



D3

Mobile Satellite Internet Controller

Configuration and Operation Manual

Preliminary May 2006-05-11

Features

Front Panel Search, Stow, and Power Commands
LED (Status Indicators)
TCPIP/LAN Interface
HTML Configuration and Operation Pages
Telnet Commands for Diagnostics
No Software Required on PC
True DVB Satellite Identification
Field Firmware Upgradeable
Simple Electrical Connections

The **D3 Mobile Satellite Internet Controller** is designed to allow the user the worlds most advanced Simple Interface.

After the D3 has been properly wired to a DataStorm Mount and connected properly to a LAN Switch or router this controller will be ready to configure and operate.

Configuration

Connection and Configuration! Nearly 95% of all technical support calls are due to either improper wiring, or wrong configuration parameters. Please be sure to review these 2 items before contacting technical support for assistance.

The D3 must be configured properly before it can be used in normal operation.

First insure that all wiring to the D3 Controller is correct. This would include any connections to the DataStorm Mount.

Verify proper Power Supply

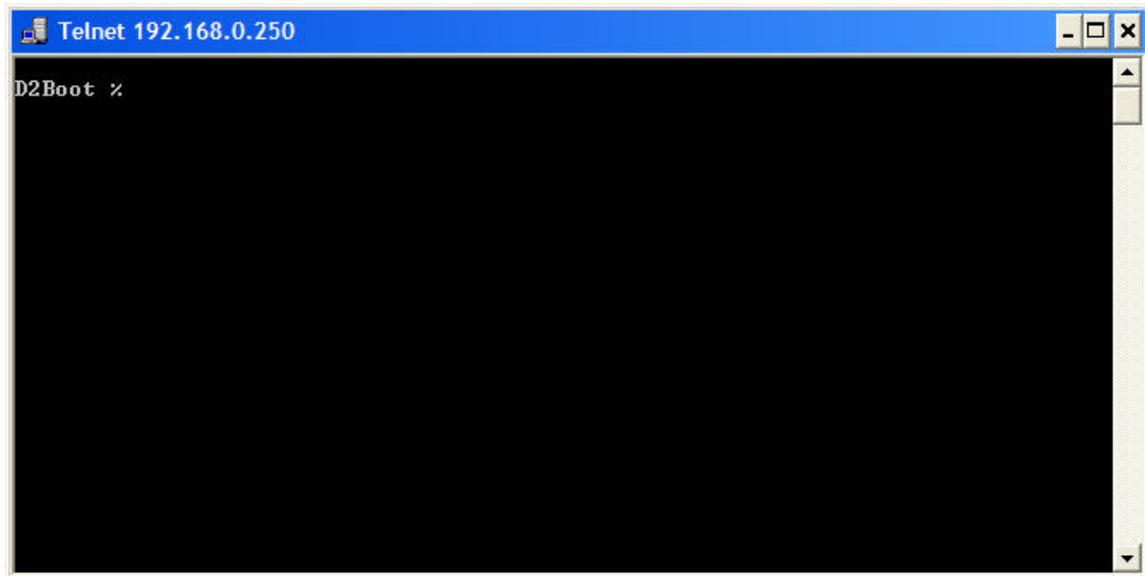
Note: Check to see that you are using the correct power supply for the model of DataStorm Mount.

F1	12 Volt 4-6 Amp
F2	15 Volt 6-8 Amp
F3	15 Volt 8 Amp
XF2	15 Volt 8 Amp
XF3	15 Volt 8 Amp

First Steps;

