

Tactiq
&
GE Healthcare

GENIE Acquisition User Interface
The Benefits of
User Task Analysis

Authors: Allen Velani avelani@tactiq.co.uk
Sean Blencowe sblencowe@tactiq.co.uk
Tim Jones tjones@tactiq.co.uk

Revision: 1.1
Date: 05 June 2006

Benefits of the GENIE Acquisition User Interface

GENIE Acquisition is the operator's console for GE Healthcare's Nuclear Medicine diagnostic imaging product range. Its' user interface was designed to provide a competitive advantage by setting new standards for ease-of-use.

- User interface designed using User Task Analysis
- Integrated with Clinical Information Systems for efficient workflow
- Increased patient throughput
- Shorter operator training time
- Easy to use yet powerful interface
- Reduction in the number of operator errors
- Reduction in the number of support calls
- Designed allowing for future enhancements
- Same user interface software supports:
 - Multiple user interface themes
 - Varying number of gamma cameras
 - Multiple gantry, gamma camera and table types
 - Optional features (auto body contouring, attenuation correction)

Case Study

GENIE Acquisition: Image Acquisition Card

The Image Acquisition card presents all of the functions required for the operator to define, execute and monitor the progress of each patient scan.

Database and Network Management Screen Button

Main Tab Cards Navigation for 3 major User Task domains:

