TABLE OF CONTENTS

1- DESCRIPTION

System Health tool, 'sys_health', checks the existence, validity, and consistency of selected fields in system configuration and calibration files. Check status, along with field values, are displayed on the screen and in an output file named 'system_health.log' in the '/usr/g/service/log' directory. The tool is used to identify possible configuration file corruptions, incorrect parameter settings, bad or missing calibration procedures, and calibration failures. Since it serves to identify/isolate possible problems and eliminate redundancy in the calibration process, the 'sys_health' tool helps shorten the time of a troubleshooting session and provide the operator with a quick summary of the system health.

2- TOOL START-UP

2-1 Running the Tool Under Software Rev 8.x, ASP and 9.0

Select the 'C-shell' from the Service Desktop and type the following in the shell window:

cd /usr/g/service/cclass <Enter>
sys_health [**-p**] [**-nf**] [**-h**] **| more <Enter>**

Where the optional keys are defined as:

Note

Only one option at a time can be selected (i.e. **-p**, **-nf**, or **-h**; do not enter the "[ ]" characters or the command will not work). In most cases, the **-nf** option is used.

-p = allow the user to display plots of selected data sets. You will be prompted for confirmation before plotting the selected data set.
-nf = do not terminate program when a FATAL error is encountered.
-h = help option which displays the command options
| more = data display will stop at bottom of screen until the spacebar is pressed to display another screen of data.

Note

It may take several minutes before any results are displayed.

Once the tool is started, it generates status output to the screen and to an output file named 'system_health.log', located in the '/usr/g/service/log' directory until a fatal error is encountered (if option key of '-nf' is not used) or when the end of the tool is reached. An example of the output format is shown in Appendix A.

Note

If a system_health.log file already exists, it will be copied to *.log.bkup when sys_health is initiated. So, two versions of the log may be kept, the current one and a *.bkup one.

2-2 Results File

The output (system_health.log) file can be displayed in a C-Shell as follows:

cd /usr/g/service/log <Enter>
more system_health.log <Enter>

Press the **<space>** bar to view additional information until the end of the file is reached. Refer to Appendix A for an example System Health output.

2-3 Running the Tool Under Software Rev 9.1 and 10.x

To start System Health Tool, at the host computer go to the Service Desktop and start the Service Bowser if it is not already running by pushing the **[Service Browser]** button on the left side of the screen. Refer to Illustration 2-1.