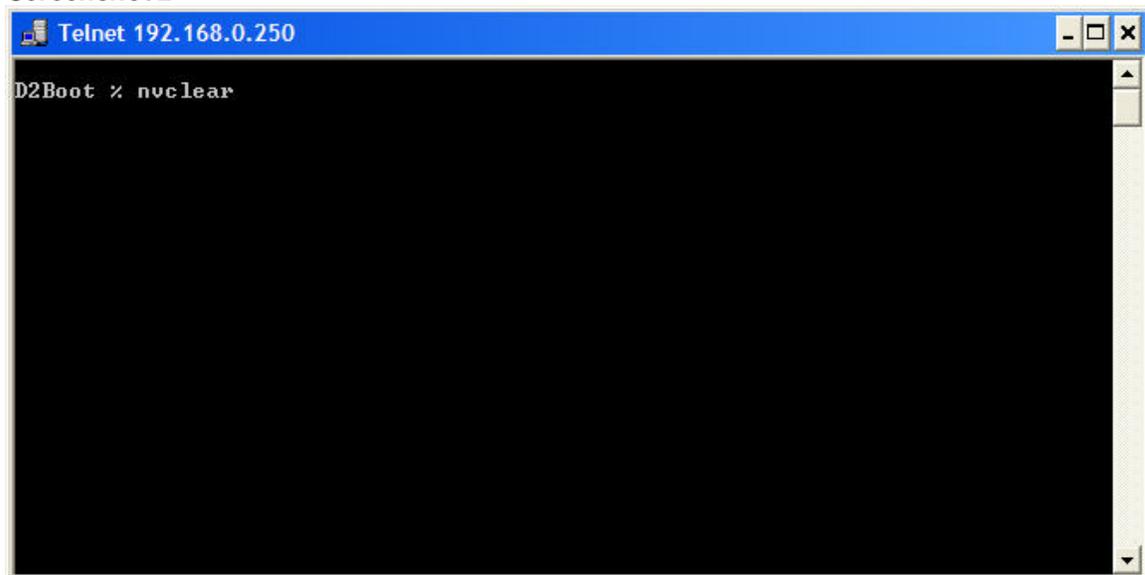
- Press *Power, Search, and Stow Buttons* at the same time on the front of D3 Controller until all LEDs on Front Panel Illuminate. This is known as Boot Mode.
- Open Telnet Session (192.168.0.250)

Screenshot 1



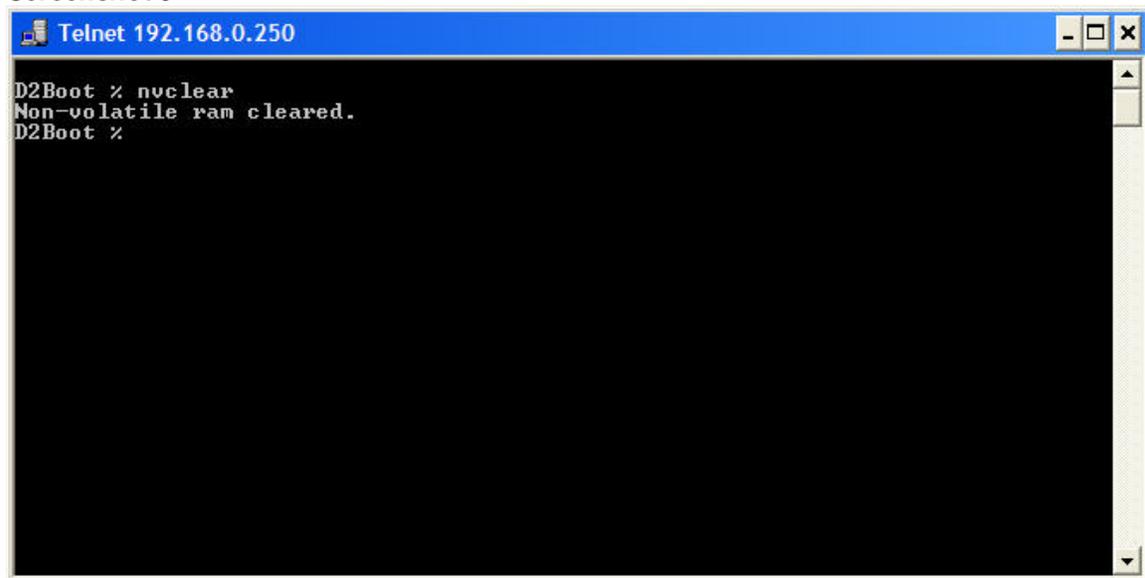
- Type *nvclear* after D2Boot Prompt

Screenshot 2



- This will clear all user configurations to factory default. **Always recommended on new installs.**

Screenshot 3



```
Telnet 192.168.0.250
D2Boot % nuclear
Non-volatile ram cleared.
D2Boot %
```

- Turn off power to the D3 Controller, and then re-apply power. The Green LED Power indicator to the Left of the Power Button will illuminate.
- Open Web Browser i.e. Internet Explorer to access the D3 HTML Status Page.
- The D3 default page address after an NVClear is always 192.168.0.250, enter this address into the Browser. The following page should appear if the PC and Router are configured properly.

