APPLIED INSTRUMENTS, INC.
RF TEST AND MEASUREMENT

Rev 23 January 2018

Limit Scan Feature Revision Brief for the XR-3 Satellite Meter

1. Update Software in Meter

To obtain the software that contains the revised Limit Scan features as described in the document below, download updates for two software components using the FlashUpdate program:

- a. Boot Program (XR-3 Boot) v1.28 or newer
- b. Software Main Program (XR-3 Main) v1.37 or newer
- c. Limit Values – using the drop-down menu choose either 'Dish East' or 'Dish Central' or 'Dish West', depending on your geographic location. Load dish limit values version 2.05 or newer into the meter. A list of which states are contained in each Dish Limits file is attached below.

Dish East	Dish Central	Dish West
Alabama	Alabama	Alaska
Connecticut	Arkansas	Arizona
Delaware	Illinois	California
District of Columbia	Indiana	Colorado
Florida	Iowa	Hawaii
Georgia	Kansas	Idaho
Indiana	Kentucky	Kansas
Kentucky	Louisiana	Montana
Maine	Michigan	Nebraska
Maryland	Minnesota	Nevada
Massachusetts	Mississippi	New Mexico
Michigan	Missouri	North Dakota
New Hampshire	Nebraska	Oklahoma
New Jersey	North Dakota	Oregon
New York	Oklahoma	South Dakota
North Carolina	South Dakota	Texas
Ohio	Tennessee	Utah
Pennsylvania	Texas	Washington
Puerto Rico	Wisconsin	Wyoming
Rhode Island		
South Carolina		
Tennessee		
Vermont		
US Virgin Islands		
Virginia		
West Virginia		

Note: When you open the FlashUpdate program, you might receive a Warning message alerting you that the previous Limit Values are no longer available. Press OK when this message appears.
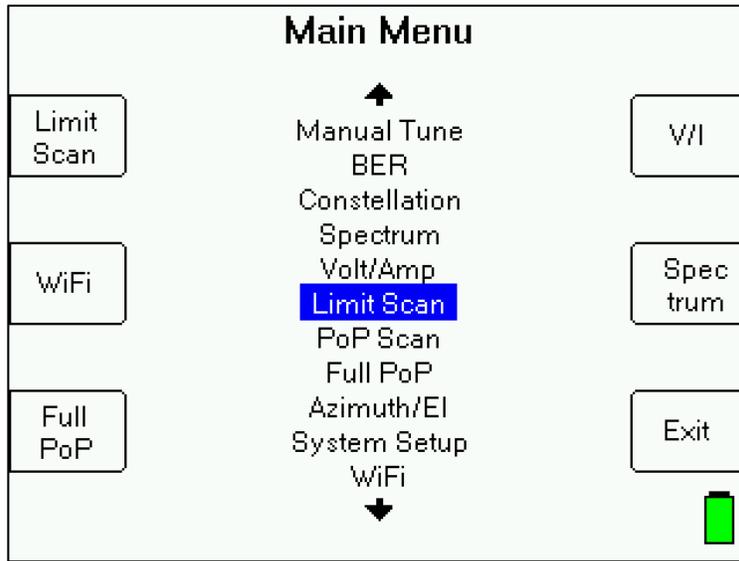

Then use the drop down box next to 'Limit Values' to choose the appropriate Dish Limits file, based on your geographic location.
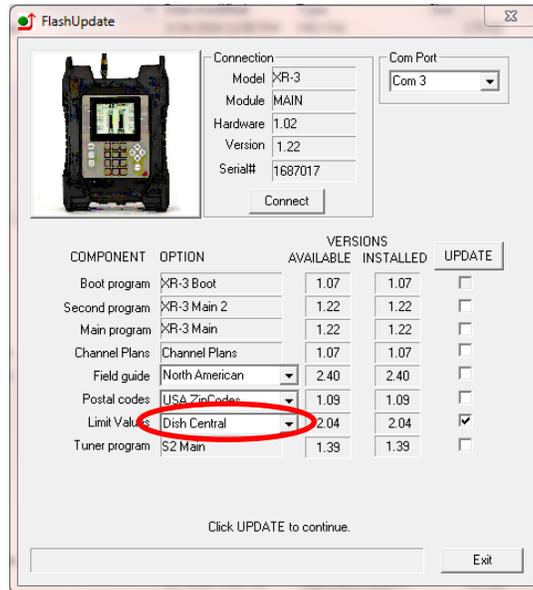
2. **Setup**

