for Az and El for each algorithm which can be used to correct these last few hundredths of a degree.

To edit these offsets, use the following path and procedure:

- Path: **HOME → Configuration → Satellite → Working Sat Tbl**
- Select and edit the satellite of interest
- NORAD Az and El offsets are found on page 3 (on screen)
- Intelsat Az and El offsets are found on page 4 (on screen)
- Commit the changes to save them.

These parameters may be edited while the system is running. The offset will take effect on the next prediction cycle, which may take a few moments.

Predictive track cannot account for true atmospheric refraction distortion (although some is modeled in at low Elevations) of the antenna due to physical effects such as temperature, wind pressure, and mechanical droop, and so forth. It will not normally perform as well as an equivalent system with closed-loop tracking.

Aligning and adjusting look angles is a tedious process that is beyond the scope of this manual.

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4.1.3 NORAD Data Set

NORAD two-line elements sets (TLEs) actually consist of three lines. The first line is the name of the satellite. The second and third lines contain fixed-length 69-character strings.

The NORAD SGP/SDP algorithm is a sophisticated astrophysical model suitable for all kinds of different orbits – geostationary, geosynchronous, even MEO and LEO satellites. NORAD TLEs are available for the ISS, for example.

The following figure shows a representative two-line element set with some example elements identified. The exact meaning of each field is well-documented elsewhere and understanding them is not essential to operating the NGC-IDU.

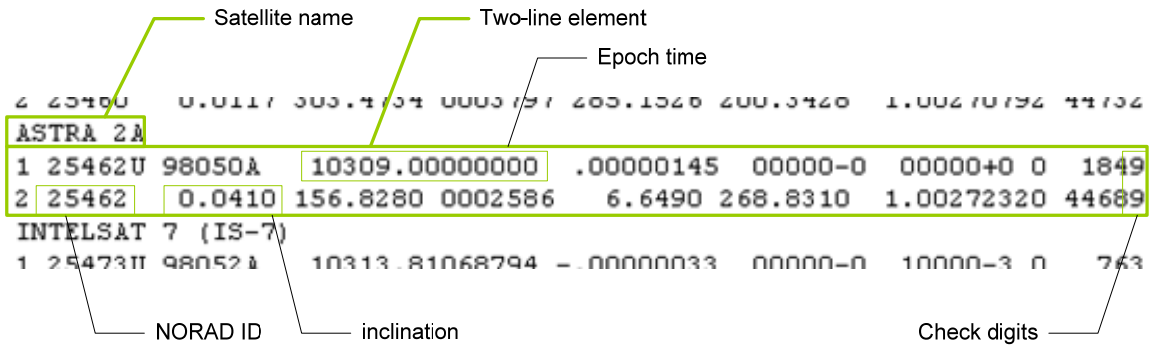

Figure 4-1: NORAD TLE with Selected Elements Identified

With the NGC-IDU, it is possible to type in the two 69-character lines of the TLE directly, but this is not recommended since it is quite tedious and error-prone. The format is very rigid and each space and location has a specific meaning. Note that every space, plus-sign, minus-sign, etc., is meaningful.

- Path: **HOME → Configuration → Satellite → Working Sat Tbl**
- Select and edit the satellite of interest

- NORAD TLEs are found on page 3 (on screen)
- Commit the changes to save them

It is much simpler and more reliable to use a PC to place a file named “geo.txt” in the root directory of a USB flash drive and use the update or import functions

- Path: **HOME → Configuration → Satellite → Global Sat Tbl → Update Table**
- Insert jump drive with geo.txt file. This file should contain one or more sets of three lines containing current TLEs
- Press the “Install File” command to add a satellite for each and every entry in the geo.txt file. Existing satellites not mentioned will not be disturbed
- Or, press “Update File” command to correct any existing TLEs in the system with updates available in the file, but it will not add any new satellites from ones in the geo.txt file that are not loaded

Please note that there is no way to “undo” installing a geo.txt file.

It is also possible to use FTP to update these files. This requires a reachable FTP site with network security be set up so that anonymous FTP can retrieve the file. Configuring this aspect is beyond the scope of this manual. The functions “Install URL” and “Update URL” use FTP instead of the jump-drive. The NGC-IDU by default will expire the TLEs after 7.0 days. This can be configured to meet the local site’s accuracy and data handling requirements.

As of the last update of this manual, NORAD TLEs are available for many satellites at the following URL: http://www.celestrak.com/NORAD/elements/geo.txt

NOTE: *ASC Signal* cannot provide ephemeris information above and beyond what is made available by the satellite operators.

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4.1.4 Intelsat Data Set (Eleven parameters)

Intelsat “weekly” element sets consist of 15 pieces of data obtained from Intelsat:

- Eleven of them are the ephemeris data itself
- One is the name of the satellite
- One is the “epoch time”, the time at which the algorithm treats as 0 hours.
- Two are check values, predicted orbital latitude and longitude 170 hours from the epoch time.

This algorithm works by fitting sinusoidal approximations to satellite motion. It is not an astrophysical model like the NORAD SDP4/SGP4 algorithm. This limits the use of Intelsat data to geosynchronous satellites.

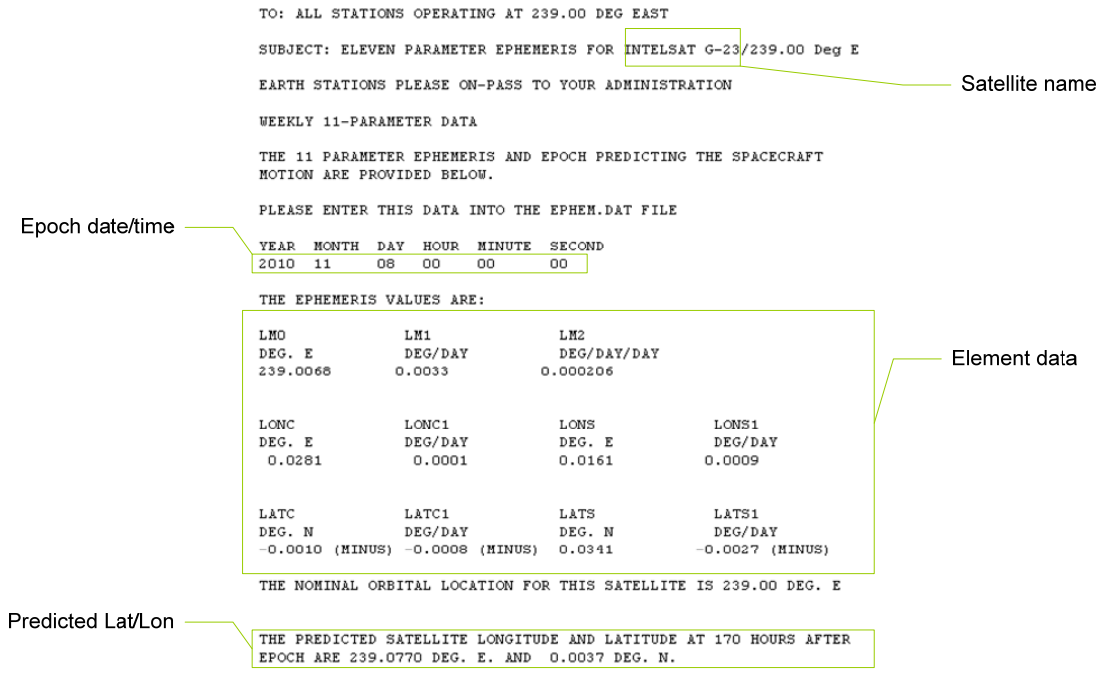

Figure 4-2: Intelsat Data with Selected Elements Identified

With the NGC-IDU, it is required to type in the Intelsat information directly. Since most fields are floating point numbers, the format is not critical, but the user needs to enter all digits or the validity check may fail.

- Path: **HOME → Configuration → Satellite → Working Sat Tbl**
- Select and edit the satellite of interest
- Intelsat data is found on page 3 (on screen). Press Edit View
- Fill out all fields on both pages 1 and 2 (on screen) of the Intelsat Data screens
- Commit the changes to save them

The NGC-IDU, by default, will allow the Intelsat information to expire after 7.0 days. This can be configured to meet the local site's accuracy and data handling requirements.

As of the last update of this manual, Intelsat data is available for many satellites at the following URL: http://www.intelsat.com/resources/satellitedata/ephemeris.asp

Select the "weekly" report for the satellite of interest. Please note *ASC Signal* cannot provide ephemeris information above and beyond what is available from the satellite operators.

4.2 Step-Track (3PP) Configuration Setup and Optimization

All NGC-IDUs can track satellites using a compatible beacon signal receiver and a step-track algorithm.

The NGC-IDU implements a form of step-track called Three Point Peaking (3PP), which is the parabolic curve fitting algorithm.

3PP will continuously adapt to any satellite but can be vulnerable to loss of the satellite during rain fades with inclined orbit satellites. The 3PP algorithm is described in some detail in **Appendix B**, section **B.5.1**. A more complete description may be found in US patent 6,657,588.

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4.2.1 Configuration

This section assumes that the beacon receiver interface has been configured and is operating correctly.

3PP has three basic parameters that control its behavior:

- The Step Multiplier Factor,
- The Step Cycle Time, and
- The Step Cycle Threshold

System performance in tracking is affected by all three settings. In general, smaller values for any or all of the parameters will result in a more active antenna that moves more. Setting the step multiplier factor to a low number (less than 0.08 or so) will tend to reduce maximum loss at the cost of slightly increasing the RMS tracking error due to less distinct information from the beacon receiver.

In addition to these settings, there are several settings that affect signal processing in the IDU and, as a consequence, will affect tracking performance:

- Beacon settle time
- Beacon soak time
- Scintillation detect Enabled
- Scintillation detect Thresh

The first two parameters control when beacon information is integrated, and for how long. The last two parameters control how much noise the IDU will accept on the analog beacon input without discarding the current second.

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4.2.2 Optimization of 3PP

With a well-behaved pedestal with a well-tuned NGC-ODU, it is possible to configure the IDU to track with normal maximum tracking losses limited of 0.2 to 0.3dB.

Here are some hints for getting the best results from 3PP Step-tracking:

- **Make sure antenna points well & is responsive.** You should have accuracy on position designate commands that is less than half the calculated step size. Antenna will only track as well as it points.

- **Make sure the resolvers are quiet.** A properly installed antenna control system will not have noticeable jitter in the resolvers when the motors are not moving. If you see constant changes in the angle reported, it usually means there is too much electrical noise on the resolver lines and the installation needs to be reviewed. Resolver jitter will affect tracking accuracy and stability. Resolver instability can cause the 3PP algorithm to make poor decisions.
- **Make sure signal strength settings are good.** Be very careful when selecting low signal threshold and clear sky. If the signal is below the low signal threshold, the antenna control system assumes that it may be on a "side lobe." If tracking is attempted when antenna is on a side lobe, the peak may be false. If the RF system is not properly configured and the signal threshold is too low, this result is actually quite likely.
- **Make sure the beacon receiver is responsive and stable.** In a clear sky situation the beacon signal should be stable to within 0.1 dB. If it is not, it could be indicative of intermodulation distortion (IMD) in the beacon receiver's front end and the installation should be reviewed. Obviously during rain or heavy clouds you may see variation, especially for bands that are susceptible to rain fade. Scintillation is another effect, caused by the same physical phenomenon that causes starlight to appear to 'twinkle,' although this tends to happen rapidly within a single second. Make sure that the beacon receiver does not have any long-term averaging turned on, since this will combine with the NGC-IDU's signal processing to introduce significant delays.

The following table illustrates some common issues and the normal next step to solve them:

Table 4.2: Step Tracking Issues

Observation	Actions
Antenna is moving too much, tracking too often	**1.** Increase step cycle threshold **2.** Increase step cycle time
Tracking is imprecise	**1.** Make sure antenna points accurately **2.** Make sure beacon signal is stable in clear-sky **3.** Make sure step size is appropriate for goals
Antenna seems to move the wrong way during tracking	**1.** Check resolver stability **2.** Lengthen beacon settle time **3.** Check beacon receiver for "low video bandwidth"
Antenna doesn't move during tracking and them jumps	**1.** Make sure step distance is more than twice deadbands in both axes

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4.2.3 Finding inclined orbit satellites

Locating inclined satellites can be difficult, especially with large antennas with narrow beams.

- If the NGC-IDU is licensed for NORAD tracking, it can be useful for finding the predicted position of the satellite.
- If not, offline tools such as *SatMaster* can be used to determine approximate look angles. Once the antenna has been steered in the general location, the Scan function can be used to look for the satellite.

In either case, the Scan function can be used to perform a squared-off spiral scan.

To initiate a scan, use the following path and procedure:

- Path: **HOME → Operations → Track**
- Select Scan

The antenna will perform the Scan until it locates a beacon signal and then peak up. It may do this for hours since there is no limit on the scan size.

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4.2.4 Interaction with other features

The technical user may wish to set a box limit for your step-tracking system. See **Section 4.8** for details on this. During Three-Point-Peaking (3PP), the NGC-IDU will keep internal records of its tracking. This information can be used to pre-charge a SmarTrack® model if use of that feature is desired.

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4.2.5 About the Adaptive Continuous Step Track (ACST) variant

The NGC-IDU also includes a form of step-track called Adaptive Continuous Step Track (ACST), which is a slightly modified version of 3PP step-track. This version uses a linear forward projection algorithm to move

the antenna along the last known Azimuth and Elevation rate of change vectors between peaking intervals, in order to improve the starting point for 3PP. It is slightly more able to deal with rain outages than step-track, but is more vulnerable at the extreme ends of the orbit where the directions are changing than SmarTrack®. Otherwise, it is configured just like 3PP.

4.3 SmarTrack® Configuration Setup and Optimization

All NGC-IDUs which can track satellites using a compatible beacon signal receiver and a step-track algorithm can also use the SmarTrack® algorithm. This algorithm is based on building a mathematical model of the observed orbit of the satellite from the history of Az and El readings during tracking. Once sufficient data is collected to build a reliable model, the APC400 switches automatically to a predictive mode and uses occasional peaking to update the model. The quality of the model is given in dB by computing the RMS error between the model's predictions and actual peaking points.

SmarTrack® is subject to very stiff quality metrics. The algorithm will use the model to reverse-project the peaking data collected and determine RMS error, which is computed first in degrees and then in estimated loss in dB using the 3dB beamwidth. If that error is greater than 1/3 of the repeak trigger, the model is not considered valid and the system will attempt to update it.

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4.3.1 SmarTrack® Configuration

The following SmarTrack® parameters are configurable:

- Minimum Move
- SmarTrack® Cycle Time
- Repeak Trigger

NOTE: many of the step-track parameters also apply to SmarTrack® during the "model building" phase.

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4.3.2 Functionality of SmarTrack®

SmarTrack® collects points using three-point peaking (3PP) step-track. It must have at least five points collected over at least a six hour period, and these points must pass the quality check. SmarTrack® collects these points using the same frequency and re-peak criteria configured for step track.

Once the model is valid, the NGC-IDU switches into a predictive mode. It will then update the model periodically, whenever the SmarTrack® repeak trigger is exceeded, or whenever the SmarTrack® cycle time has been exceeded.

Model sample data older than 48 hours is discarded, and points closer than 15 minutes to each other are also condensed.

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4.3.3 Optimization of SmarTrack®

Very little adjustment is required for SmarTrack® once the 3PP subsystem is configured to work well.

Note, however, that there are some basic tips:

- Don't set the repeak trigger too small. This can keep the system from using the models it develops
- Don't select a SmarTrack® cycle time longer than 240.0 minutes

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4.3.4 Pre-charge feature

The SmarTrack® algorithm can use information collected while step-tracking to pre-charge a model.

To do this, use the following path and procedure:

- Path: **HOME → Operations → Track**
- Pause tracking
- Change the tracking type to SmarTrack®
- Select Pre-Charge

4.3.5 SmarTrack® Model

The SmarTrack® Model itself can be viewed using the NGC-IDU.

To do so, use the following path and procedure:

- Path: **HOME → Operations → Track → Status → SmarTrack® Mdls**
- Select the satellite of interest

A text file is loaded on the screen. It consists of a number of lines like the following picture:

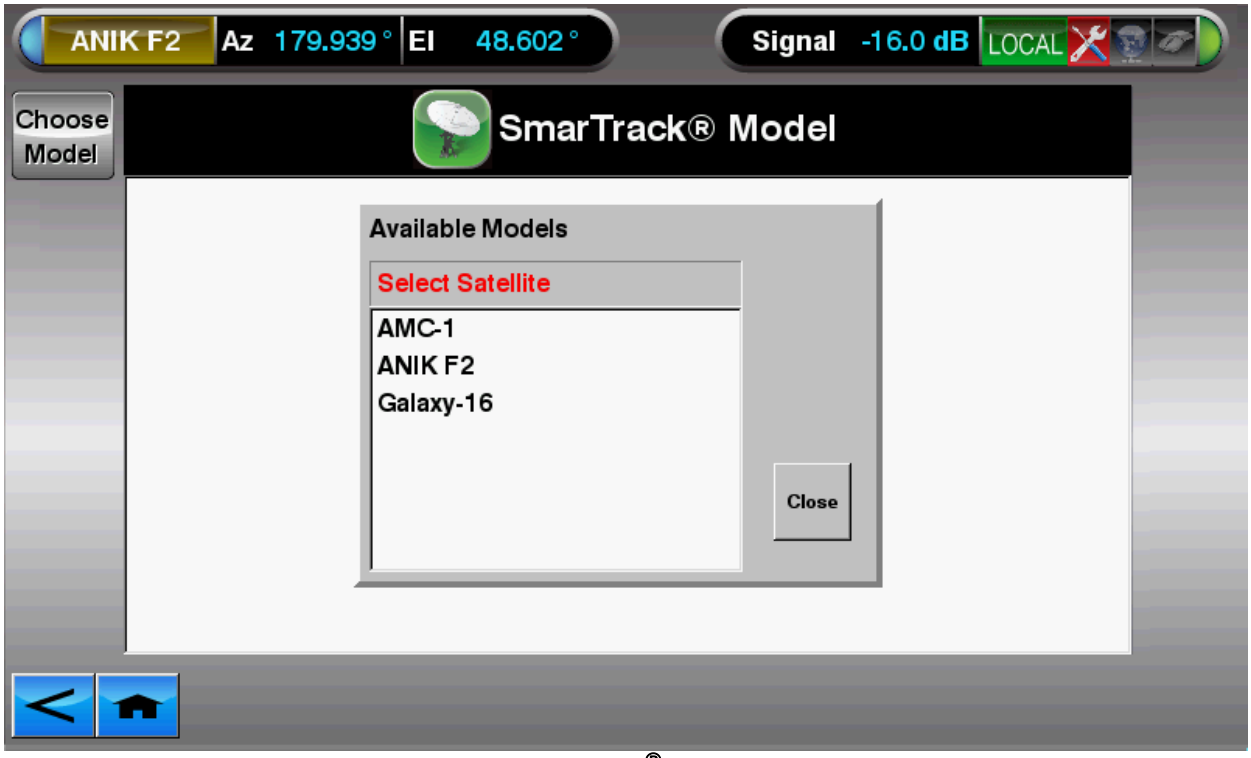

FIGURE 4-3A: SMARTRACK® MODEL (START PAGE)

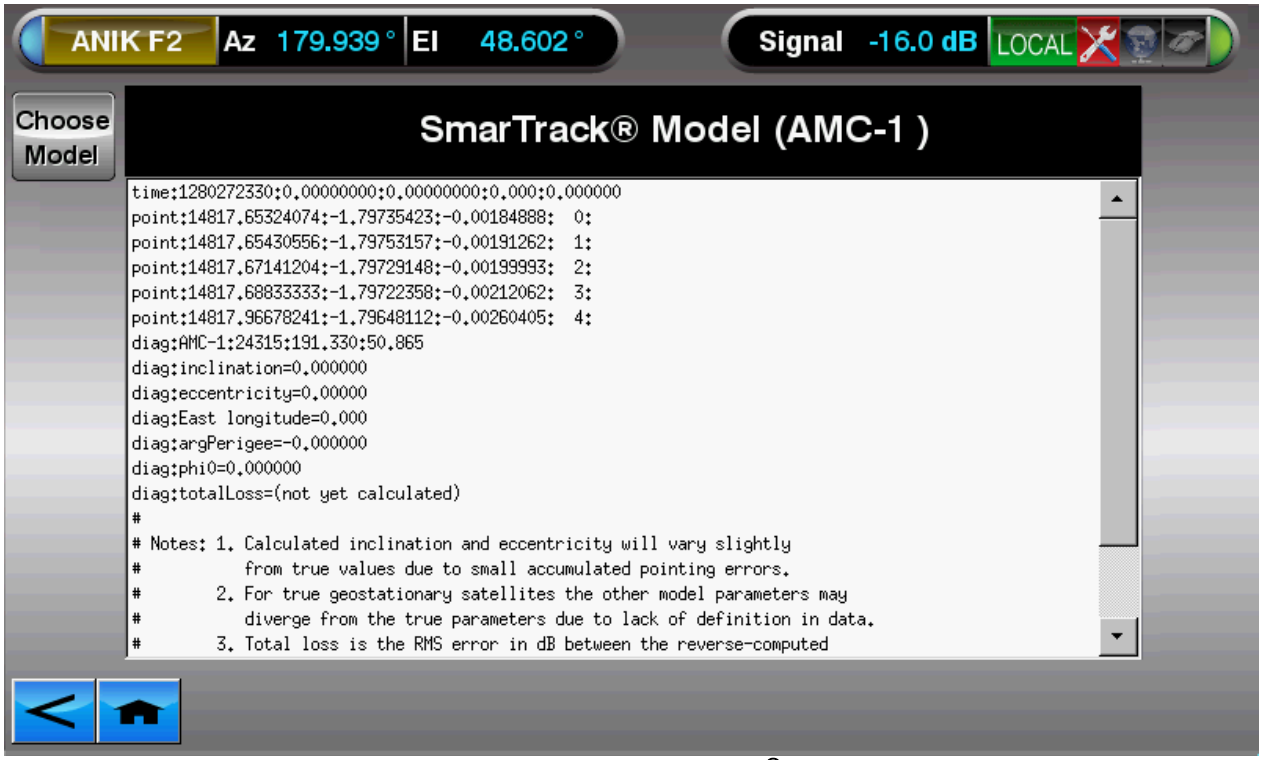

FIGURE 4-3B: SMARTRACK® MODEL

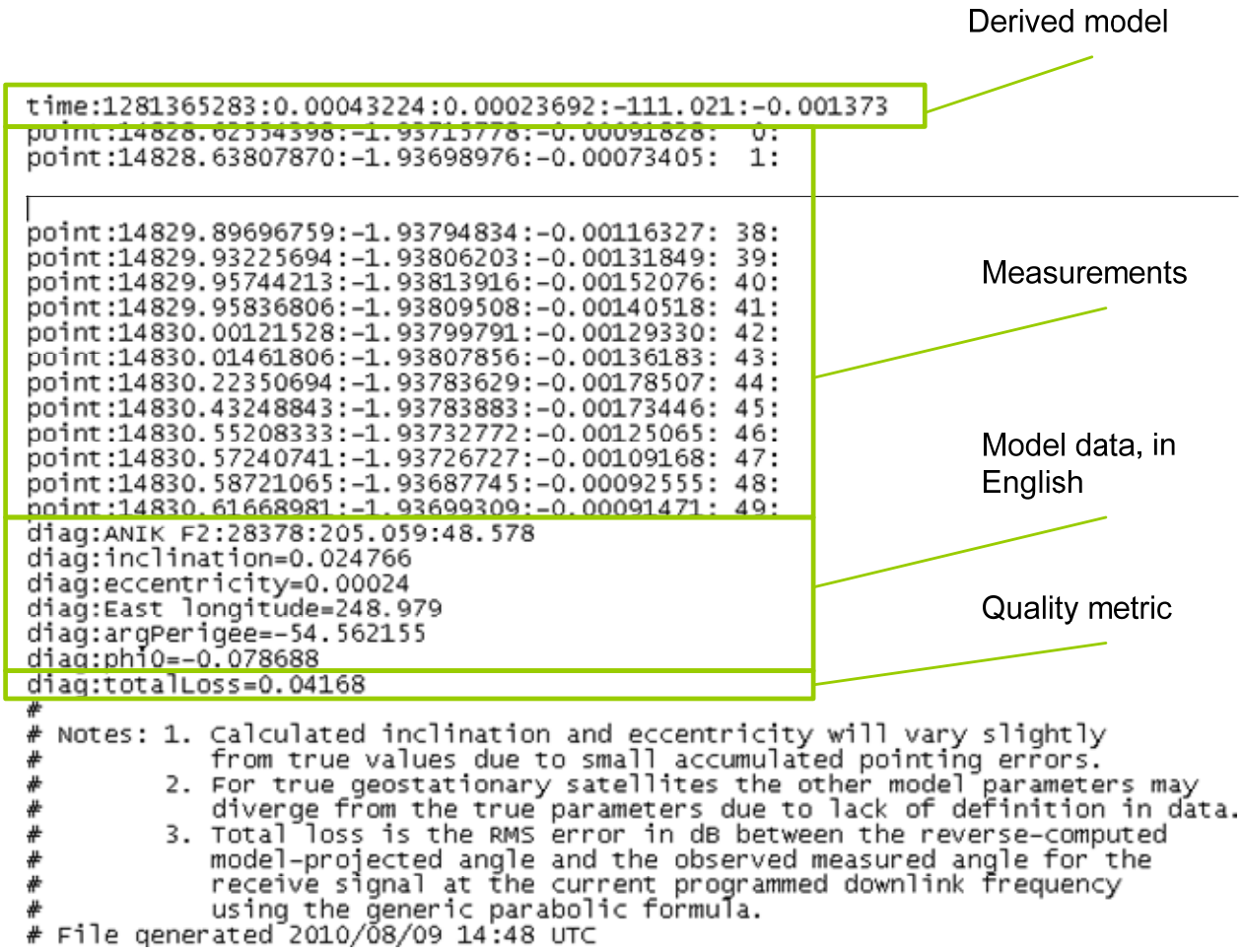

Figure 4-3c: SmarTrack® Model Breakdown

The most interesting elements are the Model data and Quality metric lines.

The model data contains the estimated parameters of the satellite at the Epoch time listed (which is the same as the file generated time for all practical purposes).

SmarTrack® tends to slightly overestimate inclination for tightly-station-kept geostationary satellites. This is because any error at all is assigned by the algorithm to the inclination.

The totalLoss is the RMS error of the collected points in the position log compared to the predicted angle from the model calculating backward. This is converted to dB using the 3dB beamwidth and a parabolic approximation of the antenna pattern.

4.4 Tracking Receivers

These sections will explain how to connect a tracking receiver to the IDU for Step-track, SmarTrack®, and other functions.

The NGC-IDU supports one or more of three separate tracking receiver types:

- External Beacon Receiver
- Internal Spectrum Analyzer (OPTION)
- Internal DVB-S Receiver (OPTION)

The following figure shows these three options and the four ways the NGC can receive a tracking signal.

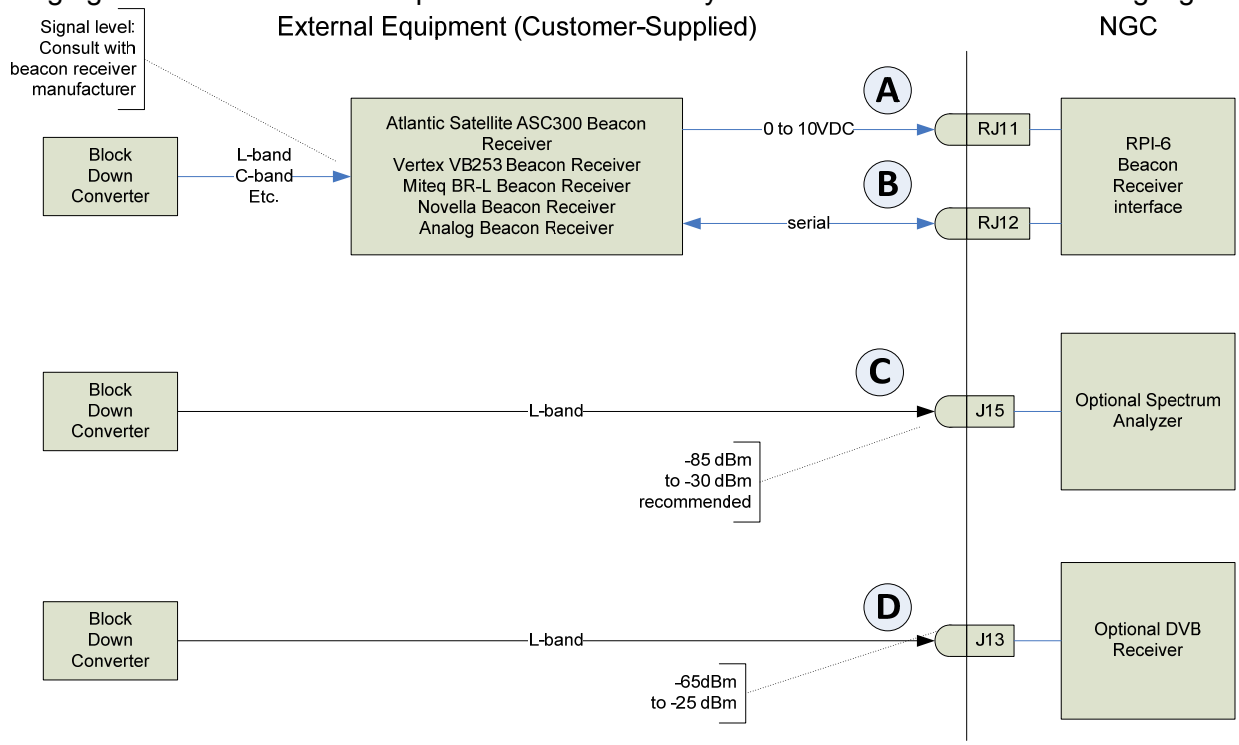

Figure 4-4: Tracking Receivers

Path: **HOME → Configuration → Tracking Config → Beacon Rcvr**, using Bcn Data Type field.

- An analog beacon receiver may be interfaced using the analog, serial, or both interfaces. The choice of whether to use analog or serial (digital) data from the beacon receiver is configurable.
- The optional built-in spectrum analyzer may be used for some satellites.
- The optional DVB receiver may be used for some satellites.

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4.4.1 Analog Beacon Receiver Interface

Many commercial beacon receivers (not supplied with the IDU) can be connected to ports J11 and J12 on the rear panel of the IDU. The IDU can accept an analog voltage (0-10VDC, see A on the figure) as long as the analog voltage is linearly proportional to the tracking signal's received signal strength in dB.

This configuration is recommended for maximum performance because the IDU will over-sample and process analog signal to detect scintillation and other effects and take measures to minimize their effect. The IDU has sensitivity to roughly 10mV of signal change. The measured statistics are available through the tracking status screen.

Path: **HOME → Configuration → Tracking Config → Beacon Rcvr**, select a Bcn Data Type of "analog"

The Bcn slope and Bcn offset should also be set to match the characteristics of the beacon receiver (IDU cannot detect these parameters; generally, manufacturer's defaults should be used).

- The Bcn Slope is in dB per volt, typically either 2.0 or 5.0.
- The Bcn Offset should be set to adjust the clear-sky to 0.0. Normally, if the offset is 0.0, then 0.0dB clear-sky corresponds to 7.5V DC on the analog input.

Each satellite in the working table has a “local beacon offset” field which is always added to the signal strength of the current satellite. This field cannot be interactively edited. The primary purpose of this field is to support receivers that do not have programmable attenuators. User should not normally configure both attenuation and local beacon offset to nonzero values.

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4.4.2 Serial Beacon Receiver Interface

The NGC-IDU also has ability to interface to several models of beacon receiver over the serial port to tune, adjust, monitor, & if required accept signal strength from those devices. Whenever a new satellite is commanded—through either ‘GoTo’ or ‘ReTune’ command—the IDU will try to tune connected beacon receiver to current frequency. It will also apply programmed attenuation and modulation if supported by beacon receiver.

- Path: **HOME → Configuration → Tracking Config → Beacon Rcvr**
- User can select between several supported beacon receivers. This selection configures the serial interface to implement the necessary protocol.

