



Super Buddy Operation Manual



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This manual covers the basic operations and functions of the meter. For more detailed instructions on how to use the meter to install particular systems, see the Application Notes available on our website: www.appliedin.com

1. Introduction

The Super Buddy represents a new standard in satellite identification capability. Rather than loading a limited set of satellites or a large number of channel plans to select from, the Super Buddy holds all of the satellite transponder information for the entire continent.

You just tell it where you are and what type of system you are connected to, and the Super Buddy accesses all satellite transponders visible to that system. The basic operation becomes extremely simple:

- Left arrow – goes to next orbit east
- Right arrow – goes to next orbit west
- Up arrow- next higher transponder
- Down arrow – next lower transponder

Connections



- 1) SIGNAL IN - connects to the LNB or receiver side of a multi-switch
- 2) IRD - connects to the IRD (receiver) – NOT REQUIRED
- 3) A/C - mini A/C cord to 50/60 Hz 120 to 240 VAC power for battery charging
- 4) DC - 12 VDC at least 1 amp for battery charging (cigarette adapter)
- 5) PC - Serial connection to PC (if you have hardware revision 1.3 or earlier) or USB connection to PC (if you have hardware revision 2.0 or later) for updating with Field Guides, etc.

IRD Connection

The IRD connector has two functions:

- Measures voltage supplied by the IRD
- Allows voltage supplied by IRD to power the LNB extending the battery life

However, the meter itself is always powered by the battery.

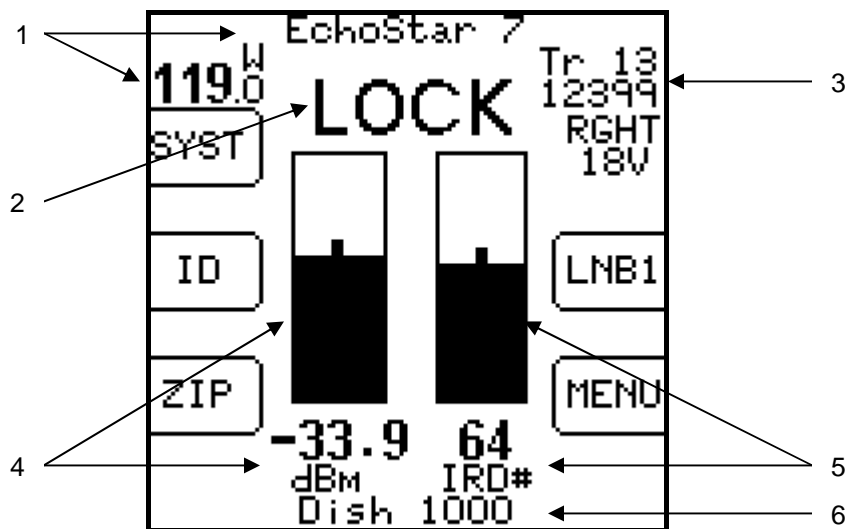
PC Connection

The Super Buddy can be connected to a serial port (RS232) or USB port (depending on the hardware version of the meter) of a PC via the supplied cable. If you have Hardware version 1.3 or earlier, a serial cable will be provided. The serial cable will feature a 9 pin D-sub connector at one end that connects to the PC and a mini stereo headphone jack at the other end that will connect to the bottom of the meter. If you have Hardware version 2.0 or later, a common USB cable will be provided.

PC software is available on our website (www.appliedin.com) for updating the instrument with the latest Field Guides (satellite data) and firmware.

2. Run Screen

The Run Screen displays all information used when pointing a dish or testing an L-Band network.



Displayed Data

- 1) Selected satellite
 - a) Change with left and right arrows (or the LNB soft key, see Multi-LNB Systems below)
 - b) Satellite name is on the top line
 - c) Orbital position is shown at upper left
- 2) Lock status
 - a) Search – when searching for a matching signal
 - b) LOCK – when signal lock obtained, this indicates you MIGHT be pointed at the selected satellite, but you must use the ID button to confirm the satellite.
- 3) Transponder information (upper right)
 - a) Transponder label
 - b) Frequency (L band or downlink)
 - c) Polarity (RGHT, LEFT, HZ or VT)
 - d) Voltage provided to LNB (13 or 18V)
- 4) Signal Level
 - a) Left bar graph (with peak center line)

- b) Numeric value in dBm, dBmV, or dBμV
- c) Scale: -10 to -70 dBm (+39 to -21 dBmV or +99 to +39 dBμV)
- 5) Signal Quality
 - a) Right bar graph (with peak center line)
 - b) Numeric value as IRD equivalent or C/N, Eb/N0 or Es/N0 in dB
 - c) Scale: 0 to 20 dB C/N
- 6) Selected LNB type (bottom line, replaced by frequency deviation if that option is chosen)

Soft Keys

- 1) SYST - transfers to the System Setup Screen
- 2) ID - starts satellite identification verification function
- 3) ZIP - transfers to the Zip Code Lookup Screen
- 4) Polarity - displays or selects polarity and LNB voltage
- 5) LNB - Turns LNB power on or off (displays present state) and selects switch ports
- 6) MENU - transfers to the Menu Screen
- 7) Left and right arrows – change satellite
- 8) Up and down arrows – change transponder

Changing Satellites

The left and right arrows switch to the next east or west satellite visible to the selected LNB. If the LNB polarity can be switched, the first priority id transponder will be used and the polarity may switch if needed. If the polarity cannot be switched, the selected polarity will be maintained.

If you have selected a multi-LNB system, the selected satellite will also change when you use the LNB soft-key to switch between LNBs. (See Multi-LNB Systems below.)

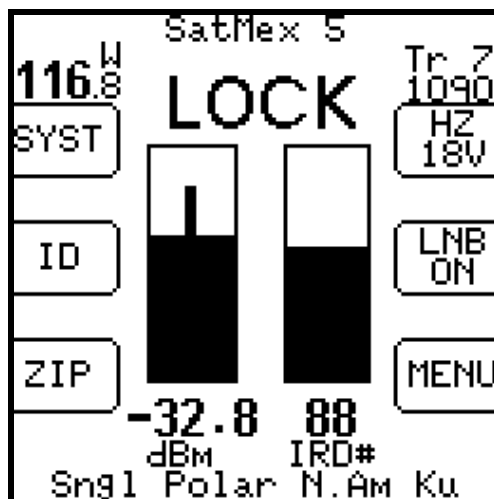
Changing Transponders

The up and down arrows take you to the next or previous transponder in the same satellite (actually in the same orbital slot). If the polarity is locked (via LNB type) then you get the next transponder of the selected polarity. Only transponders visible to your region are used.

Polarity

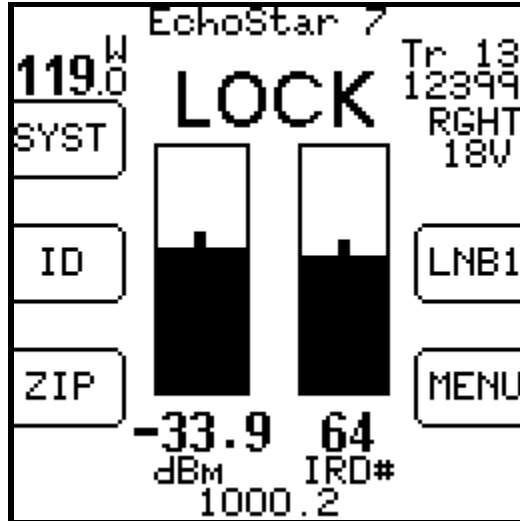
If the LNB supports polarity switching or is stacked, the polarity key is disabled (as shown above) and the transponder selection determines the polarity.

If you are using a single polarity LNB, the polarity must be selected using the polarity key and the transponder selection is limited to the selected polarity. See figure below.

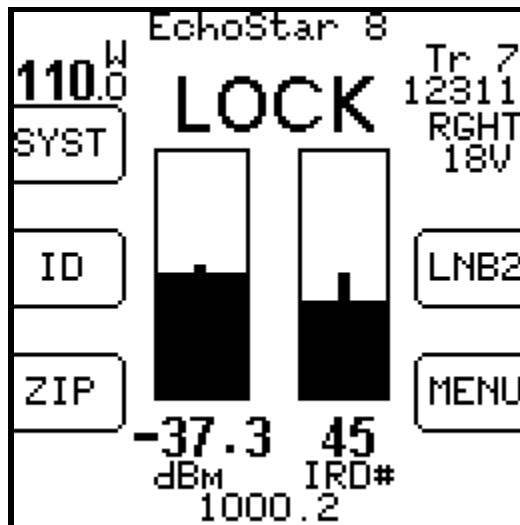


Multi-LNB Systems

When the selected LNB system supports multiple LNBs or multi-head LNBs via the switch setting, the LNB ON/OFF button also controls the switch setting. When you switch the LNB, the satellite is automatically changed to the one normally used for that port.



For example, the Dish 1000.2 system is typically used with the 110°, 119°, and 129° satellites. When you push the button to select LNB1, the meter automatically selects the 119° satellite. Push it again to select LNB2 and the 110° bird is selected. The third push gets you to LNB3 and the 129° bird.



Satellite Identification

Satellites are identified by obtaining locks on one or more transponders. To obtain a lock, the frequency, modulation and symbol rate of the transponder must be known to the instrument. These combinations vary enough between the satellites that they can be used to identify the satellite. Unfortunately, one transponder is not always enough; there may be another satellite using the same combination.

ID Verification

Unlike other meters, the Super Buddy has the ability to check one or more transponders looking for a match on a combination that is unique to each satellite. This is what we call the “ID Verification” feature. It is initiated when you press the ID button on the Run Screen.

When you change satellites with the left/right arrows, the transponder shown will be one of the transponders used in ID Verification. Once you get a lock and peak the dish on this transponder, press the ID button and the unit will check any other transponders needed to confirm the identification and display either “VERIFIED” or “ID FAILED”.

Satellite Scan

If you have peaked up the signal level on a satellite, but either don't have a lock or get an “ID FAILED” message when performing the ID Verification, the Super Buddy can try to determine which satellite you are pointed at by performing the ID Verification on different satellites sequentially. This is called the “Satellite Scan” feature.

To run a Satellite Scan, press the ID button to verify the selected satellite. If that succeeds, there is no reason to run the Satellite Scan. If that fails, there will be a “SCAN” button on the “ID FAILED” Error Screen, press that and the scan begins.

The scan will start from the selected satellite, presumably the one you are looking for, and look to the east and west one satellite at a time until a positive ID is found or the horizon is reached, or you abort the scan.

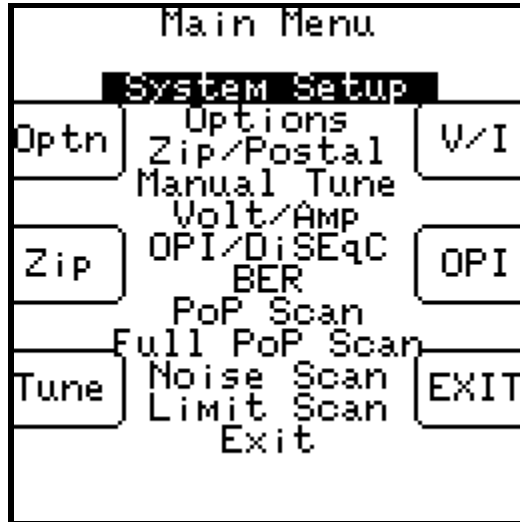
Field Guide Updates

Unfortunately, the satellite identification process is only as good as the transponder definitions that are used. And these change often enough to make the job challenging. That's where Field Guide updates come into play. As we update our database, we post the revisions on our web site, which you can download into your instrument. See the section on “Updating Your Meter”.

Our database is updated from information gathered from the service providers, other web sites, customers, and our own testing and research. If you know of any omissions or errors in our database, please contact us so that we may pass on what you have learned.

3. Main Menu

The MENU button takes you to a menu of all of the Super Buddy screens. Some of these screens are also available via soft keys from the Run Screen.



All of the functions are available on the central menu using the up/down and enter keys. Some functions are also available via soft keys as a shortcut. "Exit" takes you back to the Run Screen.

The functions are described in the sections that follow.

4. System Setup

You **must** use this screen to specify the type of system you are connected to and where you are. **This step is essential:** the Super Buddy calculates all frequencies based on this information and displays only the transponders that can actually be received by the selected system in the selected location.



This screen is a simple menu selection. Use the up/down arrows to highlight the selection you want to change and press ENTER.

The system selection actually selects three items:

- 1) Region
- 2) LNB system
- 3) Switch type

Due to the large variety of LNB systems in use, the LNB system selection is divided into three levels:

- 1) Service
- 2) System
- 3) LNB model

Because you will not need to change the region very often (if ever), the second option is highlighted by default. You will need to use the up arrow to change the region.

The LNB system also defines a default switch type, so this selection is also normally skipped. However, you may override the default switch type if desired.

Regions

When the unit is shipped from the factory, it will have the latest information for all of North America loaded into it. If you are using the Super Buddy outside of North America, you must download a different Field Guide from our website. See the Updating chapter for details.



You must select a region within the Field Guide that better identifies the area where you will be using the meter. If you are not sure of which region you are in, it probably doesn't matter because there is significant overlap in the regions. For example, the NE Continental US region extends as far south as South Carolina and the SE Continental US region extends as far north as New Jersey.

The region selection is necessary because transponders are pointed only at certain parts of the globe and the Super Buddy will use just the transponders that are pointed at your selected region.

