DataStorm D3 User Guide

v.1 MotoSAT

LM-100405

Read Me

10/07/2005: **Note that the DataStorm Administrator will NOT WORK with the current release of DataStorm D3 code [v3.7.8]**

10/07/2005: **Please refer to the D3 Changelog notes for more information on current known issues.**

Table of Contents

Welcome to the DataStorm D3 Controller

The DataStorm D Series is once again refining mobile automatic pointing while setting the standard in configuration control and reliability. The DataStorm D3 controller is the 3rd generation of D series controller that adds to the legacy of pinpoint accurate automatic find-and-peak system control. A new standard DVB [Digital Video Broadcast] tuner makes possible the means to find any satellite, anywhere on planet earth. A new method of searching for the satellite called Sweep-and-Search not only drastically reduces the time-to-online, it truly utilizes the full potential of the DataStorm's capabilities. The DataStorm D3 is also 33% less deep enabling it to be placed into space critical situations while preserving functionality by placing the power switch on the front panel. The D3 will also be the first D series controller to run the new DataStorm XF series mount system. The new XF series utilizes a ground-up redesign on motor, gears, counting, and robustness. Come discover how MotoSAT is changing the way you'll communicate.
Welcome to the new MotoSAT.

DataStorm D3 Specifications

Everything you need to know about the size, functionality, design, and system requirements of the DataStorm D3.

SYSTEM REQUIREMENTS
| Web Browser [i.e., Internet Explorer, Netscape, Firefox, Apple Safari, etc.]
| Computer with a networking port [Ethernet, Wireless card, etc.]

DIMENSIONS OF D3
| Length: 7 Inches
| Width: 11 inches
| Height: 2 Inches
| Weight: 2.5 lbs

CABLING
| DVB Tuner [receive RG6 cable in from dish, modem RG6 out to modem]
| RJ-45 Ethernet Port
| Electrical Data Interface Cable [Control Cable]: 9 conductor 18AWG 30'
| DataStorm F Series Mount Power:
    F1: 12v 4amp
    F2, F3: 15v 6.6amp
| DataStorm XF Series Mount Power: 15v 8amp

ENVIRONMENT
| Temperature: Operational from 32°F to 95°F

INTERFACE
| Manual: Three-button, Power, Search, Stow
| Virtual: Web interface commands; telnet commands also available

SOFTWARE
| D3 Software: Embedded firmware
| Maintenance: Via web interface upload

MODEM COMPATIBILITY
| Direct Interface: DiRECWAY, iDiRECT
| Non-Direct [Using true DVB]: Any Satellite modem

Power — Search — Stow

Power Supply Cable —
Control Cable —

RX In from Satellite
RX Out to Modem
Ethernet Port

DataStorm D3 Hardware Definitions

These definitions are basic descriptions of the DataStorm D3's hardware interfaces and functions.

| DataStorm D3 Front Panel Definitions |

Power ———   Search———   ——— Stow

Power On/Off Button
This button turns the D3 on and off. Also if the unit is powered on and somehow loses power, the D3 will remember the power state and when powered is restored, the D3 will automatically boot back up. In the future, this button will also provide the intelligent functionality to be able to know when it should or shouldn't turn off. For example, if the dish is in transition of searching for the satellite and the power button gets bumped, the D3 will recognize this and not sever power. Look for this and other intuitive functions from MotoSAT in the future.

Search
This button is one way to tell the DataStorm dish to find satellite. When pushed the DataStorm will check it's settings for the satellite it's assigned to then raise and proceed.
Note: If an NVCLEAR has been performed or the searching routine is the first for the D3, the dish must perform a stow [the dish will raise elevation, skew both directions, then stow back down] before it will perform an actual search.