After the dish installation is complete, select "Limit Scan" from the main menu:

```
                         Main Menu
                             ↑
    ┌────────┐         Manual Tune         ┌────────┐
    │ Limit  │             BER             │  V/I   │
    │ Scan   │         Constellation       │        │
    └────────┘           Spectrum          └────────┘
                          Volt/Amp
    ┌────────┐         ▐Limit Scan▌        ┌────────┐
    │  WiFi  │            PoP Scan         │  Spec  │
    │        │            Full PoP         │  trum  │
    └────────┘           Azimuth/El        └────────┘
    ┌────────┐         System Setup        ┌────────┐
    │  Full  │              WiFi           │  Exit  │
    │  PoP   │              ↓              │        │
    └────────┘                             └────────┘
```
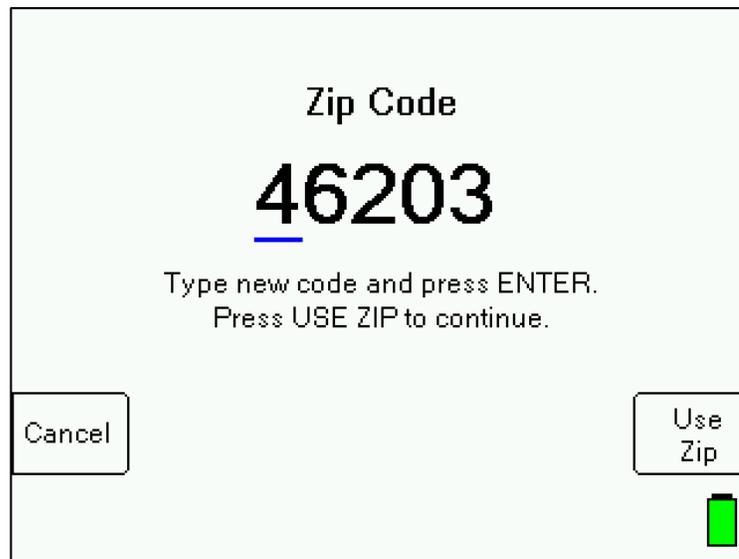
3. Zip Code

Upon selecting "Limit Scan" from the Main Menu, you will be prompted to enter the zip code of your present location. If the zip code shown is correct, then press 'Use Zip' to continue. If you loaded Dish Network limit values (i.e. Dish East, Dish Central, or Dish West) using the FlashUpdate program, then pressing 'Use Zip' will auto-populate the fields with minimum and average values specified by Dish Network.

The soft-key labeled 'Use Zip' is usable for most Dish Network satellites (61.5, 72.7, 77, 110, 118.7, 119, and 129). When there are preset minimum and average IRD and minimum Signal Level values available for the satellite, preset limits will be automatically loaded based on the zip code entered.

If you'd like to program custom limits for non-Dish Network satellites, press 'Use Custom' and see Section 5 (Editing Limits) for more details.

```
                      Zip Code

                      46203
                      ‾‾‾‾‾

            Type new code and press ENTER.
              Press USE ZIP to continue.

    ┌────────┐                           ┌────────┐
    │ Cancel │                           │  Use   │
    │        │                           │  Zip   │
    └────────┘                           └────────┘
```