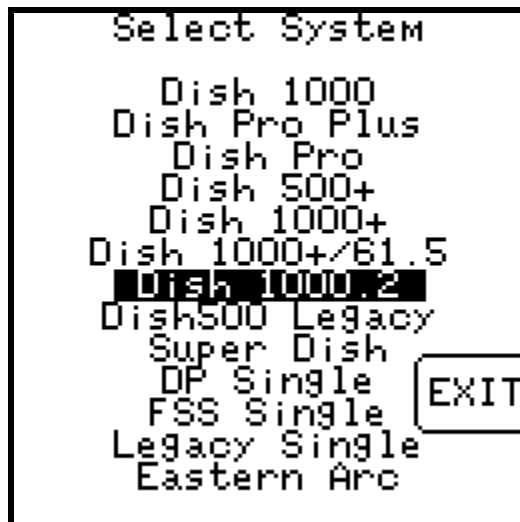
Services

The service selection groups the LNB/antenna systems into small sets of choices. The available services may change with Field Guide updates.



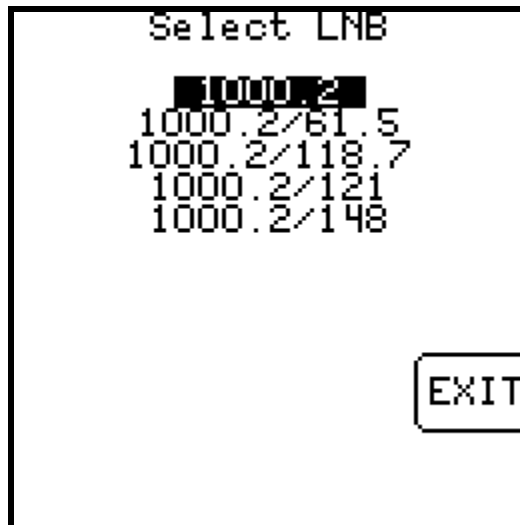
Systems

The system selection lets you pick the type of system within the selected service. In some cases this is the final LNB model selection. In other cases, the system will be broken down further by the LNB model selection.



LNB Model

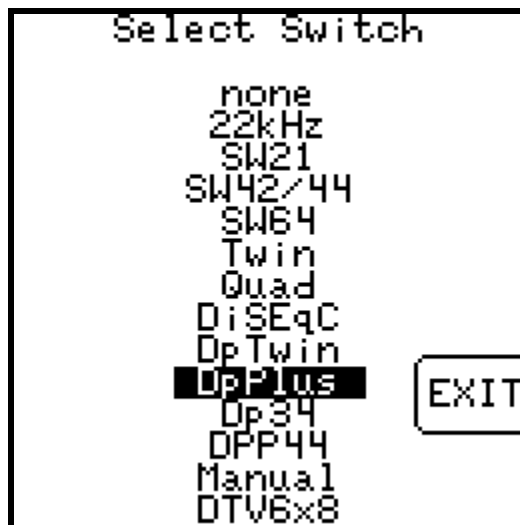
The models listed will depend on the system selected. For example:



Switch Type

Multiple LNB dishes usually have a switch that is internal to the multi-LNB head. Other systems may use external switches. When you connect the Super Buddy to an external switch rather than directly to the LNB, or when you connect to a multi-LNB head, the Super Buddy must know what switch type is connected so it can send the proper type of command to control that switch.

The switch type is usually selected automatically when you pick an LNB Model, but you may wish to change it or select another external switch. If you are installing a system that does not have a switch, you may need to select "none". (Note: additional switch types may have scrolled off the end of the screen. Use your down arrow key to view these.)



5. Options

There are several options you may select to personalize the operation of your meter.



To use this screen, highlight the option you want to change with the up/down arrows and select the value you want with the left/right arrows. Press EXIT when done.

Signal Level

The signal level may be displayed in either dBm, dBmV or dBμV.

Signal Quality

The signal quality number may be displayed as one of the following:

- C/N (carrier to noise ratio) in dB
- IRD (receiver) equivalent number
- Eb/N0 – Energy per bit over noise energy per hertz in dB
- Es/N0 – Energy per symbol over noise energy per hertz in dB

IRD numbers for DIRECTV™ range from 0 to 100. Dish Network™ uses two scales: the old scale from 0 to 125 and a new scale with much lower values.

Frequency

The frequency may be displayed as either the L-band frequency, which the meter is tuned to, or the downlink frequency transmitted by the satellite. Both are displayed in MHz. The L-Band (950-2150 MHz) frequency is the frequency of the signal after being down-converted by the LNB.

Sounder Option

Peaking via the audible tone can be done in two ways: “tone-on-lock” and “peak-o-matic”. The “tone-on-lock” method uses the following:

- 1) Slow beep - the function is on
- 2) Fast beep – the signal is locked
- 3) Solid – the signal is locked and at the highest level yet seen

This method works well when the dish is close enough to obtain a signal lock. If you have trouble finding a lock however, you may want to use the “peak-o-matic” method:

- 1) Slow beep – the function is on
- 2) Fast beep – the signal is at least 5 dB higher than the lowest level seen
- 3) Solid – the signal is higher and at the highest level seen so far

Note that the peak-o-matic method does not indicate a lock. It allows you to peak the azimuth and elevation even before a peak is obtained.

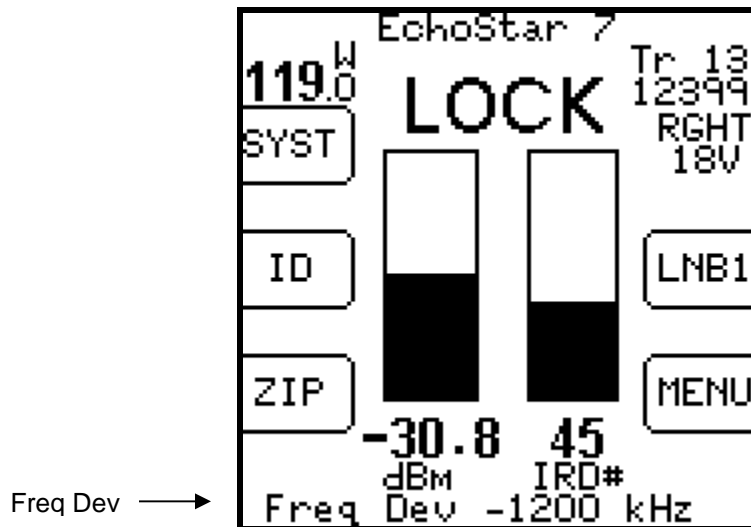
In both methods to fully peak the dish, you must move it in one direction until the signal is found, and continue moving it until you move past the peak, then move back to the solid tone.

Shutdown Timer

The unit can be set to automatically shut off after 5, 10, or 15 minutes with no buttons being pressed. This timeout can be disabled by setting the option to “none”.

Frequency Deviation

If you select Freq Dev = YES, the bottom line of the Run Screen display will be replaced with an estimate of the frequency deviation or drift of the LNB. The Super Buddy is capable of locking onto a signal up to ± 10 MHz from the frequency defined for the transponder. A frequency deviation of more than 2 MHz (2000 kHz) may indicate a problem with the LNB. High or low temperatures will cause an LNB to drift and an LNB that works in normal weather with a significant drift may fail to work in hot or cold weather due to the additional drift. Please note that the Frequency Deviation feature will only work while you are receiving a LOCK on a satellite.



IRD Calc

As mentioned under “Signal Quality” above, Dish Network has an old IRD quality scale from 0 to 125 and a newer scale with much lower values. Use this option to select which scale to use. The default is “New”.

6. Zip Code Lookup

Enter any zip code in the United States and this screen will look up the latitude and longitude for that location and calculate the azimuth and elevation angles for the selected satellite. The azimuth is given in true north (Azimuth) and in magnetic north (Magnetic) degrees. You should follow the Magnetic field value when using a compass to point the satellite dish.

Note: The zip code database in the meter is not large enough to hold all of the zip codes for the entire United States of America. Therefore, the US zip codes have been divided into two databases, USA Zip East and USA Zip West, based on the relationship to the Mississippi River. There are also databases available for Canada (Canadian Postal). The database titled 'No Postal Code' should be chosen if you are located outside of North America. The 'No Postal Code' database allows the user to type in and save his latitude and longitude coordinates and look up antenna settings based on those coordinates. The different postal code databases may be downloaded and updated using the FlashUpdate program, which is described further in the Updating section of the manual.

```

EchoStar 7
119.0W      ◀E ▶W▶
Zip/Postal  46203
Latitude    39.5
Longitude   -85.7
Azimuth     225.9
Magnetic    230.1
Elevation   32.9
Polar off   33.7
Skew        123.7
EXIT

```

Type in the zip code using the numeric keypad and press ENTER. If a postal code table is not available for your area, you may enter the latitude and longitude directly and the same azimuth and elevation calculations will be made.

You may change the selected satellite using the left and right arrows.

Polarization Offset

The "Polar off" is the polarization offset degrees used for FSS LNBS. If the value is negative, turn the LNB counter-clockwise; if positive turn it clockwise when viewed from behind the antenna looking towards the satellite.

Skew

The skew setting indicates the dish rotation relative to the mounting bracket that is needed to align the multiple LNBS with the satellite arc.

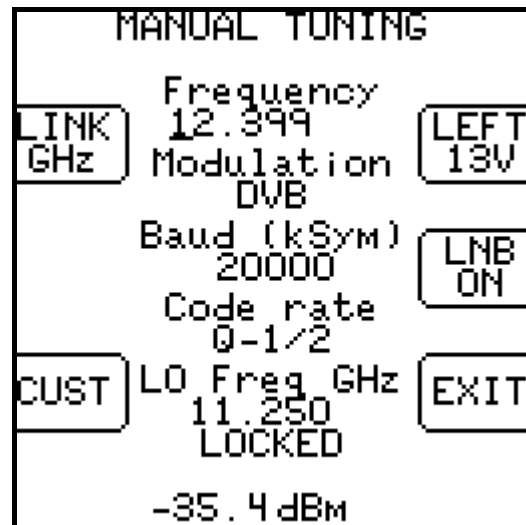
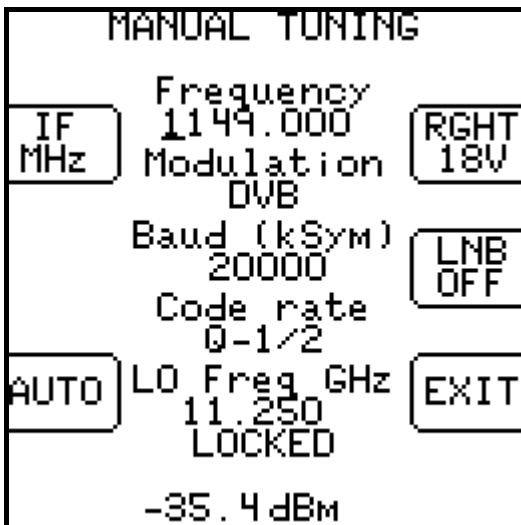
Wild Blue Data

Note: if the Wild Blue™ system is selected, some additional information pertaining to Wild Blue installations is displayed at the bottom of this screen. See the Application Note "[How to install Wild Blue with a Super Buddy](#)" for more information.



7. Manual Tuning

The Manual Tuning Screen may be useful when looking for a signal that has not yet been added to our database and loaded into the instrument or for feed transponders that aren't always active. You can manually enter the tuning parameters. The screen will display the locking status at the bottom. The parameter changes will be kept when you return to the Run Screen but not saved when powering off or changing to other satellites or transponders.



Frequency

You may specify the frequency as either the L-band tuning frequency or as the downlink satellite frequency. Press the upper left soft-key to change the frequency type. This soft key also changes the display format on the Run Screen and alters the frequency display option set up in the Options Screen. Type in the frequency and press Enter.

Modulation

Use the left/right arrows to select the modulation format:

- DSS for legacy DIRECTV™ signals
- DVB for DVB-S standard signals (Dish Network and most others)
- DC2 for Digicipher 2 signals (Star Choice and some others)
- Turbo for Dish Network's high-def 8PSK signals

Baud Rate

Use the keypad to enter the baud rate (symbol rate) in kiloSymbols per second and press Enter.

Code Rate

For Turbo modulation only, select the desired code rate with the left/right arrows. Other modulation types use automatic code rate detection.

LO Frequency

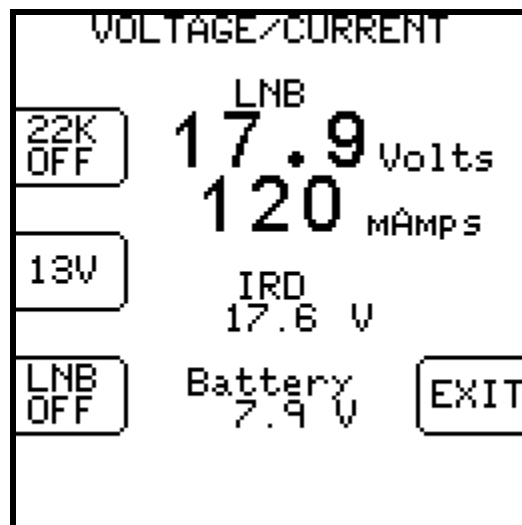
Normally, the LO frequency of the LNB is obtained from the system type selection and may change with different switch settings and polarities. This is the "AUTO" mode of operation. In rare circumstances, you may want to use the lower left key to change to "CUST" or custom mode and specify an LNB LO frequency directly. The LO (Local Oscillator) frequency is the difference between the downlink frequency and the L-band tuner frequency. High-side LO frequencies like those used in C-band LNBs and some stacking LNBs may be specified using a negative number.

LNB Control

You may use the right side soft keys to change the LNB voltage, turn the LNB on or off, or change switch settings.

8. Voltage / Current

The V/I or Voltage / Current Screen displays the LNB voltage and current draw, the IRD connection voltage, and the battery voltage.