The NGC-IDU does not automatically configure the serial interface parameters for the selected beacon receiver. It is necessary to know these and the set them using the TPU Interface. These parameters are found on the same screen where the device type is selected. The user may configure baud rate, electrical level, serial word length, serial parity, multi-drop addresses.

User may choose to leave this interface unconnected as well if an alternate means of controlling the receiver is desired. In this case, the “*none*” option on the Device Type field of the Beacon Rcvr screen should be selected to suppress the Beacon Comm. Fault alarm. In this case, the user should still program beacon receiver frequencies into the Working Satellite Table so the IDU can calculate appropriate step sizes based on the antenna’s estimated 3dB beamwidth.

The received signal strength from the beacon receiver cannot be adjusted; it is assumed that the beacon receiver settings and the signal strength fed to the beacon receiver are correct.

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4.4.3 Internal DVB-S Receiver Option

If DVB-S receiver is installed, it may be used as a tracking source.

- Path: **HOME → Configuration → Tracking Config → Beacon Rcvr**
- Select Bcn Data Type of “dvb rcvr”

Use of this receiver is primarily intended for acquisition. If properly programmed, it can tell satellites apart in the sky that happen to have identical beacons. Use for tracking is possible, but not recommended. The receiver uses carriers rather than beacons, which are usually generated from other Earth stations, so signal strength may vary for reasons unrelated to tracking operations (like uplink fade).

User cannot configure DVB receiver interactively. This is because the parameters are part of a set of interrelated and complex parameters. Configuration is made through Working Satellite Table for the current satellite, through the DVB Descriptor on page 4 of satellite editor. Parameters are elaborate as the user must know enough about the carrier in question to describe it to a miniature IRD. There is no adjustment for amplitude needed because the receiver combines AGC with use of Eb/No to estimate signal strength.

Once the user has adjusted the parameters, a ReTune function will apply them to the receiver.

NOTE: the DVB receiver is not powered on if there is no DVB Descriptor defined. This is normal. When the receiver is powered on or reprogrammed, it makes a faint chirping noise. This is also normal.

4.5 Configuration of Built-in Spectrum Analyzer for Tracking

If optional Spectrum Analyzer is installed, it can be used as a beacon measurement device. In this mode, spectrum analyzer measures total power within a tracking band around configured center frequency of beacon.

- Path: **HOME → Configuration → Tracking Config → Beacon Rcvr**
- Select a Bcn Data Type of "Spec An"

Beacon receiver's measured signal strength for a carrier is typically a very low number, like -65dB. This value has an arbitrary number of 60dB added to it, and then the Spec Analyzer Offset is added to that to get a raw signal strength reading. This signal strength has the Beacon Attenuation value subtracted from it (same value programmed into analog beacon receiver configuration above), and then local beacon offset is applied (also same as analog beacon receiver above). Again, user should not normally configure local beacon offset to nonzero values.

Use of Spectrum Analyzer as a beacon receiver may significantly reduce total system cost. It is not always as accurate as a physical beacon receiver, which is specially designed for this function, but the results are usually acceptable. Spectrum Analyzer is not recommended for applications where beacon is particularly weak compared to total energy on satellite, since it may not be possible to satisfy dynamic range restrictions of receiver while keeping RF front end out of saturation. For these applications, a receiver with a pre-select filter is required. If there is any doubt, user should consult a qualified satellite system engineer on this issue.

4.6 Satellite Configuration & Updates

This section explains how to update a satellite table manually as well as how to configure the satellite for the system.

NOTE: Can also be done with NORAD geo.txt files, even if not licensed for NORAD tracking algorithm. See **Section 4.1.3**

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4.6.1 Updating Satellite Table

The procedure to do this can be somewhat complicated by various options, so read carefully.

Before you begin, you will need to collect the following information:

- Name of the satellite, its longitude in orbit, its NORAD ID (a five-digit number).
- If using linear Pol drive, determine the Pol of the satellite signals.
- For tracking, collect the beacon frequency in L-band and information about the block down converter.
- For certain acquisition and tracking modes, it may be necessary to collect even more information, see below.

The easiest way to start is to find the satellite in the Global Satellite Table, if it is present. This table provides a lot of basic data about the satellite, including the name, longitude, and NORAD ID.

To do this, use the following path and procedure:

- Path: **Home → Configuration → Satellite → Global Sat Tbl**
- Highlight the satellite and press the Set Working button on the left. Once this is complete, back up to the Satellite Menu and select Working Sat Tbl to get to the entry. It will probably need further entry of data, since the NORAD geo.txt file does not include all needed data.

If the satellite is not in the Global Satellite Table, it can be hand-entered from the working table.

To do this, use the following path and procedure:

- Path: **Home → Configuration → Satellite → Working Sat Tbl**
- Press the New button on the left side.

NOTE: the NGC-IDU will only edit a satellite once it is in the working table. Once the working satellite entry is opened, the user can update almost any field.

The minimum data required is as follows:

1. **Name**. Choose the normal name by which the satellite is known. The user is restricted to 14 letters by the user interface.
2. **Longitude**. This is the nominal orbital longitude, such as 96 degrees West.
3. **Orbital Pol**, if linearly polarized. Normally 0.0 is horizontal, 90.0 is vertical. Note some satellites may have skewed orientation so the user may have to account for this.

4. **Beacon Frequency**. This is usually expressed in the L-band value (that is, between 950.0 MHz and 2050.0 MHz). The system uses this to determine appropriate step sizes for tracking. If The user is not step-tracking or SmarTrack®-ing, you can leave this value at 0.0.
5. **NORAD ID**. This is a five-digit number that the United States Air Force uses to identify orbiting objects. The NGC system uses this number as the primary database key so it needs to be entered and should be correct. The user can guess but be careful as it may conflict with actual NORAD IDs and cause problems later.

Depending on hardware, and tracking and acquisition modes, the user may need to enter additional data.

- If using NGC system to control the beacon receiver using serial interface, you may need to fill out the beacon attenuation field. This is the satellite-specific setting for signal attenuator in some beacon receivers
- If using the optional built-in Spectrum Analyzer, the user may need to fill in the attenuation field as well. It is used as a satellite-specific offset on the beacon strength
- If using the optional built-in DVB receiver, the user may need to fill in a descriptor to program it
- If electing to use box limits, or other features, the user may need to configure them as well
- If user is using NORAD or Intelsat Ephemeris tracking, the user may find it necessary to adjust the Az and El offsets for those modes
- If user is using Intelsat Ephemeris tracking, the user may find it necessary to enter the 15 parameters required

NOTE: once data is entered into the working satellite table and committed, it is also saved into the global table, although it cannot be seen or edited there.

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4.6.2 Configuring Satellites

⚠ **WARNING:** Do not begin satellite configuration until initial installation interview hes been completed.

Basic satellite configuration process:

1. Path: **HOME → Configuration → Satellite → Global Satellite Table (Global Sat Tbl)**
2. Check to see if your satellite is listed in the **GLOBAL SATELLITE TABLE.** If your satellite is listed, **move** on **to the WORKING SATELLITE TABLE**. You may edit your satellite values by selecting your satellite and pressing the **EDIT** button on left of screen.

   After you commit the satellite for your antenna, **EXCLAMATION POINT to left side of satellite name should disappear**. If it **DOES NOT disappear**, **more data is required**. Refer back to the previous steps to make sure that you have not missed/skipped anything

3. If satellite is **NOT** listed in Global Satellite Table, you will need to enter it from scratch by using the following path: **HOME (Main Menu) → Configuration → TRACKING CONFIG → BEACON RCVR** and moving on to Step 4.
4. Make sure the beacon frequency is correct (in L-band, not in C or Ku etc.). Typically, beacon frequency will be **between 950 and 2050 MHz.** If you are **using an analog beacon receiver**, you want this to be roughly **7.5 to 8 volts**. **Peak Up** the antenna, as you may need to adjust the signal strength and/or add Beacon Attenuation or Offset

4.7 Box Limits

The box limit feature can be used to limit the range of travel for the NGC-IDU when it is tracking a satellite.

Actions taken on hitting a box limit depend on the tracking algorithm. Here are some examples of what is meant by this:

- Step-track-like algorithms including SmarTrack®'s pause track and must be manually restarted. Hitting a box limit here is considered a serious fault condition.
- Program track algorithms limit movement to the box limits but continue to track as best as they can. Hitting a box limit here is not considered a serious condition since the angle is generated mathematically.
- Position designate and jog commands are not affected by box limits.

To enable box limits, feature must be globally enabled, and individual satellite must have defined box limit set.

To enable box limits globally, use the following path and procedure:

- Path: **HOME → Configuration →Tracking Config → General**
- Navigate to screen 2, select Box Limits, and change the setting to "enabled"

To enable and define box limits for the current satellite, use the following path and procedure:

- Path: **HOME → Configuration → Satellite → Working Sat Tbl**
- Select the satellite of interest and edit it
- Navigate to screen 2
- Set the Box Limits field to "enforced." If no limits were defined, the IDU will fill in some limits allowing ±2 degrees El and ±1 degree of Az. Alter these to match the desired limits

At this time, the NGC-IDU does not attempt to calculate box limits using spacecraft data. It is often a good idea to let the NGC-IDU track the satellite for a day and set the limits using the data collected.

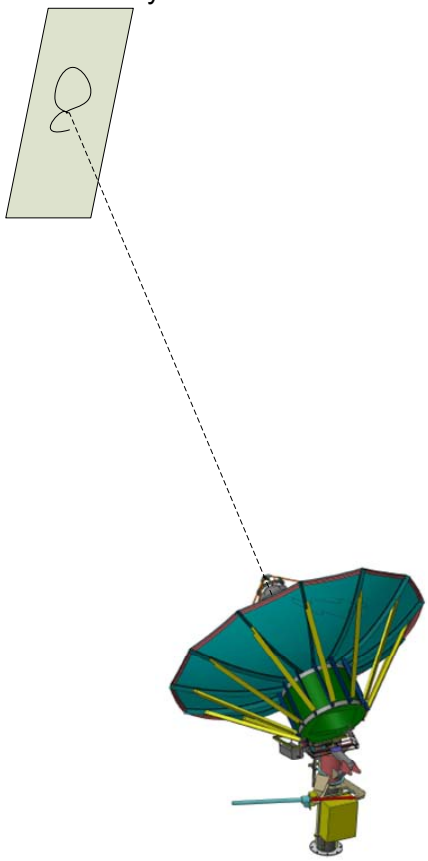

Figure 4-5: Box Limits

Box limits are not recommended for TriFold® mobile antenna systems due to the complexity of maintaining them, as these systems are designed to be moved from location to location on a regular basis.

4.8 SNMP Parameters and Configuration

The NGC-IDU includes an implementation of the Simple Network Management Protocol (SNMP), versions 1 and 2c. It does not currently support SNMP version 3.

Prior to setting up SNMP parameters, you must have the following information:

- SNMP Manager Address
- SNMP Trap Address
- SNMP System Location
- SNMP System Contact

ASC Signal recommends you obtain the information listed above from your network administrator before attempting to set up SNMP.

The *ASC Signal* specific enterprise management information base (MIB) is available to qualified customers. Contact ASC Signal customer support for information.

SNMP v1 and v2c has limited security based on "community strings". A community string is basically a per-message password that the SNMP Agent in the NGC-IDU validates against a programmed value.

There are three community strings used:

Table 4.3: Community String Functions

Function	Default
Read-only	"public"
Read-write	"private"
Trap	"public"

Once the NGC-IDU is installed, these should be changed.

4.9 10 MHz System Accessory Configuration

OPTION: Using this option **requires Release E software** (or beyond) for the NGC-IDU's SCP, TPU, & RPI-6 modules.

PATH: **HOME→ Configuration → System Setup → Accessories (right screen arrow) → 10 MHz Present**

This option must be enabled from the accessories page.

This page also allows the user to select a preferred source for system UTC time. If this is left at "auto," which is the default setting, then any source available will be used. The system can use one or more of the following: AS-1 accessory outside, the 10 MHz accessory, an IRIG-B card, a network time protocol server, or its own internal battery-backed-up clock. The internal clock is used to ride through outages.

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4.9.1 Using the 10MHz Reference Option

Path: **HOME → Configuration → Platform → 10 MHz Ref** (if option is present)

The 10MHz reference option for the NGC-IDU allows the IDU to furnish a high-accuracy, GPS-disciplined frequency reference for other earth station equipment. This reference can be monitored at the front panel. The GPS location and time provided through this interface can also be used by the NGC automatically. The NGC-IDU 10MHz option provides a 10MHz reference output and a 1 pulse-per-second (PPS) output.

If you have the 10MHz option, the following three jacks will have been added to the NGC-IDU Back Panel:

1. Antenna input
2. 10MHz output
3. 1PPS output

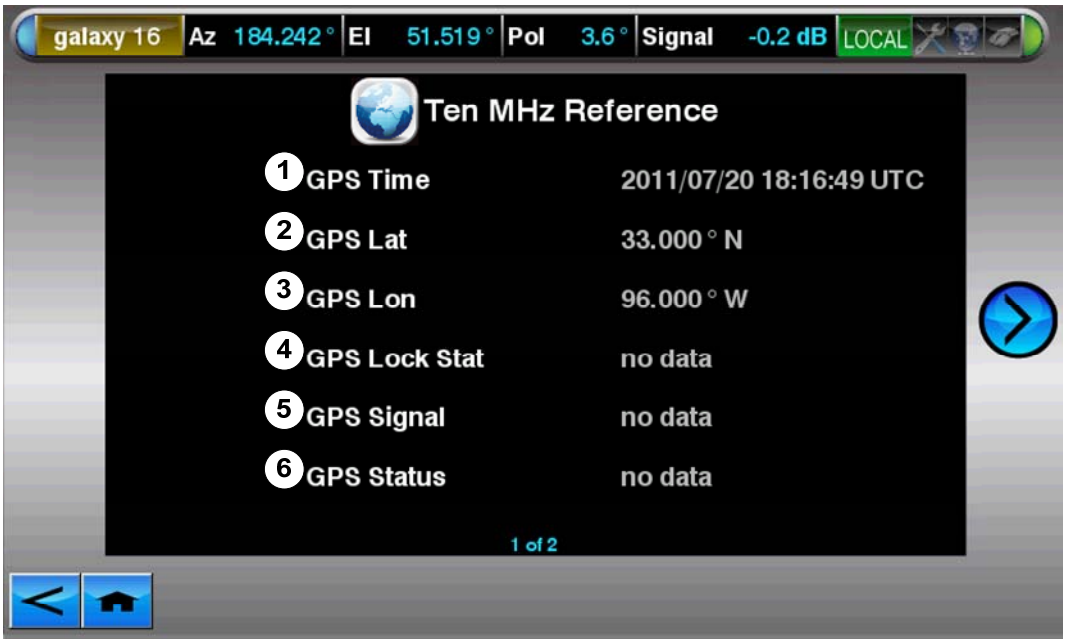

FIGURE 4-6A: 10MHZ REFERENCE SCREEN 1

#	Item	Description
1	GPS Time	Time received from GPS antenna by 10MHz reference
2	GPS Lat	Latitude received from GPS antenna by 10MHz reference
3	GPS Lon	Longitude received from GPS antenna by 10MHz reference
4	GPS Lock Stat	Lock status of GPS. Should be 'phase lock' once signal is acquired.
5	GPS Signal strength	Nominal GPS signal strength (C/N_0) measured in dB-Hz
6	GPS Status	Overall status of GPS. Should be 'position' once signal is acquired.

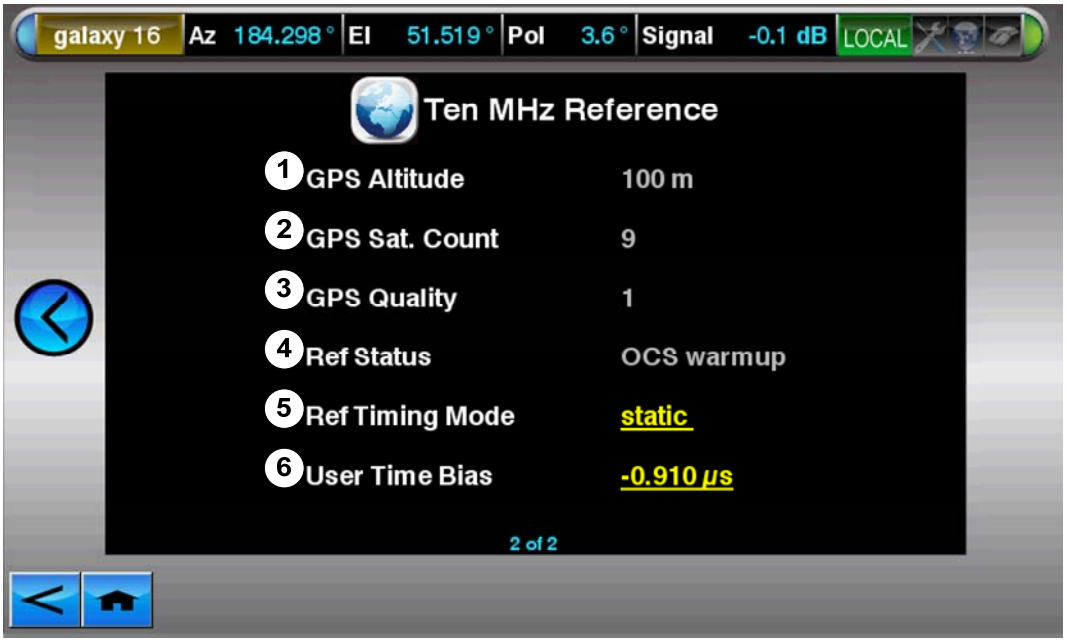

FIGURE 4-6B: 10MHZ REFERENCE SCREEN 2

#	Item	Description
1	GPS Altitude	Nominal altitude in meters.
2	GPS Sat Count	Number of satellites.
3	GPS Status	Time reference status. Should be 'fine adj.' once lock is acquired.
4	GPS Quality	GPS quality on a scale of 0-9. Should be '9'.
5	Timing Mode	System timing mode. Should be 'static' for all fixed antennas. 'Dynamic' should be used only if platform is normally moving. Changing mode will cause time to unlock for a while.
6	User Time Bias	Programmable time bias. Should be left at 0µs for all applications.

5.0 Advanced Installation, Setup, and Operation

This section contains information on less-common features. The reader of this section should already be very familiar with the info provided in sections 3.0 and 4.0 of this manual.

5.1 Acquisition Assist (OPTION, TriFold® only)

This section describes the configuration and operation of the Acquisition Assist function used with the TriFold® variants of the NGC-ODU. Please note this feature set works only with the TriFold® antennas in the Mobile operational configuration.

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5.1.1 About the Acquisition Assist

The acquisition assist is a feature that allows TriFold® antennas to search for likely satellites that match the configured parameters. It is necessarily limited by the fact that, for example, beacon frequencies tend to be re-used from satellite to satellite, so unless the acquisition signal is truly unique, the antenna may find a different satellite than the one intended.

General notes about acquisition assist:

- Acquisition assist will only function well if the positioner is functioning well. Unlike tracking, where the NGC-IDU is very tolerant of timeouts and other errors, in acquisition assist it is not, because the movements are large and human safety is potentially involved.
- Since timeouts and other issues may indicate loose resolver couplings, they should be investigated if they occur. Loose resolver couplings can cause the antenna to stow improperly and do significant damage to the positioned and/or trailer.
- The Az stow position must be 180.000 degrees. There is no programmable offset for this, as the TriFold® positioners do not have center switches.

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5.1.2 Configuring acquisition assist signals

The first step is to decide which signal source to use for acquisition and configure it.

Spectrum Analyzer—for each satellite in the working satellite table that will use the Spectrum Analyzer, configure the following:

- Center frequency in L-band and (possibly) the attenuation on page 2 of 5, and
- Tracking and acquisition sources on page 5 of 5. (These are a selection menu).

Each system should have a configured Spectrum Analyzer offset on General Track Config page 4 of 4. This is a general parameter used to convert spectrum analyzer power measurements (which are usually around -70dBm to -90dBm or so but of course vary based on your IF configuration) to clear-sky-relative values. The system takes the power measurement and adds 70.0 dBm automatically, then adds the spectrum analyzer offset to that, then subtracts the per-satellite attenuation value. The result shows up as the signal level on the top of the screen. The idea is to use the (global) offset to account for the loss/gain of your receiver system and the per-satellite attenuation to account for signal differences between satellites. It can be hard to set do this without being on a satellite…and very hard to do in the factory without the real LNA, etc. Configure this carefully to avoid acquiring on side-lobes.

DVB-S Receiver—for each satellite in the working satellite table that will use the DVB-S receiver, configure the following:

- center frequency in L-band and (possibly) the attenuation on page 2 of 5,
- DVB-S receiver program on page 4 of 5, and
- Tracking and acquisition sources on page 5 of 5. (Pages are on a selection menu).

If the DVB receiver is used, it uses the C/No measurement of the receiver, so fewer configurations are required of the RF chain. However, there are a large number of parameters that all have to be right to achieve lock, and unless you intimately know the transmitting enterprise, they can change the parameters and surprise your end users later. This is why we don't recommend the DVB Rx as the primary acquisition method for most customers).

GENERAL NOTE: It is not practical to expect to be able to enter the parameters the first time and acquire the satellite. For this situation, it is usually best to acquire a known satellite, correct the heading, use the GoTo command to acquire the new satellite, and then peak up and adjust the parameters.

5.1.3 Configuration of Acquisition Raster Scan

During acquire, the antenna will execute a “raster scan”.

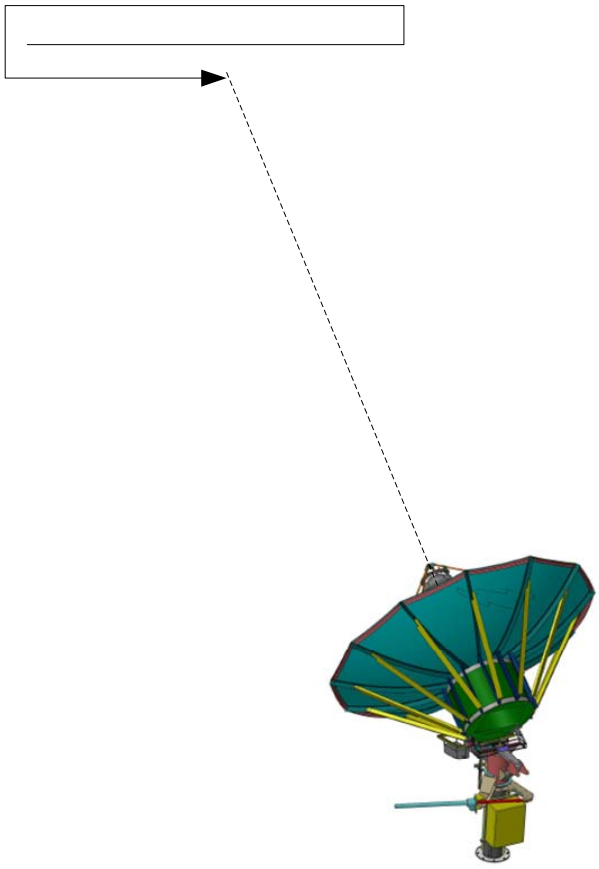

Figure 5-1: Raster scan

There are two programmable parameters for the raster scan.

- **Scan slew distance** is the total width of the sector (default is 26 degrees). Set this higher if the compass uncertainty is causing problems.
- **Scan slew speed** is the jog speed used for the Az scan. A value of 2 should work for all systems, but it may be necessary to adjust it.

To edit these parameters, use the following path and procedure:

- Path: **HOME → Configuration → Tracking Config → General**
- Navigate to page 4 (on screen)

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5.1.4 Deploy & Acquire Sequence

For mobile systems, deploy and stow buttons are on the GoTo Satellite screen, quickly accessed from the GOTO button.

Once things are set up to acquire, the recommended procedure is as follows:

- Press GOTO to get to the Goto Satellite screen
- Highlight the target satellite line on the screen
- Touch “Retune” button on left side of screen. System will ask to confirm

NOTE: the above is not strictly necessary unless changing satellites, but is best to do on every acquire to avoid forgetting

- Touch the Acquire button on the right side of the screen. The system should begin to acquire.

To understand the acquisition sequence, it is necessary to understand the “compass mode” parameter in the NGC-ODU. During initial deploy and final stow, the NGC-ODU’s compass mode is “ignore”, which causes that system to use platform coordinates.

The following table illustrates what occurs during the acquisition sequence:

Table 5.1: Acquisition Sequence

Actions	Explanation
System moves the antenna up out of stow if necessary. Stow position is where the platform Az is 180.000 degrees and the platform Elevation is approximately 90.000 degrees. The antenna will not move if the El angle is already between 10.000 and 70.000 degrees. Compass mode is 'ignore' at this point.	Antenna moved to position for definite reasons. First, it assures Az and El can freely turn. Next, it assures structure is clear of usual mounting positions of the compass. Last, it gives GPS more time to lock if system has been recently started.
When antenna reaches deploy angle (usually 68.000 degrees), system stops and takes a compass fix & GPS fix. Process takes about 5 seconds. Compass mode is 'using' at this point. System also measures the trailer attitude (roll and pitch).	The antenna is stopped for two reasons. First, motor activity might set up magnetic fields that affect the compass. Second, the antenna moving will affect the roll and pitch.
System locks the compass heading, roll, and pitch into the system. The compass mode is 'locked' at this point and from now on.	Once GPS and compass fix are made, they have to be locked because ordinary jitter in these measurements (±0.1°) would result in undesirable antenna movement.
System calculates a sector around estimated look Az. The width of this sector is called "Scan Slew Dist"; it is configurable from General Track Config page 4 of 4 and defaults to 26 degrees (+/- 13 degrees).	The sector width is calculated to overcome 2σ to 3σ of compass variation.
System raster scans within this sector starting at calculated El, then alternating between rows above and below original row in ever increasing steps until it reaches +/- 2 degrees. Width of vertical scan steps is computed from 3dB beamwidth of antenna. Scan starts at closest Az to the position at the time of the GPS fix.	The scan starts in the middle because the system assumes the El is nearly correct. The scan is much wider than it is tall because the compass uncertainty dwarfs all other uncertainties.
If it sees 3dB signal rise of any kind after signal falls off again, it will switch to a spiral-box scan to look for the real signal with real thresholds. It does so to avoid acquiring a side-lobe.	Any received signal at the intended El is probably the satellite of interest.

If the signal the system is configured to recognize is not sufficiently unique, the acquisition assist function may acquire the wrong satellite. This is why it is called "acquisition assist." Operator should confirm the satellite acquired is correct.

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5.1.5 Overriding the Compass

Magnetic compass modules are prone to errors caused by local magnetic fields.

If these are excessive, the best solution is to manually enter the compass heading by using the following path and procedure:

- Path: **HOME → Configuration → Platform screen**
- Select **Override Compass**
- Enter the true compass heading, which is the direction the tongue of the trailer is pointing
- Save the heading

At this point, the antenna Az and El should be corrected.

NOTE: if the antenna is stowed, this information will be lost and must therefore be re-entered.

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5.1.6 Correcting the Compass After Acquisition

Once the satellite has been acquired, the Az reading may be off due to compass error. This can be corrected via the following path and procedure:

- Path: **HOME → Operations → Move Antenna → Goto Sat**
- Highlight the satellite at which the antenna is actually pointing
- Select Override Compass

At this point, the compass heading is corrected so that the Az is approximately correct. The NGC-IDU does not correct the Elevation, though this should already be close.

At this point, the standard "Go To" sequences (to switch between satellites) will normally work.

NOTE: In previous versions of the NGC-IDU this button was labeled "Confirm Acq"

5.1.7 Correcting Elevation After Acquisition

If the Elevation is significantly off after this, positioner has not been completely calibrated. This command causes the NGC-IDU to solve for one unknown—Az error—under the assumption that the El is well-known and that current and reported Az are both known. It does this by a coordinate transform rotating around the center axis of the trailer. It then orders the NGC-ODU to use a revised compass heading as the new compass heading—essentially overriding the compass. Because it cannot solve for both Az and El from a single vector error (this is mathematically impossible), and it should not need to since Elevation should be very accurate. If it is not, positioner calibration probably needs to be completed or redone.

Procedure is as follows:

- Level the Positioner. You are trying to assure the axis of Az rotation is fairly precisely perpendicular to the ground. The easiest way to do this is to set antenna to about 60 degrees El, and use a digital inclinometer at a fixed point on hub while moving Az between three of the four cardinal points (e.g., 90, 180, 270 degrees). When inclinometer reads roughly the same value for all three readings (to within 0.1-0.2 degrees or so) the positioner is level.

⚠ **WARNING:** Do NOT level the trailer; level the positioner.

- Tell the ODU that the positioner is level. This is done once, through the handheld by entering diagnostic code 25. What this does is record any current offsets in the inclination read by the instruments as "vertical." Verify that the roll and pitch on the handheld now read 0 (or +/- 0.1).
- Finally, verify bore sight alignment of El. This is most easily done by peaking on a well-kept geostationary satellite and adjusting the El offset (while the positioner is kept level) until the both the El and the platform El read true. The idea is if the positioner is level then the platform El and true El should be identical and very correct.

At this point, carefully check the stow sequence to verify El is still acceptable.

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5.1.8 TriFold® operation notes

- Predictive track is not suitable or recommended for mobile TriFold® systems. Step-track recommended
- While it might be possible to use the SRT accessory with the TriFold®, the functionality of the acquisition assist in this mode is not warranted or supported.

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5.1.9 The Stow Sequence

During stow, the following sequences happen:

Table 5.2: Stow Sequences

Action	Explanation
The compass mode is changed to "ignore" to return to platform coordinates.	Stow position is not relative to the system attitude.
Antenna Az is commanded to 180.000. If the El is outside the safe turning range, it is first moved to a safe level (safe turning range is determined by *ASC Signal* trailer & antenna design).	The antenna is centered before being raised into stow because the "el creep" switch (El rate limit) disables the Az axis.
El is then raised toward 90.000 degrees until stow switch is closed.	The exact angle is not known.

If the NGC-ODU will not change compass mode to the desired state, then the stow & deploy sequence will display a fault.

5.2 Configuration of DVB-S Carrier (OPTION)

If the DVB-S receiver is installed, each satellite can be configured with a receiver program to recognize and receive a traffic carrier on that satellite. This receiver can be used for acquisition (TriFold® systems) or tracking (all systems). There are definite limitations to this method, due to the nature of these signals. Most significantly, traffic carriers are uplinked from earth, and so may be susceptible to both uplink and downlink fade conditions.

This section describes how to enter and test those configurations.

The information herein is largely duplicated from *SatEdit v1.23 Editing Software* from *Horizon Global Electronics, Ltd.*

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5.2.1 Required Information

There are 15 required pieces of information to program the DVB-S receiver. 13 of them are important. These are the information elements required by the DVB-S receiver, the choice of elements was not made by *ASC Signal Corporation*.