Stow
This button tells the DataStorm to return to travel position [stow] from wherever it's currently located [excepted if it's already stowed and the stow light is solid].
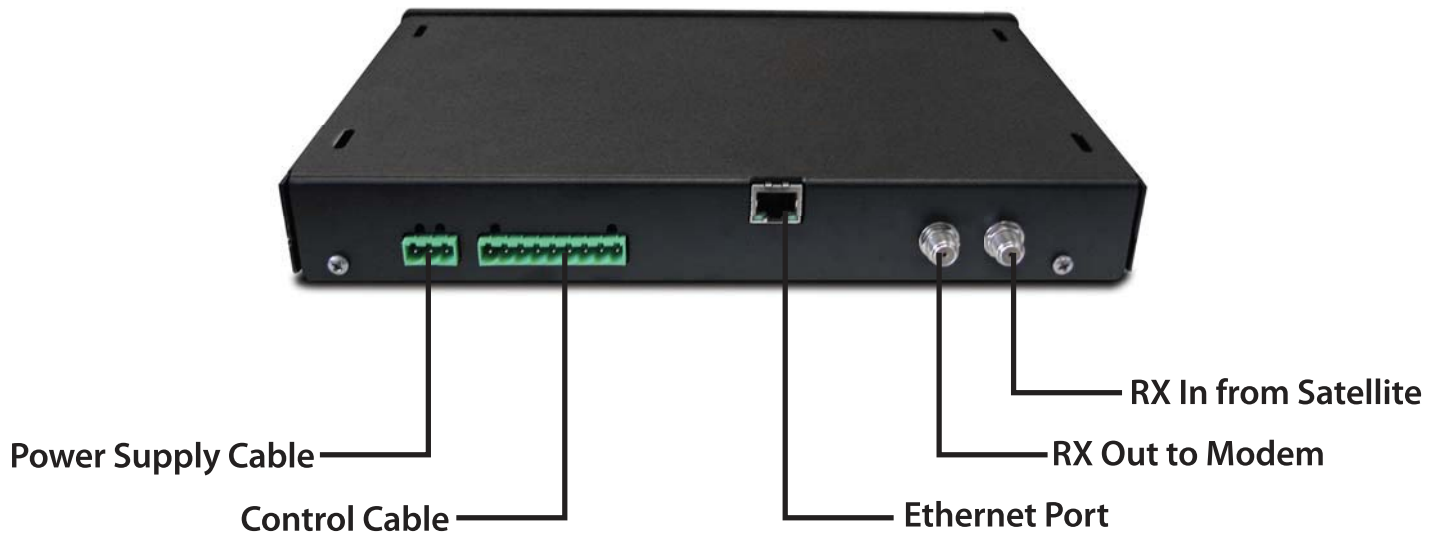Note: The D3's stow light is the best indicator of whether or not the D3 is actually stowed.

Note: Normal operation for finding the satellite will be indicated by the LNB, LAN, GPS, and Stow lights to all be lit and solid. Refer to the DataStorm D3 Light Definitions for more information on light functioning.

DataStorm D3 Hardware Definitions Cont.

These definitions are basic descriptions of the DataStorm D3's hardware interfaces and functions.

| DataStorm D3 Back Panel Definitions |

RX In from Satellite

RX Out to Modem

Power Supply Cable

Control Cable

Ethernet Port

| Power Supply Cable
The power source for DataStorm systems.
Only use approved MotoSAT power supplies.
DataStorm F Series
| DataStorm F1 Mount = 12v 4amp power supply
| DataStorm F2 Mount= 15v 6.6amp power supply
| DataStorm F3 Mount= 15v 6.6amp power supply
DataStorm XF Series
| DataStorm XF Mount = 15v 8amp power supply

| Control Cable
The communication lifeline mount and the D3 controller. This 9-wire colored coded pinout controls such things as GPS communication, power to the dish, and more.

| Ethernet Port
The communication center of the D3. This standard network connection enables the D3 to be placed in a computer network. Wired or wireless devices can access and control the D3 through this port.

| RX Out to Modem
Enables the D3 to control the signal strength via its DVB. It then can relinquish control to the modem when the correct satellite is found via this coaxial port.

| RX In from Satellite
Where the coaxial connection comes from the dish into the D3. This port is part of the DVB tuner that the D3 uses to find satellites. It will then relinquish control to the modem when the correct satellite is found.

DataStorm D2 Light Definitions

The following are light definitions of the D3's front panel lights. These are general operational definitions.

| DataStorm D3 Light Definitions |

LNB
The LNB light is only active when attached to a modem. The system will not let you 'Search' [find satellite] without the LNB active. [Solid]

LAN
The LAN light is active when a LAN connection is detected. [Solid]

GPS
The GPS light is active when a GPS signal is received from the dish. [This light becomes active usually within 1-3 min. after turning on the D3] [Solid]

READY
The READY light is active during:
| A search routine [blinking]
| When the system has cross-poled and is online [Solid].

BUSY
The BUSY light is technically the light that denotes any kind of activity or communications with the D2. It's functions are listed below:
| During a Upper Control Board update [Blinking]
| During a Search routine [Blinking]
| During a Stow routine [Blinking]
| This light should NEVER be solid
| No changes can be made to the D3 when this is blinking.

STOW
The STOW light is active during:
| A stow routine [blinking]
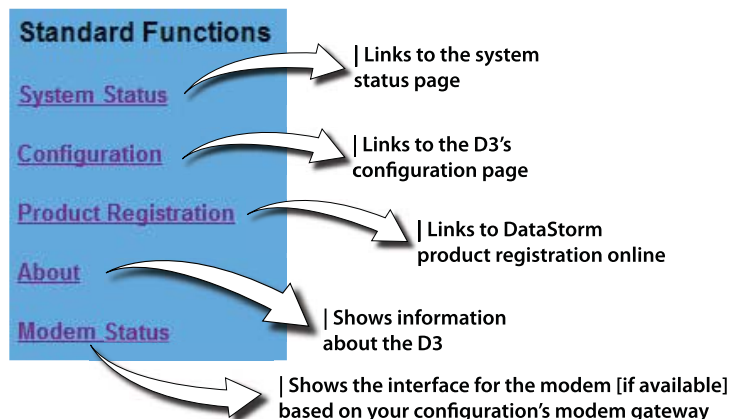| When the system has completely stowed [Solid].