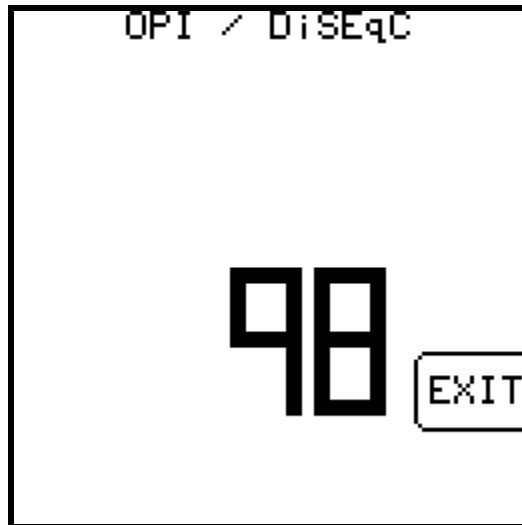
You may turn the LNB voltage on or off, change it between 13 and 18 volts (and 21 volts for the DIRECTV SWM-ODU if you have the optional built-in 21V module installed), and turn the 22 kHz tone on or off using the soft keys.

9. OPI and DiSEqC Monitoring

The OPI/DiSEqC Screen serves two similar purposes. First, it simulates the HughesNet™ Outdoor Pointing Interface used to check cross-pol alignment of the HughesNet transmitters. Second, it decodes and displays other DiSEqC commands received on the IRD port of the meter.

OPI Simulation

When OPI messages are received it displays them on the screen just like the OPI device.

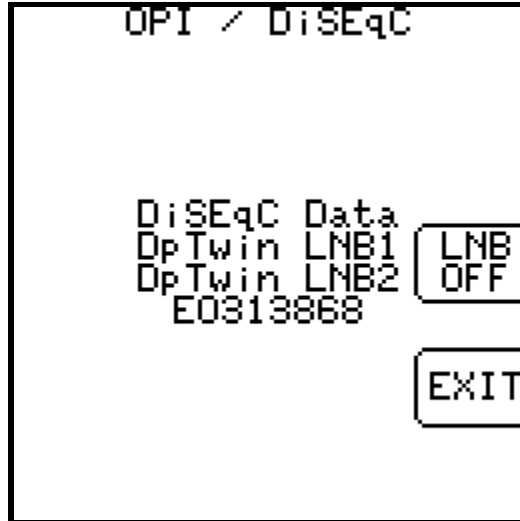


HughesNet™ Cross-Pol Check Procedure

- 1) Align the dish using the receiving LNB just as you would a normal Ku band dish using the Super Buddy Run Screen.
- 2) Connect the modem and PC to the transmit and receive cables and run the HughesNet software.
- 3) Using the PC's internet browser, access the HughesNet modem setup screens. Ensure that the OPI display is enabled and display signal strength. The signal strength must be displayed on the PC to generate the display shown on the meter.
- 4) Return to the dish and connect the Super Buddy into the receiver cable. The Super Buddy's LNB port should be connected to the LNB and the IRD port to the modem's Rx port.
- 5) Go to the Super Buddy OPI/DiSEqC Screen. This screen displays the numbers transmitted from the modem just like the OPI device.
- 6) Adjust the dish to peak the transmitter cross-pol quality number. The higher the number, the better the quality.

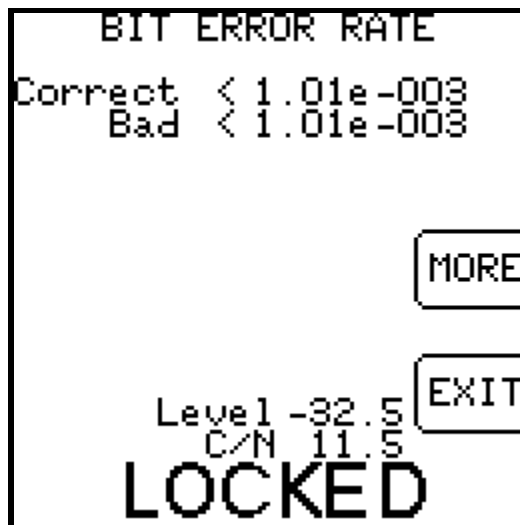
DiSEqC Monitoring

When other DiSEqC commands are received on the IRD port of the meter, they are displayed on the screen. The most common switch control commands are decoded into switch type and port selection, other commands may be displayed in their hexadecimal format.



10. Bit Error Rate

The Bit Error Rate Screen (BER on the main menu) displays the bit error rate of the signal as detected by the demodulator within the Super Buddy.



There are two rates displayed:

Corrected This is the rate of errors detected and corrected by the Reed-Solomon portion of the Forward Error Correction routine.

Bad This is the rate of errors detected that the Reed-Solomon decoder was unable to correct. These are the errors which cause tilting or other problems visible to the customer. This is sometimes referred to as the “post-FEC” error rate.

The errors that are corrected by the first stage in the decode process, the Viturbi or Turbo trellis decoder, are not available from the demodulator and are not displayed. This rate is sometimes referred to as the “pre-FEC” error rate.

If the error rate is preceded by a less than sign (<) as in the example above, it indicates that no errors have yet been detected and so the bit error is not known but is less than the number given.

The BER Screen accumulates errors as long as the screen is active. To reset the counters, exit and restart the screen.

This test can only be performed when a signal lock is obtained. If the lock is lost, the rates are not shown and will be restarted when lock is re-obtained.

In most cases, a one minute test is sufficient to determine the BER for the present conditions. As long as both rates continue to read less than some number (the < character is shown), then no errors have been detected and the system is working well. On the other hand, if you are testing during a rainstorm, you can expect some errors to occur.

The MORE button can be used to display additional information about the signal:

```

BIT ERROR RATE
Correct < 8.97e-004
Bad < 8.97e-004

Correct 0
Bad 0
SymRate 20000
ModRate 2
CodeRate 7/8
DataRate 30952
Elapsed 18
Level 11.5
C/N 0.0
LOCKED
  
```

This displays the following additional information:

- 1) Corrected error count
- 2) Uncorrected (bad) error count
- 3) Symbol rate in kilo-symbols/second
- 4) Modulation rate or bits per symbol (2 for QPSK, 3 for 8PSK)
- 5) Code rate or bit puncture rate
- 6) Data Rate – calculated rate of payload kilo-bits per second (post FEC data rate)
- 7) Elapsed time counter (1/2 seconds)

11. Proof of Performance Testing

The Proof of Performance Test (PoP Scan) feature collects and stores signal level and quality data for later transfer to a PC for reporting. This feature may be used to document the quality of installation for later reference.

Install PC Software

The SatTransfer program is required to transfer the data from the instrument to the PC and to print reports. This software is available from the Applied Instruments web site along with the FlashUpdate software used to upgrade the instrument. (See Updating section.)

Collect Test Data

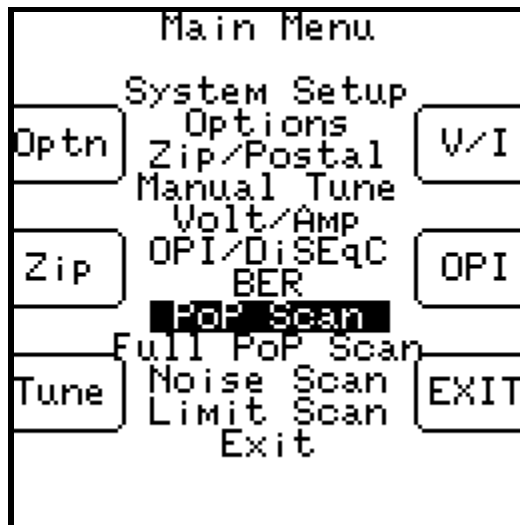
Perform your satellite dish alignment as usual. When the system is fully peaked, use one of two main menu options to perform the PoP Scan and collect the data:

PoP Scan – uses the presently selected LNB port and collects data for that LNB only.

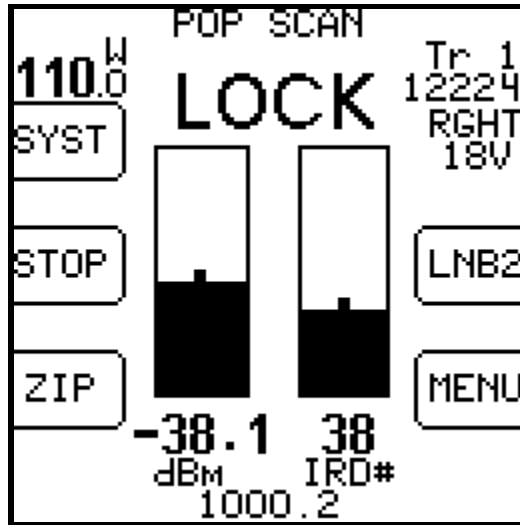
Full PoP Scan – steps through all LNB positions and collects data for all related orbital positions.

Note:

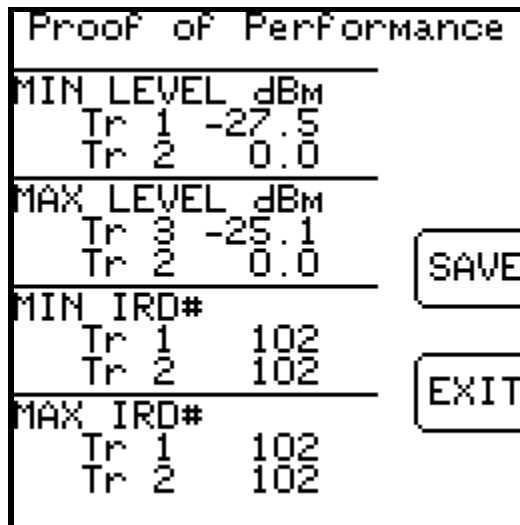
When choosing PoP Scan, the user must first power the LNB using the LNB soft key or the system may be powered externally. When using the Full PoP Scan, the meter must power the LNB so that it is able to cycle through the various LNBs.



The meter will scan through all transponders on the satellite collecting the measurement data. You may press STOP to abort the scan, otherwise, wait until the scan completes.



When the scan completes, the following screen displays a summary of the data:



You press "Exit" to discard the data or "Save" to continue.

Saving Data

If you press "Save" the following screen appears allowing you to enter some identification data about the test:

Note:

Alphabetic characters can be entered in the following way:

- Press the key once to display the numeric digit.
- Press it quickly a second time to display the first alphabetic character.
- Press it quickly a third time to display the next alpha character, etc.
- A new key always moves to a new column.
- A pause will also move to a new column.

Left/right keys move between columns.

```
Proof of Performance
Date MM/dd/yyyy
12/11/2006
Location
INDY
Technician
FRED
Notes
_
SAVE          EXIT
```

Again, press "Save" to continue and the next screen lets you enter a file name:

```
Proof of Performance
File name
TEST1
SAVE          EXIT
```

The file name must be unique. An error message will appear if you enter a name that has already been used. At present, there is no method for determining which names have been used on the instrument other than by running the SatTransfer program.

There is file storage space for about 70 files. The actual limit depends on the number of transponders used.

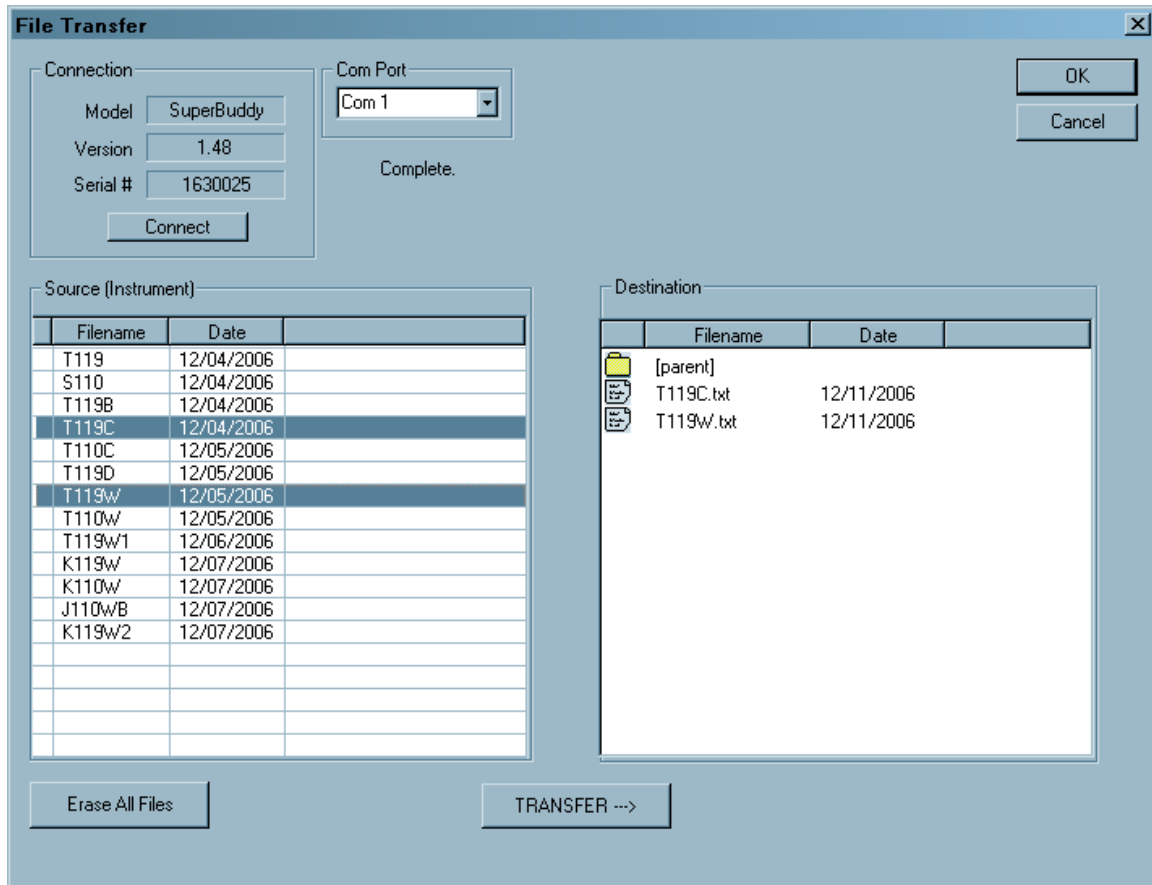
Press "SAVE" again and the system will copy the file from temporary storage to flash file storage. The instrument must then restart and go through the initialization count-down. If an error occurs during the copy process or the flash storage area is too full, the message "Flash copy failed" will appear and the test data will be lost.