Screenshot 4

SENSORS		SATELLITE	
Dish Elevation	0	Target Elevation	109.8386
Dish Azimuth	0.1004464	Target Skew	65.62312
Dish Skew	-94.87214	Satellite Longitude	89W
GPS Longitude	111.9644W	Sat Elevation	37.33864
GPS Latitude	40.72924N	Sat True Azimuth	146.9992
Motor Current	0	Sat Polarization	-24.37689

- In the Blue Field on the left side of this page under *Standard Functions* click on **Configuration**. This will send you to the D3 Configuration Page.

The Screen below only shows the top part of the Configuration Screen. This is the area we are going to set the communications between the D3, Router or Switch, and Modem.

It is important that these are configured properly or the system will not work.

- For more information on how to set the (**Network Configurations**), Local Address, Subnet Mask, Modem Gateway, Router Gateway, DNS Address, and Startup Delay go to **D3 Configuration Definitions** in this Manual
- After setting the Network Configurations click on the Update Settings Button to the right of the Screen to save these values.
 - Note: If the Local Address is changed then the D3 will reset this page, and you will now need to open the Browser using the new Local Address i.e. 192.168.1.250. Then re-enter the configuration page to complete the D3 Configuration.

Screenshot 5

The screenshot displays the MotoSAT D3 Configuration Settings web interface. At the top, there are logos for MotoSAT (MOBILE SATELLITE SYSTEMS), a satellite dish, and DATASTORM D3. The interface is divided into two main sections: Standard Functions and Advanced Functions, both with blue backgrounds and white text. The Standard Functions section includes links for System Status, Configuration, About, and Modem Status. The Advanced Functions section includes links for Manual Motor Control, Calibrate Dish, and Upgrade Firmware. The main content area is titled 'CONFIGURATION SETTINGS' and contains several input fields and a dropdown menu. The fields are: Local Address (192.168.1.250), Subnet Mask (255.255.255.0), Modem Gateway (192.168.0.1), Router Gateway (192.168.1.1), DNS Address (66.82.4.12), and Startup Delay (0 Seconds). The Advanced Functions section includes: Satellite System (HughesNet dropdown), Satellite Longitude (89W), Frequency (1410 MHz), RX Polarization (Vertical dropdown), and TX Polarization (Horizontal dropdown). An 'Update Settings' button is located to the right of the Local Address field. At the bottom, a copyright notice reads: Copyright © 2001- 2006 MotoSAT. All rights reserved.

- Satellite System, Satellite Longitude, Frequency, RX Polarization, and TX Polarization must be set for the D3 to operate properly. Get these settings from your VAR or ISP provider.

