

# digital

# Software Product Description

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**PRODUCT NAME: GAMMA-11 F/B, Version 2C**

**SPD 15.60.3**

## **DESCRIPTION:**

GAMMA-11 F/B is a hardware/software system for nuclear medicine. GAMMA-11 is designed to acquire, store, display and manipulate images from the gamma camera in order to supply quantitative, meaningful clinical information.

In the foreground/background configuration, gamma camera data acquisition can take place independent of another process. This configuration includes two terminals. One terminal is designated the foreground acquisition terminal for the gamma camera and controls the setup and initiation of data collection. The other terminal, designated the background terminal, can be used simultaneously with the foreground terminal for data analysis by GAMMA-11 programs, for program development in BASIC or FORTRAN, or for running any other programs that do not need immediate access to the disks for successful completion.

In the single job configuration, only one terminal is included. This configuration has all the capabilities of the foreground/background system, except that data acquisition and processing may not be carried out simultaneously.

### *Data Acquisition*

GAMMA-11 programs allow data acquired to be stored in five different size matrices for static studies and four different size matrices for dynamic studies. Thus a user can choose the proper size and resolution for the job at hand. List mode acquisition (i.e., unstructured data) is also available. Static studies can be collected and terminated by a preset time, preset count, or matrix element overflow. Static studies can be linked to provide easy collection of and access to sequential static views. Dynamic studies are collected at a specified frame rate. List mode studies can be acquired with an effective frame rate of 100 frames per second. An external synchronizing time marker can be included when acquiring either dynamic or list mode studies. These acquisition modes are called Gate Synchronized Acquisition (GSA) and Physiological List Mode (PLM), respectively, and are used primarily for cardiac studies.

GSA data is stored in either 32x32 or 64x64 matrices. The maximum number of images per study is determined by the amount of available memory. During acquisition, images are displayed "live" on the video display. The heart cycle time (or the time between

external synchronizing events) is continuously monitored and displayed. For GSA data acquisition, the operator can either choose fixed time intervals for each image or allow the program to divide the heart cycle time (averaged over 30 seconds) by the number of images chosen. A heart cycle time window can be selected so that if a given cycle time falls outside of this window, then the following cycle is rejected.

NOTE: GSA must be run from the background terminal.

Physiological List Mode studies are acquired with 1 millisecond time intervals.

Data is reframed by creating a number of images based on the interval between successive external time markers.

With dual isotope collection, two separate images (one for each isotope) can be collected simultaneously. (Note: The gamma camera must also have the dual isotope option). This capability does not apply to GSA or PLM.

Once collection parameters and procedures are established, they can be set up as protocols or predefined studies. Up to 20 predefined studies can be used to speed set up, minimize error, and standardize collection procedures.

### *Patient Study Index*

Once collected, patient studies are identified by a system-generated index file. Each study is identified by patient name, number, organ, study type and acquisition date. Studies are selected for analysis by index number; the user need not be concerned with the physical location of disk data.

### *Data Analysis and Display*

Data is displayed on the VSV01 color video monitor. The VSV01 color display includes a hardware character generator permitting display, along with the image, of patient identification and image counting statistics. All photographs taken from the display are thus positively identified.

### *Display Features:*

- Color or monochrome display
- Sixty-four colors; 16 colors simultaneously displayed
- Up to 31 color spectra can be defined
- Intensity or isometric display

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- Four or eight image display (16 with optional VSV01 bit maps)
- Normal or magnified display
- Lower and upper thresholding with or without contrast enhancement
- Dual/full size image display (split screen or overlaid)
- Negative image display

*Data Manipulation Features:*

- Skip frames (forward or backward)
- Sequential frame add
- Image rotation (90 degree steps)
- Image translation (horizontal and vertical)
- Non-uniformity correction
- Frame algebra — add, subtract, multiply, divide or merge frames; add, subtract, or multiply frames by a constant
- Nine point smoothing
- Nine save areas for temporary storage of images or ROI curves
- Up to 55 optional save areas for temporary storage of images
- Slice profiles (vertical or horizontal)
- Isocontour generation
- Interpolation of images (optional VSV01 bit maps required for 256 x 256 interpolation)

*Region of Interest Features:*

- Regular (keyboard controlled)
- Irregular (joystick controlled)
- Circumference or fill mode definition (irregular)
- Pertinent count rate information for each region displayed with image
- Up to 12 regions can be displayed.
- Simultaneous display of curves and images with ROIs outlined
- Select regions by thresholding (irregular)
- Select regions in magnified mode (irregular)
- Time/activity curves can be displayed normally, averaged, or overlaid.
- Selected portions of ROI curves can be expanded.