If you fill up the file storage space, you may transfer all of the stored files to a PC and then erase the meter's flash memory to create new space.

Transfer Data File to PC

After the data is collected you can take the meter back to your PC and transfer the files to the PC disk using the SatTransfer program. You will receive the SatTransfer program when downloading the FlashUpdate program. The SatTransfer program, SatTransfer.exe, will most likely be found in the default location of C:\FlashUpdate\

- 1) Connect the meter to your PC using the supplied download cable and turn the meter on.
- 2) Start SatTransfer after the meter has completed its 10 second bootup countdown. An icon that looks like the Super Buddy should be installed on your desktop for this purpose.
- 3) The File Transfer window appears somewhat like the following example.



The box on the left displays the files stored on the meter. The box on the right shows the files stored on the PC. The files are stored in a text file format so they can be easily opened in Excel or other PC applications.

By default, the files are stored in a “Data” folder under the “FlashUpdate” folder where the SatTransfer program is installed. You may navigate to other folders by double clicking on the folder icons shown in the destination file box. The [parent] folder icon takes you up one level.

Select the files on the left that you want to transfer by clicking on them. Selected files are highlighted. You may select more than one by pressing and holding Ctrl. Then click on “Transfer” to have the files copied to the PC folder. A status message near the top of the screen will show you when the transfer is complete and the right hand box will be redrawn with the newly added files.

Erasing Files

When you have transferred all desired files, click “Erase All Files” to erase the files from the meter and free up the flash storage space. Due to the way the flash memory works, it is not possible to erase only selected files; all files must be erased to free up the memory.

Print Reports

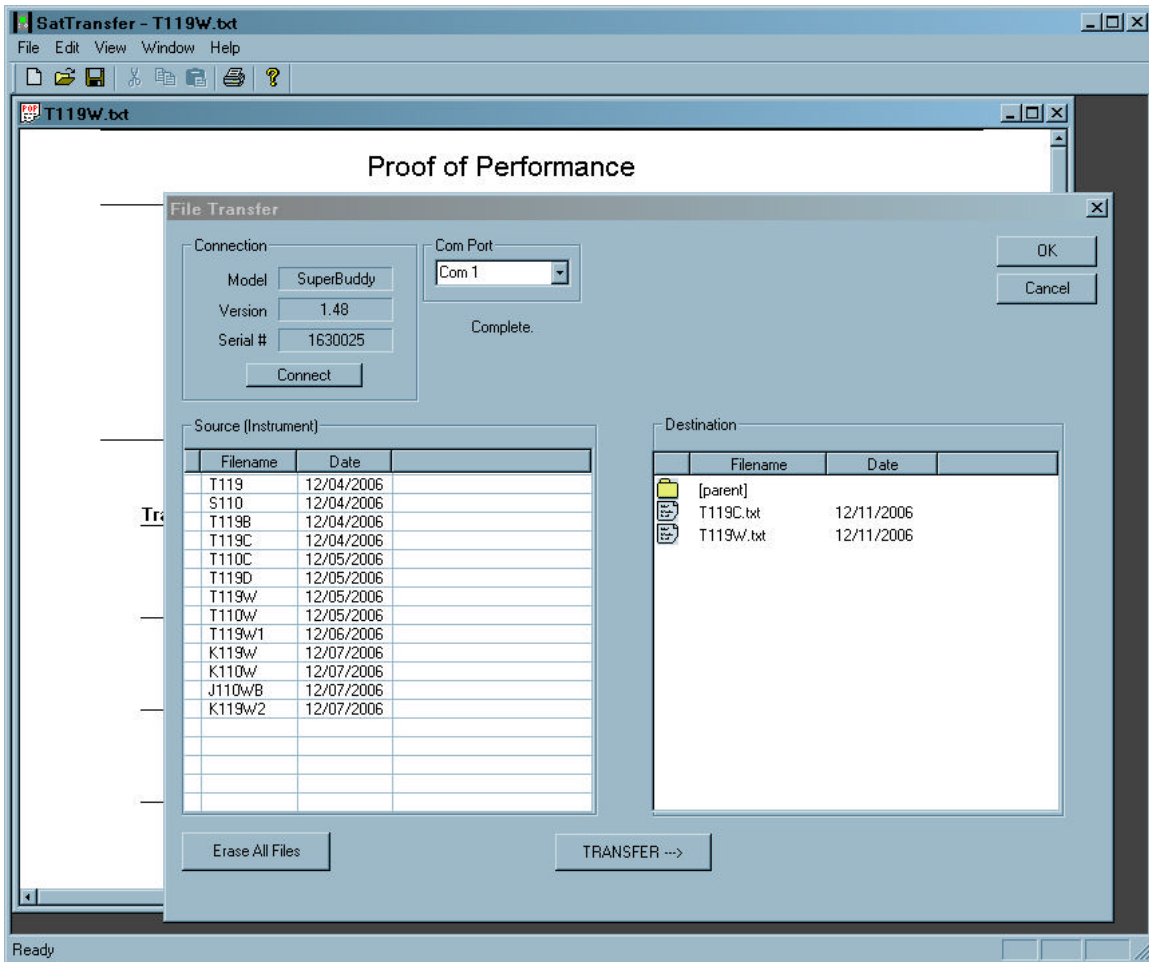
The File Transfer window is not the only window available in the SatTransfer program. You may also open one or more report windows to display and print the data.

There are two ways to open a report window:

- 1) Double click the text file in the right side of the File Transfer window.
- 2) Use the menu bar File, Open function.

The report may be viewed on the screen or printed using the File, Print menu option.

When a report window is opened, it is usually mostly hidden behind the File Transfer window. The File Transfer window may be moved aside or closed to get it out of the way:



The report itself may not fit entirely on the screen but you may scroll down to see the rest.

Proof of Performance

Filename : T119W
 Date: 12/05/2006
 Location: INDY
 Technician: J
 Notes:
 Orbit: 119.0 West
 LNB Model: DP Twin

Tran	Freq (MHz)	Level (dBm)	IRD SigQ	C/N (db)	Eb/No (dB)	Es/No (dB)	Lock Status
1	974.000	-62.5	0	0.0	1.8	1.3	Unlock
2	2111.000	-67.6	115	14.0	13.7	15.3	LOCK
3	1003.000	-58.0	0	0.0	0.1	1.3	Unlock
4	2082.000	-66.5	108	12.8	12.5	14.1	LOCK
5	1032.000	-50.4	118	16.3	16.0	17.6	LOCK
6	2053.000	-65.1	114	13.9	13.6	15.2	LOCK
7	1061.000	-50.3	117	15.4	15.1	16.7	LOCK
8	2024.000	-65.6	115	14.2	13.9	15.5	LOCK
9	1091.000	-59.6	0	0.0	-0.5	1.3	Unlock
10	1995.000	-65.2	115	14.3	14.0	15.6	LOCK
11	1120.000	-56.4	117	15.3	14.8	16.6	LOCK
12	1966.000	-64.9	114	13.9	13.6	15.2	LOCK
13	1149.000	-56.4	116	15.1	14.8	16.4	LOCK
14	1936.000	-71.5	115	14.3	14.0	15.6	LOCK
15	1178.000	-56.4	116	14.9	14.6	16.2	LOCK
16	1907.000	-63.9	116	14.8	14.5	16.1	LOCK
17	1207.000	-57.0	116	14.8	14.5	16.1	LOCK
18	1878.000	-63.6	116	14.6	14.3	15.9	LOCK
19	1236.000	-56.4	116	15.0	15.1	16.3	LOCK
20	1849.000	-62.8	115	14.2	13.9	15.5	LOCK
21	1266.000	-55.5	117	15.2	14.9	16.5	LOCK
22	1820.000	-61.3	116	14.6	13.7	15.4	LOCK
23	1295.000	-56.7	74	9.1	9.2	9.9	LOCK
24	1791.000	-62.9	116	14.8	13.9	15.6	LOCK

Ready

12. Noise Scan

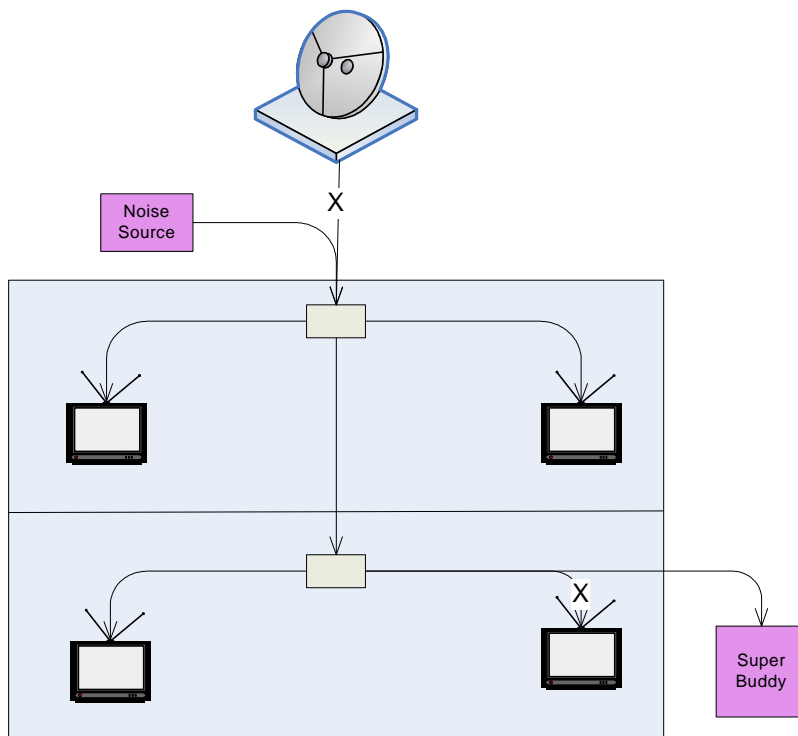
The Noise Scan feature simulates a sweep test for testing cable wiring within a building. This function tests the frequency response of the cable system to determine if it is suitable for L-band distribution.

Theory of Operation

This function requires a noise source such as the Applied Instruments' model NS-1 to inject RF power across the entire L-band spectrum into the cable network. The noise source is connected where the satellite signal would normally enter the building.

The Super Buddy is then connected at the drop points within the building and a measurement scan is performed. The scan compares the present readings with a previously stored reference reading to determine the effect of the cable system on the RF signal. The data is displayed graphically along with summary readings.

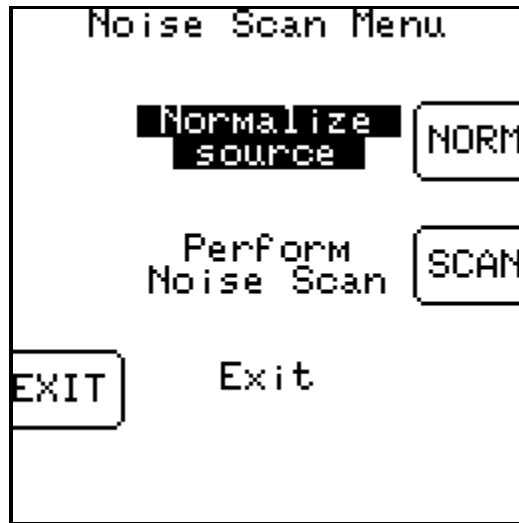
When given the expected RF level entering the network, the Super Buddy uses the measured losses to calculate the expected min/max levels at the receiver. These are compared to limits and a Pass/Fail indication is given.



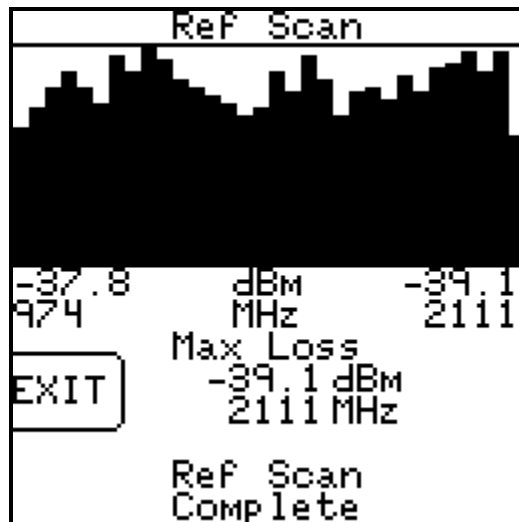
Normalization Scan

This step is required before scanning a system to normalize the readings to the noise source.

- 1) Connect the noise source (NS-1) directly to the Super Buddy using a short jumper cable.
- 2) Turn the noise source on.
- 3) On the Super Buddy, select:
 - a) MENU
 - b) Noise Scan
 - c) Normalize Source



The Super Buddy will then scan through a standard set of 32 frequencies and store the signal level at each frequency. This reference scan is stored in the Super Buddy and is used in subsequent Noise Scans.



(Note: the data shown above is NOT representative of a real scan.)