Table 5.3: DVB-S Receiver Info

Field Name	Description	Other Information
Satellite Name	Display name	This name is only used by the receiver to display on the LCD display inside the unit. The working satellite name can be used here.
Carrier Frequency	Downlink carrier frequency	Received frequency entered according to desired Band. For example, 11876 for Ku-Band (in Mhz). You can also just enter L-Band frequency and select a LNB Frequency of 0GHz (zero) if that seems easier. **NOTE:** For C-Band, receiver cannot invert spectrum, so you need to swap your local oscillator and frequency values. Otherwise, you end up with a negative resultant L-Band frequency, which would result in the meter not locking on to desired carrier.
LNB Frequency	Local oscillator of the LNA/LNB.	Here you can set local oscillator value of the LNB that you will be using. In most cases of European satellite installations for TVRO type Universal LNB's we have a choice of two local oscillators 9.75GHz and 10.6GHz. These values should be entered in MHz so 9.75GHz would become 9750 and 10.6GHz would become 10600. For United States of America it is more common to have 10.75GHz local oscillators.
Search Range	AFC capture range when searching for frequencies	Search Range feature is preset to 3000 kHz, but can be adjusted in the event of multiple SCPC carriers that are very close to each other on a transponder. However in most cases you would never need to adjust this value. Search range defines how far the AFC (Automatic Frequency Control) will search.
Sym Frequency	Symbol rate or frequency. # of kilo-symbols per second (kS).	Symbol Rate is defined by the service broadcaster. Your meter will operate from 1000 to 45000 kS. Lower symbol rates (less than 4000 kS) will take slightly longer to acquire a lock. **NOTE:** When symbol rates lower than 10000kS are used, ensure that SCPC is ticked (Single Carrier Per Channel).
Roll Off	Roll off of filter	Roll Off determines the percentage of carrier roll off. Select 0.35 for QPSK, and 0.2 for DSS modulated carriers or where circular Pol is required.
Sym Rate Code	Symbol rate filter	This should be set to match the symbol rate. It is independently configured for historical reasons.
Modulation	Modulation type	The modulation type should always be set to QPSK2 as QPSK1 and BPSK are no longer used for commercial permanent DVB modulated services
Modulation2	Modulation set or FEC mode	The FEC Mode drop-down enables the selection of DVB(QPSK) or DVB (DSS) the QPSK modulation is found worldwide and DSS modulation can be found in the United States and Japan
FEC	Forward Error Correction setting	The receiver can handle the following FEC rates 1/2, 2/3, 3/4, 5/6, and 7/8. There is also an option to select unknown where the meter will step through the available FEC's to attempt to acquire a lock when the FEC is unknown. Note: Although 6/7 is not available from the FEC drop-down menu it can be applied by selecting DSS on the modulation mode drop-down menu and selecting a Code rate of 7/8. This is only really relevant where DSS services are available (in the United States and Japan).
LPF	Low pass filter setting	Low Pass Filter is set to discard all signals above a certain frequency relative to the symbol rate (occupied bandwidth). For example, if desired carrier has a symbol rate of 27500 then the Low Pass Filter can be set at 30.0. Although 27.5 is available from the drop down menu, it is preferable to set a slightly higher value. For carriers with a symbol rate below 10000 check the SCPC box and set the Low Pass Filter to 10.0

IQ Swapped	Quadrature phase	Occasionally some carriers are transmitted with IQ Swap applied (more common on SCPC and C-Band services). This is set by trial-and-error. It is usually false.
22kHz	Tone	Setting is not critical. This generates the 22kHz tone used to switch frequencies for Universal LNBs commonly used by TVRO and VSAT systems in some countries.
Horizontal	Polarization control	Setting is not critical unless DC block has been removed from IDU system. If it has, this can generate the voltage level used to switch Polarizations. Note that when using the meter for VSAT installation the Pol should be set to Horizontal to provide 18 volts to the LNB even if receive frequency is vertically down-linked. Most typical block type LNB's operate best between 15 and 22 volts and the Pol of the LNB is mechanically set to receive one polarity.
Options	Options	Set to 1 if symbol rate is less than 10000kS/s.

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5.2.2 Collecting Info for TriFold® with Acquisition Assist

In most instances, the user would like to have a single unique setting for the entire sky to be sure that the desired satellite has been correctly found at the installation site. The following tips will guide you on making effective settings.

Here are the most important elements to acquire a lock with this receiver once the satellite has been located and the antenna is pointed. This information can be found in various publications, web sites or directly from the service provider or satellite operator.

- Frequency
- Symbol rate
- Polarization
- FEC
- IQ Swap

NOTE: If any one of the above is incorrect then a matching lock will not be obtained.

Example: At one point, the carrier information below was unique to Horizontal downlink from Astra-1 at 19.2° east:

- Frequency: 12515
- Symbol rate: 22000
- FEC: 5/6
- IQ Swap Off

So, if at the adjacent satellites from 45° east to 45° west with this selection, the user would only find a lock at 19.2° east as this combination is unique to that satellite.

Ideally there should be as many unique values as possible and the most useful is the Symbol Rate. It is quite common to find symbol rates of 22000, 27500 and 30000 as these are the rates that most commercial satellite broadcasters use. More unusual symbol rates are most likely to be unique carriers. There are other useful tools, such as the following: unusual FEC's like 7/8 or 1/2, for example, as well as where IQ Swap is found, can also be helpful in creating unique selections.

Where possible it is essential to find permanent commercial services rather than temporary feeds as it will most likely be a carrier that is continually broadcast for 24 hours and can be relied upon in the future.

5.3 Inclined Orbit Polarization Compensation

Inclined orbit satellites with linear Pol will show Pol shifts. This can be modeled two ways depending on your required accuracy. One way, used on the ASC Signal APC300, and continued in this product, is to follow the formula:

$$P = P_0 + I\cos(\frac{A+t}{D})$$

Where *P* is Pol, *P0* the default Pol angle from the satellite table, *I* the maximum inclination angle, *A* the time of max inclination, and *t* the current time. *D* is the constant that maps time into the circle for a sidereal day. Note that any value in the satellite table for this parameter will override the current setting when satellite is changed.

To enter this for a satellite, use the following path and procedure:

1. Path: **HOME → Configuration → Satellite → Working Tbl**
2. Select satellite and edit. Go to screen 4
3. Enter Pol Inc field (*I* in formula) and Pol Inc Peak Time (*A*)

When a satellite is selected (ReTune or Goto), these values are copied into the current operation.

To enter this for tracking directly, use the following path and procedure:

1. Path: **HOME → Configuration → Tracking Config → General**
2. Go to page 4 (on screen)
3. Enter Pol Inc field (*I* in formula) and Pol Inc Peak Time (*A*).

Future versions of the NGC-IDU will include the ability to calculate Pol skew offset from Ephemeris data.

5.4 Pattern Test Procedure

PATH: HOME → Operations → Pattern Test

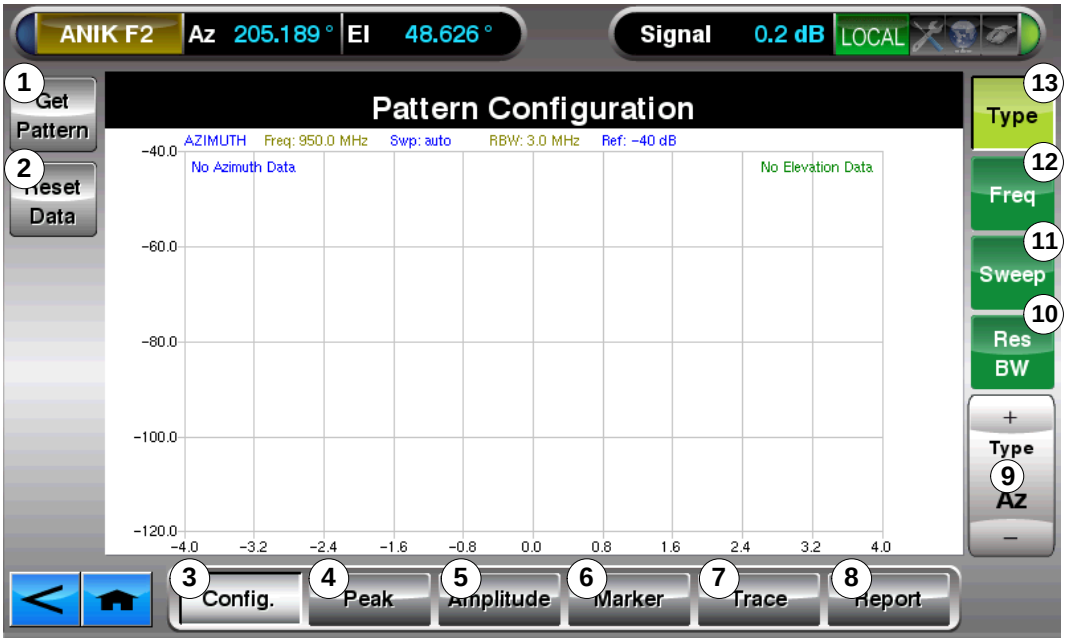


Figure 5-2: Pattern Test Configuration Page

#	Item	Description
1	Get Pattern	Begins pattern sweep for selected axis (Az or El). See **Item #9** in this table
2	Reset Data	Clear last pattern sweep(s)
3	Config.	Go to the Pattern Test Configuration screen (shown above in **Figure 5-2**)
4	Peak	Go to select the Peak screen
5	Amplitude	Go to the Amplitude screen
6	Marker	Go to the Marker screen
7	Trace	Go to the Trace screen
8	Report	Go to the Report screen (see **Section 5.4.1**)
9	3-Way Rocker	Changes available choices depending on which of the green radio buttons are selected see **#10-13** in this table)
10	Res BW	When selected, allows adjustment of the Res BW in +/- MHz
11	Sweep	When selected, allows adjustment of the sweep in +/- degrees
12	Freq	When selected, the 3-Way Rocker allows adjustment of the frequency in +/- MHz
13	Type	When selected, the 3-Way Rocker (**#9** in this table) toggles between Az (sweep or view plot), El (sweep or view plot), or Az & El (view plots only)

Before running a Pattern Test, the following setup procedure should be thoroughly and properly performed:

1. Peak the antenna on the intended satellite

2. Set type to Az or El (Sweep must be run individually for either axis. Simultaneous sweeps cannot be run with the Az & El Type selected together)

3. Set the Frequency

4. Set the Sweep Span

5. Set the Resolution Bandwidth

6. Clear out any old plot patterns, if necessary, by pressing “Reset Data” (**Item #2** in **Figure 5-2**)

To **execute a plot sweep** for the selected axis (either Az or El, not “Az & El”), press “**Get Pattern**” (**Item #1** in **Figure 5-2**). As the system executes the sweep, please take note that a Dialogue Box will warn you of the jog that is associated with taking the pattern (**Figure 5-3**), and will ask for confirmation that you wish to proceed.

Press “Yes” to continue.

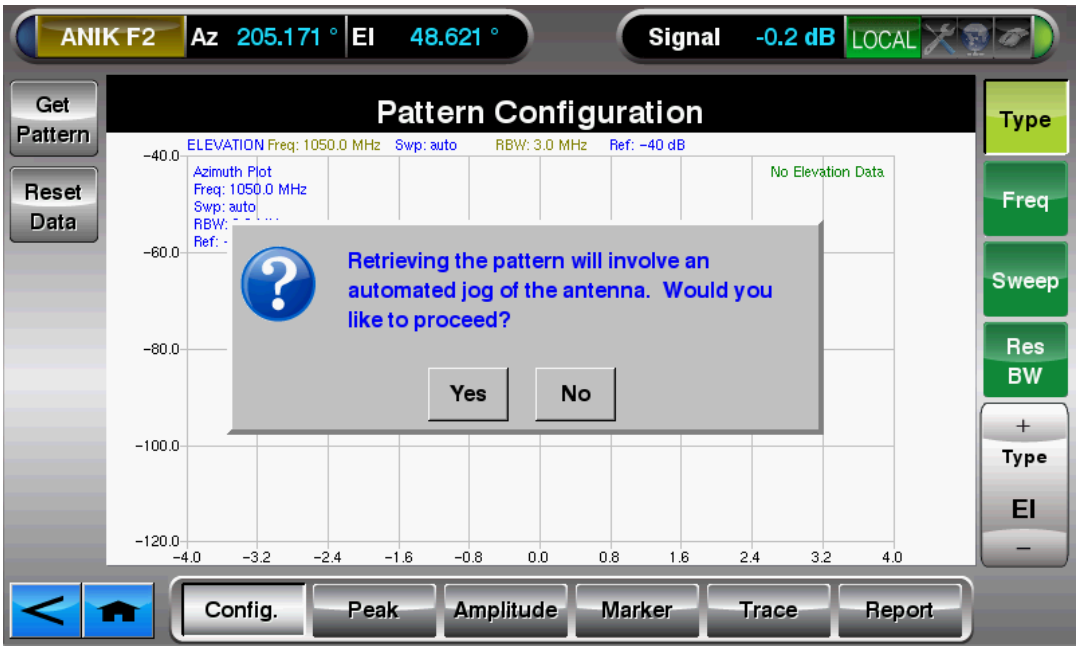


FIGURE 5-3: CONFIRMATION DIALOGUE BOX

As the SCP calibrates, the area in the Status Bar that normally displays the Signal will now display a “Sweep requested” warning. However, if the antenna has not been properly peaked, or if there has been some other error performed during the setup procedure, this warning may stay in place until the Pattern Test setup has been properly completed.

The Status Bar will now read “Moving to sweep” (**Figure 5-4**), while the antenna moves to the sweep start position.

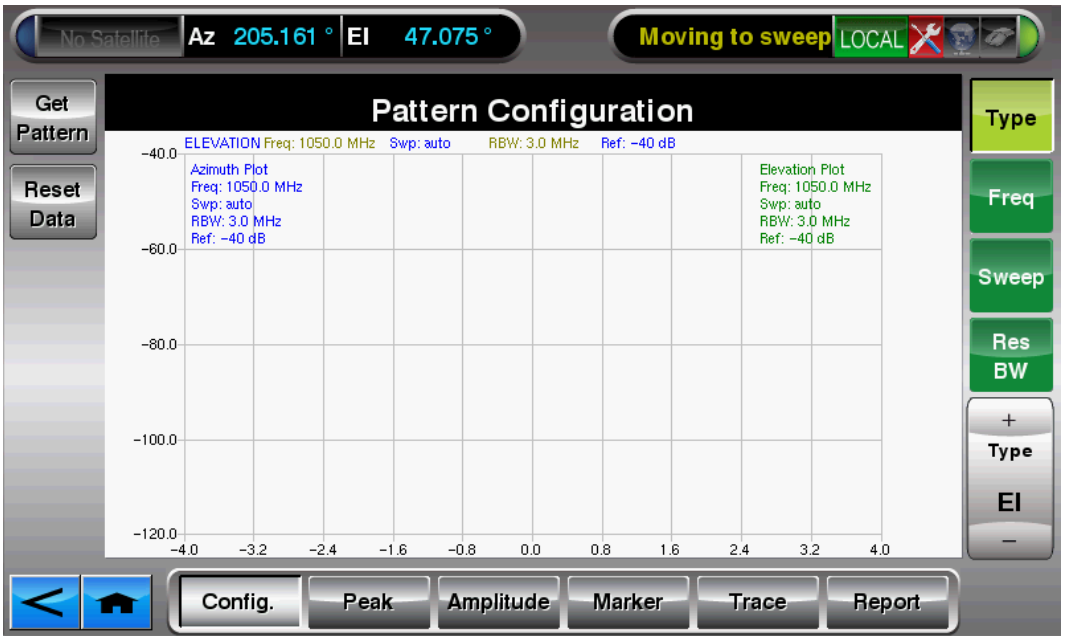


FIGURE 5-4: MOVING TO SWEEP

Once the antenna reaches the start position, it will begin the sweep. The Status Bar will change to display "Sweeping…" (as shown below in **Figure 5-5**) as the antenna moves throughout the entire range of the sweep.

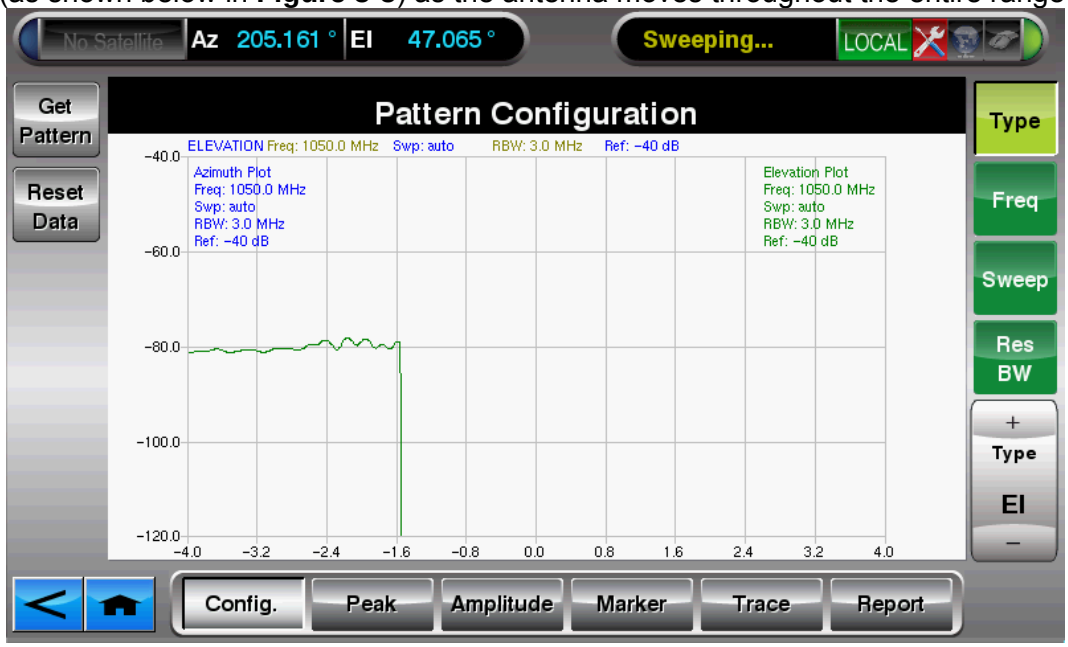


FIGURE 5-5: SWEEPING

Once the entire sweep has been completed, a Dialogue Box will appear to display "Pattern Test Complete" as shown in **Figure 5-6**. Tap the screen to continue.

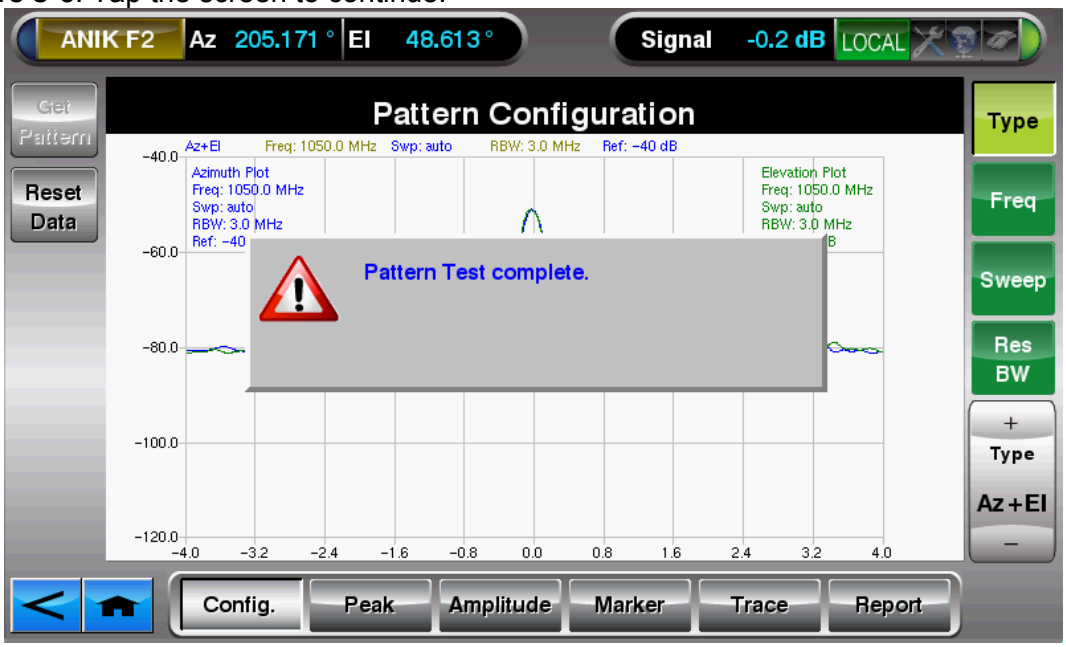


FIGURE 5-6: PATTERN TEST COMPLETE

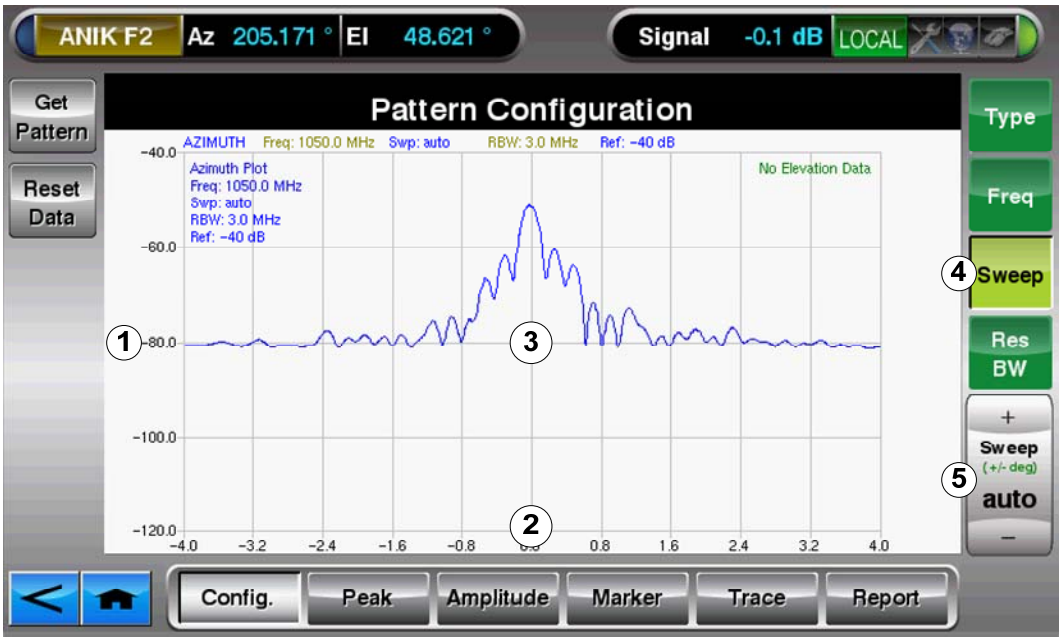


FIGURE 5-7: AZIMUTH PLOT SWEEP

#	Item	Description
1	Signal Strength	Azimuth signal strength, shown in dB
2	Angle	Angle of the antenna during the sweep, 0.0 being the origin point
3	Azimuth Plot	Plotted strength of the Azimuth sweep
4	Sweep (Radio Button)	Allows adjustment of the sweep in +/- degrees (or auto, if desired)
5	Az Selected on 3-Way Rocker	To sweep the Azimuth, Az must be selected on 3-Way rocker (or auto)

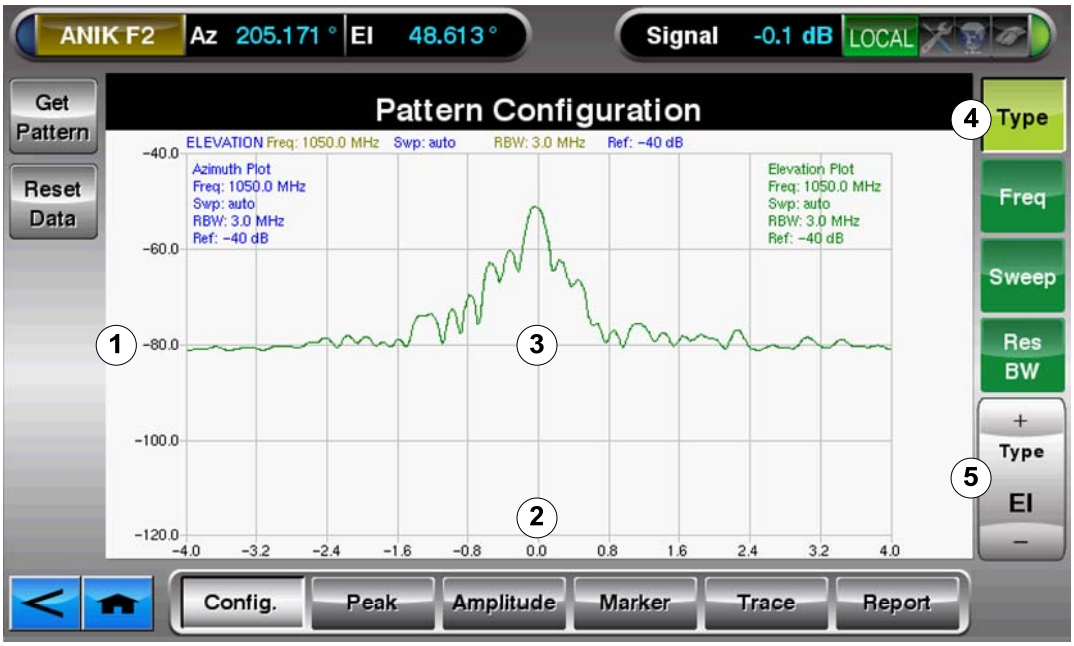


FIGURE 5-8: ELEVATION PLOT SWEEP

#	Item	Description
1	Signal Strength	Elevation signal strength, shown in dB
2	Angle	Angle of the antenna during the sweep, 0.0 being the origin point
3	Elevation Plot	Plotted strength of the Elevation sweep
4	Type	When selected, the 3-Way Rocker (#**9** in this table) toggles between Az (sweep or view plot), El (sweep or view plot), or Az & El (view plots only)
5	El Selected on 3-Way Rocker	To sweep the Elevation, El must be selected on 3-Way rocker (or auto)

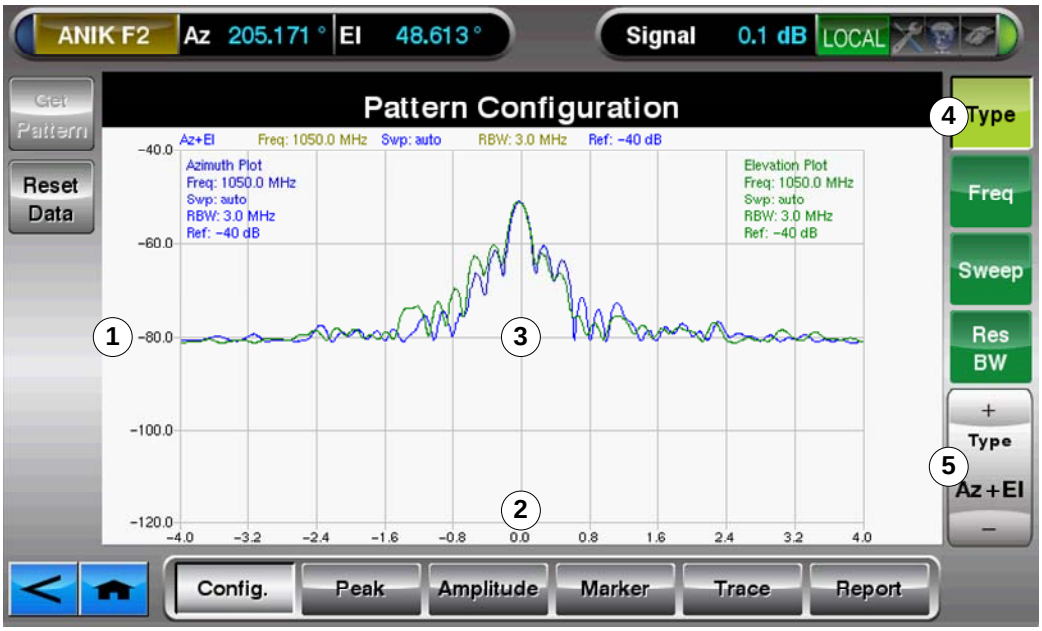


FIGURE 5-9: AZIMUTH & ELEVATION PLOT

#	Item	Description
1	Signal Strength	Elevation signal strength, shown in dB
2	Angle	Angle of the antenna during the sweep, 0.0 being the origin point
3	Azimuth & Elevation Plot	Plotted strength of both the Azimuth & Elevation sweeps
4	Type (Radio Button)	See **Item #4** in **Figure 5-8**
5	Az + El Selected on 3-Way Rocker	Displays the plots for both Az & El sweeps, for purposes of comparison.

- - - - - - - - - - - - - -

5.4.1 PATTERN TEST REPORTS

Once Pattern Test is complete, for one axis or both, it is best to next create and save a Test Report. Begin by pressing "Report" button at bottom of screen (see **Figure 5-2**) to go to the Report Page (**Figure 5-10**).

NOTE: If "Report" is pressed before Pattern Test is run, Report Page will be blank aside from showing "No Azimuth Data" and/or "No Elevation data.

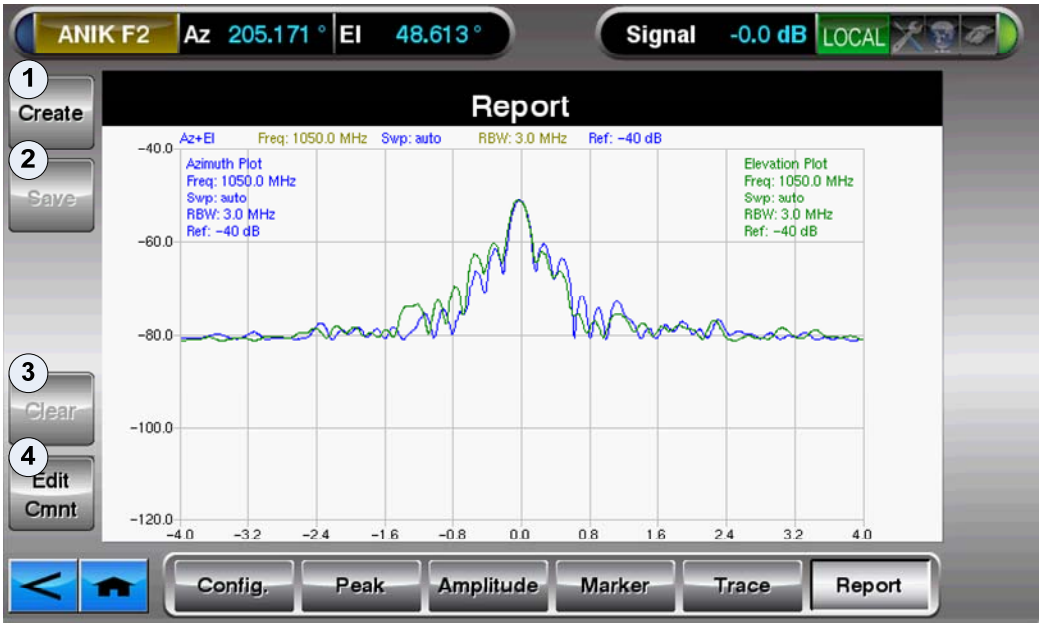


FIGURE 5-10: PATTERN TEST REPORT PAGE

#	Item	Description
1	Create	Create Pattern Rest Report of last sweep(s) (Az, El, or both)
2	Save	Save the current Test Report (will be grey/disabled until report is created)
3	Clear	Clear the current Test Report (will not clear the sweep data)
4	Edit Cmnt	Insert a Comment into the Test Report, or edit a preexisting comment

In order to create a report of the Pattern test that has just been run, press “Create” (#1 in **Figure 5-10**). The report will appear, along with a scroll bar at the right hand side. As the user scrolls through the report, it will appear similarly to that shown in **Figures 5-11a** to **5-11c**.