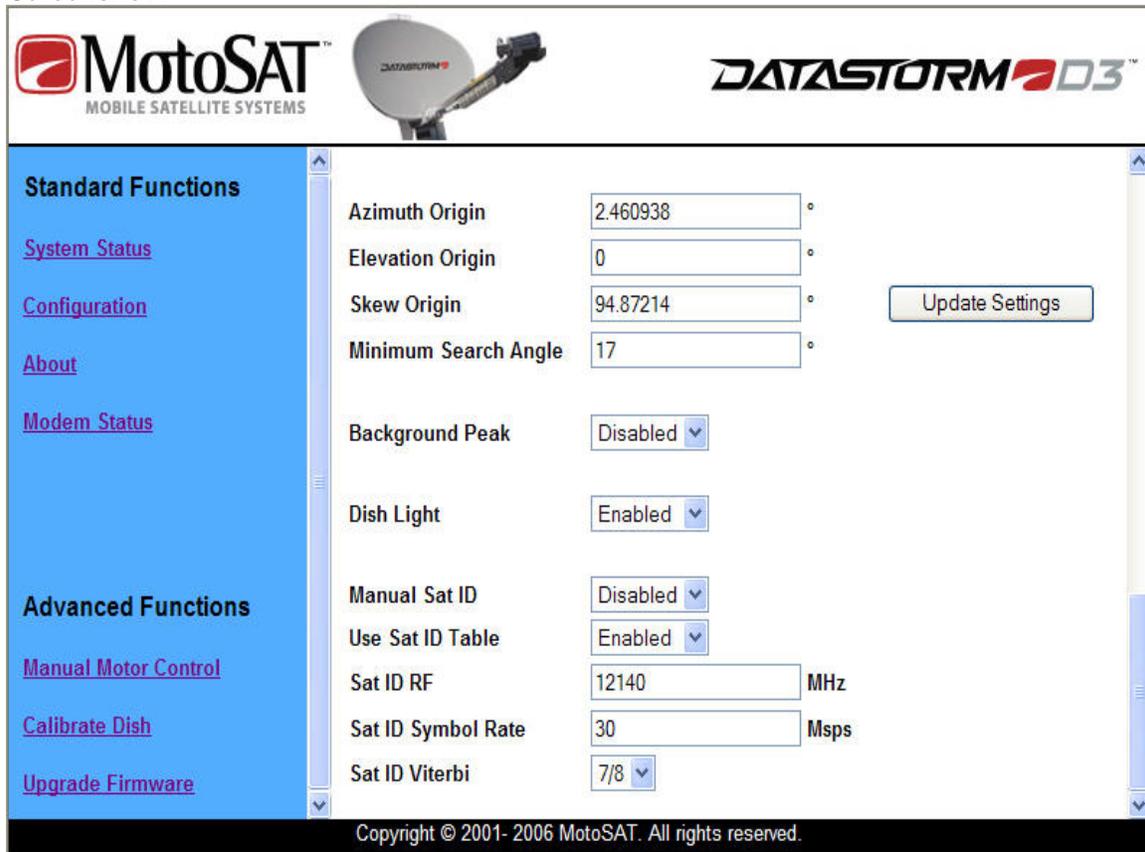
- The Satellite System has several options currently available. Use the light blue down arrow to select the correct system type.
- Once these 5 settings are input, click on the Update Settings Button to the right of the Screen to save these values.
- *Symbol Rate* (below) currently is only used in HughesNet mode. This value is typically set to 30, but it is important to confirm this value with your ISP.
- *LO Frequency* (below) is typically set to 10750 MHz. Most Continental US Satellites use this LO in their LNB's. Only change this value if the LNB LO Frequency is different.
- For all other configuration settings go to **D3 Configuration Definitions** in this Manual for additional information.

Screenshot 6

The screenshot displays the MotoSAT web interface. At the top, there are logos for MotoSAT (MOBILE SATELLITE SYSTEMS) and DATASTORM D3, along with an image of a satellite dish. The main content area is divided into two sections: Standard Functions and Advanced Functions. The Standard Functions section includes settings for Symbol Rate (30 Msp), LO Frequency (10750 MHz), 22KHz Tone (Disabled), Signal Trigger (9), Isolation Optimization (Medium), Transmitter Offset (0), and Use Last Known Position (Disabled). The Advanced Functions section includes settings for Azimuth Search Window (10), Elevation Search Window (10), Motion Stow (Disabled), Manual Location (Enabled), Latitude (40.72924N), and Longitude (111.9644W). An 'Update Settings' button is located to the right of the Standard Functions section. A copyright notice at the bottom reads: Copyright © 2001- 2006 MotoSAT. All rights reserved.