You should run a new normalization scan whenever you use a different noise source or suspect the noise source has changed output level.

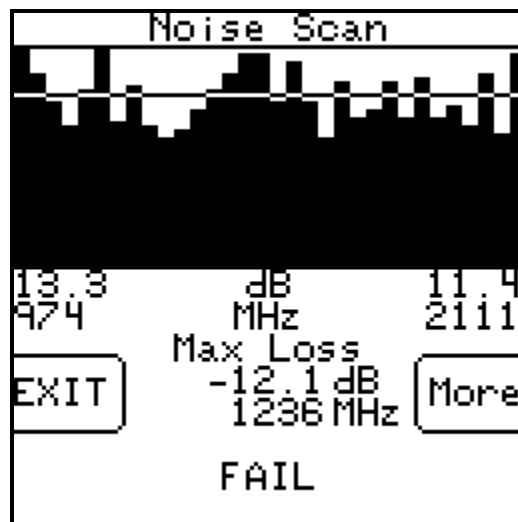
You can check your normalization scan by performing a regular noise scan while the noise source is connected with the same short jumper. The readings in this case should only differ from the reference normalization scan by a few tenths of a dB and the graph should be flat.

System Scan

Now connect the noise source to the cable system in place of the dish antenna. Turn the noise source on and leave it there while performing system scans in other parts of the building.

- 1) Connect the Super Buddy to a service drop in place of the receiver.
- 2) Select:
 - a) MENU
 - b) Noise Scan
 - c) Perform Noise Scan

The Super Buddy will scan through the same 32 frequencies and compare the reading to the stored normalization reference. The difference is the signal drop caused by the cable network at each frequency. This drop is displayed graphically as the data is collected.



(Note: the data shown above is NOT representative of a real scan.)

The Results Summary Screen shows the signal loss at the low and high frequencies and the maximum loss found. The pass/fail result is displayed at the bottom.

The graph is usually scaled so that 0 dB loss is at the top of screen. The measured loss is plotted across frequency and the area below the measured data line is shaded.

If a gain is measured, a zero line is drawn across the screen. Where it crosses the shaded portions, it appears in inverse color. The graph above shows positive gain and hence the horizontal line. This is not the usual situation but may occur if amplifiers are used in the cable network.

Press the MORE key to display the Limit Screen:

NOISE SCAN		
	MIN	MAX
Level@dish	-33.5	
Cable loss	-12.1	13.3
Level@IRD	-45.6	-20.2
Limit	-50.0	-31.0
	PASS	FAIL
<div style="display: flex; justify-content: space-between; margin-top: 10px;"> EXIT More </div>		

This screen lets you enter the expected level at the dish. It displays the min and max measured cable loss and calculates the min and max level that would result at the IRD. These levels are then compared to min and max level limits, which may be changed, and individual PASS/FAIL indications are shown. Suggested limits are -50 to -31 dBm.

You may press the MORE key to return to the Results Summary Screen or the EXIT key to return to the Noise Scan Menu Screen.

Analysis

The test shows several items which are important in determining the health of a cable system.

First, the RF level that will reach each receiver is critical. Most receivers require an input level of approximately -50 to -31 dBm. If you know what level you can expect from the intended dish, this test will estimate the levels that will reach the receivers.

Tip: on multi-LNB dishes, enter the lowest signal level expected from all LNBS.

Check the specifications for the receivers that you expect to be used and make sure these limits are appropriate. The limits will be stored and do not need to be reentered each time.

If the estimated levels at the receiver drop points are too low, you may need to add an amplifier. You can check the effect of adding amplifiers by increasing the expected level at the dish by the gain of the amp. The screen will recalculate the level at the IRD and check the new values against the limits. Just remember that adding an amplifier will negatively affect your signal quality (IRD, C/N, Eb/No, Es/No).

Second, a faulty cable network may show abnormally large losses at certain frequencies. This will show up as a large dip in the graph at a certain frequency. This should always be considered a problem even if it passes the limit check since the fault may worsen and lead to a system failure. Faults of this kind may be caused by bad connectors, broken or damaged cable, or water in the line.

Higher frequencies are attenuated more than lower frequencies as they travel through a cable. Therefore you should expect a slight left to right downward tilt in the displayed graph. RG-6 will have better performance than RG-59 cable. The longer the cable the more loss, so RG-6 cable

may work where RG-59 cable won't. This test will indicate if the existing cable, whatever kind it is, is good enough for distances it actually covers.

13. Limit Scan

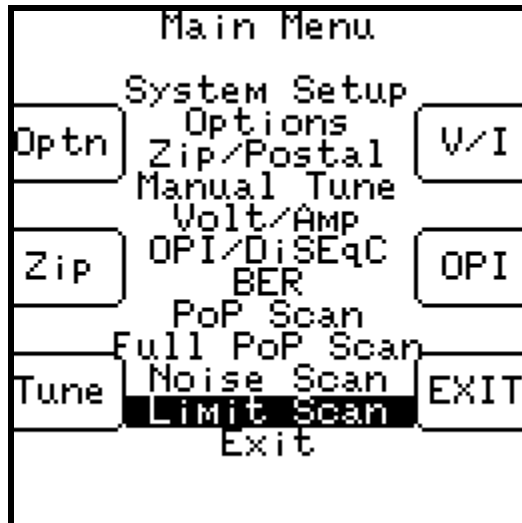
The Super Buddy™ Signal Level Meter includes a Limit Scan feature that performs a quick scan of up to 5 transponders on a satellite, checks the values against pre-determined limits, and provides a pass/fail indication. Use this test to quickly verify your installation against recommended quality values.

Specifications

- 1) Up to 5 transponders per satellite may be tested
- 2) Up to 10 total satellites may be stored
- 3) Signal quality test (IRD signal quality number)
- 4) Signal level test
- 5) Signal quality limits defined for individual transponders
- 6) Signal level limit defined overall
- 7) Limits are changeable and are stored in the instrument

Setup

Use the normal meter setup for whatever type of system you are installing. When the installation is complete, select "Limit Scan" from the main menu:



Scanning

The menu option will start the Limit Scan screen. If limits are already defined for the presently selected satellite, the scanning will start immediately:

LIMIT SCAN			
119.0 ^W			Tr 14
			1936
			LEFT
Tr	dBm	Req	IRD
14	-22.5	40	75
15		40	
16		40	
21		40	
			LNB OFF
EDIT	Level Limit		EXIT
	-50.0 dBm		

For each transponder to scan, the screen shows:

- 1) Transponder number (Tr)
- 2) Measured signal level (dBm)
- 3) The required signal quality value (Req)
- 4) The measured signal quality level (IRD)

If a lock is not obtained, the IRD column will display “??” instead. The table will be filled in as the transponders are measured in sequence. When all transponders are measured, the pass/fail indication will appear:

LIMIT SCAN			
119.0 ^W			Tr 21
			1266
			RGHT
Tr	dBm	Req	IRD
14	-20.1	40	55
15	-31.3	40	87
16	-30.9	40	75
21	-32.4	40	87
			LNB OFF
EDIT	Level Limit		EXIT
	-50.0 dBm		
PASS			

The following keys are active while scanning:

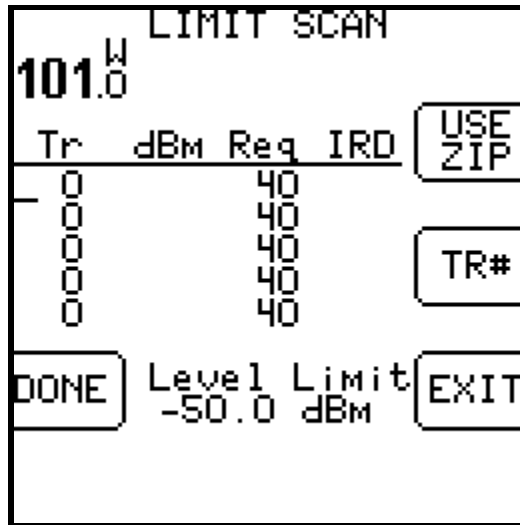
- EDIT – lets you edit the transponder list and limits (see below)
- LNB ON/OFF – also selects different LNBS in a multi-LNB system.
- Left / Right Arrows – scroll between satellites (as in the Run Screen)

Editing

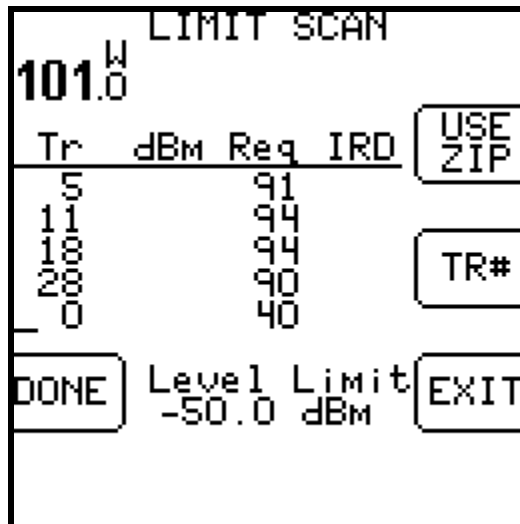
The limit editing function is activated in three ways:

- 1) By pressing EDIT from the Limit Scan screen
- 2) By activating the Limit Scan from a satellite that does not have limits defined, or
- 3) By scrolling via arrows or the LNB button to a satellite that does not have limits defined

When a satellite with no limits is selected, the edit screen contains zeros for all transponders:



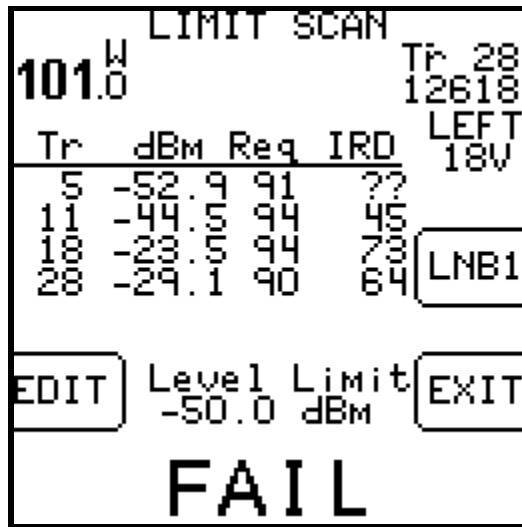
You will see a small underline cursor on the field that may be entered. Use this screen to enter the transponders you want to scan and the required IRD value for each. These IRD values apply only to the selected satellite. You may also edit the signal level limit which applies to all transponders on all satellites.



To remove a transponder, enter zero for the transponder number. If all transponders have been zeroed for a satellite, that orbit will be removed from the table.

You may also use the "TR#" key to insert a valid transponder number from the list of transponders for that satellite.

Press DONE when you have entered the desired values.



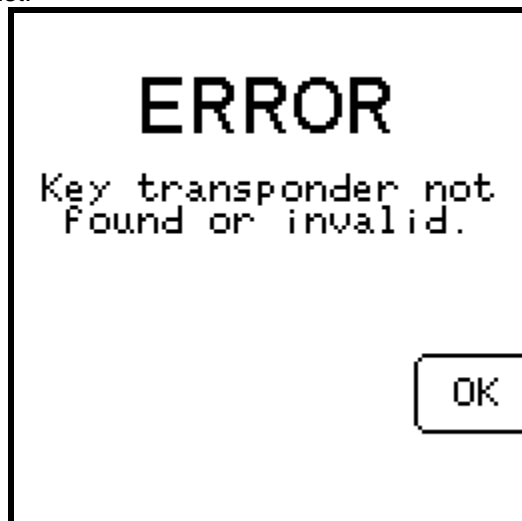
Preset Limits

Note: the preset limits are only available for Dish Network at this time
To auto-populate the Required IRD value fields based on your geographic location (zip code) in the Limit Scan feature:

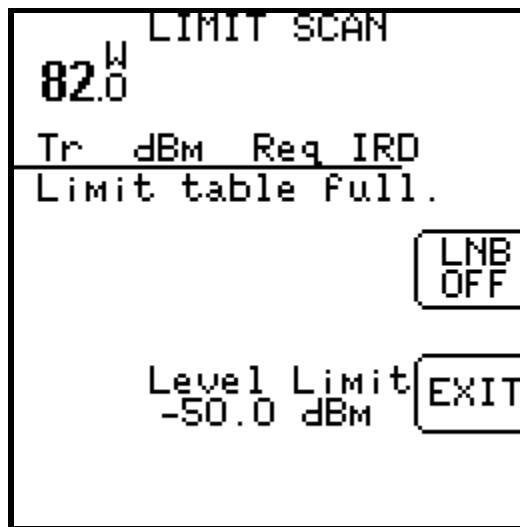
- 1) Using the soft keys, select Menu.
- 2) Using the arrow keys, highlight Limit Scan.
- 3) Press Enter.
- 4) Select the EDIT soft key.
- 5) Select the USE ZIP soft key.
- 6) Select the DONE soft key to return to the main Limit Scan screen to use this feature or select EXIT to return to the main Run screen.

Errors

If you enter an invalid transponder number, the error will be detected after you press DONE and the system tries to scan that channel. The following error will appear and the invalid transponder will be removed from the list.



If you use all 10 orbital slots, the system will not be able to create a list for any additional satellites and the following message will appear when you scroll to or activate a satellite that does not have limits defined:



Limitations

The transponder lists are stored simply by orbital position. No distinction is made for the frequency band. Therefore, if you store limits for 101 West, DirecTV, these same transponder numbers and limits will be used for 101 West AMC4 Ku band, and again for 101 West AMC4 C-Band.

Initialization

The default values consist of the standard Dish Network set of transponders for 110, 119 and 129 West. The defaults may be restored by pressing the PRESET key in the Options screen.