- QC (Quality Control)
- Image Review
- Image Acquisition

Acquisition Status Area

Scan Set-up Tab Cards

Acquisition Controls

Scan "To Do" List

666
STATIC

Allen
Det1 0deg 264mm Lon 784mm
Det2 180deg 264mm Ver 733mm
Lat 0mm

STATIC-2
1.60 Mc/s 1.66 Mc/s

23 Apr 04 13:50:21

QC
Review
Acquisition

To Do Worklist Template

Patient Name

Add Edit Review

123
ABC
Whole Body Bone

WBV

WHOLE
BODY

666
Allen
Basic

STA STA STA
STATIC STATIC-1 STATIC-2

11111
Bill
Cedars Planar Thallium

STA STA STA
ST ANT ST LAO45 ST LAO70

22222
Fred
Lung Perfusion Statics

STA STA STA

Allen STATIC-2 Start 10 Persistence Clear Change Camera Off

Patient Study Energy Start/Stop Image

Detector: 1 and 2 Detector 1 Detector 2 Transmission Scanning

Session: Tc99m Energy Isotope

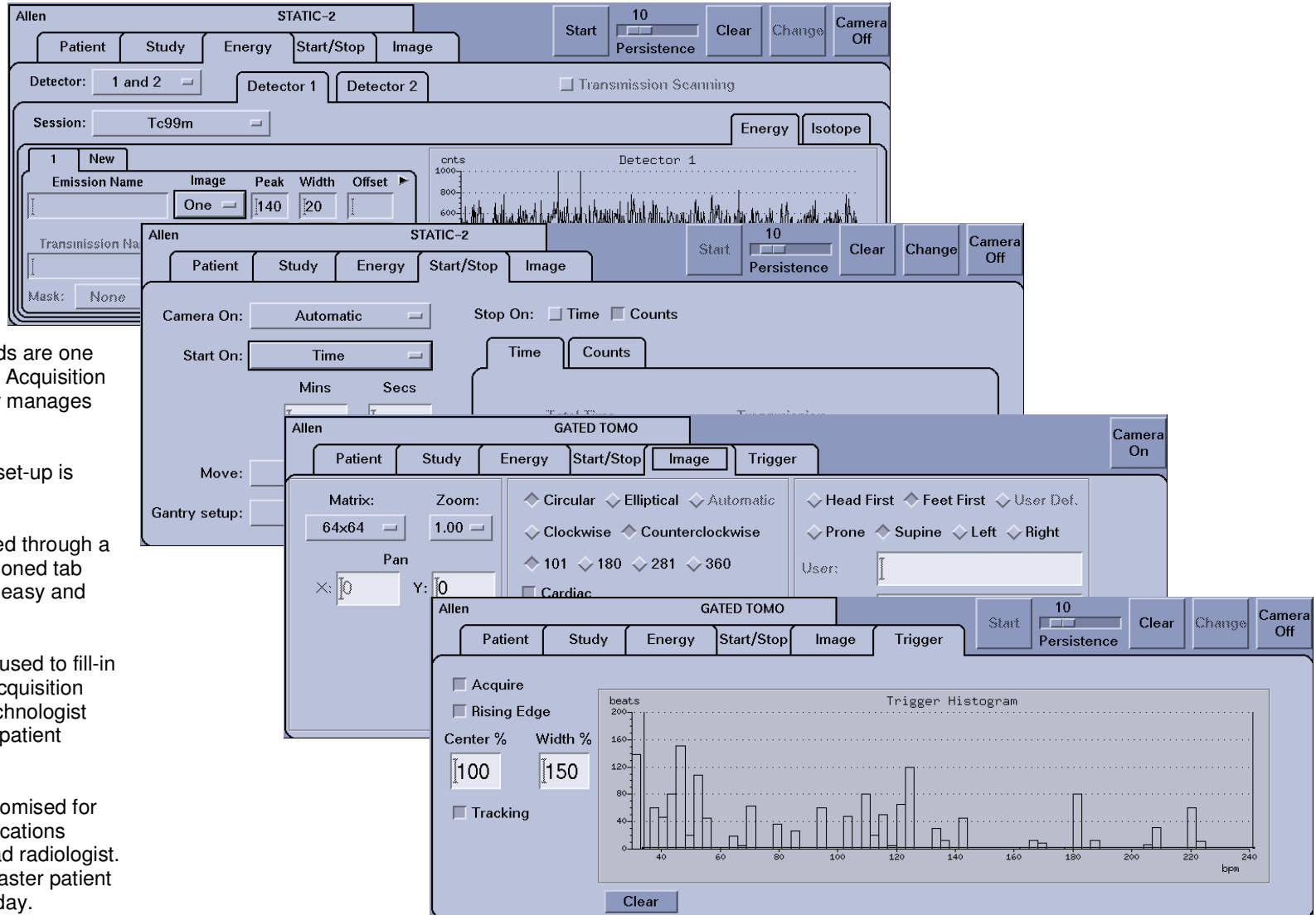
1	New	Emission Name	Image	Peak	Width	Offset
			One	140	20	
		Transmission Name				
		Mask: None		Half Life: 6.01		Hour

cnts
1000
800
600
400
200
0

Detector 1

0 100 200 300 400 500 keV

GENIE Acquisition: Scan Set-Up Tab Cards (Energy, Start/Stop, Image and Trigger)