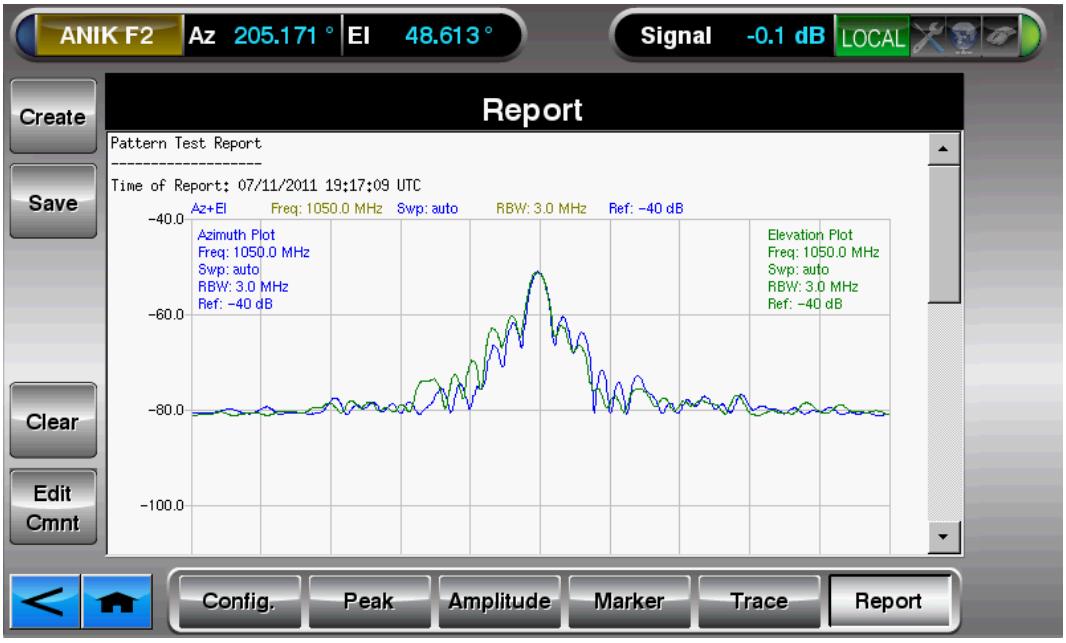


FIGURE 5-11A: PATTERN TEST REPORT 1

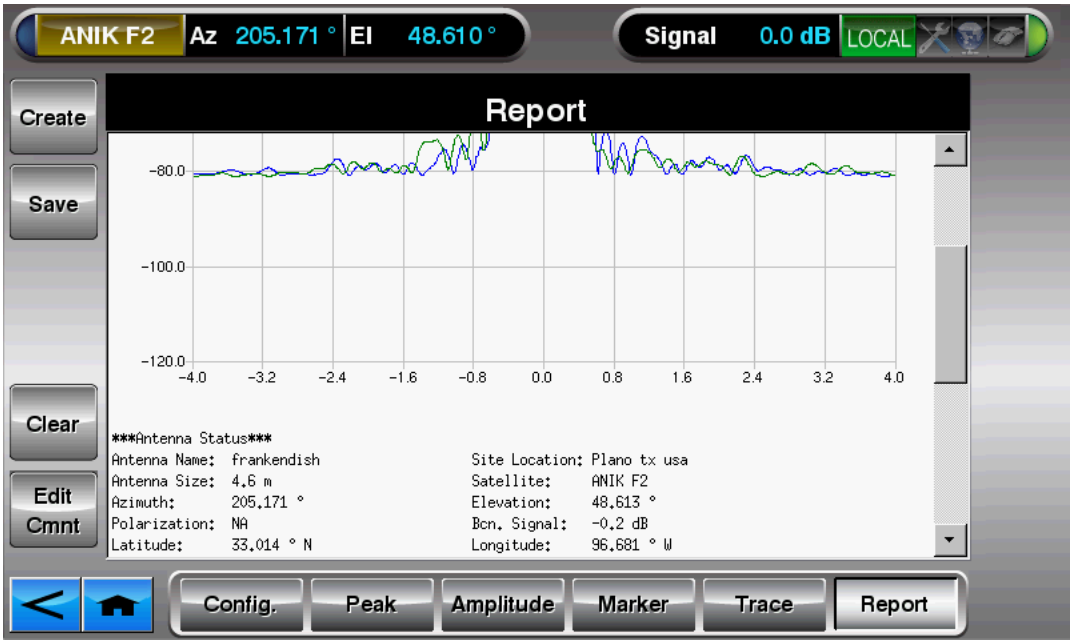


FIGURE 5-11B: PATTERN TEST REPORT 2

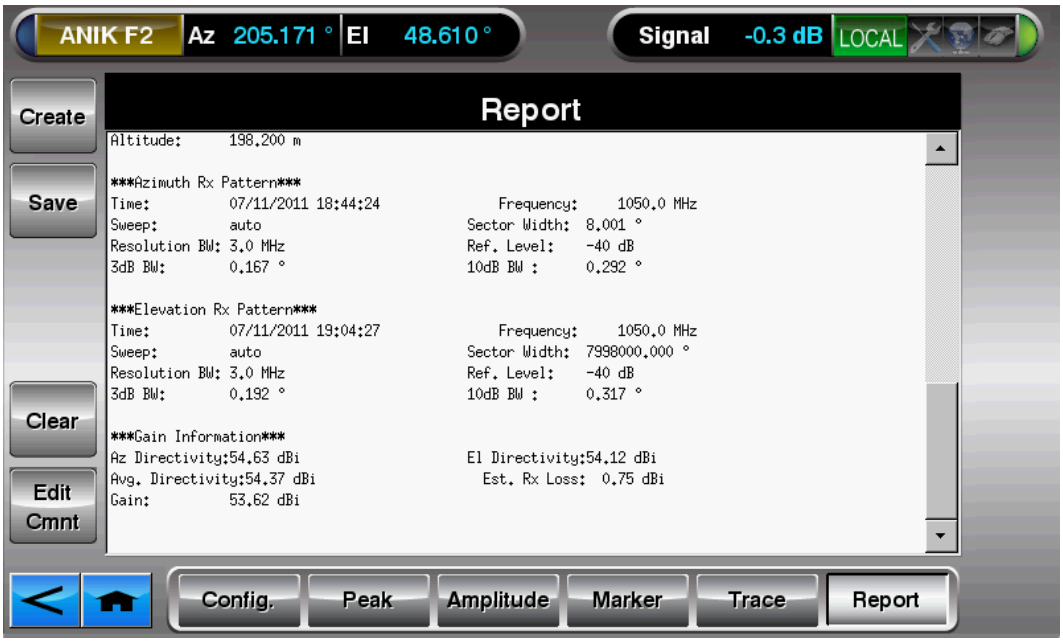


FIGURE 5-11C: PATTERN TEST REPORT 3

If user wishes to insert comments into the report before saving, simply press "Edit Cmnt" (#4 in **Figure 5-10**). Comments will appear at the end of the report, under the "*****Comment*****" heading. A report's comments may be edited at any by simply pressing "Edit Cmnt," even after the report has been saved.

Once the report is complete and the desired comments, if any, have been entered, the report may be saved by simply pressing the "Save" button (#2 in **Figure 5-10**). If a saved file of the report is not desired, or it is necessary to generate a new report, simply press "Clear" (#3 in **Figure 5-10**) to remove the current report.

Once the save has been successfully completed, the screen will display a Dialogue Box similar to that shown below in **Figure 5-12**. Tap the screen to continue.

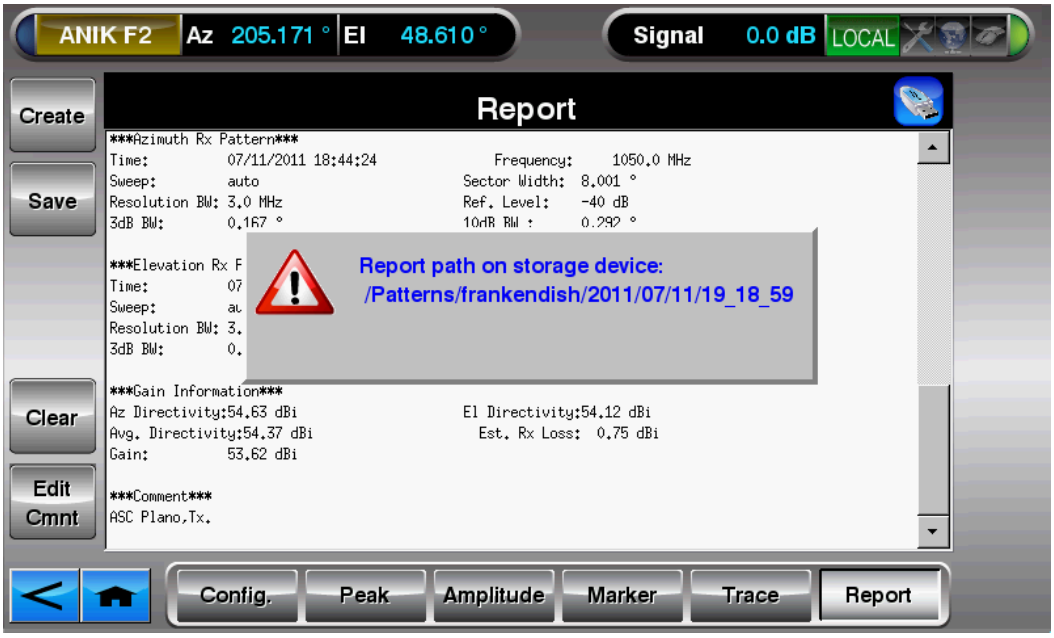
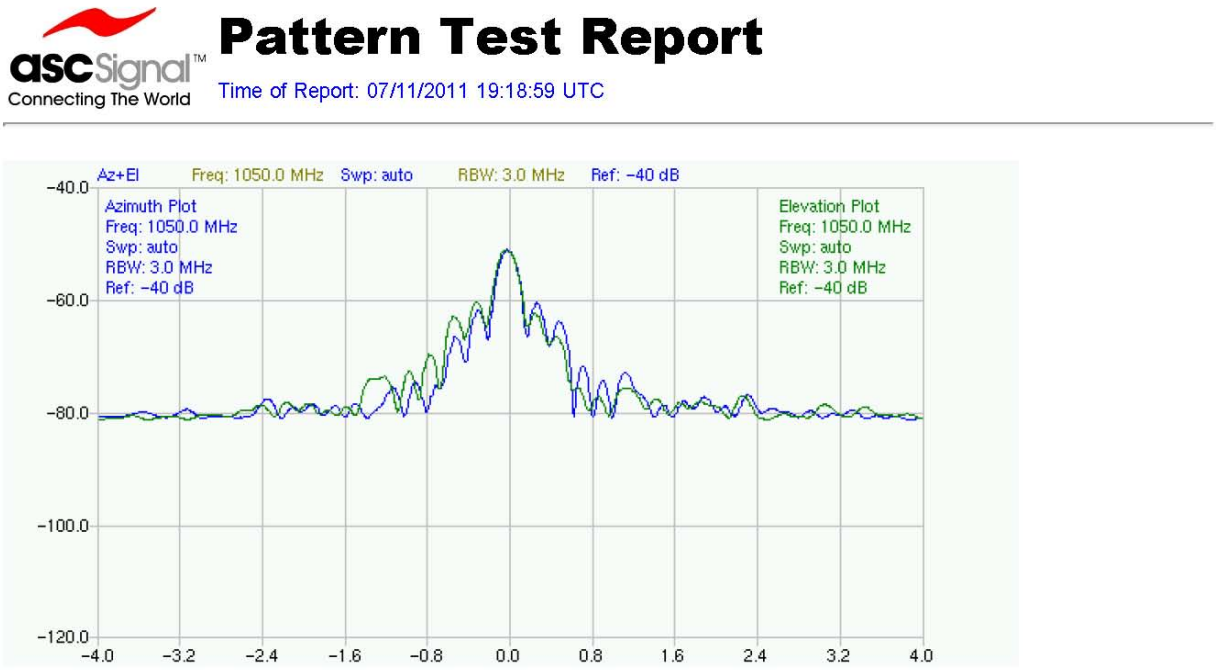


FIGURE 5-12: SAVE SUCCESSFUL

5.4.2 HTML Pattern Test Reports

In order to save a Pattern Test Report for viewing in HTML, use the following procedure:

1. Save Pattern Test Report to external USB device
2. Plug USB into a PC/Computer, and open the device
3. Locate the folder and file, using the indicated path (like that shown in the dialogue box in **Figure 5-12**)
4. The file will open in your web browser (*Internet Explorer*, *Firefox*, etc.), allowing it to become viewable



Pattern Test Report

Time of Report: 07/11/2011 19:18:59 UTC

Antenna Status

Antenna Name:	frankendish	Site Location:	Plano tx usa
Antenna Size:	4.6 m	Satellite:	ANIK F2
Azimuth:	205.171 °	Elevation:	48.610 °
Polarization:	NA	Bcn. Signal:	-0.1 dB
Latitude:	33.014 ° N	Longitude:	96.681 ° W
Altitude:	198.200 m		

Azimuth Rx Pattern

Time:	07/11/2011 18:44:24	Frequency:	1050.0 MHz
Sweep:	auto	Sector Width:	8.001 °
Resolution BW:	3.0 MHz	Ref. Level:	-40 dB
3dB BW:	0.167 °	10dB BW :	0.292 °

Elevation Rx Pattern

Time:	07/11/2011 19:04:27	Frequency:	1050.0 MHz
Sweep:	auto	Sector Width:	7998000.000 °
Resolution BW:	3.0 MHz	Ref. Level:	-40 dB
3dB BW:	0.192 °	10dB BW :	0.317 °

Gain Information

Az Directivity:	54.63 dBi	El Directivity:	54.12 dBi
Avg. Directivity:	54.37 dBi	Est. Rx Loss:	0.75 dBi
Gain:	53.62 dBi		

file:///E|/Patterns/frankendish/2011/07/11/19_18_59/report.html[7/28/2011 3:32:05 PM]

Figure 5-13: HTML Pattern Test Report Example

6.0 IDU System & Parts Troubleshooting

The following sections will provide you with convenient flowcharts and tables for the purpose of troubleshooting potentially encountered issues with the NGC-IDU.

6.1 General Problems

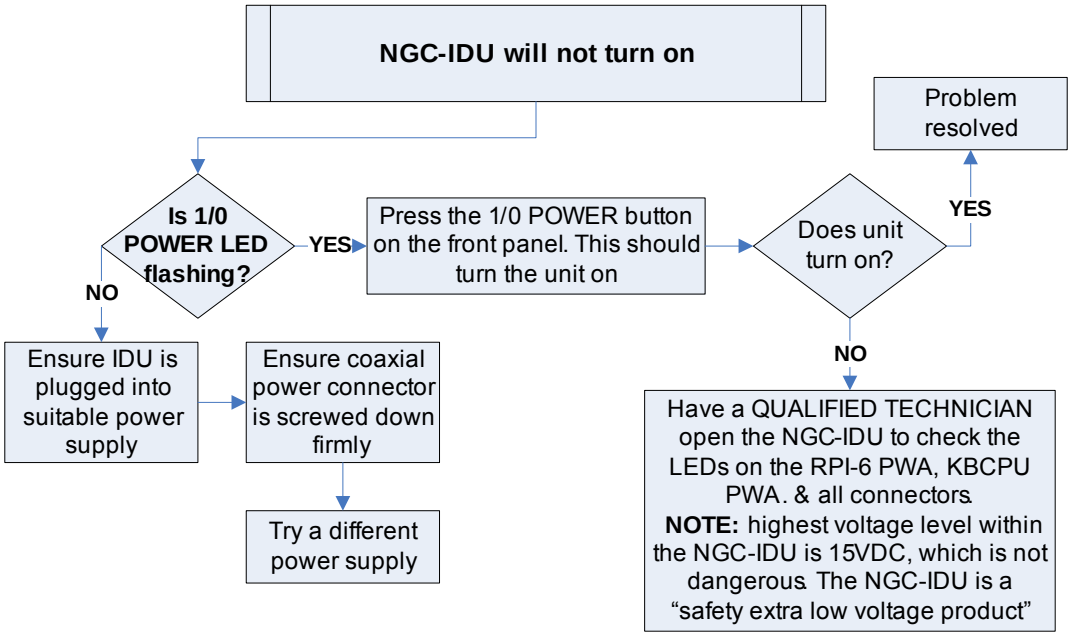


Figure 6-1: General Troubleshooting Flowchart #1

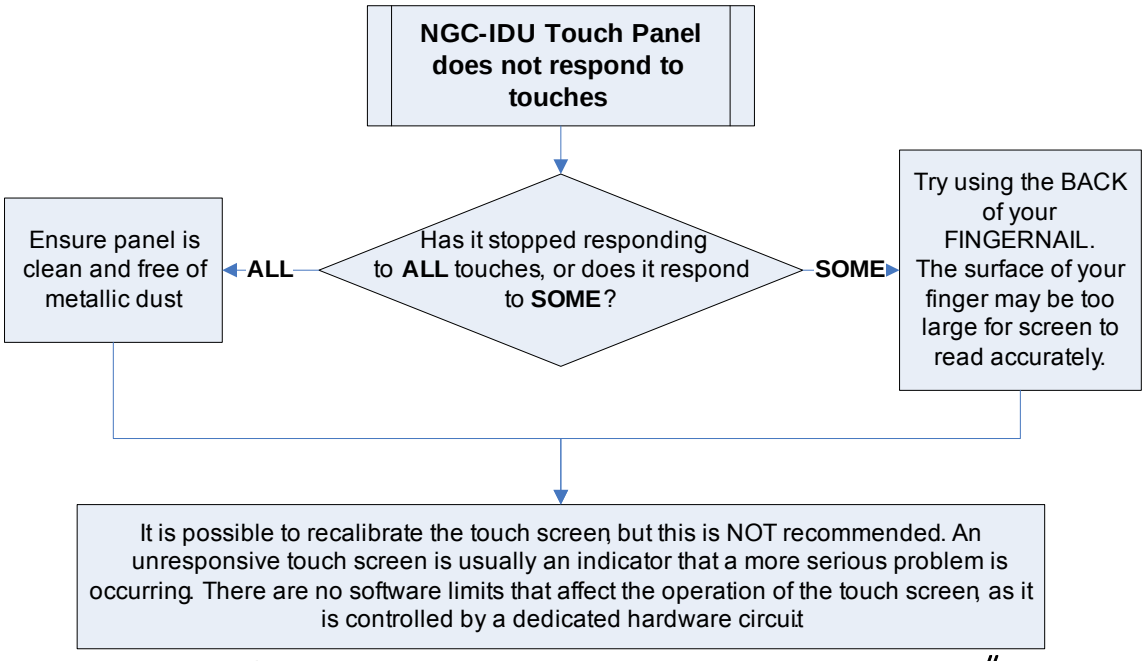


Figure 6-2: General Troubleshooting Flowchart #2

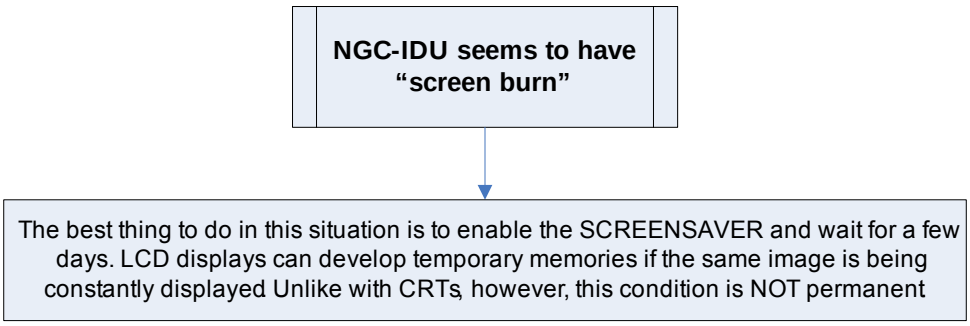


Figure 6-3: General Troubleshooting Flowchart #3

6.2 Communications Issues

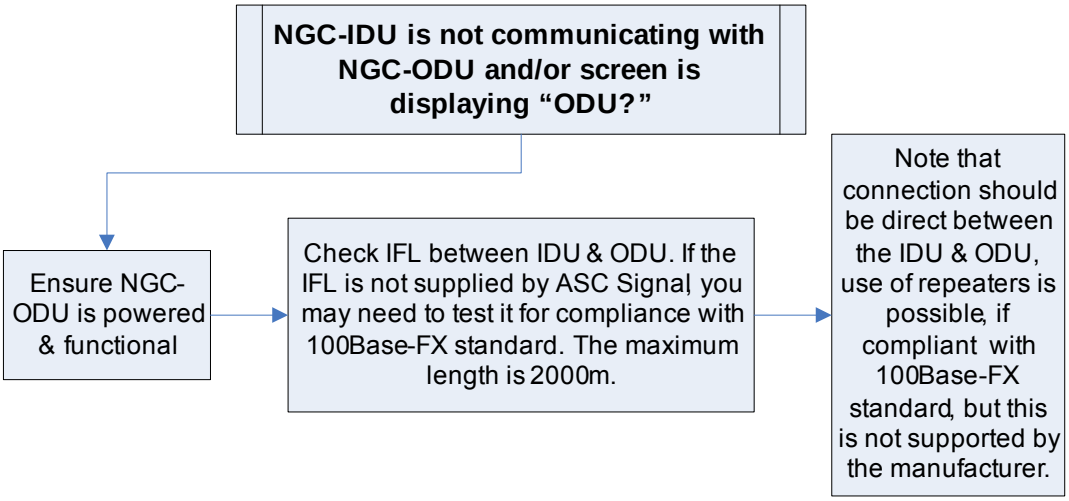


Figure 6-4: Communications Troubleshooting Flowchart #1

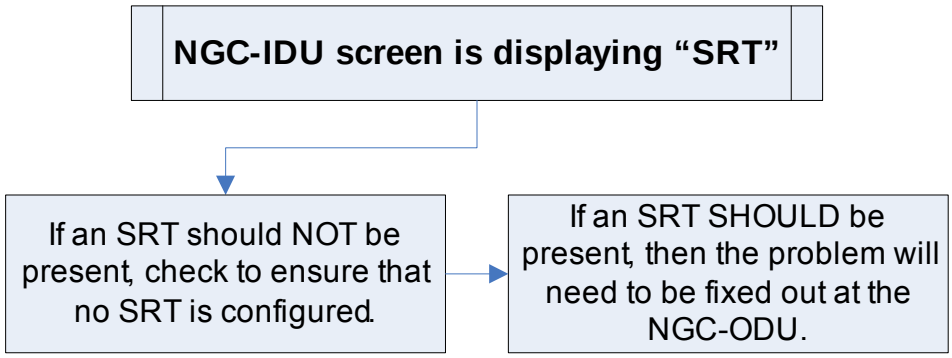


Figure 6-5: Communications Troubleshooting Flowchart #2

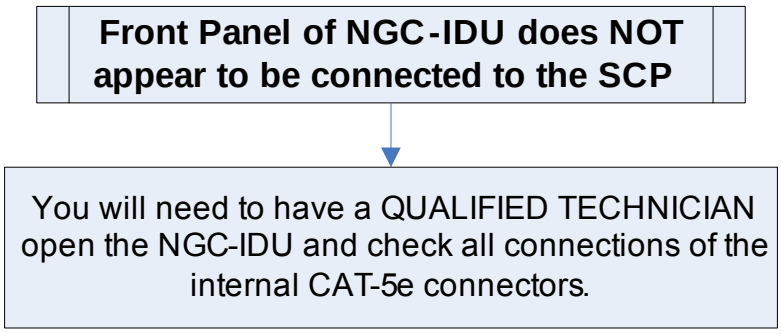


Figure 6-6: Communications Troubleshooting Flowchart #3

6.3 Alarms & Faults

Refer to the following table if the NGC-IDU is displaying an unusual alarm or condition. For FAULT SEVERITY TABLE, refer to Appendix B.

Table 6.1: Unusual Alarms & Conditions of NGC-IDU

Displayed Alarm/Condition	Description
Storage purge requested	Internal storage of SCP is filling up with logged data. Usually takes many months if not years for this to occur. Flush archives to make fault go away. **NOTE:** it may take a few seconds for the system to complete this operation
Tracking fault	Last tracking mode paused due to some condition other than user action. Generally, IDU does not stop tracking due to movement faults. This can mean data set was bad (in which case, satellite data alarm will also occur), predicting software generated an illegal value (unusual), or a disabling fault exists (such as resolver alarm)
Satellite data alarms	Issues were detected with program track data. NORAD data set or Intelsat data set is faulty. Obtain up-to-date parameters, and if data manually entered, check data entry carefully for transcription errors. Fault self-clears when data is corrected or another tracking mode selected.
Rain detected	The rain detector algorithm has measured signature of rain presence. No action required
Beacon comm. flt	IDU is configured to expect a serial connection to a beacon receiver for tuning and monitoring purposes, but it is not working. If no beacon receiver is serially connected, change beacon receiver Device Type to "none" to clear alarm For Atlantic ASC3xx series of receivers, ensure receiver is in Remote mode If beacon receiver is serially connected, ensure Device Type and serial cable are correct, and serial parameters are set up correctly
Cabinet comm.	Connection to ODU not working. Ensure ODU powered & functional. Check IFL between IDU & ODU to make sure it is intact, fibers are not swapped, & no dirt appears on connections. **NOTE:** IFL is multimode fiber using LEDs, not lasers, with no danger of eye injury
GPS/Att sense fault	This usually means system is configured in mobile operational configuration. See NGC-ODU troubleshooting instructions to correct this if antenna is not a TriFold®
Az1 VFD fault reported ***Az2 VFD fault reported*** ***El VFD fault reported***	Any of these faults mean there is a problem in ODU. See NGC-ODU Advanced Technical Manual (**7580368**) troubleshooting guide.
Az1 VFD overload fault ***Az2 VFD overload fault*** ***El VFD overload fault***	Any of these faults mean there is a problem in ODU. See NGC-ODU Manual (**7580368**) troubleshooting guide.
Cabinet temp high fault ***Cabinet temp low fault***	Both of these faults mean the NGC-ODU is outside its normal temperature range. Movement may be inhibited.
Cabinet setup	There is a parameter conflict in the ODU. Refer to the NGC-ODU Advanced Technical Manual (**7580368**) troubleshooting guide.
Uncmd move detected	Antenna moved without being commanded. This can be spuriously reported if user is changing resolver parameters, or during maintenance.
SRT Az HW Event ***SRT El HW Event*** ***SRT Z reading adj***	Any of these faults mean SRT had to readjust feedback path. This can happen occasionally and only a cause for concert if seen more than once a day or so.
Strut Interlock ***El creep activated* (on a fixed antenna)**	These usually mean the NGC-ODU has been wrongly configured as a TriFold®. Refer to the NGC-ODU Advanced Technical Manual (**7580368**) troubleshooting guide.
SRT comm.	SRT is not communicating. Refer to the NGC-ODU Advanced Technical Manual (**7580368**) troubleshooting guide.