*Dynamic Playback:*

- Sequences of preprocessed images can be displayed in cine mode
- Two to four playback buffers can be combined into one and displayed synchronously.
- Speed and direction of playback can be controlled via the joystick or keyboard.

*Predefined Analysis Features:*

- Multiple commands can be entered on a single line.
- Predefined analysis procedures (macros) can be created, edited, saved, and executed from the system disk.
- Predefined analysis can be linked with predefined study acquisition to semi-automate the system.
- Macros can call FORTRAN or BASIC programs; special calls allow macro re-entry.

*Miscellaneous Features:*

- Routine for patient positioning and detection of a valid gate signal
- Dual isotope display and processing
- List mode analysis does not require additional disk space for reconstructed images
- Comment editor

*Utility Programs*

Study Deletion — This function requires user verification to prevent accidental deletion of important data.

Study Transfer — This function transfers patient studies between any two RT-11 file structured devices (disks, magtape, floppy disks, etc.)

**MINIMUM HARDWARE REQUIRED:**

Any UNIBUS PDP-11 with line frequency clock that meets the following main memory requirements:

- 32K bytes for single job operation with RK05 as system disk
- 64K bytes for foreground/background operation with RK05 as system disk
- 64K bytes for single job operation with RL01, RK06, or RK07 as system disks
- 96K bytes for foreground/background operation with RL01, RK06, or RK07 disks

and includes,

MASS STORAGE: (one of the following)

- One RK05, RL01, or RK06 disk with a second disk or RT-11 supported magnetic tape unit, or
- One RK07 disk and a RT-11 supported magnetic tape unit

TERMINALS:

- Any console terminal supported by the prerequisite software. (Two terminals are required for foreground/background operation. The foreground terminal must operate at 1200 baud or greater.)

Display:

- VSV01 Video Display

Interface: (One of the following)

- NC11 gamma camera interface with KW11-P (AR11 needed for foreground/background operation and/or GSA or PLM), or
- NCV11 gamma camera interface (includes KVV11; AR11 not needed)

**OPTIONAL HARDWARE SUPPORTED:**

- Any RT-11 supported mass storage device for off-line data storage except TA11 cassette
- A system total of 256K bytes main memory

**PREREQUISITE SOFTWARE:**

- RT-11, Version 3B, or later release of Version 3
- BASIC-11/RT-11, Version 2, or later release of Version 2

**OPTIONAL SOFTWARE SUPPORTED:**

FORTRAN IV/RT-11, Version 2 or later release of Version 2

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**TRAINING CREDITS:**

TWO (2) — Applies only to options that include support services. Consult the latest Educational Services Catalog at your local office for the available courses, course requirements, and guidelines.

**SUPPORT CATEGORY:**

A — Software Support will be provided as stated in the Software Support Categories Addendum to this SPD.

**UPDATE POLICY:**

Software Updates, if any, released by DIGITAL during the one (1) year period following installation, will be provided to the customer for a media charge (includes no installation). After the first year, updates, if any, will be made available according to then prevailing DIGITAL policies.

**ORDERING INFORMATION:**

All binary licensed software, including any subsequent updates, is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide in part that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of the DIGITAL copyright notice and any DIGITAL proprietary notices on the software) only for use on such CPU. All source licensed software is furnished only under the terms and conditions of a separate Software Program Sources Agreement between Purchaser and DIGITAL.

Source and/or listing options are only available after the purchase of at least one binary license and after a source license agreement is in effect.

The following key (A, D) represents the form of power source for the product and must be specified at the end of the 'GMA11' number, i.e., GMA11-AA= system using 115 volt/60 hertz power.

A = 115 volt/60 Hertz

D = 230 volt/50 Hertz

The following key (D, E, Q, T, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QJ723-AD = binaries on 9-track magnetic tape.