ETHERNET
The Ethernet lights show power and connectivity.
| Green shows power
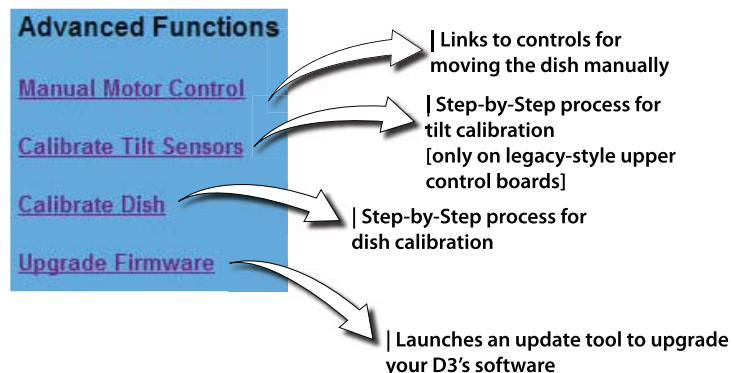| Yellow will blink and show communication

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DataStorm D3 Software Interface

The DataStorm D3's software interface is the heart of the D3 system. All configurations, in-depth sensor information, network addressing and auxillary movement operation, etc. can be found in the DataStorm D3 software interface. The DataStorm D3 software is broken up into two catagories:
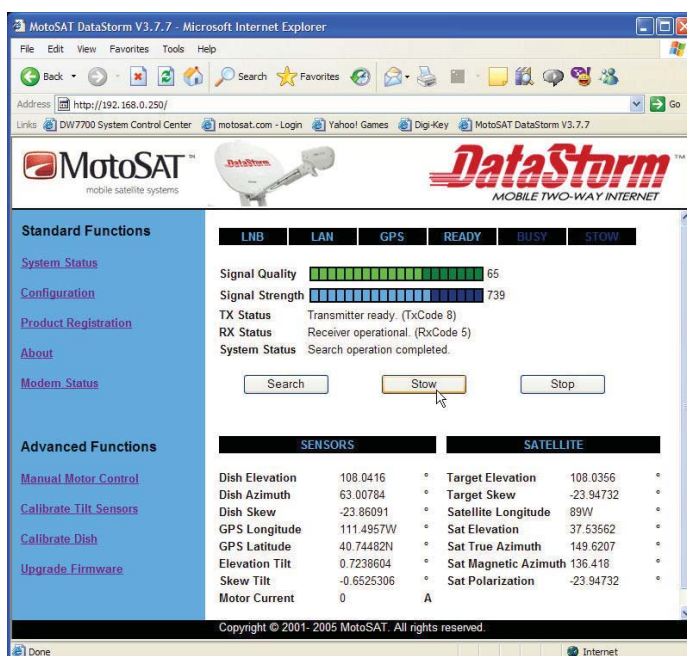
| Standard Functions

| Advanced Functions

Standard Functions

System Status — | Links to the system status page

Configuration — | Links to the D3's configuration page

Product Registration — | Links to DataStorm product registration online

About — | Shows information about the D3

Modem Status — | Shows the interface for the modem [if available] based on your configuration's modem gateway

Advanced Functions

Manual Motor Control — | Links to controls for moving the dish manually

Calibrate Tilt Sensors — | Step-by-Step process for tilt calibration [only on legacy-style upper control boards]

Calibrate Dish — | Step-by-Step process for dish calibration

Upgrade Firmware — | Launches an update tool to upgrade your D3's software

| Standard Functions

DataStorm D3 System Status Page

The DataStorm D3 system status page is the default information display center. Here the options to find satellite and stow the dish are located. System Status messages are also displayed here. Below are general explanations of the information displayed on this page.
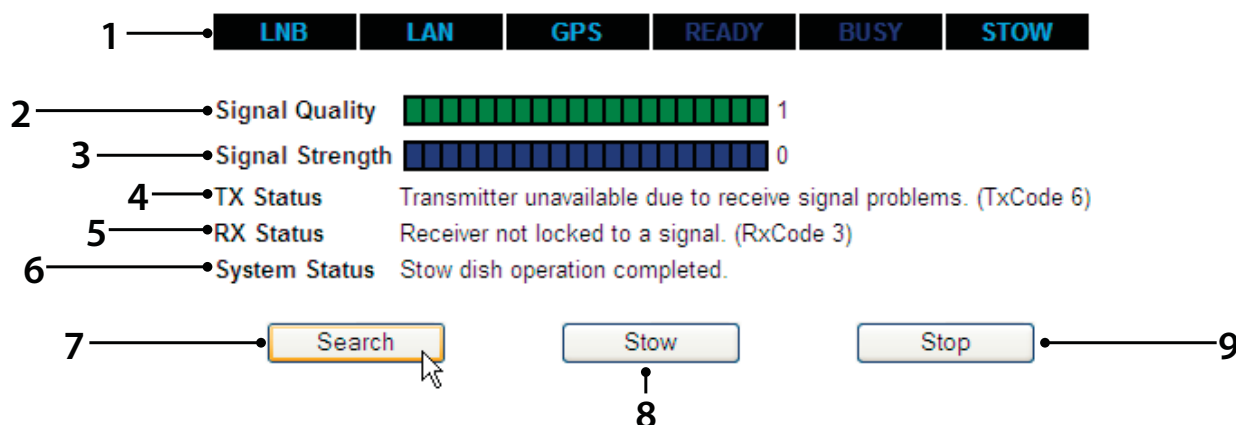
| Standard Functions

DataStorm D2 System Status Page Cont.

