APPLIED INSTRUMENTS, INC.

RF TEST AND MEASUREMENT

VSAT 7850
Operation Manual

Revision	1.00
Date	09/20/2013

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. <u>Introduction</u>

The VSAT 7850 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 VSAT 7850 holds all of the compatible 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 VSAT 7850 accesses all compatible 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
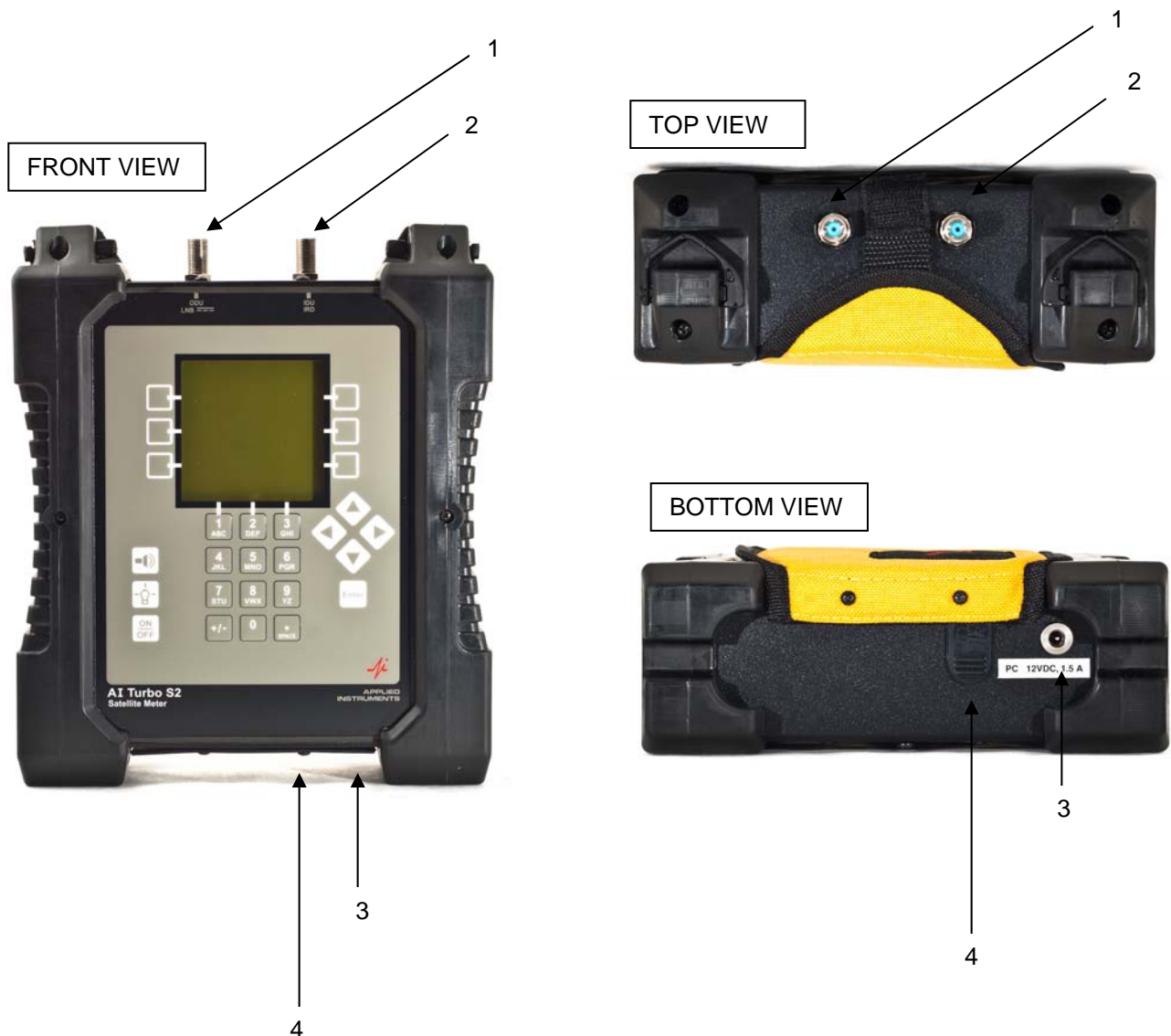
1) ODU / LNB - connects to the LNB (or receiver side of a multi-switch)
2) IDU / IRD - connects to the IRD (receiver or modem) – NOT REQUIRED
3) DC Charge port for use with:
   a) external A/C to DC switching power supply (50/60 Hz 120 to 240 VAC) power for battery charging
   b) 12 VDC vehicle adapter (at least 1 amp for battery charging)
4) PC - USB connection to PC

ODU / LNB Connection
The ODU / LNB connector has two functions:
- Supplies voltage to power the LNB
- Sends commands to control multi-LNB head or external multi-switch
- Receives RF signals coming from LNB output port or multi-switch output port

IDU/ IRD Connection
The IDU /IRD connector has two functions:
- Measures voltage supplied by the IDU/ IRD
- Allows voltage supplied by IDU / IRD to power the LNB extending the battery life of meter
However, the meter itself is always powered by its internal battery or by the external AC to DC switching power supply while connected to AC power.

Note: In order to prevent damage to the meter's circuitry, do NOT input more than 30 volts to the VSAT 7850 satellite meter.

DC Charge Port
The VSAT 7850 can be connected to its external AC to DC switching power supply for powering the meter and/or charging its internal battery from an AC outlet. The VSAT 7850 can be connected to a 12VDC adapter in a vehicle only to charge its battery.

PC Connection
The VSAT 7850 can be connected to a USB port of a PC via the supplied cable.   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.
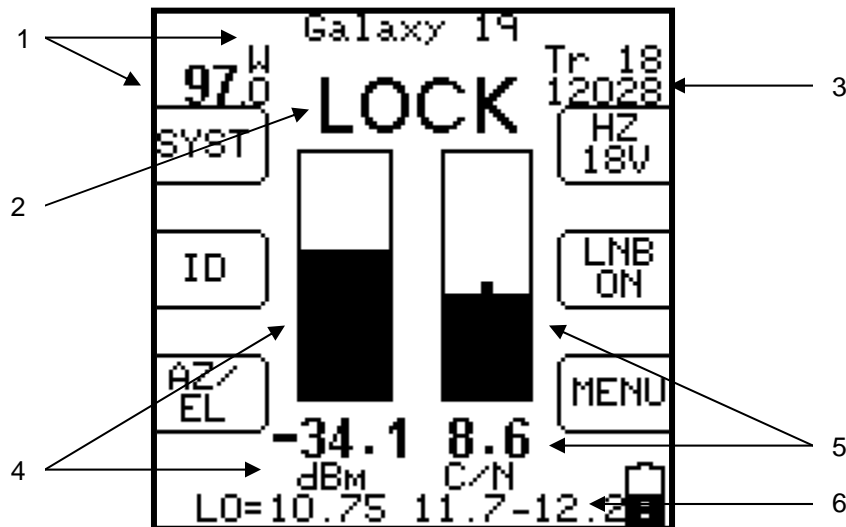
Displayed Data

1) Selected satellite
    a) Change satellite with left and right arrow keys for single LNB systems (or with the LNB soft key when connected to multi-LNB systems, 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 is obtained, this indicates you MIGHT be pointed at the selected satellite, but you must use the ID soft key 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, 18, 21, or 29 volts)
4) Signal Level
    a) Left bar graph (with peak hold center line)
    b) Numeric value in dBm, dBmV, or dBµV
    c) Scale: -75 to -15 dBm (-26 to +34 dBmV)or (+34 to +94 dBµV)
5) Signal Quality
    a) Right bar graph (with peak hold center line)
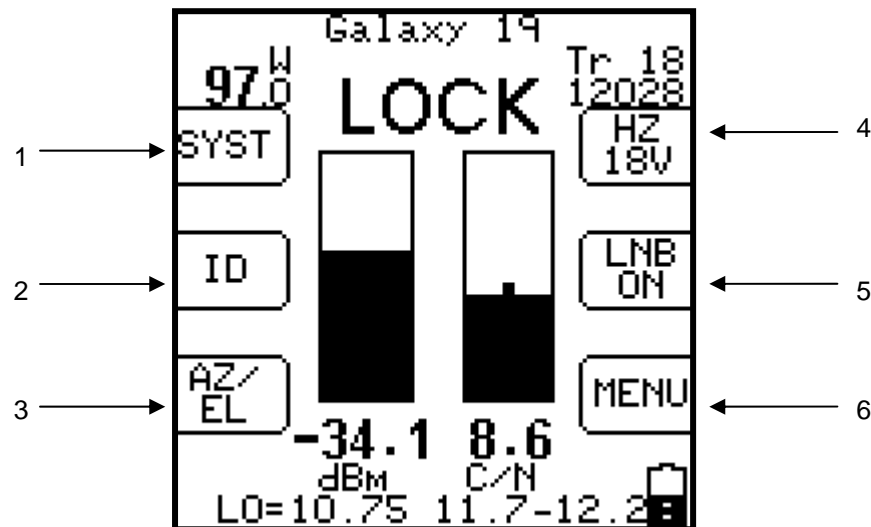   b) Numeric value as IRD equivalent or C/N, Eb/No, or Es/No in dB
    c) Scale: 0 to 20 dB C/N
6) Selected LNB type (bottom line, replaced by frequency deviation if that option is chosen)

Soft Keys

1) SYST   - transfers to the System Setup Screen
2) ID   - starts satellite identification verification function
3) AZ/EL   - transfers to the Azimuth and Elevation 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 Main Menu Screen
7) Left and right arrows – change satellite
8) Up and down arrows – change transponder

Changing Satellites

The left and right arrow keys switch to the next east or west satellite visible to the selected LNB. If the LNB polarity can be switched (dual polarity LNBF), the first priority id transponder will be used and the polarity may switch if needed. If the polarity cannot be switched (single polarity LNB with dedicated feed horn for VSAT applications), 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 arrow keys take you to the next or previous transponder in the same satellite (actually in the same orbital slot). If the polarity is locked (via single polarity 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 (i.e. dual polarity LNBF) 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 (top right soft-key) and the transponder selection is limited to the selected polarity. See figure below.
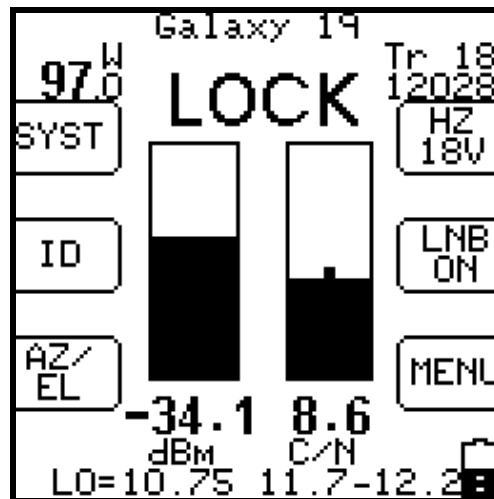
Multi-LNB Systems

When the selected LNB system supports multiple LNBs or multi-head LNBFs via the switch setting, the LNB ON/OFF button also controls the switch setting. Upon pressing the LNB power soft-key, the meter sends a switch command to toggle to the next feed horn and the satellite is automatically changed to the one normally used for that port.
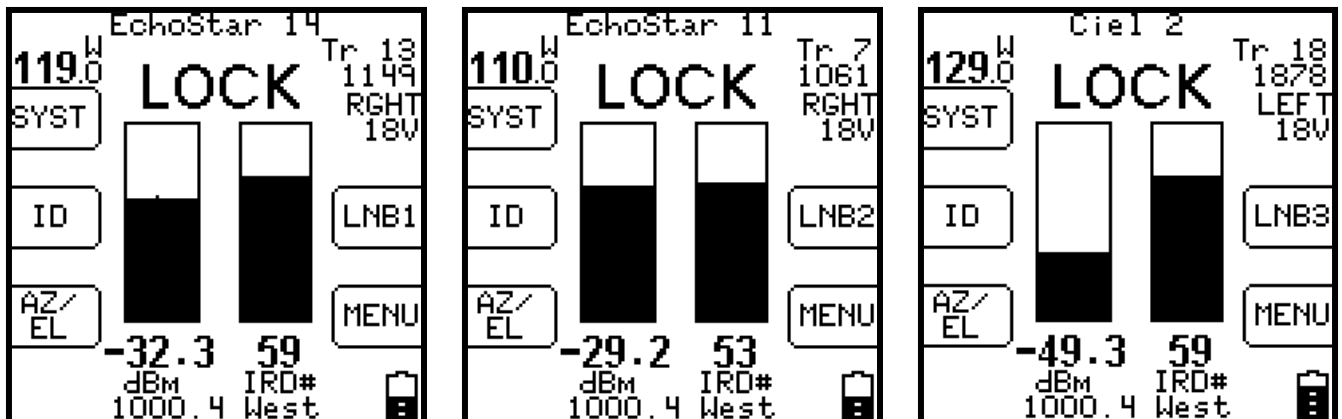
For example, the Dish Network Dish 1000.4 West system is typically used with the 110°, 119°, and 129° satellites. When you press the LNB power soft-key (middle right side of LCD screen) to select LNB1, the meter automatically selects the 119° satellite. Push it again to select LNB2 and the 110° bird 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 VSAT 7850 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 soft-key (middle left side of LCD screen) on the Run Screen.

When you change satellites with the left/right arrow keys (or with the LNB power soft-key if you're connected to a multi-LNBF system), 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 soft-key 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 (left bar graph) on a satellite, but either don't have a signal quality and lock or get an "ID FAILED" message when performing the ID Verification, the VSAT 7850 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.

```
            ID FAILED.



  SCAN




                          OK
```
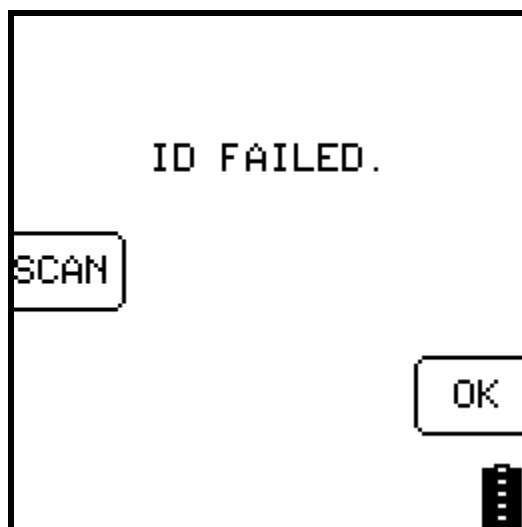
Field Guide Updates

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 software database, we post the revisions on our web site, which you can download into your instrument. See the section on "Updating Your Meter".

Our software 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.

The Hardware version and installed versions of Field Guide, Software, and Postal Codes are displayed on the LCD screen during the 5 second initialization count-down when you first power on the VSAT 7850 meter,

```
        VSAT 7850
        Satellite Meter

        950-2150 MHz  EXIT



        Serial# 1680325
  North American 2.11
    USA ZipCodes 1.09
        Software 1.28
        Hardware 1.00
```
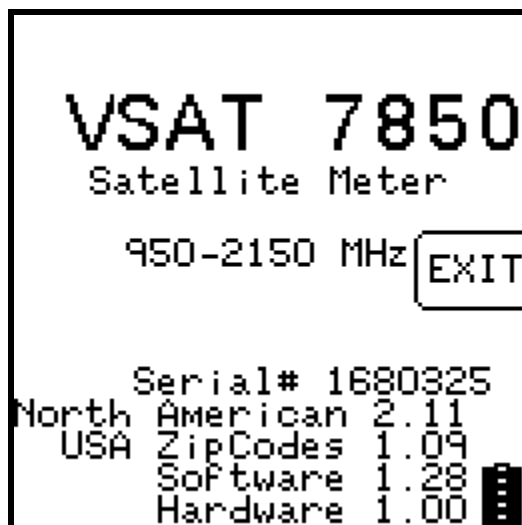
3. <u>Main Menu</u>

The MENU button takes you to a menu of all of the VSAT 7850 screens. Some of these screens are also available via soft keys from the Run Screen.
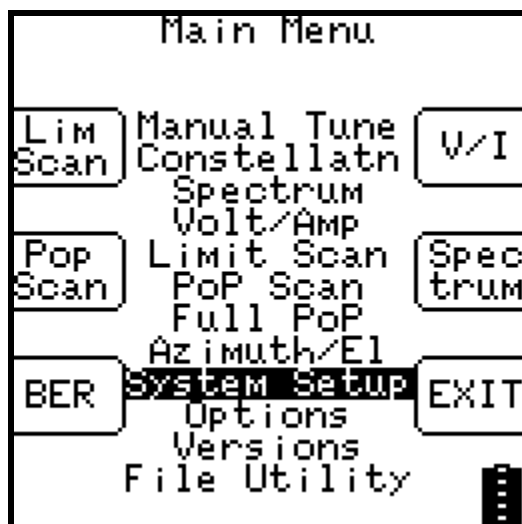
All of the functions are available on the central menu using the up/down and Enter keys. Some functions are also available via soft keys as a shortcut. "Exit" takes you back to the Run Screen.

The functions are described in the sections that follow.