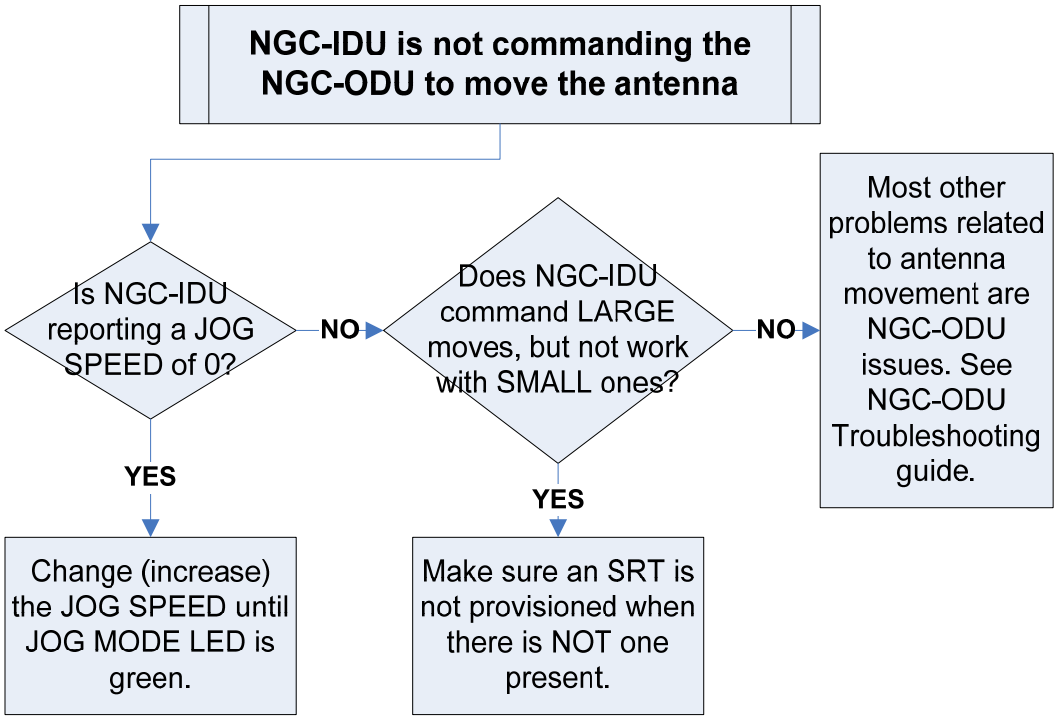


FIGURE 6-7: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #1

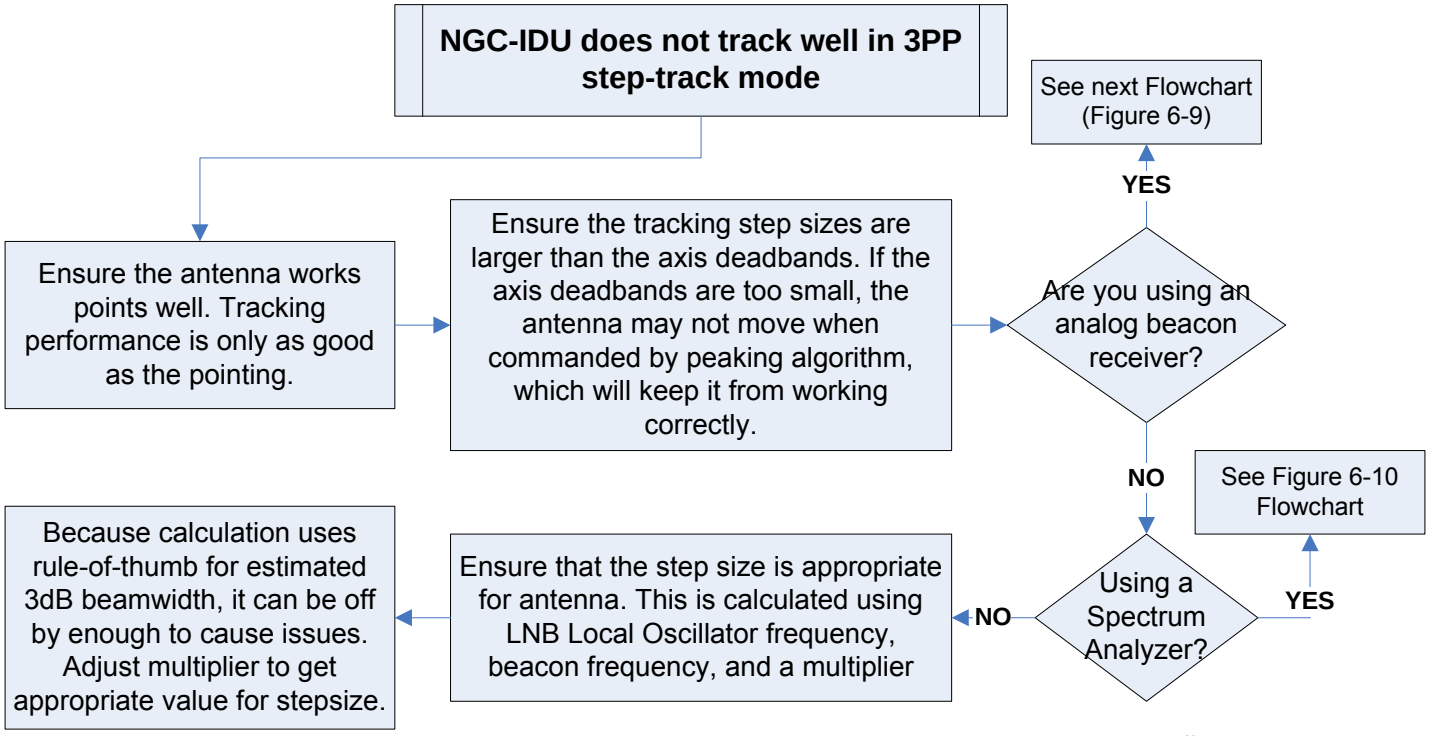


FIGURE 6-8: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #2

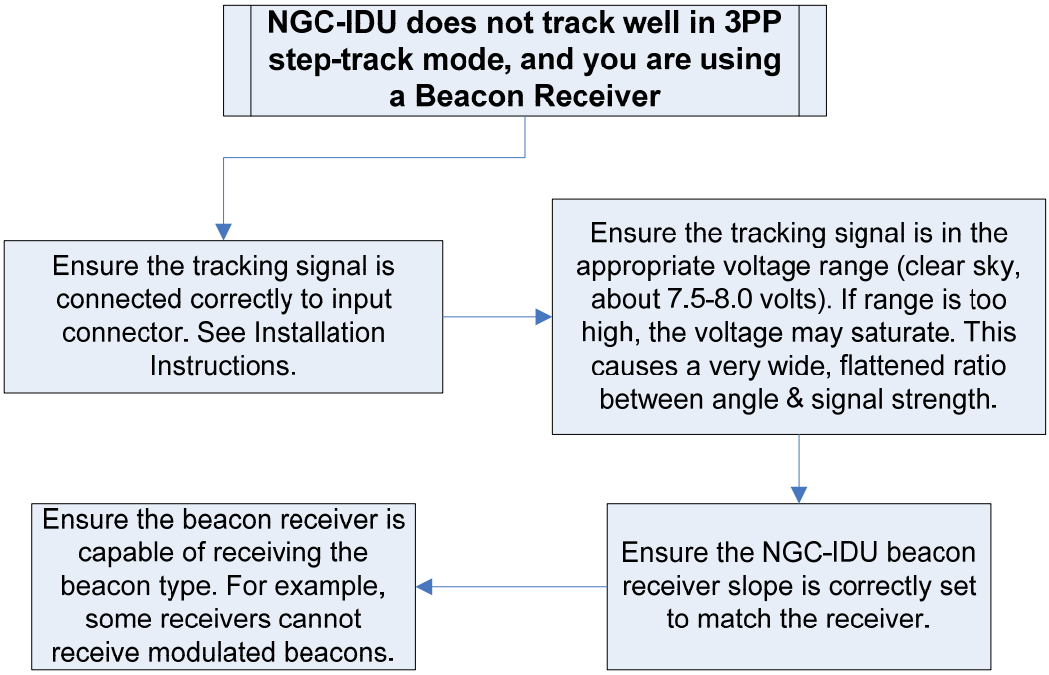


FIGURE 6-9: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #3

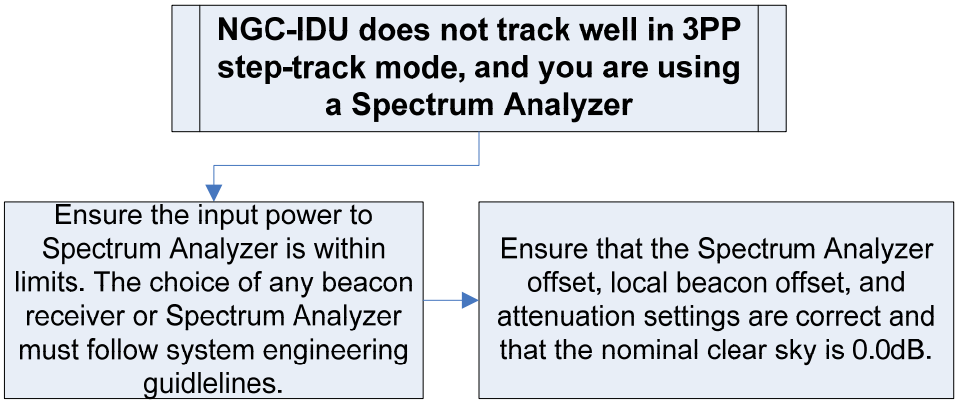


FIGURE 6-10: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #4

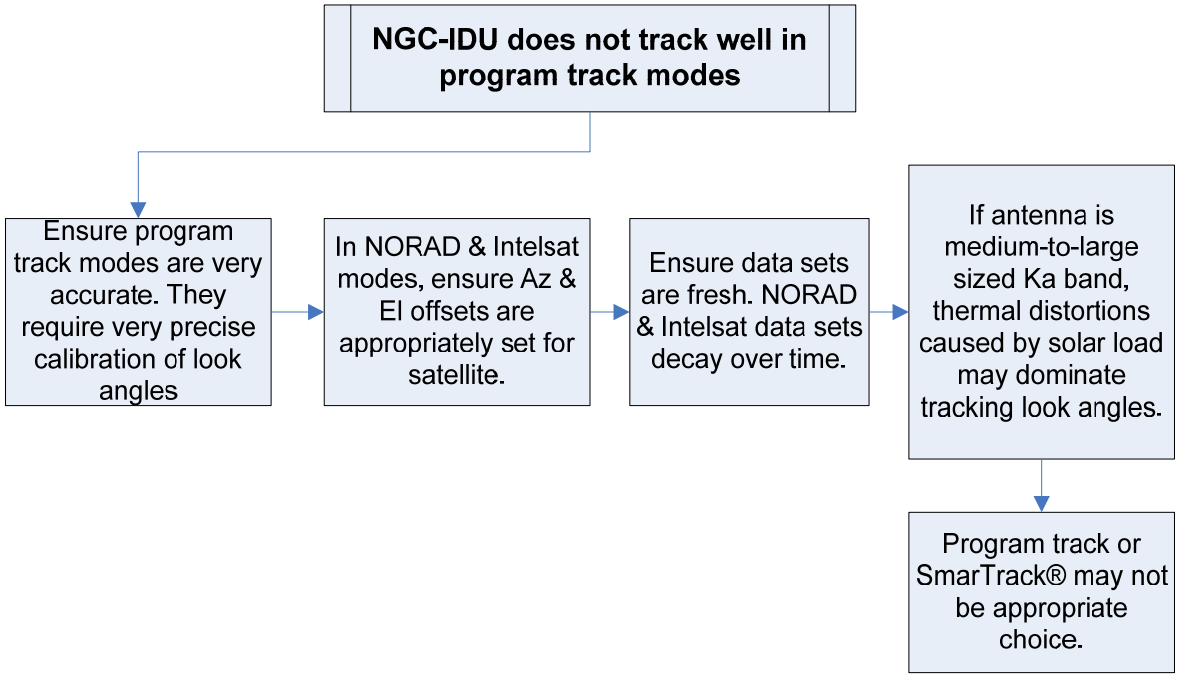


FIGURE 6-11: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #5

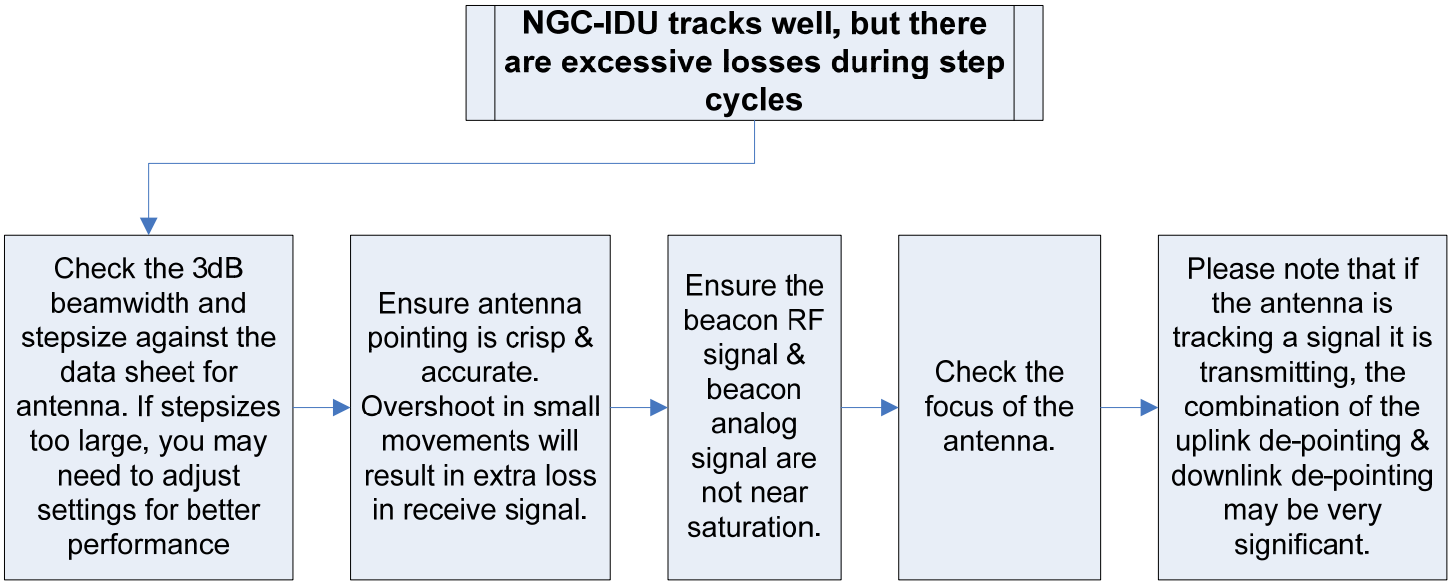


FIGURE 6-12: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #6

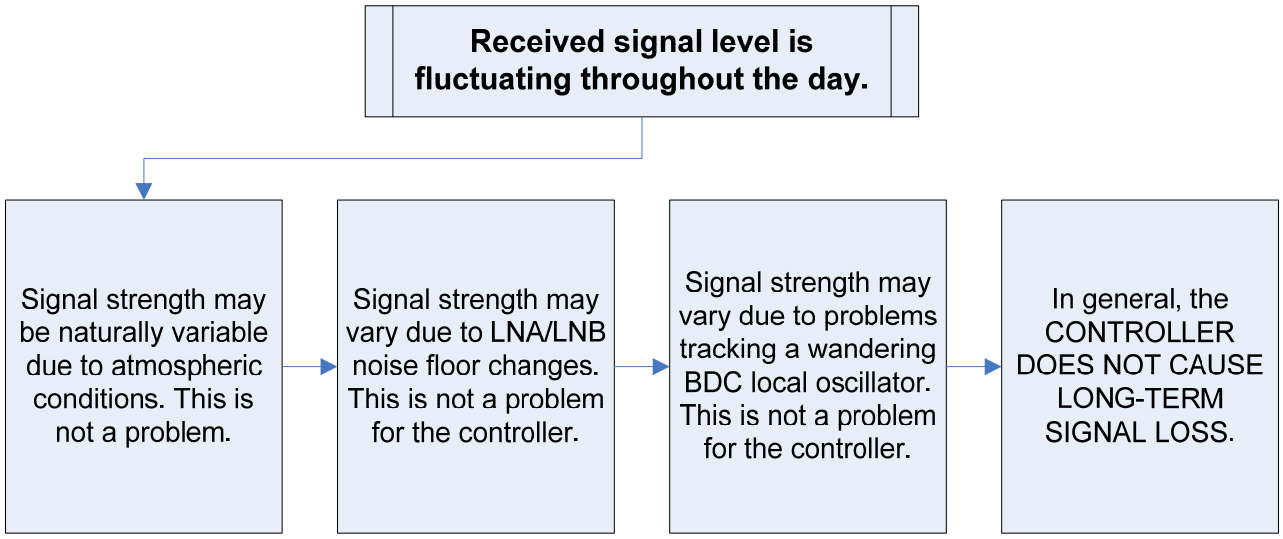


FIGURE 6-13: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #7

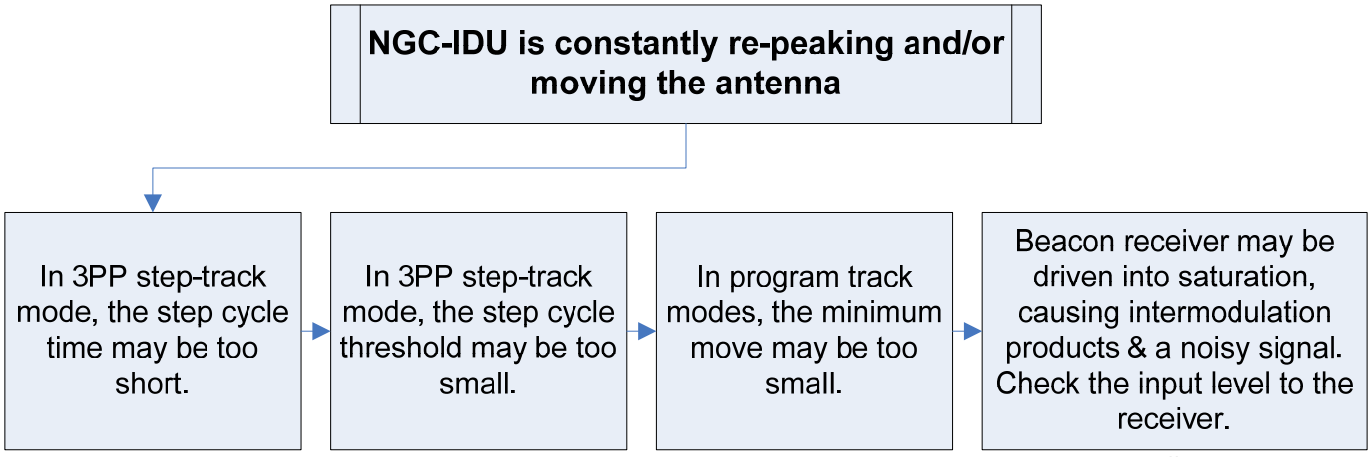


FIGURE 6-14: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #8

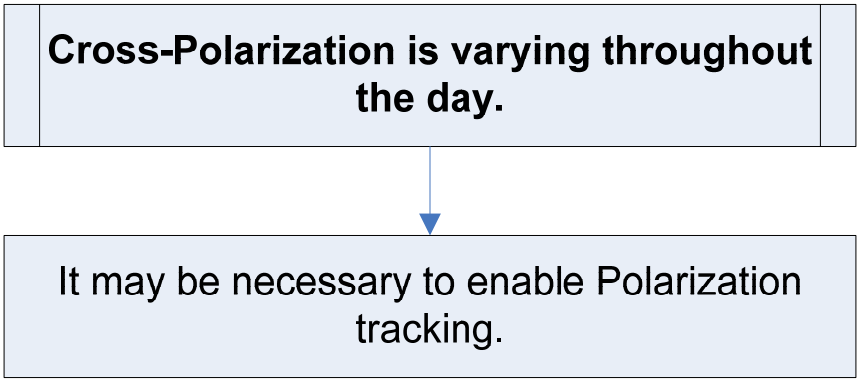


FIGURE 6-15: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #9

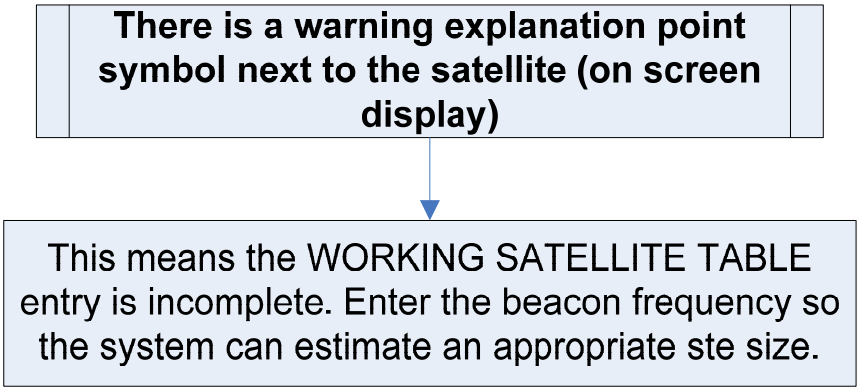


FIGURE 6-16: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #10

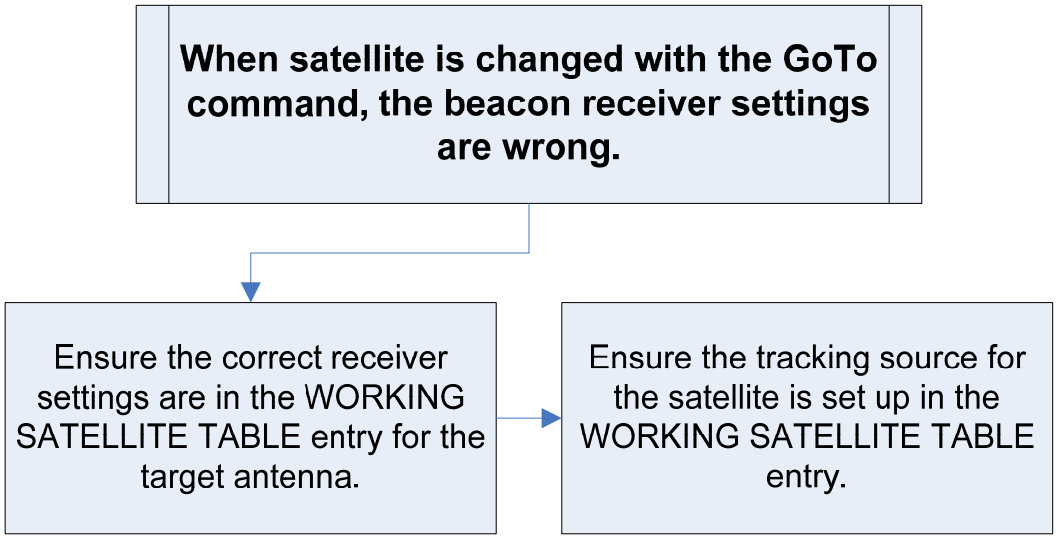


FIGURE 6-17: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #11

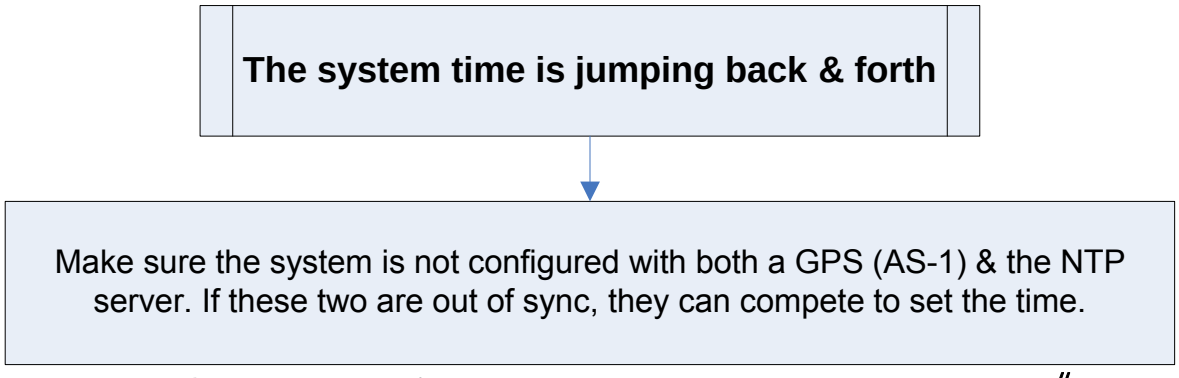


FIGURE 6-18: ALARMS/FAULTS TROUBLESHOOTING FLOWCHART #12

7.0 Inspections & Maintenance

High temperature and/or humidity can compromise the performance of the NGC system, and so good environmental control is strongly advised. Also, temperatures falling below 10°C can have a negative effect on the display quality of the LCD.

7.1 Cleaning the unit

To clean the surface of the unit including the LCD modules use a soft dry cloth without chemicals or water. Be careful, the surface of the LCD polarizer is very soft and easily scratched. Never allow any type of fluid to contact the LCD as it can penetrate into the module and damage or destroy it.

Operator maintenance consists of cleaning the surface of the unit including the LCD module and performing key test to check the functionality of the NGC-IDU Front Panel Keypad to the right of the TPU, or to an external keyboard plugged into the unit.

⚠**WARNING:** if liquid crystal material leaks from the TPU screen DO NOT allow it to come into contact with your eyes or mouth. In case of contact with hands, skin, or clothing, wash thoroughly with soap and water.

7.2 Checking redundant power supplies

The IDU does not have any automatic way to check the status of both redundant power supplies, so this needs to be checked periodically. The simplest way to check this is to check the LED on the external power brick. If this LED is on, and the connector is still firmly screwed into J1 or J2, the power supply is functional.

Figure 7-1: Location of Power Indicator LED on Power Brick

8.0 NGC-IDU Upgrade Kits

In order to ensure that your product continues to operate at the highest possible level of functionality and efficiency, new upgrade kits for the NGC-IDU are constantly in design and production. If you would like to order an Upgrade Kit for your NGC-IDU, please contact *ASC Signal Corporation*. Though not yet available at the time of this manual's writing, the first of these kits will become available in the near future.

When Upgrade Kits become available for the NGC-IDU system, customers should then consult the written instructions provided with the specific kit ordered. Future versions of this NGC-IDU manual may include a specific product list of NGC-IDU Upgrade Kits available from *ASC Signal Corporation*.

APPENDIX A: Adjusting for the Southern Hemisphere

⚠**STOP!** This section applies only to **FIXED EARTH STATION ANTENNAS** that are located in the **SOUTHERN HEMISPHERE**. This **DOES NOT APPLY TO MOBILE ANTENNAS**, which make such adjustments automatically, or to antennas in the **NORTHERN HEMISPHERE**.

If you are using a Fixed Antenna and are located in the Southern Hemisphere, you will need to make a setup adjustment in order to avoid having the NGC read your Az values as "Impossible Angle."

The NGC antenna control system moves in reference to a set of directional defaults (which are set for the Northern Hemisphere, with Due North at 0 degrees). Due to this, the IDU will read these defaults in the Southern Hemisphere as pointing the antenna into the ground, causing an "Impossible" Angle alert to come up.

The process for adjusting values for a FIXED ANTENNA in the SOUTHERN HEMISPHERE is as follows:

1. For location in the SOUTHERN HEMISPHERE, setup the system so that DUE NORTH is 180 DEGREES (the opposite of the usual 0 DEGREES, as is normal for locations in the NORTHERN HEMISPHERE)

2. Set the Az Limits in NORTHERN HEMISPHERE mode
   Path: **Home** → **Configuration** → **System Setup** → **Installation**. Select **Az High** and **Low Limit** Screens and enter values normally. Note that system will TEMPORARILY be 180 DEGREES OFF, until the next step (Step 3) has been completed

3. Once Az LIMITS have been set, change the HEADING ANGLE to 180 DEGREES by doing one of the following:

   PATH 1: **Home** → **Status** → **Heading**, and enter **180 Degrees**

   Or

   PATH 2: **Home** → **Configuration** → **Platform** → **Heading**, and enter **180 Degrees**

4. System should now be properly adjusted for Southern Hemisphere operation

APPENDIX B: THEORY OF OPERATION

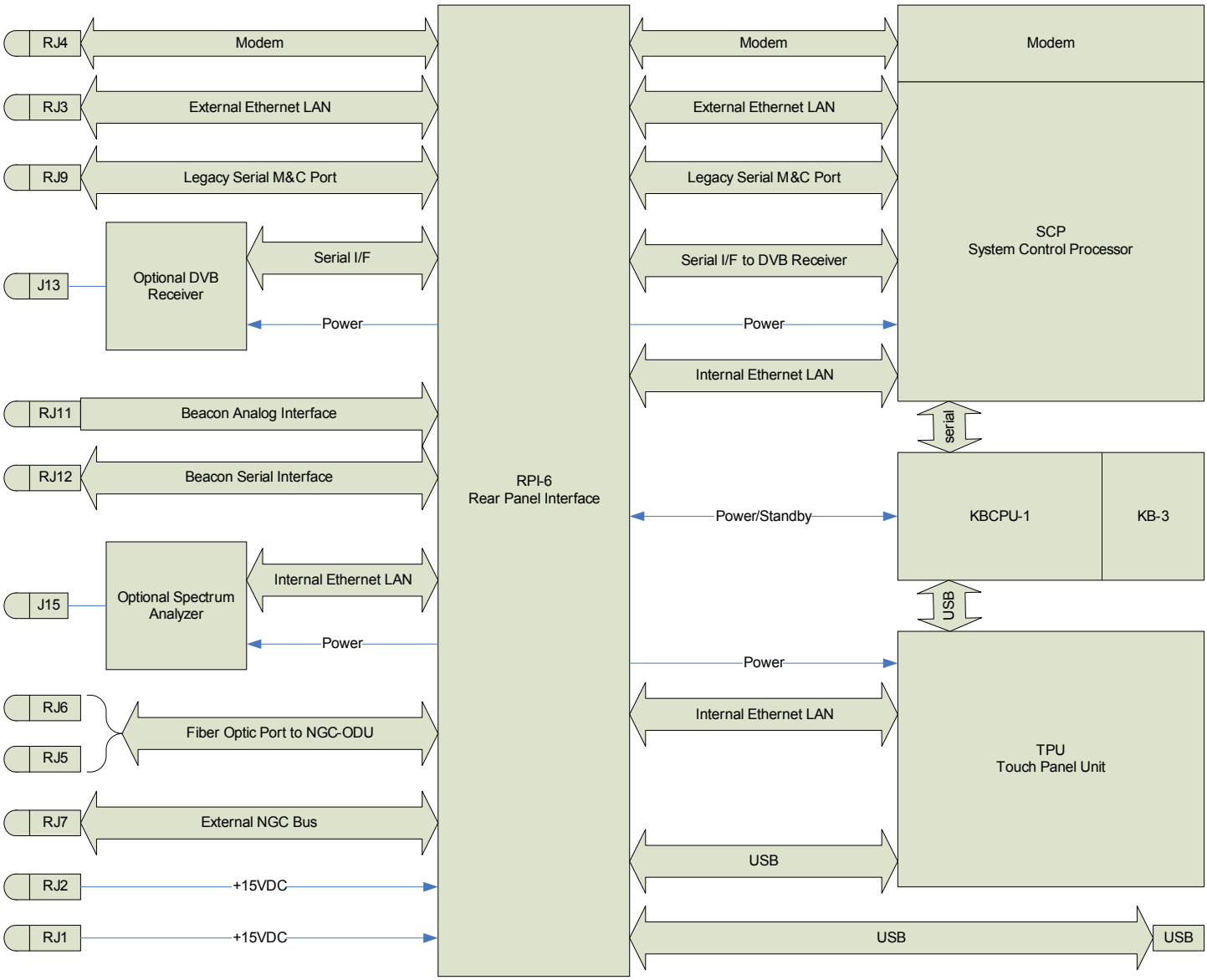


FIGURE B-1: NGC-IDU BLOCK DIAGRAM

B.1 SYSTEM ROLE OF THE NGC-IDU

The division of responsibilities between the ODU and IDU is fairly simple. The ODU is fundamentally responsible for pointing the antenna. The IDU is responsible for determining where the antenna should be pointing.

To accomplish this split, the ODU hosts electronics and software to implement the following:

- All interfaces to the drive electronics and feedback mechanisms, including all coordinate transformations
- All platform-specific accessory electrical interfaces
- The outside handheld terminal maintenance interface

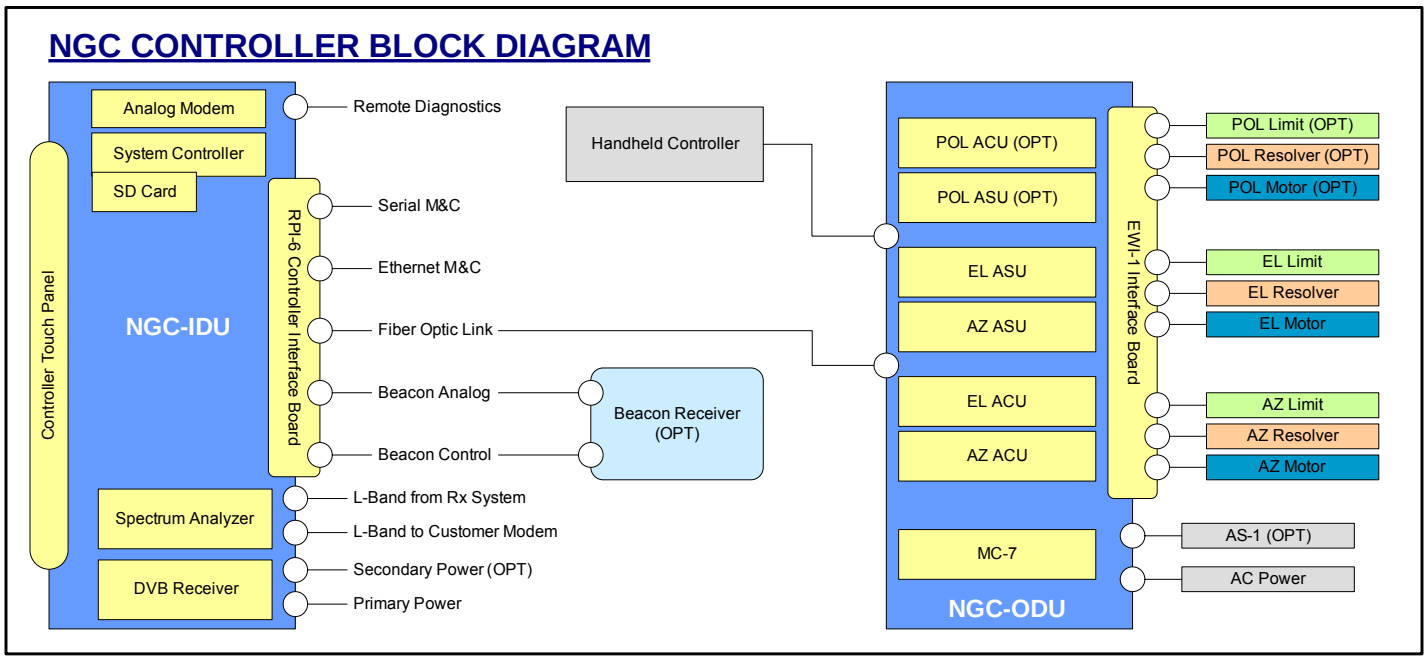


FIGURE B-2: NGC ANTENNA CONTROL SYSTEM BLOCK DIAGRAM

B.2 BASIC STRUCTURE OF THE NGC-IDU CONTROL ELECTRONICS

The IDU control electronics consists of:

- The Touch Panel Unit (TPU), which provides the user interface.
- The System Control Processor (SCP), which provides control and storage.
- The Rear Panel Interface-6 (RPI-6) PWA, which includes an internal network switch for interconnecting the components, the beacon receiver analog interface, power circuitry, and other functions
- The Keyboard CPU PWA and an attached Keyboard PWA
- Optional spectrum analyzer

Together with the ODU's MC-7 board, the TPU, SCP, RPI-6, and (optional) Spectrum Analyzer modules are interconnected using an internal TCP/IP network over 100BaseT. The network addresses are fixed for these functions and require no configuration.

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B.2.1 TOUCH PANEL INTERFACE PWA

The TPU PWA is an ARM9-based embedded Linux system running an open-source GUI program based on the Nokia Qt/Embedded development environment. Source code to the TPU GUI program will be supplied to all customers free of charge on request, as per the license for this environment, but this software is provided as-in with no warranty. The TPU has an integral 800x480 pixel WVGA color graphics display with 15-bit color (32787 colors) and an integral touch screen interface. It connects via 100BaseT Ethernet to the network switch on the RPI-6 PWA, which allows it to communicate with the SCP PWA.

The TPU is to be a Technologic Systems TS-7395 single board computer with WVGA display. This is a 200MHZ ARM9 CPU (Cirrus EP9301) running Debian Linux 2.6. This board 128 MB of RAM and 512MB of NAND-Flash memory, which is used to host the OS and application.

Very little information is stored on the TPU PWA persistently, just some user interface functions. Most information is stored on the SCP and supplied to the TPU in real time.

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B.2.2 SYSTEM CONTROL PROCESSOR PWA

The System Control Processor (SCP) is the central controlling entity. It implements data storage and tracking functions.

The SCP is a *Technologic Systems* TS-7300 single board computer. This is a 200MHZ ARM9 CPU (Cirrus EP9301) running *Linux* (a specialized distribution from the board vendor) 2.4. This board has 32MB of RAM, a real-time clock module, USB support, two network adapters (one internal and one external), and two SD card slots.

This system will use the following peripherals from the TS-7300, as described below:

- SD card slot 0 is used to host the operating system. The SD card is formatted in Linux format and cannot be read with a standard PC.
- Ethernet 0 is connected through the RPI-6 to the outside world
- Ethernet 1 is connected through the RPI-6 to the internal network switch
- UART 0 is the Linux console
- UART 2 (COM3) is used to implement the legacy serial interfaces
- UART 3 (COM4) is used to interface to the DVB receiver
- UART 4 (COM5) is used to control the LEDs on the front panel

The following peripherals are not used: USB interface, remaining serial ports, I/O ports.

The SCP PWA includes an installed analog telephone modem for remote diagnostics. The use of this is reserved to *ASC Signal Corporation*.

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B.2.3 Real Panel Interface PWA

The RPI-6 PWA is the central glue that connects the other modules in IDU. Functionally, it provides an internal network switch, optical interface, beacon receiver interface with signal processing functions, power supplies and management, and other glue functions. It also provides connectorization for the real panel, which is the basis of the name of the board.