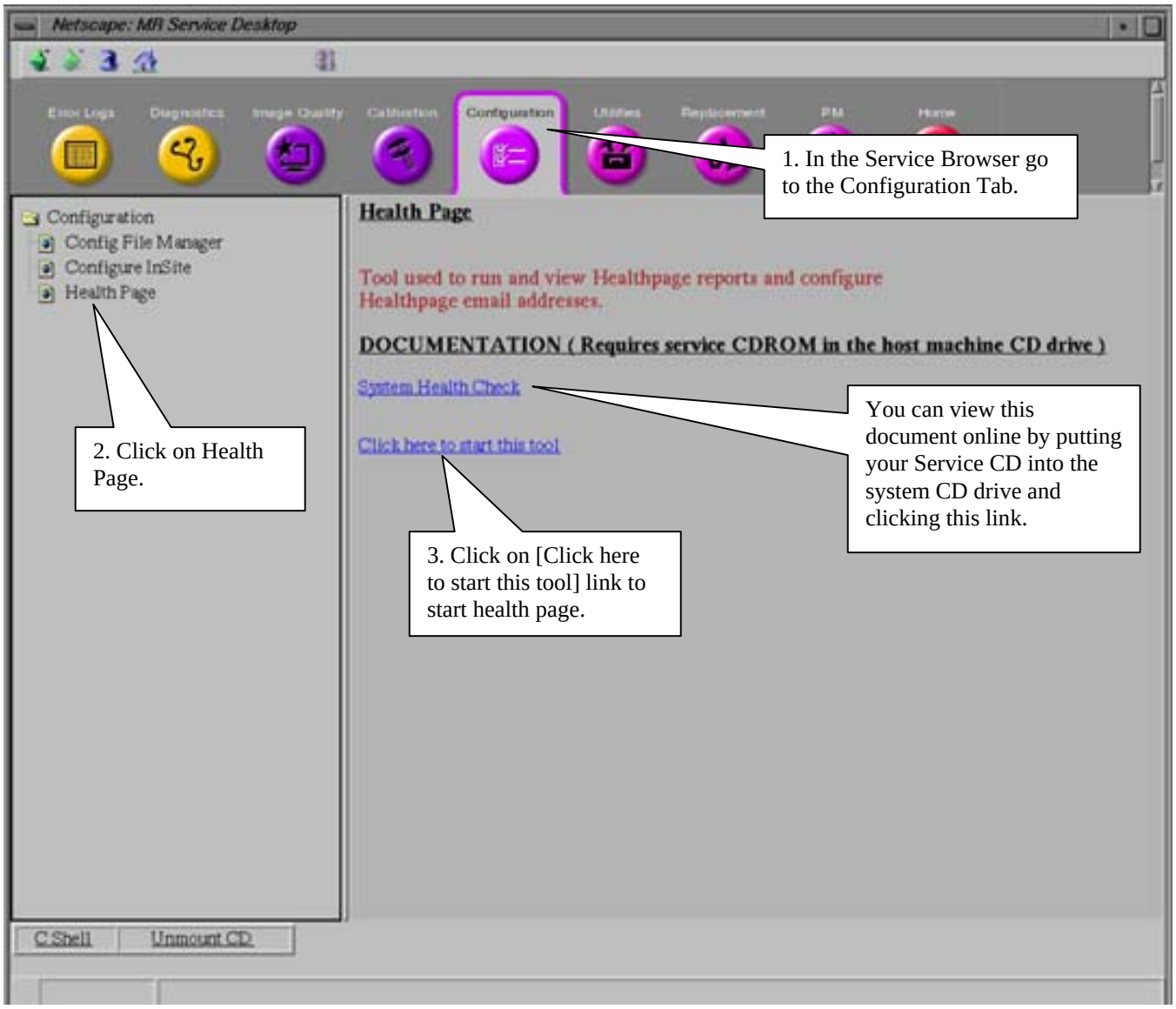

ILLUSTRATION 2-1
STARTING HEALTH PAGE

Starting the tool will bring up the System Health tool. Refer to Illustration 2-2.

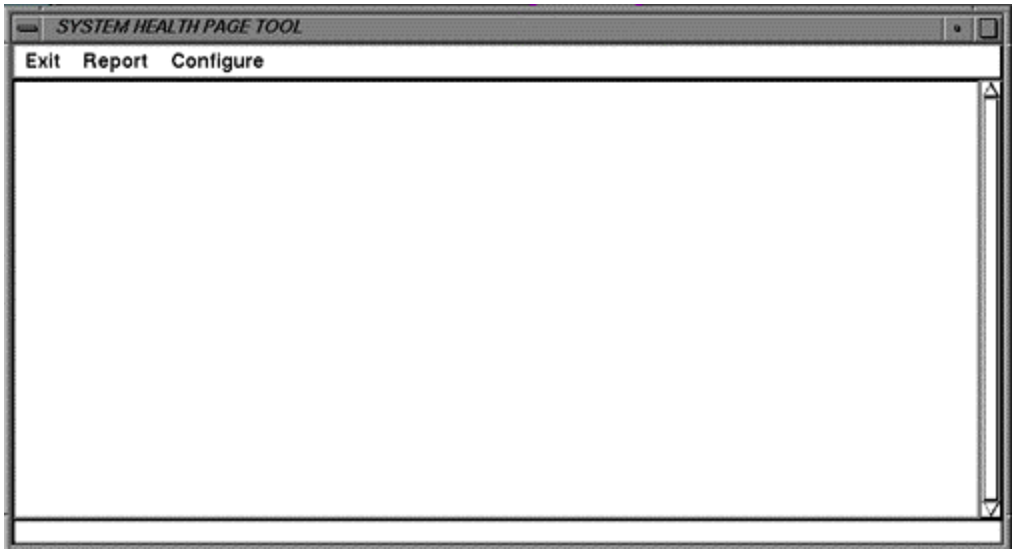

ILLUSTRATION 2-2
SYSTEM HEALTH TOOL

Menu items at the top of the screen represent the controls available for this tool.

1. Clicking **[Exit]** closes the System Health Window.

2. Clicking **[Report]** opens a menu of three Items.

    a. Custom Report: Generates a report that is a subset of a full report. This subset is setup in the **[Configure]** pull down.
    b. Full Report: Gives a report of all items System Health is designed to look at.
    c. Last Report: Displays the last System Health report generated. You can also view the last report run from the Service Browser. See Section 2-4.

Note
Reports will take several minutes to run.