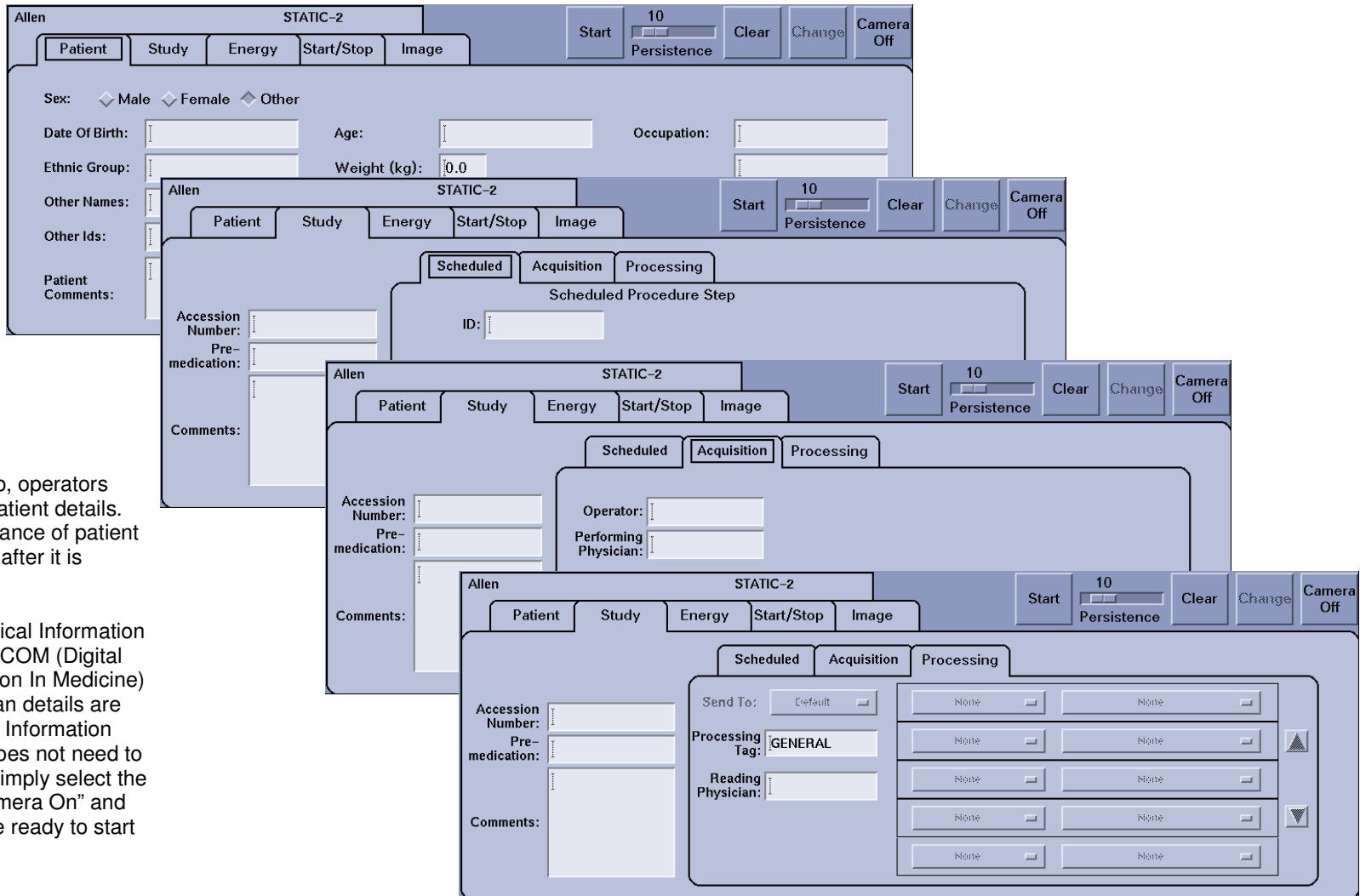
The scan set-up tab cards are one way in which the GENIE Acquisition user interface effectively manages complexity.

The complexity of scan set-up is mitigated in two ways:

1. All scan data is edited through a set of logically partitioned tab cards. Navigation is easy and well bounded.
2. Scan templates are used to fill-in the majority of the acquisition detail leaving the technologist less to do when the patient arrives.

Scan templates are customised for each system by an applications specialist and/or the head radiologist. An operator is able to master patient scanning in less than a day.

GENIE Acquisition: Scan Set-Up Tab Cards (Patient and Study)



To complete scan set-up, operators only need to enter the patient details. This can be done in advance of patient arrival, during a scan or after it is completed.

If the hospital has a Clinical Information System that supports DICOM (Digital Imaging & Communication In Medicine) Worklist, patient and scan details are provided by that Clinical Information System. The operator does not need to enter any set-up data. Simply select the patient entry; press “Camera On” and position the patient to be ready to start the acquisition.

GENIE Acquisition: Image Acquisition Card - DICOM Worklist

Acquisition

To Do Worklist Template

From: broker Date

For: NM oak
dd/mm/yyyy dd/mm/yyyy

From: To:

Query Cancel

Patient Name 9 of 9

00003 Blencowe Sean
SYS/Bone/Spot View Bon

00003 Blencowe Sean
Whole Body Bone

00001 Johnson Alan
STATIC
Accession: 1999.11.30.0001
Procedure: 100.001
Scheduled: 30/11/1999 12:30
Modality: NM
Physician: Dr.Brown

00008 Jones Amaya Sophie
ultrasound

00002 Jones Tim

Add ToDo

Scheduled Procedure. Description text is set on a white background indicating that a scan template has not been defined for this study type.

The GENIE Acquisition user interface was designed using User Task Analysis. This revealed that radiology departments used printed lists (schedules) of patient bookings to plan work. The GENIE Acquisition design adopted this idea as a core part of the acquisition set-up user interface. The “To Do” list allows an operator to set-up scans in advance of the patient arriving. Some hospitals set-up the “ToDo” list at the beginning of the day.

When GENIE Acquisition was initially designed DICOM (Digital Imaging & Communications In Medicine) for Nuclear was in its infancy. DICOM was mainly used to transfer images between scanning systems. Since then, there has been an increasing demand for integration with clinical information systems to reduce the redundant entry of patient data and speed-up workflow.