RPI-6 is connected by 100BaseT Ethernet jumpers to the TPU, SCP, and Spec Analyzer.

Electric power in IDU is all at or below +15VDC. The AC-to-DC adapter is an external “brick” device. This makes the IDU itself a Safety Extra Low Voltage (SELV) device.

RPI-6 is based on a 32-bit NXP LPC2388 microcontroller. This ARM7TDMI embedded processor includes networking, serial, Ethernet, flash memory, & RAM on a single chip with a 64 MDhrystone CPU core.

The RPI-6 software program uses a multitasking real-time kernel to balance a local network interface, managing the serial beacon receiver, managing the analog interface, and other functions. RPI-6 also programs the on-board internal network switch on power up and monitors the switch for failure conditions.

The RPI-6 also can run in a mode where it implements the USB mass storage device class. This functionality is used to provide a quick software update facility in the field by connecting the USB port to a host PC, which sees it as a “jump drive”.

The RPI-6 and the SCP exchange data continuously about every 100ms. The SCP sends down configuration information, and the RPI-6 sends up status information and measured samples from the beacon interface. All communication between the RPI-6 and SCP is carried over the internal network.

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B.2.4 Keyboard CPU and Keyboard PWAs

The KBCPU-2 implements a basic USB Human Interface Device (HID) which looks exactly like an ordinary keyboard to the TPU, to which it is connected. The KBCPU’s LED functions are interfaced through a dedicated serial link to the SCP, because USB does not provide an extensible LED interface for keyboard devices. The KBCPU also implements the soft power switch for the NGC-IDU. The keyboard itself is a separate PWA which uses capacitive touch technology to implement a keyboard without moving parts. The keyboard PWA is overlaid with a legend sheet to finish the front panel.

If a standard personal computer external keyboard is plugged into the front panel, it should be recognized, and can be used for data entry or other tasks. *ASC Signal* does not recommend leaving a keyboard connected to the NGC-IDU.

NOTE: no mouse support is provided due to restrictions in the graphics package.

The KBCPU-2 is based on a 32-bit NXP LPC2388 microcontroller. This ARM7TDMI embedded processor includes networking, serial, Ethernet, flash memory, and RAM on a single chip with a 64 MDhrystone CPU core. The Ethernet networking function is not used.

The KBCPU-2 software program implements the USB keyboard function and interfaces via serial port to the SCP to allow for controlling the front panel LEDs color and intensity. Because the USB HID protocol supports too few LEDs, a serial link is used.

The KBCPU-2 also can run in a mode where it implements the USB mass storage device class; this functionality is used to provide a quick software update facility in the field by connecting the USB port to a host PC, which sees it as a “jump drive”.

The KBCPU-2 and the SCP only exchange data as needed. The SCP sends down information to control the LEDs on the front panel. The KBCPU-2 sends all information to the TPU through the USB channel in the form of keyboard scan codes.

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B.2.5 (Option) Spectrum Analyzer Module

When ordered, an embedded spectrum analyzer module is installed in the chassis at the factory.

This analyzer can be used for several purposes:

- First, it can be used as a general tool for looking at received signals.
- Second, it can be used as a tracking receiver in some configurations.
- Third, it can be used as an acquisition receiver in TriFold® mobile systems in some configurations.

The "in some configurations" caveat has to do with the RF system engineering of the system. If the broadband IF power on the L-band is much higher than the beacon power, it is possible that the spectrum analyzer's RF front end will not have enough dynamic range to find a setting that can successfully measure the beacon. There may be inter-modulation products in the signal as a result. This can be corrected in many cases by notch filters or other system engineering techniques beyond the scope of this note.

When configured as a tracking or acquisition source, the spectrum analyzer measures the total power of the beacon on a narrowband sweep. The center frequency used is the frequency programmed for the current satellite in the Working Satellite Table. The span is 100kHz, the resolution bandwidth is 10kHz (this resolution bandwidth is wide for the typical beacon and makes the trace look squashed on the screen, but it gives the best mathematical results). The system integrates the total power for 50kHz around the peak, adds an arbitrary offset to get this in the clear-sky range (0.0 dB), adds another offset.

Please note that the system is not necessarily designed to support tracking by Spectrum Analyzer and tracking by Beacon Receiver for the same satellite with all beacon receivers. Because the per-satellite attenuation field is re-used, it may be difficult to select parameters that work for all situations.

The Spectrum Analyzer software program is supplied by the vendor. The Spectrum Analyzer uses a built-in LANtronix serial-to-Ethernet converter. The SCP program established a TCP/IP connection with the Spectrum Analyzer to control and monitor it. The Spectrum Analyzer has a fixed internal network address assigned at the factory.

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B.2.6 Internal Networking

The internal network is implemented as a peer-to-peer mesh of TCP/IP hosts using the 100baseT switch on the RPI-6 as a central element. Except for the Spectrum Analyzer interface, to simplify protocol design, all data is sent from processor to processor in one-way isochronous streams called “umbilical data”. Each stream consists of self-timed messages sent 5 to 10 times per second with lists of data items. Any processor, restarted, will have a complete set of every data item in a matter of seconds. When data items change, the sender simply sends out the updated value, and receiver is responsible for noticing changes.

All data exchanged between processors in the system is tagged with universal data indentifiers, and expressed in “big-endian” byte order. The “endianism” is a slight handicap given than all processors in the NGC are actually little-endian, but following network byte order is safest given the big-endian application ancestry and the large base of existing code to handle this orientation. The tagging assures consistent handling of data throughout the system.

B.3 Operational Configurations

The NGC Antenna Control System is equipped with several basic “operational configurations.” An “operational configuration” is the fundamental geometry of the antenna and control equipment. It is used as a key for the system to use of suppress information and algorithms. This simplifies the user interface and avoids errors.

Operational configuration is controlled by the NGC-ODU. Generally, in the NGC-IDU, this setting enables and disabled operation of certain user interface functions, but does not alter the actual operation of the system or software.

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B.3.1 Fixed Operational Configuration

“Fixed” Operational Configuration (1) is the “standard” configuration where the IDU is interfaced to a normal, El-over-Az pedestal.

"Fixed antenna" does not mean "non-motorized," we mean a configuration that is not mobile and not expected to be moved in its lifetime without re-installation. This is true of the vast majority of installations. In operation, the NGC-IDU generates pointing angles and the NGC-ODU attempts to achieve them. All timeouts, limits, and other errors associated with movement are generated by the ODU.

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B.3.2 Mobile Operational Configuration

“Mobile” Operational Configuration (2) is used with ASC Signal Standard Profile and Low Profile Positioners. It differs from the Fixed (1) configuration as follows:

- Functionality associated with automatic determination of system compass heading, etc., is enabled by this mode.
- Manual entry of some fields (e.g., site latitude) is inhibited.
- Some features are disabled, e.g., automatic tracking resume.
- Some features are added, e.g., acquisition assist

Operational Configuration has broader impact on the NGC-ODU than on the NGC-IDU. The IDU mostly affects user interface.

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B.3.3 SRT-Only Operational Configurations

“SRT Only” Operational Configuration (4) is used with non-motorized main dishes with motorized SRTs. An SRT-only antenna system is a kind of "fixed antenna" where only the SRT can move. This is a configuration that is not mobile and not expected to be moved in its lifetime without re-installation. Normally this is used in tandem with an NGC-ODU-SRT, an outdoor box that contains the power supplies and interfaces between the indoor unit and the SRT.

The key difference between the SRT-only system and the usual fixed system is the SRT-only system cannot move from satellite to satellite without manually moving the antenna. Since it does not include resolvers or other measurements, the user has to tell it what the center boresight angle is by entering this as the "Fixed Az" and "Fixed El".

This configuration differs from the Fixed (1) configuration as follows:

- Parameters associated with command of the Az and El main dish are removed. The main dish bore-sight angle is configured by the user. The Az and El axes appear to be locked.
- Alarms associated with main dish movement are removed from the system.
- The inclinometer and compass, if present, are ignored.

“SRT Only Slave Mode” Operational Configuration (5) is a variant of the SRT Only mode where the system can be connected by serial link to a master controlling system to command pointing angles. The only difference between this mode and (4) is the provision of a fourth state for the Local-Remote variable called “slave”, in which the commanded position comes in through a serial port to the NGC-ODU-SRT.

B.4 Movement Control and Monitoring

The NGC-IDU commands movement to implement position designate, jogging, and tracking functions. The tracking algorithms all work using true reported positions rather than commanded positions. This means, for example, that if the reported position is noisy enough, the IDU can appear to track in the wrong way. The IDU assumes the ODU is properly installed and working well.

In general, the IDU is extremely tolerant of ODU-reported errors. For example, if the ODU is reporting axis timeouts, the IDU will continue to try “as best it can” to track the satellite. The reason for this is many installations are unmanned, and ASC Signal wished to avoid sporadic errors of any kind to cause tracking to pause.

For each position move, the IDU commands the move in “global” coordinates. It is the responsibility of the ODU to adjust for any platform orientation. The IDU makes an independent estimation of when movements are complete for purposes of sequencing tracking steps and similar functions, based on expected parameters of the ODU. This allows tracking to function marginally even if the ODU is not properly tuned to the mount.

B.5 Tracking

Tracking can be necessary for one or more of several reasons:

- Satellites whose orbit is not nearly perfectly circular and equatorial will move in the sky. Tracking allows the antenna to follow even satellites with large movements.
- Large antennas, and antennas receiving high frequencies, can have narrow 3dB beamwidth, which means that they must be positioned accurately even if the satellite motion is small.
- Satellite operators can require active tracking as a condition of permitting the earth station to transmit. They do this in order to assure that the antenna is correctly 'peaked' on the satellite.
- In some cases, temperature and solar energy effects can slightly distort the antenna's shape, affecting the "optics", and causing the antenna to slightly mis-point.

An active tracking system can alleviate some or all of these issues.

The IDU is designed to track geosynchronous satellites, including geostationary satellites and satellites with inclined orbits up to 10 degrees, using a variety of algorithms.

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B.5.1 Three-Point Peaking (Step-track)

The IDU uses an algorithm called Three Point Peaking to step-track a satellite. It uses the same algorithm for all configurations, main dish motors or SRTs. This algorithm is covered by a US Patent.

The algorithm is quite simple. The antenna is deliberately de-pointed by a fraction of the beamwidth and the signal strength is measured. If the signal strength improves, the antenna is de-pointed again by the same distance. If the signal strength drops, the antenna is de-pointed in the opposite direction by twice that value. The system collects data until it sees three points with a peak in the geometric center, at which point it fits the measured values to a parabolic curve with the equation and calculates the mathematical maximum point (where x=0). It then moves there and repeats the algorithm on the opposite axis.

$$y = -12\left(\frac{x}{\theta_{3db}}\right)^2$$

If the SRT is provisioned with a Z axis, a third cycle is added to focus the antenna. In practice this achieves excellent pointing accuracy with a minimum number of movements.

There are several programmable parameters that affect the algorithm. The antenna size, LNB local oscillator, and the beacon frequency are used to compute the nominal 3dB beamwidth of the antenna using a generic formula that tends to be reasonably accurate.

$$\theta_{3db} = \frac{21}{fA}$$

Where f is the downlink frequency is GHz and A is the antenna diameter in meters. This value is multiplied by the step multi factor to get a step distance. The selection of the antenna size and LNB local oscillator frequencies is obvious and comes from the system equipment design.

Selecting the step multiplier factor requires decisions because a trade-off is involved. If the step multiplier factor is large, the temporary loss during de-pointing may be larger than desired. However, because the

loss is more "defined" than a smaller jump relative to the noise present in the beacon level, the mathematics will get a better solution. If there is a need to constrain maximum loss, the installer should pick a smaller step size. However, this will mean slightly less overall accuracy since the noise power in the signal is more significant, and will probably mean more steps to find the maximum. Also, if the step size is smaller than the minimum pointing capability of the antenna, the tracking algorithm may be handicapper. *ASC Signal* cannot advise as to what value is most appropriate for a situation and the user may have to find it by analysis of results.

The algorithm, like all tracking algorithms, is only as good as the pointing performance of the antenna. Because of the functional decomposition of the NGC system, this performance is completely controlled by the ODU and its interface.

The performance factors of the antenna that can affect step-tracking performance include, but are not limited to, the following:

- Repeatability and stability of resolver or encoder feedback, including hysteresis
- Suitable tuning of axis control variables for the ODU's PID control loops
- Stiffness and repeatability of the antenna structure itself

Step-tracking is not particularly sensitive to antenna calibration beyond finding the satellite in the first place. It is not particularly sensitive to physical distortion of the antenna due to heat, droop, or the notional 'steady state wind.' It is not particularly sensitive to the absolute accuracy of the resolver or encoder.

This mode requires a beacon receiver or other receiving system to serve as a feedback mechanism. The signal strength must be a reasonable proxy for the pointing accuracy of the system.

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B.5.2 (Software option) Orbital Prediction Tracking (SmarTrack®)

SmarTrack® is a patented algorithm that uses step-track information to estimate the orbital parameters of the vehicle (the satellite "model") and predict its trajectory through the sky. It is only designed to work with geosynchronous satellites.

It takes roughly six hours for the algorithm to collect enough data to create a solution. During this interval the operation of the system will be exactly the same as step track.

Once the model is created and the solution is reliable, the predictions are used as long as the signal strength is maintained. If the signal drops unexpectedly, or whenever the cycle times out, the algorithm collects a new data point and updates the model. If the signal drops below the low signal threshold, the algorithm becomes purely predictive and attempts to follow the satellite's motion until it returns.

There are several parameters to tune this interface. The repeak trigger tells how much loss is acceptable before the algorithm attempts to repeak. The cycle time is the maximum interval between model updates for the sake of time. The minimum move is the amount of total movement between the projected angle and the actual angle before the algorithm will actually move the antenna.

Path: **HOME → Operations → Track → Status → SmarTrack® Mdls** screen

The model is very technical, but at the end of the file there is some information that may be of general use:

- Inclination is the estimated inclination of the satellite. This tends to be slightly more than the true inclination because of hysteresis (wind up) in the axes.
- Eccentricity is the estimated eccentricity. Again, this can be slightly exaggerated for the same reasons as inclination.
- East longitude is the "east longitude of the mean anomaly".
- argPerigee is the argument of perigee
- phi0 should be roughly 0. If it is not, it indicates some small error in the setup.
- totalLoss is a metric of the accuracy of the model. It is the RMS error, in dB, of the difference between retrospectively-predicted positions and actual peaks in the measurement cycles, converted to dB using the beamwidth of the antenna.

If the totalLoss metric is greater than 1/3 of the repeak trigger level, the model is not considered valid and the system will attempt to update it.

NOTE: very small step sizes (in step-track setup) can cause RMS error in peaking which will cause small increases in totalLoss metric. This can cause the SmarTrack® model to be invalidated more often than it would be otherwise.

This mode requires a beacon receiver or other receiving system, and a license key with the appropriate feature enabled. The feature can be enabled in the field by entering a new license key.

The algorithm, like all tracking algorithms, is only as good as the pointing performance of the antenna. Because of the functional decomposition of the NGC system, this performance is completely controlled by the ODU and its interface. It also has other factors that affect it.

The performance factors of the antenna that can affect SmarTrack® performance include, but are not limited to:

- Repeatability and stability of resolver or encoder feedback, including hysteresis
- Suitable tuning of axis control variables for the ODU's PID control loops
- Stiffness and repeatability of the antenna structure itself
- When in predictive mode, the algorithm is dependent on physical distortion of the antenna due to heat, droop, or the notional 'steady state wind'. If these factors create losses within the step RePeak trigger, the IDU will tolerate them and lose accuracy

SmarTrack® is not particularly sensitive to antenna calibration beyond finding the satellite in the first place. It is not particularly sensitive to the absolute accuracy of the resolver or encoder.

This mode requires a beacon receiver or other receiving system to serve as a feedback mechanism. The signal strength must be a reasonable proxy for the pointing accuracy of the system.

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B.5.3 (Software option) Program Tracking (NORAD and Intelsat)

NORAD and Intelsat are predictive tracking modes that use different algorithms to predict the look angle of a satellite using measured orbital parameters. They are different algorithms using different data sets but they product similar results. They are very useful for tracking satellites where no beacon receiver equipment is present.

Periodically, the algorithm computed the estimated position of the satellite and projects the look angle. The NGC adapts to the predicted motion of the satellite in determining how often to re-compute the estimated position. If the estimated position is more than the minimum move, the IDU will move the antenna to match the new position.

This mode requires a license key with the appropriate feature enabled. A beacon receiver can be helpful but is not required. The feature can be enabled in the field by entering a new license key.

The algorithm, like all tracking algorithms, is only as good as the pointing performance of the antenna. Because of the functional decomposition of the NGC, this performance is completely controlled by the NGC-ODU and its interface.

The performance factors of the antenna that can affect program tracking performance include, but are not limited to:

- Repeatability and stability of resolver or encoder feedback, including hysteresis
- Suitable tuning of axis control variables for the NGC-ODU's PID control loops
- Stiffness and repeatability of the antenna structure itself.
- The algorithm is dependent on physical distortion of the antenna due to heat, droop, or the notional 'steady state wind'.
- The algorithm is highly sensitive to antenna calibration.

Once the appropriate offsets have been determined and configured, it is not particularly sensitive to the absolute accuracy of the resolver or encoder over large distances, but it is highly sensitive to nonlinearity over the range of travel for the current satellite.

B.6 Management Interfaces

B.6.1 SNMP

The Simple Network Management Protocol (SNMP) Agent is the main interface between the IDU server and all client software.

The SNMP agent is based on off-the-shelf software, specifically Net-SNMP 5.2. Net-SNMP is an open source package of various tools relating to SNMP distributed under a Berkeley-UNIX like license. This package was originally based on the Carnegie Mellon University SNMP implementation (version 2.1.2.1). The terms of source license allow ASC Signal Corporation to distribute and modify source free of charge (and without publishing the changes) as long as original copyright notices are left intact. The SNMP Agent will maintain all visible parameters in MIBs. Device Driver processes and other processes in the system will send data value update messages to the SNMP Agent using the Inter-Process Communication Framework.

NetSNMP Agent was extended to provide MIB handlers for NGC-specific MIB elements. Please note the IDU's MIB implementation is largely common with the APC400, a previous product.

Due to limitations in the off-the-shelf product used to implement SNMP, certain configurations may require ASC Signal to make small modifications to the configuration of the SNMP Agent. Specifically, permanent trap destinations that survive system power cycle cannot be altered from any supported interface.

When the system is in "Local" or "Local Handheld" mode, almost all "read-write" object IDs (OIDs) in the MIB are presented as "read-only." The management station can override this by forcing the item acs4000LocalRemote.1 to "remote."

B.6.2 Serial Interface

The NGC Antenna Control System includes a serial port interface to implement subsets of certain legacy M&C protocols for APC100, APC300, and APC400.

This interface is highly limited. It is not recommended for new designs, and not recommended for control of the system regardless of settings, although it can be used for minimum monitoring.

The basic problem is the legacy protocols are device-specific and emulation is somewhat limited. Another problem is the IDU simply has more data than the earlier systems and the M&C protocol cannot express all of the necessary items.

ASC Signal strongly recommends the use of SNMP to monitor and control the system. Alternately, advanced users can use the open-source TPU software package as a basis for a control system, although ASC Signal cannot support this effort as that code is supplied for that purpose without warranty.

NOTE: For APC100 mode, when the system is in "Local" or "Local Handheld" mode, almost all set commands are rejected. The management station can override this through an NGC-specific extension to the APC100 protocol.

B.7 Special Modes for Certain Systems

B.7.1 TriFold® Acquisition Assist

Acquisition assist can use the spectrum analyzer, beacon receiver, or DVB receiver.

What happens during acquire is a preprogrammed sequence of steps:

- The system moves the antenna up out of stow if necessary.
- The system takes a compass fix and calculates a sector around the estimated look Az. The width of this sector is called "Scan Slew Dist"; it is configurable from General Track Config page 4 of 4 and defaults to 26 degrees (+/- 13 degrees).
- The system raster scans within this sector starting at the calculated El, then alternating between rows above and below the original row in ever increasing steps until it reaches +/- 2 degrees. The width of the vertical scan steps is computed from the 3dB beamwidth of the antenna.
- If it sees a 3dB signal rise of any kind, after the signal falls off again, it will switch to a spiral-box scan looking for the real signal with the real thresholds. It does this to avoid acquiring a side-lobe.

B.8 Customer-Furnished Components

B.8.1 Analog Beacon Receiver

The IDU can be configured to track satellites using an external beacon receiver.

There are two interfaces between the IDU and beacon receiver, an analog interface and serial interface. The system can use either one or both. Generally, ASC Signal recommends the use of at least the analog interface for reasons explained below.

The analog interface is a 0 to 10V DC signal from the beacon receiver to the IDU. The voltage is proportional to the measured signal strength, usually (but not always) at a ratio of 2.0 dB per volt. Ideally the peak voltage of the beacon receiver should be about 7.5 to 8.0 volts; this provides adequate dynamic range for rain fades and tracking but also avoids hitting the high limit.

The serial (aka "digital") interface is an RS-232, RS-422, or RS-485 interface to the beacon receiver which can be used for configuration and control of the beacon receiver. The use of this interface is not required; it is, however, mandatory if the IDU is required to be able to re-tune the beacon receiver when moving between satellites.

Different beacon receivers have different configuration requirements due to different capabilities. For example, an Atlantic Satellite ASC300-L requires only the frequency and attenuation level to be set; this receiver can be completely controlled from the IDU. The Miteq BR-L has far more parameters and while the NGC can control it to some extent, it is better to interface to this with an M&C system (not supplied).

The IDU can use signal strength readings reported serially from the beacon receiver if desired. *ASC Signal* recommends the analog interface because the IDU can over-sample this signal and measure not just the signal levels but the scintillation in the signal levels. Generally, the serial interface does not provide this information. However, it may be desirable in some systems, especially if the installer is trying to re-use a legacy beacon receiver that is not configured for 0-10VDC operation.

B.9 Options and Accessories

This section is reserved for NGC System options and accessories, both future and current, which have not yet been covered in other sections of this manual.

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B.9.1 Emergency Stop Switch

An Emergency Stop Switch can be installed in the front of the chassis.

APPENDIX C: GLOSSARY TABLES

This section lists all NGC-IDU parameters in alphabetical order. Each parameter is accompanied by a description of the function, and the range (or a cross-reference to a table for the range), whether or not it is a configurable parameter and the associated privilege level required, and which screen area it is located in.

TABLE C.1: LIST OF HANDHELD TERMINAL PARAMETERS

Name	Function	Units & Range	Config	Screen
ACO	Alarms currently reported by NGC that have been cut-off (acknowledged) by the user.	List (see Table C.30)	No	Status → Faults
Active Faults	Alarms reported by NGC	List (see Table C.30)	No	Status → Faults
Altitude	Site altitude, in meters	Meters, -100 to 10000	Yes	Status → or Configuration → Platform → Location
Antenna Size	Antenna size. Primarily used to guess 3dB beamwidth.	Meters	No	Configuration → Platform → or Configuration → Tracking Config → General
Auto Track Resume	Whether to resume tracking on IDU restart	True/false	Yes	Configuration → Tracking Config → General
Az 1 DC Volts	Main DC bus voltage of AZ1 VFD	Volts	No	Status → Diagnostics → VF Drives
Az 1 Freq Ref	Frequency ref of AZ1 VFD	Hz	No	Status → Diagnostics → VF Drives
Az 1 Motor Current	Amperage being delivered to the AZ1 motor.	Amperes	No	Status → Diagnostics → VF Drives
Az 1 Output Freq	Current true frequency commanded of the AZ1 motor.	Hertz	No	Status → Diagnostics → VF Drives
Az 1 Temperature	Reported temperature of AZ1 VFD heatsink. Note not all VFDs have this ability.	Degrees, C	No	Status → Diagnostics → VF Drives
Az 1 VFD Link Status	Modbus link status for AZ1 VFD	See Table C.29	No	Status → Diagnostics → VF Drives
Az 1 VFD Product ID	VFD make and model for AZ1 axis. Automatically detected from VFD over modbus.	G7 or V1000	No	Status → Diagnostics → VF Drives
Az 2 DC Volts	Main DC bus voltage of AZ2 VFD. (Not used in single Az motor configurations)	Volts	No	Status → Diagnostics → VF Drives
Az 2 Freq Ref	Frequency ref of AZ2 VFD. (Not used in single Az motor configurations)	Hz	No	Status → Diagnostics → VF Drives
Az 2 Motor Current	Amperage being delivered to the AZ2 motor. (Not used in single Az motor configurations.)	Amperes	No	Status → Diagnostics → VF Drives
Az 2 Output Freq	Current true frequency commanded of the AZ2 motor. (Not used in single Az motor configurations)	Hertz	No	Status → Diagnostics → VF Drives
Az 2 Temperature	Reported temperature of AZ2 VFD heatsink. Note not all VFDs have this ability. (Not used in single Az motor configurations.)	Degrees, C	No	Status → Diagnostics → VF Drives
Az 2 VFD Link Status	Modbus link status for AZ2 VFD. (Not used in single Az motor configurations)	See Table C.29	No	Status → Diagnostics → VF Drives

Name	Function	Units & Range	Config	Screen
Az 2 VFD Product ID	VFD make and model for AZ2 axis. (Not used in single Az motor configurations). Automatically detected from VFD over modbus.	G7	No	Status → Diagnostics → VF Drives
Az Brake Delay	Time delay between actuating Az brake release and turning on drive signal to Az motor. When set to 0.0, brake release function is disabled.	Seconds, 0 to 2.0	Yes	Configuration → Motorization
Az ccw Plat SW Limit	Software limit, min legal value of Current Platform Az. If Target Platform Az lower than this, impossible angle will be declared.	Degrees, -360 to 360	Yes	Configuration → Platform
Az cw Plat SW Limit	Software limit, max legal value of Current Platform Az. If Target Platform Az greater than this, impossible angle will be declared.	Degrees, -360 to 360	Yes	Configuration → Platform
Az Deadband	Az drive error tolerance. When difference between target platform Az & current platform Az is less than this, Az command is completed. Note that system will allow slightly larger error without declaring timeout in order to prevent resolver jitter from causing spurious errors.	Degrees, 0 to 1.0	Yes	Configuration → Motorization
Az Drv Time	Distance between samples in Integration buffer in Az axis PID to use as derivative difference signal	0 to 5	Yes	Configuration → Motorization
Az Encoder Offset	Offset added to raw resolver offset to get to current platform Az	Degrees, -180 to 360	Yes,	Configuration → Platform
Az Encoder Type	Az axis angle feedback device type and architecture, selected from list of predefined types.	See	Yes	Configuration → Platform
Az Fault	Summary of Az fault conditions. System shows highest priority fault	See Table C.30	No	Status → Diagnostics
Az Int Depth	Az Axis PID integrator depth in samples	0 to 100	Yes	Configuration → Motorization
Az IntTime	Number of seconds of samples to integrate in the Az PID control block	0 to 5	Yes	Configuration → Motorization
Az Invert	Indication of whether Az resolver/encoder is mounted so it counts backward from the true angle	Normal/invert	Yes	Configuration → Motorization
Az Kd	Az axis PID controller derivative gain coefficient	Fraction	Yes	Configuration → Motorization
Az Ki	Az axis PID controller integration gain coefficient	Fraction	Yes	Configuration → Motorization
Az Kp	Az axis PID controller proportional gain coefficient	Fraction	Yes	Configuration → Motorization
Az Limit	Summary of Az limit conditions. System shows highest priority limit.	See Table C.3	No	Status
Az Max Rate	Az maximum rate (usually 1000)	10 to 1000	Yes	Configuration → Motorization
Az Min Rate	Min. drive rate to Az VFD. Motors will lose torque in a non-linear fashion below a certain frequency, so parameter is used in combo with deadband to produce appropriate response.	10 to 1000	Yes	Configuration → Motorization
Az Overcurrent Trip	VFD parameter indicating max sustained current that should be generated for Az motor. Consult installation drawing for motor kit for correct value.	Amperes, 0 to 20.0	Yes	Configuration → Motorization
Az Ratio	Az encoder turns ratio. Number of times resolver or encoder turns per turn of the main axis.	Usually 1/1	Yes	Configuration → Motorization
Az Rsp Timeout	Number of seconds with no discernable movement tolerated by Az axis control loop when position loop is enabled	Seconds, 0 to 10	Yes	Configuration → Motorization

Name	Function	Units & Range	Config	Screen
Azimuth	Current global Az calculated from platform angles, attitude, and SRT position	Degrees, 0 to 360	No	Status → or Configuration → Platform
Bcn Atten	Attenuation in dB to tell beacon receiver to apply	dB	Yes	Configuration → Tracking Config → Beacon Rcvr
Bcn Data Type	Input selection for tracking	Spec an, analog, digital (serial), dvb rcvr	Yes	Configuration → Tracking Config → Beacon Rcver
Bcn Frequency1	Beacon frequency, usually in L-band	MHz	Yes	Configuration → Tracking Config → Beacon Rcvr
Bcn Inversion	Indicates which sideband is selected by the BDC	True/false	Yes	Configuration → Tracking Config → General
Bcn Lvl Sigma	Standard deviation of latest second of beacon samples	dB	No	Status → Tracking → Beacon Display
Bcn Modulation	Demodulator to tell beacon receiver to apply	Continuous/ bpsk	Yes	Configuration → Tracking Config → Beacon Rcver
Bcn Offset	Offset used to adjust clear-sky	dB	Yes	Configuration → Tracking Config → Beacon Rcver
Bcn Rain Detect Thresh	Standard deviation in long-term buffer that triggers rain	dB	Yes	Configuration → Tracking Config → General
Bcn Rain Detector	Controls whether the system looks for rain event signatures	On off	Yes	Configuration → Tracking Config → General
Bcn Relay Control	Control over the FormC contact on J11	Normal/invert	Yes	Configuration → Tracking Config → Beacon Rcver
Bcn Settle Time	Number of seconds to wait after moving before sampling beacon. Used to ensure system has stopped moving.	Seconds	Yes	Configuration → Tracking Config → General
Bcn Slope	Slope of the beacon receiver analog output	dB/Volt	Yes	Configuration → Tracking Config → Beacon Rcver
Bcn Soak Time	Number of seconds to average the beacon before summarizing the current point in 3PP	Seconds	Yes	Configuration → Tracking Config → General
Beamwidth	Calculated 3dB BW. Can't be directly entered, it is computed using 21/fA formula.	degrees	No	Configuration → Tracking Config → General
Box Limits	Global enable/disable for box limit enforcement	True/false	Yes	Configuration → Tracking Config → General
Cabinet Temp	Approximate temperature inside NGC-ODU	Degrees C	No	Status → Diagnostics
CCW Coast	Distance from target platform Pol that NGC cuts power to Pol motor in the CCW direction.	Degrees, 0 to 1.0	Yes	Configuration → Motorization
Compass Cal	Compass setting for AS-1. Not used in fixed system	See Table	No	Status
Compass Flt	AS-1 compass error indicator.	See Table C.10	No	Status
Compass Mode	Controls how compass and inclinometer are used to process coordinate transforms. Can be selected from a list of predefined modes.	See Table C.11	Yes	Status
Current Sat ID	Current satellite in NGC-IDU	0 to 63	No	Status bar