14. Updating Your Meter

Updates to the Field Guide and to the instrument firmware are available from the Applied Instruments website.

Requirements

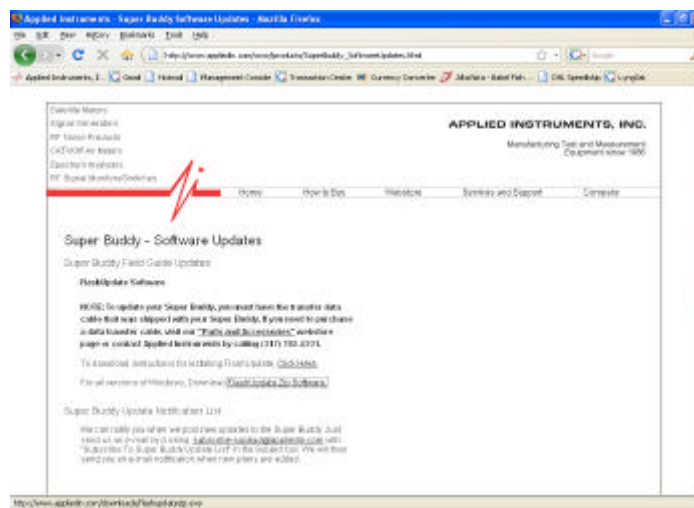
- 1) A PC running Microsoft Windows 95, 98, 2000, NT, XP, or Vista
- 2) The appropriate connection port on your PC (either Serial or USB, depending on hardware version of your Super Buddy meter)
 - a) Hardware V1.3 or earlier - you need an RS-232 serial port (COM port, 9 pin D-sub connector) on your PC
 - b) Hardware V2.0 or later - you need a USB port on your PC
- 3) An internet connection
- 4) The PC download cable provided with the instrument
 - a) Hardware V1.3 or earlier – an RS232 serial cable is provided. It has a 9 pin connector at one end that connects to the PC and a stereo/headphone jack at the other end that connects to the bottom of the meter
 - b) Hardware V2.0 or later - a USB cable is provided

Note: If your Super Buddy has the RS232 download cable and your PC does not have an RS232 serial port (9 pin), a USB to serial adapter **with a proper ground connection** may be used. Unfortunately, many USB to serial converters available today do not contain a proper ground connection; see the section on USB Converters below.

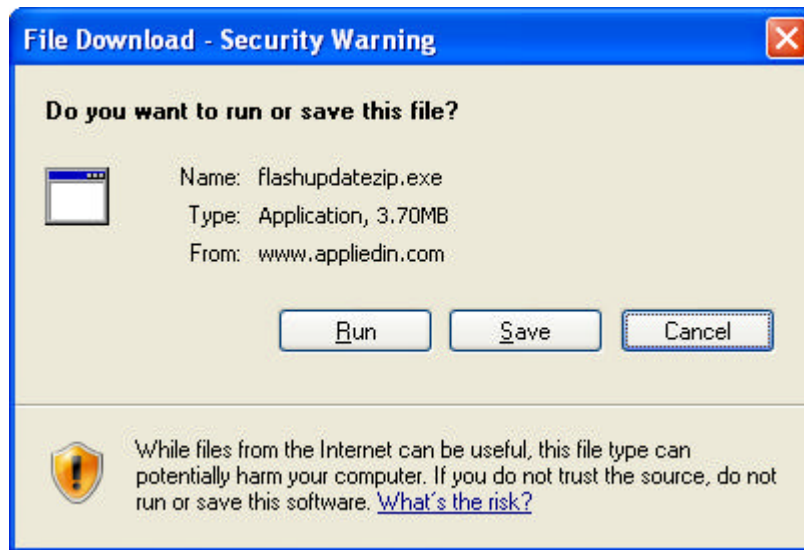
Installation

Before you can update your instrument, you must obtain and install the FlashUpdate software application onto your PC:

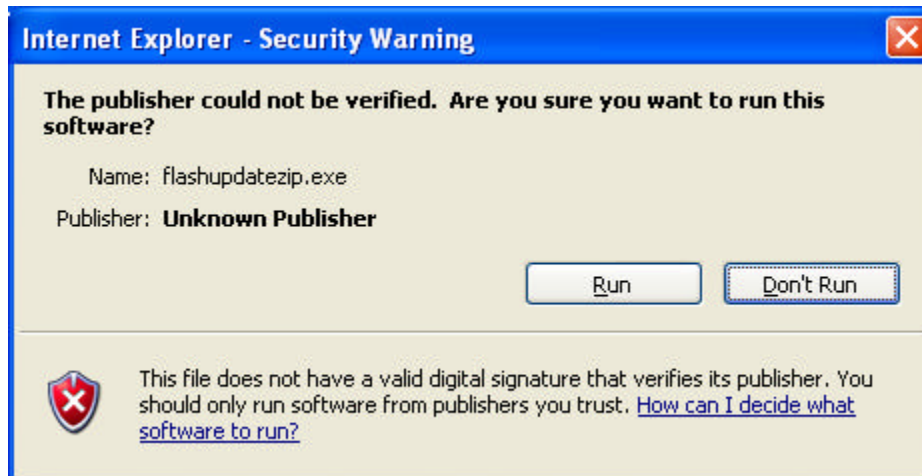
- 1) Go to the Applied Instruments website www.appliedin.com. With your mouse, move your cursor over Satellite Meters, then Meters, then click on Super Buddy. On the right side of the Super Buddy product page, click on 'Software Updates' then click on "Download FlashUpdate Zip Software" or use the following link directly:
www.appliedin.com/downloads/flashupdatezip.exe



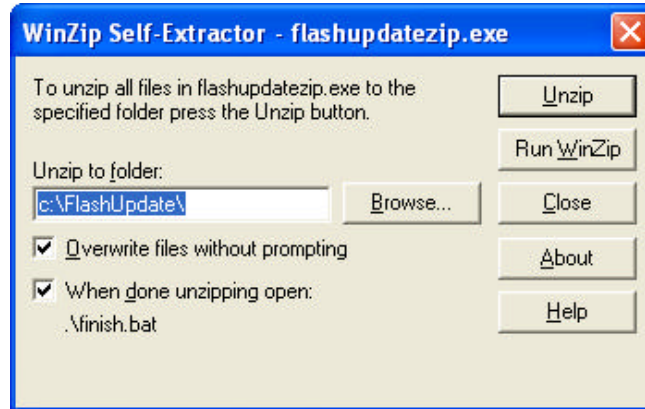
- 2) This is a self-extracting archive file. You may choose to open or run the file directly from the website or may save it to your disk and then open or run it. It is recommended that you run the file. The instructions below assume that you have chosen to run the file.



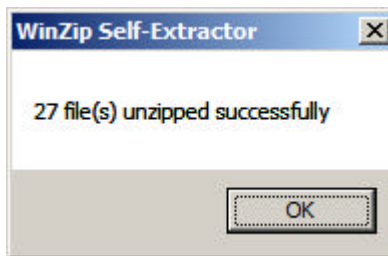
You may receive a warning message. Press Run to continue to open the file.



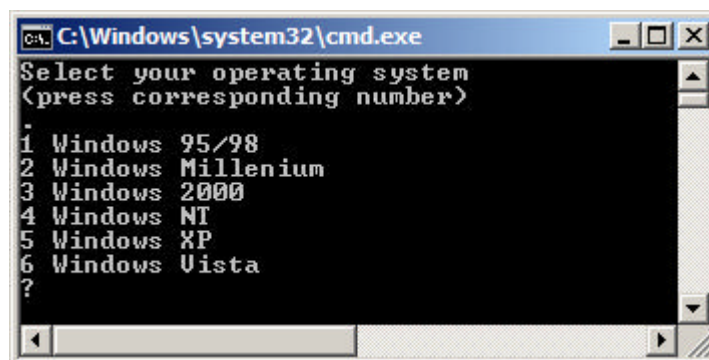
- 3) When you open this self-extracting archive file, the WinZip Self-Extractor program will appear. It is recommended that you press the Unzip button to unzip the files to the default location (c:\FlashUpdate\). If you wish to unzip the files to another location, type that desired destination folder into the field titled 'Unzip to folder' or press the Browse button and then navigate the network to select the desired destination folder.



- 4) It will unzip several files onto your PC to the location you indicated. Press OK.



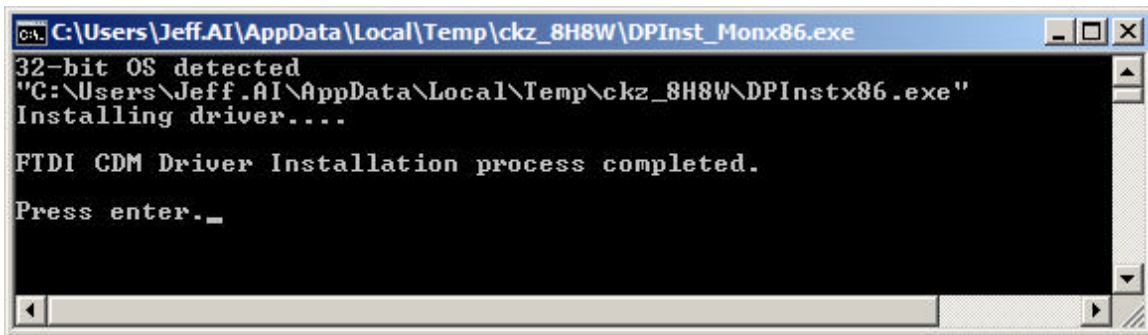
- 5) A Command Prompt screen will appear. Type the number next to the question mark at the flashing cursor that corresponds to your computer's operating system. If you aren't sure of which Operating System you are running, please proceed to Step 6. If you already know your Operating System, please proceed to Step 7.



- 6) To find out which Operating System you're running on this PC, using your mouse, right click on the My Computer icon. Scroll to Properties and left click on it. On the General tab, underneath System, it will tell you which Operating System is installed on your PC (i.e. Microsoft Windows XP).

Another method to find out which Operating System you're running is by using Windows Explorer. Path: Windows Explorer → Help → About.

- 7) Another Command Prompt screen will appear to let you know that USB drivers are being installed. After the USB driver installation is complete, you will receive a message advising you to press Enter. Pressing Enter will complete the software application installation process and the "DOS looking" screen disappears.



```

C:\Users\Jeff.AI\AppData\Local\Temp\ckz_8H8W\DPInst_Monx86.exe
32-bit OS detected
"C:\Users\Jeff.AI\AppData\Local\Temp\ckz_8H8W\DPInstx86.exe"
Installing driver....

FTDI CDM Driver Installation process completed.

Press enter._

```

- 8) Close your internet browser window if you have still had it open and view your desktop screen.
- 9) You will notice that two new shortcut icons have been installed on your desktop. If the icons do not appear on your desktop, you can use "My Computer" or Windows Explorer to navigate to the C:\FlashUpdate\ folder and open FlashUpdate.exe from there.

FlashUpdate is the program used to download the latest satellite transponder and firmware updates to the Super Buddy meter. Application filename: FlashUpdate.exe



FlashUpdate.lnk

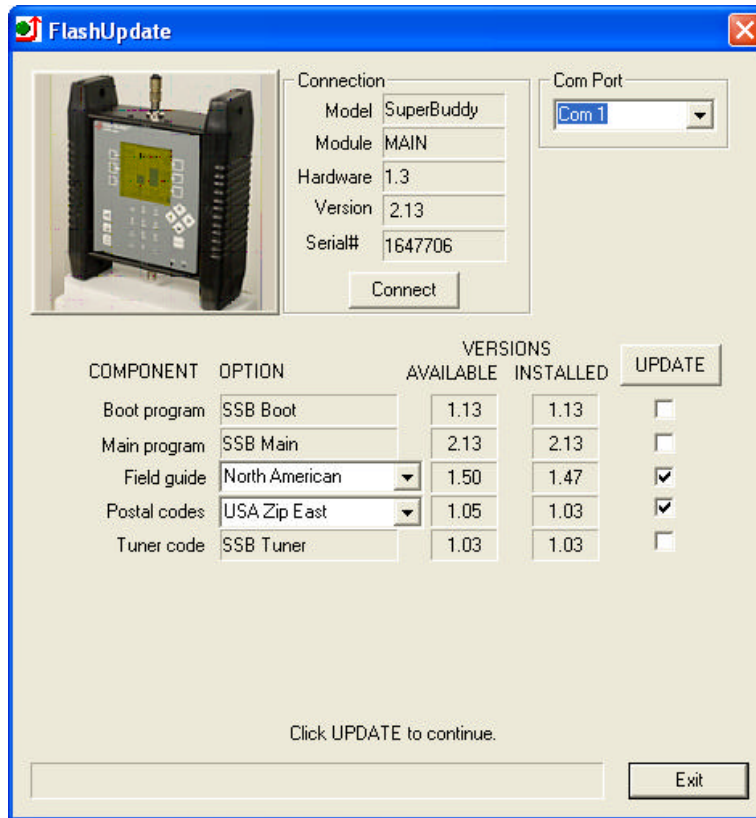
Sat Transfer is the program used to upload stored Proof of Performance Scan information from your Super Buddy meter to the PC. Application filename: SatTransfer.exe



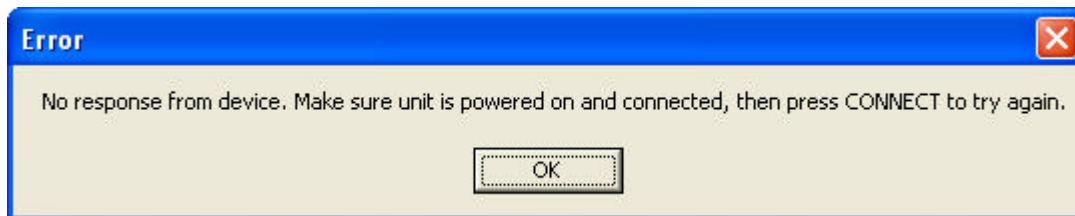
SatTransfer.lnk

Updating

- 1) Ensure you have an active internet connection.
- 2) Plug your Super Buddy into the AC outlet to prevent any problems due to a low battery.
- 3) Connect the Super Buddy to your PC using the supplied download cable and turn it on.
- 4) Double click the Flash Update shortcut icon or start the application from wherever you saved it (i.e. your C drive).
- 5) If the connection is working, the top portion of the following screen should be filled in with data obtained from the instrument (i.e. serial number, loaded software version, etc).