The system status page will be broken up into 3 sections: main, sensors, and satellite.

| DataStorm D3 System Status Page: **Main** |

| 1-6 Light Status Buttons
These buttons coincide with the lights on the D3 front panel.

| 2-Signal Quality Bar
Signal quality is attained via the modem. This bar displays that quality value.

| 3-Signal Strength
Signal strength is a function of the D3. This bar displays that strength value.

| 4-TX Status
TX status of the transmitter operation on the dish. Normal operation indicates the transmitter is unavailable until satellite is found.

| 5-RX Status
RX status of the modem. Normal operation indicates the receiver is not locked until satellite is found.

| 6-System Status
System status displays the current status of the D3. Any state the D3 is in will be displayed here as well as error messages.

| 7-Search Button
The search button is used to raise the dish and find satellite during satellite based commissioning or connecting to the Internet.

| 8-Stow Button
The Stow button is used for returning the dish to the travel position when it is in a position other than stowed.

| 9-Stop Button
This buttons stops all current running motor functions of the dish.

| Standard Functions

DataStorm D3 System Status Page Cont.

| DataStorm D3 System Status Page: 6s


```
                    SENSORS
  1 → Dish Elevation      108.0416    °
  2 → Dish Azimuth        63.00784    °
  3 → Dish  Skew          -23.86091   °
  4 → GPS Longitude       111.4957W   °
  5 → GPS Latitude        40.74482N   °
  6 → Elevation Tilt      0.7238604   °
  7 → Skew Tilt           -0.6525306  °
  8 → Motor Current       0           A
```

| 1-Dish Elevation
Displays the actual dish elevation [up/down] in degrees.

| 2-Dish Azimuth
Displays the actual dish azimuth [left/right rotation] in degrees.

| 3-Dish Skew
Displays the actual dish skew [dish face rotation] in degrees.

| 4-GPS Longitude
Displays the GPS longitude from the GPS antenna on the dish. If this value is shown and the GPS status light on the D3 is not lit, The D3 is using the last know GPS value.

| 5-GPS Latitude
Displays the GPS latitude from the GPS antenna on the dish. If this value is shown and the GPS status light on the D3 is not lit, The D3 is using the last know GPS value.

| 6-Elevation Tilt
The actual tilt of the DataStorm mount up and down.

| 7-Skew Tilt
The actual tilt of the DataStorm mount from side to side.

| 8-Motor Current [in AMPs]
Indicates the motor draw in amps when a motor is in use.

| Standard Functions

DataStorm D3 System Status Page Cont.

| DataStorm D3 System Status Page: Sat

1 → Target Elevation	108.0356	°
2 → Target Skew	-23.94732	°
3 → Satellite Longitude	89W	°
4 → Sat Elevation	37.53562	°
5 → Sat True Azimuth	149.6207	°
6 → Sat Magnetic Azimuth	136.418	°
7 → Sat Polarization	-23.94732	°

SATELLITE

| 1-Target Elevation
Displays the predicted dish elevation in degrees of the chosen satellite based on GPS and compass.

Target Azimuth
NOT DISPLAYED BECAUSE THERE IS NO COMPASS. THEREFORE, THERE CANNOT BE A PREDICTED AZIMUTH ANGLE.

| 2-Target Skew
Displays the predicted dish skew in degrees of the chosen satellite based on GPS and compass.

| 3-Satellite Longitude
Displays the orbital slot of the satellite to be found.

| 4-Sat Elevation
Displays the actual elevation of the Satellite you are pointing to based on your current Latitude and Longitude received via GPS.

| 5-Sat True Azimuth
Displays the actual true azimuth of the Satellite you are pointing to based on your current Latitude and Longitude received via GPS.

| 6-Sat Magnetic Azimuth
Displays the actual magnetic azimuth of the Satellite you are pointing to based on your current Latitude and Longitude received via GPS.
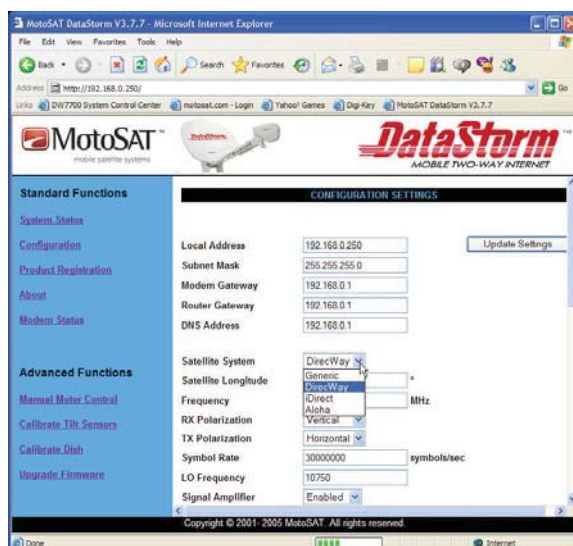
| 7-Sat Polarization
Displays the actual polarization [skew] of the Satellite you are pointing to based on your current Latitude and Longitude received via GPS.