Name	Function	Units & Range	Config	Screen
CW Coast	Distance from target platform Pol that NGC cuts power to Pol motor in the CW direction	Degrees, 0 to 1	Yes	Configuration → Motorization
Device Type [Beacon RX]	What type of beacon receiver is attached by serial port to J12	Enumerated list	Yes	Configuration → Tracking Config → Beacon Rcvr
El Brake Delay	Time delay between actuating El brake release and turning on drive signal to El motor. When set to 0.0 the brake release function is disabled.	Seconds, 0 to 2.0	Yes	Configuration → Motorization
El DC Volts	Main DC bus voltage of El VFD	Volts	No	Status → Diagnostics → VF Drives
El Deadband	El drive error tolerance. When difference between target platform El & current platform El as is less than this value, El command is completed. Note that system allows slightly larger error without declaring timeout in order to prevent resolver jitter from causing spurious errors.	Degrees, 0 to 1	Yes	Configuration → Motorization
El Dn Plat SW Lmt	Software limit, which is the minimum legal value of Current Platform El. If the Target Platform El is lower than this, an impossible angle will be declared.	Degrees, -180 to 180	Yes	Configuration → Platform
El Drv Time	Distance between samples in Integration buffer in El axis PID to use as derivative difference signal	0 to 5	Yes	Configuration → Motorization
El Encoder Offset	Offset added to raw resolver offset to get to current platform El.	Degrees, -180 to 360	Yes	Configuration → Platform
El Encoder Type	El axis angle feedback device type and architecture, selected from a list of predefined types.	See Table C.2	Yes	Configuration → Platform
El Fault	Summary of El fault conditions. System shows highest priority fault	See Table C.30	No	Status → Diagnostics
El Freq Ref	Frequency ref of El VFD	Hz	No	Status → Diagnostics → VF Drives
El Int Depth	El Axis PID integrator depth in samples	0 to 100	Yes	Configuration → Motorization
El Int Time	Number of seconds of samples to integrate in the El PID control block	0 to 5	Yes	Configuration → Motorization
El Invert	Indication of whether El resolver/encoder is mounted so it counts backward from the true angle	Normal/invert	Yes	Configuration → Motorization
El Kd	El axis PID controller derivative gain coefficient	Fraction	Yes	Configuration → Motorization
El Ki	El axis PID controller integration gain coefficient	Fraction	Yes	Configuration → Motorization
El Kp	El axis PID controller proportional gain coefficient	Fraction	Yes	Configuration → Motorization
El Limit	Summary of Az limit conditions. System shows highest priority limit	See Table C.4	No	Status
El Max Rate	El maximum rate (usually 1000)	10 to 1000	Yes	Configuration → Motorization
El Min Rate	Minimum drive rate to El VFD. Motors will lose torque in a non-linear fashion below a certain frequency, so parameter is used in combination with deadband to produce appropriate response.	10 to 1000	Yes	Configuration → Motorization
El Output Current	Amperage being delivered to the El motor.	Amperes	No	Status → Diagnostics → VF Drives

Name	Function	Units & Range	Config	Screen
El Output Freq	Current true frequency commanded of El motor.	Hertz	No	Status → Diagnostics → VF Drives
El Overcurrent Trip	VFD parameter indicating max sustained current that should be generated for El motor. Consult installation drawing for motor kit for correct value.	Amperes, 0 to 20.0	Yes	Configuration → Motorization
El Ratio	El encoder turns ratio. Number of times resolver or encoder turns per turn of the main axis.	Usually 1/1	Yes	Configuration → Motorization
El Rsp TO	Number of seconds with no discernable movement tolerated by El axis control loop when position loop is enabled	Seconds, 0 to 10	Yes	Configuration → Motorization
El Temperature	Reported temperature of El VFD heatsink. Note not all VFDs have this ability.	Degrees, C	No	Status → Diagnostics → VF Drives
El Up Plat SW Lmt	Software limit, which is the maximum legal value of Current Platform El. If Target Platform El is greater than this, an impossible angle will be declared.	Degrees, -180 to 180	Yes, mandatory	Configuration → Platform
El VFD Link Status	Modbus link status for El VFD	See Table C.29	No	Status → Diagnostics → VF Drives
El VFD Product ID	VFD make and model for el axis. Automatically detected from VFD over modbus.	V1000	No	Status → Diagnostics → VF Drives
Elevation	Current global El calculated from platform angles, attitude, and SRT position	Degrees, -90 to 90	No	Status → or Configuration → Platform
Filter Depth	Number of samples in the beacon averaging filter	Number	No	Status → Tracking → Beacon Display
Gateway	Network address of local gateway router	IP address	Yes	Configuration → System Setup
GPS Quality	AS-1 quality reported (not used in fixed antennas)	See Table C.13	No	Status
GPS Sat Count	GPS satellite count reported (not used in fixed antennas)	0 to 12	No	Status
GPS Status	AS-1 fault reported (not used in fixed antennas)	See Table C.12	No	Status
Heading	True heading that corresponds to 0 degrees for platform Az	Degrees, 0 to 359.999	Yes, typically 0	Status → or Configuration → Platform
HW Address	MAC Address of Ethernet	MAC address	Yes	Configuration → System Setup
Intelsat Life	Expiration criterion for Intelsat data sets	Days	Yes	Configuration → Tracking Config → General
IP Address	Network address of external ethernet port	IP address	Yes	Configuration → System Setup
IP Mask	Network mask of external Ethernet port	IP address	Yes	Configuration → System Setup
J9 Emulation	Configures which protocol to emulate on J9 on the rear panel	APC100	Yes	Configuration → System Setup
Jog Speed	Jog speed for Az and El axes	0 to 9	No	Operations → Move Ant.
Latched Faults	Alarms reported by NGC since last time latch was cleared including ones that have gone away	List (see Appendix D & Table C.30)	No	Status → Faults
Latitude	Latitude, in degrees north. If an AS-1 is installed, the value cannot be edited.	Degrees, -90 to 90	Yes	Status → or Configuration → Platform → Location

Name	Function	Units & Range	Config	Screen
LNB Local Oscillator	LNA/LNB/BDC local oscillator frequency	Display only	No	Configuration → Tracking Config → General
Local Remote	Commanding presence indication	See Table C.15	No	Status bar
Longitude	Longitude, in degrees **WEST.** If an AS-1 is installed, the value cannot be edited.	Degrees, -180 to 180	Yes	Status → or Configuration → Platform → Location
Low Signal Alarm	Current low signal alarm	Boolean	No	Status bar
Low Signal Level	Low signal level, where unit stops tracking	dB	No	Configuration → Tracking Config → General
Main Dish Motorless Az	For SRT-only operational configurations, this is the true Az when SRT is centered. (Not used in other configurations)	Degrees, 0..359.999	Yes	Configuration → Platform
Main Dish Motorless El	For SRT-only operational configurations, this is the true El when the SRT is centered. (Not used in other configurations)	Degrees, -90..90	Yes	Configuration → Platform
MFB1 Version	Not used in this system			
Minimum Move	Minimum distance before SmarTrack®, NORAD, etc., order a move	degrees	Yes	Configuration → Tracking Config → SmarTrack®
Movement CMD	Various commands useful in some configurations, such as SRT lock, Pol self test (future use), selected from a list.	See Table C.17	No	Operations Move Antenna
Norad Life	Expiration criterion for NORAD TLEs	Days	Yes	Configuration → Tracking Config → General
NTP Server IP	Network address of an NTP server to synchronize time	IP address	Yes	Configuration → System Setup
Operational Config	Basic setup parameters used to tell the NGC-ODU what kind of pedestal and equipment it is running on. Be very careful to get this right.	See Table C.19	Yes, critical	Configuration → System Setup
Path Loss Allowance	Loss target for SRT *before* both SRT and main dish are moved	dB, 0 to 12	Yes	Configuration → Tracking Config → SRT
Path Preposition Tol	Loss target for SRT when both SRT and main dish are moved	dB, 0 to 12	Yes	Configuration → Tracking Config → SRT
Pitch	Angle of the kingpost side-to-side; that is, around a vector pointing straight out toward 90 degrees, typically.	Degrees, -10 to 10	Yes, typicall y0	Status → or Configuration → Platform
Pol Brake Delay	Time delay between actuating Pol brake release and turning on drive signal to Pol motor. When set to 0.0 the brake release function is disabled.	Seconds, 0 to 2.0	Yes	Configuration → Motorization
Pol CCW Plat SW Lmt	Software limit, which is the minimum legal value of Current Platform Pol. If the Target Platform Pol is lower than this, an impossible angle will be declared.	Degrees, -360 to 360	Yes	Configuration → Platform
Pol CW Plat SW Lmt	Software limit, the max legal value of Current Platform Pol. If Target Platform Pol is greater than this, impossible angle will be declared.	Degrees, -360 to 360	Yes	Configuration → Platform
Pol Encoder Offset	Offset added to raw resolver offset to get to current platform Pol	Degrees, -180 to 360	Yes	Configuration → Platform
Pol Encoder Type	Pol axis angle feedback device type and architecture, selected from list of predefined types.	See Table C.2	Yes	Configuration → Platform
Pol Fault	Summary of Pol fault conditions. System shows highest priority fault	See Table C.30	No	Status → Diagnostics

Name	Function	Units & Range	Config	Screen
Pol Inc	Estimated inclination adjustment for Pol. A value of 0.0 turns this feature off.	Degrees	Yes	Configuration → Tracking Config → General
Pol Inc Peak Time	Time of max El for Pol inclination adjustment.	Time	Yes	Configuration → Tracking Config → General
Pol Invert	Indication of whether Pol resolver/encoder is mounted so it counts backward from the true angle	Normal/invert	Yes	Configuration → Motorization
Pol Motor Type	Not presently used. In future systems this will allow selecting a DC motor type from a list of predefined types.	See Table C.20	No	Configuration → Motorization
Pol Present	Indicates whether or not a Pol drive is present, selected from a list of predefined options.	See Table C.21	Yes	Configuration → Motorization
Pol Ratio	Pol encoder turns ratio. Number of times resolver or encoder turns per turn of the main axis.	Usually 1/1 or 2/1	Yes	Configuration → Motorization
Pol Resp TO	Number of seconds with no discernable movement tolerated by Pol axis control loop when position loop is enabled	Seconds, 0 to 10	Yes	Configuration → Motorization
Polarization	Current global Pol calculated from platform angles, attitude, and SRT position.	Degrees, -180 to 360	No	Status
Premove Alm Timer	How long to wait before moving if alarm is installed	Seconds, 0..20	Yes	Configuration → Platform
Product Key	Software license key	string	Yes	Configuration → System Setup
Product Serial Number	Serial number	string	No	Configuration → System Setup
Rain Detected	Indication of rain. The system does nothing with this, except mark an event in the log.	True/false	No	Configuration → Tracking Config → General
RainBuf Depth	Number of one-minute sample intervals in the rain buffer	number	No	Status → Tracking → Beacon Display
RainBuf Mean	Average signal strength in rain buffer	dB	No	Status → Tracking → Beacon Display
RainBuf Sigma	Standard deviation of the rain sample buffer. Used to mark likely rain events in the event history log.	dB	No	Status → Tracking → Beacon Display
Read Community	Security string for SNMPv1 and v2c	String	Yes	Configuration → System Setup → SNMP
RePeak Trigger	Low signal threshold for the SmarTrack®, before re-peaking to update the model is ordered.	dB	Yes	Configuration → Tracking Config → SmarTrack®
Roll	Angle of the kingpost side-to-side; that is, around a vector pointing straight out from 180 degrees, typically. Usually set to 0.0.	Degrees, -10 to 10	Yes	Status→ or Configuration → Platform
Scan El Offset	Distance between raster scans during acquisition assist. This parameter is only used by TriFold®. Automatically calculated from 3dB beamwidth	Degrees	No	Status
Scan Pass Count	Max # of raster scans during acquisition assist. Parameter is only used by TriFold®. Automatically calculated from 3dB beamwidth.	Number	No	Status
Scan Slew Dist	Size of sector to search during TriFold® acquisition assist	Degrees	Yes	Configuration → Tracking Config → General
Scan Slew Spd.	Jog speed 1-9 to use during acquisition assist	Number	Yes	Configuration → Tracking Config → General

Name	Function	Units & Range	Config	Screen
Scint Detect Enabled	Tells system whether to pay attention to detected scintillation in tracking	True/false	Yes	Configuration → Tracking Config → General
Scint Detect Thresh	Standard deviation of samples within one second that constitutes scintillation	dB	Yes	Configuration → Tracking Config → General
Scintillation	System's evaluation of the level of scintillation in the atmosphere		No	Status → Tracking → Beacon Display
TPU Version	NGC-IDU TPU software version reported	String	No	Administration
SCP Version	NGC-IDU SCP software version reported	String	No	Administration
Screen Saver	Setting for LCD idle behavior	On/off	Yes	Administration → Settings
Serial Baud Rate [Beacon RX]	Beacon receiver serial baud rate	Selection from list	Yes	Configuration → Tracking Config → Beacon Rcver
Serial Control [Beacon RX]	Beacon receiver serial levels and word size	Enumeration	Yes	Configuration → Tracking Config → Beacon Rcver
Serial multi-addr [Beacon RX]	Beacon receiver multidrop address if applicable	Number	Yes	Configuration → Tracking Config → Beacon Rcver
Signal Strength	NGC-IDU signal strength	dB	No	Status bar
Site ID	Name of site			Configuration → Platform
SmarTrack® Cycle Time	NGC-IDU SmarTrack® tracking cycle time	Display only	No	Configuration → Tracking Config → SmarTrack®
SNMP Off	Turn SNMP agent on/off	On/off	Yes	Configuration → System Setup → SNMP
SNMP Port Num	UDP port. Do not change	UDP port number	Yes	Configuration → System Setup → SNMP
SNMP Sys Contact	MIB-2 string	String	Yes	Configuration → System Setup → SNMP
SNMP Sys Location	MIB-2 string	String	Yes	Configuration → System Setup → SNMP
SNMP Sys Name	MIB-2 string	String	Yes	Configuration → System Setup → SNMP
Soft Limit Margin	Used in calibration of X and Y to ascertain position for soft limits versus detected hard limits	Degrees	No	Configuration → SRT
Spec An Offset	General offset applied to beacon power measurements to account for cable losses and amplifier gains	dB	Yes	Configuration → Tracking Config → General
Spec An Stat	Summary status of Spectrum Analyzer Option	See **Section 2.7.3**	No	Status → Diagnostics
SRT 3dB BW	Estimate of number of degrees offset before SRT degrades signal by 3dB	Degrees	Yes	Configuration → SRT
SRT Axis TO	Timeout value for all SRT axes. Minimum time to drive motors without seeing any feedback change.	Seconds, 0.0 to 5.0	Yes	Configuration → SRT
SRT Current X Delta	Current side-to-side offset of SRT	Degrees	No	Operations → Move Ant. → SRT Pos
SRT Current Y Delta	Current up-and-down offset of SRT	Degrees	No	Operations → Move Ant. → SRT Pos
SRT Current Z Delta	Current in-and-out offset of SRT	Inches	No	Operations → Move Ant. → SRT Pos

Name	Function	Units & Range	Config	Screen
SRT Num Axes	SRT master configuration field, selected from a list of predefined options.	See Table C.22	Yes	Configuration → SRT
SRT Status	Overall summary of SRT's current state	See Table C.24	No	Status
SRT X Axis Motor Type	Motor type for attached stepper motor to the X SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.	See Table C.20	Yes	Configuration → SRT
SRT X Limit	Summary of current limit states of the X axis	See Table C.3	No	Status
SRT X Range	Calibrated side-to-side range of SRT	Degrees	No	Configuration → SRT
SRT X Scale	Relationship between X offset and cross-el beam displacement	Fraction	Yes	Configuration → SRT
SRT Y Axis Motor Type	Motor type for attached stepper motor to the Y SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.	See Table C.20	Yes	Configuration → SRT
SRT Y Limit	Summary of current limit states of the Y axis	See Table C.4	No	Status
SRT Y Range	Calibrated up-and-down range of SRT	Degrees	No	Configuration → SRT
SRT Y Scale	Relationship between Y offset and El beam displacement	Fraction	Yes	Configuration → SRT
SRT Z Axis Motor Type	Motor type for attached stepper motor to the Z SRT axis, selected from a list of predefined motors. This controls the amount of current delivered to the motor and the holding torque.	See Table C.20	Yes	Configuration → SRT
SRT Z Limit Status	Summary of current limit states of the Z axis.	See Table C.26	No	Configuration → SRT
SRT Z Range	Calibrated in and out range of SRT	Inches	No	Configuration → SRT
SRT Z Scale	Relationship between Z offset and stepsize of motors	Fraction	Yes	Configuration → SRT
SRT Z Soft Lim Marg	Used in calibration of X and Y to ascertain position for soft limits versus detected hard limits	Inches	No	Configuration → SRT
SRT Z Step Size	Step size during peaking for Z axis. If set to 0 Z axis peaking is disabled.	Inches	Yes	Configuration → SRT
Step Cycle Thresh	NGC-IDU step cycle threshold	Display only	Yes	Configuration → Tracking Config → Steptrack
Step Cycle Time	NGC-IDU tracking cycle time	Display only	Yes	Configuration → Tracking Config → Steptrack
Step Distance	Distance to move during 3PP. Calculated by tracking software	Degrees	No	Configuration → Tracking Config → Steptrack
Step Multi Factor	Percentage of 3dB BW to make step distance	Number	Yes	Configuration → Tracking Config → Steptrack
Stop Cmd	Summary of EStop conditions	See Appendix D	No	Status → Diagnostics
System Name	Name of the system within the site	Display only	Yes	Configuration → System Setup
Target Az	Commanded Az for entire antenna subsystem (main dish plus subreflector if included) in the global coordinate system	Degrees, 0 to 360	No	Operations → Move Ant.
Target El	Commanded El for entire antenna subsystem (main dish plus subreflector if included) in the global (horizon) coordinate system	Degrees, -90 to 90	No	Operations → Move Ant.
Target Pol	Commanded Pol for entire antenna subsystem (main dish plus subreflector if included) in the global (horizon) coordinate system	Degrees, -180 to 360	No	Operations → Move Ant.

Name	Function	Units & Range	Config	Screen
Time	Current UTC time from GPS or NGC-IDU		No	Status→ or Configuration → Platform → Location
Track Mode	Current kind of tracking	See Table C.27	No	Status→ or Operations → Track
Track State	Current tracking state	See Table C.28	No	Status→ or Operations → Track
Trap Community	Security string for SNMPv1 and v2c	string	Yes	Configuration → System Setup → SNMP
VFD Count	Number of VFDs	2 (Az, El) 3 (Az1, Az2, El)	No	Status → Diagnostics → VF Drives
VFD Drive Status	Summary of drive status for VFDs	See VFD manual	No	Status → Diagnostics → VF Drives → Drives
VFD Fault Contents	Summary of VFD's fault status report	See VFD manual	No	Status → Diagnostics → VF Drives → Faults
VFD Input	Summary of input status for VFDs	See VFD manual	No	Status → Diagnostics → VF Drives → Input
VFD Inverter Status	Summary of VFD's inverter status reports	See VFD Manual	No	Status → Diagnostics → VF Drives → Inverter
Write Community	Security string for SNMPv1 and v2c	string	yes	Configuration → System Setup → SNMP
X Axis Fault	Summary of side-to-side (X axis) fault conditions. System shows highest priority fault	See Table C.16	No	Status → Diagnostics
Y Axis Fault	Summary of up-and-down (Y axis) fault conditions. System shows highest priority fault	See Table C.16	No	Status → Diagnostics
Z Axis Fault	Summary of in-and-out (Z axis) fault conditions. System shows highest priority fault if more than one applies.	See Table C.16	No	Status → Diagnostics

Table C.2: Encoder/Resolver Types

The NGC-ODU typically only allows the use of standard resolvers unless EWI-2 is installed.

Value	Meaning	Comment
----	No device present, option not selected	
Dynapar 17	Dynapar 17-bit SSI encoder (requires EWI-2)	For future use.
Heidenhain 26	Heidenhain 26-bit SSI encoder (requires specialized wiring). This is the standard setting for the 8.1m mount.	Contact ASC Signal.
potentiometer	Analog potentiometer (not supported in current release of software)	For future use only
Renishaw	Renishaw SSI encoder (requires specialized wiring)	Contact ASCI Signal.
Resolver	Standard sin/cos resolvers. This is the normal setting for almost all antennas.	Almost always correct setting unless system is different
Resolver 18-to-1	ASC Signal assembly 7543381 (not supported in current release of software)	For future use only

Table C.3: Axis Limit Conditions, Azimuth, Polarization, and SRT X axes

These are the limit conditions commonly reported by the NGC-ODU for axes with clockwise and counterclockwise directions.

Value	Meaning	Comment
----	No device present, option not selected	
CCW limit	Counterclockwise hardware limit	Takes precedence over soft CCW limit
CW limit	Clockwise hardware limit	Takes precedence over soft CW limit
Limit fault	Usually means both hardware limits are active at same time	Repair required
off	No limit active	
Soft CCW limit	Clockwise software limit	Configurable limit
Soft CCW limit	Counterclockwise software limit	Configurable limit

Table C.4: Axis Limit Conditions, Elevation and SRT Y axes

These are the limit conditions commonly reported by the NGC-ODU for axes with up and down directions.

Value	Meaning	Comment
Down limit	Down hardware limit	This takes precedence over the soft down limit
Limit fault	Usually means both hardware limits are active at same time	Repair required
off	No limit active	
Soft Down limit	Down software limit	Configurable limit
Up limit	Up hardware limit	This takes precedence over the soft up limit
Up limit	Up software limit	Configurable limit

Table C.5: Supplementary azimuth axis inputs

These are extra inputs to the Az axis that can be used with customized installations of the NGC-ODU. For a typical fixed antenna, none of these are used.

Value	Meaning	Comment
Axis Interlock	Axis interlock input is active. Not used in this system presently.	Not used
CCW Sector	Counterclockwise sector switch active. Not used in this system presently.	Not used
Center active	Center switch active. Not used in this system presently.	Not used
CW Sector	Clockwise sector switch active. Not used in this system presently.	Not used
Strut Interlock	Strut interlock input is present. Not used in this system presently.	Not used

Table C.6: Supplementary elevation axis inputs

These are extra inputs to the El axis that can be used with customized installations of the NGC-ODU. For a typical fixed antenna, none of these are used except the low El input.

Value	Meaning	Comment
Axis Interlock	Axis interlock input is active. Not presently used in this system	Not used
Creep Active	Antenna El in “up” direction is severely rate-limited. Normal during stow cycles.	Trifold® positioner is only normal application
Low El Alarm	Low El input switch is active	Usually wired in parallel with a transmit mute function
Lower Sector	Lower sector switch active. Not presently used in this system	Not used
Stow Limit	Antenna is stowed.	Trifold® positioner is only normal application
Strut Interlock	Strut interlock present. When enabled, this disabled El axis to prevent damage.	Standard profile Trifold® positioned is the only normal application
Upper Sector	Upper sector switch active. Not presently used in this system	Not used

Table C.7: Cabinet power status fields

This is a summary field for cabinet power.

Value	Meaning	Comment
???	Not reported or out of range	Indicates trouble in sensor circuits or power configuration
High voltage	An overvoltage has been detected	Check power
Low voltage	An under-voltage has been detected	Check power
Normal	Power is all in range	None

Table C.8: NGC Communications Bus Entities

These are the PWAs that may be installed on the NGC Bus.

Value	Meaning	Comment
Az ASU	Az axis sending unit	
Az CCW ACU	Counterclockwise Az axis control unit for dual-VFD az systems	
Az CW ACU	Clockwise Az axis control unit for dual-VFD az systems	
El ACU	El axis control unit	
El ASU	El axis sending unit	
MC-7 Board	Master control board for NGC-ODU	
Pol ACU	Pol axis control unit	Optional
Pol ASU	Pol axis sending unit	Optional
Single Az ACU	Az axis control unit for single-VFD az systems	
SRT X Axis	SRT side-to-size axis control board	Optional
SRT Y Axis	SRT up-and-down axis control board	Optional
SRT Z Axis	SRT in-and-out axis control board	Optional

Table C.9: Compass Calibration Statuses

These are the legal values for the compass calibration field.

Value	Meaning	Comment
----	No device present, option not selected	
???	Value out of range or compass not provisioned	This is the normal state if no AS-1 is installed
Calibrated	Normal operation	This is the normal state if an AS-1 is installed
Calibrating	Compass is in calibration cycle	Optional
Uncalibrated	Compass has not been calibrated	Optional. Only used if AS-1 is present

Table C.10: Compass Faults

These are the compass faults that may be reported.

Value	Meaning	Comment
----	No device present, option not selected	
???	Compass not provisioned	Normal state is no AS-1 is installed.
data from compass	Compass is normal.	Optional. Data received from compass
no data from comp	Compass is not responding.	Optional. No data from compass received

Table C.11: Compass Mode

These are the compass modes that may be selected in the TriFold® configuration. For a fixed antenna this is almost always set to “ignore”.

Value	Meaning	Comment
----	No device present, option not selected	
???	Value out of range	
Fixed	Compass has been overridden by the IDU by automatic calculation.	Optional
Ignore	Compass and inclinometer functions disabled. Normal state for a fixed antenna.	
Locked	Compass reading has been locked into memory.	Optional
Override	Compass has been overridden by the IDU by direct manual entry.	Optional
Using	System using compass. Not normally left in this state for very long, as compass may be noisy	Optional

Table C.12 GPS Faults

This is a list of GPS faults that may be reported by an AS-1 module.

Value	Meaning	Comment
----	No device present, option not selected	
???	Value out of range	
No data from dev	Device is supposed to be present but	Optional
No satellite fix	GPS is attempting to lock	Optional
Satellite fixed	GPS is completely locked	Optional

Table C.13 GPS Quality

This is the GPS quality returned by the AS-1.

Value	Meaning	Comment
???	No GPS installed or not working	
Good	GPS quality is good	Optional
Marginal	GPS quality is marginal	Optional
None	GPS is not locked	Optional

Table C.14: Limit Switch Mask Fields

These fields allow the user to disable unused limit inputs.

Value	Meaning	Comment
Axis Interlock	Axis interlock input is active. Not presently used in system	Not used
CCW Sector	CCW sector switch active. Not presently used in system	Not used
Center active	Center switch active. Not presently used in system	Not used
Creep Active	Antenna El in "up" direction severely rate-limited. Normal in stow cycles	Trifold® positioner is only normal application
CW Sector	CW sector switch active. Not presently used in system	Not used
Low El Alarm	Low El input switch is active	Usually wired in parallel with a transmit mute function
Lower Sector	Lower sector switch active. Not presently used in system	Not used
Stow Limit	Antenna is stowed.	Trifold® positioner is only normal application
Strut Interlock	Strut interlock is present. When enabled, disables the El axis to prevent damage.	Standard profile Trifold® positioner is only normal application
Upper Sector	Upper sector switch active. Not presently used in system	Not used

Table C.15: Local Remote settings

These are the values for local/remote.

Value	Meaning	Comment
Local	TPU or Remote TPU has control	
Remote	SNMP Agent or M&C port has control	
Local handheld	Handheld terminal has control	
???	Value out of range	
----	Field not updated	

Table C.16: Axis Movement Faults

These are the axis movement faults that can be reported. Not all axes report all faults.

Value	Meaning	Comment
Cleared	No fault	Normal
commBus fault	Issues detected with serial bus	
Feedback failure	Connection to resolver, encoder, or potentiometer has completely failed	
High temp	Component is too hot.	Not all axes report
Impossible angle	Target angle for this axis is out of software limits. Correct angle to clear fault.	
In calibration	Axis being calibrated. Factory or as-directed use only.	Only SRT & some Pol axes support this
In confidence test	Axis is being self-tested. Factory use only	Only SRT & some Pol axes support this
In self test	Axis is being self-tested. Factory use only.	Only SRT & some Pol axes support this
Interlock	Interlock signal present	Usually means ESTOP
Low temp	Component is too cold.	Not all axes report
Maintenance mode	Factory use only.	
Not calibrated	Axis needs to be calibrated.	Only SRT & some Pol axes support this
Overcurrent	Motor overcurrent alarm	Only SRT & some Pol axes support this
Parameter conflict	Parameters do not make sense.	Correct the parameters
Reading lost	Connection to resolver, encoder, or potentiometer has given an unexpected result. Happens from time to time, & is only a problem if frequent.	Not all axes report
Software lock	Axis was locked by software command	
Timeout	Movement timeout was detected.	
Uncommanded move	Movement detected for no reason. Can happen if resolver settings are changed, in which case it should be ignored.	
Under-voltage	Voltage is too low for motor to run.	Not all axes report
VFD fault	VFD reports serious error.	Az or El axes only

Table C.17: Movement command enumerations

These are some commanded functions that can be entered.

Value	Meaning	Comment
???	No value	
confidence test (Pol)	Confidence-test Pol. Factory use only.	Do not use
cont's confidence test (Pol)"	Confidence-test Pol. Factory use only.	Do not use
Lock	Lock SRT	
no operation	Normal reading	
recalibrate (Pol)	Recalibrate Pol	
Resume automatic	Unlock SRT	
self test (Pol)	Self-test Pol	

Table C.18: Voltage Monitor Mask values

Since there are several possible power supply configurations, the NGC-ODU has a configuration field to deal with variations without generating spurious alarms.

Value	Meaning	Comment
Minus 12V A	Ignore -12VDC monitoring (recommended if no resolvers are present in system)	
Minus 12V B	Not used	Future redundant power supply option
Motor Voltage A	Ignore motor voltage monitoring (not recommended if SRT or DC Pol drive present)	
Motor Voltage B	Not used	Future redundant power supply option
Plus 12V A	Ignore +12VDC monitoring (not recommended)	Do not mask
Plus 12V B	Not used	Future redundant power supply option

Table C.19: Operational Configurations

This field gives the NGC-ODU system information about the kind of antenna it is controlling.

Value	Meaning	Comment
Fixed	System whose geographic location is not normally assumed to change	Normal for non-TriFold® positioners
Fixed equat mount	For future use only	Do not use
Mobile ant paused	Location changes, including frequently, & includes an AS-1 to determine location and attitude automatically	TriFold® packages ONLY
Slave SRT only	For future use only	NGC-ODU-SRT only
SRT only	Main reflector is not motorized & cannot move, but SRT is installed.	NGC-ODU-SRT only

Table C.20: Stepper Motor types

This field allows the SRT controller to be told what specific DC motors are installed in the SRT.

Value	Meaning	Comment
----	Not provisioned	---
???	Value of of range	Optional
NEMA 23 HIS	NEMA 23 motor. Normal for 3.5m SRT	Optional
NEMA 34 HIS	NEMA 34 motor. Normal for 8.1m SRT	Optional
Unknown	Not configured	Optional

Table C.21: Polarization Axis Setup

This field configures the expected geometry of the polarization subsystem.

Value	Meaning	Comment
----	Value not valid	Should be fixed
???	Value out of range	Should be fixed
Main no Pol	Motorized main dish system with no Pol drive	May automatically correct itself to match operational config
Main use Pol	Motorized main dish system with Pol drive	May automatically correct itself to match operational config
No main no Pol	SRT-only system with no Pol drive	May automatically correct itself to match operational config
No main use Pol	SRT-only system with Pol drive	May automatically correct itself to match operational config

Table C.22: SRT Axes Present field

This field configures the expected geometry of the SRT.

Value	Meaning	Comment
???	Value out of range	Correct this, it may lead to problems
Not present	No SRT should be present	
XY present	A two-axis SRT is present	Optional
XYZ present	A three-axis SRT is present	Optional

Table C.23: SRT Movement Command

This field gives access to the SRT diagnostic and maintenance commands.

Value	Meaning	Comment
No operation	Default state	Optional
Lock XYZ	Lock all SRT axes	Optional
Resume automatic	Unlock all locked axes	Optional
Recalibrate	Recalibrate SRT. Warning: this moves SRT to all limits of operation.	Optional
Self test	Check SRT for functionality without disturbing position more than a slight amount	Optional
Lock XY	Lock XY axes but not Z axis (if present)	Optional
Confidence test	Confidence-test of SRT. Factory use only.	Optional
Con's confidence test	Continuous confidence-test of SRT. Factory use only.	Optional
???	Value out of range	Optional
---	No value reported	Optional

Table C.24: SRT Overall Status

This field gives a summary of the SRT. The SRT is a plug-and-play accessory to the NGC-ODU.

Value	Meaning	Comment
Absent	No SRT is detected	
Present & disabled	SRT detected but not provisioned	Optional
Present but faulted	SRT detected but in fault state	Optional
Operational	SRT detected and online	Optional
Locked	SRT present but movement frozen	Optional
LockedXY unlockZ	SRT present but movement frozen in XY.	Optional
???	Value out of range	Optional
----	No value reported	

Table C.25: SRT Temperature Status

This field gives a summary of the SRT temperature.