4. Scanning

If limits have already been defined for the presently selected satellite, the scanning will start immediately. Press the LNB   soft-key (located near middle right area of screen) to power the LNB. On a multi-LNBF setup, press the LNB soft-key more than once to toggle from LNB1 to LNB2 to LNB3, etc. The satellite orbital position (i.e. 119.0W) related   to each selected LNB port will be displayed in the top left corner of the LCD screen.
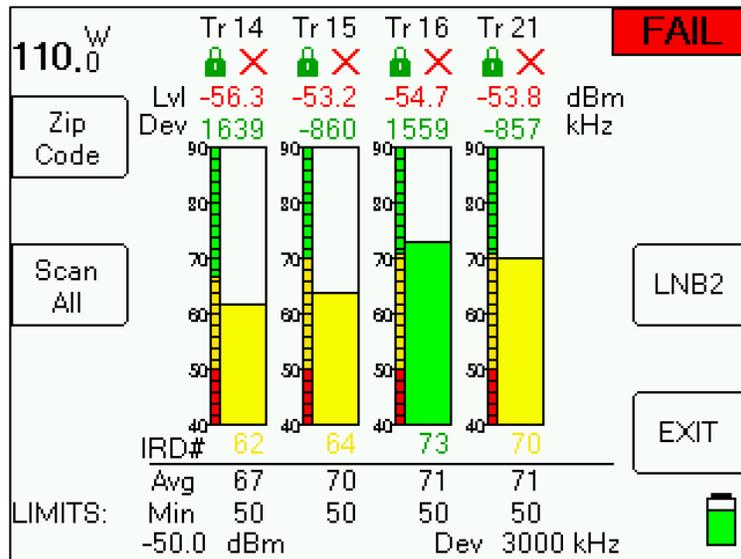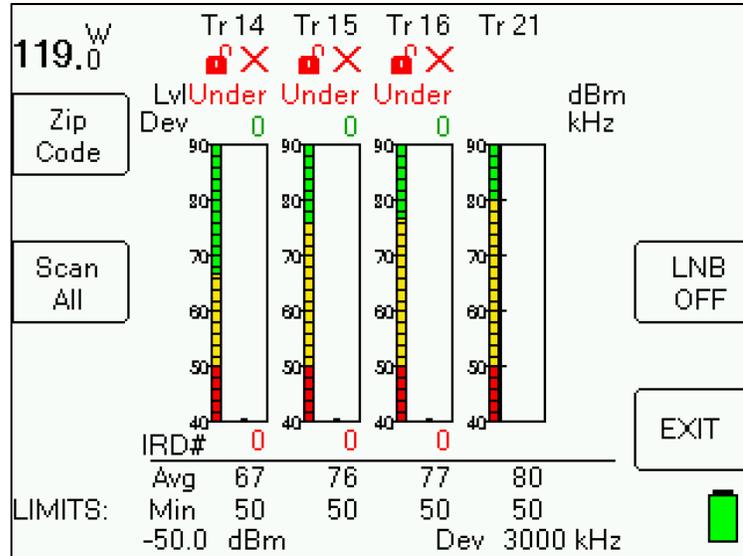
For each transponder to scan, the screen shows:
1) Tr – The transponder numbers to be scanned
2) Lock – The green closed padlock symbol reflects a signal lock on the transponder. The red open padlock symbol reflects a non-locking situation on the subject transponder.
3) Lvl – The measured RF signal level value (i.e. dBm) corresponding to each specified transponder
4) Dev – The frequency deviation (estimated LNB LO drift, stated in kHz) measured for each specified transponder
5) IRD – The measured IRD signal quality value corresponding to each specified transponder
6) Avg – The average IRD signal quality limit for each specified transponder (also shown as yellow area on bar graphs)
7) Min – The minimum IRD signal quality limit for each specified transponder (also shown as red area on bar graphs)
8) The RF level limit for all specified transponders
9) The frequency deviation limit (stated in kHz) for all specified transponders

10) A grade below each individual transponder number:
  a. FAIL (Red X) - Below the minimum Signal Level limit or below the minimum IRD Signal Quality limit
  b. Low (Yellow Triangle) - At or above the minimum Signal Level limit and at or above the minimum Signal Quality limits but below the average Signal Quality limit
  c. Good (Green Check Mark) - At or above the minimum Signal Level limit and at or above the average Signal Quality limit

11) An overall grade is shown in the top right corner of the screen, which includes the grades of all specified transponders for the satellite shown:
  a. FAIL (Red) - Below the minimum Signal Level limit or below the minimum IRD Signal Quality limits
  b. Low (Yellow) - At or above the minimum Signal Level limit and at or above the minimum Signal Quality limits but below the average Signal Quality limits
  c. Good (Green) - At or above the minimum Signal Level limit and at or above the average Signal Quality limits

If a lock is not obtained for a transponder, the IRD field will display "0" as the measured signal quality value and a red unlocked padlock symbol will be shown immediately below the transponder number.   The table will be filled in as the transponders are measured in sequence. As each transponder is scanned, its individual transponder grade appears. When all limit scan transponders have been   scanned, the overall grade will appear in the top right corner of the screen.

The Limit Scan will continue running constantly until stopped by the user. You will receive a summary (overall grade) at the top right corner of the   screen after each cycle of limit scanning has been completed.