| Standard Functions

DataStorm D3 Configuration Page

The DataStorm D3's configuration page is where changes can be made for finding the satellite, setting up the D3 on a network, and setting other configurations. Below are general explanations of the information displayed on this page.
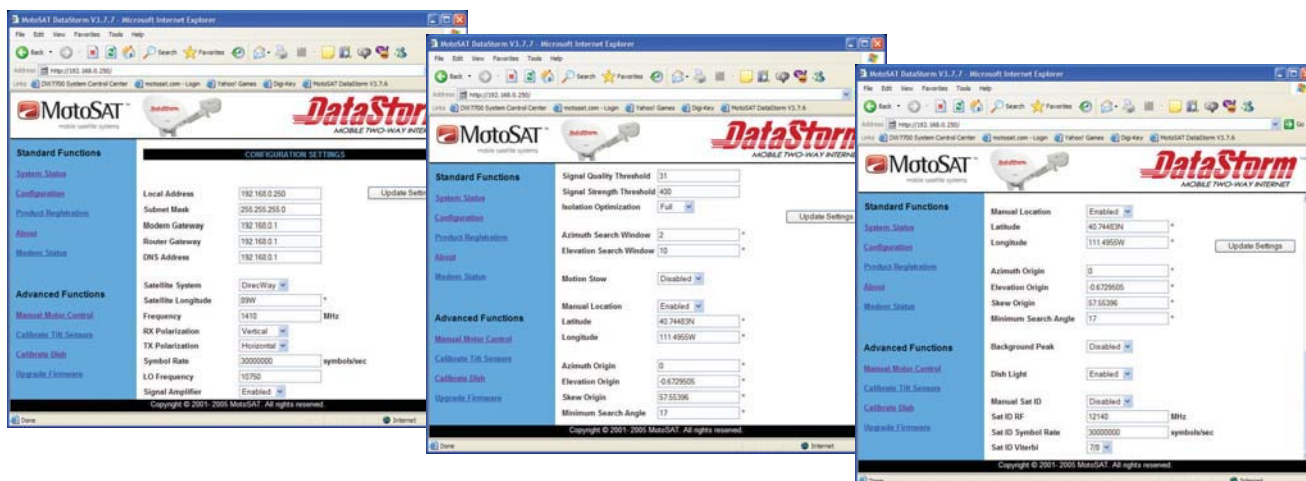

| Standard Functions

DataStorm D3 Configuration Pages Cont.

The D3's configuration page will be broken up into: Main 1, Main 2, Main 3

| DataStorm D3 Configuration Page: Main 1 2 3

| Standard Functions

DataStorm D3 Configuration Pages Cont.

| DataStorm D3 Configuration Page: Main1 |

1	Local Address	192.168.0.250
2	Subnet Mask	255.255.255.0
3	Modem Gateway	192.168.0.1
4	Router Gateway	192.168.0.1
5	DNS Address	192.168.0.1
6	Satellite System	DirecWay
7	Satellite Longitude	89W °
8	Frequency	1410 MHz
9	RX Polarization	Vertical
10	TX Polarization	Horizontal
11	Symbol Rate	30000000 symbols/sec
12	LO Frequency	10750
13	Signal Amplifier	Enabled

Update Settings

| Update Settings
To have the D3 accept any changes you must click the 'Update Settings' button to store the new configuration.

| **1-Local Address**
The IP address of the D3.
[Default is: 192.168.0.250]

| **2-Subnet Mask**
The subnet mask of the D3.

| **3-Modem Gateway**
The IP address of the Modem.

| **4-Router Gateway**
LAN IP address of the router. If the D3 is placed behind a router in the network.

| **5-DNS Address**
The IP address of the modem.

| **6-Satellite System**
Choose which satellite platform you are using; i.e. Generic , DiRECWAY, iDirect, etc.

| **7-Satellite Longitude**
This value indicates the satellite you are searching for in degrees.

| **8-Frequency**
The assigned transponder frequency on your assigned satellite.

| **9-RX Polarization**
Based on your assigned transponder it can be vertical or horizontal.

| **10-TX Polarization**
Based on your assigned transponder it can be vertical or horizontal.

| **11-Symbol Rate**
Usually can be left at default but refer to your satellite platforms documentation.

| **12-LO Frequency**
Spec from the mount's LNB; default is 10750 and should be changed by calling tech support.

| **13-Signal Amplifier**
Default is enabled. Should only be changed by calling tech support.

| Standard Functions

DataStorm D3 Configuration Pages Cont.