4. <u>System Setup</u>

You **must** use this screen to specify the type of system you are connected to and where you are. **This step is essential**: the VSAT 7850 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 key 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 VSAT 7850 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 VSAT 7850 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.

```
        Select Service

        Dish Network
           DIRECTV
          Bell TV
         HughesNet
        Shaw Direct
      Other Providers
      Special Setups
      Generic Ku Band
      Generic C Band
      Generic Ka Bar EXIT
```

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.

```
        Select System

   H/V Dual Pol LNBF
   H/V Sngl Pol LNB
   Circ Dual Pol LNBF
   Circ Sngl Pol LNB




                    EXIT
```
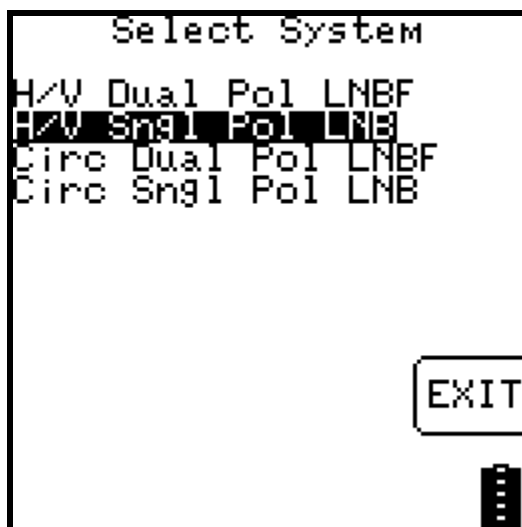
LNB Model

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

```
        Select LNB Model


LO=10.75 11.7-12.2
LO=10.75 11.7-12.75
LO=10.75 w/22kHz
LO=11.3
LO=11.25
LO=10.7
LO=10.6 11.7-12.2
LO=10.6 11.7-12.75
LO=10.6 w/22kHz      EXIT
LO=10.5
LO=10.445
```
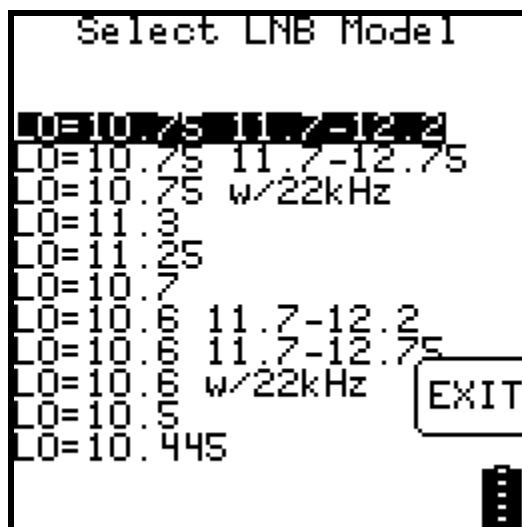
Switch Type

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 VSAT 7850 to an external switch rather than directly to the LNB, or when you connect to a multi-LNB head, the VSAT 7850 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.)

```
        Select Switch


            None
            22kHz
            SW21
           SW42/44
            SW64
            Twin
            Quad
            DiSEqC
           DpTwin
           DpPlus       EXIT
            Dp34
            DPP44
```
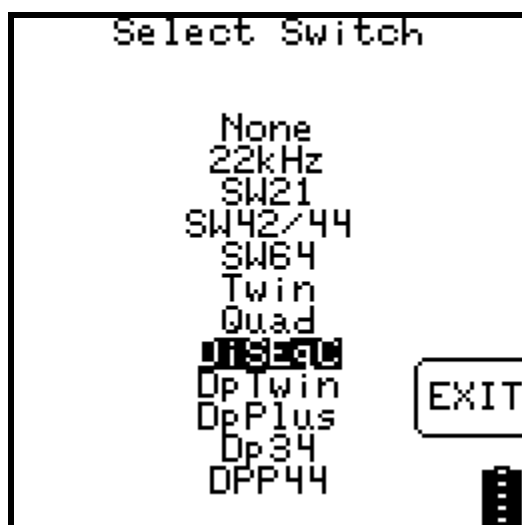
5. <u>Options</u>

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

```
          OPTIONS
     Level:dBm
   Quality:C/N
 Frequency:Dnlink      ┌─────┐
   Sounder:Lock        │ PRE │
  Shutdown:None        │ SET │
  Freq Dev:YES         └─────┘
  IRD Calc:New         ┌─────┐
 PoP delay:20          │DATE │
  Key beep:OFF         │TIME │
                       └─────┘
                       ┌─────┐
                       │EXIT │
                       └─────┘

   (arrows select)
```

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 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/N_0 – Energy per bit over noise energy per hertz in dB
- Es/N_0 – 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 (approximately 0 to 85).

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 VSAT 7850 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.

Freq Dev ⟶
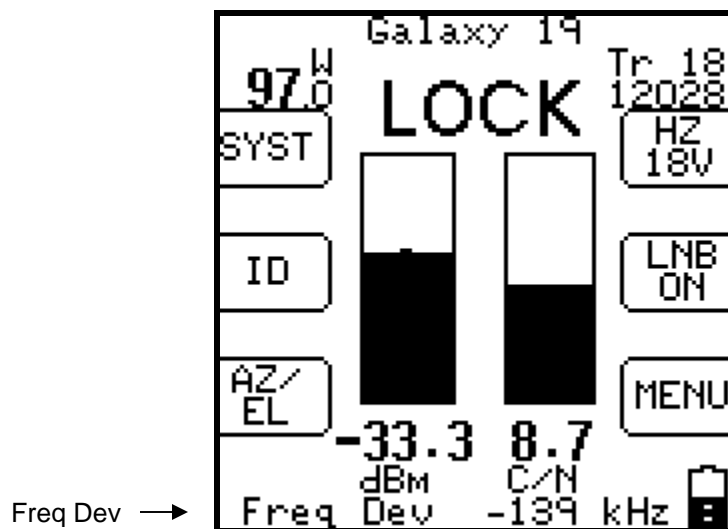
IRD Calc

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 (approximately 0 to 85). Use this option to select which scale to use. The default is "New".

PoP Delay

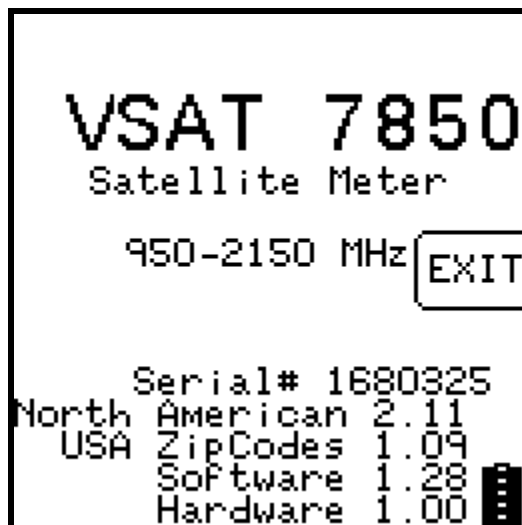If you notice transponder results missing from the PoP Scan reports, you may need to introduce a delay into the Proof of Performance scan. The value entered in this field is the number of samples taken if a LOCK isn't obtained. The unit takes 3 samples per second. If 0 is entered in this field, the PoP Scan will operate normally without any delay. You may experiment with 5, 10, 15, or other values.

Key Beep
By default, key beep is on and user will hear an audible "beep" when any buttons on the meter are pressed. User may turn off the key beep if desired.

Version
Pressing the VERS soft-key will lead the user to a new screen that will display the versions of software that are loaded in the meter and its hardware version. The screen also displays the serial number of the meter.

```
        VSAT 7850
      Satellite Meter

      950-2150 MHz EXIT


         Serial# 1680325
North American 2.11
  USA ZipCodes 1.09
       Software 1.28
       Hardware 1.00
```

Preset
Pressing the Preset soft-key in the Options menu will return the meter to its factory default settings (will erase any stored postal code or latitude and longitude setting, will return the RF signal level field to its default dBm value, will return the signal quality field to its default IRD value, etc.).

Date / Time
Pressing the DATE TIME soft-key in the Options menu will lead the user to a new screen that allows the user to specify and store the date and time for the meter's internal clock.

```
         DATE / TIME



             Date
          (MM/dd/yyyy)
          09/11/2013

             Time
          (hh:MM:ss)
          15:57:55
                      EXIT
```
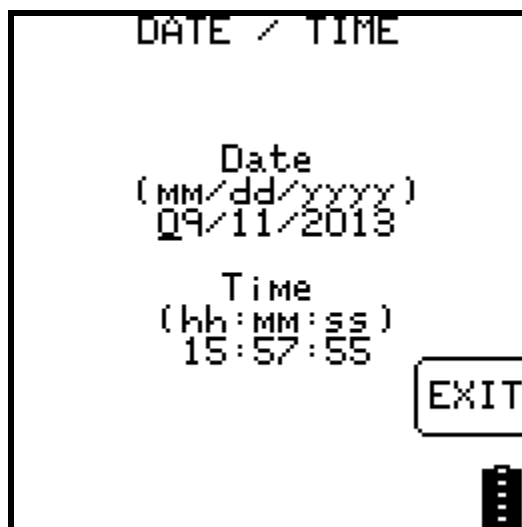
6. <u>Azimuth / Elevation Lookup</u>

The meter can look up the azimuth, elevation, and polarization offset for different satellites based on the latitude and longitude specified by the user. 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. You may change the selected satellite using the left and right arrow keys.

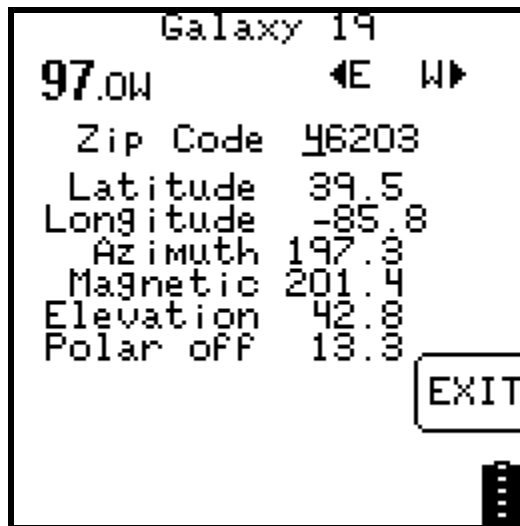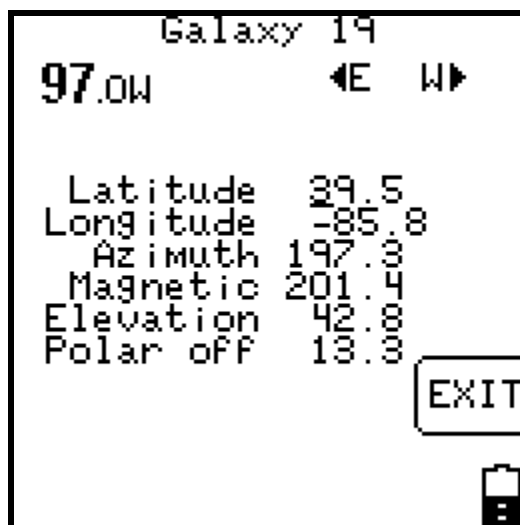In the United States, enter any zip code and this screen will look up the latitude and longitude for that location and calculate the azimuth and elevation angles for the selected satellite.
The USA ZipCodes database in the meter holds all of the zip codes for the entire United States of America. There is also a database available for Canada (Canadian Postal). Type in the zip code or postal code using the numeric keypad and press ENTER.

```
            Galaxy 19
   97.0W           ◄E   W►

      Zip Code  46203
     Latitude   39.5
    Longitude  -85.8
      Azimuth 197.3
     Magnetic 201.4
    Elevation  42.8
    Polar off  13.3
                        ┌─────┐
                        │EXIT │
                        └─────┘
```

The database titled 'No Postal Code' should be chosen if you are located outside of North America. This database allows the user to type in and save his latitude and longitude coordinates and look up antenna settings based on those coordinates. Type in the latitude and longitude directly and press ENTER. For locations west of the prime meridian (°W longitude) or south of the equator (°S latitude), type a "-" (dash) in front of the numeric value.

```
            Galaxy 19
   97.0W           ◄E   W►


     Latitude   39.5
    Longitude  -85.8
      Azimuth 197.3
     Magnetic 201.4
    Elevation  42.8
    Polar off  13.3
                        ┌─────┐
                        │EXIT │
                        └─────┘
```

The different postal code databases or 'No Postal Code' database may be downloaded and updated using the FlashUpdate program, which is described further in the Updating section of the manual.

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.

7. <u>Manual Tuning</u>

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. If you need to permanently save a transponder to the VSAT 7850 meter's database, then please use the Custom Transponder feature.
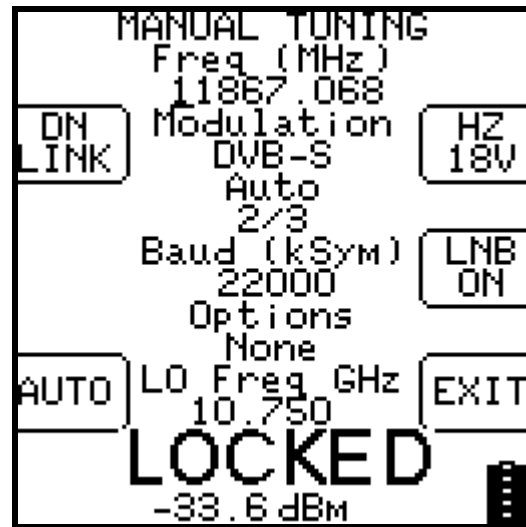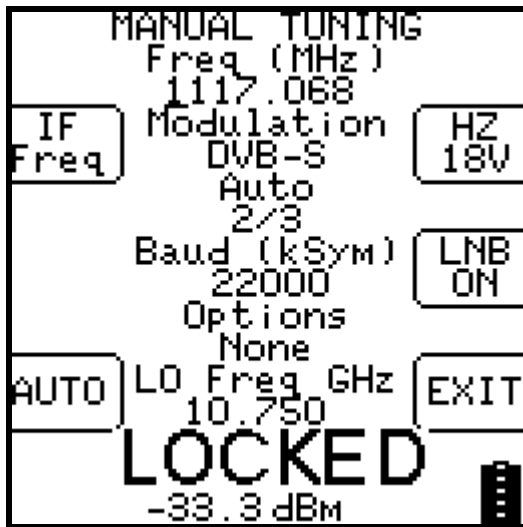
Frequency

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:

    DVB-S   for DVB-S standard signals
    DVB-S2   for newer DVB-S2 CCM (many high-def) broadcast signals
    S2-ACM   for DVB-S2 ACM or VCM signals (often used for VSAT data terminals)
    Other   for signal types that the VSAT 7850 is not compatible with
                    (i.e. Turbo FEC and Digicipher 2)*
    DSS   for legacy DIRECTV™ signals

*VSAT 7850 will only display RF signal level (i.e. dBm) when tuned to a transponder with an incompatible signal type. Meter will not display lock or demodulated signal quality.

Code Rate

For DSS, DVB-S, DVB-S2, user can select the desired code rate with the left/right arrow keys. DVB-S2 ACM uses only automatic code rate detection.
Note: Code Rate is also referred to as 'puncture code' or often 'FEC' (Forward Error Correction) rate

Baud Rate

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

Options

Use the left/right arrow keys to toggle through the options related to your chosen modulation type.

If DVB-S2 modulation type is selected and you have chosen a specific code rate, then you may choose between ' Pilot on' and 'Pilot off' . If your code rate is set to 'Auto' , then your pilot status will automatically be set to 'Pilot Auto'.

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. <u>Custom Transponder</u>

- Users may define and permanently save up to 256 custom transponders in the database of the VSAT 7850 satellite meter.
- To enter the Custom Transponder setup screen from the main Run screen, press MENU soft-key (located near bottom right corner of LCD screen). Th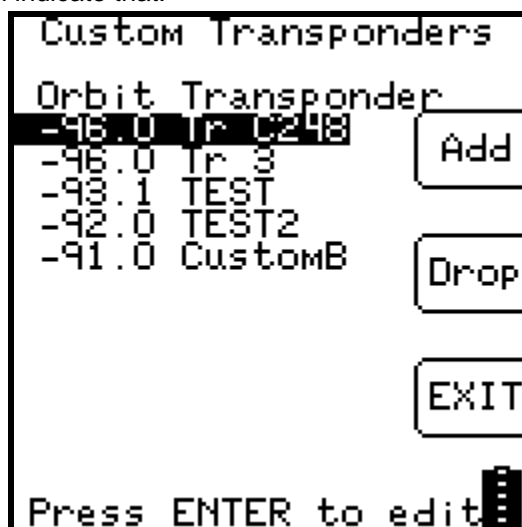en use your Up or Down arrow buttons to select 'Custom Trans' near the bottom of the Main Menu list, and press the Enter button.
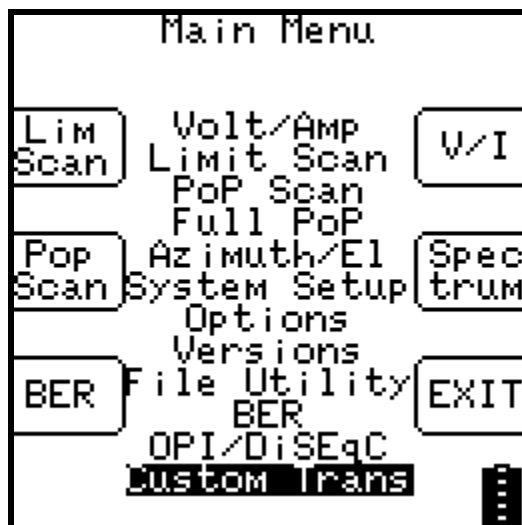
- Any saved custom transponders in the meters database will be shown. If none have been saved, meter will indicate that.

- If you wish to edit those already saved custom transponders, highlight a custom transponder and press Enter button.
- Press "Add" soft-key (located near top right corner of LCD screen) to add a new custom transponder.
- If you wish to delete an already saved custom transponder, highlight a custom transponder and press "Drop" soft-key (located near middle right side of LCD screen).
- If you wish to exit the Custom Transponders screen, press the EXIT soft-key (located near bottom right corner of LCD screen).

- Add or edit will take you to a screen to define the transponder parameters. The layout of the Custom Transponder parameters screen is similar to the Manual Tune screen. Use alphanumeric keypad to type in field values. After entering a value, press the Enter button. Use Up and Down Arrow buttons to navigate to the next field.

```
 Custom Transponders
rbit   -93.1    (-=West)
  Sat  G25
                        DN
abel   TEST            LINK
Freq   12100.100
olar   Horiz
 Mod   DVB-S            P
Code   7/8            Save
Baud   12150 kSym
ilot   AUTO
ptns   None            P
  Id   NO             EXIT 0
```

Custom Transponder Parameters Fields editable by user:

- Orbit - Specify orbital location of satellite. For satellites located west of the Prime Meridian, type a "-" in front (i.e. -89.0 for 89.0W)
- Sat - Specify name of satellite (i.e. Galaxy 28)
- Label - Specify transponder label (i.e. Tr 5)
- Freq - Specify frequency of transponder (i.e. 12149.625).*
- Polar - Using Left or Right arrow buttons, specify polarization of transponder (i.e. Horizontal or Vertical or Left or Right)
- Mod - Using Left or Right arrow buttons, specify signal type (i.e. DVB-S, DVB-S2, S2-ACM, Other, or DSS)
- Code - Using Left or Right arrow buttons, specify Code Rate / FEC (i.e. Auto or 1/2 or 2/3 or 3/4)
- Baud - Specify Symbol Rate (i.e. 2010 kSym)
- Pilot - Using Left or Right arrow buttons, if applicable, specify Pilot status (i.e. AUTO or OFF or ON)
- Optns - If applicable specify any other options relevant to the transponder
- Id - Using Left or Right arrow buttons, specify if you want this custom transponder to be used as an ID transponder for ID verification check on the satellite.**

*It is best to specify the downlink frequency (frequency direct from the satellite before down-conversion by LNB). If you wish to specify the L-Band frequency (frequency of the transponder after down-conversion by LNB), then press the "DN LINK" soft-key (located near top right corner of LCD screen) and you will see the soft-key label change to "IF Freq". Then enter the L-Band frequency. The meter will then calculate the downlink frequency based on the user's present LNB LO settings that have been defined in the System Setup menu. Modems often display the L-Band frequency of the carrier, but for this information to be useful, the user must specify the LO frequency of the LNB in use for that system.

**If there is already an ID transponder for the satellite in the meter's database, then the custom transponder would become a 2nd ID transponder used for an additional level of checking. If there

is not presently an ID transponder for the satellite in the meter's database, then the custom transponder would become the default transponder and sole ID transponder for that satellite.

***Remember that the VSAT 7850 satellite meter is only designed to measure the downlink / receive / outbound signal. Please do not enter any transponder parameters for the uplink / transmit / inbound signal, as the parameters will not be of any utility in the meter.