The partial user interface screen shown here demonstrates that the seamless addition of DICOM Worklist functionality was possible because GENIE Acquisition already supported this user task. A clinical information system is queried to determine the studies scheduled for scanning. The operator highlights the study of interest and presses the “Add ToDo” button. An entry for the study is added to the “To Do” list together with filled-in scan definitions based on matching the scheduled study type to a scan template. The operator simply positions the patient on the scanner table and starts the scan.

Johnson Alan

Patient Study

Sex: Male

Date Of Birth: 1970.02.13 Age: 34 y Occupation: Engineer

Ethnic Group: English Weight (kg): 71.0 History: Broken rib and toe

Other Names: Henry Height (m): 1.75

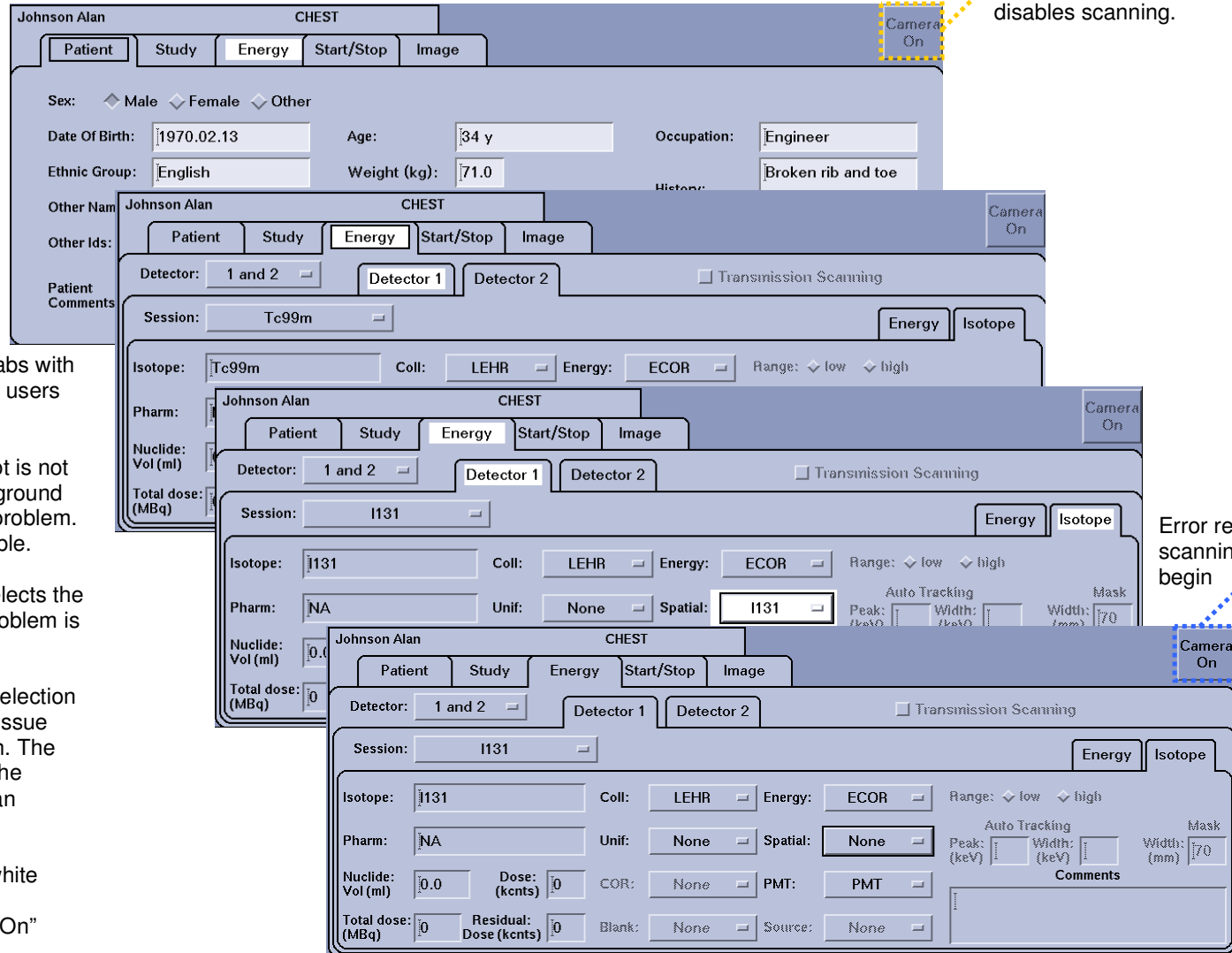
Other Ids: 90001 Alerts: None State:

Patient Comments: Complains of back p Special Needs: Walking assistance Transport: Wheelchair

Pregnancy State: Not Location: Ward B

GENIE Acquisition: Guided Interactions - Error Marking

Error on energy set-up tab card disables scanning.