| DataStorm D3 Configuration Page: Main 2 |

14	Signal Quality Threshold	31
15	Signal Strength Threshold	400
16	Isolation Optimization	Full
17	Azimuth Search Window	2 °
18	Elevation Search Window	10 °
19	Motion Stow	Disabled
20	Manual Location	Enabled
21	Latitude	40.74483N °
22	Longitude	111.4955W °
23	Azimuth Origin	0 °
24	Elevation Origin	-0.6729505 °
25	Skew Origin	57.55396 °
26	Minimum Search Angle	17 °

Update Settings

| Update Settings
To have the D3 accept any changes you must click the 'Update Settings' button to store the new configuration.

| 14-Signal Quality Threshold
Sets the minimum signal quality needed to peak on a satellite.

| 15-Signal Strength Threshold
Sets the minimum signal strength needed to peak on a satellite. Set Signal Strength Threshold to a value as low as possible that does not constantly start and stop azimuth movement. To set this value, run a test dish and take note of the lowest signal strength reading seen and set your threshold for 30 points above that reading. This value is 440 - 480 Typical.

| 16-Isolation Optimization
Has 3 settings:
- **Partial [default]**
  Indicates that the D3 will perform a cross-pol
- **Full**
  Indicates that the D3 will not only perform a cross-pol but ensure it's optimization.
- **None [test purposes only]**
  Indicates the D3 will not perform a cross-pol and just connect.

| 17-Azimuth Search Window
Width in degrees of the actual search pattern window the DataStorm will search in for the satellite. [left and right on a horizontal plane]

| 18-Elevation Search Window
Height in degrees of the actual search pattern window the DataStorm will search in for the satellite. [up and down on a horizontal plane]

| 19-Motion Stow
If signal quality is lost for 30 seconds or more, the dish will automatically stow if enabled.

| 20-Manual Location [GPS]
If enabled the manual GPS coordinates can be placed here overriding the automatic functioning of the DataStorm GPS module.

| 22-Azimuth Origin
The start mark in degrees for azimuth rotation.

| Standard Functions

DataStorm D3 Configuration Pages Cont.

| DataStorm D3 Configuration Page: Maint 2

14	Signal Quality Threshold	31
15	Signal Strength Threshold	400
16	Isolation Optimization	Full
17	Azimuth Search Window	2 °
18	Elevation Search Window	10 °
19	Motion Stow	Disabled
20	Manual Location	Enabled
21	Latitude	40.74483N °
22	Longitude	111.4955W °
23	Azimuth Origin	0 °
24	Elevation Origin	-0.6729505 °
25	Skew Origin	57.55396 °
26	Minimum Search Angle	17 °

Update Settings

| Update Settings
To have the D3 accept any changes you must click the 'Update Settings' button to store the new configuration.

| 24-Elevation Origin
The start mark in degrees for elevation rotation. After a successful peak of a satellite this value is automatically optimized.

| 25-Stow Origin
The start mark in degrees for skew rotation. After a successful peak of a satellite this value is automatically optimized.

| 26-Minimum Search Angle
Sets the minimum elevation search angle for finding satellite. Used in locations where a low look angle via elevation is needed. Also can be used for rotational height protection.

| Standard Functions

DataStorm D3 Configuration Pages Cont.

| DataStorm D3 Configuration Page: Main3 |

27	Background Peak	Disabled
28	Dish Light	Enabled
29	Manual Sat ID	Disabled
30	Sat ID RF	12140	MHz
31	Sat ID Symbol Rate	30000000	symbols/sec
32	Sat ID Viterbi	7/8

Update Settings

| Update Settings
To have the D3 accept any changes you must click the 'Update Settings' button to store the new configuration.

| 27-Background Peak
If enabled, the dish will automatically repeak itself if signal quality drops 5 points.

| 28-Dish Light
Turns on or off the DataStorm blue light.

| 29-32-Future D3 Upgrade Settings
These settings will be used for future upgrades to the D3.

| **Standard Functions**

DataStorm D3 About Page

| DataStorm D3 About Page |

DataStorm (D3)
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TECHNICAL SUPPORT

Phone 800-247-7486
Fax   801-972-5407
Email support@datastorm.com
Web   www.datastorm.com

SYSTEM

1	Version	3.7.7
2	License	Not Licensed
3	Type	DirecWay
4	Gateway	192.168.0.1
5	ESN	3544201

| **1-Version**
Displays the current build of D3 software.

| **2-License**
Displays whether or not the D3 has been registered with MotoSAT. [This process can be done via the Product Registration link: [link]]

| **3-Type**
Displays the current Type mode of the D3. Available types are: Generic, Direcway, and iDirect. [Aloha is not available at this time.]

| **4-Gateway**
Displays the IP address of the Modem from the D3's network configuration.