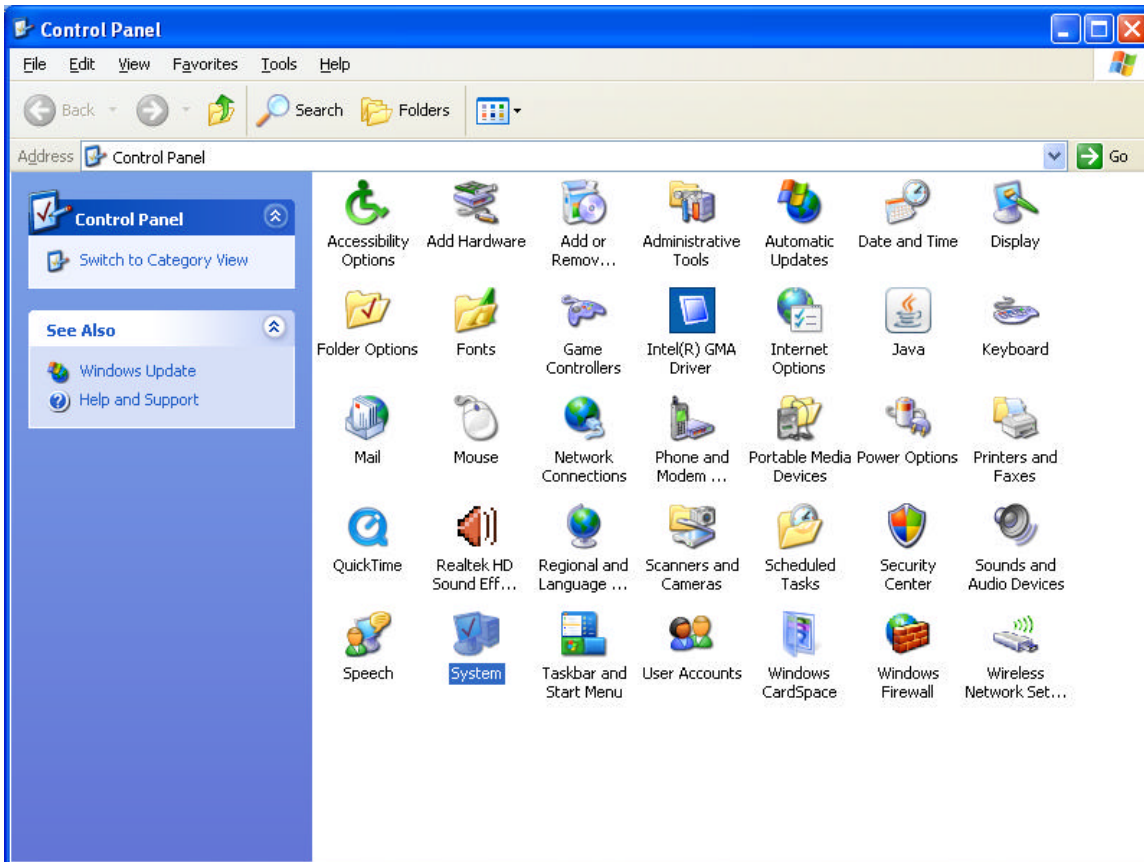


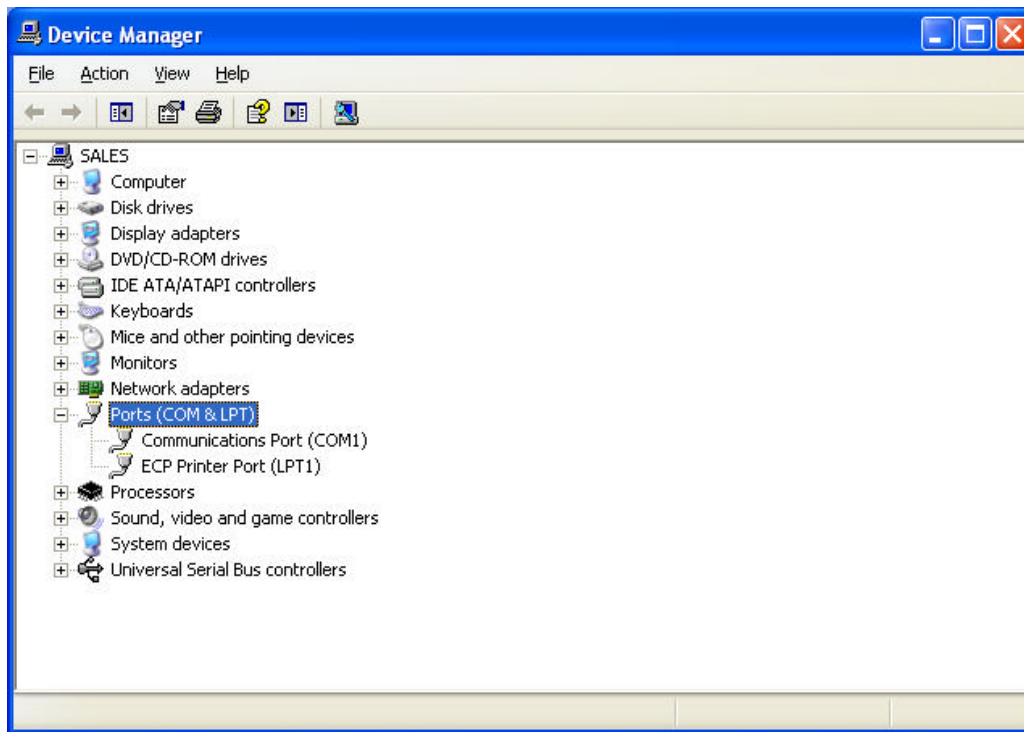
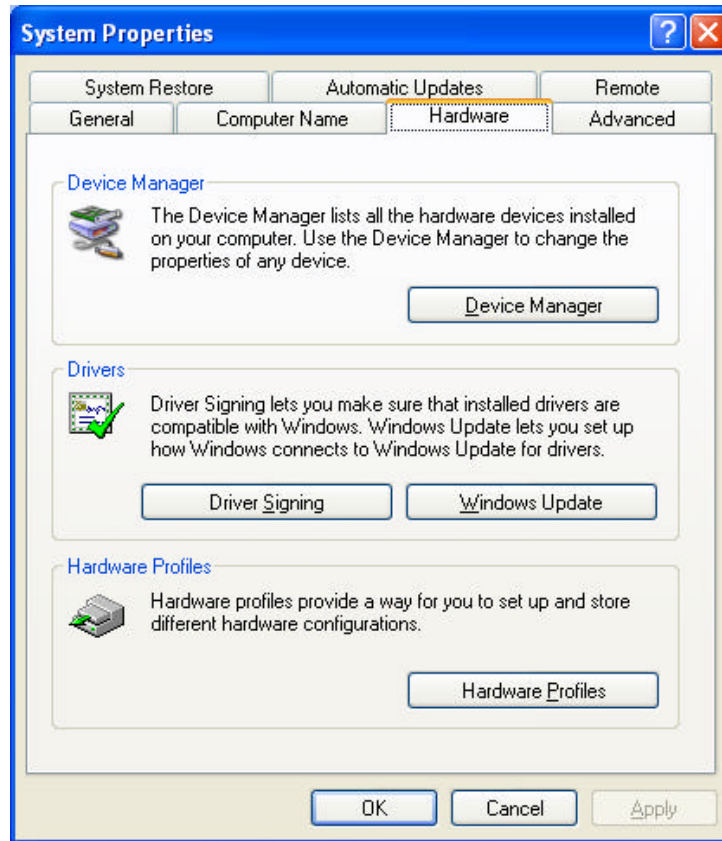
6) If the connection is not working, you will get an error message after a delay.



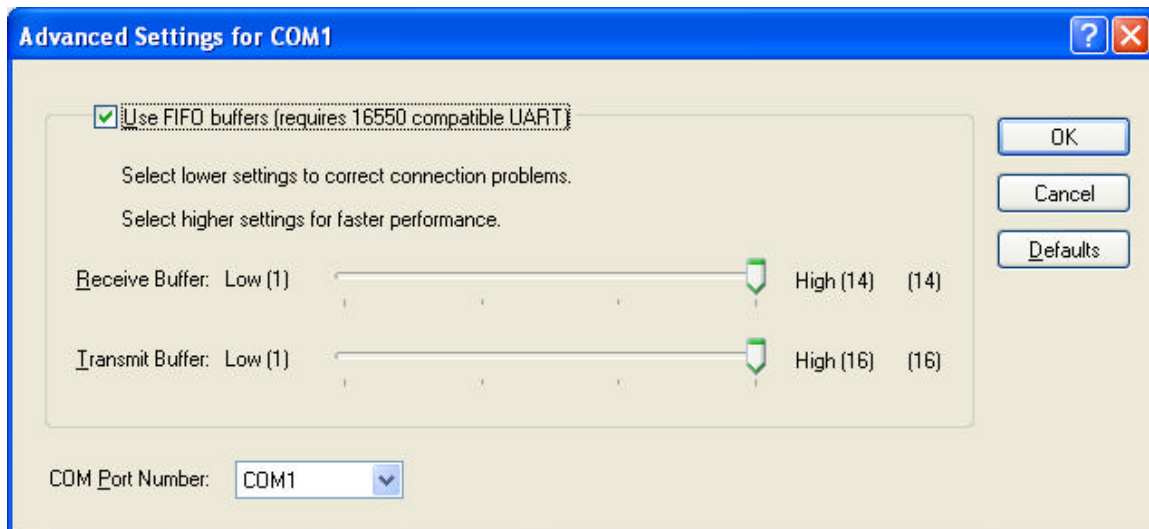
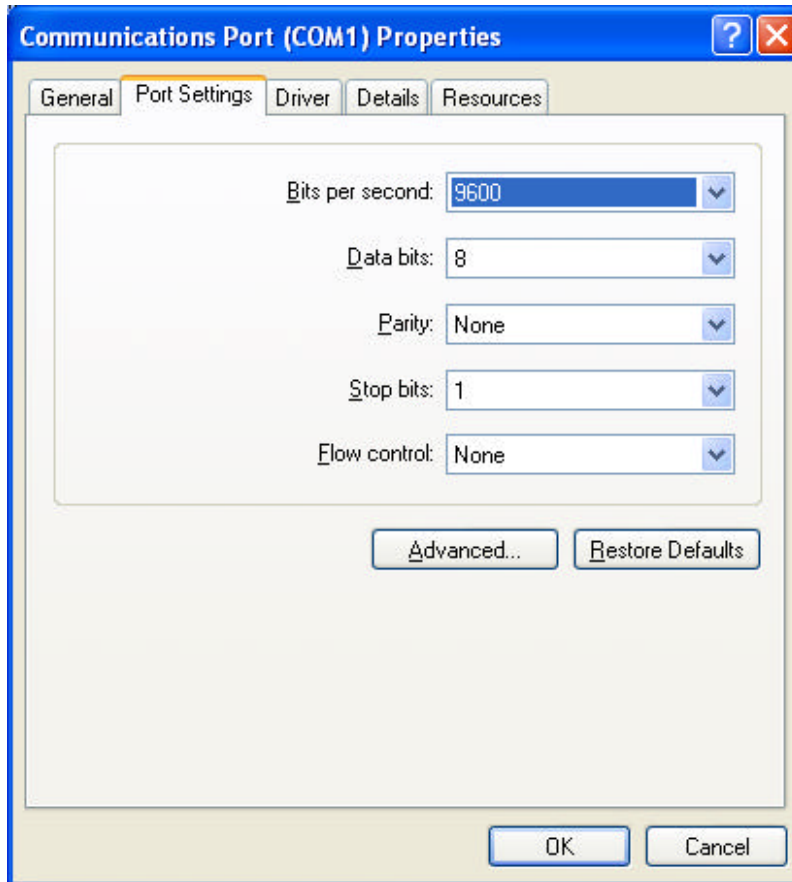
In this case, check to be sure the instrument is on and the download cable is fully seated. Click "Connect" to retry the connection. If it still fails and you have Super Buddy hardware version 1.3 or earlier with an RS232 serial PC connection, verify that the selected COM port is correct. If you have Super Buddy hardware 2.0 or newer with USB PC connection, the computer should automatically establish connection with the meter. If you don't know the com port number, you can try all available ports or you can check your COM port assignments in the Device Manager section of the Windows Control Panel.