3. Clicking **[Custom]** opens a menu of four items.

    a. Enable/Disable Health Page: This is a toggle selection. What ever state is showing when opening the pull down is the current state of Health Page. Click the entry to change it.

    b. Edit Schedule: System Health can be set you automatically run on a periodic basis. See Illustration 2-3. Specific dates can be setup or a routine run setup ever so many days as setup by the user. If email addresses are setup, reports can automatically sent to these addresses.

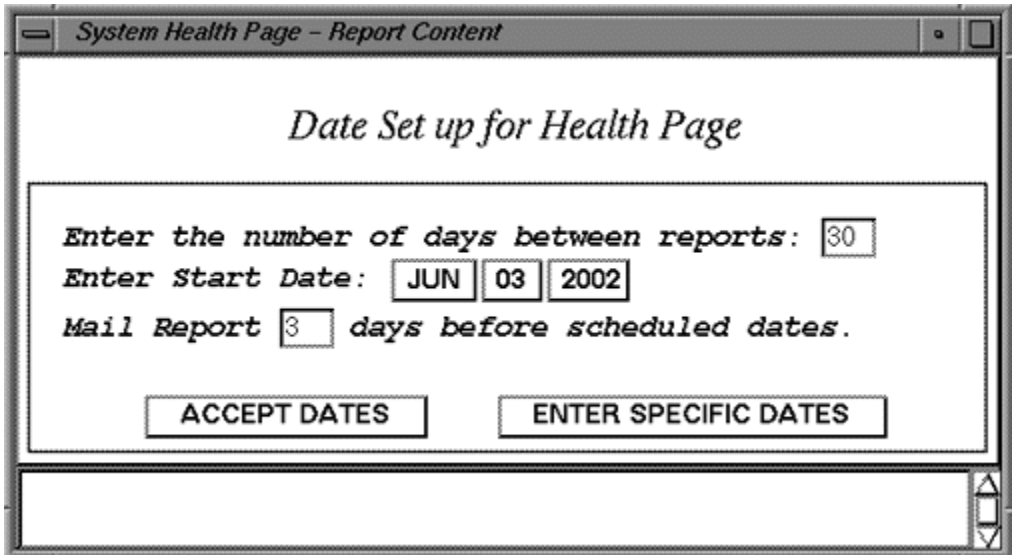

Illustration 2-3
Auto Report Setup

c. Edit email Addresses: Email addresses can be added to System Health to email result files. See Illustration 2-4.

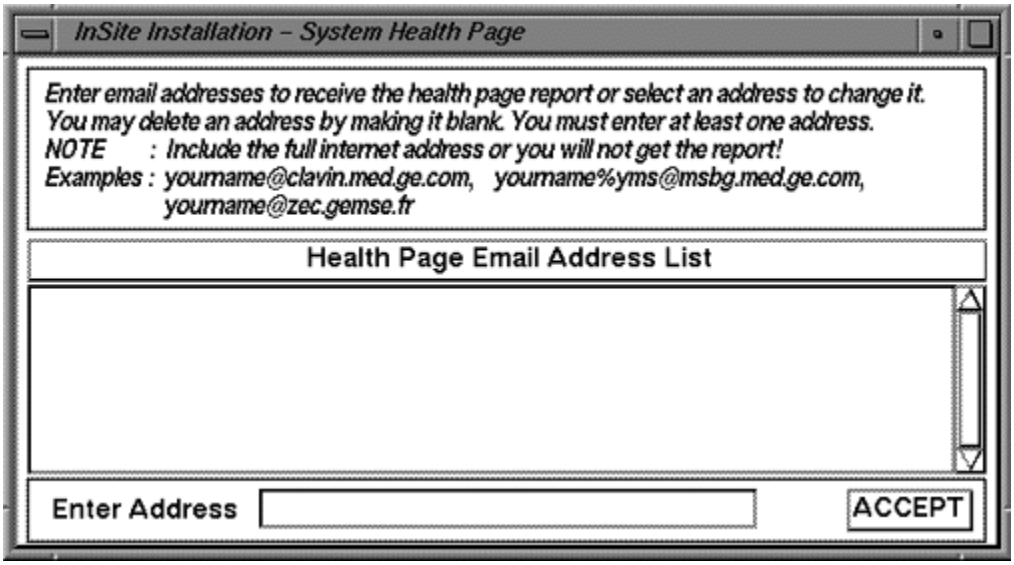

Illustration 2-4
Edit Email Addresses

d. Edit Report Content: Use this tool to modify what checks System Health makes. See Illustration 2-5. Click the Select **[All]** button to select everything. This is the default. Or click the **[Clear]** button to change Include to No and then double click the entries wanted to change Include to Yes. Click the **[Accept**] button when done.