Section	Setting	Value	Unit
Standard Functions	Symbol Rate	30	Msp
	LO Frequency	10750	MHz
	22KHz Tone	Disabled	
	Signal Trigger	9	
	Isolation Optimization	Medium	
	Transmitter Offset	0	°
	Use Last Known Position	Disabled	
Advanced Functions	Azimuth Search Window	10	°
	Elevation Search Window	10	°
	Motion Stow	Disabled	
	Manual Location	Enabled	
	Latitude	40.72924N	°
	Longitude	111.9644W	°

Screenshot 7



MotoSAT™
MOBILE SATELLITE SYSTEMS

DATASTORM D3™

Standard Functions

- [System Status](#)
- [Configuration](#)
- [About](#)
- [Modem Status](#)

Advanced Functions

- [Manual Motor Control](#)
- [Calibrate Dish](#)
- [Upgrade Firmware](#)

Azimuth Origin: 2.460938 °

Elevation Origin: 0 °

Skew Origin: 94.87214 °

Minimum Search Angle: 17 °

Background Peak: Disabled

Dish Light: Enabled

Manual Sat ID: Disabled

Use Sat ID Table: Enabled

Sat ID RF: 12140 MHz

Sat ID Symbol Rate: 30 Msps

Sat ID Viterbi: 7/8

Update Settings

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D3 Configuration Definitions

This document describes the function and typical use of each configuration item. See Screenshots 5, 6, and 7 for visual details.

Config Name (Default)

Local Address (192.168.0.250)

The Local Address is the internal Ethernet Address of the D3 Controller. This address is set at 192.168.0.250 from the factory but can be changed based on the customer network requirements.

Subnet Mask (255.255.255.0)

Default to 255.255.255.0, see your IT manager if changes to this value are necessary.

Modem Gateway (192.168.0.1)

This value is set to the modem address. See manuals or white papers for more information.

Router Gateway (192.168.0.1)

This value is set to the Router address. If a LAN switch is used then setting this to the modem address is typical. See manuals or white papers for more information.

DNS Address (192.168.0.1)

This value is set to the modem address. See manuals or white papers for more information.

Startup Delay (0)

Startup Delay sets a time delay from D3 Power On to active LAN connection. This time period is displayed in seconds (0 to 999). This time delay is used to allow the Router and or Modem time to configure properly and communicate after AC power has been applied to these devices. The D3 will attempt to communicate with the modem after the delay time has expired.

Example; a Linksys router typically requires 20 seconds before it has set DHCP and accessed the WAN port before it is ready. So setting the Startup Delay to 30 seconds should resolve this for the D3 to see the modem. Network Switches do not require a delay.

Satellite System (Generic)

Satellite System sets Modem or ISP type. Setting this value for the proper modem type will allow the D3 to integrate at different levels with specific modems.

Currently the D3 integrates closely with the HughesNet and iDirect Modems allowing the D3 to confirm correct Satellite Identification, Signal Quality level, set TX ranging values, etc. The D3 may soon integrate with other Modem suppliers.

Other Modems currently displayed in the Satellite System drop down box are; UnaSAT, Aloha, and Generic. These currently function in Generic mode.

Important Note: It is extremely important that when using HughesNet mode that many of the following configurations are set correctly. Just being close will not work.

Satellite Longitude (89W)

Satellite Longitude is a numerical value that sets the Target Satellite Location. I.E. 89W

If inputting a Satellite Longitude in the western hemisphere then you would place a W after the numerical longitude value. It is not necessary to add the W as the western hemisphere is set to default.

If inputting a Satellite Longitude in the eastern hemisphere then you would place a E after the numerical longitude value.

IF Frequency (1430)

HughesNet Required! This value is set from 950 to 1450 MHz. Check with the Hughes configurations to insure accuracy.

For all other Modems including Generic this value is not necessary.

RX Polarization (V)

This is a critical setting. For the D3 to set the Satellite System properly for correct modem operation the Receive Polarization must be correct.

TX Polarization (H)

HughesNet Required! Sets the TX Polarization value for Hughes. Not required for all other systems. Check with the Hughes configurations to insure accuracy.

Note: When using the DataStorm F1 Mount TX Polarization must be Horizontal Only! When using F2, F3, XF2, and XF3 mounts the TX Polarization must be set to the opposite field of the RX Polarization.