- Press "Save" to save the changes or the new transponder parameters.
- Press the "EXIT" soft-key (located near bottom right corner of LCD screen) if you wish to exit the Custom Transponders editing screen without saving the changes or new transponder parameters.
- The custom transponders will appear in the meter as if they are part of the Field Guide. As such, they will be usable and viewable in the Limit Scan and Proof of Performance (PoP Scan) features.
- Users may save up to 256 custom satellite transponders in the meter.
- If the custom transponder is not visible to the selected LNB and feed horn configuration, it won't appear (i.e. If you define a horizontal transponder and select a circular feed horn in the System Setup menu then you won't see it displayed. If you define a C-Band transponder and select a Ku Band LNB in the System Setup menu then you won't see it displayed)
- Custom transponders do not have any beam/footprint info so they are considered visible in all geographic regions and therefore will appear in the meter, regardless of which geographic Region is chosen in the System Setup menu and which Field Guide is loaded.

9. <u>Voltage / Current</u>

The V/I or Voltage / Current Screen displays:
LNB – voltage output supplied to LNB
mAmps - current draw of LNB
IRD - the voltage output of modem or satellite receiver if connected to meter's IRD / IDU port
Battery - meter's internal battery voltage
Ext DC – amount of voltage being supplied to meter by external AC to DC switching power supply
or by external DC vehicle charge cord connected to DC charge port on bottom panel of meter
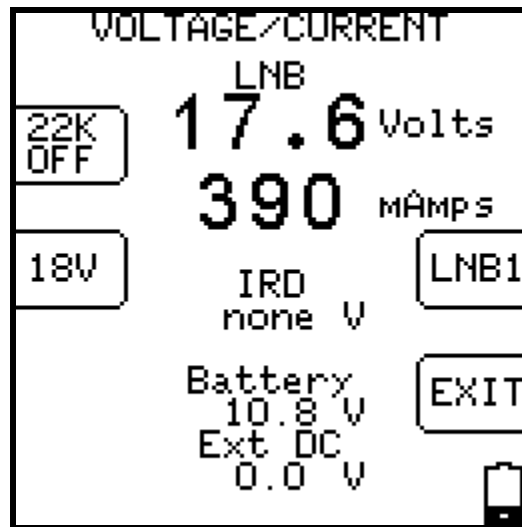
Soft Keys

1) 22K   - Turns the 22 kHz tone on or off
2) Voltage   - Changes LNB voltage (see below)
3) LNB   - Turns LNB power on or off and selects switch ports
4) EXIT   - returns to the Main Menu Screen

For the voltage, the VSAT 7850 can output 13V, 18V, 21V for DIRECTV SWiM LNBs, or 29V.

Note: In the screenshot shown above, approximately 18 volts is being output by the meter to the LNB.

10. <u>OPI and DiSEqC Monitoring</u>

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

OPI Simulation
When OPI messages are received it displays them on the screen just like the OPI device.
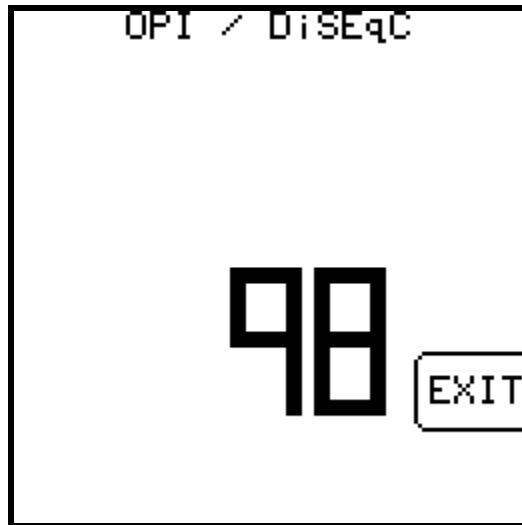
HughesNet™ Cross-Pol Check Procedure

1) Align the dish using the receiving LNB just as you would a normal Ku band dish using the VSAT 7850's main 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 VSAT 7850 into the receiver cable. The VSAT 7850's ODU / LNB port should be connected to the LNB and the IDU / IRD port to the modem's Rx port.
5) Go to the VSAT 7850 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 IDU / 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.
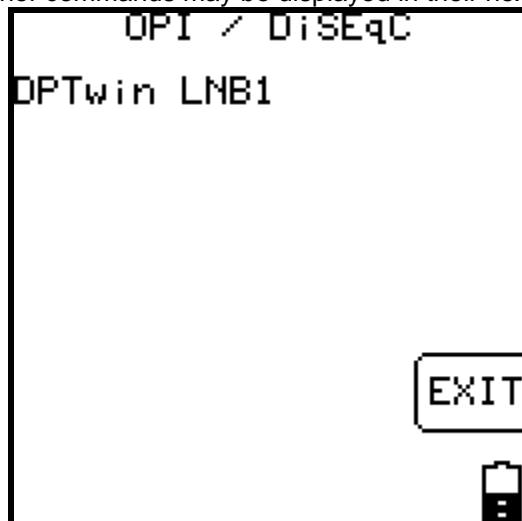
11. <u>**Bit Error Rate / Packet Error Rate**</u>

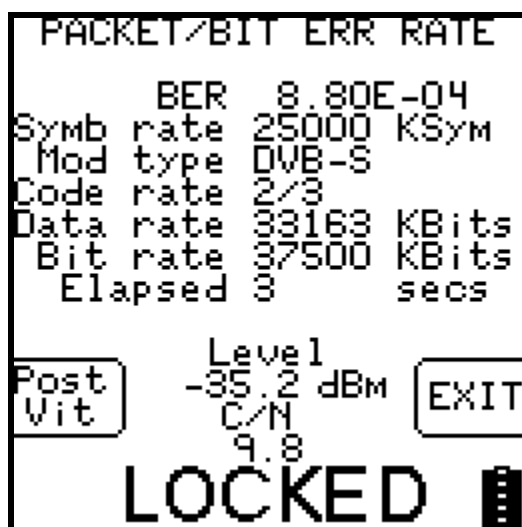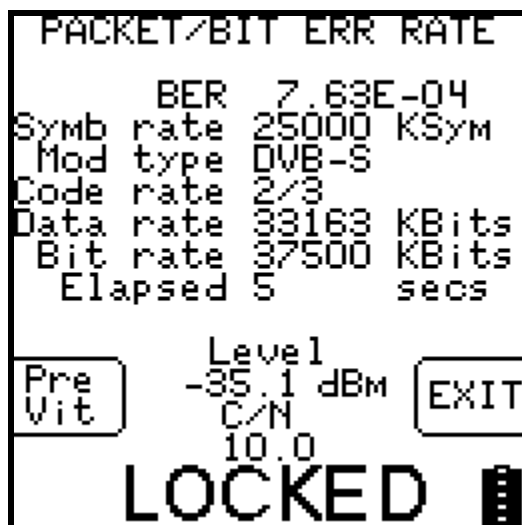The Bit Error Rate / Packet Error Rate screen (select BER from the Main Menu) displays the bit error rate (BER) or packet error rate (PER) of the signal as detected by the demodulator chipset within the VSAT 7850.

```
 PACKET/BIT ERR RATE

        BER   7.63E-04
Symb rate 25000 KSym
 Mod type DVB-S
Code rate 2/3
Data rate 33163 KBits
 Bit rate 37500 KBits
   Elapsed 5     secs


          Level
Pre    -35.1 dBm   EXIT
Vit      C/N
         10.0
    LOCKED
```

```
 PACKET/BIT ERR RATE

        BER   8.80E-04
Symb rate 25000 KSym
 Mod type DVB-S
Code rate 2/3
Data rate 33163 KBits
 Bit rate 37500 KBits
   Elapsed 3     secs


          Level
Post   -35.2 dBm   EXIT
Vit      C/N
          9.8
    LOCKED
```

Pre-Viterbi and Post-Viterbi BER
The meter displays the errors Pre-Viterbi (before the Viterbi decoder) and Post Viterbi (after the Viterbi decoder) BER (bit error rate) for DVB-S and DSS / DIRECTV Legacy signals. Press soft-key near bottom left corner to toggle between Pre-Viterbi (Pre Vit) and Post-Viterbi (Post Vit) BER.

PER
The meter displays the PER (packet error rate) for DVB-S2 signals.

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.

Meter displays:

1)   BER error count* (for DVB-S and DSS signal types) or PER error count (for DVB-S2 signal type)
2)   Symbol rate in kilo-symbols/second
3)   Symbol rate error
4)   Modulation type (i.e. DVB-S, DSS, DVB-S2, S2-ACM)
5)   Code rate or bit puncture rate
6)   Data rate – calculated rate of payload kilo-bits per second (post-FEC data rate)
7)   Bit rate
8)   Elapsed time counter (seconds)
*Press soft-key near bottom left corner to toggle between Pre-Viterbi (Pre Vit) and Post-Viterbi (Post Vit) BER for DVB-S and DSS signal types.

12.   <u>Proof of Performance Testing</u>

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 website 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.

Tip: You should choose Full PoP Scan when you're connected to a multi-LNB head (LNBF assembly with built-in multi-switch) that is receiving signals from more than one satellite or when you're connected to the output port of a multi-switch that has signals from more than one satellite connected to the input ports of the multi-switch. You should choose PoP Scan when you're connected to a single LNB that is receiving signals from a single satellite.

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 by sending the required switch commands to the multi-switch or multi-LNBF head with built-in multi-switch.
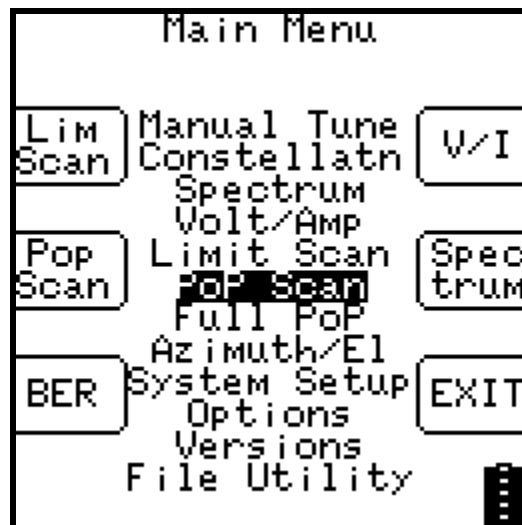
The meter will scan through all transponders on the satellite collecting the measurement data.
You may press STOP to abort the scan, otherwise, wait until the scan completes.
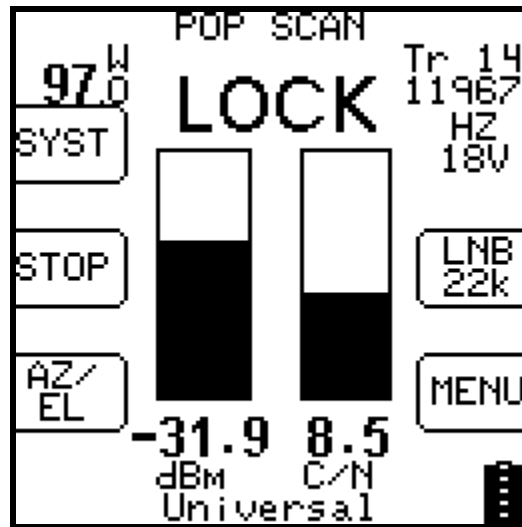
When the scan completes, the following screen displays a summary of the data:
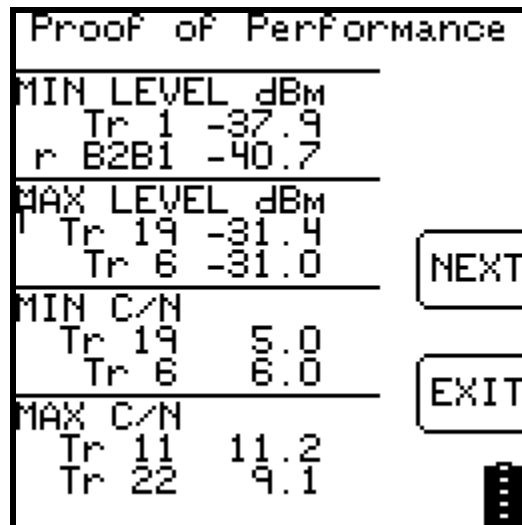
You press "EXIT" to discard the data or "NEXT" to continue.
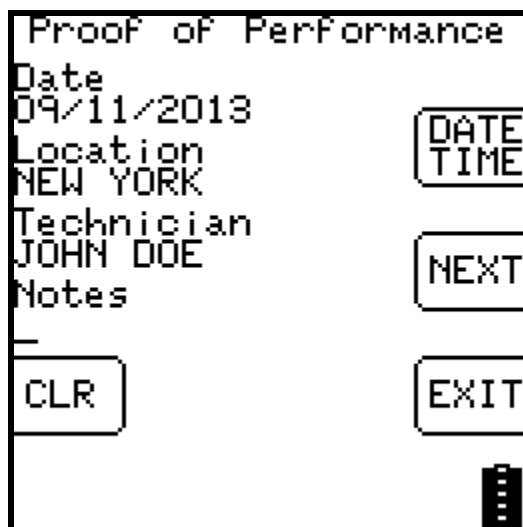
Saving Data

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

Note:
Alphanumeric 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                     │
│ 09/11/2013      ┌──────┐ │
│ Location        │ DATE │ │
│ NEW YORK        │ TIME │ │
│ Technician      └──────┘ │
│ JOHN DOE        ┌──────┐ │
│ Notes           │ NEXT │ │
│ _               └──────┘ │
│ ┌─────┐         ┌──────┐ │
│ │ CLR │         │ EXIT │ │
│ └─────┘         └──────┘ │
│                      ▓   │
│                      ▓   │
└──────────────────────────┘
```

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

```
┌──────────────────────────┐
│ Proof of Performance     │
│                          │
│ File name                │
│ 97W G19 KU_              │
│                          │
│                          │
│                          │
│                 ┌──────┐ │
│                 │ SAVE │ │
│                 └──────┘ │
│ ┌─────┐         ┌──────┐ │
│ │ CLR │         │ EXIT │ │
│ └─────┘         └──────┘ │
│                      ▓   │
│                      ▓   │
└──────────────────────────┘
```

The file name must be unique. An error message will appear if you enter a name that has already been used. To determine which names have been used, the user can run the SatTransfer program on a PC or can select 'File Utility' from the Main Menu.

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

Press "SAVE" and the system will copy the file from temporary storage to flash file storage. 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 can transfer all of the stored files to a PC and then erase the meter's flash memory to create new space. You can erase the stored files by using the SatTransfer program on a PC or by pressing the 'Format' soft-key in the File Utility screen.

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 USB data transfer cable and turn the meter on.
2) Start SatTransfer after the meter has completed its 5 second boot-up countdown. An icon that looks like the VSAT 7850 should be installed on your desktop for this purpose.

SatTransfer.lnk

3) The File Transfer window appears somewhat like the following example.
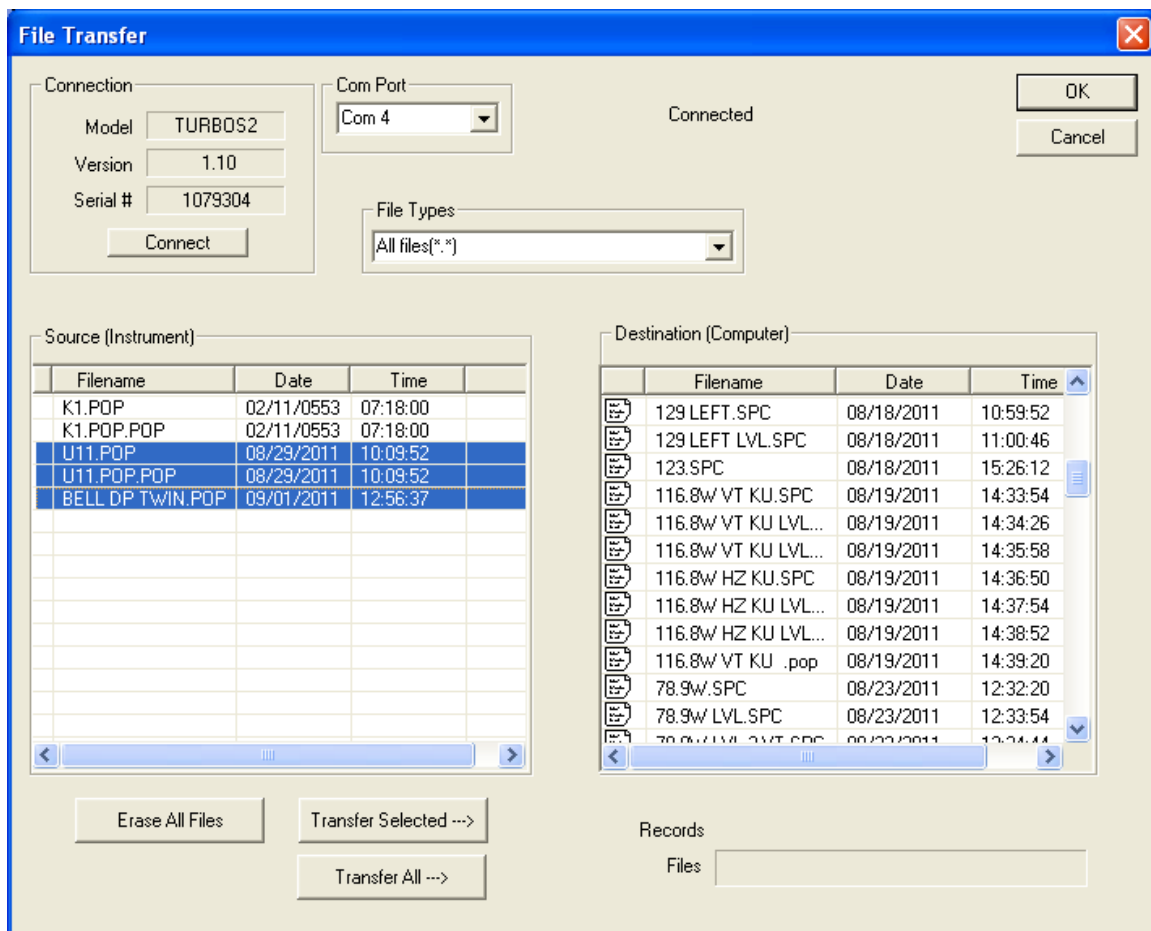
The box on the left displays the files stored on the meter. The box on the right shows the files stored on the PC. The files are stored in a text file format (.txt) so they can be easily opened in Excel or other PC applications.

By default, the text files are stored in a "Data" folder under the "FlashUpdate" folder where the SatTransfer program is installed (in the folder C:\FlashUpdate\Data). 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 Selected' to have the chosen files copied to the PC folder or you can click on 'Transfer All' button to copy all stored files from the meter to the PC. A status message near the bottom right of the SatTransfer 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:
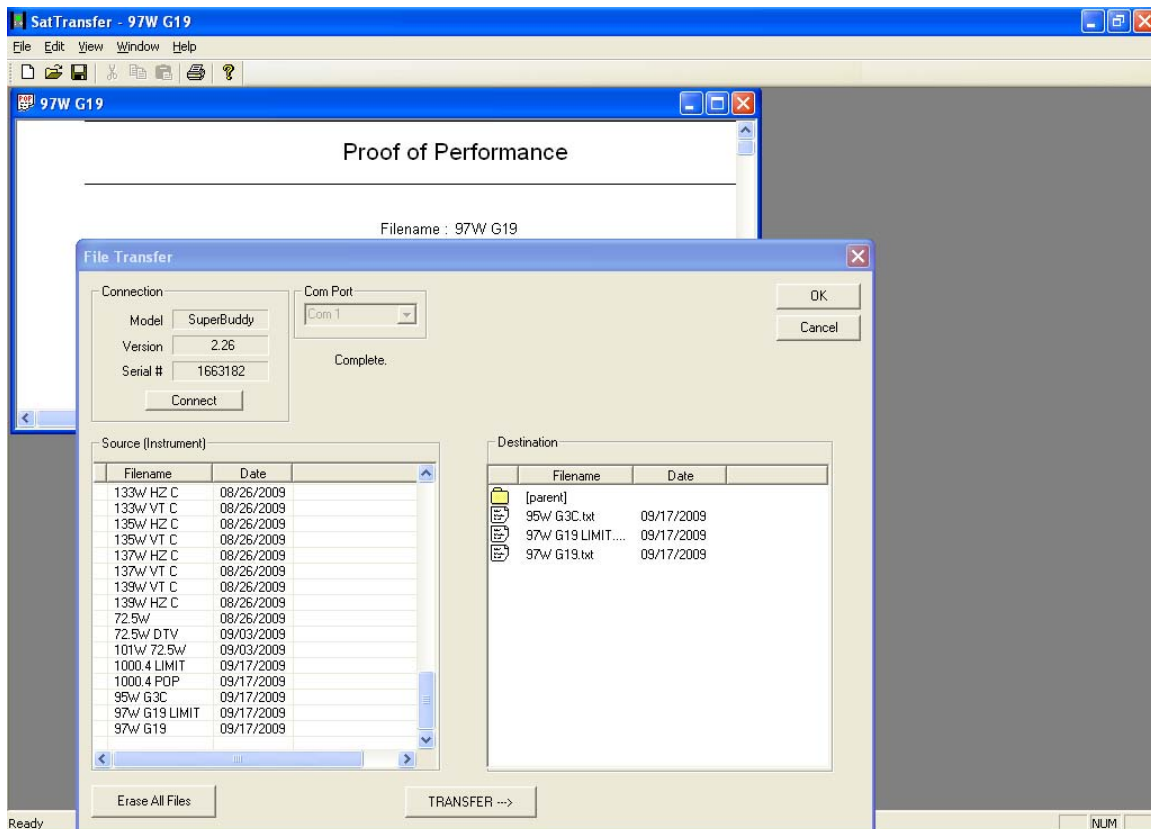
The report itself may not fit entirely on the screen but you may scroll down to see the rest.

SatTransfer - [97W G19]

File   Edit   View   Window   Help

Proof of Performance