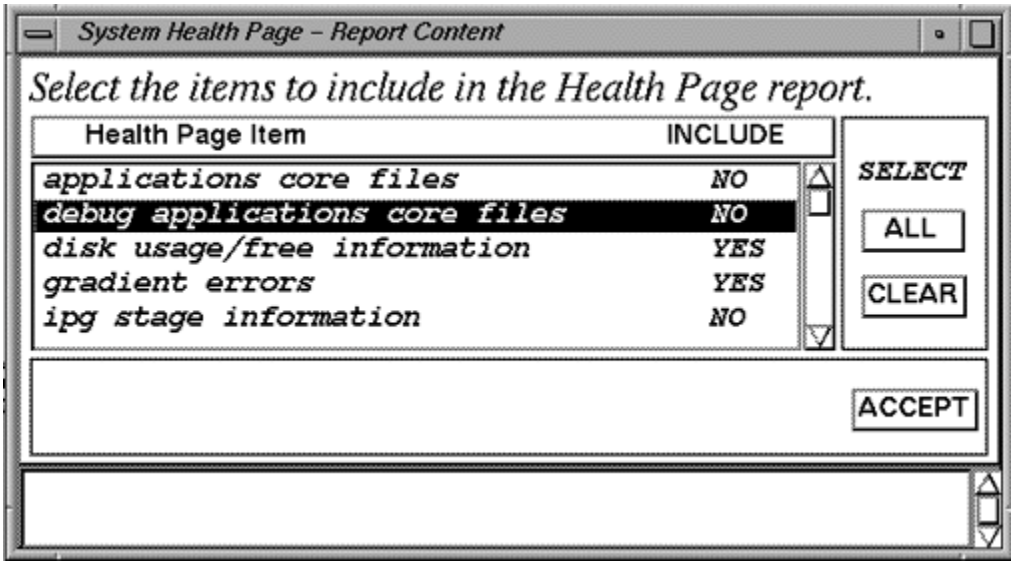

Illustration 2-5
System Health Report Content

2-4 Viewing System Health in the Service Browser

To view the last System Health that was run on the system, go to the Error Log tab of the Service Browser, See Illustration 2-6.