Symbol Rate (30)

HughesNet Required! The symbol rate is enter in Msps (Mega Symbols per Second). Again this value is only needed in HughesNet mode.

Example; 30,000,000 symbols per second is entered as 30 Msps.

LO Frequency (10750)

LO Frequency is used in the LNB to mix with the incoming RF signal to produce a IF Frequency in the 950 to 2150 MHz range. Check with the Modem supplier to see what IF Frequency is needed for your specific application.

The Default LO Frequency is 10750 MHz. This value is usually set between 9750 to 11300 MHz. It is extremely important this value is set correctly for proper D3 operation.

22Khz Tone (Disabled)

The *22Khz Tone* can be used to switch the LO Oscillator from one frequency to another. Some Modems may require 22Khz tone for other reasons. Check with your Modem Hardware supplier or ISP to see if 22Khz tone is necessary for your application.

Signal Trigger (9)

Signal Trigger is a numerical value that represents a change of Signal Strength Level during a small time period. When this value is triggered the D3 will initial a Signal Identification Peak.

The Signal Trigger Value is set to Default 9. It can be adjusted from 0 to 40. The lower this value can be set the wider view of the sky for a quicker search. If this value is set too low the D3 will begin to stop on false targets such as trees, lights, and buildings. The higher this value is set the narrower the sky view search angle.

Isolation Optimization (Medium)

Isolation Optimization is used to set Cross Polarization (CrossPol) of the antenna Transmitter to an acceptable Isolation level.

Low

When set to *Low* the skew CrossPol value is determined by calculating the proper skew rotation of the RF Assembly using GPS. If Skew has ever been set to Medium or High mode for initial CrossPol to Optimize the

Isolation then setting Isolation Optimization to low should offer a minimal acceptable isolation for TX use.

Medium

When set to *Medium*, CrossPol is initially set similar to the *Low* setting. After the D3 completes Signal Peak it will begin a Hughes ACP if in HughesNet mode. If in any other Satellite System mode the D3 will begin a MotoSAT passive CrossPol to optimize the RX polarization. This CrossPol typically set TX Isolation also.

High

When set to *High*, initializes like *Medium*. When in HughesNet mode the ACP routine will maximize Hughes Isolation to maximum value.

Transmitter Offset (0)

Transmitter Offset works in conjunction with *Isolation Optimization*. When Isolation Optimization is set to Medium or High. Once the D3 has finalized ACP, test the CrossPol with the NOC and adjust Skew as necessary. Note the difference of Skew change and put this value into the Transmitter Offset box. (Value in +/-degrees)

Important: This feature does not work in Hughes Net Mode.

Use Last Known Position (Disabled)

Disabled (Default)

When *Use Last Known Position* is disabled the D3 reads the current location values (Latitude and Longitude) from the GPS and begins a new search from this location when “Search” has been initiated.

Enabled

When Enabled the D3 Controller will return the Dish to the last known location a “Search” has been initiated.

If the Target Satellite is not found then the Dish will begin a normal search routine.

Azimuth Search Window (10)

The *Azimuth Search Window* is the horizontal search area of the Mount after a Reference Satellite has been located. The D3 will determine the calculated relative location of the Target Satellite from the Reference Satellite Location. The D3 Controller will begin a search for the Target Satellite from the low side of the *Azimuth Search Window* and continue to move the Dish Azimuth higher from this location until it reaches the end of the *Azimuth Search Window*. Elevation will then move either up or down and then Azimuth will return to the other end of the window. This will continue until the Target Satellite has been found or the entire search window has been searched. A value of 10 in this window will allow the azimuth to search 5 degrees above and below the calculated Target location.

The Default value for *Azimuth Search Window* is 10. This value can be narrowed if the vehicle is always very level, but not recommended. If the Mount/Dish is placed on a Skid or Pallet and the ground is not level increasing this value may be necessary.

Elevation Search Window (10)

The *Elevation Search Window* is the vertical search area of the Mount after a Reference Satellite has been located. The D3 will determine the calculated relative location of the Target Satellite from the Reference Satellite Location. The D3 Controller will begin a search for the Target Satellite in the middle of the *Elevation Search Window* and continue to move the Dish Elevation higher and lower from this location at the end of every Azimuth pass until the total Value set in this window has been searched. I.E. a value of 10 in this window will allow the elevation to search 5 degrees above and below the calculated Target location.

