TABLE OF CONTENTS

DESCRIPTION

Auto Raw Data Display Tool (formerly called Real Time Spike Noise Test) is an easy to use real-time troubleshooting tool that allows the viewing of raw data on the terminal. The raw data show spike noise as intensified, or bright, areas on the screen (see Illustration L1967a). Refer to section 4 for spike noise theory.

SPIKE NOISE EXAMPLES
ILLUSTRATION L1967A

These raw data screens are stored as image files, and can be compared with each other to help you determine if the amount of spike noise is decreasing or increasing as component or cabling changes are made.

1- SET UP

1. Remove Head Coil from cradle, if present.

CAUTION

Equipment damage possibility. Completely remove the quad head coil from the cradle before performing any body scans. Failure to do so may damage the head coil T/R network.

2. Landmark, using body loader **only**. Do not place a phantom in the loader or the signal from it will mask the white pixels you need to see.

Note

Run the type of scan that produces the most spike noise. Typically, Auto Raw Data Display is used to review data received from fast gradient recall scans. This scan displays one slice per pass, which is useful for correlating the effect of wiggling cables, or making other system changes during the scan and analyzing their effect; the raw data images are updated every 4.5 seconds.

3. Set up scan protocol as prescribed below. This protocol is selected because it is a standard PSD that "shakes" the system and is more likely to generate white pixels. Keep in mind that any **customer psd** can be used, but may not provide the same update rate.

4. Select **[Scan Modes]**, **[Service], [Accept]**

5. Select **[New Exam]**

6. Id: **geservice**
   Name: **spike noise**
   Weight (lb): **111**

7. In the Protocol field, type **o.45.1** (o=Other, 1=series) to load the protocol, then **[Accept]**.

8. Select **[Sequentl]** on the Imaging Parameters window. This provides the fastest image display rate.

9. Set *Locs Before Pause* to **[None]** on the Acquisition Timing window.

10. **[Save Series]**

Note

The service protocol defaults to 28 scan locations on the [Scanning Range] page. To lengthen the scan without affecting the 4.5 second image display rate, increase the number of scan locations.

2- SCAN & TROUBLESHOOTING

1. Press MOVE TO SCAN button on operator workspace workstation.

2. **[Modify CVs]**, set `rawmode` = **1 <Enter>**. **[Accept], [Accept]**. This selects raw image reconstruction for display on the IP. Remember to press **<Enter>** after each CV parameter.

3. **[Backup]**.

4. **[Manual Prescan]** and check that R1=**6**, R2=**15**, TG=**0**. **[Done].** Remember to press **<Enter>** after each parameter.

5. **[Scan]**. Raw data plot updates after each pass while the scan is running.

6. Adjust window width to 1, and window level to 90. Look for white pixel content in the raw data display.

Note

Raw data can be viewed at the end of scan, or during scan while system conditions are being altered, such as wiggling the cables to create spike noise. This requires Auto Display Mode to be on.

7. Compare raw data plot to other raw data plots, if available.

8. Troubleshoot for cause of white pixels.

9. Click **[Prepare for Scan]** after each scan.

10. Rescan and troubleshoot for cause of white pixels until problem is solved.

11. For the ADVANCED USER: Magnitude raw data are displayed by default; this can be changed to Amplitude, Phase, or Q data display by typing the following at the TPS Terminal: **ed_recon_ctrl=xxx**, where xxx is **129** for Amplitude data, **130** for Phase data, or **136** for Q data. If a TPS Terminal is not on the system, a laptop with proper interface may be used.

3- SYSTEM RESTORATION

1. Reconnect cables and other hardware that were disconnected during white pixel troubleshooting.

2. Perform a body scan to check for acceptable image quality and proper system operation.

3. After archiving any desired images created during troubleshooting, delete the Spike Noise Exam.

4- SPIKE NOISE THEORY

Spike noise, also known as *corduroy*, or *white pixel*, is one of the most common artifacts in MR imaging. Corduroy refers to the parallel line patterns that are often seen in the affected image. These are caused by intensified, or bright, areas in raw data (i.e., white pixels). These intensified areas are typically created by arcs or spike noise received by the system. The source of the arcs or spike noise can be any current-carrying conductor, or any conductor within a changing magnetic field. This includes: cables, electronic components, and support hardware.

The arcing must be happening within the magnet room, unless the RF shield is not functioning properly. Any arcing outside the magnet room should be attenuated by the RF shield and filters. Although it happens very rarely, it is possible for digital data handling problems during data acquisition to create spike noise. Spike noise requires thorough troubleshooting to reduce the frequency, time, and cost of repair.

Corduroy can appear very differently from image to image. It may be apparent on only one image in a series, or on every image. It may be just fine lines that are hardly noticeable, or it may destroy the total image. It may even look like an SNR problem where the image is grainy. The magnitude of the arc, and where it happens in raw data k-space, determine how it affects the image. White pixels toward the center of k-space have more affect on the image. This is because most of SNR for the image comes from the central portion of k-space. These many symptoms of spike noise can lead one to believe that they have multiple problems when it is really just one source.

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	April 28,1998	R. Hawthorne	Initial conversion to Word
1	Nov 2, 1998	M. Keber	Removed obsolete 8.1 information; misc. style guide cleanup.
2	Oct 14, 1999	M. Keber	Added correct proprietary heading to document.