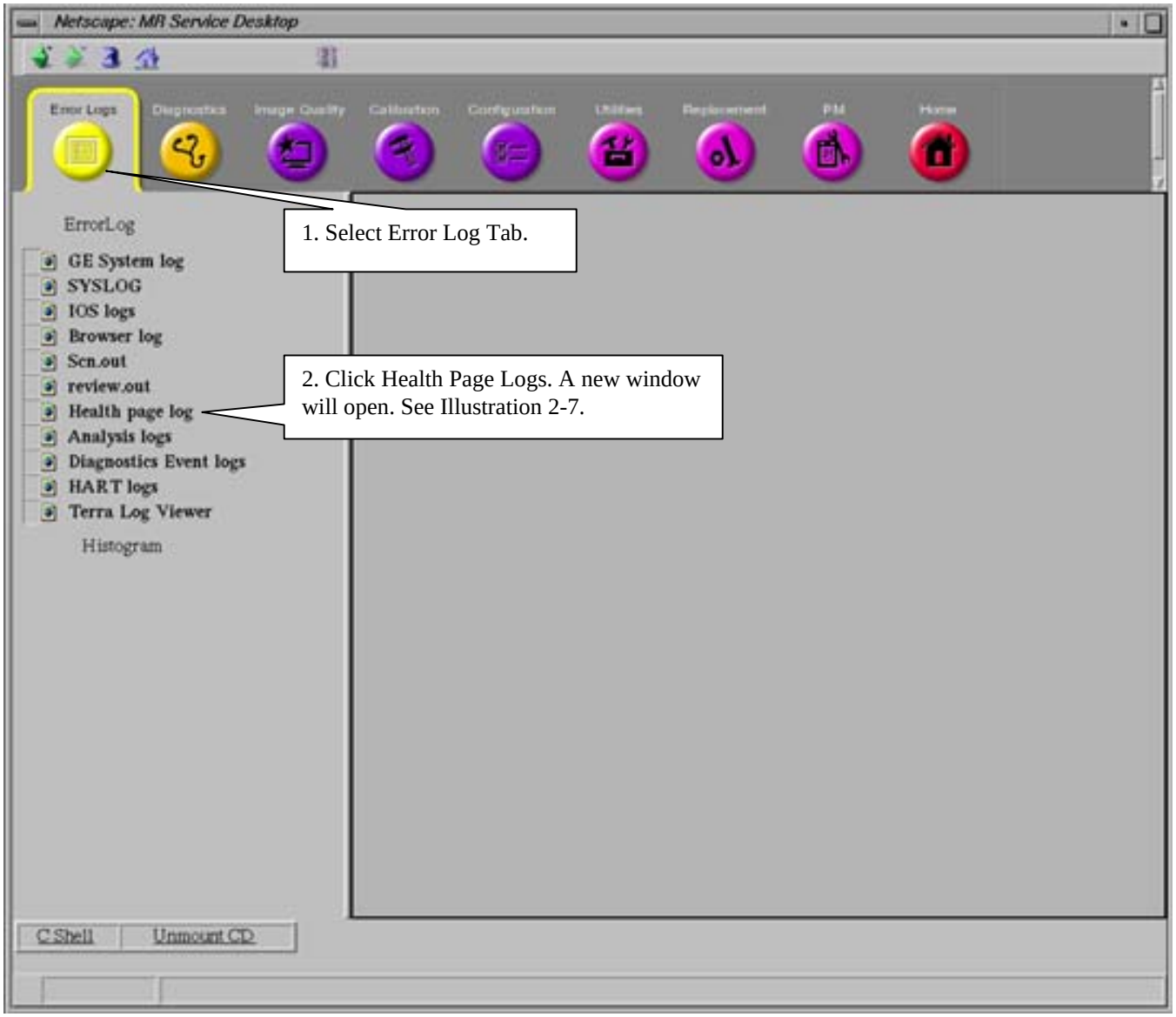

ILLUSTRATION 2-6
ACCESSING HEALTH PAGE LOG

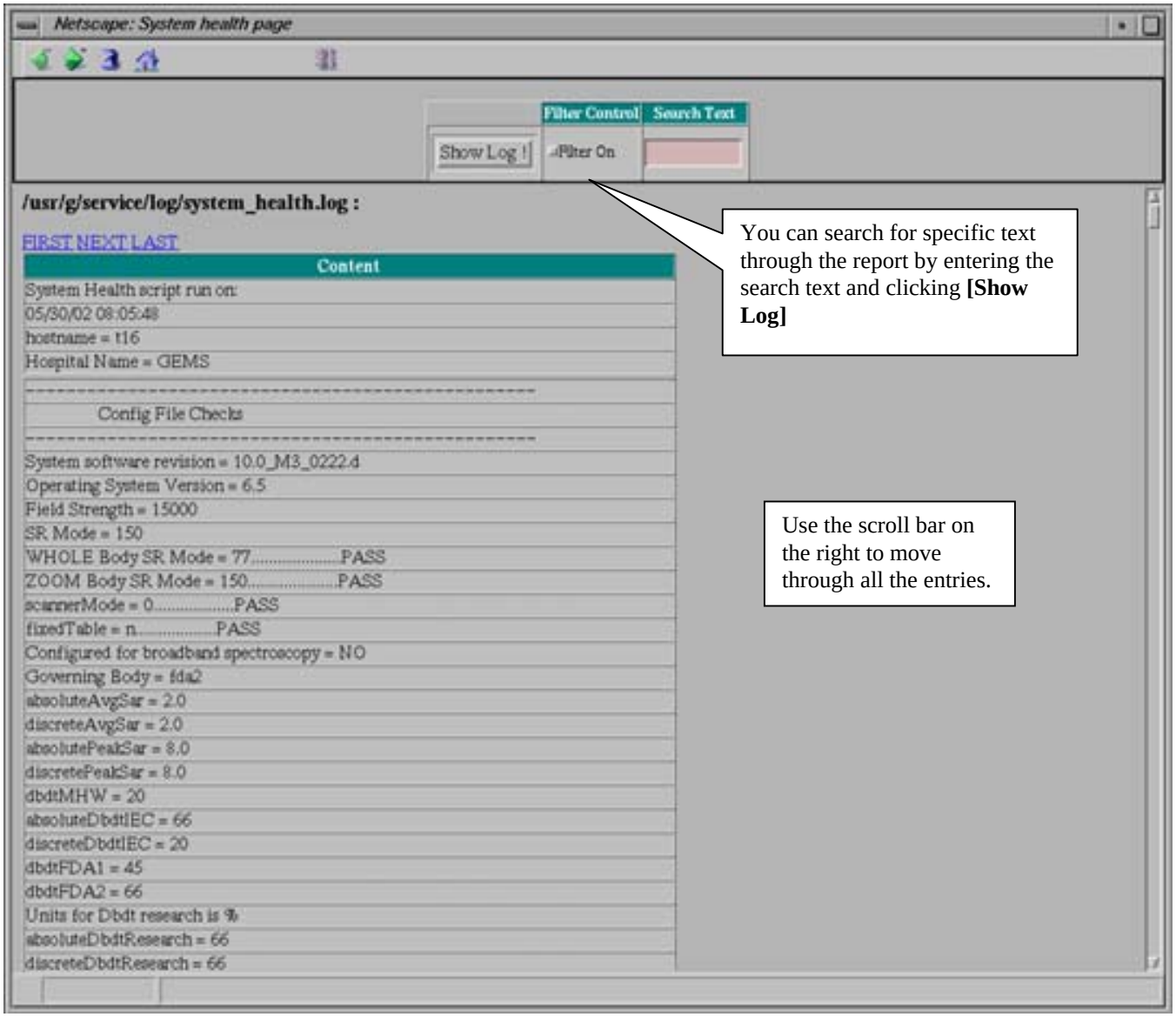

ILLUSTRATION 2-7
SYSTEM HEALTH PAGE

3- FUNCTIONAL DESCRIPTION

The following sections provide a detailed description of the files checked when running the System Health tool.

3-1 Configuration Files

The System Health Check Script, 'sys_health', reads selected fields from the following configuration files in '/usr/g/w/config':

Suite.cfg
MRconfig.cfg
CoilConfig.cfg
GradientConfig.cfg
prescan_config.cfg

For ***TwinSpeed*** system there are two GradientConfig files: GradientConfig.cfg.WHOLE and GradientConfig.cfg.ZOOM.

3-1-1 Suite Configuration File

The 'sys_health' software extracts the following field from the Suite.cfg file locate in '/usr/g/w/config':

- hospitalName (hospital name)

3-1-2 MR Configuration File

The 'sys_health' software extracts the parameters corresponding to the following fields from MRconfig.cfg file located in '/user/g/w/config':

- field_strength (magnet field strength)
- specRFamp (broadband spectroscopy switch)
- govBody (governing body for the system)
- ampCalHead (amp cal factor for the head coil)
- ampCalBody (amp cal factor the the body coil)
- magnetSerNum (magnet serial number)
- mCoilTRdriver (multi-coil configuration switch)
- RFampType (RF amplifier type)
- gradientAmp (gradient amplifier type)

3-1-3 Gradient Configuration File