The Default value for *Elevation Search Window* is 10. This value can be narrowed if the vehicle is always very level, but not recommended. If the Mount/Dish is placed on a Skid or Pallet and the ground is not level increasing this value may be necessary.

Motion Stow (Disabled)

Motion Stow is initiated when the Tilt (accelerometer) Sensors detect motion other than mild rocking caused by wind. The D3 Controller **must** be on for Motion Stow to work.

NOTE: It is important to know that some vehicles may disable the AC power when the ignition has been turned on. If the DC Power Supply that runs the D3 is on this AC Power circuit then Motion Stow can not work.

Manual Location (Disabled)

Disabled

When *Manual Location* is disabled the D3 reads the Location values (Latitude and Longitude) from the GPS module installed on the Mount/UCB.

NOTE: If a *Search* has been initiated and it has been 3 minutes with GPS not acquiring valid latitude and longitude, the D3 will use the current values displayed in *Latitude* and *Longitude* and begin a search for the target satellite. These values may be from a previous location and not valid for Skew and Ranging information in some modems.

Enabled

When Enabled the D3 Controller will use the current Latitude and Longitude values located in the Latitude and Longitude fields.

Latitude

Latitude values can be entered manually if GPS is not able to deliver valid data to this field. But even if *Manual Location* has been *Enabled* once GPS can deliver a valid Latitude it will overwrite the current value in this field.

Longitude

Longitude values can be entered manually if GPS is not able to deliver valid data to this field. But even if *Manual Location* has been *Enabled* once GPS can deliver a valid Longitude it will overwrite the current value in this field.

Azimuth Origin (2.5)

After a Dish Calibrate the D3 will set Azimuth Origin on an F1 to 0 (zero) degrees. On an F2, F3 and XF mounts this value is set for about 2.5 degrees.

The primary reason for Azimuth Origin on the F2 and F3 is to allow the dealer to set the mechanical Azimuth Stow location to a true physical Azimuth Zero position relative to the mounting plate. Even though this

adjustment is not necessary on most F2 and F3 mounts some dealers like the ability to set this stow zero position.

The XF mounts actually have both Electronic Azimuth Zero sensors and mechanical Azimuth Stall position. The XF Electronic Zero position is very close to where mechanical stowed zero location is on the mounting plate. The XF allows the Dish to search and peak at Electronic zero because the mechanical stall is -2.5 degrees lower. It is not necessary to make any adjustments to this setting on the XF mounts.

Elevation Origin (3)

After a Dish Calibrate the D3 will set Elevation Origin to approximately 3 degrees.

What this means is when the motor counts reach zero the F1, F2, or F3 have seen a mechanical stall in the Stowed position. From this stalled position the mount is about 3 degrees higher than a level (horizontal) stow.

After a Search and Peak on the Target Satellite this value may change +/- several degrees. This automatic adjustment will now set the true horizontal stow value of the mount. This now means that when a search elevation value is determined by the D3, the D3 will move very close to the correct value to find the Target Satellite on the first search pass.

It is recommended that this value not be adjusted after a successful Target Satellite Search and Peak.

Skew Origin (0) F1 (-96) F2/3 XF2/3

This value is different on all mounts. On the F1 it is approximately 468 Counts for Zero degrees Skew after a Dish Calibrate is performed. On an F2 or F3 mount 0 Counts is approximately -96 degrees after a Dish Calibrate is performed.

However once a Dish has found and peaked the Target Satellite and the Ready Light has illuminated this value will be corrected automatically after ACP has completed. (ACP must be in Medium or High Mode.)

It is recommended that this value not be adjusted if ACP Isolation was performed in Medium or High mode.

Minimum Search Angle (17)

This is the lowest Satellite Look Angle allowed by the D3 Controller when in search mode. From the factory the D3 is set with an angle of 17

degrees. Seventeen degrees on the F1 and F3 mounts allows the Dish to rotate 360+ degrees in azimuth without the LNB Arm Assembly hitting objects on the roof of the vehicle.