The following keys are active while scanning:
Scan All – collects and stores a complete limit scan for later transfer to a PC
LNB ON/OFF – also selects different LNBs in a multi-LNB system
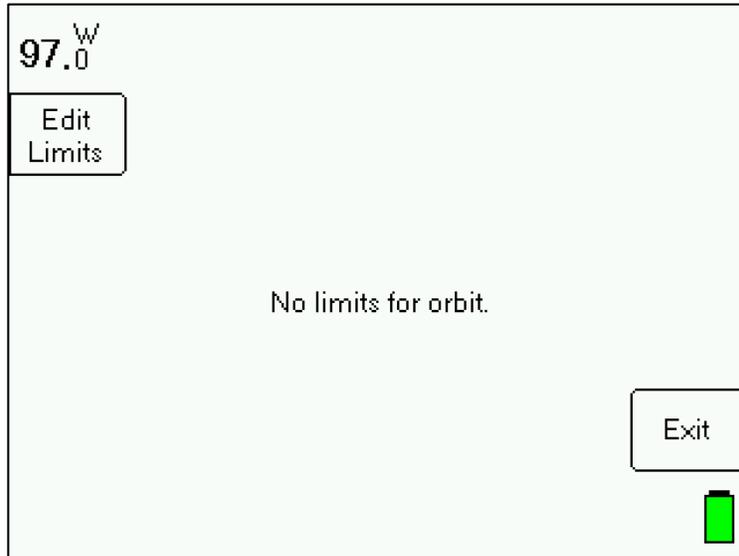EXIT - returns to the main Run screen
Left / Right Arrow keys – scroll between satellites (as in the Run Screen)
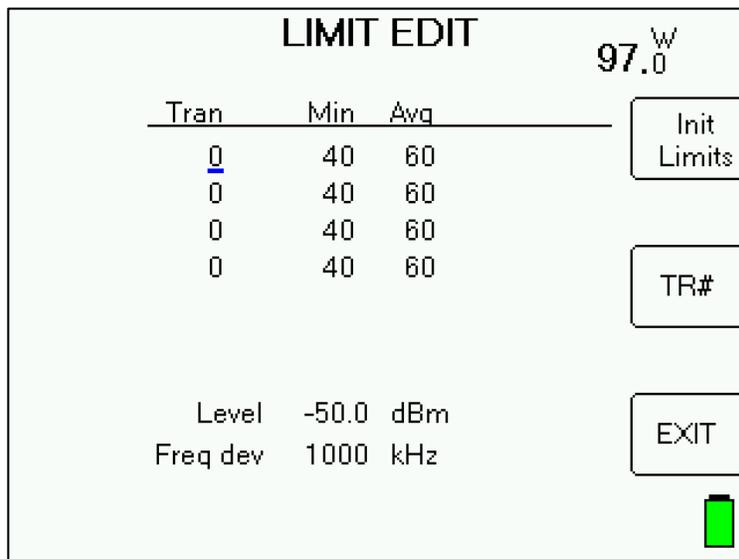
5. **Editing Limits**

If you'd like to program custom limits for non-Dish Network satellites, press 'Use Custom'.

If limits have not yet been defined, a message will be displayed that says "No limits for orbit". Press 'Edit Limits' soft-key to define limits.

```
 W
97.0

┌────────┐
│  Edit  │
│ Limits │
└────────┘




            No limits for orbit.



                                  ┌──────┐
                                  │ Exit │
                                  └──────┘

                                     ▐█▌
```

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

```
            LIMIT EDIT       W
                           97.0

   Tran    Min   Avg            ┌────────┐
      0     40    60            │  Init  │
      0     40    60            │ Limits │
      0     40    60            └────────┘
      0     40    60
                               ┌────────┐
                               │  TR#   │
                               └────────┘


   Level   -50.0  dBm          ┌────────┐
   Freq dev 1000  kHz          │  EXIT  │
                               └────────┘

                                  ▐█▌
```

Soft-keys:
Init Limits – Returns transponder numbers and limits to default values
TR# - toggles through transponder numbers of transponders already stored in the meter's database (i.e. in the Field Guide)
EXIT – exits to Limit Scan run screen