The 'sys_health' software extracts the parameters corresponding to the following fields from the GradientConfig.cfg file located in '/usr/g/w/config' :
:

- SRMode
- psdRFWait1.5T/1.0T/0.5T
- psdGradWait1.5T/1.0T/0.5T
- GCoilType (gradient coil type)
- xfull (x-gradient cal maximum value)
- yfull (y-gradient cal maximum value)
- zfull (z-gradient cal maximum value)
- xRiseTime (x-gradient rise time)
- yRiseTime (y-gradient rise time)
- zRiseTime (z-gradient rise time)

For ***TwinSpeed*** system there are two GradientConfig.cfg files, GradientConfig.cfg.WHOLE and GradientConfig.cfg.ZOOM

3-1-4 Coil Configuration File

The 'sys_health' software extracts and checks all parameters for all coils from the CoilConfig.cfg file located in '/usr/g/w/config'.

3-1-5 Pre-scan Configuration File

The 'sys_health' software extracts the parameter corresponding to the following field from the prescan_config.cfg file located in '/usr/g/w/config':

- ftg_on (fast TG switch)

3-2 Calibration Files

3-2-1 Bandpass Assymmetry Files

The 'sys_health' software checks for the existence of the bandpass assymmetry file, bcrvs1.dat, located in '/usr/g/bin'. If the system has a multi-coil configuration, 'sys_health' checks for the existence of the following files:

- bcrvs1.dat
- bcrvs2.dat
- bcrvs3.dat
- bcrvs4.dat

If the system is configured with a fast receiver, 'sys_health' checks for the existence of the following files:

- bcrvf1.dat
- bcrvf2.dat
- bcrvf3.dat
- bcrvf4.dat
- bcrvf5.dat

3-2-2 B0 Dither Files

Note

For ***TwinSpeed*** system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' software checks for the existence of the B0 dither files located in '/usr/g/bin':

- b0vectors.dat.body
- b0vectors.dat.head

The number of entries in this file is verified. The start "esp" value is displayed. When the option '-p' switch is evoked, the following data files can be plotted on the screen:

- b0vectors.datb.xyz
- b0vectors.dath.xyz

3-2-3 Group Delay File

Note

For ***TwinSpeed*** system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' software checks for the existence of the group delay calibration file 'delay.dat' located in '/usr/g/bin'. If the file exists, 'sys_health' extracts the following axis delay parameter values from this file:

x_delay (sixth row)
y_delay (eighth row)
z_delay (tenth row)

If the delays between any two delays are more than 5, then the 'sys_health' software flags and reports this as being abnormally high. The delay for the 100 kHz fast receiver filter should also be extracted from 'delay.dat'. This parameter, fr1_delay, should not be 0 when the SRmode equals 120 or 150, or when the number of fast receiver is equal to 1.

The 'sys_health' software checks for the existence of the following files:

delay.espb.xyz
delay.esph.xyz.

If these files are missing from the '/usr/g/bin' directory, 'sys_health' flags this and reports a failure status. When the '-p' switch is evoked, 'sys_health' gives the operator an option to plot the data file, 'delay.fst.xyz' on the screen.

3-2-4 B0 Image File

Note

For ***TwinSpeed*** system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' software checks for the existence of the B0 Image calibration files:

- b0imgx.body (b0imgx.head)
- b0imgy.body (b0imgy.head)
- b0imgz.body (b0imgz.head)

If these files exist, 'sys_health' extracts the B0 image results for each file, and compares these values to a pre-defined B0 ghost value, 5.0. If any of the extracted values are greater than 5.0, 'sys_health' flags this and reports a failure status.

3-2-5 EPI White Pixel File

Note

For ***TwinSpeed*** system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' attempts to open, read, and display the content of the following files created by EPI White Pixel Test:

- sn_report.body (when in body mode)
- sn_report.head (when in head mode)

These calibration files are located in "/usr/g/service/cclass/ept". If they are not found, the status message indicating that body epiwp or head epiwp has not been run is displayed. No fatal error is generated with the missing EPI white pixel files.

3-2-6 Probe Calibration File

Note

For ***TwinSpeed*** system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' software checks for the existence of the probe calibration files, probepfix.dat and probesfix.dat located in the '/usr/g/caldir' directory. If both are located, 'sys_health' extracts fields in these files corresponding to:

probe-s	probe-p
steam_x	press_x
steam_y	press_y
steam_z	press_z

If any of the above parameters have values of '0', then 'sys_health' flags this and reports the status that probe tuning is required. The 'sys_health' software also checks whether the values above have not been changed from the default load from cold (LFC) values. Under this condition, 'sys_health' reports that probe tuning is required.

The 'sys_health' module can also flag possible tuning problems. These problems include the conditions when the magnitude of steam_x, steam_y, steam_z, press_x, press_y, or press_z is greater than 0.4. Another possible probe tuning problem can arise when the sum of the magnitude of steam_x, steam_y, and steam_z is greater than 0.6, or when the sum of the magnitude of press_x, press_y, and press_z is greater than 0.6. When any of these conditions occurs, 'sys_health' flags it and reports a failure status.

3-2-7 Grafidy Calibration File

Note

For TwinSpeed system all the files below are linked to either .WHOLE or .ZOOM.

The 'sys_health' software reads the content of the following grafidy calibration files in the '/usr/g/caldir' directory:

- grafidyx.cal
- grafidyy.cal
- grafidyz.cal

All B0 and linear fitting time constant values (alphas and taus) are checked against pre-defined limits. These limits are:

- tau_low = 1000 (us)
- tau_hi = 3000000 (us)
- alpha_low = 2.5
- alpha_xterm_low = -0.2
- alpha_xterm_hi = 0.2

When a value is out-of-bounds, then 'sys_health' flags and reports the status.

In the linear fit case, 'sys_health' checks whether or not the alpha constants are above the alpha_low value (2.0) and are positive numbers.

In the cross-term case, 'sys_health' determines which cross terms are enabled. If cross terms are applied, it verifies that the third and fourth fitting terms are zeros. Furthermore, all applicable cross-term tau values should be verified to be within the pre-defined range (tau_low:tau_hi.