Once the Dish has been mounted on the roof or platform this value can be lowered as necessary as long as full Azimuth Rotation will not cause the LNB to hit objects in this rotation. Typically 17 degrees will work for most of US and Southern Canada.

Background Peak (Disabled)

Disabled

When disabled the dish remains pointed in a fixed position. Any movement caused by wind or vehicle repositioning is ignored.

Enabled

When Enabled the D3 Controller will monitor DVB Signals and/or Modem Signal Data to try to maintain a peak at the Target Satellite. This will usually mean fine adjustments of Azimuth and Elevation to the Dish.

Note: This is NOT an “Inmotion” routine and may not keep up positioning in a real time situation. There may be some signal degradation if movement of the Dish is too rapid.

Dish Light (Enabled)

Enabled

Under normal use when the *Dish Light* is *Enabled* the DataStorm Dish will have a glowing Blue reflection off of the Dish surface when the dish is deployed. When the Dish is stowed this light will be off.

Disabled

If the user chooses to have this light off all the time simply disable this feature.

Manual Sat ID (Disabled)

Disabled

If the D3 Satellite ID Table is current (valid) and the Target Satellite (Satellite Longitude) is valid in this table then *Manual Sat ID* should be **Disabled**.

Enabled

If there is not a Valid Target Satellite in the current D3 Sat ID Table this feature can be enabled. When *Enabled* the user must input valid data in the Sat ID RF, Sat ID Symbol Rate, and the Sat ID Viterbi.

Another condition where *Manual Sat ID* would be *Enabled* could happen if a Reference Satellite recently had changes where it would ID the same as the Target Satellite. Under this condition the user would need to change the Target Satellite *Manual Sat ID* values.

Use Sat ID Table (Enabled)

The D3 has an internal Satellite ID Table which covers most of the Ku Band Satellites around the world. This table is updated by firmware periodically. The D3 uses this table to ID any reference satellite in the sky that is within approximately +/- 45 degrees of the “Satellite Longitude”, Target Satellite or Target Longitude. Once a reference Satellite within this range has been ID’ed the D3 will calculate the correct azimuth distance to the Target Satellite.

Terms; *Reference Satellite* is any satellite that can be used to determine the correct location of the Target Satellite.

Target Satellite is the Satellite that the D3 has been configured to search and Peak. This is selected by inputting a valid Satellite Longitude in Configuration. Target Satellite, Target Longitude, and Satellite Longitude are synonymous in this document.

Enabled

If the D3 Satellite ID Table is current (valid) the “Use Sat ID Table” should be **Enabled**. A current Satellite ID Table allows the D3 to perform faster searches.

Disabled

If it has been a year or more since the last use of the D3 it is possible that there will be several or many errors in the Satellite

Table. The more errors in this table the more likely the search time for the Target Satellite will increase. It is also possible that a Reference Satellite may now have the same ID information as the Target Satellite. Under these conditions a user may want to Disable the “*Use Sat ID Table*” and Enable the “*Manual Sat ID*” to be able to find the Target Satellite to download a current Firmware Upgrade with a current Satellite ID Table.

Sat ID RF

This value is displayed in Megahertz (MHz) (million cycles per second). This value must be input correctly when Manual Sat ID is “*Enabled*”. The Ku Band RF Receive Frequency range is from 10650 to 12950 MHz. Example; 12,140,000,000 Hertz (cycles per second) would be entered As 12140 MHz

Sat ID Symbol Rate

This value is displayed in Mega symbols per second. This value must be input correctly when Manual Sat ID is “*Enabled*”. The D3 controller can read values from 2 to 45 Msps. Examples; *26, 015,000 symbols per second must be entered as 26.015 Msps, or 10,000,000 symbols per second can be entered as 10.*

Sat ID Viterbi

Viterbi or FEC are used to describe the Error Correction Ratio. This ratio must be input correctly when Manual Sat ID is “*Enabled*”. This value can be from 1/2, 2/3, 3/4, 5/6, or 7/8