D = 9-track Magnetic Tape

E = RK05 Disk Cartridge

Q = RL01 Disk Cartridge

T = RK06 Disk Cartridge

Z = No hardware dependency

*Standard Options*

GMA11 -A— GAMMA-11 single job system includes hardware, single-use license for GAMMA-11, RT-11, BASIC-11/RT-11, binaries on RK05 disk, documentation, support services (power: A, D)

GMA11 -B— GAMMA-11 single job system, includes hardware, single-use license for GAMMA-11, RT-11, BASIC-11/RT-11, binaries on RK06 disk, documentation, support services (power: A, D)

GMA11 -C— GAMMA-11 single job system includes hardware, single-use license for GAMMA-11, RT-11, BASIC-11/RT-11, binaries on RL01 disk, documentation, support services (power: A, D)

*Source/Listing Options*

QJ721 -E— All GAMMA-11 sources (media: D, E, Q, T)

*Upgrade Options*

The following option is available as an upgrade kit from GAMMA-11, Version 7, for use on the same single CPU on which GAMMA-11, Version 7, is licensed. The license previously granted for GAMMA-11, Version 7, shall be extended to cover this upgrade.

QJ723 -A— Single-use license for GAMMA-11 F/B, RT-11, BASIC-11/RT-11, binaries, documentation, support services (media: D, E)

*Update Options*

Users of GAMMA-11 F/B, Version 2, whose specified Support Category warranty has expired may order under license the following software update at the then current charge for such update. The update is distributed in source or binary form on the appropriate medium and includes no installation or other services unless specifically stated otherwise.

QJ721 -H— Binaries, GAMMA-11 documentation , (media: D, E, Q, T)

Users of GAMMA-11 F/B, Version 2, whose specified Support Category warranty has not expired may order under license the following software update for the then current media charge. The update is distributed in source or binary form on the appropriate medium and includes no installation or other services unless specifically stated otherwise.

QJ721 -W— Binaries, GAMMA-11 documentation , (media: D, E, Q, T)

*Miscellaneous Options:*

QJ721 -G— Pre-delivery kit (media: Z)

**ADDITIONAL SERVICES:**

None

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ADDENDUM  
SOFTWARE SUPPORT CATEGORIES

Each software product (hereinafter 'SOFTWARE') with a designated Support Category A or B in the applicable Software Product Description (SPD) existing at the time of order will be the current release at the time of delivery and will conform to the SPD. DIGITAL's sole obligation shall be to correct defects (nonconformance of the SOFTWARE to the SPD) as described below. Any SOFTWARE with a designated Support Category C will be furnished on an 'as is' basis.

For SOFTWARE with a designated Support Category A or B, DIGITAL will provide the services set forth below without additional charge.

## CATEGORY A

1. Upon notification by customer to the nearest DIGITAL office that the computer system, including all required prerequisite hardware and software, is ready for the installation of the SOFTWARE, DIGITAL will install such SOFTWARE in any location within the contiguous forty-eight (48) United States, the District of Columbia, or a country in which DIGITAL or a subsidiary of DIGITAL has a software service facility. The notification must be received by DIGITAL and the system must be ready for installation within thirty (30) days after the delivery of the SOFTWARE to customer or DIGITAL will have no obligation to install. Installation will consist of: (1) verification that all components of the SOFTWARE have been received by customer, (2) loading the SOFTWARE, and (3) executing a DIGITAL sample procedure.
2. During the ninety (90) day period after installation, if the customer encounters a problem with the current unaltered release of the SOFTWARE which DIGITAL determines to be a defect in the SOFTWARE, DIGITAL will provide the following remedial service (on site where necessary): (1) if the SOFTWARE is inoperable, apply a temporary correction (TC) or make a reasonable attempt to develop an emergency by-pass, and (2) assist the customer to prepare a Software Performance Report (SPR) and submit it to DIGITAL.
3. During the one (1) year period following installation, if the customer encounters a problem with the SOFTWARE which his diagnosis indicates is caused by a SOFTWARE defect, the customer may submit an SPR to DIGITAL. DIGITAL will respond to problems reported in SPRs which are caused by defects in the current unaltered release of the SOFTWARE via the Maintenance Periodical for the SOFTWARE, which reports SPRs received, code corrections, temporary corrections, generally useful emergency by-passes and/or notice of the availability of corrected code. Software Updates, if any, released by DIGITAL during the one (1) year period, will be provided to the customer on DIGITAL's standard distribution media as specified in the applicable SPD. The customer will be charged only for the media on which such updates are provided, unless otherwise stated in the applicable SPD, at DIGITAL's then current media prices.

## CATEGORY B

During the one (1) year period following delivery, the services provided to the customer will be the same as set forth in 3 above.

## CATEGORY C

SOFTWARE is provided on an 'as is' basis. Any software services, if available, will be provided at the then current charges.

DIGITAL shall have the right to make additional charges for any additional effort required to provide services resulting from customer use of other than current unaltered release of the SOFTWARE operated in accordance with the SPD.