```
          Filename : 97W G19
              Date: 09/17/2009
          Location: INDIANAPOLIS
        Technician: MICHAEL
             Notes: 97W G19
         LNB Model: Std N.Am Ku 10.75
        FieldGuide: North American V1.66
          Software: 2.26
            Serial: 1663182
```
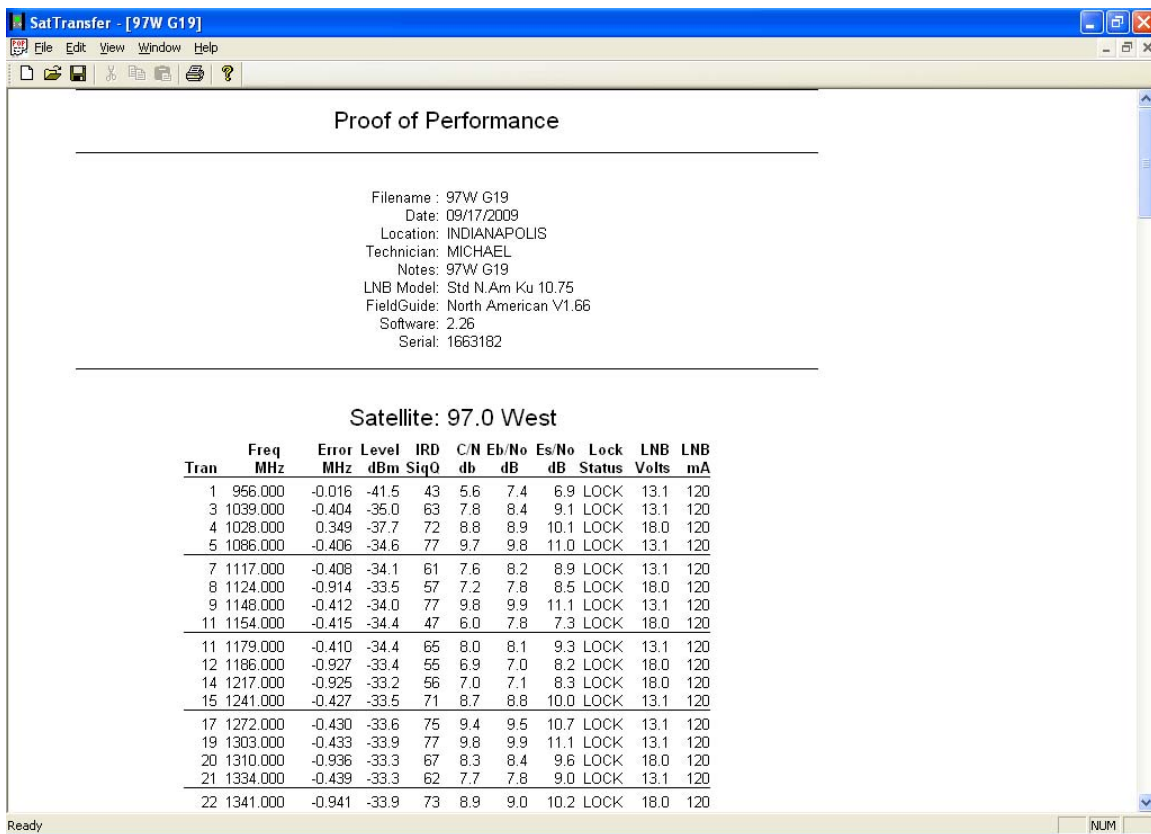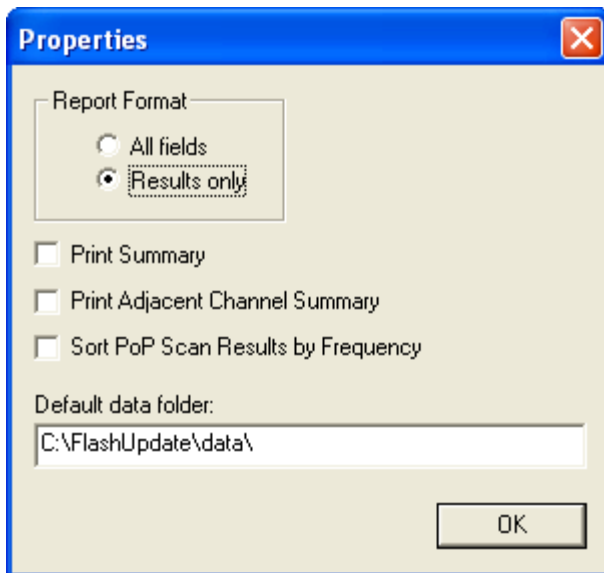
Satellite: 97.0 West

Tran		Dnlink MHz	Freq MHz	Error MHz	Pol	Mod Type	Code Rate	Symbol Rate	Level dBm	IRD SiqQ	C/N db	Eb/No dB	Es/No dB	Lock Status	LNB Volts	LNB mA
1	.	11706	956.000	-0.016	V	DVB	1/2	7160	-41.5	43	5.6	7.4	6.9	LOCK	13.1	120
3	ID	11789	1039.000	-0.404	V	DVB	2/3	28125	-35.0	63	7.8	8.4	9.1	LOCK	13.1	120
4	.	11778	1028.000	0.349	H	DVB	3/4	3979	-37.7	72	8.8	8.9	10.1	LOCK	18.0	120
5	.	11836	1086.000	-0.406	V	DVB	3/4	20765	-34.6	77	9.7	9.8	11.0	LOCK	13.1	120
7	.	11867	1117.000	-0.408	V	DVB	2/3	22000	-34.1	61	7.6	8.2	8.9	LOCK	13.1	120
8	.	11874	1124.000	-0.914	H	DVB	2/3	22000	-33.5	57	7.2	7.8	8.5	LOCK	18.0	120
9	.	11898	1148.000	-0.412	V	DVB	3/4	22000	-34.0	77	9.8	9.9	11.1	LOCK	13.1	120
11	.	11904	1154.000	-0.415	H	DVB	1/2	8680	-34.4	47	6.0	7.8	7.3	LOCK	18.0	120
11	.	11929	1179.000	-0.410	V	DVB	3/4	22000	-34.4	65	8.0	8.1	9.3	LOCK	13.1	120
12	.	11936	1186.000	-0.927	H	DVB	3/4	20000	-33.4	55	6.9	7.0	8.2	LOCK	18.0	120
14	.	11967	1217.000	-0.925	H	DVB	3/4	22000	-33.2	56	7.0	7.1	8.3	LOCK	18.0	120
15	.	11991	1241.000	-0.427	V	DVB	3/4	22000	-33.5	71	8.7	8.8	10.0	LOCK	13.1	120
17	.	12022	1272.000	-0.430	V	DVB	3/4	22000	-33.6	75	9.4	9.5	10.7	LOCK	13.1	120
19	.	12053	1303.000	-0.433	V	DVB	3/4	22000	-33.9	77	9.8	9.9	11.1	LOCK	13.1	120
20	.	12060	1310.000	-0.936	H	DVB	3/4	22000	-33.3	67	8.3	8.4	9.6	LOCK	18.0	120
21	.	12084	1334.000	-0.439	V	DVB	3/4	22000	-33.3	62	7.7	7.8	9.0	LOCK	13.1	120
22	.	12091	1341.000	-0.941	H	DVB	3/4	20000	-33.9	73	8.9	9.0	10.2	LOCK	18.0	120

Ready   NUM

It is recommended to select File/Properties/Results only before printing Proof of Performance Scans to reduce the number of columns printed. Most field technicians do not need to or want to see the transponder parameters (modulation type, code rate, baud rate). Screenshots of the Properties settings change and the subsequent trimmed down Proof of Performance Scan results are shown below.

Properties

Report Format
○ All fields
● Results only

☐ Print Summary

☐ Print Adjacent Channel Summary

☐ Sort PoP Scan Results by Frequency

Default data folder:

C:\FlashUpdate\data\

[OK]

SatTransfer - [97W G19]

File   Edit   View   Window   Help

Proof of Performance

Filename : 97W G19
Date: 09/17/2009
Location: INDIANAPOLIS
Technician: MICHAEL
Notes: 97W G19
LNB Model: Std N.Am Ku 10.75
FieldGuide: North American V1.66
Software: 2.26
Serial: 1663182

Satellite: 97.0 West

Tran	Freq MHz	Error MHz	Level dBm	IRD SiqQ	C/N db	Eb/No dB	Es/No dB	Lock Status	LNB Volts	LNB mA
1	956.000	-0.016	-41.5	43	5.6	7.4	6.9	LOCK	13.1	120
3	1039.000	-0.404	-35.0	63	7.8	8.4	9.1	LOCK	13.1	120
4	1028.000	0.349	-37.7	72	8.8	8.9	10.1	LOCK	18.0	120
5	1086.000	-0.406	-34.6	77	9.7	9.8	11.0	LOCK	13.1	120
7	1117.000	-0.408	-34.1	61	7.6	8.2	8.9	LOCK	13.1	120
8	1124.000	-0.914	-33.5	57	7.2	7.8	8.5	LOCK	18.0	120
9	1148.000	-0.412	-34.0	77	9.8	9.9	11.1	LOCK	13.1	120
11	1154.000	-0.415	-34.4	47	6.0	7.8	7.3	LOCK	18.0	120
11	1179.000	-0.410	-34.4	65	8.0	8.1	9.3	LOCK	13.1	120
12	1186.000	-0.927	-33.4	55	6.9	7.0	8.2	LOCK	18.0	120
14	1217.000	-0.925	-33.2	56	7.0	7.1	8.3	LOCK	18.0	120
15	1241.000	-0.427	-33.5	71	8.7	8.8	10.0	LOCK	13.1	120
17	1272.000	-0.430	-33.6	75	9.4	9.5	10.7	LOCK	13.1	120
19	1303.000	-0.433	-33.9	77	9.8	9.9	11.1	LOCK	13.1	120
20	1310.000	-0.936	-33.3	67	8.3	8.4	9.6	LOCK	18.0	120
21	1334.000	-0.439	-33.3	62	7.7	7.8	9.0	LOCK	13.1	120
22	1341.000	-0.941	-33.9	73	8.9	9.0	10.2	LOCK	18.0	120

Ready   NUM
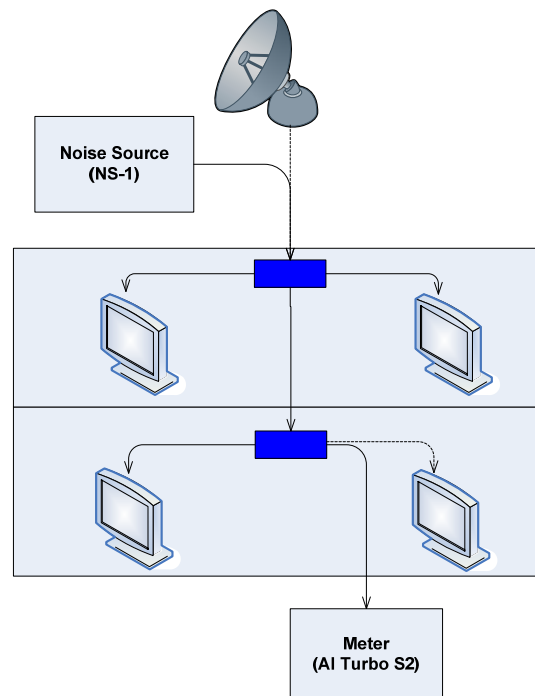
13. Noise Scan

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 test signal generator 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 VSAT 7850 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.

After the user specifies the expected RF level entering the network, the VSAT 7850 uses the measured losses to calculate the expected min/max levels at the receiver. These are compared to limits set by the user 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 ODU / LNB port of the VSAT 7850 meter using a short jumper cable.
2) Turn the noise source on.
3) On the VSAT 7850, select:
    a) MENU
    b) Spectrum
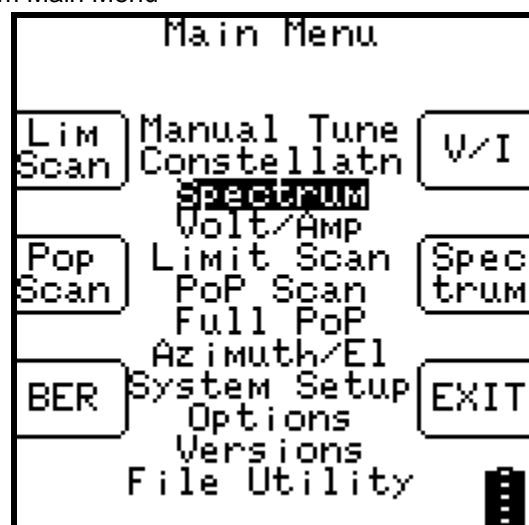   1) Connect NS-1 to ODU/LNB port of AITS2 with short (i.e. 2-3 ft) coax jumper cable.
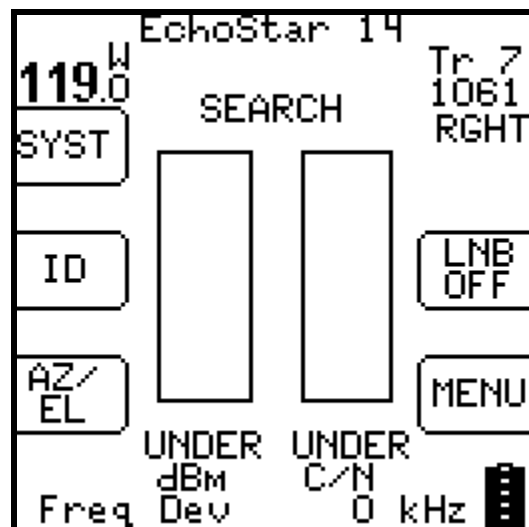
2) Power on NS-1
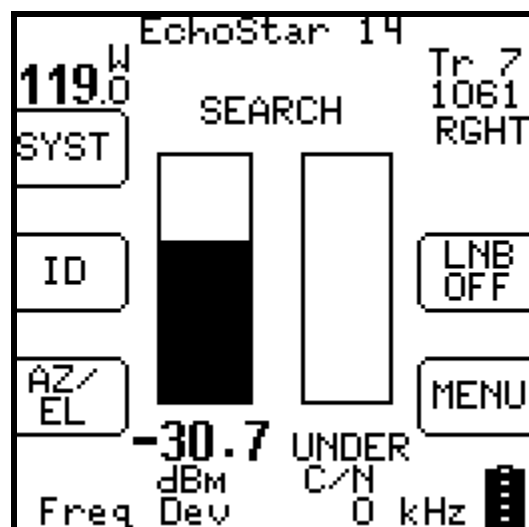
3) Press MENU soft-key

4) Choose Spectrum from Main Menu

5) Let meter scan across screen to collect all output levels from 950 to 2150 MHz. The VSAT 7850 will then scan through a standard set of 128 frequencies and store the signal level at each frequency. This reference scan is stored in the VSAT 7850 and is used in subsequent Noise Scans. You should save a new spectrum scan (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 coax cable. 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.
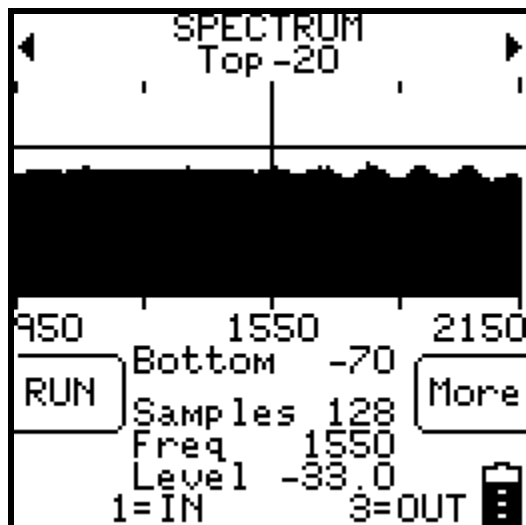
6) Press More soft-key
7) Choose "Save scan"
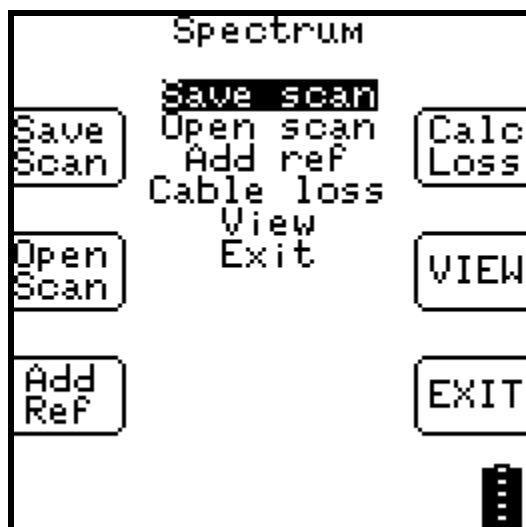
8) Type file name related to your reference signal source (i.e. model NS-1 handheld broadband noise generator):

```
          Spectrum File
            01/16/2012


     File name
     NS-1_
     ┌──────┐                  ┌──────┐
     │DATE  │                  │SAVE  │
     │TIME  │                  └──────┘
     └──────┘
     ┌──────┐                  ┌──────┐
     │CLR   │                  │EXIT  │
     └──────┘                  └──────┘
```

9) Press SAVE soft-key. Meter then displays:

```

            NOTE

        File stored.