Press the left or right arrow buttons to toggle to a different satellite orbit (i.e. 97.0W, 99.0W, 101.0W, etc.)
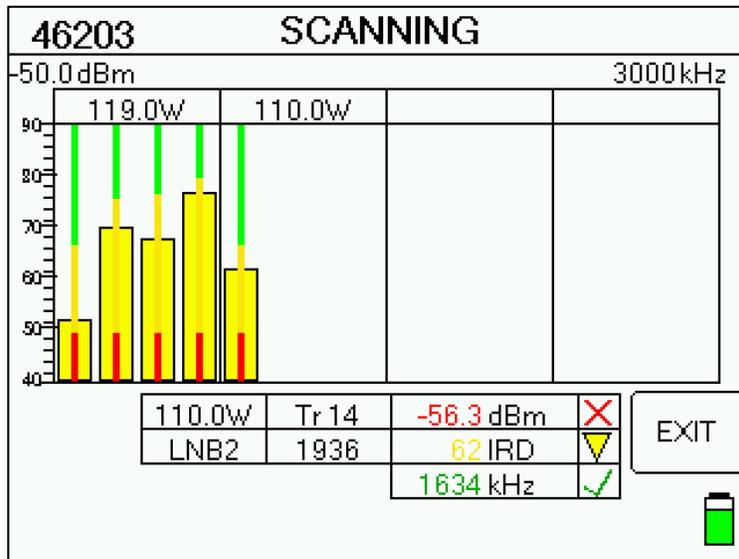Press the up or down arrow button to toggle to the next field to edit the value.
Press Enter button after typing in a value using the meter's alphanumeric keypad.
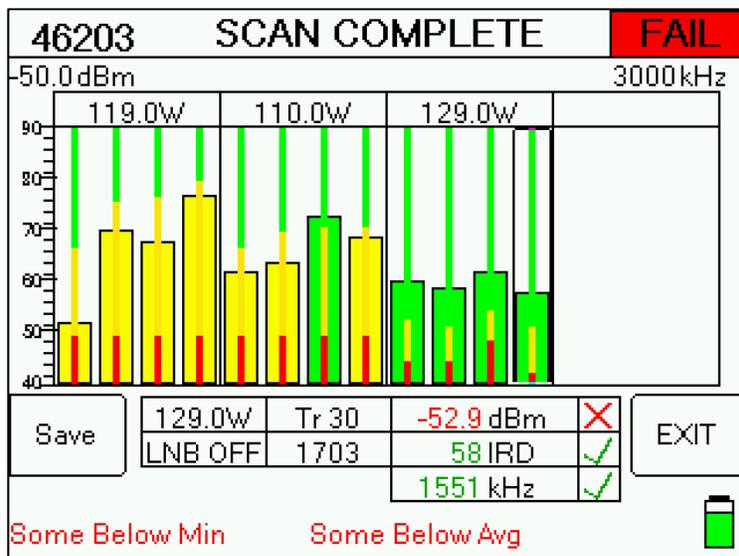
6. Saving Limit Scans

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 XR-3 while out in the field. Then you can upload it to a PC when back at the office (or upload it onsite wirelessly if you have an XR-3 with Wi-Fi) 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 four 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 'Scan All' soft-key near middle left area 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.

46203	SCANNING		
-50.0 dBm			3000 kHz

(bar graph display)

110.0W	Tr 14	-56.3 dBm	✕	
LNB2	1936	62 IRD	▽	EXIT
		1634 kHz	✓	

After the Limit Scan is complete, a summary is shown for all satellites and transponders scanned. An overall grade is shown in the top right corner of the screen. To see the measurements and grades for each individual transponder, press your left or right arrow button to toggle through the transponders and refer to the data below the bar graph.

46203	SCAN COMPLETE		FAIL
-50.0 dBm			3000 kHz

(bar graph display)

Save	129.0W	Tr 30	-52.9 dBm	✕	
	LNB OFF	1703	58 IRD	✓	EXIT
			1551 kHz	✓	

Some Below Min   Some Below Avg

Press 'Save' soft-key to save the results. A screen will appear that allows you to type in the file name, location, technician name or ID   number, and any notes. An error message will appear if you enter a name that has   already been used. Use the alphanumeric keypad to fill in these fields and then press the SAVE soft-key and the system will copy the file from temporary   storage to flash file storage.

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.

Press DATE TIME soft-key to edit the meter's time and date clock. Press Clear soft-key to delete the value entered in the selected field.

```
                    Limit Scan File

                       11/08/2017

                    File Name
                    DISH WA DPP 1000.2

    DATE       Location                            SAVE
    TIME       INDIANAPOLIS

                    Technician
                    JOHN SMITH
    Clear                                          EXIT
               Notes

                 -
```

1. **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 MeterMaid application. MeterMaid version 1.12 or higher is required to   display the Dish Network revised Limit Scan results properly.

A screenshot from an example of a transferred Limit Scan file is shown below.

Right click on top of the scan results for some options.

You can switch from Table view to Graph view.

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, symbol rate).