Path: Control Panel-->System-->Hardware Tab-->Device Manager button-->Ports (COM & LPT)

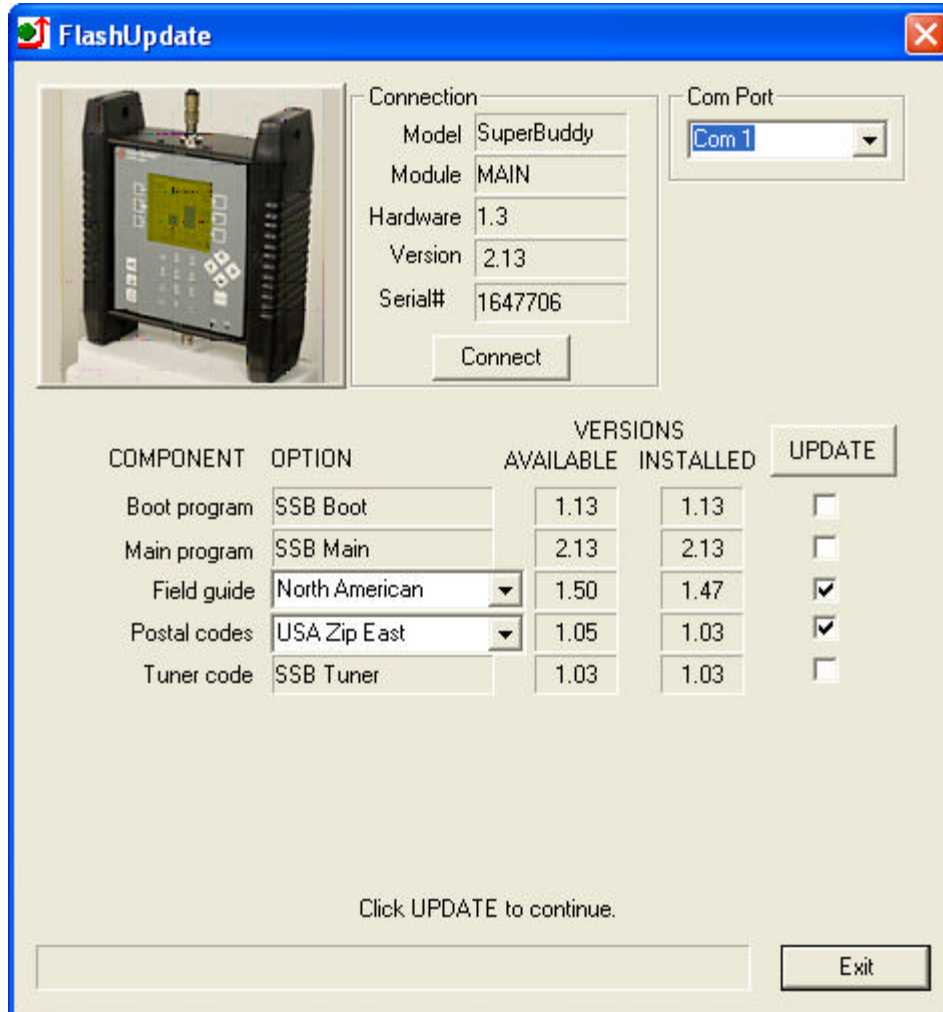




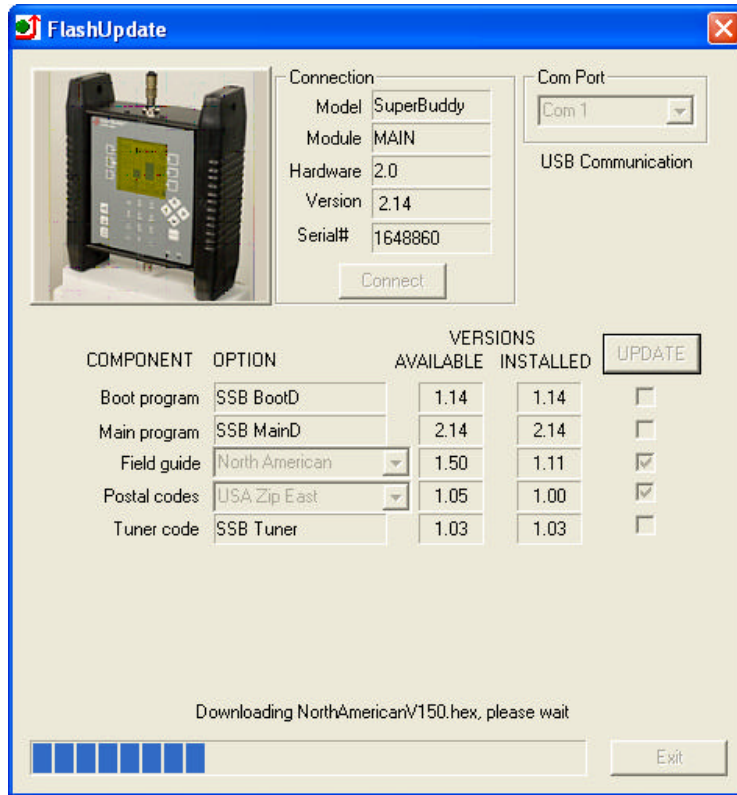
If you see that your Communications Port is set to something other than COM ports 1 through 6, you will need to reassign the COM port. To reassign the COM port, right click with your mouse on the desired COM port and select Properties. Then click on the Port Settings tab. Then click on the Advanced button. Using the drag down menu at the bottom of the Advanced Settings screen, reassign the COM port to an open (unused) port to either COM 1, COM 2, COM 3, COM 4, COM 5, or COM 6. Then press OK twice and exit out of the Device Manager and exit out of the Control Panel.



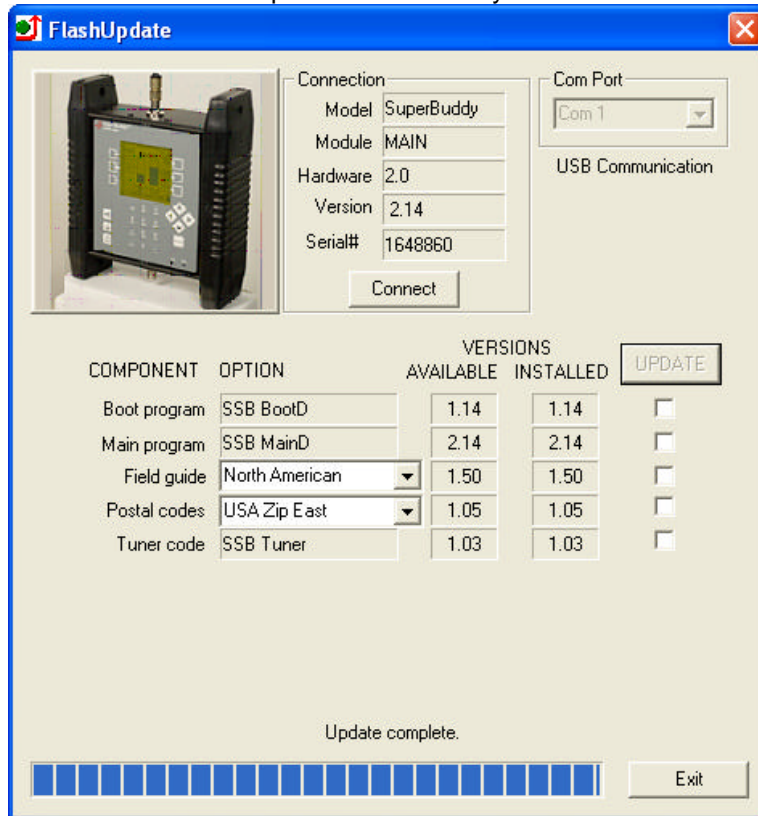
- 7) As soon as the connection is established, the application will access the website and obtain the latest available versions for the various components. These will be compared with the versions installed on your instrument. Any component with a newer version available will be checked. Normally, there is no need to check anything that isn't already checked.



- 8) Select your postal code region: USA Zip East or USA Zip West (based on the relationship to the Mississippi River), Canadian Postal, or No Postal Code (if located outside of North America).
- 9) Click "UPDATE" to start updating the instrument. This process is rather slow. The progress bar at the bottom will show the installation progress of each component.
- If you have Hardware V1.3 or earlier with serial PC connection, the download process can take up to 10 minutes to complete, depending on the number of components that need to be updated.
 - If you have Hardware V2.0 or later with USB PC connection, the download process can take up to 5 minutes to complete, depending on the number of components that need to be updated.



- 10) When finished, the program will display “Update Complete”, click “Exit”. You may now disconnect the meter from the computer and it is ready to use.



Field Guides

There are several Field Guides available now and more may be added in the future. The different Field Guides cover different parts of the world. You can select the Field Guide you need using the pull down list.

If you simply want to change Field Guides even though no new versions are available, you may need to also put a check in the box before clicking "UPDATE". Only components that are checked will be updated.

Postal Codes

Postal code files for the United States and Canada are available now and more may be added in the future. You can select the Postal Code file you need using the pull down list.

If you simply want to change your Postal Code file, even though no new versions are available, you may need to also put a check in the box before clicking "UPDATE". Only components that are checked will be updated.

Note: The zip code database in the meter is not large enough to hold all of the zip codes for the entire United States of America. Therefore, the USA zip codes have been divided into two databases, USA Zip East and USA Zip West, based on the relationship to the Mississippi River.

If you are using the meter outside of the United States and Canada, then choose "No Postal Codes." This allows you to type in and save your latitude and longitude coordinates for your location. Based on the lat/long coordinates provided, the meter can still calculate the azimuth, elevation, and skew settings of the dish antenna as it relates to each satellite.

USB Converters

Note: This section is only applicable if you are using a USB to Serial Converter cable and you have Super Buddy hardware versions 1.1, 1.2, or 1.3

If your PC does not have an RS232 serial port, it is possible to use a USB to RS232 converter. These are available from most electronics retailers for a modest cost. However there are two problems frequently encountered when using these converters.

First, the USB converter will be assigned to a COM port by the Windows operating system. This is usually Com 5 or Com 6 but your system may vary. You can try each com port available in the FlashUpdate program or use the Windows Control Panel to determine which com port has been assigned. For FlashUpdate to recognize the meter, it must be on COM Ports 1, 2, 3, 4, 5, or 6. If Windows has assigned the USB converter a COM port number higher than 6, then you'll need to reassign it to a COM port 1 through 6.

Second, many of these converters do not implement a proper signal ground between the PC and the Super Buddy's serial cable. These same converters may work perfectly well with other equipment by relying on the AC power ground to provide a common ground. But since the Super Buddy is a battery operated device, its RS232 signals are isolated from the AC ground even when the AC battery charging cord is plugged in.

These converters may occasionally work with the Super Buddy simply because the two ground levels happen to be close to each other at the time. They may work initially and then fail part way through the update.

A ground connection can be made with an external wire connecting the F-connector shield (not the center pin) to the frame of the PC (a screw on the back may work).

If you are using a USB converter that you are not sure of, we recommend testing the connection by updating just the Field Guide first. If that works, restart FlashUpdate and update the necessary remaining components. If the update fails during the Field Guide, it is easy to restart the process after finding a different system or installing a ground wire. If the update fails during the Main Program Software, call for technical support to help you restart the update. If the update fails during the Boot Program Software, the meter will have to be returned to the factory to restore the boot program.

Applied Instruments has been satisfied with a USB converter manufactured by Aten, model UC232A. From our testing, it seemed to be the most user-friendly and best performing. This model is available from Applied Instruments and from many online electronics retailers.

Do NOT use the Belkin brand USB to Serial converters with this instrument, as Applied Instruments has seen them cause many problems.

15. Power

LNB Power

The LNB current is limited to different values under different conditions:

	Current Limit Hardware V1.3 and earlier	Current Limit Hardware V2.0 and newer
1) Normal battery operation:	600 mAmps	750 mAmps
2) Charger active (AC or DC):	250 mAmps	500 mAmps
3) IRD power to LNB:	950 mAmps	950 mAmps

Under conditions 1 and 2, an inrush current of 750 mAmps is allowed for a short period if you have hardware revision 1.3 or earlier. Under conditions 1 and 2, an inrush current of 900 mAmps is allowed for a short period if you have hardware revision 2.0 or later.

Battery Charge

The battery charge indicator is based on the battery voltage, which changes slowly during the normal period of operation but quickly when the battery is either fully charged or nearly discharged. Therefore, the battery indicator will only appear full or empty for a short time. Most of the time it will appear $\frac{1}{2}$ or $\frac{3}{4}$ full. When the charge indicator shows $\frac{1}{4}$ charge, you will need to charge it soon. It will shut off very soon after the indicator goes to empty.

Attempting to turn on a unit when the battery contains insufficient charge may result in beeps and/or a flash on the LCD but will not harm the unit.

A fully discharged battery will recharge in about 3 hours.

AC Power

When AC power is applied, it supplies power to charge the battery, run the meter, and power the LNB. In this case, the power available to the LNB is limited to 250 mAmps if you have hardware revision 1.3 or earlier and is limited to 500 mAmps if you have hardware revision 2.0 or later to avoid overdriving the AC power circuit and the battery charging circuit.

DC Power

When external DC power is provided, it also supplies power to charge the battery, run the meter, and power the LNB. The LNB power is again limited to 250 mAmps if you have hardware revision 1.3 or earlier and is limited to 500 mAmps if you have hardware revision 2.0 or later to avoid overdriving the battery charge circuit.

WARRANTY

The Applied Instruments Super Buddy is warranted against defects in materials and workmanship for a period of twelve months. Applied Instruments agrees to repair or replace any assembly or component found to be defective under normal use during this period. Our obligation under this warranty is limited solely to repairing the instrument proven to be defective within the scope of the warranty when returned to the factory. Transportation to the factory is to be prepaid by the customer. Authorization (RMA#) by Applied Instruments is required prior to shipment.

Applied Instruments assumes no liability for secondary charges or consequential damages and, in any event, Applied Instruments' liability for breach of warranty under any contract shall not exceed the purchase price of the instrument shipped, and against which a claim is made.

Any application recommendation made by Applied Instruments for the use of its products is based upon tests believed to be reliable, but Applied Instruments makes no guarantee of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Applied Instruments any liability in connection with the sale of our products other than that set forth herein.



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