                          ┌──────┐
                          │  OK  │
                          └──────┘
```

10) Now connect NS-1 to one end of a long coax cable and power on the NS-1.
11) Connect the other end of the long coax cable to the ODU / LNB port of the VSAT 7850
    meter.
12) Power on the VSAT 7850 meter.
13) Press MENU soft-key on VSAT 7850 meter.
14) Choose Spectrum from the Main Menu.
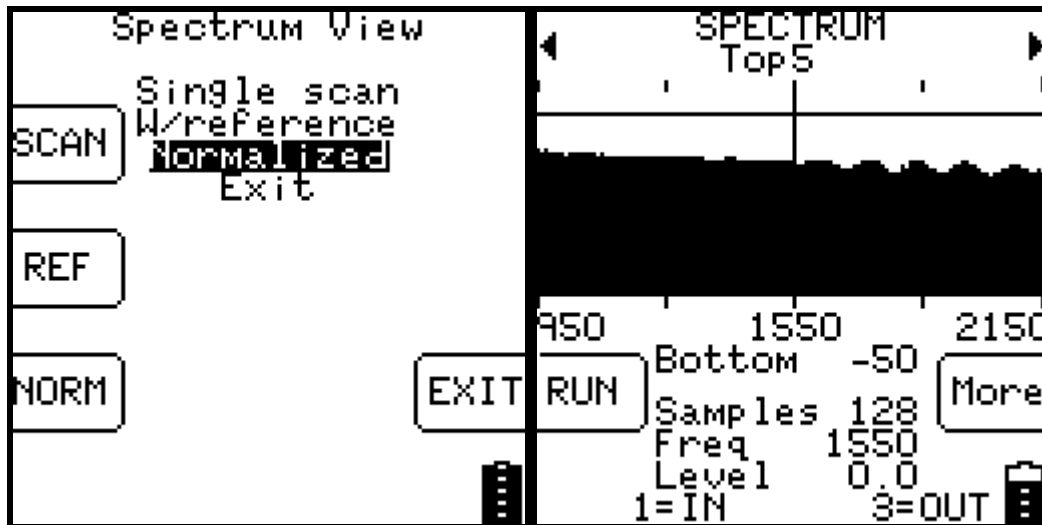15) Press More soft-key.
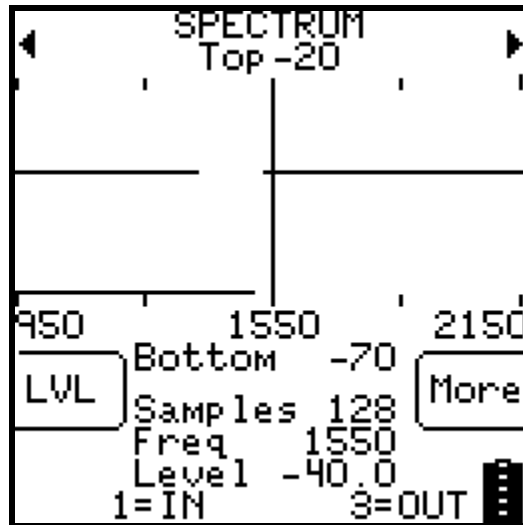
16) Choose "Add ref"
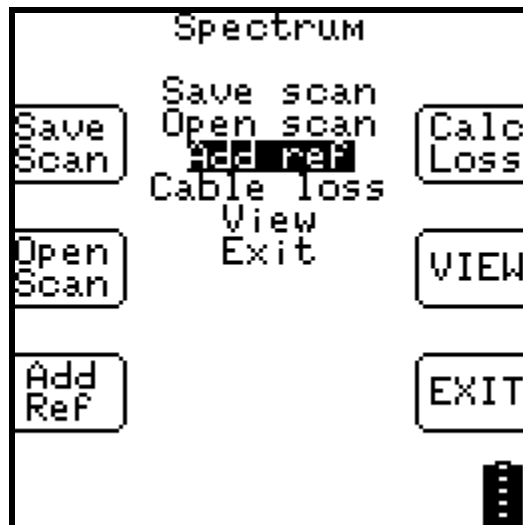
17) Select your source reference file and press Enter.

18) You can choose to view both your un-normalized reference source and the scan of the long cable on the screen at the same time by choosing:
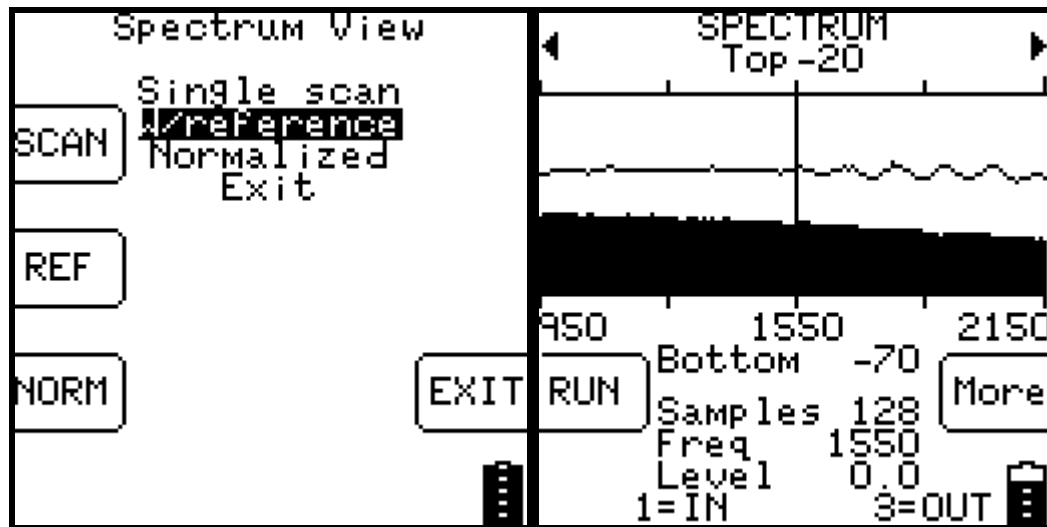
Or, you can choose to view your normalized reference source and the scan of the long cable on the screen at the same time:
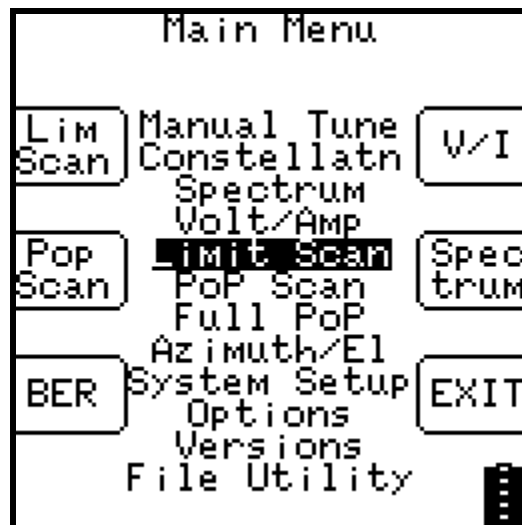
14. <u>Limit Scan</u>

The VSAT 7850 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 – i.e. 0 to 100 signal quality scale)
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.

Note: The Limit Scan is only useful if the LNB is being powered by the meter. Press the LNB soft-key to power the LNB. On a multi-LNB setup, press the LNB soft key more than once to toggle from LNB1 to LNB2 to LNB3, etc. The satellite orbital position (i.e. 110.0W) related to each selected LNB port will be displayed in the top left corner of the LCD screen.

For each transponder to scan, the screen shows:
1) Tr – The transponder numbers to be scanned (transponders must be defined by user)
2) dBm – The received dBm signal level value corresponding to each specified transponder
3) Req – The required minimum IRD signal quality value Limit (must be defined by the user)
4) IRD – The received IRD signal quality value corresponding to each specified transponder
5) Level Limit – (found at the very bottom center of the LCD screen) displays the minimum desired Signal Level (dBm, dBmV, or dBμV) value Limit (must be specified by user).

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.

The Limit Scan will continue running constantly until stopped by the user. You will receive a PASS or FAIL message after each cycle of limit scanning has been completed. A PASS message means that all of the received Signal Level and IRD signal quality values were greater than the minimum limits defined by the user for the specified transponders. A FAIL message means that at least one of the received Signal Level (dBm) or IRD signal quality values were less than the minimum limits specified by the user.
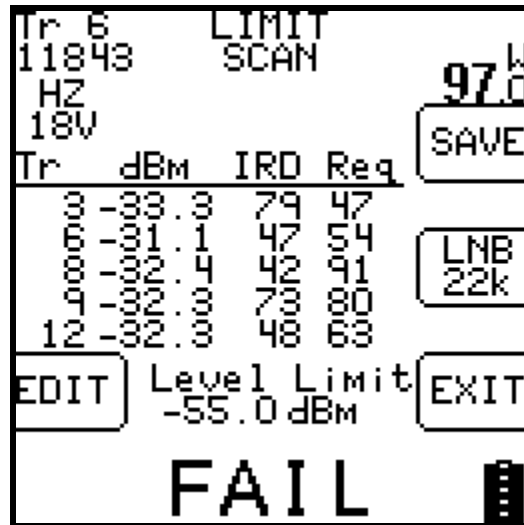
The following keys are active while scanning:
EDIT – lets you edit the transponder list and limits (see below)
SAVE – collects and stores a complete limit scan for upload to a PC
LNB ON/OFF – also selects different LNBs in a multi-LNB system
EXIT - returns to the main Run screen
Left / Right Arrow keys – scroll between satellites (as in the Run Screen)

Editing

The limit editing function may be activated in three ways:
1) By pressing EDIT soft-key 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 left/right arrow keys or the LNB soft-key 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:
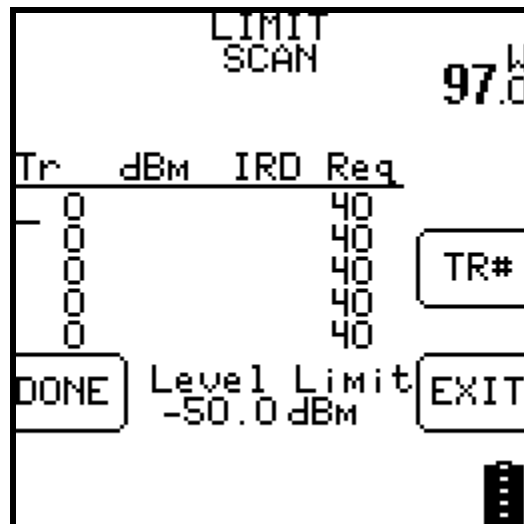
You will see a small underline cursor on the field that may be modified. Use the up/down arrow keys to move cursor to next desired field when no editing is necessary. With the cursor on the

correct field, use the numeric keypad to begin typing the desired value to define the transponders you want to scan. Press the Enter key to move cursor to next field after typing in each desired value. You may edit the required IRD value for each transponder. These IRD values apply only to the selected satellite and specific transponder. 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 Limit Scan table.

You may also use the "TR#" soft-key to insert a valid transponder number from the list of transponders for that satellite. When your cursor is in the Transponder (Tr) column field, pressing the TR# soft key several times will allow you to numerically scroll through the different transponders.

Press DONE when you have entered the desired values to return to the Limit Scan screen to let the Limit Scan begin or press EXIT to return to the main Run screen where your bar graphs are found.

Preset Limits

Note: At the present time, the soft key labeled "USE ZIP" is only usable for certain Dish Network satellites. For the USE ZIP soft key to be active, the service provider must send the related files with their desired minimum IRD values and minimum Signal Level Limits (dBm) for each zip code to Applied Instruments. When there are preset minimum IRD and Signal Level values available for the satellite, pressing the USE ZIP soft key will auto-populate the fields with minimum values specified by the service provider.

To auto-populate the Required IRD value fields based on your geographic location (latitude and longitude or zip code / postal code) in the Limit Scan feature:
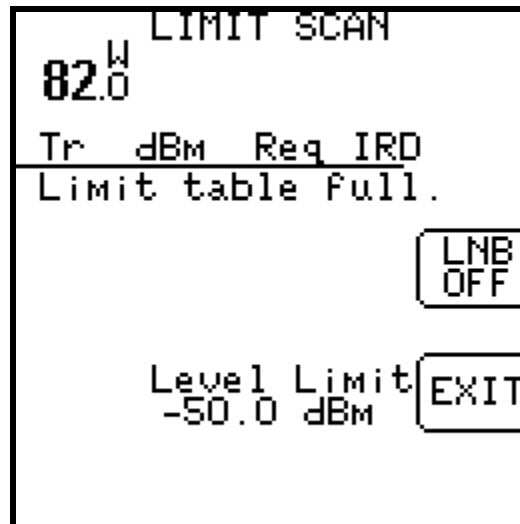1)   Using the soft keys, select MENU
2)   Using the arrow keys, highlight 'Limit Scan'
3)   Press Enter
4)   Select the EDIT soft key
5)   Select the USE ZIP soft key
6)   Select the DONE soft key to return to the main Limit Scan screen to use this feature or select EXIT to return to the main Run screen

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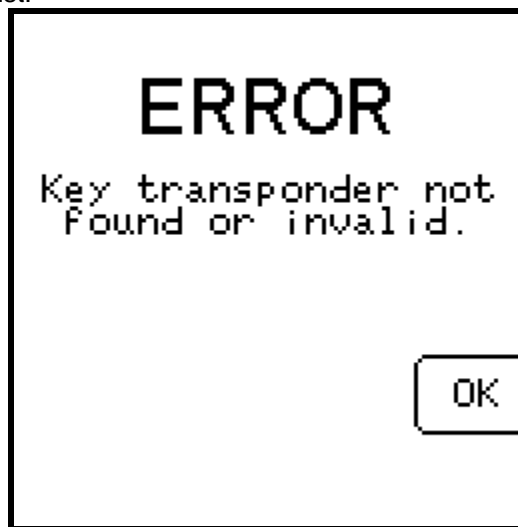
If you use all 10 orbital slots, the system will not be able to create a list for any additional satellites and the following message will appear when you scroll to or activate a satellite that does not have limits defined:

```
        LIMIT SCAN
   W
82.0

Tr  dBm  Req IRD
Limit table full.

                    LNB
                    OFF


        Level Limit EXIT
          -50.0 dBm
```

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 SES-1 Ku band, and again for 101° West SES-1 C-Band.
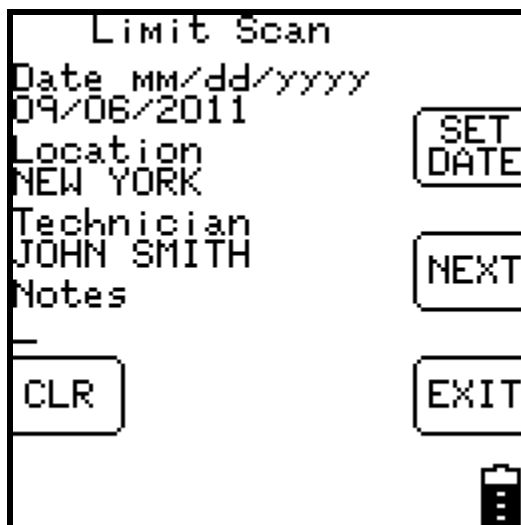
Initialization

The default values consist of the standard Dish Network set of transponders. The defaults may be restored by pressing the PRESET key in the Options screen.

Saving Limit Scans

You may find it beneficial to document the Limit Scan to prove that the signal level and quality of the key transponders are adequate before you leave the site. To accomplish this, you may save the Limit Scan to the flash memory of the VSAT 7850 while out in the field. Then you can upload it to a PC when back at the office to store the documentation on your hard drive or forward it on to upper management if required. Since the Limit Scan function only scans the key transponders (up to five per satellite), it is much less time consuming to use than the Proof of Performance Scan feature that scans all transponders on the satellite.

To save a Limit Scan, press the SAVE soft-key in upper right hand corner of LCD screen. The meter will then perform a Limit Scan on the key transponders for LNB1. Then it will automatically send the necessary commands to toggle to LNB2 and LNB3 and will scan through those key transponders if you've indicated in the System Setup that you're connected to a multi-LNB assembly.

After the Limit Scan is complete, a screen will appear that allows you to type in the date, location, technician name or ID number, and any notes. Use the numeric keypad to fill in these fields and then press the NEXT soft-key.

```
           Limit Scan
Date mm/dd/yyyy
09/06/2011                    ┌─────┐
Location                      │ SET │
NEW YORK                      │DATE │
                              └─────┘
Technician
JOHN SMITH                    ┌─────┐
Notes                         │NEXT │
                              └─────┘
_
┌─────┐                       ┌─────┐
│ CLR │                       │EXIT │
└─────┘                       └─────┘

                                  ▮
```

Then you must type in a unique file name for this Limit Scan. An error message will appear if you enter a name that has already been used. To determine which names have been used, the user can run the SatTransfer program on a PC or can select 'File Utility' from the Main Menu.

After you type in the file name using the numeric keypad, press "SAVE" and the system will copy the file from temporary storage to flash file storage.