GENIE Acquisition marks fields and tabs with a background colour of white to guide users through problem resolution.

The energy card in the first screenshot is not selected, but its tab has a white background which draws the users attention to a problem. The “Camera On” button is not available.

In the second screenshot, the user selects the energy card and discovers that the problem is specific to Detector 1.

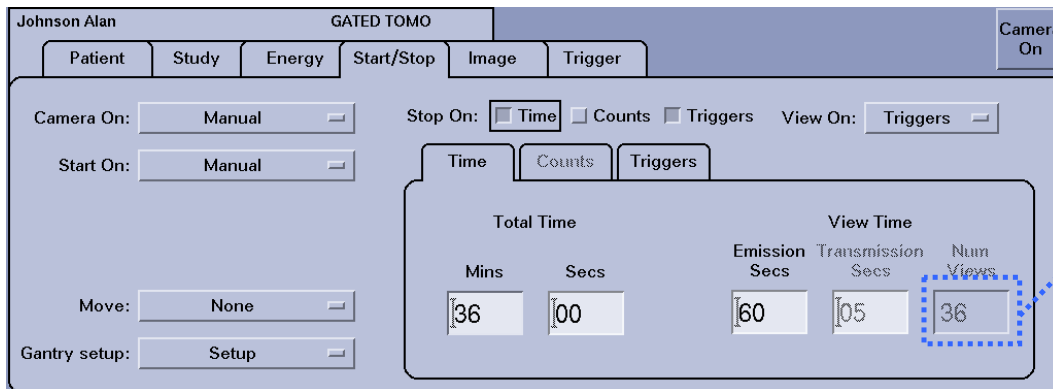
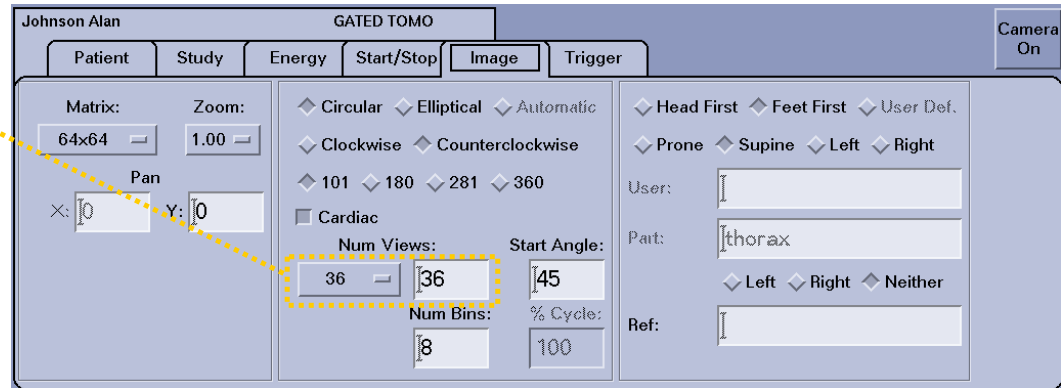
The third screenshot shows that the selection of the Detector 1 tab card reveals an issue with using the “I131” spatial correction. The correction specified is not present in the database and it must be acquired or an alternative correction selected.

The final screenshot shows that the white marking disappears when the spatial correction is turned off. The “Camera On” button becomes available.

Error removed scanning can begin

GENIE Acquisition: Guided Interactions - Supporting Information

Number of views to be scanned is entered on the image set-up tab card.



Number of views to be scanned is presented on the time subcard of the start/stop set-up tab card. This field is not editable and serves as guidance for users when defining the scan time.

One way in which users define the total scan time is to define the time per view. In this case, the user has set the time per view to 60 seconds. The total scan time for 36 views is 36 minutes.