In the short time constant linear case, 'sys_health' verifies that the first tau and alpha terms are zeros and checks, which axes have short time constant (STC) correction enabled. The short time constant alphas are checked to ensure they are all possible. Any abnormalities are flagged and included in the status report as a failure.

In the very long time constant case, 'sys_health' verifies if VLTCs are enabled or disabled. All non-zero encounters are reported as a failure.

When the 'pl' switch is evoked, 'sys_health' gives the user an option to plot the following data files on the screen:

- g*short.dat
- g*long.dat

3-3 T-Test Files

Note: For ***TwinSpeed*** system all the relevant files below have a GradMode extension.

The 'sys_health' software looks for the following T-test files in directory '/usr/g/service/data':

- HSS: (*.HSS - High Speed Stability)
- RFT: (*.RFT - RF Test)
- LVshim: (*.LVS - LV Shim)
- SPT: (*.SPT - System Performance Test)
- QRT: (*.QRT - Quick Receiver Test)

- SST: (*.SST - Small Sample Test)
- RFS (*.RFS - RF Amp Status Test)
- TLT: (*.TLT - Top Level Test)

The latest version of each test result file is also reported. If no result file of a particular test type is found, 'sys_health' indicates this in the status report. If a *.SPT file exists in the '/usr/g/service/data' directory, then 'sys_health' reads the Group 9 data from the latest *.SPT file. SPT Group 9 data contains pass/fail status of all the SPT tests. The 'sys_health' software also displays results from the last LV Shim run and the last CTL SNR run.

3-4 Miscellaneous System Data

3-4-1 Software Revision

The 'sys_health' software determines the software revision on the current system by evoking the 'getver' command.

3-4-2 IPG Emulation Mode

The 'sys_health' software determines which system device is emulated by reading the 'ipg_stage' file in the '/usr/g/w/config' directory. It extracts the line which starts with 'a'. Each letter on that line indicates a device mode or status.

- A (emulate PAC)
- B (emulate TYME II)
- C (emulate IWS-PC)
- D (emulate T/R driver)
- E (emulate WHOLE-BODY gradient of TRM)
- F (emulate ZOOM gradient of TRM)
- G (emulate gradient amp)
- H (emulate RF amp)
- I (emulate power monitor)
- M (emulate entire MDS)
- 0 (disable reporting of gradient overloads)
- Q (emulate the peripheral pulse signal from the PAC)
- R (emulate SRI)
- S (emulate bore wall temperature sensor)
- T (emulate table)
- V (emulate vacuum monitor)
- W (disable watchdogging)
- X (disable SRI errors)
- Y (disable gradient errors)
- Z (enable watchdog debug mode)

When no components are emulated, then 'sys_health' also reports this to the screen and the 'system_health.log' file.

3-4-3 Disk Space Report

The 'sys_health' tool reports the number of free disk blocks on the current system.

3-4-4 Install Options

The ’sys_health’ tool checks for installed options.

3-4-5 Host HW Inventory

The ’sys_health’ tool lists the hardware components on the host computer and reports all SCSI devices on the host that are powered up.

3-4-6 File Checksum

The ’sys_health’ tool checks file checksums. This feature is used to determine whether or not any software or patches have been loaded onto the system.

3-4-7 TNS Status

The ’sys_health’ tools reads the Transient Noise Suppresion (TNS) status, which reports the spike noise count data.

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
A	Oct 7, 1997	K. L-P	Preliminary release.
B	Oct. 29, 1997	K. L-P	Additional explanations in tool start-up section
0	Dec. 19, 1997	K. L-P	Initial release.
1	Sept. 21, 1998	M. Keber	Fix for SPR MRIge46422 (do not use "[ ]" with sys_health command).
2	Nov. 8, 1999	M. Keber	Updated Section 2-2 to view output from C-Shell (cannot be viewed with Report Manager), Section 3-1-4 (parameters for all coils now checked starting with 8.2.5 M5), and Appendix A (replaced 5.x example with 8.x example file output).
3	June 20, 2000	M. Jones	Replaced Appendix A with latest output file from Bay 3.
4	March 15, 2001	M. Jones	Added note to Section 2-1 re allowing time for results to display.
5	July 16. 2001	A. Nevelsky	Updated for TwinSpeed scanner for 9.0 releases.
6	June 5, 2002	Hawthorne	Added browser support for using Health Page in the service browser and use of the Health Page setup tool into section 2