```
           Limit Scan
File name
DISH 1000.4 WEST_




                              ┌─────┐
                              │SAVE │
                              └─────┘
┌─────┐                       ┌─────┐
│ CLR │                       │EXIT │
└─────┘                       └─────┘

                                  ▮
```

If an error occurs during the copy process or if the flash storage area is too full, the message "Flash copy failed" will appear and the test data will be lost.

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

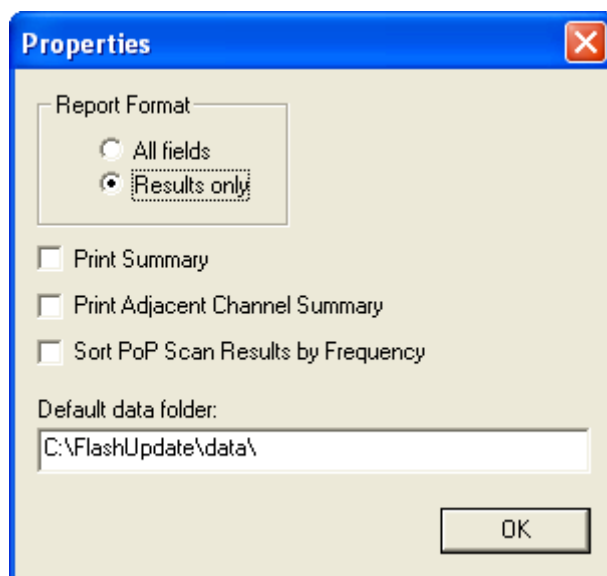## Install PC Software & Transferring Data Files to PC

The process for transferring the saved Limit Scans to your PC is identical to the process for transferring saved Proof of Performance scans. Please see the Proof of Performance Testing
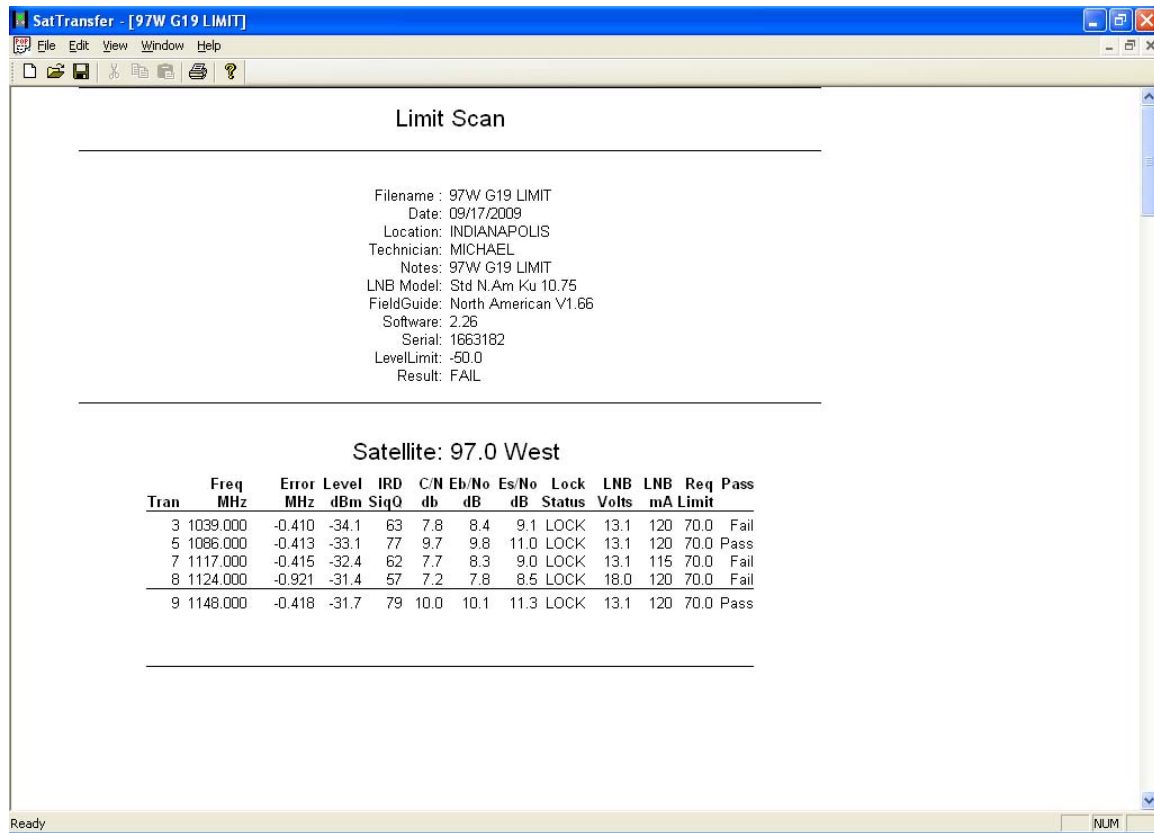
section of the operation manual for instructions of how to transfer the saved files to your PC using the SatTransfer application.

Screenshots from examples of transferred Limit Scan files are shown below.
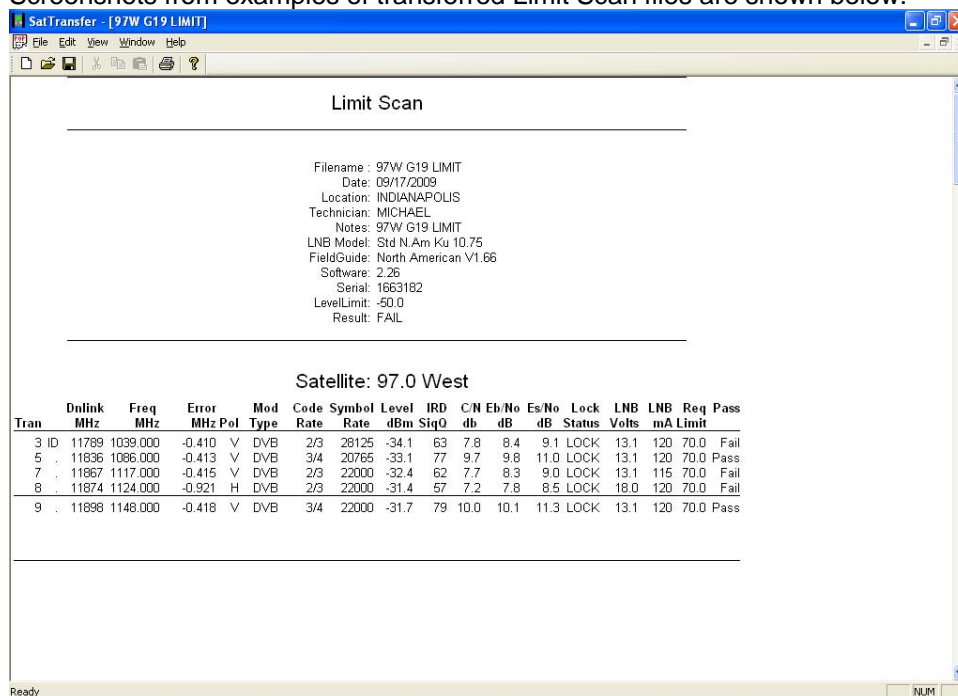
It is recommended to select File/Properties/Results Only before printing Limit Scans to reduce the number of columns printed. Most field technicians do not need to or want to see the transponder parameters (modulation type, code rate, baud rate). Screenshots of the Properties settings change and the subsequent trimmed down Limit Scan results are shown below.

Limit Scan

Filename : 97W G19 LIMIT
Date: 09/17/2009
Location: INDIANAPOLIS
Technician: MICHAEL
Notes: 97W G19 LIMIT
LNB Model: Std N.Am Ku 10.75
FieldGuide: North American V1.66
Software: 2.26
Serial: 1663182
LevelLimit: -50.0
Result: FAIL

Satellite: 97.0 West

Tran	Freq MHz	Error MHz	Level dBm	IRD SiqQ	C/N db	Eb/No dB	Es/No dB	Lock Status	LNB Volts	LNB mA	Req Limit	Pass
3	1039.000	-0.410	-34.1	63	7.8	8.4	9.1	LOCK	13.1	120	70.0	Fail
5	1086.000	-0.413	-33.1	77	9.7	9.8	11.0	LOCK	13.1	120	70.0	Pass
7	1117.000	-0.415	-32.4	62	7.7	8.3	9.0	LOCK	13.1	115	70.0	Fail
8	1124.000	-0.921	-31.4	57	7.2	7.8	8.5	LOCK	18.0	120	70.0	Fail
9	1148.000	-0.418	-31.7	79	10.0	10.1	11.3	LOCK	13.1	120	70.0	Pass

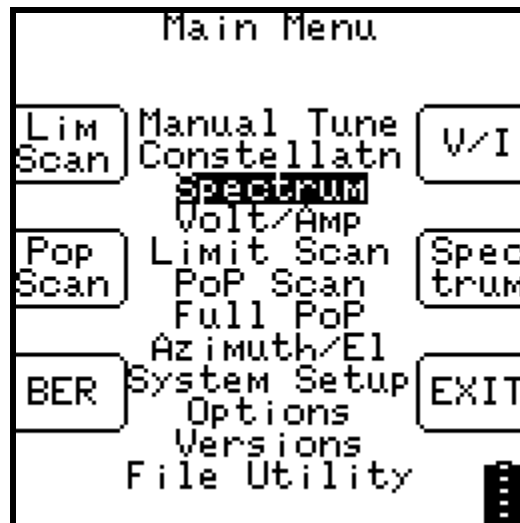## 15. <u>**Spectrum Screen**</u>

The spectrum screen may be used to:

- Look for the presence of carriers
- Look at a carrier with an incompatible modulation type or encryption
- Optimize your polarity adjustment (null out the opposite polarity)

This feature imitates a spectrum analyzer screen although it has less resolution and a much slower sweep rate than an actual spectrum analyzer. This screen has the following features:

- Adjustable frequency span
- Automated level scaling
- Frequency and level cursors
- Adjustable sweep rate

To view the spectrum display, press the MENU soft-key in bottom right hand corner of main Run screen. Then use your up/down arrow keys to highlight "Spectrum" and press the Enter key.

The spectrum screen will start sweeping with the maximum frequency span and amplitude range.
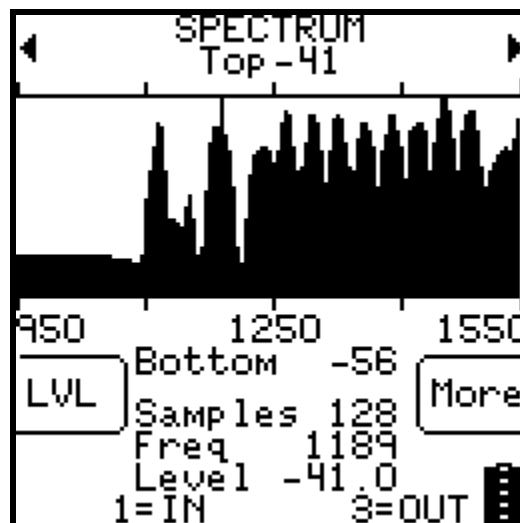
Cursor Position
Press Up/Down arrow keys to move cursor vertically to different amplitude levels on the y-axis. The level (Level) at the cursor position is shown in the bottom center area of the screen. Note: Signal Level displayed will depend on whether you have selected dBm, dBmV, or dBµV in the Options menu.

Press Left/Right arrow keys to move cursor horizontally to different frequencies on x-axis. The frequency (Freq) of the cursor position is also shown in the bottom center area of the screen.

Span
Press the 1 key on the numeric keypad to zoom in (less span). This will cut the displayed span in half around the cursor's frequency position. Minimum span is 50 MHz.

Press the 3 key on the numeric keypad to zoom out (more span). This doubles the displayed span around the cursor's frequency position. Full span is 1200 MHz (i.e. 950 to 2150 MHz).

Paging
Press the upper left soft-key to "page" to the left, changing the start and stop frequencies (when not at full span). Press upper right soft-key to "page" to the right.

Amplitude Range
The default amplitude range shown on the spectrum display is -70 to -20 dBm. To change the amplitude range, press the LVL soft-key in bottom left hand corner of LCD screen to turn auto scaling on or off. This will rescale the amplitude range to the min/max amplitude levels detected during the last sweep. When on, the level scaling will be adjusted to make the measured signal levels more obvious.

Resolution and Refresh Rate
Press +/- key on numeric keypad to change the sample rate (samples per sweep). You can choose between 32, 64, or 128. 32 samples results in lower resolution and less detail, but a faster sweep. 128 samples results in a higher resolution and more detail, but a slower sweep. By default, the meter measures 128 samples (1 pixel per sample) to create a picture of the power spectrum.

Press EXIT soft-key in bottom right hand corner of LCD screen to return to main Run screen.

16.   <u>File Utility</u>

The File Utility feature allows the user to see the filenames that he/she has used for saved PoP Scans, Limit Scans, and Spectrum Scans. The user can also delete a single file or format the flash drive and therefore erase all saved files from the flash memory of the meter.
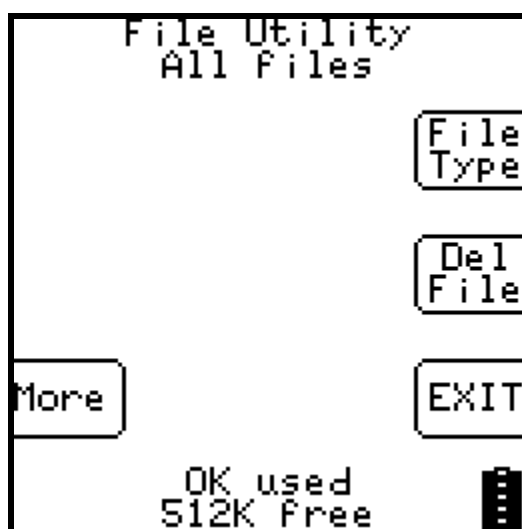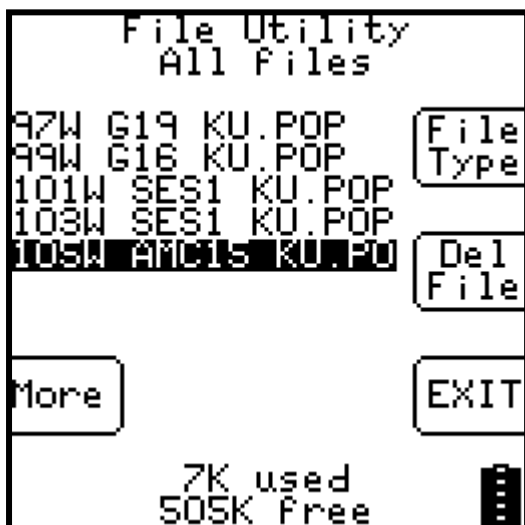
Press MENU soft-key and then select 'File Utility'.
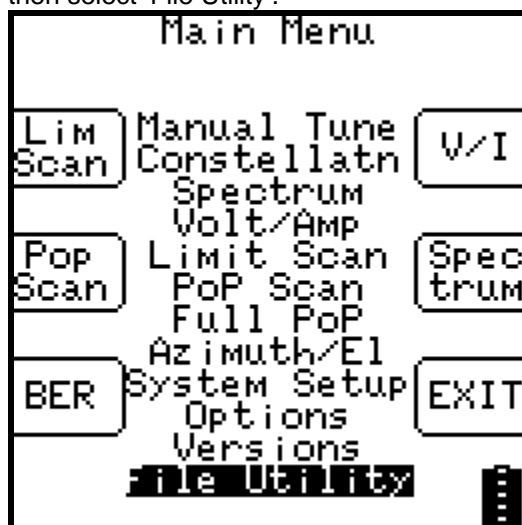
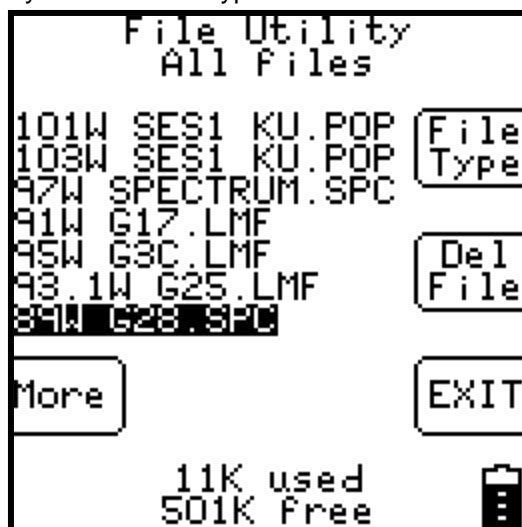The user can choose to see all saved files or filter the saved files.
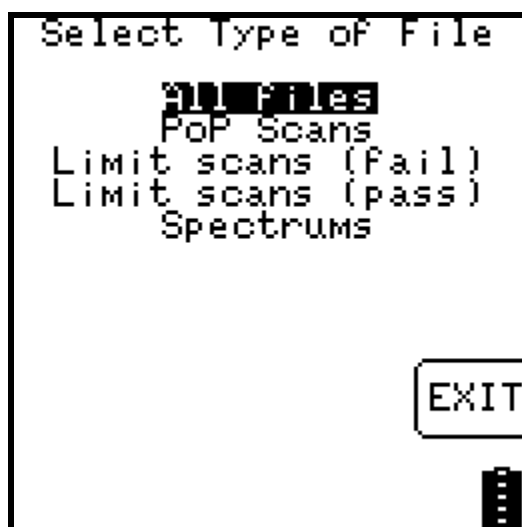
To delete a single file, highlight the file using the up/down arrow keys and then press the Delete soft-key. To format the flash memory and erase all saved files, press More soft-key and the Format soft-key.

```
    File Utility
     All Files

97W G19 KU.POP     ┌─────┐
99W G16 KU.POP     │File │
101W SES1 KU.POP   │Type │
103W SES1 KU.POP   └─────┘
105W AMC15 KU.PO   ┌─────┐
                   │Del  │
                   │File │
                   └─────┘
┌─────┐            ┌─────┐
│More │            │EXIT │
└─────┘            └─────┘
        7K used        ▐█▌
        505K free
```

```
    ┌─────────────────┐


      DELETE?

    F:105W AMC15 KU.POP


┌─────┐            ┌─────┐
│ NO  │            │ OK  │
└─────┘            └─────┘
                         ▐█▌
```

```
    File Utility
     All Files

                   ┌─────┐
                   │File │
                   │Type │
                   └─────┘
                   ┌─────┐
                   │Del  │
                   │File │
                   └─────┘
┌─────┐            ┌─────┐
│More │            │EXIT │
└─────┘            └─────┘
        OK used        ▐█▌
        512K free
```

Each file type is designated by a different file type extension:
Limit Scans (fail) = .lmf
Limit Scans (pass) = .lmp
PoP Scans = .pop
Spectrum Scans = .scp