GENIE Acquisition: Image Review Card

The Image Review card presents all of the functions required for the operator to review acquired images. This includes image screen format, pan, zoom, mirror, rotate, image cine and colour map selection controls. These operations can be performed while another scan is taking place.

The screenshot displays the GENIE Acquisition software interface. The main window shows two grayscale images of a circular object, with technical data at the top right: Det1 0deg 264mm, Det2 180deg 264mm, Ver 733mm, Lat 0mm. The interface includes several control panels:

- Image screen formats:** A panel with a grid of icons for selecting different image display layouts.
- Image orientation:** A panel with a 'Rotate' field set to 0 deg and a 'Mirror' section with a 'Current' button.
- Image cine controls:** A panel with 'Cine' and 'Fast' buttons, a play/pause button, and a 'Mode' dropdown set to 'Slow'.
- Colour map selector:** A panel with buttons for 'Linear', 'GE Color', 'Mid4 Mono', 'Mid8 Mono', 'Hot Iron', and 'Custom'.
- Image review toolbox:** A central panel containing 'Pan and Zoom' controls (X: 0.0, Y: 0.0, Zoom: 7.000), 'Scroll' controls (Top: 1, Total: 36), and 'Reset' buttons.

GENIE Acquisition: QC (Quality Control) Card

The QC Card presents all of the functions required to calibrate a gamma camera and to analyse changes in image quality. Some functions are only made available to a "Service" user.

25 Sep 03 12:34:42

Det1 0deg 264mm
Det2 180deg 264mm Ver 733mm
Lat 0mm

Camera Uniformity Analysis for Tc99m
Detector: 1

Most Recent CUA: 25 Sep 03 12:34 Selected CUA: 25 Sep 03 12:33

Integral Uniformity

Differential Uniformity

Results	FFOV	CFOV
Integral Uniformity: 13.87	10.5	
Differential Uniformity: 9.31	7.98	

Results	FFOV	CFOV
Integral Uniformity: 10.67	10.67	
Differential Uniformity: 9.37	9.37	

Unsatisfactory

Unsatisfactory

Datapoint Selection

Current Previous

The results have been added to the trends.

Quit

Camera Uniformity Analysis

CUA should be performed with a source that provides 10k counts per second. Maximum count rate should not exceed 20k counts per second unless transmission scanning.

If the system has transmission scan sources, selecting the transmission scan energy session Tscan will perform a

Calibration and Image Quality Toolbox

Quality Control Set-Up and Control Area

GENIE Acquisition: Database and Network Management Screen

The Database and Network Management screen is used to manage the review, deletion and transfer of patient data. These tasks can be performed at the same time as monitoring and controlling the current scan.

666 Allen GATED TOMO-1
 MGTOMO Acc/Rej 396 /---bts Det1 -93deg 264mm Lon 0mm
 Time 2:22 / 3:02 Av. HR 107 bpm Det2 8deg 264mm Ver 733mm
 View 14 / 36 View time 0:08 / 0:07 Lat 0mm
 Total 24.27 Mcnt 16.60 Mc/s Total 24.27 Mcnt 16.60 Mc/s

23 Apr 04 14:26:03

GENIE Acquisition Release 4.0 Slough Labs Shutdown...

Patient Selector

Sort: Patient Name Local Database

ABC Whole Body Bone	123	13 Apr 04 16:22
Allen Basic	666	24 Feb 04 10:37
Bill Cedars Planar Thallium	11111	15 Apr 04 11:45
Corrections and NEMA cua	!Nema	19 Feb 04 15:59
Corrections and NEMA pnt	!Nema	15 Apr 04 11:46
Corrections and NEMA ecor	!Nema	15 Apr 04 11:54
Corrections and NEMA geo	!Nema	15 Apr 04 11:57
Corrections and NEMA lin	!Nema	15 Apr 04 11:58
Corrections and NEMA 20order	!Nema	15 Apr 04 12:55
Fred Lung Perfusion Statics	22222	15 Apr 04 11:46
Mark Lung Ventilation	1234	16 Apr 04 09:21

Network

Send Fetch

Manual Automatic

Destination:

das56_v das57_v broker xeleris

Send

Network Jobs Management

Active Log

Job Id	Time	Station/Status

Cancel

ExamWatch™
 A small acquisition display keeps the operator intuitively informed of a scan's progress.

Acquisition Stop Button
 Scanning can be halted with one-click no matter what part of the user interface is currently displayed.