| **5-ESN**
Displays the ESN number from the modem you are currently using. This is also a good indicator of whether or not the D2 is communicating with the modem.
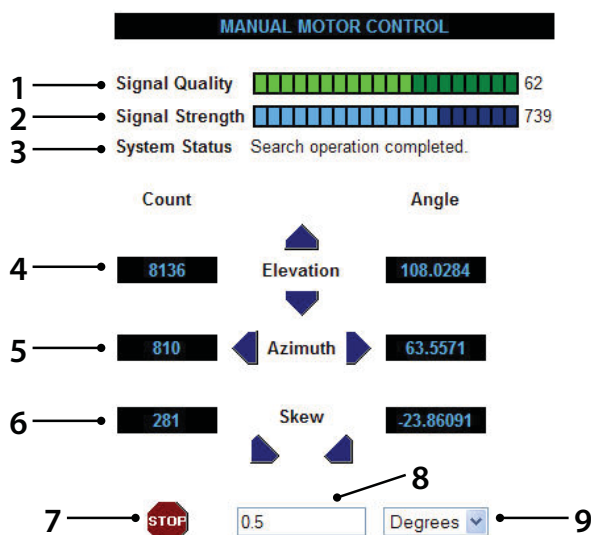
| **General Information**
The rest of the information on this page is contact and copyright information. Any questions regarding this can be sent to the email address shown.

| Advanced Functions

DataStorm D3 Manual Motor Controls

| DataStorm D3 Manual Motor Controls |

| 1-Signal Quality Bar
Signal quality is attained via the modem. This bar displays quality value.

| 2-Signal Strength Bar
Signal strength is a function of the D3. This bar displays strength value.

| 3-System Status
Displays the current state of the D3.

| 4-Elevation Movement
Relates to the up and down motion of the DataStorm dish. Displays both motor counts and actual angle in degrees. The top arrow moves the dish up, the bottom arrow, down based on the number in #7.

| 5-Azimuth Movement
Relates to the left and right motion of the DataStorm dish. Displays both motor counts and actual angle in degrees. The left arrow moves the dish counter-clockwise, the right arrow, clockwise based on the number in #7.

| 6-Skew Movement
Relates to the left and right motion of the dish face [polarization]. Displays both motor counts and actual angle in degrees. The left arrow moves the dish closer to zero, the right arrow, increases based on the number in #7.

| 7-Stop
Stops any current motor movement

| 8-Input Box
Place a value here to move the DataStorm.

| 9-Degrees or Counts
The DataStorm dish can move by motor counts [when a motor's gear makes a revolution], or it can move in degrees.

| Advanced Functions
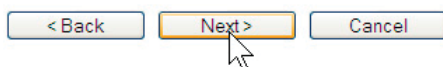
DataStorm D3 Calibrations: Tilt

| DataStorm D3 Calibrations: Tilt |

THE DISH MUST BE STOWED

ONLY USE THIS CALIBRATION IF YOU HAVE A LEGACY STYLE UPPER CONTROL BOARD WHICH IS ATTACHED BETWEEN THE DISH ARMS; THESE HAVE NOT BEEN SHIPPED IN NEW DATASTORM MOUNTS SINCE SEPTEMBER 2004 [F1 ONLY]
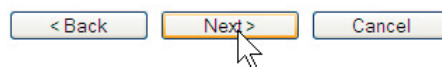
CALIBRATE TILT SENSORS

Incorrectly setting the zero point for the tilt sensors can cause serious problems with the unit's ability to find the satellite. Click next to continue or cancel to quit.

< Back   Next >   Cancel

CALIBRATE TILT SENSORS

Make sure the arm of the dish is level. If not, click cancel to exit the calibration routine, and manually level the arm. Click next when you are ready to measure data....

< Back   Next >   Cancel

| 1-Starting the Tilt Calibration
Because this upper control board version rests between the arms, it needs an initial calibration to memorize it's level point.

| 2-First Compass Reading
With the dish stowed, raise the DataStorm until its arm is level [parallel with the base plate]. When level, click next to take the reading. [Typical level position is up 3° from the stowed position.]

CALIBRATE TILT SENSORS

Tilt sensor calibration is complete. Click finish to return.

< Back   Next >   Finish

| 3-Tilt Calibration Finish
You have completed the tilt calibration. Please note the elevation tilt on the main system status page for tilt readings.

| Advanced Functions

DataStorm D3 Calibrations: Dish

│DataStorm D3 Calibrations: Dish │

CALIBRATE DISH

Before calibrating the dish, make sure that your vehicle is level. Click next to continue or cancel to quit.

[< Back] [Next >] [Cancel]

CALIBRATE DISH

Performing dish calibration... please wait...

Elevation 419
Azimuth   0
Skew   495
Current   0.5414061

[< Back] [Next >] [Cancel]

│1-Starting the Dish Calibration
The dish calibration is done to test the motor functioning of the dish.

│2-Dish Calibration
The entire dish calibration takes about 8-10 min. During this time you can monitor its progress by watching each of the axis' move in motor counts or degrees.

CALIBRATE DISH

Dish calibration is complete. Click finish to return.