```
    File Utility
     All Files

101W  SES1  KU.POP  ┌─────┐
103W  SES1  KU.POP  │File │
97W  SPECTRUM.SPC   │Type │
91W  G17.LMF        └─────┘
95W  G3C.LMF        ┌─────┐
93.1W  G25.LMF      │Del  │
89W  G28.SPC        │File │
                    └─────┘
┌─────┐             ┌─────┐
│More │             │EXIT │
└─────┘             └─────┘
        11K used        ▐█▌
        501K free
```

17.   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, Vista, or Windows 7
2) USB connection port on your PC
3) An internet connection
4) The USB data transfer cable provided with the instrument

Installation

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

1) Ensure that you are signed on as Administrator or have Administrator rights for Microsoft Windows.
2) Temporarily disable your computer's anti-virus software and firewall so it doesn't interfere with the installation of the FlashUpdate and SatTransfer programs and the related USB drivers. If you have a hardware firewall, either stand-alone, or in a router, you must either modify the settings of the device to permit access to our program or you will have to entirely by-pass the router or other inhibiting hardware device.
3) Go to the Applied Instruments website www.appliedin.com. With your mouse, move your cursor over Service and Support and click on it, then click Software Updates, then click on VSAT 7850 satellite meter. Then click on "Click Here to Download FlashUpdate Zip Software" or use the following link directly:
   www.appliedin.com/downloads/flashupdatezip.exe
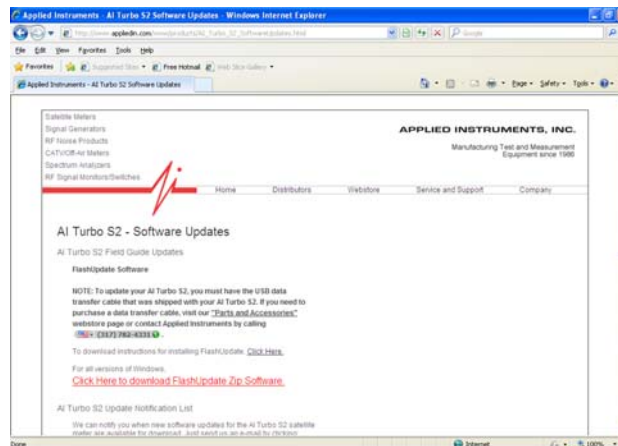
4) This is a self-extracting archive file. You may choose to open or run the file directly from the website or may save it to your disk and then open or run it. It is recommended that you run the file. The instructions below assume that you have chosen to run the file.
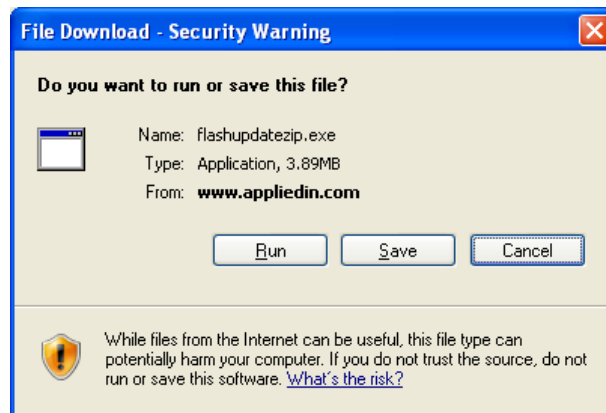
You may receive a warning message. Press Run to continue to open the file.
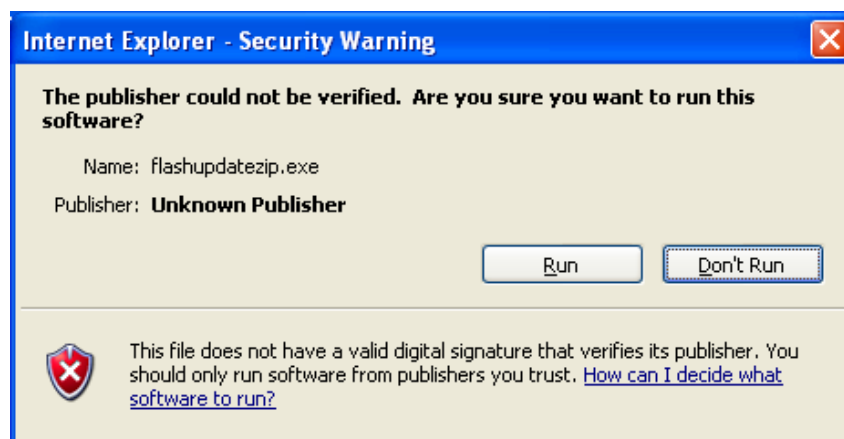
5) When you open this self-extracting archive file, the WinZip Self-Extractor program will appear. It is recommended that you press the Unzip button to unzip the files to the default location (c:\FlashUpdate\). If you wish to unzip the files to another location, type that desired destination folder into the field titled 'Unzip to folder' or press the Browse button and then navigate the network to select the desired destination folder.
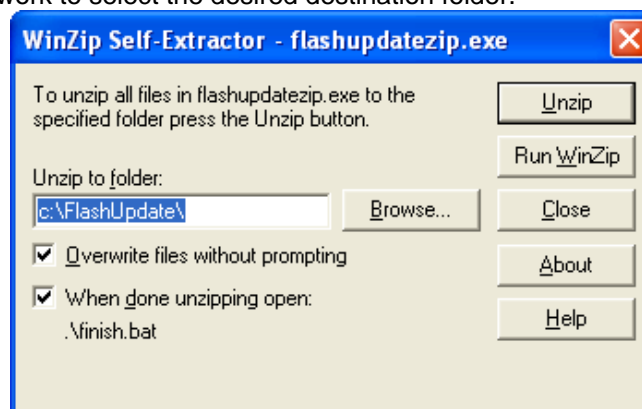
6) It will unzip several files onto your PC to the location you indicated. Press OK.
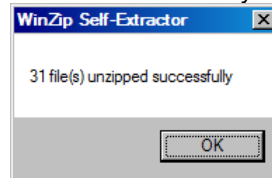
7) A Command Prompt screen will appear. Using your computer's keyboard, type the number next to the question mark at the flashing cursor that corresponds to your computer's operating system. If you aren't sure of which Operating System you are running, please proceed to Step 8. If you already know your Operating System, please proceed to Step 9.
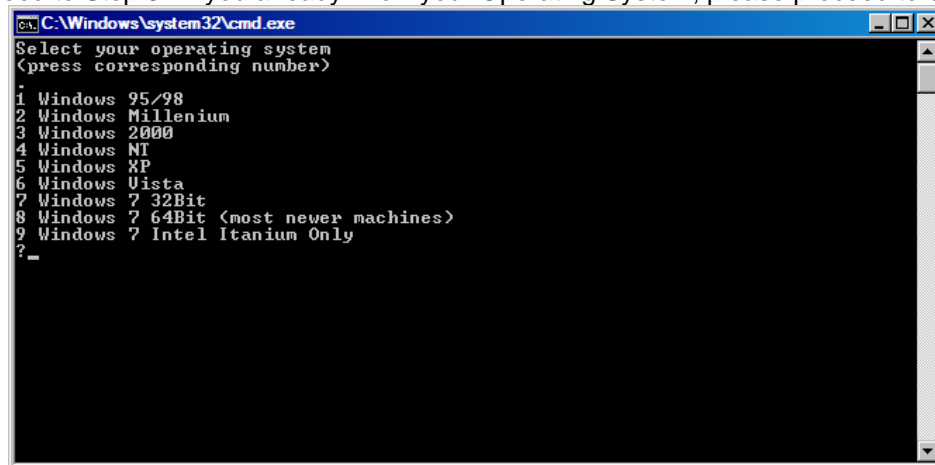

8) To find out which Operating System you're running on this PC, using your mouse, right click on the My Computer icon. Scroll to Properties and left click on it. On the General tab, underneath System, it will tell you which Operating System is installed on your PC (i.e. Microsoft Windows XP).

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

9) 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.
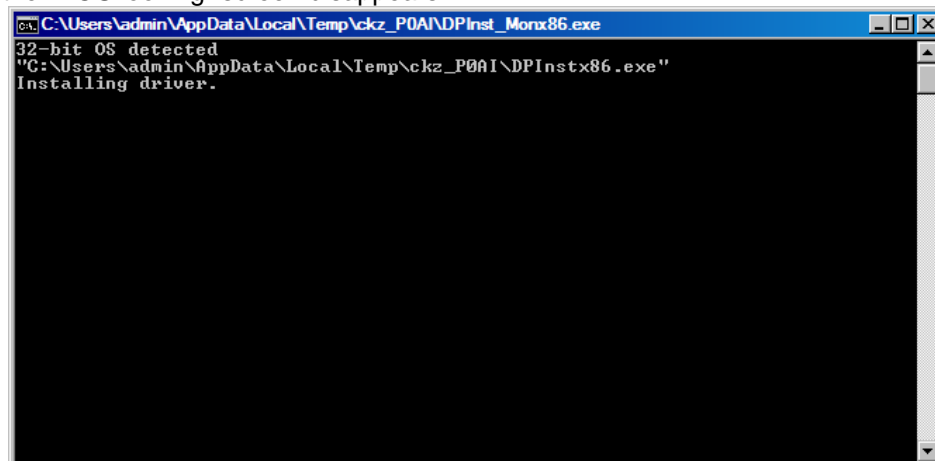
10) Close your internet browser window if you still have it open and view your desktop screen.

11) 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 and you can also copy and paste shortcut icons from the folder to your Desktop. If you're running Windows Vista or Windows 7 and the shortcut icons do not appear on the desktop after downloading, please right click with your mouse on the Desktop and select Refresh and then the shortcuts should appear.

FlashUpdate is the program used to download the latest satellite transponder and firmware updates to the VSAT 7850 meter. Application filename: FlashUpdate.exe

FlashUpdate.lnk

SatTransfer is the program used to upload stored Proof of Performance Scan, Limit Scan, and Spectrum Scan information from your VSAT 7850 meter to the PC. Application filename: SatTransfer.exe

SatTransfer.lnk

Updating

1) Ensure you have an active internet connection.
2) Plug your VSAT 7850 into an AC outlet to prevent any problems due to a low battery.
3) Connect the VSAT 7850 to your PC using the supplied USB data transfer cable and turn the meter on.
4) Double click the FlashUpdate shortcut icon or start the application from wherever you saved it (i.e. your C drive).
5) If connection is established, a picture of the VSAT 7850 meter will appear in the top left corner of the FlashUpdate program and the top center portion of the program will be filled in with data obtained from the instrument (i.e. serial number, loaded software version, etc).   If the connection is working, proceed to Step 7. If connection is not established, proceed to Step 6.
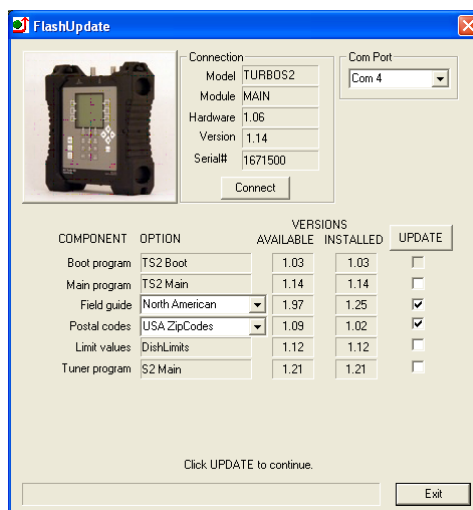
6)   If the connection is not working, you will get an error message after a delay.
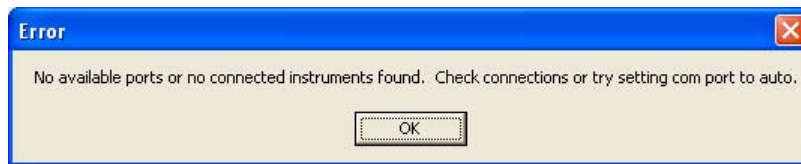
In this case, check to be sure the instrument is on and the USB data transfer cable is fully seated. Click "Connect" to retry the connection. With the USB connection, the computer should automatically establish connection with the meter. If you don't know the com port number, you can choose Auto or try 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)
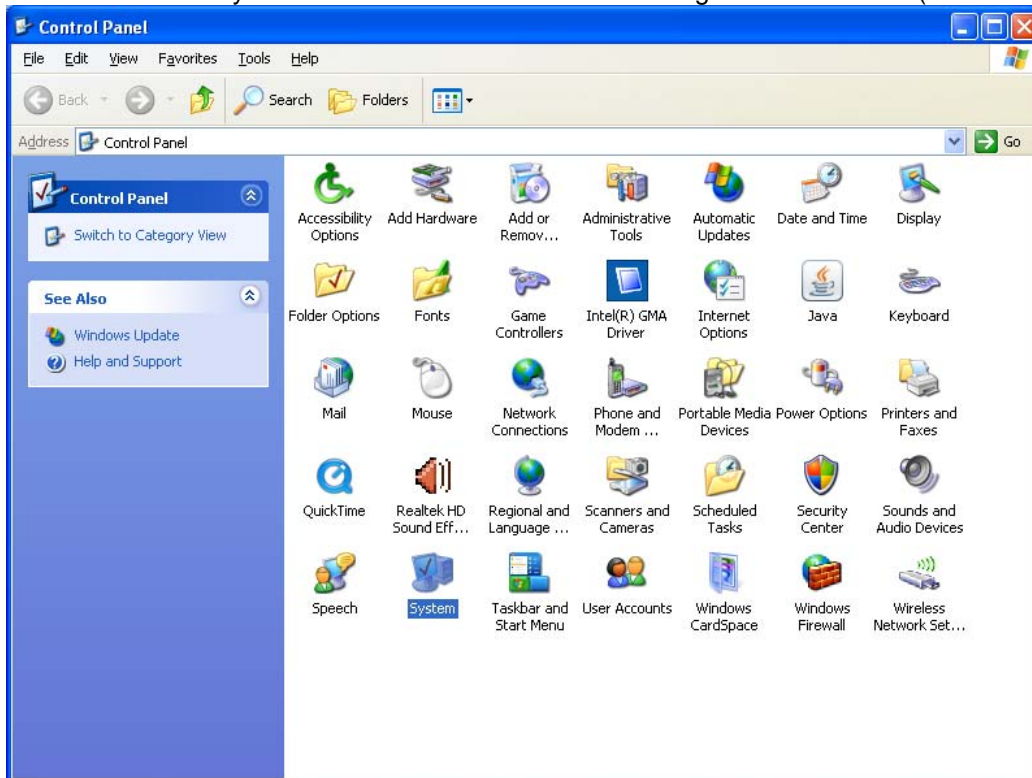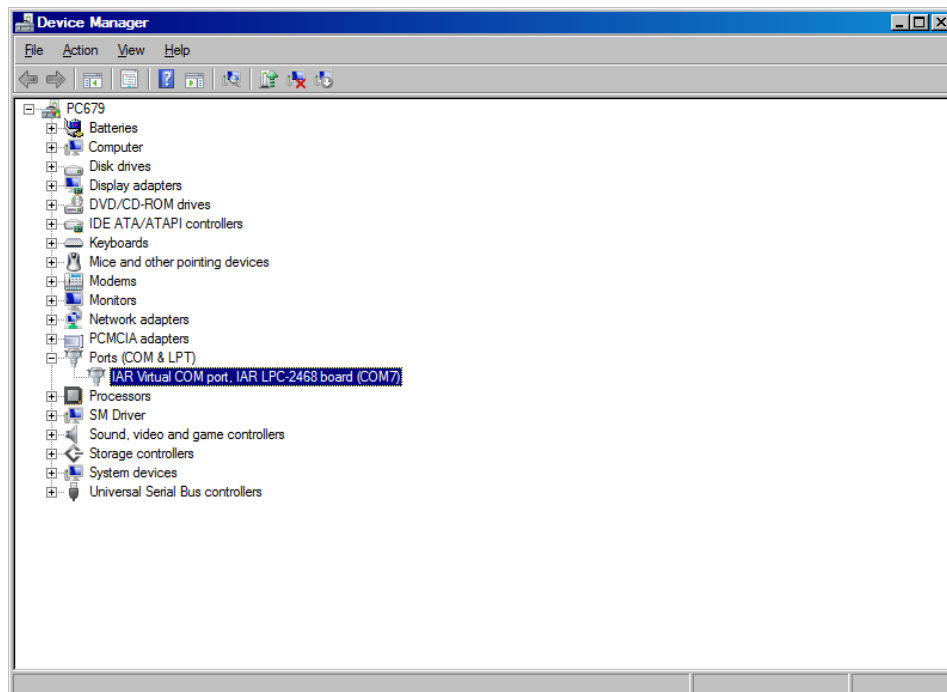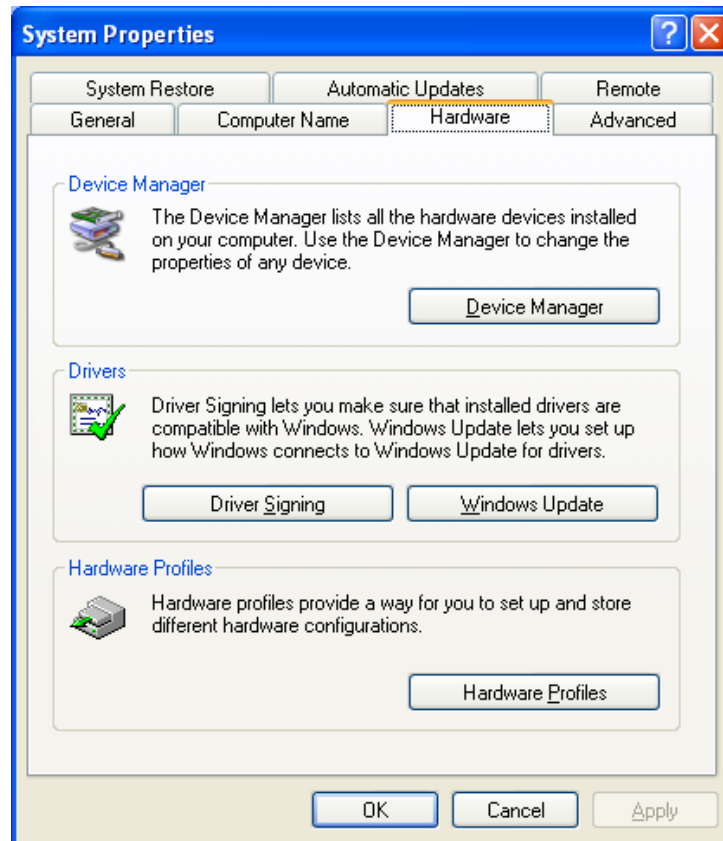
If you see that your Communications Port is set to something other than COM ports 1 through 12, you will need to reassign the COM port. To reassign the COM port, right click with your mouse on the desired COM port and select Properties. Then click on the Port Settings tab. Then click on the Advanced button. Using the drag down menu at the bottom of the Advanced Settings screen, reassign the COM port to an open (unused) port to any COM port from COM1 to COM12. Then press OK twice and exit out of the Device Manager and exit out of the Control Panel.
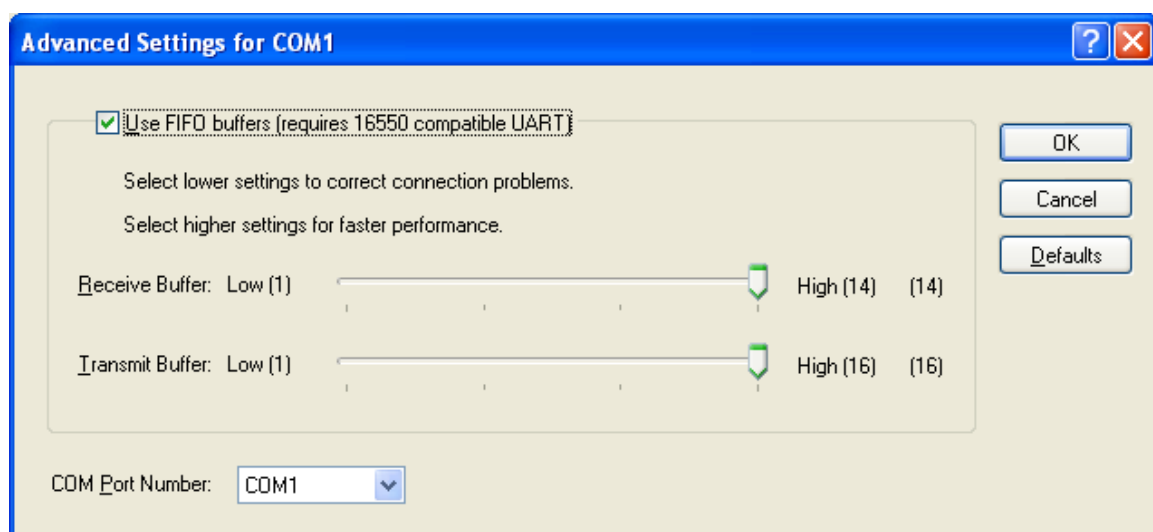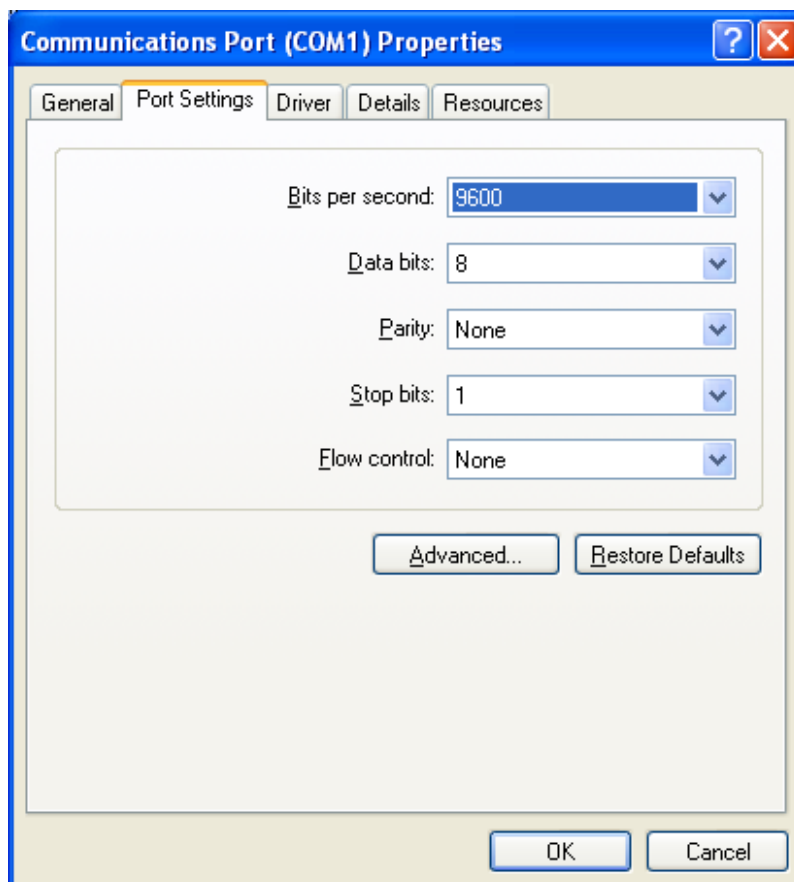
7) As soon as the connection is established, the application will access the website and obtain the latest available versions for the various components. These will be compared with the versions installed on your instrument. Any component with a newer version available will be checked. Normally, there is no need to check anything that isn't already checked and we don't recommend manually check marking the boxes.
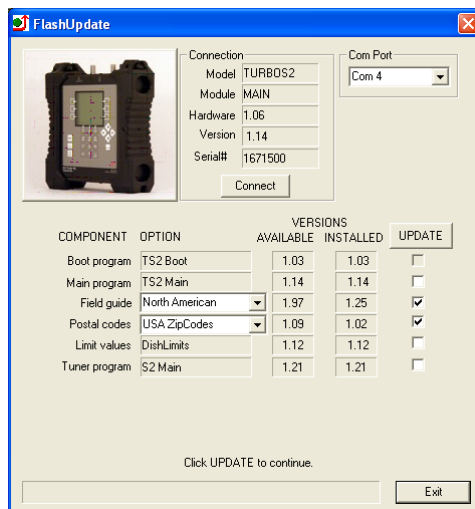
8) Select your postal code region: USA ZipCodes, Canadian Postal, or No Postal Code (if located outside of North America).

Click "UPDATE" to start updating the instrument. The progress bar at the bottom will show the installation progress of each component. In the screenshot from the example shown below, the program has detected that four components need to be updated (it automatically placed four check marks next to the items that need updated). The blue status bar at the bottom of the program will reset itself after each of the four components is downloaded.

The download process can take up to approximately 2 minutes to complete, depending on the number of components that need to be updated.
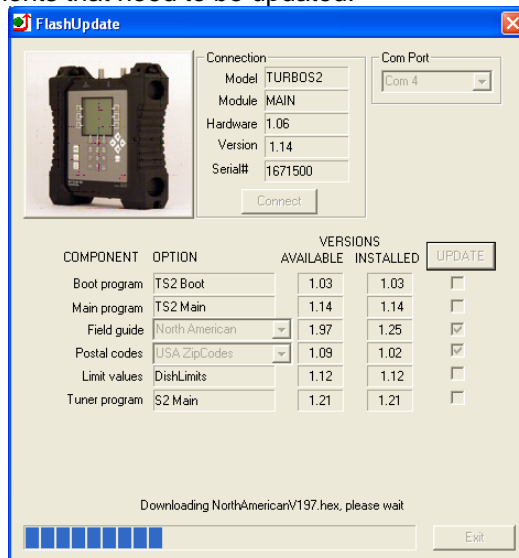
The word "REMOTE" should appear on the LCD screen of the VSAT 7850 satellite meter to indicate that the instrument is being programmed and controlled remotely. Standby while the

instrument is updated. Do NOT press any buttons on the VSAT 7850 meter while the update is in progress. Do NOT bump or unplug the USB data transfer cable from the meter while the update is in progress.

9) When finished, the program will display "Update Complete", click "Exit". You may now disconnect the VSAT 7850 meter from the computer and it is ready to use.
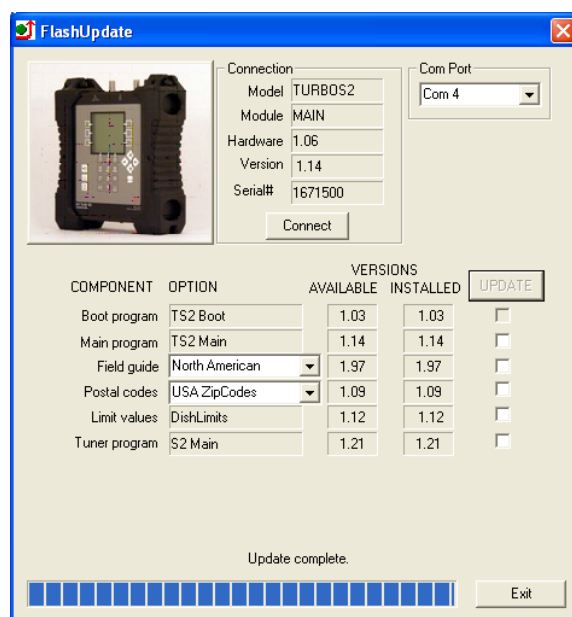
Field Guides

There are several global Field Guides (satellite transponder databases) available now and more may be added in the future. You can select the Field Guide you need using the pull down list. The different Field Guides cover different regions of the world:
North American Field Guide
South American Field Guide
European Field Guide
African Field Guide
Middle East Field Guide
Asian Field Guide
South Pacific Field Guide

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.

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.

Future Updates
You may check for an update by connecting your VSAT 7850 to your computer and performing the step in the section "Checking for Updates". Make sure your Internet connection is active (if you have a dial up connection to the Internet.) It is recommended you check for updates regularly (i.e. monthly).

If you have any problems or questions about the FlashUpdate program, call Applied Instruments' Tech Support team at +1 (317) 782-4331 from Monday through Friday, 8AM to 6PM USA Eastern Time Zone (UTC-5).

15. Power

LNB Power

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

		Current Limit
1)	Normal battery operation:	780 mAmps
2)	Charger active (AC):	780 mAmps
3)	IRD power to LNB:	950 mAmps

Under conditions 1 and 2, an inrush current of 900 mAmps is allowed for a short period of time.

Battery Charge

1) Charging: Use either the AC to DC switching power supply or the 12VDC vehicle charger. To fully charge a dead battery, it should require approximately 3 hours. It is okay to leave the meter charging all night since the meter will go into trickle charge mode when the battery is almost fully charged. During cold weather keep the VSAT 7850 indoors in a warm environment while charging. The battery charge temperature range is 41°F to 100°F or 5°C to 38°C.

2) Discharge / Charge: Before initial use of the meter you should fully discharge the battery and then recharge overnight. To quickly discharge the battery, disable the automatic shut-off in the Options menu, connect-to and power an LNB until the meter shuts off. To fully discharge the battery, disconnect from the LNB, power up the meter and let it die from powering itself.

3) Battery Charge Symbol: The battery symbol indicating remaining battery life in the lower right corner of the LCD display can be misleading. If not powering an LNB it may display full, even if it is not. It is more accurate when connected to an LNB load. It is normal for the battery symbol of a fully charged battery to quickly drop by ¼ when powering an LNB. The symbol should remain in the middle two segments for the longest time period, and will again drop faster when the last battery symbol segment is displayed. In summary the symbol drops by 25% quickly, remains in the middle 50% the longest, and then the last 25% drops quickly.

   The symbol's behavior is non linear. The battery charge indicator is based on the internal 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 ½ or ¾ full. When the charge indicator shows ¼ charge, you will need to charge it soon. It will shut off very soon after the indicator goes to empty.

4) Automatic Shutoff: If desired you can activate the automatic shutoff feature. To activate it, press MENU → OPTIONS and then scroll to the Shutdown field with your Up/Down arrows and use the Left/Right arrows to choose the desired auto shut-down time (5 min, 10 min, 15 min, NONE). The auto shutdown feature is turned off (set to NONE) in its default state.

5) LNB Power Awareness: Only power the LNB while taking measurements. Avoid powering an LNB while not actually taking measurements.

6) 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.

AC Power

When 110VAC or 220VAC power is applied via the external AC to DC switching power supply, it supplies 14VDC power to charge the battery, run the meter, and power the LNB. In this case, the power available to the LNB is limited to 750 mAmps to avoid overdriving the power circuit and the battery charging circuit.

DC Power

When external 12VDC power is provided from a vehicle, it supplies enough power only to charge the battery.

16. <u>Troubleshooting / FAQs</u>