Value	Meaning	Comment
Ok	Temperature available and in range	Optional
Low temp	Temperature too low	Optional
High temp	Temperature too high	Optional
Sensor fault	Temperature sensor offline	Optional
Temp not available	No temp sensor on board(s)	Optional
???	Value out of range	Optional
----	No value reported	

Table C.26: SRT Z Limit status field

This field tells if the Z axis of an XYZ SRT has a limit fault.

Value	Meaning	Comment
----	Not provisioned	
???	Value out of range	Optional
In limit	Not used	SRTs do not have hardware limits
Off	Not in limit	Optional
Out limit	Not used	SRTs do not have hardware limits
Soft in limit	At software "in" limit	Optional
Soft out limit	At software"out" limit	Optional

Table C.27: Track Mode enumeration

These are merely reported by the NGC-ODU from data supplied by the NGC-IDU.

Value	Meaning	Comment
----	No data from NGC-IDU	
???	Value out of range	
Adaptive cont step	NGC-IDU reports interpolative tracking is selected	
Intelsat	NGC-IDU reports Intelsat tracking is selected	
Intelsat adaptive	NGC-IDU reports Intelsat tracking with peak optimization is selected	
No track supported	NGC-IDU reports no tracking is enabled	Unusual
NORAD	NGC-IDU reports NORAD tracking is selected	
NORAD adaptive	NGC-IDU reports NORAD tracking with peak optimization is selected	
Smart first order	Not used	
Smart orbital	NGC-IDU reports SmarTrack® is selected	
Step	NGC-IDU reports 3PP step tracking is selected	
Stop	NGC-IDU reports no tracking is configured	

Table C.28: Track State field meanings

These are merely reported by the NGC-ODU from data supplied by the NGC-IDU.

Value	Meaning	Comment
----	No data from NGC-IDU	
???	Value out of range	
faulted	NGC-IDU reports track fault	Usually means data error, not antenna problem
Not present	No tracking enabled	
Not tracking	NGC-IDU reports it is not tracking	
Paused	NGC-IDU reports track paused	
Predictive track	NGC-IDU reports it is in prediction mode	Optional
Step tracking	NGC-IDU reports it is in beacon tracking mode	

Table C.29: VFD DataLink Status

These are the statuses of the modbus for each control unit.

Value	Meaning	Comment
----	No data from ACU	Transient
???	Value out of range	Transient
Down	Modbus link is down	
Impaired	Modbus link is working but with errors	
Unknown	ACU is not sure	Transient
Working	Modbus link is OK	

Table C.30: Fault Severity Table

Screen Fault/Event Name	Severity	Source	Description
AC voltage error	Major	NGC-ODU	ODU reports problem with mains power supply. (In fault history, this may read “Outdoor AC problem”).
Az ACU 1	Major	NGC-ODU	ODU reports communications problems with indicated ACU module. ODU needs service.
Az ACU 2	Major	NGC-ODU	ODU reports communications problems with indicated ACU module. ODU needs service.
Az ASU fault	Major	NGC-ODU	ODU reports communications problems with indicated ASU module. ODU may need service. (In fault history, may read “Az sending unit fault”).
Az axis timeout	Minor	NGC-ODU	NGC-ODU reports main dish Az axis motor timeout
Az CCW HW lim	Minor	NGC-ODU	Limit switch closed. Note corresponding software limit may also be asserted.
Az CCW soft limit	Minor	NGC-ODU	NGC-ODU reports main dish Az CCW software limit reached or exceeded
Az CW HW lim	Minor	NGC-ODU	Limit switch is closed. Note corresponding software limit may also be asserted.
Az CW soft Limit	Minor	NGC-ODU	NGC-ODU reports main dish Az CW software limit reached or exceeded
Az interlock	Major	NGC-ODU	System dependent. See NGC-ODU manual

Az resolver fault	Major	NGC-ODU	NGC-ODU reports a Pol resolver/encoder error. Note not all encoder/resolver errors create this alarm.
Az1 VFD fault reported	Major	NGC-ODU	NGC-ODU reports a problem from Azimuth VFD.
Az1 VFD overload fault	Major	NGC-ODU	NGC-ODU reports a problem from Azimuth VFD.
Az2 VFD fault reported	Major	NGC-ODU	Dual-drive systems only. ODU reports a problem from Az VFD.
Az2 VFD overload fault	Major	NGC-ODU	Dual-drive systems only. ODU reports a problem from Az VFD.
Beacon comm. flt	Major	NGC-IDU	Serial interface to beacon receiver is not working. Check configuration. For ASC3xx receivers, this could mean receiver is in LOCAL mode. (In fault history, may read "Beacon Comm").
Beacon saturate	Minor	NGC-IDU	Beacon analog input is saturated (approximately +10.25V). Adjust beacon receiver to get margin. (In fault history, this may read "Beacon analog overvolt").
Box limit	Minor	NGC-IDU	NGC-IDU encountered a box limit. Can only happen in tracking modes, as box limits do not limit position commands or jogging
Cabinet bus volt Error	Major	NGC-ODU	One or more power supply is out of spec
ODU P/S Fault	Major	NGC-ODU	One or more DC power supplies failed. ODU needs service
Cabinet comm.	Major	NGC-IDU	No data link to ODU. Check fiber connection, power at ODU
Cabinet open fault	Minor	NGC-ODU	System dependent. See NGC-ODU manual
Cabinet setup	Major	NGC-ODU	Parameter conflict in NGC-ODU. Check settings.
Cabinet temp high fault	Major	NGC-ODU	NGC-ODU is too hot. Check solar load and consider shielding.
Cabinet temp low fault	Major	NGC-ODU	NGC-ODU is too cold. Check heater system option.
Compass calibr. fault	Minor	NGC-ODU	AS-1 compass is not calibrated. This will disable auto acquisition assist function in TriFold® controllers.
El ACU 1	Major	NGC-ODU	ODU reports communications problems with indicated ACU module. ODU needs service.
El ASU fault	Major	NGC-ODU	ODU reports communications problems with indicated ASU module. ODU may need service. (In fault history, may read "El sending unit fault")
El axis timeout	Minor	NGC-ODU	NGC-ODU reports main dish El axis motor timeout
El creep activated	Info	NGC-ODU	System dependent. See NGC-ODU manual
El down HW lim	Minor	NGC-ODU	Limit switch closed. Note corresponding software limit may also be asserted.
El down soft limit	Minor	NGC-ODU	ODU reports main dish El down software limit reached/exceeded.
El Interlock	Major	NGC-ODU	System dependent. See NGC-ODU manual
El Resolver Fault	Major	NGC-ODU	NGC-ODU reports a Pol resolver/encoder error. Note not all encoder/resolver errors create this alarm.
El up HW lim	Minor	NGC-ODU	Limit switch closed. Note corresponding software limit may also be asserted.
El up soft limit	Minor	NGC-ODU	ODU reports main dish El up software limit reached or exceeded
El VFD fault reported	Major	NGC-ODU	NGC-ODU reports a problem from El VFD.
El VFD overload Fault	Major	NGC-ODU	NGC-ODU reports a problem from El VFD.
ESTOP fault	Major	NGC-ODU	NGC-ODU reports ESTOP.
External Interlock	Major	NGC-ODU	System dependent. See NGC-ODU manual
GPS/Att sense Fault	Minor	NGC-ODU	ODU cannot communicate with AS-1 module. If alarm appears on any non-TriFold® system, operational configuration is incorrect (in fault history, may read "Outdoor GPS error").
Handheld malfunction	Major	NGC-ODU	System dependent. See NGC-ODU manual
IDU overtemp	Major	NGC-IDU	Internal temp of IDU is out of specification. IDU needs cooling.
IDU undertemp	Major	NGC-IDU	Internal temp of IDU is out of specification. IDU needs heating.
Low Elevation	Minor	NGC-ODU	System dependent. See NGC-ODU manual
Low signal alarm	Minor	NGC-IDU	Tracking source input is below the low signal threshold.
Maint-only settings	Minor	NGC-IDU	IDU is in developmental support mode. Not used in production systems.
MC-7 BIT failed	Critical	NGC-ODU	NGC-ODU reports major problem. Cabinet needs service.
Pol ACU	Major	NGC-ODU	ODU reports communications problems with indicated ACU module. ODU needs service.
Pol ASU fault	Major	NGC-IDU	ODU reports communications problems with indicated ASU module. ODU may need service. (In fault history, may read "Pol sending unit fault")
Pol axis timeout	Minor	NGC-ODU	NGC-ODU reports main dish Pol axis motor timeout

Pol CCW HW lim	Minor	NGC-ODU	Limit switch is closed. Note that corresponding software limit may also be asserted.
Pol CCW soft limit	Minor	NGC-ODU	ODU reports main dish Pol CCW software limit reached or exceeded
Pol CW HW lim	Minor	NGC-ODU	Limit switch closed. Note that corresponding software limit may also be asserted.
Pol CW soft limit	Minor	NGC-ODU	ODU reports main dish Pol CW software limit reached or exceeded
Pol Interlock	Major	NGC-ODU	System dependent. See NGC-ODU manual
Pol resolver fault	Major	NGC-ODU	ODU reports a Pol resolver/encoder error. Note not all encoder/resolver errors create this alarm.
Rain detected	Minor	NGC-IDU	Tracking subsystem measured beacon variation that appears to match the signature of rain. This is not definitive and no action is specifically taken. (In fault history, this may just read “Rain”).
Resolver subsys alarm	Major	NGC-ODU	System dependent. See ODU manual (in fault history, this may read “Resolver to digital comm. fault”).
RPI-6 Fault	Major	NGC-IDU	RPI-6 module reports a major error. IDU needs service.
SA fault	Major	NGC-IDU	Analyzer module reports a major error. IDU needs service.
Satellite data alarms	Minor	NGC-IDU	Predictive data is bad, e.g., NORAD TLEs
SCP fault	Critical	NGC-IDU	SCP module reports a major error. IDU needs service.
SRT Az CCW lim	Major	NGC-ODU	SRT is at min X cross-Elevation (Az) software limit. (SRT does not have hardware limits.)
SRT Az CW lim	Major	NGC-ODU	SRT is at max X cross-Elevation (Az) software limit. (SRT does not have hardware limits.)
SRT comm.	Major	NGC-ODU	ODU has lost communication with one or more SRT axis controllers. Check configuration. SRT may need service.
SRT el down lim	Major	NGC-ODU	SRT at min Y El software limit (SRT has no hardware limits)
SRT el up lim	Major	NGC-ODU	SRT at max Y El software limit (SRT has no hardware limits)
SRT in limit	Minor	NGC-ODU	SRT Z at max software limit (SRT has no hardware limits)
SRT out limit	Minor	NGC-ODU	SRT Z at max software limit (SRT has no hardware limits)
SRT temperature	Major	NGC-ODU	SRT temperature is outside operational limits
SRT temp override	Minor	NGC-ODU	SRT temperature interlocks are disabled by handheld.
SRT X HW event	Minor	NGC-ODU	SRT X (Az) asserted a hardware fault.
SRT X reading adj	Minor	NGC-ODU	SRT X axis adjusted its reading.
SRT X timeout	Major	NGC-ODU	SRT X axis reported a timeout.
SRT Y HW event	Major	NGC-ODU	SRT Y (El) asserted a hardware fault.
SRT Y reading adj	Minor	NGC-ODU	SRT Y axis adjusted its reading.
SRT Y timeout	Major	NGC-ODU	SRT Y axis reported a timeout.
SRT Z HW event	Major	NGC-ODU	SRT Z axis asserted a hardware fault.
SRT Z reading adj	Minor	NGC-ODU	SRT Z axis adjusted its reading.
SRT Z TO	Major	NGC-ODU	SRT Z axis reported a timeout.
Storage purge requested	Critical	NGC-IDU	Internal storage starting to fill up, and manual purge should be performed (In fault history, may read “Storage is nearly full”).
Strut interlock	Major	NGC-ODU	See NGC-ODU manual.
System interlock	Major	NGC-ODU	See NGC-ODU manual.
Tracking fault	Minor	NGC-IDU	Tracking could not resume for some reason that is algorithm-dependent. Not usually asserted alone; check other alarms.
Uncmd move detected	Major	NGC-ODU	See NGC-ODU manual.

APPENDIX D: SCREEN STATUS MESSAGES

The following **Table D.1** lists virtually all of messages that might appear on the TPU in pop-up dialog boxes.

TABLE D.1: SCREEN STATUS MESSAGES

Message Text	Message type	Meaning
Acquisition prevents jog	Warning	Current mode of system is one where a jog command is inappropriate, so command was ignored.
Adding entry to working table, please wait	Informational	NGC-IDU is adding an entry to the working satellite table database.
Analyzer is being used for tracking	Warning	Current mode of system is using spectrum analyzer for tracking, so last user request cannot be honored.
Antenna not level enough to deploy	Error	Antenna's roll and/or pitch is 10 degrees or more so the acquisition assist is disabled.
Automatic Acquire Failed	Error	Acquisition assist failed to find a suitable signal within the parameters.
Automatic track resume	Informational	System has resumed tracking after power outage as configured.
Axis movement fault?	Error	ODU reported significant error on one or more axes during the last attempted move.
Az and El disabled because ODU temperature too low	Warning	One or more VFDs in ODU are below min operating temp. Consult ODU manual.
Az calibration mode reported	Warning	SRT X axis not calibrated. Consult ODU manual
Az comm bus fault reported	Warning	Az axis (or SRT X axis) reported communication bus error condition. Check Fault screen. Consult ODU manual.
Az commanded to invalid angle	Warning	Az command cannot be physically reached without violating a limit.
Az direction fault reported	Error	Az axis (or SRT X axis) reported direction error condition. Check Fault screen. Consult ODU manual.
Az disabled because ODU temperature too high	Error	Az VFD too hot for safe operation. Consult ODU manual.
Az interlock fault reported	Error	Az axis (or SRT X axis) reported an interlock condition. Check Fault screen. Consult ODU manual.
Az is software locked	Warning	ODU reports the axis is locked
Az maintenance mode reported	Warning	Az axis (or SRT X axis) in maintenance mode. Consult ODU manual.
Az movement fault?	Error	NGC-ODU reported a significant Az movement fault
Az parameter conflict	Error	Parameters in ODU for Az do not make sense to ODU.
Az timeout fault reported	Warning	Az axis (or SRT X axis) timed out. Check Fault screen.
Box Limit	Informational	Box limit has been encountered and tracking is being adjusted to account for it. Normal in predictive tracking algorithms.
Box Limit, tracking paused	Informational	A box limit has been encountered and the tracking is being halted. Normal in step-track-based algorithms.
Cannot delete active satellite	Warning	Current satellite cannot be removed from working satellite table.
Cannot deploy/acquire, not a mobile system	Error	The command required is not supported by the current operational configuration.
Cannot stow, not a mobile system	Warning	Requested command is not normal for this type of system so it is denied.
Can't change jog speed during acquire	Warning	Jog speed changes are disallowed during acquisition assist function.
Compass mode fault?	Error	Compass is not in right state for command. Only reported by TriFold® NGC-ODUs. Usually indicates a problem with ODU.
Compass mode not set correctly	Error	Compass is not in right state for command. Only reported by TriFold® NGC-ODUs. Usually indicates a problem with ODU.
Compass not calibrated	Error	ODU's compass in AS-1 is not calibrated, impeding acquisition assist
Could not precharge	Warning	Algorithm precharge did not have enough quality data to work.
Distill visible, please wait	Informational	User requested only visible satellites be left in Global Satellite Table.
Done with distill	Informational	The action has completed successfully.
Done with purge	Informational	The action has completed successfully.
El calibration mode reported	Warning	SRT Y axis is not calibrated. Consult ODU manual.

El comm bus fault reported	Warning	El axis (or SRT Y axis) reported communication bus error condition. Check Fault screen. Consult ODU manual.
El commanded to invalid angle	Warning	El command cannot be physically reached without violating limit.
El direction fault reported	Error	El axis (or SRT Y axis) reported direction error condition. Check Fault screen. Consult ODU manual.
El disabled because ODU temperature too high	Warning	El VFD is too hot for safe operation. Consult NGC-ODU manual.
El interlock fault reported	Error	El axis (or SRT Y axis) reported interlock condition. Check Fault screen. Consult ODU manual.
El is software locked	Warning	The ODU reports the axis is locked
El maintenance mode reported	Warning	The El axis (or SRT Y axis) is in maintenance mode. Consult NGC-ODU manual.
El parameter conflict	Error	Parameters in ODU for El do not make sense to the ODU
El timeout fault reported	Warning	El axis (or SRT Y axis) timed out. Check Fault screen
End scan: receiver lock	Informational	The acquisition assist has found a likely signal.
Entry added to working satellite table	Informational	Entry successfully added.
ESTOP disallows resume tracking	Warning	After a power cycle, IDU determined that automatic track resume is enabled
ESTOP disallows scan	Warning	Command cannot be completed because of an ESTOP condition
ESTOP is preventing movement	Error	Command cannot be completed because of an ESTOP condition
ESTOP prevents jog	Warning	Command cannot be completed because of an ESTOP condition
Faults disallow resume tracking	Error	Current fault state doesn't allow tracking. Check Faults and Fault History to determine the issue.
Faults disallow tracking	Error	Current fault state doesn't allow tracking. Check Faults and Fault History to determine the issue.
HW Fault: See Fault History	Error	ODU reported highly unusual fault code to IDU, one the IDU does not recognize or is not expecting in current configuration.
IDU EMERGENCY STOP!	Informational	IDU ESTOP has been engaged
Importing NORAD database, please wait	Informational	User has requested database load from geo.txt file.
Intelsat parameter check failed	Warning	Parameters for current satellite are not consistent or up-to-date.
Jog speed is 0, cannot jog	Informational	
Key is not valid	Error	Product license key is not valid for this system.
Loaded geo.txt	Informational	NORAD database is loaded.
Missing data to compute	Warning	GPS is not valid at critical step in sequence. Try again, this may be transient.
Motorization parameters may need tuning	Warning	ODU having trouble closing control loop adequately. IDU will continue attempting to track but performance is probably somewhat impaired.
Must lock SRT to do pattern	Warning	Pattern testing feature cannot use SRT.
No GPS fix, cannot deploy	Error	Acquisition assist cannot complete, no GPS fix
No pol drive template?	Warning	System is configured to automatically program the Pol axis to match current satellite, but nothing has been saved that matches frequency band & Pol drive configuration.
No resume, box off	Informational	After a power cycle, IDU determined that automatic track resume is enabled
No resume, mobile system	Informational	After a power cycle, IDU determined that automatic track resume is enabled
No resume, no sat box	Informational	After a power cycle, IDU determined that automatic track resume is enabled
No resume, not active	Informational	After a power cycle, IDU determined that automatic track resume is enabled
No spectrum to clear	Warning	Clear spectrum was requested but no spectrum is saved for the current satellite.
No SRT Present	Error	No SRT hardware is detected so a command cannot be completed.
NORAD database installed	Informational	The operation requested is complete.
NORAD database updated	Informational	The operation requested is complete.
NORAD param check failed	Error	Parameters for current satellite are not consistent or up-to-date.
NORAD unable to initialize	Error	Unlikely internal error in SGP4/SDP4 algorithm,

Not licensed for extended SA features	Warning	No license key bit is set for the requested operation.
Not licensed for Intelsat	Warning	No license key bit is set for the requested operation.
Not licensed for NORAD	Warning	No license key bit is set for the requested operation.
Not licensed for SmarTrack®	Warning	No license key bit is set for the requested operation.
ODU EMERGENCY STOP!	Warning	ODU is reporting engagement of an ESTOP
Pattern test prevents jog	Warning	Jog is not allowed in current system mode.
Peaking complete	Informational	Initial peak was successful.
Peaking DVB carrier	Informational	DVB-S receiver is being used to peak
Pol calibration mode reported	Warning	The Pol drive not calibrated. Consult ODU manual.
Pol comm bus fault reported	Warning	Pol axis reported communication bus error condition. Check Fault screen. Consult ODU manual.
Pol commanded to invalid angle	Warning	Pol command cannot be physically reached without violating limit.
Pol direction fault reported	Error	Pol axis reported direction error condition. Check Fault screen. Consult ODU manual.
Pol disabled because ODU temperature too high	Error	Pol PWA too hot for safe operation. Consult ODU manual.
Pol disabled because of low voltage	Error	Insufficient power exists to run Pol motor. Only applies to certain drive electronics, see ODU manual.
Pol in calibration	Informational	Pol drive is being calibrated. Only applies to certain drive electronics, see ODU manual.
Pol in self test	Informational	Pol drive is being self-tested. Only applies to certain drive electronics, see ODU manual.
Pol overcurrent fault reported	Error	Pol motor tripped electronic circuit breaker. Only applies to certain drive electronics, see ODU manual.
Pol timeout fault reported	Error	The Az axis (or SRT X axis) timed out. Check Fault screen.
Purge global table to geostationary set only, please wait	Informational	The requested action is in progress.
Purge global table to visible sats only, please wait	Informational	The requested action is in progress.
Purge global table to working set only, please wait	Informational	The requested action is in progress.
Purge working table to visible sats only, please wait	Informational	The requested action is in progress.
Removed entry from working table	Informational	The requested action is in progress.
Requested NORAD ID already exists in global table	Informational	There is already a global satellite entry with this number. Use it, delete it, or check number you entered for accuracy.
Returned to last good peak	Informational	Step-tracking was abandoned due to sudden signal loss, and antenna returned to last good value. Often means sudden rain fade.
Satellite is already inactive	Informational	Satellite is already not in the working table.
Scan acquisition, goto peaking	Informational	Acquisition assist has determined that the signal level is sufficient to use step-track to finish.
Signal too low to peak system	Warning	Signal is below the low signal level.
Signal too low to resume tracking	Warning	Signal is below the low signal level.
Simulating ref level below -30dB	Informational	Spec analyzer hardware capabilities are exceeded so system is simulating this ability. Quality of readings may be affected.
Sorry, system is not licensed for that mode	Warning	No license key bit is set for the requested operation.
Spectrum Analyzer leaving user control	Informational	Spectrum analyzer mode change.
Spectrum Analyzer now under user control	Informational	Spectrum analyzer mode change.
Spectrum Analyzer user control mode timed out	Informational	Spectrum analyzer mode change.
Spectrum file cleared	Informational	Saved spectral mask for this satellite has been deleted.
SRT Disabled	Warning	SRT is disabled so a command cannot be completed.

SRT Faulted	Error	SRT is faulted so a command cannot be completed.
SRT Locked	Informational	SRT locked. Unlock it through Operations → Move Ant.
SRT Z peak at limits	Warning	Z axis has reached a limit. Usually indicates SRT was not installed with sufficient range of movement.
Starting spiral scan to look for signal	Informational	System is using a box-spiral to look for the satellite.
Stow complete	Informational	System is stowed.
Stow sequence started	Informational	System is starting to stow.
Try to peak antenna	Informational	System is peaking for the first time.
Updating NORAD database, please wait	Informational	User has requested database load from geo.txt file.
User defined SA mode terminated	Informational	System needs the spectrum analyzer
Using analyzer to acquire	Informational	System is using the indicated tracking source now.
Using beacon to acquire	Informational	System is using the indicated tracking source now.
Using DVB to acquire	Informational	System is using the indicated tracking source now.
Z Movement timeout?	Error	SRT Z axis did not move within the programmed timeout.

APPENDIX E: LIMITATIONS & RESTRICTIONS TO J9 APC100 EMULATION

This is an emulation, as best as the NGC-IDU can implement it. The NGC-IDU, however, is not an APC100, and does not derive software source code or other functionality directly from the APC100, so differences in behavior and likely to exist. Differences are documented within this manual wherever possible.

ASC Signal Corporation has made every effort to make the NGC-IDU transparently emulate the APC100 as much as possible, but M&C programs should still be retested to ensure compatibility.

- A general rule is that the NGC-IDU will report the actual value it is using rather than reporting an emulation of the value that the APC100 would have used. This can mean small differences between values uploaded from the values downloaded where units are different.
- Status information from the NGC-IDU to the M&C system is supported. The other direction except for movement commands is implemented but may have unexpected results, because the APC100 had far less information than the NGC-IDU does.
- The NGC-IDU is more liberal in accepting commands from the serial port than the APC100 was, and many commands and data operations will work when the unit is in LOCAL mode. This is because the data design of the NGC-IDU can more accurately deal with multiple command sources. It is recommended, but not necessary, that the control system examine the LOCAL/REMOTE bit in the status field and not issue commands if the unit is in LOCAL mode.
- The NGC-IDU has more configuration settings, in general, than the APC100, so the UP and DP commands cannot and should not be used to attempt to restore the state of a system.
- Note also that this is a legacy protocol so improvements to it cannot be made without impacting existing installations.
- The NGC-IDU does not allow for emulation of this protocol over the TCP/IP network in the current software system.
- Do not attempt to export parameters from the NGC-IDU and upload to an APC100, this is not supported.
- New working table satellites uploaded through the APC100 interface will be very incomplete. This is not recommended or supported.

NOTE: configuration of the NGC-IDU over this interface should be attempted only with extreme caution.

APPENDIX F: NGC-IDU MOBILE TRIFOLD® COORDINATE SYSTEMS

For the TriFold® mobile antenna systems, both the IDU and ODU coordinate system is as follows:

- 0 degrees platform Azimuth must be aligned with the tongue of the trailer. 180 degrees platform Azimuth must be the center of travel and the normal stow position.
- 90 degrees platform Elevation must be the stow position.
- Roll and pitch should read zero when the antenna is level. Level is defined as when the Azimuth axis is perpendicular to ground.
- Compass (platform) heading should read approximately 0 degrees when the tongue of the trailer is pointed due North.
- Positive pitch is defined when the tongue of the trailer is raised.
- Positive roll is defined when the left side of the trailer, looking forward toward the tongue, is higher than the right side of the trailer.

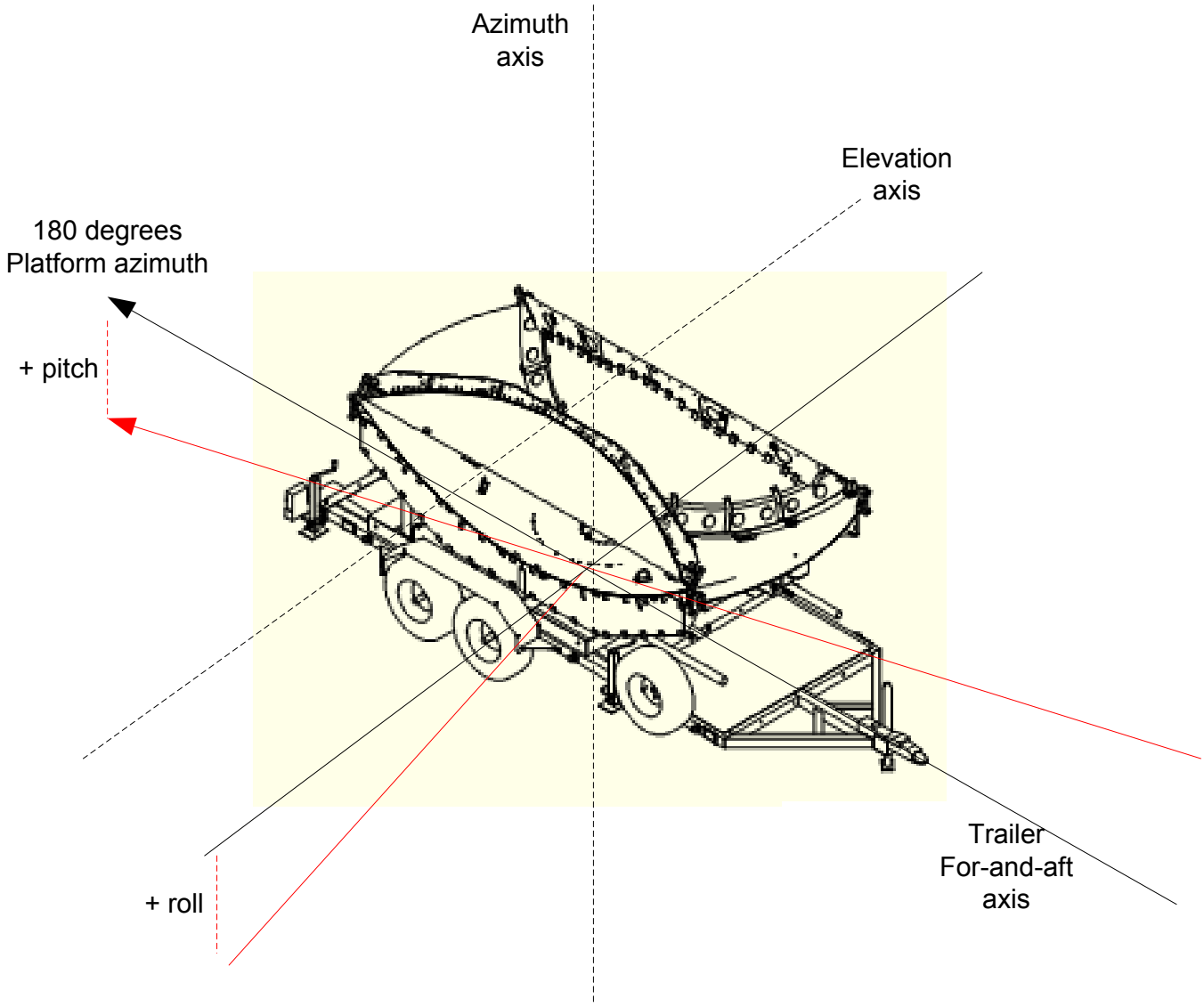

FIGURE F-1: TRIFOLD® ORIENTATION

APPENDIX G: EQUIPMENT ISSUES & TECHNICAL SUPPORT

REPORTING EQUIPMENT LOSS OR DAMAGE

If you find equipment was damaged during the shipping process, file a claim with the carrier. Follow the "Reporting Visible Loss or Damage" or "Reporting Concealed Damage" procedures to file a claim with a carrier.

REPORTING VISIBLE LOSS OR DAMAGE

Make a note of any loss or evidence of external damage on the freight bill or receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier refusing to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

REPORTING CONCEALED DAMAGE

Concealed damage means damage which does not become apparent until the unit has been unpacked. The contents may be damaged in transit due to rough handling, even though the carton may not show external damage. If you discover damage after unpacking the unit, make a written request for an inspection by the carrier's agent, then file a claim with the carrier since such damage is most likely the carrier's responsibility.

INVENTORY EQUIPMENT RECEIVED

After opening your shipment, you should take inventory of the parts immediately. Check each item received in your shipment against the packing slip included with the shipment. If any items are missing, please notify ASC Signal Corporation immediately by contacting Customer Service.

RETURNING DAMAGED/DEFECTIVE EQUIPMENT

ASC Signal strives to ensure all items arrive safe and in working order. Despite these efforts, equipment is at times received with damage or faults. When this occurs, it may be necessary to return some items to ASC Signal for either repair or replacement. Returns can be expedited using the following procedure:

Step 1: Call the ASC Signal Technical Support and request a Return Material Authorization (RMA) number, as well as the address to which you should forward the material(s)
Step 2: Tag or identify the defective equipment, noting the defect or circumstances. Also, be sure to write the RMA number on the outside of the carton. It would be helpful to reference the ASC Signal sales order and purchase order number, as well as the date the equipment was received
Step 3: Pack the equipment in the original container with protective packing material. If the original container and packing material are no longer available, pack the equipment in a sturdy corrugated box and cushion it with appropriate packing material
Step 4: Be sure to include the following information when returning the equipment:

- Company Name, Address (City, State and Zip Code), and Telephone Number
- RMA Number*****
- Problem/Damage Description******
- Contact Name

***** Absence of the RMA number will cause a delay in processing your equipment for repair. Be sure to include the RMA number on all correspondence.
****** All installation, adjustment and operational information must be strictly adhered to in order to achieve warranted performance specifications.
Step 5: Ship the equipment to ASC Signal Corporation using UPS, U.S. Postal Service, or other appropriate carrier, freight prepaid and insured. The material should be forwarded to the address given by the ASC Signal Customer Service contact

TECH SUPPORT CONTACT INFO

For technical support, contact information, and/or technical documentation:

ASC Signal Corporate Website: www.ascsignal.com
ASC Tech Support Phone: (214) 291-7659
ASC Tech Support Email: SatComTechSupport@ascsignal.com

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