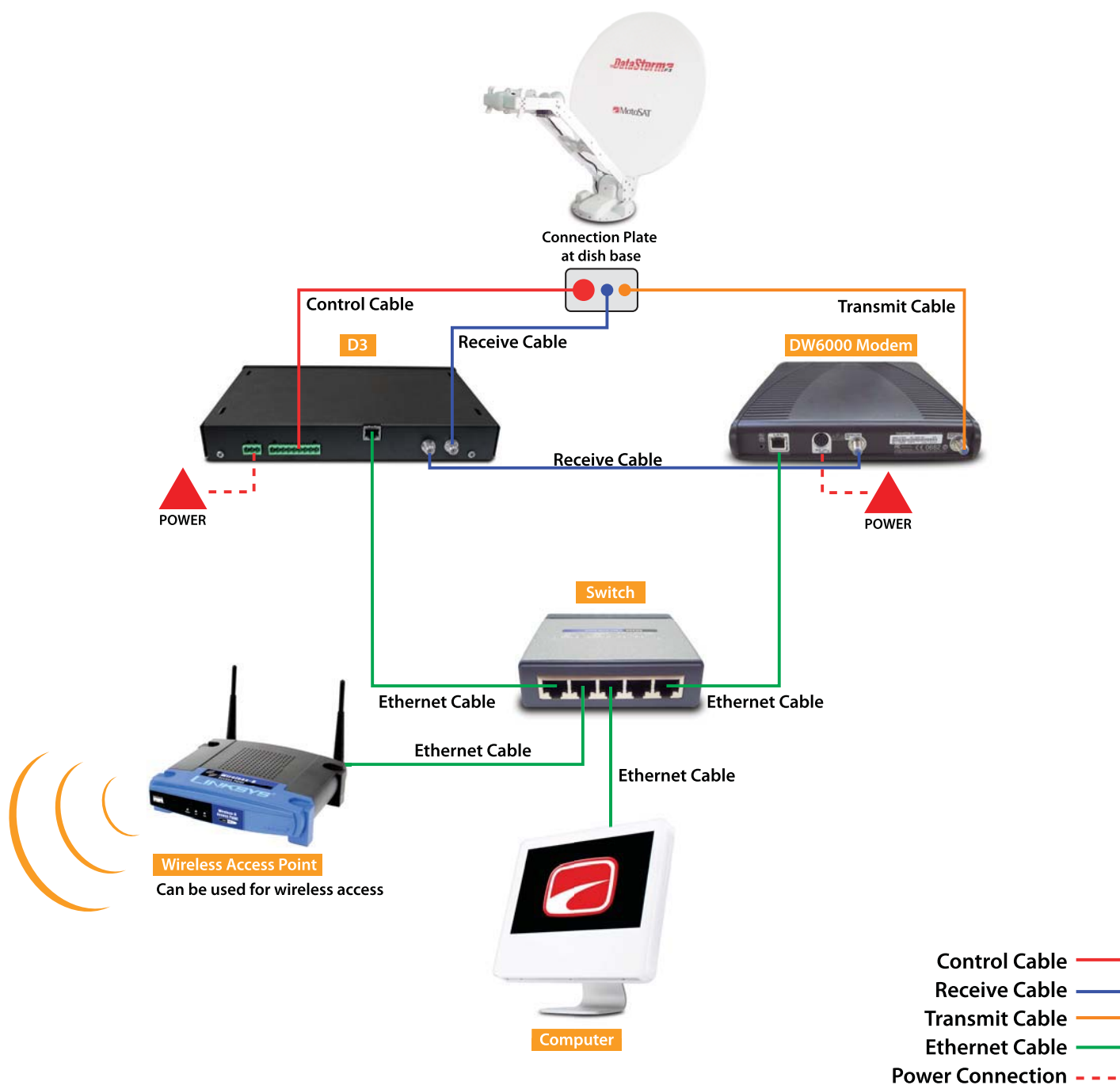[< Back] [Next >] [Finish]

│3-Dish Calibration Finish
You have completed the dish calibration. Upon completion the dish will end up in a stowed position. If any errors were encountered please check the Error Code Definitions for more details in the DataStorm D2 Appendix.

DW6000/DW7000 NAT Modem

This shows how to setup a basic DiRECWAY DW6000/DW7000 NAT Enabled Modem with the D3.

| DW6000 Wiring Setup NAT Modem |

Connection Plate
at dish base

Control Cable

Transmit Cable

D3

Receive Cable

DW6000 Modem

Receive Cable

POWER

POWER

Switch

Ethernet Cable

Ethernet Cable

Ethernet Cable

Ethernet Cable

Wireless Access Point
Can be used for wireless access

Computer

Control Cable ———
Receive Cable ———
Transmit Cable ———
Ethernet Cable ———
Power Connection - - -

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Operations: DW6000/DW4020 NAT Modem Cont.

|DW4020 Wiring Setup NAT Modem |

Connection Plate
at dish base

Transmit Cable

Control Cable

DW4020 Modem Set

Receive Cable

D3

POWER

POWER

Receive Cable

Ethernet Cable

Ethernet Cable

Ethernet Cable

Wireless Access Point
Can be used for wireless access

Computer

Control Cable —————
Receive Cable —————
Transmit Cable —————
Ethernet Cable —————
Power Connection - - - -