a) I receive an error message stating: "Error: LNB under voltage, over current, or short"
   i) Replace top (Signal In port) F-connector barrel. Use a 7/16" wrench to loosen existing barrel. Install new F-connector barrel and only tighten to 20 inch pounds of torque with wrench after finger-tightening. Warning: Do NOT over-tighten!
   ii) Ensure that you have the latest available version of Field Guide and Software loaded. If you don't, you must update meter's software using the FlashUpdate program.
   iii) If issue still remains, contact Applied Instruments' Tech Support department and request a RMA# to send the instrument to the factory for inspection and repair.

b) While I have the LNB connected to the ODU / LNB port of the meter with a coax cable and the LNB power is turned on, I don't even see any signal level shown on left bar graph. It just says "UNDER".
   i) Replace top (Signal In port) F-connector barrel. Use a 7/16" wrench to loosen existing barrel. Install new F-connector barrel and only tighten to 20 inch pounds of torque with wrench after finger-tightening. Warning: Do NOT over-tighten!

c) While attempting to perform a Limit Scan, I receive an Error message saying "ERROR: Key transponder not found or invalid".
   i) Turn the meter off and on. Then go to MENU/OPTIONS and press the PRESET soft-key in the lower left corner of the LCD screen. Then exit back to the MAIN MENU and try to run your Limit Scan again.

d) I believe my dish is properly aligned, but I'm not getting a LOCK on the meter for the desired satellite.
   i) Ensure that you have the latest available version of Field Guide and Software loaded. If you don't, you must update meter's software using the FlashUpdate program.
   ii) Ensure that you are using the proper LNB type and that you have specified the correct LNB type in the System Setup software menu. If in doubt, refer to the label or tag on the body of the LNB and contact Applied Instruments' Tech Support department to consult with them.
   iii) If the incoming signals are linearly polarized, you must ensure that you have properly adjusted the polarization offset of the LNBF or feed horn assembly. Even if the antenna reflector is set to the proper azimuth and elevation, it is possible to not receive adequate signal if your polarization offset is very far off.
   iv) If you're working with circularly polarized signals on a multi-LNB dish assembly, you must ensure that the skew/tilt of the dish is set correctly. You can use the ZIP postal code lookup feature to obtain approximate tilt/skew settings.

e) My VSAT 7850 meter is displaying a message on the screen that says "LNB already powered by IRD input". Why is this message displayed?
   i) It means the meter is detecting power from an IRD that is connected to the IDU / IRD port of the VSAT 7850 meter. The IRD is powering the LNBF through the meter in this configuration. If the user's reason for pressing the LNB soft key was simply to toggle through the satellites related to the multi-LNB head, then he will have to use the left-right arrow keys instead to navigate in this configuration. If you receive this error message when there isn't an IRD or modem connected to the meter's IDU / IRD port of the VSAT 7850 meter, there may be a problem in the LNB power circuit of the meter which would require service at the factory.

f) Can I hook the IRD power to the IDU / IRD port of the VSAT 7850 to power the meter if the meter has a dead battery?
   i) No. The IRD/satellite receiver isn't powerful enough to power both the meter and the LNB. When the IRD is hooked up to the IDU / IRD port of the VSAT 7850 meter, it can power the LNB through the meter (if the ODU / LNB port of the meter is connected to the LNB). If the VSAT 7850 meter's battery is completely dead, you will need to recharge it for at least a few minutes to allow the battery to power the meter itself. Using the IRD to power the LNB through the meter takes the LNB load off of the meter to make the satellite meter's battery last longer.

g) Can the VSAT 7850 meter be used to measure satellite signals outside the United States?
   i) Yes, the VSAT 7850 meter can be used outside the United States. Just be sure to download the appropriate global regional Field Guide into the meter using the FlashUpdate application. We have Field Guides available for North America, Europe, South America, South Pacific, Asia, Middle East, and Africa. We have postal code files available for the USA and Canada. For any region outside North America, download the postal code file called "No Postal Codes" that allows you to type in and save your geographic coordinates (latitude and longitude).

h) According to my VSAT 7850 meter, I'm getting LOCKs on all of the even transponders, but I'm not getting locks on any of the odd transponders. What is the issue and how can I fix it?
   There are a few possible causes for this:
   i) It's possible that you have a faulty LNBF & the internal 13V/18V switching isn't working properly
   ii) It's possible that your satellite meter isn't providing the correct voltage (most likely either 13V or 18V), as requested. You can test the voltage output of the meter with a voltmeter. If you confirm that the meter is not outputting voltage correctly, please contact Applied Instruments' Tech Support department and request a RMA# to send the instrument to the factory for inspection and repair.
   iii) You may have a stacked system and you have not specified a stacked setting in the System Setup software menu of your VSAT 7850 meter.
   iv) There is a chance that only the even transponders are active on the satellite for your beam footprint area.

i) My serial number is missing off the back of my VSAT 7850 meter. How can I obtain my serial number to know its history and to check if it's still under warranty?
   i) Connect your VSAT 7850 meter to the PC, power it on, and open the FlashUpdate or SatTransfer program. The serial number of the connected unit will be displayed in FlashUpdate and SatTransfer if proper connection is established.
   ii) Turn the meter on. Then go to MENU, OPTIONS, and press the VERS soft-key in the lower left corner of the LCD screen to see the unit's serial number above the loaded software versions.

j) While attempting to download or run the FlashUpdate application, the download just seems to stall out and not make any progress. What could be the cause of this?
   i) This issue is most likely caused by your anti-virus software or firewall blocking our program. Please temporarily disable your computer's anti-virus software and firewall so it doesn't interfere with the installation of the FlashUpdate and SatTransfer programs and the related USB drivers. If you have a hardware firewall, either stand-alone, or in a router, you must either modify the settings of the device to permit access to our program or you will have to entirely by-pass the router or other inhibiting hardware device. Also ensure that you are signed on as Administrator or have Administrator rights for Microsoft Windows.

   If your company has a strict policy and the firewall blocks any executable files, then please contact your IT department and ask for assistance. Applied Instruments is more than happy to speak to the IT department about a work-around solution.

17. <u>Replacement Parts & Accessories</u>

Standard Accessories

Item Description	Part Number
Padded Cordura Flap for model VSAT 7850	978-08400
Shoulder Strap	978-01842
D-Ring for Should Strap (Qty 1 Ring)	978-71120
Replacement Battery for model VSAT 7850	742-00016
120-240VAC/14VDC Charger for model VSAT 7850	990-08520
12VDC Vehicle Battery Charge Cord	967-20003
USB Data Transfer Cable	983-00002
Replacement Double Female F-Connector Barrel	715-01026
Power-passing splitter	340-00012
Operation Manual for model VSAT 7850	078-00370

Optional Accessories

Item Description	Part Number
Hard Shell Protective Carrying Case	978-00008
Desktop kickstand for model VSAT 7850 satellite meter	976-08430
NS-1 Handheld Broadband RF Noise Generator (5-2150 MHz)	NS-1

18. <u>Maintenance and Repairs</u>

Repair Services

In the event that a unit is damaged or otherwise not performing as specified, repair and maintenance service is available. Warranty repair will be performed within one year from the date of purchase at no charge. Beyond one year, charges for time, material, and handling will be incurred. Warranty repair includes defects in material and workmanship only. Each repair is done on a case by case basis and charged according to the technician's time and the components replaced. If unit is under warranty (standard warranty period is 12 months), charges do not apply unless instrument has been opened, abused, or exposed to moisture. Accidental damage or abuse repairs will always incur time, material, and handling charges. Shipping charges to our factory are the responsibility of the customer. Return shipping charges are also the responsibility of the customer (except for "in warranty" repairs).

If you need to return equipment for service, please call our factory at +1 (317) 782-4331 and ask for Tech Support or email us at info@appliedin.com and indicate REPAIR REQUEST in the subject line. To obtain a RMA number, you will first need to provide the following information:

-Your name, email address, telephone number, ship-to address, and bill-to address
-Model of instrument you have
-Version of software that you have loaded (if applicable)
-Serial number of the instrument
-Detailed description of the issue

The RMA number must be written on the outside of the shipping box and on all correspondence relating to that particular shipment. Please include details of the service requested. Ensure that

the equipment is securely packed with proper cushioning material on all sides. The unit should be insured for its full value in case of damage or loss in transit. After the repair is completed, we will contact you for payment. If payment is not received within 60 days after contact is made, then the repaired equipment will become the property of Applied Instruments.

Version Updating

As our product lines are refined and features and performance are enhanced, we will upgrade older units at a nominal cost when possible. Shipping charges are additional. Contact us at +1 (317) 782-4331 for price and schedule if you are interested in having a unit updated.

Calibration

Periodic calibration may be necessary to ensure that the unit is operating within the original factory specifications. A standard calibration charge will be incurred.

19. <u>Specifications</u>

SPECIFICATIONS
Frequency Range........950-2150 MHz
Tuning Resolution........4 kHz
Signal Level Range... ..-75 to -15 dBm (-26 to +34 dBmV)
                              (+34 to +94 dBµV)
RF Level Accuracy.........+/- 2 dB typical, 3 dB max
Signal Lock Formats.....DVB-S (QPSK)
                              DVB-S2 (QPSK, 8PSK, 16APSK, 32APSK, CCM, VCM, ACM),
                              DSS / DIRECTV Legacy (QPSK)
Impedance.....................75 Ohm
LNB Power....................13VDC for V/R, 18VDC for H/L
                              (current limited at 780mA),
                              21VDC for DIRECTV SWM LNBs
                              (current limited at 520 mA),
                              29VDC
                              (current limited at 360 mA)
Switch Control.................22 kHz, DiSEqC
Battery............................ rechargeable Li-Ion, 4400mAh 12.6V Max
Run time/charge..............4 hours for a single LNB
                               (depends on LNB current draw)
Universal AC charger.....100 to 240 VAC, 50/60 Hz
                               fast charge and then trickle
Vehicle charger...............12VDC
Computer Interface..........USB
RF Connector ....F barrel field replaceable
Size/Weight...................... 7.6"W x 6.7"H x 2.40"D / 3.2 lbs.
(without rubber guards)   19.3cm x 17.0cm x 6.1cm / 1450 g
Operating Temperature Range.........-20°F to 120°F (-29°C to 49°C)
Battery Charge Temperature Range.........41°F to 100°F (5°C to 38°C)
Warranty.........................12 month limited
Specifications are subject to change without notice.

WARRANTY

The Applied Instruments VSAT 7850 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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